Terrestrial & Palustrine Plant Communities of Pennsylvania 2nd Ed.

Section 2

Palustrine Communities

Palustrine Forests

Coniferous Palustrine Forests

Black Spruce – Tamarack Palustrine Woodland

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

Global Rank: G3G5
State Rank: S2

General Description

This describes a group of wetland woodlands found mostly in glacially formed, ice-block depressions (kettleholes) of small, higher-elevation watersheds of the glaciated regions of Pennsylvania and in cold-air pockets of drainages at higher elevations of the Unglaciated Allegheny Plateau. These wetlands are dominated by a mixture of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). These are trees of short stature (<30 feet) growing as a sparse overstory (<40% cover). The substrate consists of deep, poorly decomposed peat. The woodland is often found interior (i.e., closer to the middle of the wetland) to the Black Spruce-Tamarack Peatland Forest and on the edge of the low-shrub bog. There is generally very little groundwater or surface water enrichment in these systems, resulting in nutrient stressed, stunted trees. Other trees that may occur include gray birch (*Betula populifolia*) and red maple (*Acer rubrum*). The sparse woodland gives way to tall black spruce and tamarack (Black Spruce – Tamarack Peatland Forest) away from the bog mat and this peatland forest gives way to a fringe of hemlock and other tall trees at the outer edge of the wetland where organic soils thin and become mineral. At this interface there is more nutrient input from surface and groundwater from the surrounding uplands.

The dominant shrub species is usually leatherleaf (*Chamaedaphne calyculata*), but may also include Labrador-tea (*Rhododendron groenlandicum*), bog-rosemary (*Andromeda polifolia*), swamp azalea (*Rhododendron viscosum*), mountain-holly (*Ilex mucronata*), winterberry (*Ilex verticillata*), and highbush blueberry (*Vaccinium corymbosum*) along with black chokeberry (*Photinia melanocarpa*), black huckleberry (*Gaylussacia baccata*) and sheep laurel (*Kalmia angustifolia*). The sedge, *Carex trisperma*, is often dominant along with a carpet of sphagnum mosses. Other species include star-flower (*Trientalis borealis*), white beak-rush (*Rhynchospora alba*), cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris palustris*), violets (*Viola* spp.), creeping snowberry (*Gaultheria hispidula)* and goldthread (*Coptis trifolia*). Sphagnum occurs throughout.

Rank Justification

Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation.

Identification

- Occurs on saturated soils in deep, peat-filled depressions with little inflow or outflow in small watersheds at high elevations in Pennsylvania (1000-2000 ft.)
- Conifers are dominant with only a few scattered broad-leaved deciduous trees, mostly red maple and gray birch
- Trees tend to be less than 30 feet tall and sparsely distributed (<40% cover)
- Often associated with an open bog-mat community dominated by leatherleaf, sedges, and sphagnum mosses
- Found between the low shrub bog and the surrounding wetland conifer forest

Characteristic Species

Trees

- Black spruce (*Picea mariana*)
- Tamarack (*Larix laricina*)

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sheep laurel (*Kalmia angustifolia*)
- Black huckleberry (*Gaylussacia baccata*)
- Bog laurel (*Kalmia polifolia*)

Herbs

- Sedge (*Carex trisperma*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Pitcher-plant (*Sarracenia purpurea*)
- Spatulate-leaved sundew (*Drosera intermedia*)
- Round-leaved sundew (*Drosera rotundifolia*)
- Small cranberry (*Vaccinium oxycoccos*)
- Cranberry (*Vaccinium macrocarpon*)
- White beak-rush (*Rhynchospora alba*)
- Tawny cotton-grass (*Eriophorum virginicum*)

Bryophytes

- *Sphagnum* spp.
- *Pleurozium schreberi*
- *Aulacomnium* spp.
- *Dicranum* spp.

International Vegetation Classification Associations:

Black Spruce Woodland Bog (CEGL006098)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

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

Pennsylvania Community Code

WB : Black Spruce – Tamarack Palustrine Woodland

Similar Ecological Communities

Black Spruce – Tamarack Woodland is closely related to the Black Spruce – Tamarack Peatland Forest plant community type, which may occur adjacent to the woodland type. The distinction between the two is the percent canopy cover; the forested type typically has greater than 60% cover by trees, the woodland type is less than 60% cover.

Red Spruce Mixed Hardwood Palustrine Woodland and Black Spruce – Tamarack Woodland are similar in species composition but Red Spruce Mixed Hardwood Palustrine Woodland differs from this community type in that the Red Spruce Mixed Hardwood Palustrine Woodland is dominated by red spruce (*Picea rubra*).

Fike Crosswalk

Black Spruce – Tamarack Palustrine Woodland

Conservation Value

This is a rare plant community in Pennsylvania that has an unusual array of species and is habitat for both rare and common species of plants and animals that reside nowhere else in Pennsylvania including pitcher-plant (*Sarracenia purpurea*), sundews (*Drosera* spp.), and the white-throated sparrow (*Zonotrichia albicollis*). This community provides wintering habitat for northern bird species of spruce forests and woodlands that migrate south during severe winters. Some rare species found in this community include heartleaf twayblade (*Listera cordata*), dwarf mistletoe (*Arceuthobium pusillum*), Labrador-tea (*Rhododendron groenlandicum*), bog sedge (*Carex paupercula*), few-flowered sedge (*Carex pauciflora*), Collin's sedge (*Carex collinsii*), few-seeded sedge (*Carex oligosperma*), blackpoll warbler (*Dendroica striata*), bog copper butterfly (*Lycaena epixanthe*), and snowshoe hare (*Lepus americanus*). This community can provide archaeological/historical data on past climates and species as the acidic conditions prevent breakdown of pollen and plant residue in peat.

Threats

Black Spruce – Tamarack Woodlands are threatened by habitat alteration in the small watersheds they occupy, nutrient input from surrounding uplands, and alterations to the hydrologic regime (beaver dams, lowering or raising of water tables). Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation. As global climate change progresses, many boreal characteristic species within this community type may be intolerable of increasing temperatures. Invasive exotic plant species are not likely to be a threat unless there is nutrient input from surrounding uplands. Spruce budworm (*Choristoneura fumiferana*) and exotic invasive insects that feed on conifers may be a threat. Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species.

Management

In Pennsylvania, this community type is found in small watersheds on glacial deposits derived from sandstone and conglomerate as well as high-elevation wetlands of the Unglaciated Allegheny Plateau. These wetland communities depend on low availability of nutrients, minimal surface water and ground

water inputs, and potentially cold temperatures. Development should be restricted to prevent alterations to the hydrologic and nutrient processes that drive this community.

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Since this community type is easily impacted by nutrient inputs, we would suggest a significant buffer between any logging operations or development and the wetland. Issues include the potential for soil erosion based on soil texture, condition of the adjacent vegetation (mature forests vs. early successional forests), and slope. As slope steepness increases the buffer should be extended. Impervious surfaces and compacted soils surrounding the wetland should be minimized to prevent surface runoff. Direct impacts and habitat alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Where impacts are necessary low-impact alternatives (e.g., elevated footpaths, boardwalks, bridges) are encouraged. Multiple high-quality examples of this type should come under conservation protection.

Research Needs

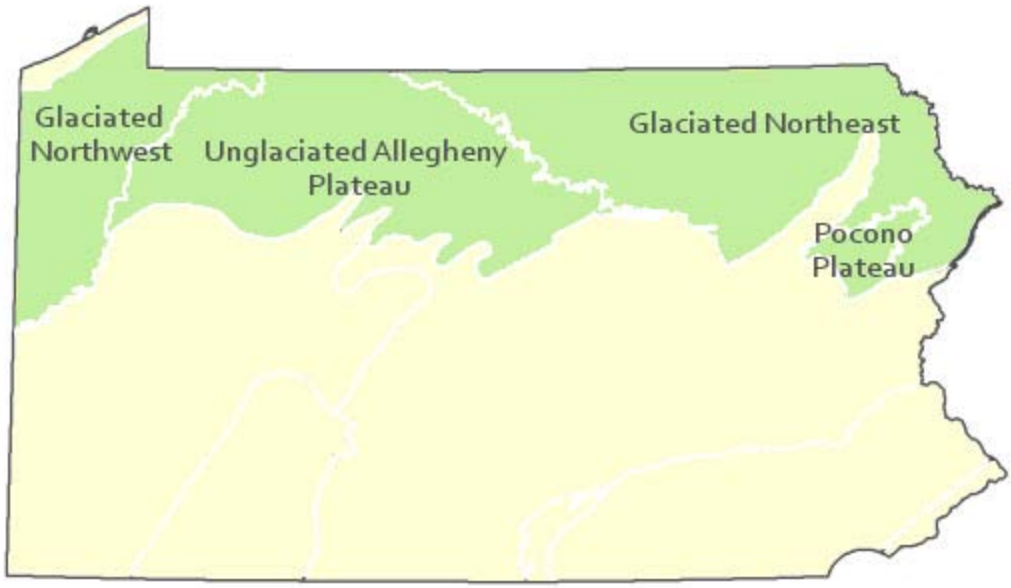
Variations may occur at eco-regional levels. There is a need to collect community plot data to characterize variations of this community to assist further classification. It is possible that this and other conifer wetland types were never logged. Knowing tree age and wetland history will provide information on the natural successional trajectory of this wetland as well as the vegetation and landscape of Pennsylvania prior to large-scale development. With potential global climate change, this community type is likely to be impacted. Occurrences of this community should be monitored for impacts such as changes in the health of the associated species and whether species composition shifts with the climate to determine if this community will persist in Pennsylvania.

Trends

The relative trend for this community is likely declining in the short term due to flooding from beaver activity. If natural succession is allowed to continue, many of these flooded occurrences will recover over time if potential global climate change does not prevent recovery.

Black Spruce – Tamarack Woodlands were probably more common in the northeast at one time but declined due to wetland draining for peat excavation, which was often followed by flooding for recreation. This type of alteration no longer occurs. Potential global climate change may be the biggest threat to this community type in Pennsylvania. Black spruce may also be under threat from spruce budworm and exotic pests.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, Unglaciated Allegheny Plateau

Global Distribution

New Brunswick south to Pennsylvania and New Jersey

Hemlock Palustrine Forest

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

Global Rank: G4?
State Rank: S3

General Description

These are wetland forests dominated or co-dominated by Eastern hemlock (*Tsuga canadensis*). The canopy may also contain a mixture of other conifers, including red spruce (*Picea rubens*)), tamarack (*Larix laricina*), and eastern white pine (*Pinus strobus*). Hardwoods may contribute up to 25% of the canopy; common species include red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), and black ash (*Fraxinus nigra*). There is generally a pronounced hummock and hollow microtopography. This community type may occur as a zone around a wetter community type of a more northern affinity. It may also occur in basins or on slopes fed by groundwater seepage. Rosebay (*Rhododendron maximum*) is often present, sometimes quite dense. Witherod (*Viburnum cassinoides*), swamp azalea (*Rhododendron viscosum*), winterberry (*Ilex verticillata*), and highbush blueberry (*Vaccinium corymbosum*) are also commonly associated with this type. Herbs include cinnamon fern (*Osmunda cinnamomea*), skunk-cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), partridge-berry (*Mitchella repens*), Canada mayflower (*Maianthemum canadense*), goldthread (*Coptis trifolia*), violets (*Viola* spp.), dewdrop (*Dalibarda repens*), star-flower (Trientalis borealis), and various grasses and sedges. There may be a strong bryophyte component, usually dominated by sphagnum moss (*Sphagnum* spp.).

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

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Occurs on saturated soils in basins or depressions on the fringe of inundated areas or in backwater situations along rivers
- Dominance of Eastern hemlock (*Tsuga canadensis*) in the canopy.
- Hemlock trees 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*)
- Witherod (*Viburnum cassinoides*)
- Winterberry (*Ilex verticillata*)
- Highbush blueberry (*Vaccinium corymbosum*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Sensitive fern (*Onoclea sensibilis*)
- Partridge-berry (*Mitchella repens*)
- Goldthread (*Coptis trifolia*)
- Violets (*Viola* spp.)
- Dewdrop (*Dalibarda repens*)
- Star-flower (*Trientalis borealis*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Eastern Hemlock - Great Laurel Swamp (CEGL006279)

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

UF : Hemlock Palustrine Forest

Similar Ecological Communities

Hemlock Palustrine Forests differ from Hemlock – Mixed Hardwood Palustrine Forests in that the conifer cover is higher in the Hemlock Palustrine Forests (greater than 75% cover). Hemlock – Mixed Hardwood Palustrine Woodlands differ from Hemlock Palustrine Forests in that Hemlock – Mixed Hardwood Palustrine Woodlands have a more open canopy (< 60% canopy cover) and typically a denser shrub layer.

Fike Crosswalk

Hemlock palustrine forest

Conservation Value

Hemlock Palustrine Forests 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 by slowing the flow of surficial water causing sediment to settle within this wetland.

Threats

Hemlock Palustrine Forests are threatened by habitat alteration, deposition (sedimentation, agricultural runoff), and alterations to the hydrological regime (beaver dams, lowering of water tables). Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. 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. 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 and habitat alteration 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 can not 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.

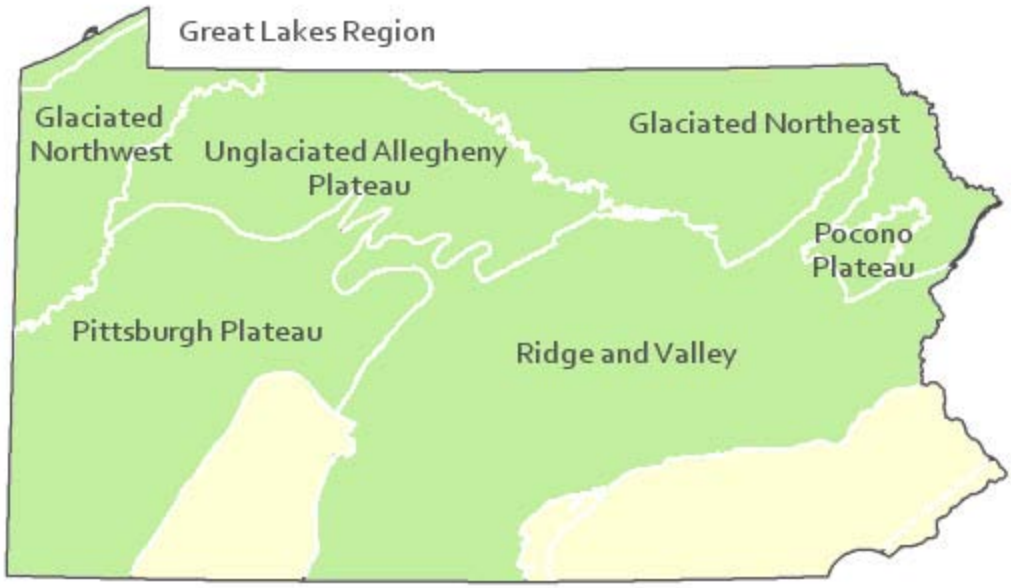
Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community type. Community changes following hemlock defoliation from wooly adelgid infestations should also be studied.

Trends

Hemlock Palustrine Forests were probably more historically common but declined due to wetland draining/filling, alterations to groundwater discharge, clearing of the adjacent lands leading to sedimentation, and harvesting of Eastern hemlock bark for tannins. Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is declining due to hydrological alterations and tree mortalities resulting from hemlock woolly adelgid (*Adelgis tsugae*) infestations.

Range Map



Pennsylvania Range

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

Global Distribution

Northern Wisconsin, Michigan, northern Ohio, Maine, New Hampshire, Vermont, New Jersey, Maryland, New York, and Pennsylvania. It occurs in Canada in Ontario and possibly Quebec.

Red Spruce Palustrine Forest

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

Global Rank: G2?
State Rank: S3

General Description

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

Rank Justification

Vulnerable in the nation or state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Dominated by red spruce (*Picea rubens*), Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), and tamarack (*Larix laricina*)
- Conifer tree species contribute over 75% of the canopy
- Hummock and hollow microtopography with sedges, forbs, and sphagnum and other mosses occupying the hummocks
- Canopy closure is greater than 60%

Characteristic Species

Trees

- Red spruce (*Picea rubens*)

- Tamarack (*Larix laricina*)
- Eastern hemlock (*Tsuga canadensis*)
- Balsam fir (*Abies balsamea*)
- Red maple (*Acer rubrum*)
- Yellow birch (*Betula alleghaniensis*)

Shrubs

- Highbush blueberry (*Vaccinium corymbosum*)
- Winterberry (*Ilex verticillata*)
- Mountain holly (*Ilex mucronata*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)
- Sedge (*Carex trisperma*)
- Sedge (*Carex folliculata*)
- Violets (*Viola* spp.)
- Dewdrop (*Dalibarda repens*)
- Bunchberry (*Cornus canadensis*)

Bryophytes

- *Sphagnum* spp.
- *Dicranum* spp.
- *Hypnum* spp.
- *Pleurozium schreberi*
- *Thuidium* spp.
- *Mnium* spp.

International Vegetation Classification Associations:

Swamp Forest - Bog Complex (Spruce Type) (CEGL006277)

NatureServe Ecological Systems:

High Allegheny Wetland (CES202.069)
Southern and Central Appalachian Bog and Fen (CES202.300)
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

UK : Red Spruce Palustrine Forest

Similar Ecological Communities

Red Spruce Palustrine Forest and Red Spruce – Mixed Hardwood Palustrine Forest are similar in species composition and may be adjacent to each other. The main distinguishing feature is that Red Spruce Palustrine Forest has a canopy cover for conifers greater than 75% and Red Spruce – Mixed Hardwood Palustrine Forest has a canopy cover for conifers between 25% and 75%. They also tend to differ in the density and composition of the understory. The Red Spruce – Mixed Hardwood Palustrine Forest often exhibits a dense cover of shrubs while the Red Spruce Palustrine Forest usually has little shrub cover, but a dense carpet of sphagnum.

Red Spruce Palustrine Forest and Red Spruce – Mixed Hardwood Palustrine Woodland are also similar in species composition, but differ from each other in species dominance and canopy cover. Red Spruce Palustrine Forest has a canopy cover greater than 60% and composed primarily of conifer species, while Red Spruce Mixed Hardwood Palustrine Woodland has a mixed hardwood-conifer canopy cover equaling less than 60%.

Fike Crosswalk

Red Spruce Palustrine Forest

Conservation Value

This community serves as nesting habitat for songbirds such as blackburnian and black-throated green warblers and wintering habitat for many other songbirds. Rare plant species found in this community include creeping snowberry (*Gaultheria hispidula*), dwarf mistletoe (*Arceuthobium pusillum*), twinflower (*Linnaea borealis*), and rough-leaved aster (*Eurybia radula*), and rare animal species may include snowshoe hare (*Lepus americanus*). 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 this wetland.

Threats

Red Spruce Palustrine Forests are threatened by habitat alteration in the watersheds they occupy, nutrient input from surrounding uplands, and alterations to the hydrologic regime (beaver dams, road crossings that impede water movement, lowering or raising of water tables). Clearing and development of adjacent land can lead to an accumulation of run-off, pollution and sedimentation. Clearing adjacent lands can also lead to vulnerability of the community to wind damage since the trees have shallow root systems. As global climate change progresses, the range of this community type may recede north. Invasive exotic plant species are not likely to be a threat unless there is nutrient input from surrounding uplands. Spruce budworm (*Choristoneura fumiferana*) and exotic invasive insects that feed on conifers may be a threat.

In Pennsylvania, this community type is found in small watersheds on glacial deposits derived from sandstone and conglomerate. These wetland communities depend on low to moderate availability of nutrients, moderate surface water and ground water inputs, and probably cold temperatures. Development should be restricted to prevent alterations to the hydrologic and nutrient processes that drive this community.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Since these communities are impacted by nutrient inputs and wind throw, a buffer between any logging operations or development and the wetland is suggested. 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. 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 and habitat alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Where impacts are necessary low-impact alternatives (e.g., elevated footpaths, boardwalks, bridges that do not impede flow) are encouraged. Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species. Indirect impacts such as isolation of the wetland by development from other similar wetlands may be a threat to the persistence of the type.

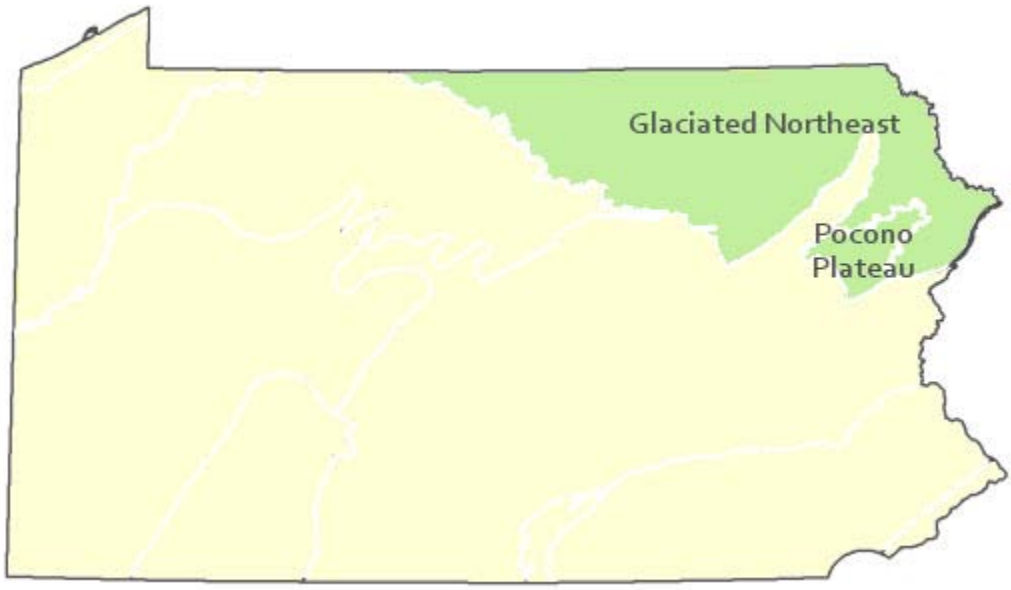
Research Needs

It is possible that this and other conifer wetland types were never harvested at some locations. Knowing the ages of the trees and histories of the wetlands will provide some understanding of the natural successional trajectory of this wetland and the vegetation and landscape of Pennsylvania prior to large-scale development. With potential global climate change, this community type is likely to be significantly impacted. It should be monitored to determine impacts such as the health of species and shifts in species composition to determine if this community will persist in Pennsylvania.

Trends

Red Spruce Palustrine Forests were probably more common in the northeast at one time but declined due to wetland draining and filling. This type of alteration no longer occurs. However, the relative trend for this community is likely declining in the short term due to flooding from beaver activity. If natural succession is allowed to continue and potential climate change does not influence this community, many of these flooded occurrences will recover over time.

Range Map



Pennsylvania Range

Glaciated Northeast and Pocono Plateau

Global Distribution

Connecticut, Maine, Massachusetts, New Hampshire, New York, Pennsylvania, Vermont, and West Virginia. It also extends into New Brunswick and Quebec in Canada,

Coniferous - Broadleaf Palustrine Forests

Hemlock – Mixed Hardwood Palustrine Forest

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

Global Rank: G5
State Rank: S2S3

General Description

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

Herbs

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

Bryophytes

- *Sphagnum* 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 forest community types. If the conifer component is greater than 75% and dominated by Eastern hemlock, the community is regarded as the Hemlock Palustrine Forest community type. This type differs from the Hemlock – Mixed Hardwood Palustrine Woodland in that the Hemlock – Mixed Hardwood Palustrine Forest has a canopy cover greater than 60%.

Fike Crosswalk

Hemlock - mixed hardwood palustrine forest

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 this wetland.

Threats

Hemlock – Mixed Hardwood Palustrine Forests are threatened by habitat alteration, deposition (sedimentation, agricultural runoff) and alterations to the hydrological regime (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. Soil erodibility in terms of the 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. Impervious surfaces surrounding the wetland should be minimized to prevent thermal pollution. Direct impacts and habitat alteration should be avoided (i.e. roads, trails, filling of wetland) and low impact alternatives (i.e. elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland can not 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.

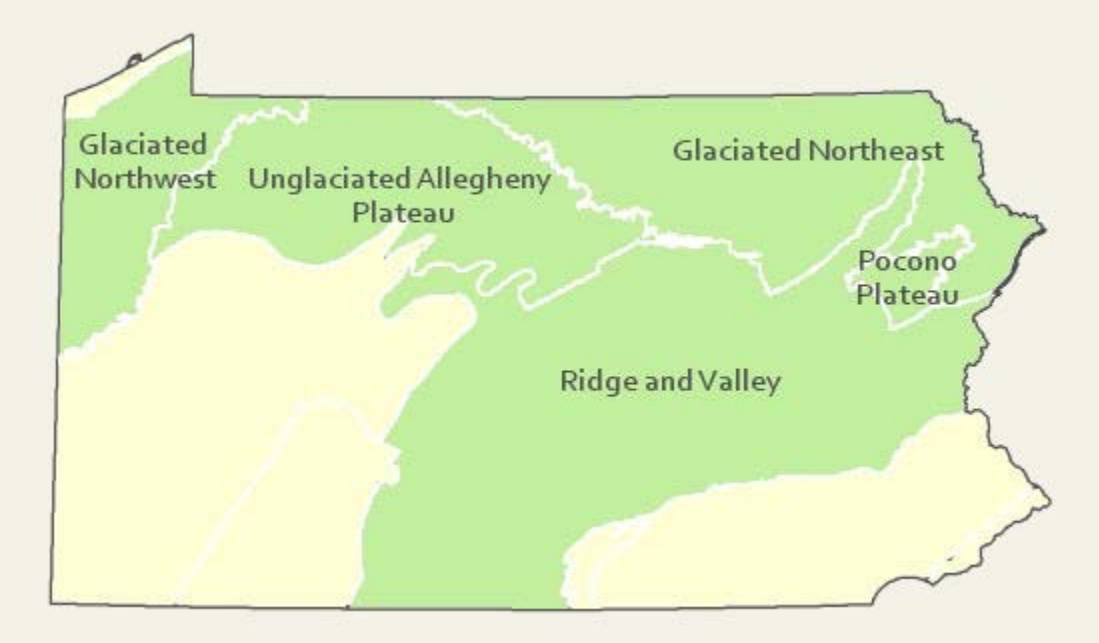
Research Needs

Variations may occur at eco-regional levels. There is a need to collect community plot data to characterize variations of this community to assist further classification of this community. Community changes following hemlock defoliation from wooly adelgid infestations should also be studied.

Trends

The relative trend for this community is likely declining due to hydrological alterations and hemlock mortality resulting from wooly adelgid infestations. Hemlock – Mixed Hardwood Palustrine Forests were probably more common but declined due to wetland draining/filling, alterations to groundwater discharge, and clearing of the adjacent lands leading to sedimentation.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, Ridge and Valley, Unglaciated Allegheny Plateau

Global Distribution

The association is found in Connecticut, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. It may possibly occur in Nova Scotia.

Red Spruce – Mixed Hardwood Palustrine Forest

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

Global Rank: G3
State Rank: S3

General Description

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

The Red Spruce Mixed Hardwood Palustrine Forest often exhibits a dense cover of hardwood shrub species including mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), and witherod (*Viburnum cassinoides*). Herbaceous and creeping shrub species include goldthread (*Coptis trifolia*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), marsh fern (*Thelypteris palustris*), sedges (*Carex disperma*, *Carex folliculata,* and *Carex trisperma*), violets (*Viola* spp.), creeping snowberry (*Gaultheria hispidula*), Canada mayflower (*Maianthemum canadensis*), asters, and grasses such as slender mannagrass (*Glyceria melicaria*). The bryophyte layer is usually well developed and dominated by sphagnum.

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Dominated by red spruce (*Picea rubens*), Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), tamarack (*Larix laricina*), yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), and occasionally blackgum (*Nyssa sylvatica*)
- Conifer tree species contribute between 25% and 75% of the canopy
- Hummock and hollow microtopography with sedges, forbs, and sphagnum and other mosses occupying the hummocks
- Canopy closure is greater than 60%

Characteristic Species

Trees

- Red spruce (*Picea rubens*)
- Yellow birch (*Betula alleghaniensis*)
- Eastern hemlock (*Tsuga canadensis*)
- Balsam fir (*Abies balsamea*)
- Red maple (*Acer rubrum*)
- Black ash (*Fraxinus nigra*)

Shrubs

- Mountain holly (*Ilex mucronata*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Winterberry (*Ilex verticillata*)
- Maleberry (*Lyonia ligustrina*)
- Meadow-sweet (*Spiraea latifolia*)

Herbs

- Sedge (*Carex folliculata*)
- Dewdrop (*Dalibarda repens*)

- Rough aster (*Eurybia radula*)
- Slender mannagrass (*Glyceria melicaria*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Sensitive fern (*Onoclea sensibilis*)

Bryophytes

- *Sphagnum* spp.
- *Dicranum* spp.
- *Pleurozium schreberi*
- *Thuidium delicatulum*

International Vegetation Classification Associations:

Red Spruce - Red Maple / Winterberry Swamp (CEGL006556)

NatureServe Ecological Systems:

High Allegheny Wetland (CES202.069)

Origin of Concept

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

Pennsylvania Community Code

UH : Red Spruce – Mixed Hardwood Palustrine Forest

Similar Ecological Communities

Red Spruce – Mixed Hardwood Palustrine Forests are also similar in species composition to Red Spruce Palustrine Forests, and may occur adjacent to each other. The main distinguishing feature is Red Spruce Palustrine Forest has a canopy cover for conifers greater than 75% and Red Spruce – Mixed Hardwood Palustrine Forest has a canopy cover for conifers between 25% and 75%. They also tend to differ in the density and composition of the understory. The Red Spruce – Mixed Hardwood Palustrine Forest often exhibits a dense cover of shrubs while the Red Spruce Palustrine Forest usually has little shrub cover, but a dense carpet of sphagnum. Red Spruce – Mixed Hardwood Palustrine Forest and Red Spruce – Mixed Hardwood Palustrine Woodland are similar in species composition and often occur adjacent to each other. The main distinguishing feature is that Red Spruce – Mixed Hardwood Palustrine Forest has a canopy cover greater than 60% and Red Spruce – Mixed Hardwood Palustrine Woodland has a canopy cover less than 60%.

Fike Crosswalk

Red Spruce – Mixed Hardwood Palustrine Forest

Conservation Value

This community serves as nesting habitat for songbirds such as blackburnian and black-throated green warblers and wintering habitat for many other songbirds. Rare species that may occur within Red Spruce – Mixed Hardwood Palustrine Forest include creeping snowberry (*Gaultheria hispidula*), and snowshoe hare (*Lepus americanus*)

Threats

Red Spruce – Mixed Hardwood Palustrine Forests are threatened by habitat alteration in the watersheds they occupy, nutrient input from surrounding uplands, and alterations to the hydrologic regime (beaver dams, road crossings that impede water movement, lowering or raising of water tables). Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation. Clearing adjacent lands can also lead to vulnerability to wind damage since the trees have shallow root systems. As global climate change progresses, this community type may recede north. Invasive exotic plant species are not likely to be a threat unless there is nutrient input from surrounding uplands. Spruce budworm (*Choristoneura fumiferana*) and exotic invasive insects that feed on conifers may be a threat.

In Pennsylvania, this community type is found in small watersheds on glacial deposits derived from sandstone and conglomerate. These wetland communities depend on low to moderate availability of nutrients, moderate surface water and ground water inputs, and probably cold temperatures. Development should be restricted to prevent alterations to the hydrologic and nutrient processes that drive this community.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Since these communities are impacted by nutrient inputs and wind-throw, a buffer between any logging operations or development and the wetland is suggested. 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. 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 and habitat alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Low-impact alternatives (e.g., elevated footpaths, boardwalks, bridges that do not impede flow) are encouraged if impacts are neccessary. Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species. Indirect impacts such as isolation of the wetland by development from other similar wetlands may be a threat to the persistence of the type.

Research Needs

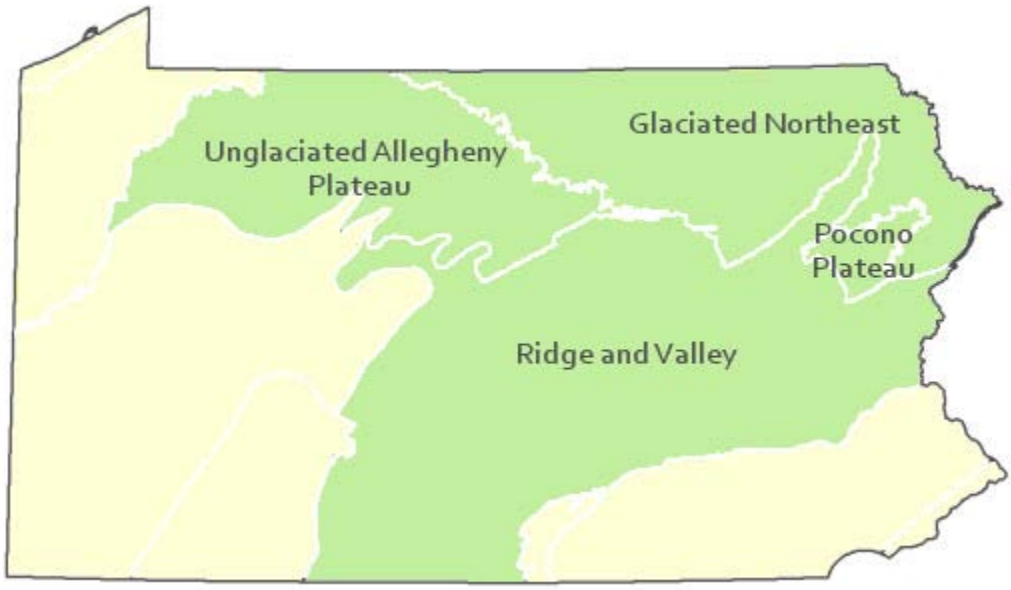
There is a need to monitor this community type to assess if potential climate change will alter the environmental conditions required for this community to persist.

Trends

Wetland protection has most likely stabilized the loss of wetlands in general. However, the relative trend for this community is likely declining in the short term due to flooding from beaver activity. If natural succession is allowed to continue and potential climate change does not influence this community, many of these flooded occurrences will recover over time.

Red Spruce – Mixed Hardwood Palustrine Forests may have been more common in the northeast at one time but declined due to wetland draining and filling. This type of alteration no longer occurs. However, development continues around the edges of the red spruce wetlands leading to geographic isolation. Global climate change may be the biggest threat to this community type in Pennsylvania. Red spruce (*Picea rubens*) may be under threat from spruce budworm (*Choristoneura fumiferana*) and exotic pests. If this occurs, these wetland forests will become hardwood swamps dominated by red maple.

Range Map



Pennsylvania Range

Glaciated Northeast, Pocono Plateau, Ridge and Valley and Unglaciated Allegheny Plateau

Global Distribution

Connecticut, Maine, Massachusetts, New Hampshire, New York, Pennsylvania, Vermont, and West Virginia. It also extends into New Brunswick and Quebec in Canada,

Broadleaf Palustrine Forests

Bitternut Hickory Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain

Global Rank: G2G4
State Rank: S3

General Description

This forest occurs on mid to high floodplain terraces of mid- to large-sized rivers. It is currently documented from the Delaware, Allegheny, and Cheat rivers and probably occurs on other rivers within the region. Flood frequency is unknown, but it is likely flooded less often than Sycamore – Mixed Hardwood Floodplain Forest and Silver Maple Floodplain Forest found on lower floodplain terraces. Soils on these stabilized terraces are derived from alluvial deposits and consist of fine sandy loams and loamy fine sand.

The canopy is usually somewhat open, although occasionally closed, dominated by bitternut hickory (*Carya cordiformis*). Co-dominant or associate canopy species include northern red oak (*Quercus rubra*), butternut (*Juglans cinerea*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), white ash (*Fraxinus americana*), and silver maple (*Acer saccharinum*). The relatively sparse subcanopy is similar to the canopy layer and may also include hornbeam (*Carpinus caroliniana*), red maple (*Acer rubrum*) and sugar maple (*Acer saccharum*).

The shrub layer is usually sparse and includes occasional saplings of canopy and subcanopy species, as well as opportunistic native and exotic shrubs such as multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese barberry (*Berberis thunbergii*), black raspberry (*Rubus*

occidentalis), and prickly dewberry (*Rubus flagellaris*). The herbaceous layer is weedy, with invasive exotic species common or dominant, including Japanese stiltgrass (*Microstegium vimineum*), garlic-mustard (*Alliaria petiolata*), and gill-over-the-ground (*Glechoma hederacea*). Common native species include white-snakeroot (*Ageratina altissima* var. *altissima*), Virginia waterleaf (*Hydrophyllum virginianum*), and sedges (*Carex* spp).

Rank Justification

National or subnational conservation status not yet assessed.

Identification

- Found in mid to high floodplain terraces of mid- to large-sized rivers
- Somewhat open canopy dominated or co-dominated by bitternut hickory
- Soils are derived from alluvial deposits and consist of fine sandy loams and loamy fine sand

Characteristic Species

Trees

- Bitternut hickory (*Carya cordiformis*)
- American beech (*Fagus grandifolia*)
- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- Sugar maple (*Acer saccharum*)
- Wild black cherry (*Prunus serotina*)
- White ash (*Fraxinus americana*)
- Green ash, red ash (*Fraxinus pennsylvanica*)
- Hornbeam (*Carpinus caroliniana*)

Shrubs

- Black raspberry (*Rubus occidentalis*)
- Prickly dewberry (*Rubus flagellaris*)

Herbs

- White-snakeroot (*Ageratina altissima* var. *altissima*)

- Virginia waterleaf (*Hydrophyllum virginianum*)
- Sedges (*Carex* spp.)

Vines

- Poison-ivy (*Toxicodendron radicans*)

Exotic Species

- Multiflora rose (*Rosa multiflora*)
- Morrow's honeysuckle (*Lonicera morrowii*)
- Japanese barberry (*Berberis thunbergii*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Garlic-mustard (*Alliaria petiolata*)
- Gill-over-the-ground (*Glechoma hederacea*)

International Vegetation Classification Associations:

Bitternut Hickory - Black Cherry / White Snakeroot Forest (CEGL006445)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Perles, S. J., G. S. Podniesinski, E. Eastman, L. A. Sneddon, and S. C. Gawler. 2007. Classification and Mapping of Vegetation and Fire Fuel Models at Delaware Water Gap National Recreation Area. Technical Report NPS/NER/NRTR—2007/076. National Park Service. Philadelphia, PA.

Pennsylvania Community Code

SX : Miscellaneous Palustrine/Floodplain Forest

Similar Ecological Communities

Bitternut Hickory Floodplain Forest and Silver Maple Floodplain Forest can have similar species and position on the floodplain. Bitternut Hickory Floodplain Forest is distinguished by the dominance of bitternut hickory (*Carya cordiformis*) while Silver Maple Floodplain Forest is dominated by silver maple (*Acer saccharinum*). Bitternut Hickory Floodplain Forest and Sugar Maple – Mixed Hardwood Floodplain Forest can have similar species and position on the floodplain. Bitternut Hickory Floodplain Forest is distinguished by the dominance of bitternut hickory (*Carya cordiformis*) while Sugar Maple – Mixed Hardwood Floodplain Forest is dominated by sugar maple (*Acer saccharum*).

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from NPS Community Classification and mapping studies along the Delaware River and floodplain classification studies in the Ohio River Basin.

Conservation Value

The community is an important part of the river floodplain ecosystem, which provides significant ecosystem services such as sediment control, filtering runoff, and cooling overland flow of water, in addition to wildlife habitat. Great blue herons (*Adrea herodias*) nest in colonies on river floodplains near their riverine foraging areas. Standing dead trees (snags) provide cavities for bats, wood ducks (*Aix sponsa)*, and other cavity nesting species. Large contiguous floodplain forests provide important habitat for wildlife species requiring large blocks of interior forest, such as neotropical migrants. The dominant species in this community, bitternut hickory (*Carya cordiformis*), produces mast seed which serves an important role as a food source in mammal population dynamics.

Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and have high conservation significance. Within the river floodplain system, Bitternut Hickory Floodplain Forests are rare and are limited to small patches often occurring within a greater more diverse complex of communities.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) can greatly alter their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation.

Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of

the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. In general, unaltered and intact river systems are more resilient to environmental stress than human-impacted or engineered river systems.

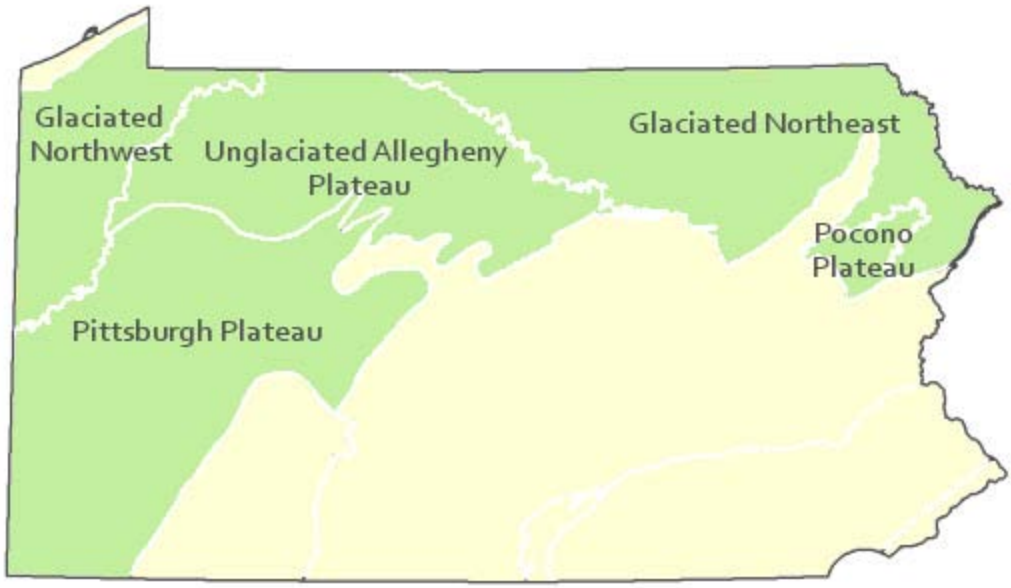
Research Needs

The Bitternut Hickory Floodplain Forest has been documented for the Delaware, Allegheny, and Cheat rivers. However, due to the limited occurrences of this type in the Allegheny, it is unclear how widespread this type is within the basin and how and if it differs from the floodplain forests described for the Delaware and Cheat. Bitternut hickory is often a part of mesic floodplain forests in the Ohio River Basin, and it is unclear if it is a distinct type in the Allegheny, or just part of a broader Silver Maple Floodplain Forest type. More work should be done to document and describe the species composition, environmental settings, and distribution of hickory dominated forests within the upper Ohio River Basin. Additionally, there is need to monitor high quality examples of this community type in the Delaware and to determine the impact of invasive species within this type.

Trends

Bitternut Hickory Floodplain Forests were undoubtedly more common historically and have declined due to dam impoundments, human development, and conversion of rich floodplain sites to agriculture; modification of the adjacent upland has further impacted the quality of this type. Conversion of rich floodplain areas to agriculture probably contributed the most to loss of this type across its range. In addition, as this type is dependent upon nutrient input and disturbance from flowing water, alteration of the natural flooding regime (duration and frequency) also contributed to changes in the composition of this type, as species not able to tolerate periodic inundation were able to gain a foothold. The relative trend for this community is most likely declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and lack of periodic flooding events.

Range Map



Pennsylvania Range

This type is found in the High Appalachian Plateau Ecoregion, primarily within the Upper Delaware and Upper Allegheny river basins.

Global Distribution

This type is currently documented from New Jersey, New York, Pennsylvania, and West Virginia.

Elm – Ash – Maple Lakeplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): Great Lakes Region Wetland

Global Rank: G4?
State Rank: S1

General Description

These wetlands are specific to the Erie Lake Plain. While the usual aspect is that of a forest, on wetter and/or more recently disturbed sites, there may be a more open canopy. The topography is flat overall with a hummock and hollow microtopography, often with small vernal ponds scattered throughout. The water table is near the surface most of the year. The dominant tree species are American elm (*Ulmus americana*), red green ash (*Fraxinus pennsylvanica*), pumpkin ash (*Fraxinus profunda*), and silver maple (*Acer saccharinum*). Other trees commonly present include red maple (*Acer rubrum*), eastern cottonwood (*Populus deltoides*), basswood (*Tilia americana* var. *americana*), yellow birch (*Betula alleghaniensis*), and sourgum blackgum (*Nyssa sylvatica*). The shrub layer is usually dominated by spicebush (*Lindera benzoin*), although this is likely a result of deer over-browsing. The herbaceous layer may be very diverse, representative species include sedge (*Carex bromoides*), sedge (*Carex intumescens*), short hair sedge (*Carex crinita* var. *crinita*), spinulose wood fern (*Dryopteris carthusiana*), sensitive fern (*Onoclea sensibilis*), purplecress (*Cardamine douglassii*), cinnamon fern (*Osmunda cinnamomea*), and blue marsh violet (*Viola cucullata*). This community type in Pennsylvania remains on only a handful of sites.

Rank Justification

Critically imperiled in the nation or state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

Identification

- Wetland depressions on flat plain
- Found only in Erie Lake Plain
- Presence of pumpkin ash (*Fraxinus profunda*)
- Hummock and hollow microtopography

Characteristic Species

Trees

- American elm (*Ulmus americana*)
- Green ash, red ash (*Fraxinus pennsylvanica*)

- Pumpkin ash (*Fraxinus profunda*)
- Silver maple (*Acer saccharinum*)
- Red maple (*Acer rubrum*)
- Eastern cottonwood (*Populus deltoides*)
- Basswood (*Tilia americana*)
- Yellow birch (*Betula alleghaniensis*)
- Blackgum (*Nyssa sylvatica*)

Shrubs

- Spicebush (*Lindera benzoin*)

Herbs

- Sedge (*Carex bromoides*)
- Sedge (*Carex intumescens*)
- Short hair sedge (*Carex crinita* var. *crinita*)
- Spinulose wood fern (*Dryopteris carthusiana*)
- Sensitive fern (*Onoclea sensibilis*)
- Purplecress (*Cardamine douglassii*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Blue marsh violet (*Viola cucullata*)

International Vegetation Classification Associations:

Maple - Ash - Elm Swamp Forest (CEGL005038)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Rich Swamp (CES202.605)

Origin of Concept

Fike, J. 1999. Terrestrial and palustrine plant communities of Pennsylvania. Pennsylvania Natural Diversity Inventory. Harrisburg, PA. 86 pp., Western Pennsylvania Conservancy. 2005. Rapid Inventory and Assessment of Landscape, Ecological and Biodiversity Resources Relative to Management Options

Pennsylvania Community Code

SX : Miscellaneous Palustrine/Floodplain Forest

Similar Ecological Communities

In Pennsylvania this type is restricted to the Erie Lake Plain. It shares species with both floodplain forest types and rich upland types, but is distinguishable by its setting, by the presence of pumpkin ash (*Fraxinus profunda*) on most sites, and by the unusual combination of tree species.

Fike Crosswalk

Great lakes region lakeplain palustrine forest

Conservation Value

Rare plant species found in this community include pumpkin ash (*Fraxinus profunda*). 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 the wetland.

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off, pollution, and sedimentation. Invasive plant species such as Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), and common reed (*Phragmites australis* ssp. *australis*) can dominate shrub and herb layers this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

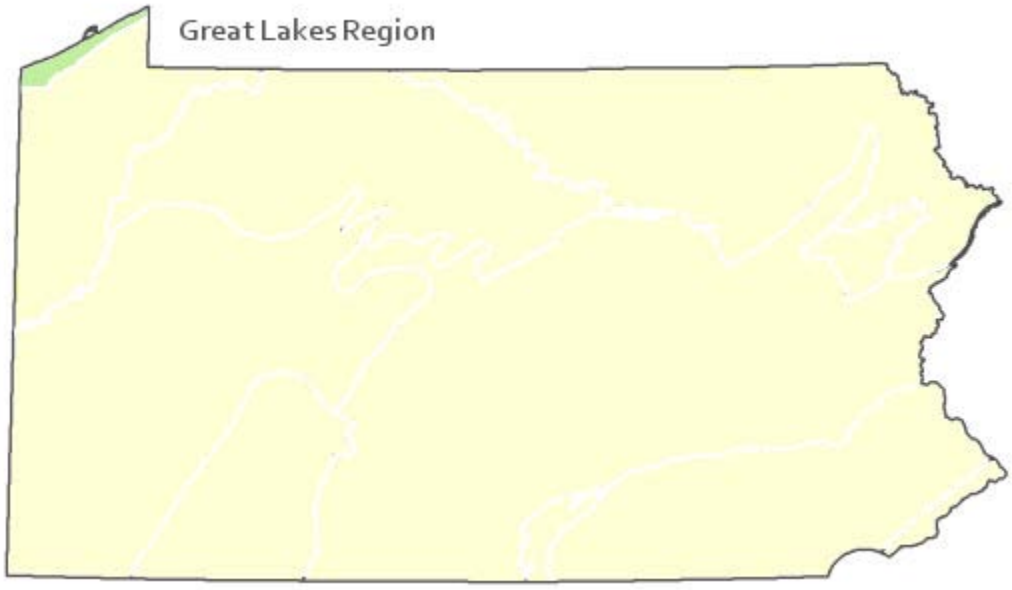
Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased evaporation of the standing water and sedimentation. Agricultural development of the lake plain in the Great Lakes Region of Pennsylvania contributed to the decline of this community. The relative trend for this community is likely declining slightly due to hydrological alterations, forest fragmentation, and tree mortality resulting from the emerald ash borer (*Agrilus planipennis*).

Range Map



Pennsylvania Range

Great Lakes Region.

Global Distribution

Indiana, Illinois, Michigan, Pennsylvania, Ohio, Ontario, Wisconsin

Green Ash – Mixed Hardwood Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain

Global Rank: GNR
State Rank: S4

General Description

The Green Ash – Mixed Hardwood Floodplain Forest occurs behind levees and on low terraces which may frequently be temporarily flooded but with a shorter duration of flooding than the Silver Maple Floodplain Forest. However, soil characteristics suggest that the ground water level is high for much of the growing season (hydric soil indicators present, soils typically somewhat poorly drained to poorly drained). Soil texture varies from silt to clay loam. On more exposed sites with higher flood flow velocities and coarser substrates, this community may more closely resemble the Sycamore – Mixed Hardwood Floodplain Forest.

The canopy of this community is dominated by green ash (*Fraxinus pennsylvanica*) and may contain one or more other hardwood species as sub-dominants, including black walnut (*Juglans nigra*) and sycamore (*Platanus occidentalis*). Other less common canopy species include American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), and pin oak (*Quercus palustris*). The subcanopy and shrub layers are often sparse (occasionally dense at some sites) and are characterized by regeneration of canopy tree species and some shrub species such as spicebush (*Lindera benzoin*). Where exotic species are not rampant, the herbaceous layer is characterized by jewelweed (*Impatiens* spp.), wood nettle (*Laportea canadensis*), wingstem (*Verbesina alternifolia*), Canadian waterleaf (*Hydrophyllum canadense*), poison ivy (*Toxicodendron radicans*), and Virginia creeper (*Parthenocissus quinquefolia*). A number of examples of this community have been heavily impacted by exotic herbaceous species, which may attain a total cover in excess of 90 percent. Common

exotic species include multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), common privet (*Ligustrum vulgare*), Japanese barberry (*Berberis thunbergii*), Japanese stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), dame's-rocket (*Hesperis matronalis*), gill-over-the-ground (*Glechoma hederacea*), and garlic-mustard (*Alliaria petiolata*).

Rank Justification

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

Identification

- Dominated by green ash (*Fraxinus pennsylvanica*) and co-dominated by black walnut (*Juglans nigra*) and sycamore (*Platanus occidentalis*)
- Occurs behind levees and on low floodplain terraces
- Soil texture varies from silt to clay loam

Characteristic Species

Trees

- Green ash, red ash (*Fraxinus pennsylvanica*)
- Black walnut (*Juglans nigra*)
- Sycamore (*Platanus occidentalis*)
- American elm (*Ulmus americana*)
- Hackberry (*Celtis occidentalis*)
- Red maple (*Acer rubrum*)
- Silver maple (*Acer saccharinum*)
- Pin oak (*Quercus palustris*)

Shrubs

- Spicebush (*Lindera benzoin*)

Herbs

- Jewelweed (*Impatiens* spp.)
- Wood-nettle (*Laportea canadensis*)
- Wingstem (*Verbesina alternifolia*)

- Canadian waterleaf (*Hydrophyllum canadense*)

Vines

- Poison-ivy (*Toxicodendron radicans*)
- Virginia-creeper (*Parthenocissus quinquefolia*)

Exotic Species

- Multiflora rose (*Rosa multiflora*)
- Morrow's honeysuckle (*Lonicera morrowii*)
- Common privet (*Ligustrum vulgare*)
- Japanese barberry (*Berberis thunbergii*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Japanese knotweed (*Fallopia japonica*)
- Dame's-rocket (*Hesperis matronalis*)
- Gill-over-the-ground (*Glechoma hederacea*)
- Garlic-mustard (*Alliaria petiolata*)

International Vegetation Classification Associations:

Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

SX : Miscellaneous Palustrine/Floodplain Forest

Similar Ecological Communities

Green Ash – Mixed Hardwood Floodplain Forest shares many species with other palustrine forests but is distinguishable from other floodplain forests due to the clear dominance of green ash (*Fraxinus pennsylvanica*) whereas the Silver Maple Floodplain Forest is dominated by silver maple (*Acer saccharinum*), Oak – Mixed Hardwood Palustrine Forest is dominated by oaks (*Quercus* spp.), and Sycamore Mixed Hardwood Floodplain Forest is dominated by sycamore (*Platanus occidentalis*). On more exposed sites with higher flood flow velocities and coarser substrates, this community may more closely resemble the Sycamore – Mixed Hardwood Floodplain Forest.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

While this type itself is not rare in Pennsylvania, large contiguous forested floodplains along stretches of free flowing river are uncommon. Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and hold conservation significance. 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 this wetland.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian

buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

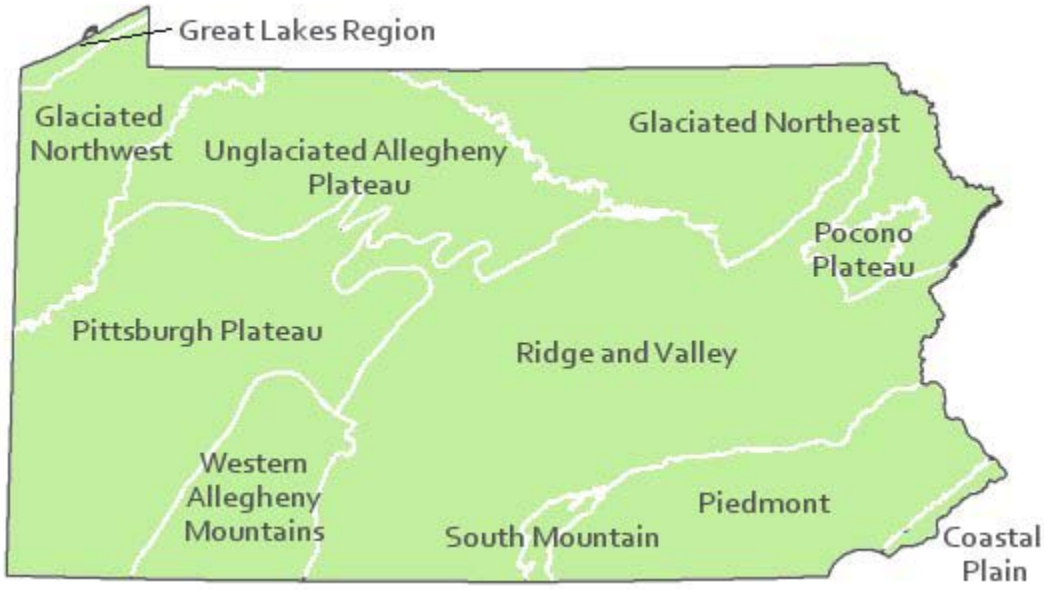
Research Needs

Variations may occur at ecoregional levels. There is a need to collect additional plot data to characterize variations and guide further classification of this community.

Trends

Green Ash – Mixed Hardwood Floodplain Forests were undoubtedly more common but have declined due to dam impoundments, human development, and farming; modification of the adjacent upland has further impacted the quality of this type. As this type requires lower velocity flows, alteration of the natural flooding regime (duration and frequency) has most likely been the most critical factor influencing the quality and persistence of this type. The relative trend for this community is likely stable or may be declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and lack of periodic flooding events.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Delaware, Maryland, New Jersey, New York, and Pennsylvania

Oak – Mixed Hardwood Palustrine Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain and Basin Wetland and Vernal Pool

Global Rank: GNR
State Rank: S2

General Description

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

This community is characterized by a closed canopy forest, dominated by pin oak (*Quercus palustris*) and swamp white oak (*Quercus bicolor*). Associate canopy species may include red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), black ash (*Fraxinus nigra*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and bitternut hickory (*Carya cordiformis*). The understory vegetation is generally sparse, but varies considerably depending on site hydrology and light availability. Under more open canopies, the shrub layer contains buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticillata*), arrow-wood (*Viburnum recognitum*), spicebush (*Lindera benzoin*), and highbush blueberry (*Vaccinium corymbosum*). The sparse herbaceous layer includes sedges (*Carex intumescens, Carex.*

lurida, Carex crinita, Carex bromoides), skunk-cabbage (*Symplocarpus foetidus*), turtlehead (*Chelone glabra*), jewelweed (*Impatiens* spp.), tearthumb (*Persicaria sagittata*), clear weed (*Pilea pumila*), rice cutgrass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*), stout woodreed (*Cinna arundinacea*), marsh fern (*Thelypteris palustris*), cinnamon fern (*Osmunda cinnamomea*), beggar-ticks (*Bidens frondosa*), water-pepper (*Persicaria punctata*), floating mannagrass (*Glyceria septentrionalis*), fowl mannagrass (*Glyceria striata*), slender mannagrass (Glyceria melicaria), bugleweed (*Lycopus uniflorus*), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), and other species tolerant of lower light conditions. These wetlands may also contain a substantial bryophyte layer that includes several peat moss (*Sphagnum* spp.) species or may be completely devoid of vegetation altogether (in dense shade and/or where seasonal flooding occurs).

Rank Justification

Vulnerable in the nation or state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Poorly drained depressions in basin areas that are seasonally wet (winter and early spring), but can be dry in late summer and early fall
- Mucky soils and little peat development
- Canopy dominated by pin oak and/or swamp white oak
- Occurs in poorly drained depressions in basin areas and floodplains that are seasonally wet
- Rainwater, floodwater or groundwater fed

Characteristic Species

Trees

- Pin oak (*Quercus palustris*)
- Swamp white oak (*Quercus bicolor*)
- Red maple (*Acer rubrum*)
- Green ash, red ash (*Fraxinus pennsylvanica*)
- Black ash (*Fraxinus nigra*)
- Blackgum (*Nyssa sylvatica*)
- American elm (*Ulmus americana*)
- Shagbark hickory (*Carya ovata*)

Shrubs

- Buttonbush (*Cephalanthus occidentalis*)
- Winterberry (*Ilex verticillata*)
- Northern arrow-wood (*Viburnum recognitum*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Spicebush (*Lindera benzoin*)

Herbs

- Sedge (*Carex intumescens*)
- Sedge (*Carex lurida*)
- Short hair sedge (*Carex crinita* var. *crinita*)
- Sedge (*Carex bromoides*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Turtlehead (*Chelone glabra*)
- Jewelweed (*Impatiens* spp.)
- Tearthumb (*Persicaria sagittata*)
- Clearweed (*Pilea pumila*)
- Rice cutgrass (*Leersia oryzoides*)
- Cutgrass (*Leersia virginica*)
- Sensitive fern (*Onoclea sensibilis*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Wood reedgrass (*Cinna arundinacea*)
- Marsh fern (*Thelypteris palustris*)
- Beggar-ticks (*Bidens frondosa*)
- Dotted smartweed (*Persicaria punctata*)
- Floating mannagrass (*Glyceria septentrionalis*)

- Fowl mannagrass (*Glyceria striata*)
- Slender mannagrass (*Glyceria melicaria*)
- Bugleweed (*Lycopus uniflorus*)
- False nettle (*Boehmeria cylindrica*)

International Vegetation Classification Associations:

Northeastern Pin Oak - Swamp White Oak Forest (CEGL006240)
Pin Oak Small River Floodplain Forest (CEGL006185)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Fike, J. 1999. Terrestrial and palustrine plant communities of Pennsylvania. Pennsylvania Natural Diversity Inventory. Harrisburg, PA. 86 pp., Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0., Leppo 2009

Pennsylvania Community Code

UA : Bottomland Oak – Hardwood Palustrine Forest

Similar Ecological Communities

This community type is distinguished from the various red maple palustrine forest types (Red Maple – Black Ash Palustrine Forest and Red Maple – Black Gum Palustrine Forest) by the dominance or near-dominance of pin oak (Quercus palustris), and/or swamp white oak (Quercus bicolor).

Fike Crosswalk

Bottomland oak - hardwood palustrine forest

Conservation Value

The community is important habitat for reptile and amphibian species such as wood frogs (*Rana sylvatica*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), and Jefferson salamander (*Ambystoma jeffersonianum*). The oaks also produce acorn mast which is an important food item for many wildlife species such as small and large mammals. 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 this wetland.

Threats

Alteration to the current hydrological regime and overstory clearing are the two important threats to this community and can lead to habitat destruction and/or shifts in community function and dynamics. The emerald ash borer (*Agrilus planipennis*) may result in the decline or loss of green and black ash from this community in the near future. Development of adjacent land can lead to an accumulation of agricultural run-off and pollution, as well as sedimentation. Invasive plant species such as Japanese knotweed (*Fallopia japonica*), moneywort (*Lysimachia nummularia*), and Japanese stiltgrass (*Microstegium vimineum*) can be common in this community.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

Research Needs

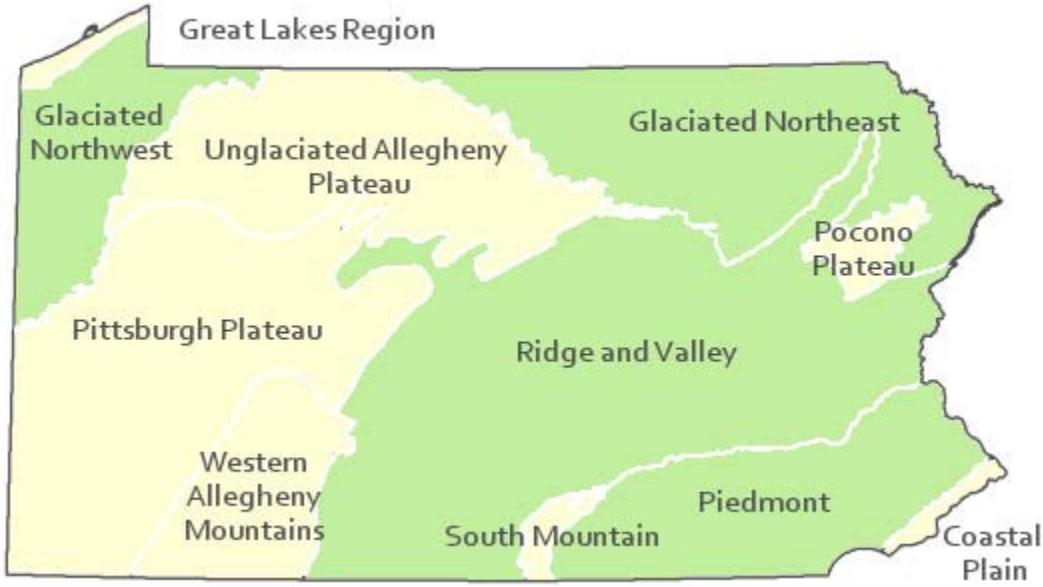
Variations may occur at eco-regional levels. There is a need to collect plot data to characterize variations and guide further classification of this community. There is also a need to further distinguish this type from other oak and red maple-dominated wetlands.

Trends

Oak – Mixed Hardwood Palustrine Forests were probably more common but have declined due wetland draining/filling and clearing of the adjacent lands leading to sedimentation. Wetland protection has

helped to prevent decline of these communities. The relative trend for this community is likely stable or may be declining slightly due to development and/or hydrological alterations.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Piedmont, Ridge and Valley.

Global Distribution

This community occurs throughout the northeastern U.S. and has been identified in plant community classifications in Connecticut, Massachusetts, New Jersey, and New York.

Red Maple – Black Ash Palustrine Forest

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

Global Rank: G2G4
State Rank: S2S3

General Description

These are palustrine forests enriched by groundwater, varying from circumneutral to calcareous. The substrate can be muck or mineral soil with or without a thin layer of organic matter. Calciphiles are often present. The dominant trees are usually red maple (*Acer rubrum*) and black ash (*Fraxinus nigra*). Associates include swamp white oak (*Quercus bicolor*), blackgum (*Nyssa sylvatica*), and American elm (*Ulmus americana*). Common understory species include meadow-sweets (*Spiraea latifolia, S. alba*), winterberry (*Ilex verticillata*), and alders (*Alnus serrulata* or *A. incana* ssp*. rugosa*. Alder-leaved buckthorn (*Rhamnus alnifolia*) and poison sumac (*Toxicodendron vernix*) may be present in the more calcareous sites. Common herbs include royal fern (*Osmunda regalis*), tussock sedge (*Carex stricta*), a sedge (*Carex leptalea*), skunk-cabbage (*Symplocarpus foetidus*), violets (*Viola* spp.), water avens (*Geum rivale*), and sensitive fern (*Onoclea sensibilis*). Many calciphilic species associated with this type have moderate to high light requirements, and thus are found in openings. These species include hemlock-parsley (*Conioselinum chinense*), spreading globe-flower (*Trollius laxus*), sedges (*Carex interior*, *C. flava, C. lacustris, C. laevivaginata*), small yellow lady's-slipper (*Cypripedium parviflorum* var. *parviflorum*), showy lady's-slipper (*Cypripedium reginae*), and downy willow-herb (*Epilobium strictum*).

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Poorly drained depressions with primarily organic soils
- Typically underlain by calcareous bedrock or calcareous glacial deposits
- Canopy dominated by red maple (*Acer rubrum*) and black ash (*Fraxinus nigra*)
- Ground-fed circumneutral water
- May have openings with calciphilic species such as hemlock-parsley (*Conioselinum chinense*), spreading globe-flower (*Trollius laxus*), sedges (*Carex interior, C. flava, C. lacustris, C. laevivaginata*), small yellow lady's-slipper (*Cypripedium parviflorum* var. *parviflorum*), showy lady's-slipper (*Cypripedium reginae*), and downy willow-herb (*Epilobium strictum*)

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Black ash (*Fraxinus nigra*)
- Swamp white oak (*Quercus bicolor*)
- Blackgum (*Nyssa sylvatica*)
- American elm (*Ulmus americana*)

Shrubs

- Alder-leaved buckthorn (*Rhamnus alnifolia*)
- Ninebark (*Physocarpus opulifolius*)
- Meadow-sweet (*Spiraea alba*)
- Meadow-sweet (*Spiraea latifolia*)
- Winterberry (*Ilex verticillata*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Swamp azalea (*Rhododendron viscosum*)

Herbs

- Sedge (*Carex interior*)
- Sedge (*Carex leptalea*)
- Yellow lady's-slipper (*Cypripedium parviflorum* var. *parviflorum*)

- Showy lady's-slipper (*Cypripedium reginae*)
- Water avens (*Geum rivale*)
- Downy willow-herb (*Epilobium strictum*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Tussock sedge (*Carex stricta*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Violets (*Viola* spp.)
- Sensitive fern (*Onoclea sensibilis*)
- Hemlock-parsley (*Conioselinum chinense*)
- Spreading globe-flower (*Trollius laxus*)

International Vegetation Classification Associations:

Red Maple - Black Ash Swamp (CEGL007441)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Rich Swamp (CES202.605)

Origin of Concept

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

Pennsylvania Community Code

UC : Red Maple – Black Ash Palustrine Forest

Similar Ecological Communities

The much more common Red Maple – Blackgum Palustrine Forest is not generally influenced by calcareous waters, and lacks the black ash (*Fraxinus nigra*) and herbaceous calciphiles that characterize the Red Maple – Black Ash Palustrine Forest.

Red Maple – Black Ash Palustrine Forest may contain pin oak (*Quercus palustris*) and swamp white oak (*Quercus bicolor*) which dominate the Oak - Mixed Hardwood Palustrine Forest but the Red Maple – Black Ash Palustrine Forest is clearly dominated by red maple (*Acer rubrum*) and black ash (*Fraxinus nigra*).

Fike Crosswalk

Red maple - black ash palustrine forest

Conservation Value

The community supports calciphilic and rare plant species including spreading globe-flower (*Trollius laxus*), yellow sedge (*Carex flava*), small yellow lady's-slipper (*Cypripedium parviflorum* var. *parviflorum*), showy lady's-slipper (*Cypripedium reginae*), 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 this wetland.

Threats

Alteration to the current hydrological regime is a major threat to this community and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as purple loosestrife (*Lythrum salicaria*) and Japanese stiltgrass (*Microstegium vimineum*) can be common in this community. Ash (*Fraxinus* spp.) mortality resulting from the emerald ash borer (*Agrilus planipennis*)is a major concern.

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. 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 and habitat alteration 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 can not 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.

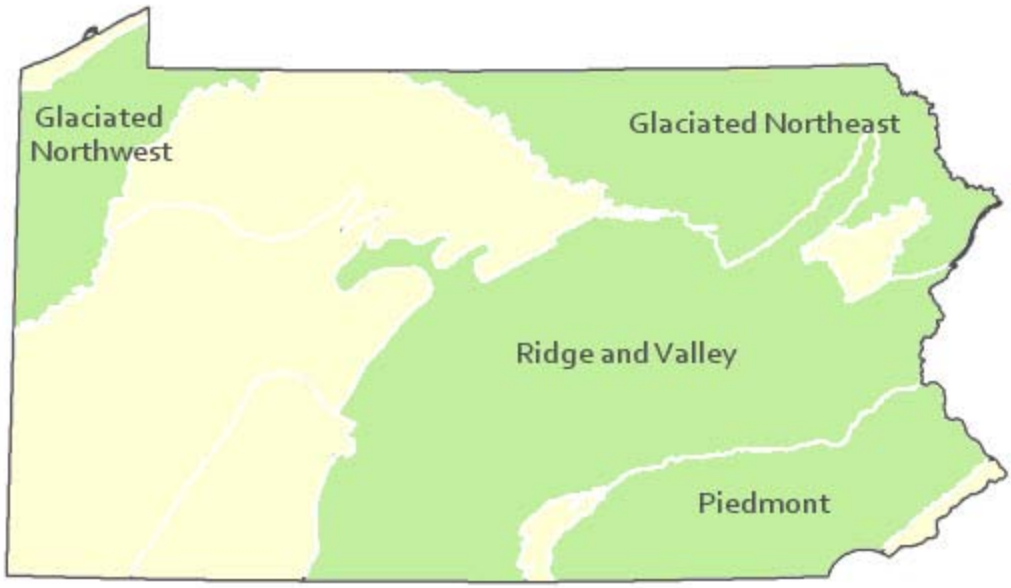
Research Needs

Variations may occur at ecoregional levels. There is a need to collect additional plot data to characterize variations and guide further classification of this community.

Trends

Red Maple – Black Ash Palustrine Forests were probably more common but declined due to dam impoundments, wetland draining/filling, and clearing of the adjacent lands leading to increased sedimentation and disruption of wetland hydrology. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Piedmont, Ridge and Valley.

Global Distribution

Maryland, New York, Pennsylvania, and West Virginia.

Red Maple – Black-gum Palustrine Forest

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

Global Rank: G4
State Rank: S3S4

General Description

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

Rank Justification

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

Identification

- Typically occurs on saturated or seasonally wet acidic soils in seepage areas, basins, hillsides, streamheads, and floodplain edges
- Typically a shallow to deep peat layer on top of mineral soil
- Canopy will be dominated by red maple (*Acer rubrum*) and blackgum (*Nyssa sylvatica*)
- Hummock and hollow microtopography

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Blackgum (*Nyssa sylvatica*)
- Yellow birch (*Betula alleghaniensis*)
- Eastern white pine (*Pinus strobus*)
- Eastern hemlock (*Tsuga canadensis*)
- Swamp white oak (*Quercus bicolor*)
- Pin oak (*Quercus palustris*)
- Black willow (*Salix nigra*)

Shrubs

- Highbush blueberry (*Vaccinium corymbosum*)
- Winterberry (*Ilex verticillata*)
- Dogwoods (*Cornus* spp.)
- Alders (*Alnus* spp.)

Herbs

- Skunk cabbage (*Symplocarpus foetidus*)
- Violets (*Viola* spp.)
- Cinnamon fern (*Osmunda cinnamomea*)

- Sedges (*Carex* spp.)
- Sensitive fern (*Onoclea sensibilis*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Red Maple - Blackgum Basin Swamp (CEGL006014)

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., Leppo, B., Zimmerman, E., Ray, S., Podniesinski, G., and Furedi, M. 2009. Pennsylvania Statewide Seasonal Pool Ecosystem Classification: Description, mapping, and classification of seasonal pools, their associated plant and animal communities, and the surrounding landscape. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA.

Pennsylvania Community Code

UG : Red Maple – Black Gum Palustrine Forest

Similar Ecological Communities

This type differs from Red Maple – Black Ash Palustrine Forest in that the Red Maple – Blackgum Palustrine Forest lacks the presence of caliciphilic species such as black ash (*Fraxinus nigra*) and is typically co-dominated by blackgum (*Nyssa sylvatica*). Red Maple – Blackgum Palustrine Forest is more acidic while the Red Maple – Black Ash Palustrine Forest is typically more circumneutral.

Red Maple – Blackgum Palustrine Forest may contain pin oak (*Quercus palustris*) and swamp white oak (*Quercus bicolor*) which dominate the Oak - Mixed Hardwood Palustrine Forest but the Red Maple – Blackgum Palustrine Forest is clearly dominated by red maple (*Acer rubrum*) and blackgum (*Nyssa sylvatica*).

Fike Crosswalk

Red Maple – Black-gum Palustrine Forest

Conservation Value

This community 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 this wetland.

Threats

Red Maple – Blackgum Palustrine Forests are threatened by habitat alteration, deposition (sedimentation, agricultural runoff), and alterations to the hydrological regime (lowering of water tables). Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. This community is susceptible to invasive plant species such as common reed (*Phragmites australis* ssp. *australis*) and mulitflora rose (*Rosa multiflora*).

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. 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 and habitat alteration 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 can not 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.

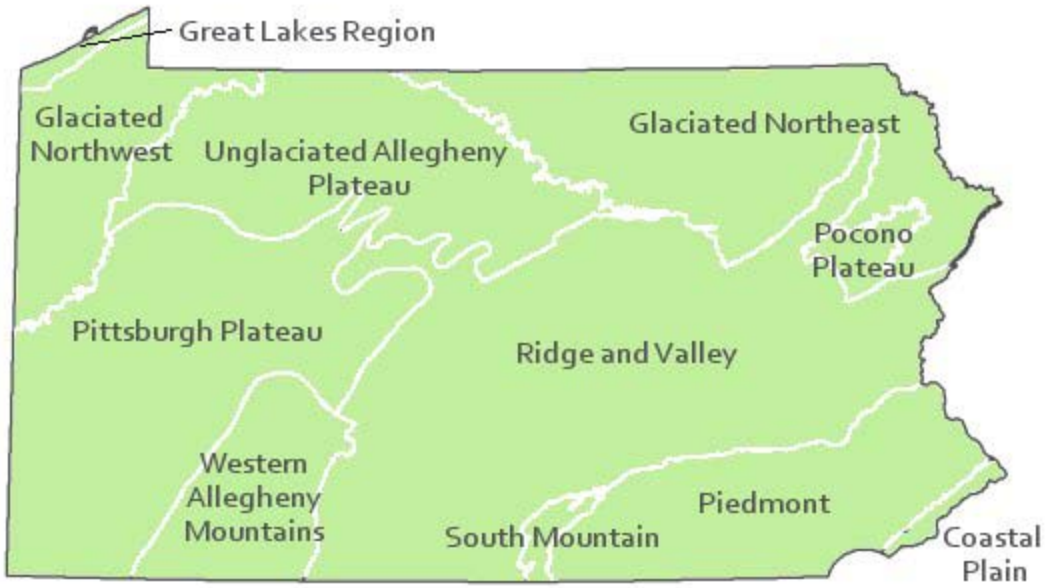
Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Connecticut, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont

Red Maple – Elm – Willow Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River floodplain

Global Rank: G4
State Rank: S2

General Description

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 red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), red elm (*Ulmus rubra*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), bitternut hickory (*Carya cordiformis*), black willow (*Salix nigra*), silky willow (*Salix sericea*), arrow-wood (*Viburnum recognitum*), silky dogwood (*Cornus amomum*), spicebush (*Lindera benzoin*), riverbank grape (*Vitis riparia*), elderberry (*Sambucus canadensis*), sensitive fern (*Onoclea sensibilis*), ostrich fern (*Matteuccia struthiopteris*), and smartweeds (*Polygonum* and *Persicaria* spp.).

Rank Justification

Vulnerable in the nation or state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Occurs along major rivers, often located in old oxbows along the floodplain, or in depressions behind natural levees
- Dominated by red maple (*Acer rubrum*) with green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), red elm (*Ulmus rubra*), and willows (*Salix* spp.) as co-dominants.

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Green ash, red ash (*Fraxinus pennsylvanica*)
- American elm (*Ulmus americana*)
- Pin oak (*Quercus palustris*)
- Swamp white oak (*Quercus bicolor*)
- Bitternut hickory (*Carya cordiformis*)
- Black willow (*Salix nigra*)

Shrubs

- Black willow (*Salix nigra*)
- Silky willow (*Salix sericea*)
- Northern arrow-wood (*Viburnum recognitum*)
- Silky dogwood (*Cornus amomum*)
- Spicebush (*Lindera benzoin*)
- American elder (*Sambucus canadensis*)

Herbs

- Sensitive fern (*Onoclea sensibilis*)
- Ostrich fern (*Matteuccia struthiopteris*)
- Smartweeds (*Persicaria* spp.)

Vines

- Riverbank grape (*Vitis riparia*)

International Vegetation Classification Associations:

Northern Piedmont / Central Appalachian Maple-Ash Swamp Forest (CEGL006548)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

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

Pennsylvania Community Code

SC : Red Maple – Elm – Willow Floodplain Swamp

Similar Ecological Communities

The other floodplain forest types, Sycamore Mixed Hardwood Floodplain Forest, Green Ash – Mixed Hardwood 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. This palustrine forest type is primarily associated with major rivers, often located in old oxbows along the floodplain or in depressions behind natural levees, and has red maple (*Acer rubrum*) with

green ash (*Fraxinus pennsylvanica*), American elm (Ulmus americana), red elm (*Ulmus rubra*), and willows (*Salix* spp.) as co-dominants tree species.

Fike Crosswalk

Red maple - elm - willow floodplain swamp

Conservation Value

The community is an important part of the river floodplain ecosystem, which provides significant ecosystem services such as sediment control, filtering runoff, and cooling overland flow of water, in addition to wildlife habitat. Great blue heron (*Adrea herodias*) nest in colonies on river floodplains near their riverine foraging areas. Standing dead trees (snags) provide cavities for bats, wood ducks (*Aix sponsa)*, and other cavity nesting species. Large contiguous floodplain forests provide important habitat for wildlife species requiring large blocks of interior forest, such as neotropical migrants.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation.

Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained, and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian

habitat. In general, unaltered and intact river systems are more resilient to environmental stress than human-impacted or engineered river systems.

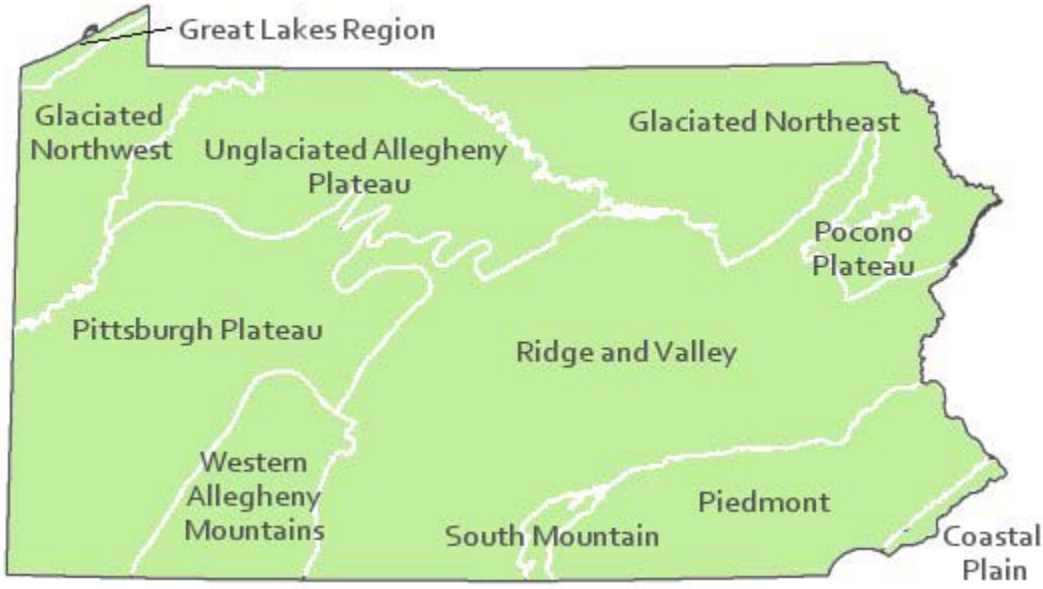
Research Needs

More work should be done to document and describe the species composition, environmental settings and distribution of this community type. Additionally, there is need to monitor high quality examples of this community to determine the impact of invasive species within this type.

Trends

Lack of historical information regarding this community type makes it difficult to determine trends. This community type is likely stable but may be decreasing due to hydrological alterations.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Kentucky, Maryland, New Jersey, Pennsylvania, Virginia, and West Virginia.

Red Maple – Magnolia Palustrine Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain and Basin Wetland and Coastal Plain

Global Rank: G3?
State Rank: S1

General Description

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 red maple (*Acer rubrum*), sweet-bay magnolia (*Magnolia virginiana*), blackgum (*Nyssa sylvatica*), sweetgum (*Liquidambar styraciflua*), and swamp white oak (*Quercus bicolor*). Shrubs include sweet pepperbush (*Clethra alnifolia*), fetter-bush (*Leucothoe racemosa*), winterberry (*Ilex verticillata*), smooth winterberry (*Ilex laevigata*), highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*), and possum-haw (*Viburnum nudum*). The herbaceous layer is often sparse; species include marsh St. John's-wort (*Triadenum virginicum*) in openings, violets (*Viola* spp.), royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomea*), and other ferns, sedges, and sphagnum.

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Nutrient poor, acidic swamp forest
- Found on the Coastal Plain and some areas in the Piedmont

- Groundwater fed
- Moderately deep to deep muck over mineral soils with standing water
- Co-dominance of red maple (*Acer rubrum*) with sweet-bay magnolia (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), and blackgum (*Nyssa sylvatica*)

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Sweet-bay magnolia (*Magnolia virginiana*)
- Blackgum (*Nyssa sylvatica*)
- Sweetgum (*Liquidambar styraciflua*)
- Swamp white oak (*Quercus bicolor*)

Shrubs

- Sweet pepperbush (*Clethra alnifolia*)
- Fetter-bush (*Leucothoe racemosa*)
- Winterberry (*Ilex verticillata*)
- Smooth winterberry (*Ilex laevigata*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Swamp azalea (*Rhododendron viscosum*)
- Possum-haw (*Viburnum nudum*)
- Shadbush (*Amelanchier canadensis*)

Herbs

- Marsh St. John's-wort (*Triadenum virginicum*)
- Violets (*Viola* spp.)
- Cinnamon fern (*Osmunda cinnamomea*)
- Royal fern (*Osmunda regalis*)
- Southern twayblade (*Listera australis*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Southern Red Maple - Blackgum Swamp Forest (CEGL006238)

NatureServe Ecological Systems:

Northern Atlantic Coastal Plain Stream and River (CES203.070)
Northern Atlantic Coastal Plain Pitch Pine Lowland (CES203.374)

Origin of Concept

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

Pennsylvania Community Code

SX : Miscellaneous Palustrine/Floodplain Forest

Similar Ecological Communities

The presence of red maple (*Acer rubrum*) with sweet-bay magnolia (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), and other coastal plain species clearly distinguishes the Red Maple – Magnolia Palustrine Forest from other red maple dominated palustrine forests such as Red Maple – Blackgum Palustrine Forest and Red Maple – Black Ash Palustine Forest.

Fike Crosswalk

Red maple - magnolia coastal plain palustrine forest

Conservation Value

Red Maple – Magnolia Palustrine Forest is a rare community within the state and rare plant species found in this community may include sweet-bay magnolia (*Magnolia virginiana*), fetter-bush (*Leucothoe racemosa*), and possum-haw (*Viburnum nudum*).

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, as well as sedimentation. Invasive plant species such as tree-of-heaven (Ailanthus altissima), Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), and common reed (Phragmites australis spp. australis) can dominate this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

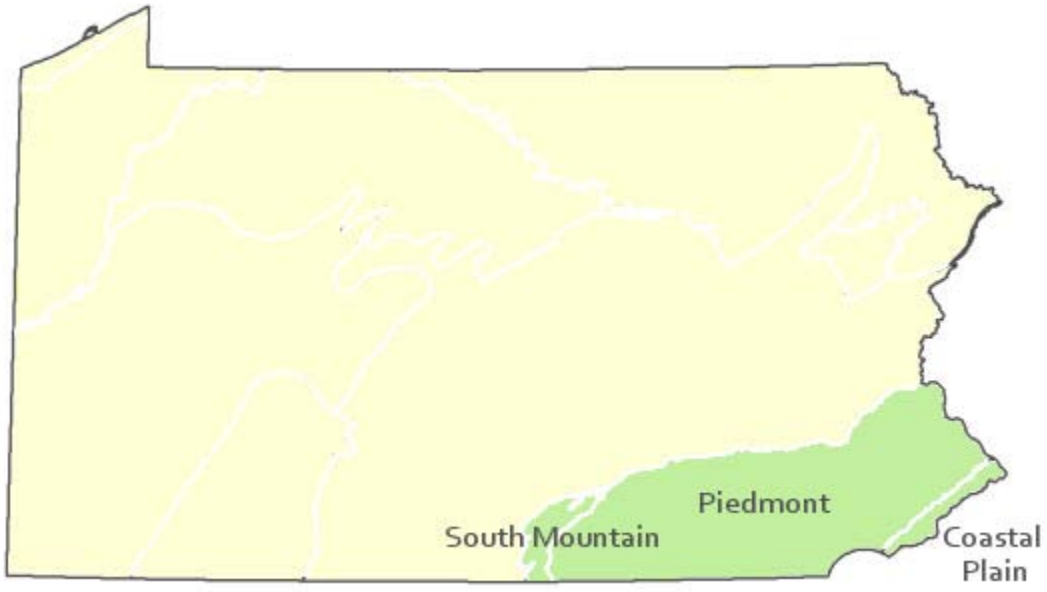
Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased sedimentation and altered hydrology. The development of the Coastal Plain in Pennsylvania contributed to the decline of this community. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations and habitat destruction.

Range Map



Pennsylvania Range

Coastal Plain, Piedmont, South Mountain.

Global Distribution

Delaware, New Jersey, Maryland, and Pennsylvania.

Silver Maple Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain

Global Rank: GNR, G4, G4?
State Rank: S4

General Description

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

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

Forest quality varies considerably across the range of this community type in Pennsylvania. Most stands exhibit a moderately open understory and regeneration of overstory trees has been a concern in Silver Maple Floodplain Forests in the region due to changes in frequency and duration of flooding events and invasion of exotic invasive plants.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Found on floodplains of large creeks and rivers
- Canopy dominated by silver maple

Characteristic Species

Trees

- Silver maple (*Acer saccharinum*)
- Red maple (*Acer rubrum*)
- Black willow (*Salix nigra*)
- Box-elder (*Acer negundo*)
- American elm (*Ulmus americana*)
- Red elm (*Ulmus rubra*)

Shrubs

- Silky dogwood (*Cornus amomum*)
- Gray dogwood (*Cornus racemosa*)

- Spicebush (*Lindera benzoin*)
- American elder (*Sambucus canadensis*)
- Northern arrow-wood (*Viburnum recognitum*)

Herbs

- Ostrich fern (*Matteuccia struthiopteris*)
- Jewelweed (*Impatiens capensis*)
- Turk's-cap lily (*Lilium superbum*)
- Clearweed (*Pilea pumila*)
- Rice cutgrass (*Leersia oryzoides*)
- Sensitive fern (*Onoclea sensibilis*)
- Jack-in-the-pulpit (*Arisaema triphyllum*)
- Green-dragon (*Arisaema dracontium*)
- Wood reedgrass (*Cinna arundinacea*)
- False nettle (*Boehmeria cylindrica*)
- Common blue violet (*Viola sororia*)
- Jumpseed (*Persicaria virginiana*)

Vines

- Riverbank grape (*Vitis riparia*)
- Poison-ivy (*Toxicodendron radicans*)

International Vegetation Classification Associations:

Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)
Silver Maple Floodplain Levee Forest (CEGL006147)
Silver Maple - Elm Forest (CEGL002586)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Fike, J. 1999. Terrestrial and palustrine plant communities of Pennsylvania. Pennsylvania Natural Diversity Inventory. Harrisburg, PA. 86 pp., Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0., Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501.

Pennsylvania Community Code

SM : Silver Maple Floodplain Forest

Similar Ecological Communities

Sugar Maple – Mixed Hardwood Floodplain Forests contain a greater diversity of canopy trees than the Silver Maple Floodplain Forest, which is dominated mainly by silver maple (*Acer saccharinum*). Sugar Maple – Mixed Hardwood Floodplain Forests are limited to rich sites on small to medium size tributaries. In addition to a greater diversity of canopy trees, including white ash and basswood, Sugar Maple – Mixed Hardwood Floodplain Forests exhibit a more diverse vernal flora than do the Silver Maple Floodplain Forest as nutrients, especially calcium are more available and sites are more protected from high intensity, long duration spring floods. Sugar Maple – Mixed Hardwood Floodplain Forests typically have more structural diversity than the Silver Maple Floodplain Forest types, with small trees and shrubs common in the subcanopy.

Fike Crosswalk

Silver Maple Floodplain Forest

Conservation Value

While this type itself is not rare in Pennsylvania, large contiguous forested floodplains along stretches of free flowing river are uncommon. Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and hold high conservation significance. 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 this wetland.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native

floodplain plants are displaced. Robust clonal invasive species such as Japanese knotweed (*Fallopia japonica*) may interfere with seedling recruitment in the understory. Development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution.

Management

Direct impacts to floodplain ecosystems (e.g., road construction, development, filling of wetlands) altered their composition, structure, and function statewide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

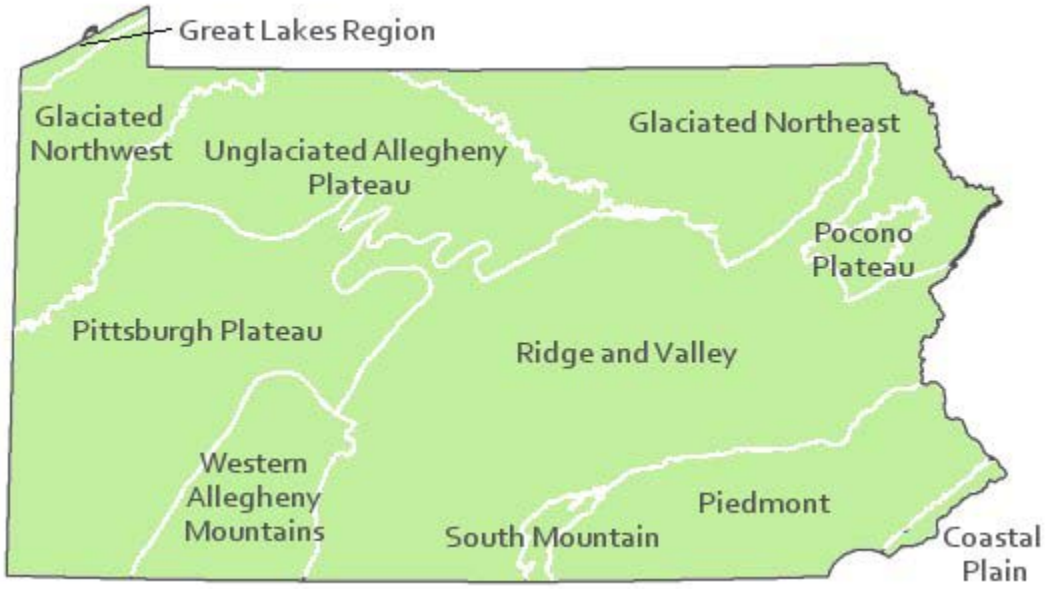
Research Needs

Variations may occur at ecoregional levels. This type occurs across the state, but several sub-types are described in NatureServe's International Vegetation Classification System, suggesting that more work is needed to investigate differences between silver maple forests across ecoregions. There is need to monitor high quality examples of this community type.

Trends

Silver Maple Floodplain Forests were undoubtedly more common and have declined due to dam impoundments, human development, and farming; modification of the adjacent upland has further impacted the quality of this type. As this type is dependent upon nutrient input and disturbance of flowing water, alteration of the natural flooding regime (duration and frequency) is most likely the most critical factor influencing the quality and persistence of this type. The relative trend for this community is likely stable or may be declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining due to invasion by exotic plant species and lack of periodic flooding events.

Range Map



Pennsylvania Range

Statewide

Global Distribution

This community occurs throughout the mid-Atlantic U.S. and has been identified in plant community classifications from Pennsylvania, New York, Maryland, and Delaware.

Sugar Maple – Mixed Hardwood Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain

Global Rank: GNR
State Rank: S4

General Description

There may be local variations seen in this type due to variation in microtopography within the floodplain. In addition to sugar maple (*Acer saccharum*) or black maple (*Acer nigrum*), one of which typically dominates the overstory, the canopy is composed of a diverse mix of associated tree species including basswood (*Tilia americana*), white ash (*Fraxinus americana*), green ash (*Fraxinus pennsylvanica*), bitternut hickory (*Carya cordiformis*), and American beech (*Fagus grandifolia*). While usually present, sycamore (*Platanus occidentalis*) and silver maple (*Acer saccharinum*) generally do not exceed 25% of the canopy. In flood channels and floodplain depressions, black ash (*Fraxinus nigra*) and red maple (*Acer rubrum*) may be present. On more exposed sites, with higher flooding velocities and coarser substrates, this community shares many characteristics with the Sycamore – Mixed hardwood Floodplain Forest and sycamore (*Platanus occidentalis*) may be a co-dominant. These forests typically have more structural diversity than the Silver Maple Floodplain Forest types, with sugar maple and white ash common in the subcanopy.

Rank Justification

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

Identification

- Found on floodplains of small to medium-sized tributaries of the Ohio River Basin and Delaware River
- Canopy dominated by sugar maple (*Acer saccharum*) and black maple (*Acer nigrum*)
- Soils are typically rich, with pH ranging from 6.5 to 8.0

Characteristic Species

Trees

- Sugar maple (*Acer saccharum*)
- Black maple (*Acer nigrum*)
- Basswood (*Tilia americana*)
- White ash (*Fraxinus americana*)

- Green ash, red ash (*Fraxinus pennsylvanica*)
- Bitternut hickory (*Carya cordiformis*)
- American beech (*Fagus grandifolia*)
- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- Hornbeam (*Carpinus caroliniana*)

Shrubs

- Spicebush (*Lindera benzoin*)
- Arrow-wood (*Viburnum dentatum* var. *lucidum*)
- Elderberry (*Sambucus nigra* ssp. *canadensis*)

Herbs

- Clearweed (*Pilea pumila*)
- Sensitive fern (*Onoclea sensibilis*)
- Ostrich fern (*Matteuccia struthiopteris*)
- Jack-in-the-pulpit (*Arisaema triphyllum*)
- Christmas fern (*Polystichum acrostichoides*)
- Foamflower (*Tiarella cordifolia*)
- Wood geranium (*Geranium maculatum*)
- False nettle (*Boehmeria cylindrica*)
- Common blue violet (*Viola sororia*)
- Cream violet (*Viola striata*)
- White-snakeroot (*Ageratina altissima* var. *altissima*)
- Wakerobin (*Trillium erectum*)
- Toadshade (*Trillium sessile*)
- Blue-eyed-mary (*Collinsia verna*)

- Wood-nettle (*Laportea canadensis*)
- Jumpseed (*Persicaria virginiana*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Ramp (*Allium tricoccum*)
- Blue cohosh (*Caulophyllum thalictroides*)
- Ostrich fern (*Matteuccia struthiopteris*)
- Wild-ginger (*Asarum canadense*)

Vines

- Poison-ivy (*Toxicodendron radicans*)

International Vegetation Classification Associations:

Terrace Hardwood Floodplain Forest (CEGL006114)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

SX : Miscellaneous Palustrine/Floodplain Forest

Similar Ecological Communities

Silver Maple Floodplain Forest are dominated by silver maple and occupy a broader ecological position within the floodplain, whereas the Sugar Maple – Mixed Hardwood Floodplain Forests are limited to rich sites on small to medium size tributaries. In addition to a greater diversity of canopy trees, including white ash (*Fraxinus americana*) and basswood (*Tilia americana*), Sugar Maple – Mixed Hardwood Floodplain Forest exhibits a more diverse vernal flora than the Silver Maple Floodplain Forest as nutrients, especially calcium, are more available and sites are more protected from high intensity, long duration spring floods. Sugar Maple – Mixed Hardwood Floodplain Forests typically have more structural diversity than the Silver Maple Floodplain Forest, with small tree and shrubs common in the subcanopy.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Ohio River Basin.

Conservation Value

Large contiguous forested floodplains along stretches of free-flowing river are uncommon. Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and hold a high conservation significance. This community may host rare plant species including declined trillium (*Trillium flexipes*), wild-oat (*Chasmanthium latifolium*), and purple-rocket (*Iodanthus pinnatifidus*). 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 this wetland.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous landuse planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

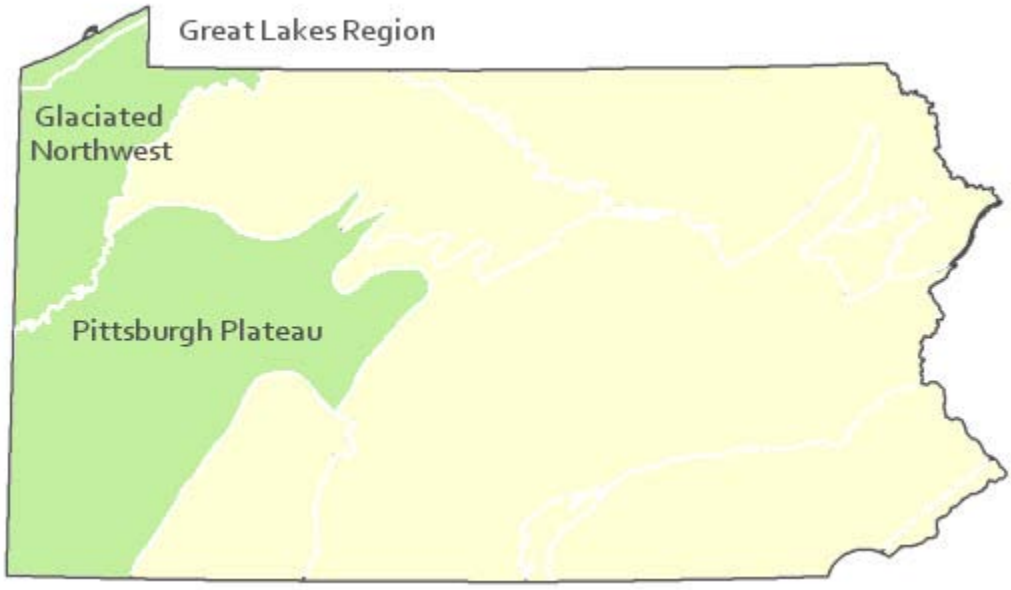
Research Needs

Naturally occurring patches of this type are limited to the Ohio River Basin. While sugar maple dominated forests are often present on floodplains throughout the state, they are often found on sites highly altered by human activity. These may represent remaining, but modified, woodlots between fields, or sites where sugar maple expanded into areas previously dominated by silver maple, sycamore, or other floodplain species following alteration of the natural flooding regime More work needs to be done to determine the origin of the altered sugar maple forest patches across the state and identify characteristics that can be used to differentiate these from the naturally occurring Sugar Maple – Mixed Hardwood Floodplain Forest. Additionally, there is a need to monitor high quality examples of this community type.

Trends

Sugar Maple – Mixed Hardwood Floodplain Forests were undoubtedly more common and have declined due to dam impoundments, human development, and conversion of the rich floodplain sites to agriculture; modification of the adjacent upland has further impacted the quality of this type. Conversion of rich floodplain areas to agriculture probably contributed the most to loss of this type across its range. In addition, as this type is dependent upon nutrient input and disturbance from flowing water, alteration of the natural flooding regime (duration and frequency) also contributed to changes in the composition of this type, as species not able to tolerate periodic inundation were able to gain a foothold. The relative trend for this community is most likely declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and lack of periodic flooding events.

Range Map



Pennsylvania Range

Glaciated Northwest, Pittsburgh Plateau, and Great Lakes Region

Global Distribution

Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont.

Sweetgum – Willow Oak Coastal Plain Palustrine Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): Costal Plain

Global Rank: GNR
State Rank: S1

General Description

Sweetgum – Willow Oak Coastal Plain Palustrine Forest occupies depressions that are often flooded during winter and spring to a depth of up to 1 m. These depressions are larger than the typical vernal pool and have less distinct boundaries. The resulting low areas of Sweetgum – Willow Oak Coastal Plain Palustrine Forest are interspersed with patches of slightly higher, better drained forest with a similar species composition. Shrub growth may be dense, especially in the slightly higher areas, margins, bases of trees etc.; Swamp dog-hobble (*Leucothoe racemosa*), sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and southern arrow-wood (*Viburnum dentatum*) are characteristic shrubs. The herbaceous layer is sparse where water stands for the longest time. In slightly higher areas the following are common: cinnamon fern (*Osmunda cinnamomea*), sedges (*Carex intumescens, C. tribuloides, C. abscondita*), Canada mayflower (*Maianthemum canadense*), and bellwort (*Uvularia sessilifolia*).

Rank Justification

This forest type is limited to the 5—6 mile wide strip of Atlantic Coastal Plain that extends along the Delaware Estuary in southeastern Pennsylvania. Proximity to Philadelphia has resulted in urbanization and suburbanization of much of the coastal plain, leaving little of the original natural vegetation. The largest remaining examples are the 239-acre Delhaas Woods Preserve which encompasses several coastal plain forest types and the 285-acre Five Mile Woods Preserve. Other tracts are fragmented and highly vulnerable to invasion by non-native, invasive species.

Identification

- Occurs only on the coastal plain
- Sweetgum (*Liquidambar styraciflua*) is a prominent component of the canopy

- Occupies slight depressions in an otherwise nearly level landscape
- Characterized by extensive seasonal flooding
- Herbaceous and shrub growth are thin or lacking in areas of deepest water

Characteristic Species

Trees

- Sweetgum (*Liquidambar styraciflua*)
- Willow oak (*Quercus phellos*)
- Swamp chestnut oak (*Quercus michauxii*)
- Pin oak (*Quercus palustris*)
- Swamp white oak (*Quercus bicolor*)
- Red maple (*Acer rubrum*)
- Blackgum (*Nyssa sylvatica*)
- River birch (*Betula nigra*)

Shrubs

- Sweet pepperbush (*Clethra alnifolia*)
- Fetter-bush (*Leucothoe racemosa*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Southern arrow-wood (*Viburnum dentatum*)
- Swamp dewberry (*Rubus hispidus*)
- Poison-ivy (*Toxicodendron radicans*)
- Pinxter-flower (*Rhododendron periclymenoides*)
- Catbrier (*Smilax glauca*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)
- New York fern (*Thelypteris noveboracensis*)

- Sedge (*Carex intumescens*)
- Sedge (*Carex tribuloides*)
- Canada mayflower (*Maianthemum canadense*)
- Clearweed (*Pilea pumila*)
- False nettle (*Boehmeria cylindrica*)
- Jewelweed (*Impatiens capensis*)
- Long's sedge (*Carex longii*)
- Bellwort (*Uvularia sessilifolia*)

International Vegetation Classification Associations:

Red Maple - Sweetgum Swamp (CEGL006110)

NatureServe Ecological Systems:

None

Origin of Concept

Rhoads, Ann F. and Timothy A. Block. 2011. Natural Areas Inventory Update of Bucks County Pennsylvania. Bucks County Commissioners, Doylestown, PA.

Pennsylvania Community Code

MX : Sweet Gum – Oak Coastal Plain Forest

Similar Ecological Communities

The Sweetgum – Willow Oak Coastal Plain Palustrine Forest is similar to vernal pool wetlands as well as adjacent terrestrial forests on the Costal Plain of Pennsylvania. The Non-vegetated Vernal Pool Community differs from the Sweetgum – Willow Oak Coastal Plain Palustrine Forest mainly in its more distinct margin and smaller size. The Sweetgum – Willow Oak Coastal Plain Palustrine Forest often occurs as a wide “bottom-land” with extensive seasonal flooding which, when the water drops, become un-vegetated areas. Both support species associated with vernal pool wetlands. The Sweetgum – Oak Coastal Plain Forest is a terrestrial type not subjected to the seasonal flooding seen in the Sweetgum – Willow Oak Coastal Plain Palustrine Forest. In contrast to the Sweetgum – Willow Oak Coastal Plain Palustrine Forest, it exhibits a more-continuous herbaceous cover, often including club mosses, such as flat-branched ground-pine (*Lycopodium obscurum*) and running-pine (*Diphasiastrum digitatum*). There are also differences in the shrub-layer. Swamp dog-hobble (Leucothoe racemosa) is more common in Sweetgum – Willow Oak Coastal Plain Palustrine Forest patches, whereas pinxter-flower (*Rhododendron*

periclymenoides) becomes a more prominent part of the shrub layer in the Sweetgum – Oak Coastal Plain Forest.

Fike Crosswalk

None; this type is new to the Pennsylvania Plant Community Classification developed from inventory studies of Bucks County by Morris Arboretum.

Conservation Value

Rare community type in Pennsylvania, limited to the Atlantic Coastal Plain. This community provides habitat for species not found elsewhere in PA, including willow oak (*Quercus phellos*), swamp chestnut oak (*Quercus michauxii*), a sedge (*Carex abscondita*), and Long's sedge (*Carex longii*).

The seasonal flooding also contributes to amphibian breeding habitat for rare species including eastern spadefoot toad (*Scaphiopus holbrookii holbrookii)*, New Jersey chorus frog (*Pseudacris feriarum kalmii*), wood frog (*Lithobates sylvaticus*), and eastern mud turtle (*Kinosternon subrubrum subrubrum*).

Threats

Already limited in extent, occurrences of Sweetgum - Willow Oak Coastal Plain Palustrine Forest patches are threatened by activities that lead to further fragmentation and changes to the hydrological character. Most occurrences are threatened by invasive species, especially mile-a-minute (*Persicaria perfoliata*) and common reed (*Phragmites australis*), and over-browsing by white-tailed deer.

Management

All areas of natural vegetation adjacent to existing coastal plain preserves should be protected to prevent loss of habitat and/or fragmentation.

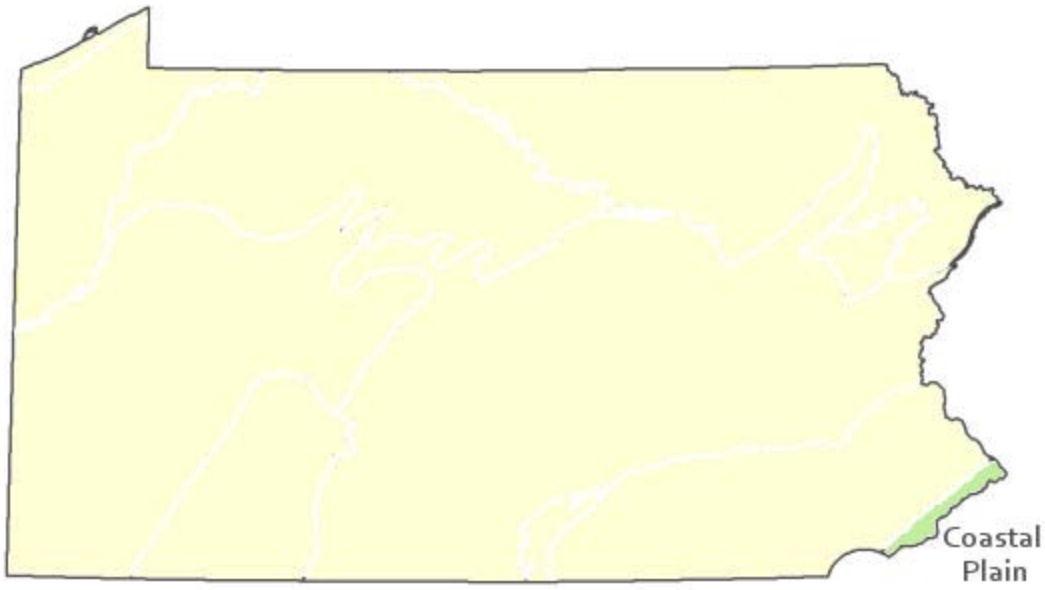
Research Needs

Remaining sites should be monitored for deer browse impact which appears to be increasing. A better understanding of the hydrology would be helpful in designing protection strategies.

Trends

Acreage has declined due to land development pressure; fragmentation of remaining examples has allowed invasion by non-native, invasive species of plants including mile-a-minute (*Persicaria perfoliata*), common reed (*Phragmites australis*), and Japanese honeysuckle (*Lonicera japonica*). Changes in soil acidity and nutrient status complicate restoration efforts on tracts that were formerly cultivated. Deer browse appears to be increasing.

Range Map



Pennsylvania Range

Southeastern strip of Bucks County parallel to the Delaware River

Global Distribution

Mid-Atlantic States of Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia (NatureServe 2011)

Sycamore – Mixed Hardwood Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain

Global Rank: GNR
State Rank: S4

General Description

This community is primarily associated with intermediate and smaller tributaries on low to intermediate elevation islands and terraces. The presence of several tree species with low to moderate flood tolerance suggests the substrate is sufficiently coarse and the flow is sufficiently rapid to prevent significant development of anaerobic soil conditions. The substrate is saturated or inundated annually from less than a week to as long as three months each year (typically more than 7 weeks each year). The substrate is usually coarse sand and gravel, often with inclusions of cobble-lined scour channels.

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

Rank Justification

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

Identification

- Found on low to intermediate elevation islands and terraces of intermediate and smaller tributaries of the Susquehanna and Delaware river basins
- The substrate is temporarily flooded from less than a week to as long as three months each year (typically more than 7 weeks each year)
- Clearly dominated by sycamore in the forest canopy, but usually has significant cover of one or more other hardwood species, usually river birch

- Influenced by high intensity flooding events

Characteristic Species

Trees

- Sycamore (*Platanus occidentalis*)
- River birch (*Betula nigra*)
- Silver maple (*Acer saccharinum*)
- Green ash, red ash (*Fraxinus pennsylvanica*)
- Black walnut (*Juglans nigra*)
- Black willow (*Salix nigra*)
- Box-elder (*Acer negundo*)

Shrubs

- Silky dogwood (*Cornus amomum*)
- Gray dogwood (*Cornus racemosa*)
- Ninebark (*Physocarpus opulifolius*)

Herbs

- Jewelweed (*Impatiens* spp.)
- Clearweed (*Pilea pumila*)
- False nettle (*Boehmeria cylindrica*)
- Wood-nettle (*Laportea canadensis*)
- Stinging nettle (*Urtica dioica*)
- Ostrich fern (*Matteuccia struthiopteris*)
- Wild germander (*Teucrium canadense*)
- Green-dragon (*Arisaema dracontium*)
- Goldenrods (*Solidago* spp.)
- Wingstem (*Verbesina alternifolia*)

- Riverbank wild-rye (*Elymus riparius*)
- Bugleweed (*Lycopus uniflorus*)

Vines

- Riverbank grape (*Vitis riparia*)
- Poison-ivy (*Toxicodendron radicans*)

International Vegetation Classification Associations:

Piedmont / Central Appalachian Rich Floodplain Forest (CEGL004073)
River Birch Low Floodplain Fores (CEGL006184)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501., Perles, S. J., G. S. Podniesinski, E. Eastman, L. A. Sneddon, and S. C. Gawler. 2007. Classification and Mapping of Vegetation and Fire Fuel Models at Delaware Water Gap National Recreation Area. Technical Report NPS/NER/NRTR—2007/076. National Park Service. Philadelphia, PA. , Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501.

Pennsylvania Community Code

SE : Sycamore – (River Birch) – Box Elder Floodplain Forest

Similar Ecological Communities

Sycamore – Mixed Hardwood Floodplain Forest is dominated by sycamore. River birch, which is often a canopy dominant of Sycamore – Mixed Hardwood Floodplain Forests, is absent, or nearly so, in the Sycamore Floodplain Forest. Differences in soils, site hydrology, stream order and landscape position, and other ecosystem factors contribute to differences in species composition between the Sycamore Floodplain Forest and Sycamore – Mixed Hardwood Floodplain Forest type associated with the Susquehanna and Delaware river basins.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins. It is related to the Sycamore - (river birch) - Box-elder Floodplain forest concept in Fike (1999), now separated into two types to reflect the near absence of river birch in the Ohio Drainage.

Conservation Value

While this type itself is not rare in Pennsylvania, large contiguous forested floodplains along stretches of free flowing river are uncommon. Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and hold high conservation significance. 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 this wetland.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and plant and animal species within. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous landuse planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

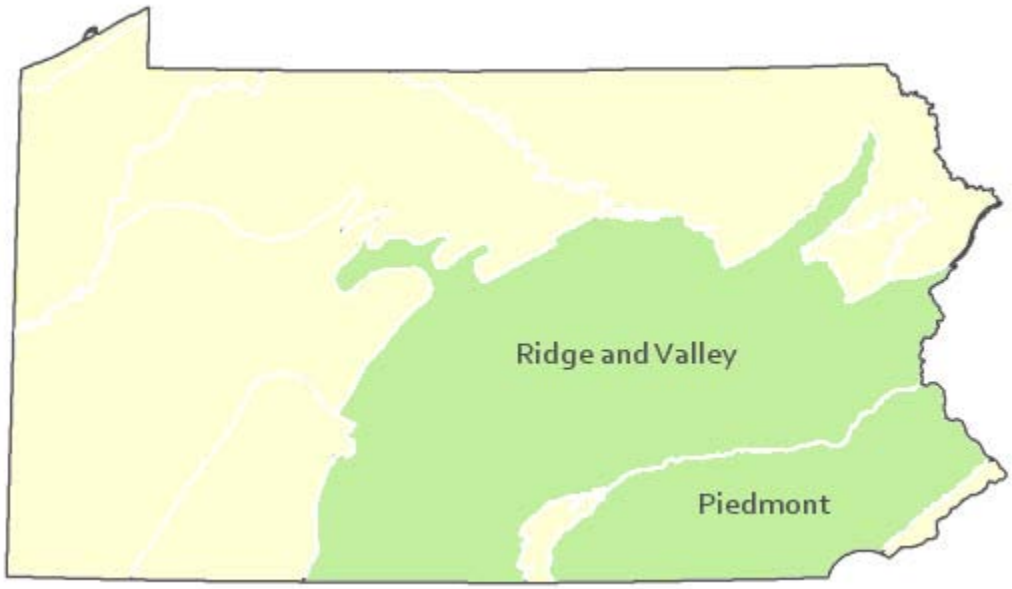
Research Needs

Variations occur at ecoregional levels. Plot data collected during floodplain studies to characterize floodplain communities indicated that Sycamore Floodplain Forests differ significantly between different drainages, most importantly, river birch (*Betula nigra*) shares dominance with sycamore in the Susquehanna drainage. Differences in soils, site hydrology, stream order and landscape position, and other factors contribute to differences in species composition between this type, primarily found in the Susquehanna and Delaware river basins and the similar Sycamore – Mixed Hardwood Floodplain Forest type associated with the Ohio Basin. There is need to monitor high quality examples of this community type.

Trends

Sycamore – Mixed Hardwood Floodplain Forests were undoubtedly more common but have declined due to dam impoundments, human development, and farming; modification of the adjacent upland has further impacted the quality of this type. As this type requires high velocity flows, alteration of the natural flooding regime (duration and frequency) has most likely been the most critical factor influencing the quality and persistence of this type. The relative trend for this community is likely stable or may be declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and lack of periodic flooding events.

Range Map



Pennsylvania Range

Ridge and Valley, Piedmont

Global Distribution

Delaware, Maryland, New Jersey, New York, Pennsylvania, Virginia, and West Virginia.

Sycamore Floodplain Forest

System: Palustrine
Subsystem: Forest
PA Ecological Group(s): River Floodplain

Global Rank: G4, GNR, G4
State Rank: S4

General Description

The Sycamore Floodplain Forest community typically occurs on the floodplains of intermediate to large order streams and rivers of the Ohio River basin, subject to extended periods of inundation, ice floe, and high velocity flood events. This type is found along higher gradient, smaller tributaries within the Susquehanna and Delaware River Basins. The sites supporting this type vary from islands, low bars, and cobble levees to low terraces and back channels (sloughs). The substrate may remain saturated or inundated for extended periods of time during the growing season. The substrate varies from well drained coarse sand, gravel, or cobble on bars, levees and islands in the stream channel to finer textured silt-loam of the sloughs and low terraces where flooding velocity is much reduced. The majority of stands appear to be roughly even-aged, suggesting the colonization of newly formed gravel/cobble bars after flood events. Where coarse sediment is accreting on the edge of existing sycamore stands, there may be several distinct cohorts of sycamore trees, with the oldest cohort furthest from the active stream channel. The community is characterized by a relatively open canopy dominated by sycamore (*Platanus occidentalis*). In the Ohio Basin, box-elder (*Acer negundo*) is often an important component of the understory. Silver maple (*Acer saccharinum*), is present, but not dominant, and river birch (*Betula*

nigra), may be present in this type in the Susquehanna and Delaware River Basins. Other tree species include red ash (*Fraxinus pennsylvanica*), black walnut (*Juglans nigra*), black willow (*Salix nigra*), and black maple (*Acer nigrum*). Common shrubs include silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), ninebark (*Physocarpus opulifolius*), riverbank grape (*Vitis riparia*), and poison-ivy (*Toxicodendron radicans*). Herbaceous species diversity and cover varies greatly with the density of the canopy. On sites with a closed canopy, jewelweed (*Impatiens spp.*), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), wood-nettle (*Laportea canadensis*), great nettle (*Urtica dioica*), ostrich fern (*Matteuccia struthiopteris*), northern germander (*Teucrium canadense*), jumpseed (*Persicaria virginiana*), Jack in-the-pulpit (*Arisaema triphyllum*), and green dragon (*Arisaema dracontium*) are common. With a more open canopy, goldenrods (*Solidago spp.*), wingstem (*Verbesina alternifolia*), and riverbank wild-rye (*Elymus riparius*) dominate the herbaceous layer. The shrub and herbaceous layers are often heavily impacted by non-native plant species such as multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), common privet (*Ligustrum vulgare*), Japanese barberry (*Berberis thunbergii*), reed canary-grass (*Phalaris arundinacea*), stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), dame's-rocket (*Hesperis matronalis*), and garlic mustard (*Alliaria petiolata*).

Rank Justification

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

Identification

- Found throughout the Ohio River Basin on river floodplains of large creeks and rivers, but limited to higher gradient, smaller tributaries in the Susquehanna and Delaware River Basins.
- Canopy dominated by sycamore
- Substrate supporting younger stands sandy/cobbly, but finer sediments may be present in stands of larger trees.
- Large amounts of flood debris, suggesting community is influenced by high intensity flooding events

Characteristic Species

Trees

- Sycamore (*Platanus occidentalis*)
- Box-elder (*Acer negundo*)
- River birch (*Betula nigra*)
- Silver maple (*Acer saccharinum*)
- Green ash, red ash (*Fraxinus pennsylvanica*)

- Black walnut (*Juglans nigra*)
- Black willow (*Salix nigra*)
- Black maple (*Acer nigrum*)

Shrubs

- Silky dogwood (*Cornus amomum*)
- Gray dogwood (*Cornus racemosa*)
- Ninebark (*Physocarpus opulifolius*)

Herbs

- Jewelweed (*Impatiens* spp.)
- Clearweed (*Pilea pumila*)
- False nettle (*Boehmeria cylindrica*)
- Wood-nettle (*Laportea canadensis*)
- Stinging nettle (*Urtica dioica*)
- Wild germander (*Teucrium canadense*)
- Jack-in-the-pulpit (*Arisaema triphyllum*)
- Green-dragon (*Arisaema dracontium*)
- Goldenrods (*Solidago* spp.)
- Wingstem (*Verbesina alternifolia*)
- Riverbank wild-rye (*Elymus riparius*)
- Winterberry (*Ilex verticillata*)
- Northern arrow-wood (*Viburnum recognitum*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Sedge (*Carex intumescens*)
- Sedge (*Carex lurida*)
- Short hair sedge (*Carex crinita* var. *crinita*)

- Marsh fern (*Thelypteris palustris*)
- Beggar-ticks (*Bidens frondosa*)
- Dotted smartweed (*Persicaria punctata*)
- Floating mannagrass (*Glyceria septentrionalis*)
- Bugleweed (*Lycopus uniflorus*)
- Jumpseed (*Persicaria virginiana*)

Vines

- Riverbank grape (*Vitis riparia*)
- Poison-ivy (*Toxicodendron radicans*)

International Vegetation Classification Associations:

New River Sycamore - Ash Floodplain Forest (CEGL006458)
Piedmont / Central Appalachian Rich Floodplain Forest (CEGL004073)
Sycamore - Silver Maple Calcareous Floodplain Forest (CEGL007334)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Enviro

Pennsylvania Community Code

SE : Sycamore – (River Birch) – Box Elder Floodplain Forest

Similar Ecological Communities

Sycamore Mixed – Hardwood Floodplain Forest is the predominant sycamore-dominated floodplain forest type in eastern Pennsylvania and often co-dominated by river birch. Differences in soils, site hydrology, stream order and landscape position, and other ecosystem factors contribute to differences in species composition between the Sycamore Floodplain Forest and Sycamore Mixed – Hardwood Floodplain Forest type associated with the Susquehanna and Delaware River Basins. River birch, which is often a canopy co-dominant of Sycamore Mixed – Hardwood Floodplain Forest, is absent, or nearly so, in the Sycamore Floodplain Forest.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins. It is related to the Sycamore - (river birch) - Box-elder Floodplain forest concept in Fike (1999), now separated into two types to reflect the near absence of river birch in the Ohio Drainage.

Conservation Value

The community is an important part of the river floodplain ecosystem, which provides significant ecosystem services such as sediment control, filtering runoff, and cooling overland flow of water, in addition to wildlife habitat,. Floodplain forests provide critical habitat for wildlife species. Abandoned oxbows, pools and depressions within the floodplain provide important breeding habitats for reptiles and amphibians. Great blue heron (*Adrea herodias*) nest in colonies on river floodplains near their riverine foraging areas. Standing dead trees (snags) provide cavities for bats, wood ducks (*Aix sponsa*), and other cavity nesting species. Large contiguous floodplain forests provide important habitat for wildlife species requiring large blocks of interior forest, such as neotropical migrants.

While this type itself is not rare in Pennsylvania, large contiguous forested floodplains along stretches of free flowing river are uncommon. Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and hold high conservation significance.

Threats

Alteration to the frequency and duration of flood events and conversion of the river floodplains for human development are the two greatest threats to this community statewide and can lead to outright habitat loss and/or shifts in community function and dynamics. Invasion of non-native invasive plants may also be equally devastating as native floodplain plants are displaced. Development of the adjacent uplands can lead to increased pollution and sedimentation though increased run off.

Management

Direct impacts to the floodplain ecosystems (i.e. road construction, development, filling of wetlands) have greatly alter their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (i.e. elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and plant and animal species within. Maintenance of natural buffers surrounding high quality examples floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of

the site should be avoided. Numerous land-use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include: protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

Research Needs

Variations occur at eco-regional levels. Plot data collected during floodplain studies to characterize floodplain communities indicated that Sycamore Floodplain Forests differ significantly between different drainages, most importantly, river birch (Betula nigra) shares dominance with sycamore in the Susquehanna drainage. Differences in soils, site hydrology, stream order and landscape position, and other factors contribute to differences in species composition between this type, primarily found in the Ohio Basin and the similar Sycamore – Mixed Hardwood Floodplain Forest type associated with the Susquehanna and Delaware River Basins, which includes the river birch as a canopy co-dominant. In addition to further studying the range of this type, there is need to monitor high quality examples of this community.

Trends

Sycamore Floodplain Forests were undoubtedly more common prior to wide-scale alteration of riverine ecosystems. Since European settlement this type has declined due to dam impoundments, human development, and farming; modification of the adjacent upland has further impacted the quality of this type. As this type requires high velocity flows, alteration of the natural flooding regime (duration and frequency) has most likely been the most critical factor influencing the quality and persistence of this type. The relative trend for this community is likely declining slightly due to development and further changes to river hydrology could(may?) result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and reduction in flooding frequency due to flood control and navigational dams.

Pennsylvania Range

This type is most common in the Ohio River Basin in Pennsylvania, but is also found along higher gradient, smaller tributaries of the Susquehanna and Delaware Rivers.

Global Distribution

This community occurs throughout eastern and midwestern U.S. and has been identified in plant community classifications from New York west to Indiana.

Palustrine Woodlands

Coniferous Palustrine Woodlands

Black Spruce – Tamarack Palustrine Woodland

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

Global Rank: G3G5
State Rank: S2

General Description

This describes a group of wetland woodlands found mostly in glacially formed, ice-block depressions (kettleholes) of small, higher-elevation watersheds of the glaciated regions of Pennsylvania and in cold-air pockets of drainages at higher elevations of the Unglaciated Allegheny Plateau. These wetlands are dominated by a mixture of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). These are trees of short stature (<30 feet) growing as a sparse overstory (<40% cover). The substrate consists of deep, poorly decomposed peat. The woodland is often found interior (i.e., closer to the middle of the wetland) to the Black Spruce-Tamarack Peatland Forest and on the edge of the low-shrub bog. There is generally very little groundwater or surface water enrichment in these systems, resulting in nutrient stressed, stunted trees. Other trees that may occur include gray birch (*Betula populifolia*) and red maple (*Acer rubrum*). The sparse woodland gives way to tall black spruce and tamarack (Black Spruce – Tamarack Peatland Forest) away from the bog mat and this peatland forest gives way to a fringe of hemlock and other tall trees at the outer edge of the wetland where organic soils thin and become mineral. At this interface there is more nutrient input from surface and groundwater from the surrounding uplands.

The dominant shrub species is usually leatherleaf (*Chamaedaphne calyculata*), but may also include Labrador-tea (*Rhododendron groenlandicum*), bog-rosemary (*Andromeda polifolia*), swamp azalea

(*Rhododendron viscosum*), mountain-holly (*Ilex mucronata*), winterberry (*Ilex verticillata*), and highbush blueberry (*Vaccinium corymbosum*) along with black chokeberry (*Photinia melanocarpa*), black huckleberry (*Gaylussacia baccata*) and sheep laurel (*Kalmia angustifolia*). The sedge, *Carex trisperma*, is often dominant along with a carpet of sphagnum mosses. Other species include star-flower (*Trientalis borealis*), white beak-rush (*Rhynchospora alba*), cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris palustris*), violets (*Viola* spp.), creeping snowberry (*Gaultheria hispidula)* and goldthread (*Coptis trifolia*). Sphagnum occurs throughout.

Rank Justification

Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation.

Identification

- Occurs on saturated soils in deep, peat-filled depressions with little inflow or outflow in small watersheds at high elevations in Pennsylvania (1000-2000 ft.)
- Conifers are dominant with only a few scattered broad-leaved deciduous trees, mostly red maple and gray birch
- Trees tend to be less than 30 feet tall and sparsely distributed (<40% cover)
- Often associated with an open bog-mat community dominated by leatherleaf, sedges, and sphagnum mosses
- Found between the low shrub bog and the surrounding wetland conifer forest

Characteristic Species

Trees

- Black spruce (*Picea mariana*)
- Tamarack (*Larix laricina*)

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sheep laurel (*Kalmia angustifolia*)
- Black huckleberry (*Gaylussacia baccata*)
- Bog laurel (*Kalmia polifolia*)

Herbs

- Sedge (*Carex trisperma*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Pitcher-plant (*Sarracenia purpurea*)
- Spatulate-leaved sundew (*Drosera intermedia*)
- Round-leaved sundew (*Drosera rotundifolia*)
- Small cranberry (*Vaccinium oxycoccos*)
- Cranberry (*Vaccinium macrocarpon*)
- White beak-rush (*Rhynchospora alba*)
- Tawny cotton-grass (*Eriophorum virginicum*)

Bryophytes

- *Sphagnum* spp.
- *Pleurozium schreberi*
- *Aulacomnium* spp.
- *Dicranum* spp.

International Vegetation Classification Associations:

Black Spruce Woodland Bog (CEGL006098)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

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

Pennsylvania Community Code

WB : Black Spruce – Tamarack Palustrine Woodland

Similar Ecological Communities

Black Spruce – Tamarack Woodland is closely related to the Black Spruce – Tamarack Peatland Forest plant community type, which may occur adjacent to the woodland type. The distinction between the

two is the percent canopy cover; the forested type typically has greater than 60% cover by trees, the woodland type is less than 60% cover.

Red Spruce Mixed Hardwood Palustrine Woodland and Black Spruce – Tamarack Woodland are similar in species composition but Red Spruce Mixed Hardwood Palustrine Woodland differs from this community type in that the Red Spruce Mixed Hardwood Palustrine Woodland is dominated by red spruce (*Picea rubra*).

Fike Crosswalk

Black Spruce – Tamarack Palustrine Woodland

Conservation Value

This is a rare plant community in Pennsylvania that has an unusual array of species and is habitat for both rare and common species of plants and animals that reside nowhere else in Pennsylvania including pitcher-plant (*Sarracenia purpurea*), sundews (*Drosera* spp.), and the white-throated sparrow (*Zonotrichia albicollis*). This community provides wintering habitat for northern bird species of spruce forests and woodlands that migrate south during severe winters. Some rare species found in this community include heartleaf twayblade (*Listera cordata*), dwarf mistletoe (*Arceuthobium pusillum*), Labrador-tea (*Rhododendron groenlandicum*), bog sedge (*Carex paupercula*), few-flowered sedge (*Carex pauciflora*), Collin's sedge (*Carex collinsii*), few-seeded sedge (*Carex oligosperma*), blackpoll warbler (*Dendroica striata*), bog copper butterfly (*Lycaena epixanthe*), and snowshoe hare (*Lepus americanus*). This community can provide archaeological/historical data on past climates and species as the acidic conditions prevent breakdown of pollen and plant residue in peat.

Threats

Black Spruce – Tamarack Woodlands are threatened by habitat alteration in the small watersheds they occupy, nutrient input from surrounding uplands, and alterations to the hydrologic regime (beaver dams, lowering or raising of water tables). Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation. As global climate change progresses, many boreal characteristic species within this community type may be intolerable of increasing temperatures. Invasive exotic plant species are not likely to be a threat unless there is nutrient input from surrounding uplands. Spruce budworm (*Choristoneura fumiferana*) and exotic invasive insects that feed on conifers may be a threat. Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species.

Management

In Pennsylvania, this community type is found in small watersheds on glacial deposits derived from sandstone and conglomerate as well as high-elevation wetlands of the Unglaciated Allegheny Plateau. These wetland communities depend on low availability of nutrients, minimal surface water and ground water inputs, and potentially cold temperatures. Development should be restricted to prevent alterations to the hydrologic and nutrient processes that drive this community.

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Since this community type is easily impacted by nutrient inputs, we would suggest a significant buffer between any logging operations or development and the wetland. Issues include the potential for soil erosion based on soil texture, condition of the adjacent vegetation (mature forests vs. early successional forests), and slope. As slope steepness increases the buffer should be extended. Impervious surfaces and compacted soils surrounding the wetland should be minimized to prevent surface runoff. Direct impacts and habitat alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Where impacts are necessary low-impact alternatives (e.g., elevated footpaths, boardwalks, bridges) are encouraged. Multiple high-quality examples of this type should come under conservation protection.

Research Needs

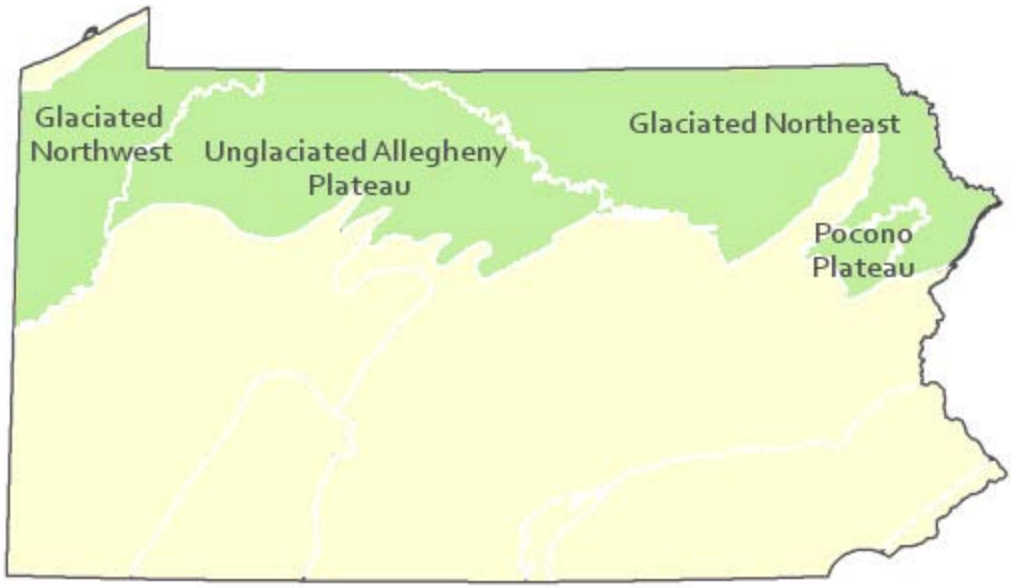
Variations may occur at eco-regional levels. There is a need to collect community plot data to characterize variations of this community to assist further classification. It is possible that this and other conifer wetland types were never logged. Knowing tree age and wetland history will provide information on the natural successional trajectory of this wetland as well as the vegetation and landscape of Pennsylvania prior to large-scale development. With potential global climate change, this community type is likely to be impacted. Occurrences of this community should be monitored for impacts such as changes in the health of the associated species and whether species composition shifts with the climate to determine if this community will persist in Pennsylvania.

Trends

The relative trend for this community is likely declining in the short term due to flooding from beaver activity. If natural succession is allowed to continue, many of these flooded occurrences will recover over time if potential global climate change does not prevent recovery.

Black Spruce – Tamarack Woodlands were probably more common in the northeast at one time but declined due to wetland draining for peat excavation, which was often followed by flooding for recreation. This type of alteration no longer occurs. Potential global climate change may be the biggest threat to this community type in Pennsylvania. Black spruce may also be under threat from spruce budworm and exotic pests.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, Unglaciated Allegheny Plateau

Global Distribution

New Brunswick south to Pennsylvania and New Jersey

Pitch Pine – Leatherleaf Palustrine Woodland

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

Global Rank: G3G5
State Rank: S2

General Description

These wetlands occur on shallow peat over glacial till, often in burned-over areas, and/or in small, relatively closed basins. Scattered gray birch (*Betula populifolia*), eastern white pine (*Pinus strobus*), and red maple (*Acer rubrum*) may also occur, although pitch pine (*Pinus rigida*) is usually the dominant tree. Leatherleaf (*Chamaedaphne calyculata*) generally forms a dense, low shrub layer. Other shrubs include black chokeberry (*Photinia melanocarpa*), velvetleaf blueberry (*Vaccinium myrtilloides*), sheep laurel (*Kalmia angustifolia*), Labrador-tea (*Rhododendron groenlandicum*), rhodora (*Rhododendron canadense*), black huckleberry (*Gaylussacia baccata*), and scattered highbush blueberry (*Vaccinium corymbosum*). There is a dense sphagnum layer beneath, often with cranberry (*Vaccinium macrocarpon*). Common herbaceous species include the sedge, (*Carex trisperma*), and cotton-grass (*Eriophorum vaginatum*). This community may grade into the pitch pine-rhodora-scrub oak barrens community, a community that is similar structurally and may contain many of the same species but is an upland type.

Rank Justification

Critically imperiled in the nation or state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

Identification

- Dominated by pitch pine (*Pinus rigida*) and leatherleaf (*Chamaedaphne calyculata*)
- Typically associated with scrub oak and pitch pine barrens on ridgetops
- Canopy cover is between 10% and 60%

Characteristic Species

Trees

- Pitch pine (*Pinus rigida*)
- Red maple (*Acer rubrum*)
- Gray birch (*Betula populifolia*)

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sheep laurel (*Kalmia angustifolia*)
- Sour-top blueberry (*Vaccinium myrtilloides*)
- Cranberry (*Vaccinium macrocarpon*)
- Labrador-tea (*Rhododendron groenlandicum*)

Herbs

- Sedge (*Carex trisperma*)
- Cotton-grass (*Eriophorum vaginatum*)
- Thread rush (*Juncus filiformis*)
- Cotton-grass (*Eriophorum vaginatum*)
- Tawny cotton-grass (*Eriophorum virginicum*)

Bryophytes

- *Dicranum* spp.
- *Polytrichum commune*
- *Sphagnum* spp.

International Vegetation Classification Associations:

Pitch Pine Bog (CEGL006194)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

Pennsylvania Community Code

WP : Pitch pine – Leatherleaf Palustrine Woodland

Similar Ecological Communities

The dominance of pitch pine (*Pinus rigida*) along with leatherleaf (*Chamaedaphne calyculata*) distinguish Pitch Pine – Leatherleaf Palustrine Woodland from the other leatherleaf dominated community types such as Leatherleaf – Bog-rosemary Bog, Leatherleaf – Cranberry Bog, and Leatherleaf – Sedge Wetland.

Fike Crosswalk

Pitch Pine - Leatherleaf Palustrine Woodland

Conservation Value

This community is often found as part of the Ridgetop Acidic Barrens complex, which is a rare ecosystem in Pennsylvania supporting rare species. Rare plant species found in this community may include Labrador-tea (*Rhododendron groenlandicum*) and thread rush (*Juncus filiformis*). Pitch Pine – Leatherleaf Palustrine Woodlands may serve as habitat for birds of open low scrub habitats, such as white-throated sparrows (*Zonotrichia albicollis*).

Threats

Development and fire suppression are probably the greatest threats since the type appears to need fire to maintain its species composition and open canopy. Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation.

Management

Development should be restricted to prevent encroachment. This community is found in fire-maintained landscapes and controlled fires need to be allowed to sweep through the system on occasion. This community is probably not connected to the regional aquifer as it is perched above it for most of the year and is subject to drought. It depends on precipitation and run-off from surrounding uplands for surface water input. Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species.

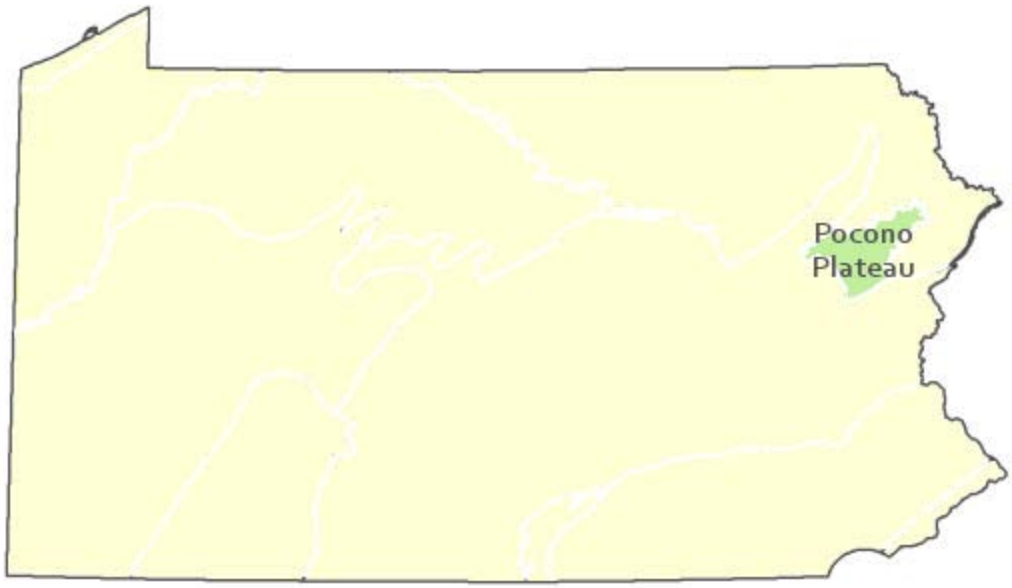
Research Needs

The role of fire in this community type needs to be investigated. Further, the role of factors such as frost, drought, heat, and inundation frequency and duration are not known. Variations may occur at ecoregional levels. There is a need to collect collect plot data to characterize variations of this community to assist further classification and determine if there are changes with time and lack of disturbance.

Trends

Pitch Pine – Leatherleaf Palustrine Woodland is probably relatively stable since the environmental conditions where this type is found are generally inhospitable to most invasive plants: soils that are low in nutrients, frequent fire, drought, water-logging, and frost. Without fire and other disturbances, this type may gradually succeed into a forested wetland.

Range Map



Pennsylvania Range

Pocono Plateau

Global Distribution

Connecticut, Maine, Massachuestts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, as well as Quebec, Canada

Coniferous - Broadleaf Palustrine Woodlands

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.

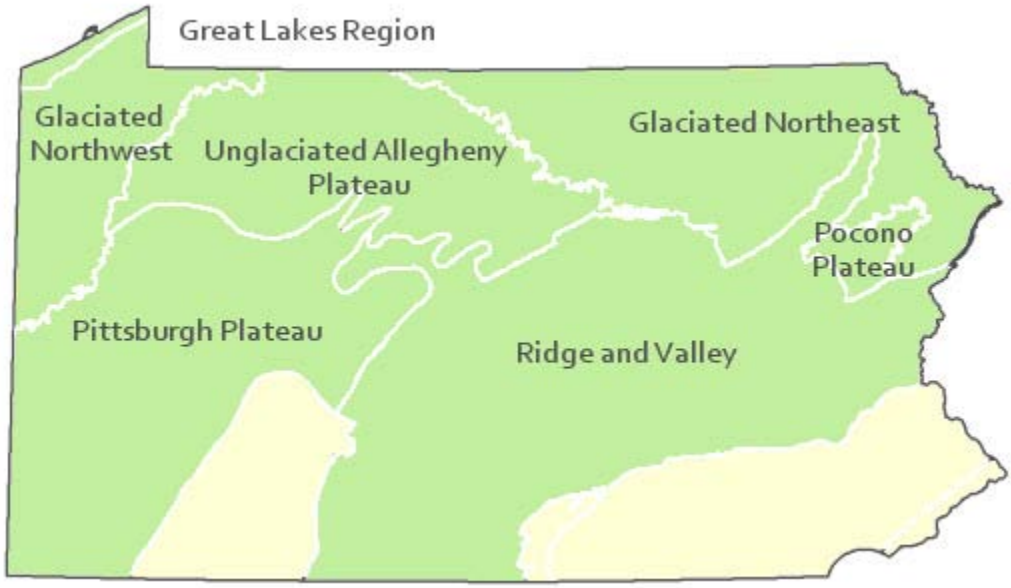
Research Needs

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

Red Spruce – Mixed Hardwood Palustrine Woodland

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

Global Rank: G2G3
State Rank: S3

General Description

These wetlands tend to be small in size, or may occur as part of a structurally diverse wetland complex. The substrate is usually sphagnum peat. Total tree cover is sparse, usually between 10% and 60% but often <40%. Red spruce (*Picea rubens*), sometimes in combination with other conifers, contributes between 25% and 75% of the canopy. Other conifer species that may occur include Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), and tamarack (*Larix laricina*). The most common hardwood species are yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), and occasionally blackgum (*Nyssa sylvatica*). The shrub layer can be dense and may include mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), and witherod (*Viburnum cassinoides*). Herbaceous and creeping shrub species include goldthread (*Coptis trifolia*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), marsh fern (*Thelypteris palustris*), sedges (*Carex disperma*, *Carex folliculata,* and *Carex trisperma*), violets (*Viola* spp.), creeping snowberry (*Gaultheria hispidula*), Canada mayflower (*Maianthemum canadensis*), asters, and grasses such as slender mannagrass (*Glyceria melicaria*). The bryophyte layer is usually well developed and dominated by sphagnum.

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Dominated by red spruce (*Picea rubens*), Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), tamarack (*Larix laricina*), yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), and occasionally blackgum (*Nyssa sylvatica*)
- Conifer tree species contributes between 25% and 75% of the canopy
- Hummock and hollow microtopography with sedges, forbs, and sphagnum and other mosses occupying the hummocks
- Canopy closure is less than 60%

Characteristic Species

Trees

- Red spruce (*Picea rubens*)
- Yellow birch (*Betula alleghaniensis*)
- Eastern hemlock (*Tsuga canadensis*)
- Balsam fir (*Abies balsamea*)
- Red maple (*Acer rubrum*)
- Black ash (*Fraxinus nigra*)

Shrubs

- Mountain holly (*Ilex mucronata*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Winterberry (*Ilex verticillata*)
- Maleberry (*Lyonia ligustrina*)
- Meadow-sweet (*Spiraea latifolia*)

Herbs

- Sedge (*Carex folliculata*)
- Dewdrop (*Dalibarda repens*)

- Rough aster (*Eurybia radula*)
- Slender mannagrass (*Glyceria melicaria*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Sensitive fern (*Onoclea sensibilis*)

Bryophytes

- *Sphagnum* spp.
- *Dicranum* spp.
- *Pleurozium schreberi*
- *Thuidium delicatulum*

International Vegetation Classification Associations:

Red Spruce / Heath / Peatmoss Woodland Swamp (CEGL006588)

NatureServe Ecological Systems:

High Allegheny Wetland (CES202.069)
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

WS : Red Spruce Palustrine Woodland

Similar Ecological Communities

Red Spruce – Mixed Hardwood Palustrine Woodland and Red Spruce – Mixed Hardwood Palustrine Forest are similar in species composition and occur adjacent to each other. The main distinguishing feature is that Red Spruce – Mixed Hardwood Palustrine Forest has a canopy cover greater than 60% and Red Spruce Palustrine – Mixed Hardwood Woodland has a canopy cover less than 60%.

Fike Crosswalk

Red Spruce Palustrine Woodland

Conservation Value

This community serves as nesting habitat for songbirds such as blackburnian and black-throated green warblers and wintering habitat for many other songbirds. Rare species that may occur within Red Spruce – Mixed Hardwood Palustrine Woodland include creeping snowberry (*Gaultheria hispidula*), rough-leaved aster (*Eurybia radula*), and snowshoe hare (*Lepus americanus*)

Threats

Red Spruce – Mixed Hardwood Palustrine Woodlands are threatened by habitat alteration in the watersheds they occupy, nutrient input from surrounding uplands, and alterations to the hydrologic regime (beaver dams, road crossings that impede water movement, lowering or raising of water tables). Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation. Clearing adjacent lands can also lead to vulnerability to wind damage since the trees have shallow root systems. As global climate change progresses, this community type may recede north. Invasive exotic plant species are not likely to be a threat unless there is nutrient input from surrounding uplands. Spruce budworm (*Choristoneura fumiferana*) and exotic invasive insects that feed on conifers may be a threat.

In Pennsylvania, this community type is found in small watersheds on glacial deposits derived from sandstone and conglomerate. These wetland communities depend on low to moderate availability of nutrients, moderate surface water and ground water inputs, and probably cold temperatures. Development should be restricted to prevent alterations to the hydrologic and nutrient processes that drive this community.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Since these communities are impacted by nutrient inputs and wind-throw, a buffer between any logging operations or development and the wetland is suggested. 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. 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 and habitat alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Low-impact alternatives (e.g., elevated footpaths, boardwalks, bridges that do not impede flow) are encouraged if impacts are neccessary. Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species. Indirect impacts such as isolation of the wetland by development from other similar wetlands may be a threat to the persistence of the type.

Research Needs

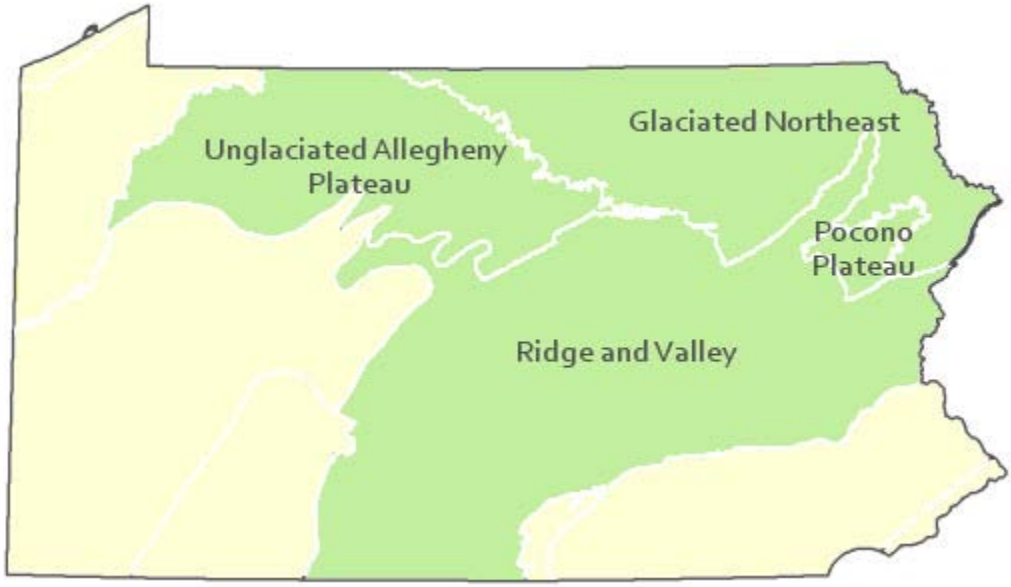
There is a need to monitor this community type to assess if potential climate change will alter the environmental conditions required for this community to persist.

Trends

Wetland protection has most likely stabilized the loss of wetlands in general. However, the relative trend for this community is likely declining in the short term due to flooding from beaver activity. If natural succession is allowed to continue and potential climate change does not influence this community, many of these flooded occurrences will recover over time.

Red Spruce – Mixed Hardwood Palustrine Woodlands may have been more common in the northeast at one time but declined due to wetland draining and filling. This type of alteration no longer occurs. However, development continues around the edges of the red spruce wetlands leading to geographic isolation. Global climate change may be the biggest threat to this community type in Pennsylvania. Red spruce (*Picea rubens*) may be under threat from spruce budworm (*Choristoneura fumiferana*) and exotic pests. If this occurs, these wetland forests will become hardwood swamps dominated by red maple.

Range Map



Pennsylvania Range

Glaciated Northeast, Pocono Plateau, Ridge and Valley and Unglaciated Allegheny Plateau

Global Distribution

Connecticut, Maine, Massachusetts, New Hampshire, New York, Pennsylvania, Vermont, and West Virginia. It also extends into New Brunswick and Quebec in Canada,

Broadleaf Woodlands

Red Maple – Highbush Blueberry Palustrine Woodland

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

Global Rank: G4
State Rank: S5

General Description

This community type usually occurs on mineral soil often with a layer of muck (occasionally occurs on peat). These woodlands (10-60% tree cover) may occur as isolated pockets in small depressions or as part of larger wetland complexes, and are often associated with past impoundment (beaver or other). This type is most typical of northern and colder portions of the state. Red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), and gray birch (*Betula populifolia*) are the most common tree species, although other species may also be present, including eastern white pine (*Pinus strobus*), pitch pine (*Pinus rigida*), yellow birch (*Betula alleghaniensis*), Eastern hemlock (*Tsuga canadensis*), tamarack (*Larix laricina*), and red spruce (*Picea rubens*). The most characteristic shrub species is highbush blueberry (*Vaccinium corymbosum*). Other shrubs that commonly occur are swamp azalea (*Rhododendron viscosum*), speckled alder (*Alnus incana*), red chokeberry (*Photinia pyrifolia*), maleberry (*Lyonia ligustrina*), mountain holly (*Ilex mucronata*), witherod (*Viburnum cassinoides*), northern arrow-wood (*Viburnum recognitum*), meadow-sweet (*Spiraea latifolia*), hardhack (*Spiraea tomentosa*), elderberry (*Sambucus canadensis*), and winterberry (*Ilex verticillata*). Herbaceous species include tussock sedge (*Carex stricta*) and other sedges (*Carex. folliculata, Carex* spp.), soft rush (*Juncus effusus*), mannagrasses (*Glyceria* spp.), three-way sedge (*Dulichium arundinaceum*), creeping spike-rush (*Eleocharis palustris*), marsh St. John's-wort (*Triadenum virginicum*), wool-grass (*Scirpus cyperinus*), bluejoint (*Calamagrostis canadensis*), and cinnamon fern (*Osmunda cinnamomea*).

Rank Justification

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

Identification

- Tree cover between 10 and 60%, dominated by red maple (*Acer rubrum*) and usually less than 30 feet tall
- Shrub layer is extremely dense with shrubs growing on hummocks and is dominated by highbush blueberry (*Vaccinium corymbosum*)
- Have standing water between the hummocks for most of the year with wapato (*Sagittaria latifolia*), bur-reed (*Sparganium americanum*), and other emergent aquatic plants

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Gray birch (*Betula populifolia*)
- Blackgum (*Nyssa sylvatica*)

Shrubs

- Highbush blueberry (*Vaccinium corymbosum*)
- Meadow-sweet (*Spiraea latifolia*)
- Steeple-bush (*Spiraea tomentosa*)
- Winterberry (*Ilex verticillata*)
- Northern arrow-wood (*Viburnum recognitum*)

Herbs

- Tussock sedge (*Carex stricta*)
- Sedge (*Carex folliculata*)
- Soft rush (*Juncus effusus*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Royal fern (*Osmunda regalis*)
- Marsh fern (*Thelypteris palustris*)

- Marsh St. John's-wort (*Triadenum virginicum*)
- Wool-grass (*Scirpus cyperinus*)
- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)

Vines

- Virginia-creeper (*Parthenocissus quinquefolia*)
- Poison-ivy (*Toxicodendron radicans*)

Bryophytes

- *Sphagnum* spp.
- *Thuidium delicatulum*
- *Polytrichum commune*
- *Hypnum* spp.

International Vegetation Classification Associations:

Blueberry Wetland Thicket (CEGL006371)

NatureServe Ecological Systems:

North-Central Appalachian Acidic Swamp (CES202.604)

Origin of Concept

Pennsylvania Community Code

WH : Red Maple – Highbush Blueberry Palustrine Woodland

Similar Ecological Communities

Red Maple – Highbush Blueberry Palustrine Woodland differs from the Red Maple – Sedge Palustrine Woodland and Red Maple – Mixed shrub Palustrine Woodland in that the dominant shrub species is highbush blueberry (*Vaccinium corymbosum*). Red Maple – Sedge Palustrine Woodland lacks a definitive shrub layer and is dominated by sedge species in the herb layer. Red Maple – Mixed shrub Palustrine Woodland has a shrub layer dominated by a combination of silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), smooth alder (*Alnus serrulata*), silky willow (*Salix sericea*), swamp rose (*Rosa palustris*), and/or buttonbush (*Cephalanthus occidentalis*).

Fike Crosswalk

Red Maple – Highbush Blueberry Palustrine Woodland

Conservation Value

This community serves as nesting habitat for birds such as swamp sparrow (*Melospiza georgiana*), yellow-rumped warbler (*Dendroica coronata*), and American goldfinch (*Carduelis tristis*) as well as foraging habitat for wood ducks (*Aix sponsa*), black ducks (*Anas rubripes*), and bat species. This community may serve as habitat for many species of dragonflies and damselflies. 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 this wetland.

Threats

Red Maple – Highbush Blueberry Palustrine Woodlands are threatened by habitat alteration in the watersheds they occupy and nutrient input from surrounding uplands. Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation. Clearing adjacent lands can also lead to wind damage since the trees have shallow root systems. Alterations to the hydrologic regime (beaver dams, road crossings that impede water movement, lowering or raising of water tables) may actually encourage this wetland type. Invasive exotic plant species are a threat when there is nutrient input from surrounding uplands. Species such as common reed (*Phragmites australis* ssp. *australis*), purple loosestrife (*Lythrum salicaria*), and other exotic invasive species can become abundant with increases in nutrients, sediments and other disturbances.

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. 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 and habitat alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species.

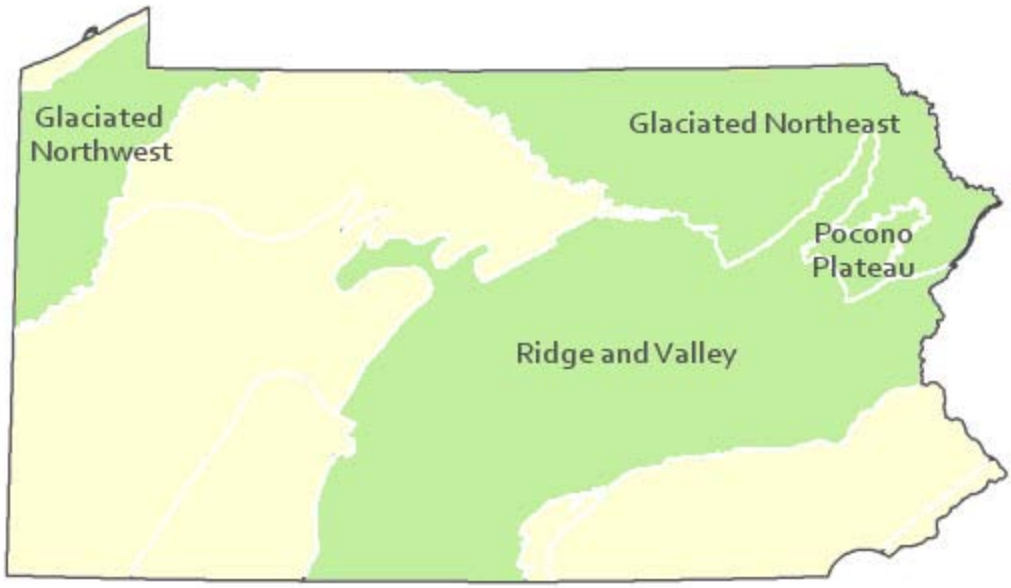
Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

Probably expanding due to beaver population expansion, housing development, and road construction.

Range Map



Pennsylvania Range

Glaciated NE, Glaciated NW, Pocono Plateau, Ridge and Valley

Global Distribution

Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Vermont

Red Maple – Mixed shrub Palustrine Woodland

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

Global Rank: G4G5
State Rank: S5

General Description

This community type usually occurs on mineral soil with a thin layer of muck. The pH is somewhat acidic to circumneutral. Trees are sparse (10-60% cover) and generally less than 30 feet tall. Red maple (*Acer rubrum*) dominates the canopy, sometimes with a mixture of other trees such as blackgum (*Nyssa sylvatica*), Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), black willow (*Salix nigra*), swamp white oak (*Quercus bicolor*), pin oak (*Q. palustris*), and black ash (*Fraxinus nigra*). The shrub layer is typically dense and includes silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), smooth alder (*Alnus serrulata*), silky willow (*Salix sericea*), swamp rose (*Rosa palustris*), and buttonbush (*Cephalanthus occidentalis*). Ferns usually dominate the herbaceous layer. Characteristic species include marsh fern (*Thelypteris palustris*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), crested wood fern (*Dryopteris cristata*), and royal fern (*Osmunda regalis*). Other herbs include skunk-cabbage (*Symplocarpus foetidus*),

beggar-ticks (*Bidens* spp.), jewelweed (*Impatiens capensis*), and in wetter areas, arrow-arum (*Peltandra virginica*), wapato (*Sagittaria latifolia*), and marsh-marigold (*Caltha palustris*).

Rank Justification

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

Identification

- Tree cover between 10 and 60%, dominated by red maple (*Acer rubrum*) and usually less than 30 feet tall
- Shrub layer is extremely dense with shrubs growing on hummocks, including silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), smooth alder (*Alnus serrulata*), silky willow (*Salix sericea*), swamp rose (*Rosa palustris*), and buttonbush (*Cephalanthus occidentalis*).
- Have standing water between the hummocks for most of the year with wapato (*Sagittaria latifolia*), bur-reed (*Sparganium americanum*), and other emergent aquatic plants

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Gray birch (*Betula populifolia*)
- Blackgum (*Nyssa sylvatica*)

- Black willow (*Salix nigra*)

Shrubs

- Smooth alder (*Alnus serrulata*)
- Swamp rose (*Rosa palustris*)
- Spicebush (*Lindera benzoin*)
- Silky dogwood (*Cornus amomum*)
- Buttonbush (*Cephalanthus occidentalis*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)
- Marsh fern (*Thelypteris palustris*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Jewelweed (*Impatiens capensis*)
- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)

Vines

- Virginia-creeper (*Parthenocissus quinquefolia*)
- Poison-ivy (*Toxicodendron radicans*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Southern New England / Northern Piedmont Red Maple Seepage Swamp (CEGL006406)

NatureServe Ecological Systems:

Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp (CES201.574)
North-Central Appalachian Acidic Swamp (CES202.604)
Central Appalachian Stream and Riparian (CES202.609)

Origin of Concept

Pennsylvania Community Code

WM : Red Maple – Mixed Shrub Palustrine Woodland

Similar Ecological Communities

Red Maple – Mixed shrub Palustrine Woodland differs from the Red Maple – Highbush Blueberry Palustrine Woodland and Red Maple – Sedge Palustrine Woodland in that the dominant shrub species is a combination of silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), smooth alder (*Alnus serrulata*), silky willow (*Salix sericea*), swamp rose (*Rosa palustris*), and/or buttonbush (*Cephalanthus occidentalis*). Red Maple – Sedge Palustrine Woodland lacks a definitve shrub layer and is dominated by sedge species in the herb layer. Red Maple – Highbush Blueberry Palustrine Woodland has a shrub layer dominated by highbush blueberry (*Vaccinium corymbosum*).

Fike Crosswalk

Red Maple – Mixed shrub Palustrine Woodland

Conservation Value

This community serves as nesting habitat for birds such as swamp sparrow (*Melospiza georgiana*), yellow-rumped warbler (*Dendroica coronata*), and American goldfinch (*Carduelis tristis*) as well as foraging habitat for wood ducks (*Aix sponsa*), black ducks (*Anas rubripes*), and bat species. This community may serve as habitat for many species of dragonflies and damselflies. 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 this wetland.

Threats

Red Maple – Mixed shrub Palustrine Woodlands are threatened by habitat alteration in the watersheds they occupy and nutrient input from surrounding uplands. Clearing and development of adjacent land can lead to an accumulation of run-off, pollution, and sedimentation. Clearing adjacent lands can also lead to wind damage since the trees have shallow root systems. Alterations to the hydrologic regime (beaver dams, road crossings that impede water movement, lowering or raising of water tables) may actually encourage this wetland type. Invasive exotic plant species are a threat when there is nutrient input from surrounding uplands. Species such as common reed (*Phragmites australis* ssp. *australis*), purple loosestrife (*Lythrum salicaria*), and other exotic invasive species can become abundant with increases in nutrients, sediments, and other disturbances.

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. 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 and habitat

alteration in the wetland should be avoided (e.g., roads, trails, filling of wetlands). Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species.

Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

This community tends to benefit from disturbance and may be expanding due to beaver population expansion as well as hydrological alterations resulting from housing development and road construction.

Range Map

Pennsylvania Range

Statewide

Global Distribution

Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Vermont

Red Maple – Sedge Palustrine Woodland

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

Global Rank: G3G5
State Rank: S5

General Description

This type typically occurs in areas of past impoundment (often by beaver). Red maple (*Acer rubrum*) is often the only tree species, although scattered blackgum (*Nyssa sylvatica*), eastern white pine (*Pinus strobus*), Eastern hemlock (*Tsuga canadensis*), birch (*Betula* spp.), swamp white oak (*Quercus bicolor*), pin oak (*Quercus palustris*), and others may also occur. There are frequently numerous snags and stumps of trees drowned out by fluctuating water levels. Depending on the condition of the dam and time since impoundment, the area may be very wet with areas of open water to nearly dry. Typically there is a thick sedge layer with a pronounced hummock and hollow microtopography and live or dead trees on many of the larger hummocks. The shrub layer is variable; it may be dense, especially at the upland border, to nearly absent. Some of the possible shrub species are smooth alder (*Alnus serrulata*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), meadow-sweet (*Spiraea latifolia*), steeplebush (*Spiraea tomentosa*), silky willow (*Salix sericea*), arrow-wood (*Viburnum recognitum*), silky dogwood (*Cornus amomum*), and elderberry (*Sambucus canadensis*). The herbaceous layer is strongly dominated by sedges; the most common species is tussock sedge (*Carex stricta*), although other sedge species (e.g., *C. lurida*, *C. intumescens*, *C. canescens*, *C. stipata,* and *C. tribuloides*) may also occur. Other herbaceous species include bluejoint (*Calamagrostis canadensis*), fly-away grass (*Agrostis scabra*),

rushes (*Juncus* spp.), three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), and marsh St. John's-wort (*Triadenum virginicum*), and in wetter areas, arrow-arum (*Peltandra virginica*), wapato (*Sagittaria latifolia*), and marsh-marigold (*Caltha palustris*).

Rank Justification

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

Identification

- Evidence of past impoundment
- Basins or streamside depressions with muck or mineral soils with a surface organic layer
- Pronounced hummock and hollow microtopography
- Dominated by red maple (*Acer rubrum*), tussock sedge (*Carex stricta*), and various other sedges (*C. lurida, C. intumescens, C. canescens, C. stipata, and C. tribuloides*)

Characteristic Species

Trees

- Red maple (*Acer rubrum*)

- Blackgum (*Nyssa sylvatica*)
- Eastern white pine (*Pinus strobus*)
- Eastern hemlock (*Tsuga canadensis*)
- Swamp white oak (*Quercus bicolor*)
- Pin oak (*Quercus palustris*)

Shrubs

- Smooth alder (*Alnus serrulata*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Winterberry (*Ilex verticillata*)
- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Meadow-sweet (*Spiraea latifolia*)
- Steeple-bush (*Spiraea tomentosa*)
- Silky willow (*Salix sericea*)
- Northern arrow-wood (*Viburnum recognitum*)
- Silky dogwood (*Cornus amomum*)
- American elder (*Sambucus canadensis*)

Herbs

- Tussock sedge (*Carex stricta*)
- Sedge (*Carex lurida*)
- Sedge (*Carex intumescens*)
- Sedge (*Carex canescens*)
- Sedge (*Carex stipata*)
- Sedge (*Carex tribuloides*)
- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)
- Fly-away grass (*Agrostis scabra*)

- Rushes (*Juncus* spp.)
- Three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*)
- Marsh St. John's-wort (*Triadenum virginicum*)
- Arrow-arum (*Peltandra virginica*)
- Wapato (*Sagittaria latifolia*)
- Marsh-marigold (*Caltha palustris*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Red Maple / Tussock Sedge Wooded Marsh (CEGL006119)

NatureServe Ecological Systems:

Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp (CES201.574)
North-Central Appalachian Acidic Swamp (CES202.604)

Origin of Concept

Pennsylvania Community Code

WD : Red Maple – Sedge Palustrine Woodland

Similar Ecological Communities

Red Maple – Sedge Palustrine Woodland, Red Maple – Mixed shrub Palustrine Woodland, and Red Maple – Highbush Blueberry Palustrine Woodland can occur in similar habitats and can grade into each other. The main distinguishing feature for Red Maple – Sedge Palustrine Woodland is the dominance of sedge species in the herb layer as well as the lack of a shrub layer that defines the Red Maple – Mixed shrub Palustrine Woodland and Red Maple – Highbush Blueberry Palustrine Woodland types.

Fike Crosswalk

Red Maple – Sedge Palustrine Woodland

Conservation Value

Red Maple – Sedge Palustrine Woodland is potential habitat for bog turtles (*Glyptemys muhlenbergii*) and marsh birds. 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 this wetland.

Threats

Alteration to the current hydrological regime and succession are major threats to this community and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as purple loosestrife (*Lythrum salicaria*) and Japanese stiltgrass (*Microstegium vimineum*) can be common in this community.

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. 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 and habitat alteration 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 can not 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.

Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

Wetland protection has most likely stabilized the decline of wetlands in general. Beaver activity has probably increased occurrences of this community type and the relative trend for this community is likely stable. The absence of beaver impoundments could result in a decrease of this community as it succeeds into the Red Maple – Mixed Shrub Palustrine Woodland or a forested wetland.

Range Map

Pennsylvania Range

Statewide

Global Distribution

Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Vermont

Palustrine Shrublands

Broadleaf Palustrine Shrublands

Acidic Mixed Shrub – Sphagnum Wetland

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: G5
State Rank: SNR

General Description

This community type typically occurs in upland depressions, along slow-moving streams, or associated with large wetland complexes, frequently influenced by beaver action or other impoundment. When part of a wetland complex, this community generally occurs at the landward edge of the acidic peat mat where it receives more enriched waters from groundwater discharge and/or inflow from the surrounding watershed. Hydrological conditions can range from temporarily flooded to seasonally flooded, or even saturated. The substrate may be peat or mineral soil with a substantial accumulation of organic matter. The pH of this community type is usually at the lower end of the spectrum as indicated by the presence of more acidophilic species.

The community type is characterized by a substantial tall-shrub layer that may be dominated by a single species or a patchwork of mixed species. Shrub species may include: smooth alder (*Alnus serrulata*), speckled alder (*A. incana* ssp*. rugosa*), highbush blueberry (*Vaccinium corymbosum*), maleberry (*Lyonia ligustrina*), winterberry (*Ilex verticillata*), mountain holly (*Ilex mucronata*), and leatherleaf (*Chamaedaphne calyculata*). The herbaceous layer may vary from sparse to patchily dense. Swamp dewberry (*Rubus hispidus*) is often found in the herbaceous layer along with mostly ferns and sedges. A

distinguishing characteristic of this community type is the presence of an extensive sphagnum (*Sphagnum* spp.) layer.

Rank Justification

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

Identification

- Occurs on saturated or semi-saturated soils in upland depressions, along slow-moving streams, or the landward edge of large wetland complexes
- Soils are very poorly drained peat or mineral soils with a substantial organic layer
- The pH of this wetland type is more acidic and is reflected in the associated shrub species and the presence of an extensive sphagnum layer
- Shrub layer may be dominated by a single shrub species or a mix of species with most being acidophiles
- An extensive sphagnum layer is present

Characteristic Species

Shrubs

- Smooth alder (*Alnus serrulata*)
- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Maleberry (*Lyonia ligustrina*)
- Mountain holly (*Ilex mucronata*)
- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Black chokeberry (*Photinia melanocarpa*)
- Swamp azalea (*Rhododendron viscosum*)
- Rhodora (*Rhododendron canadense*)
- Sheep laurel (*Kalmia angustifolia*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)

- Marsh fern (*Thelypteris palustris*)
- Swamp dewberry (*Rubus hispidus*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Northern Peatland Shrub Swamp (CEGL006158)

NatureServe Ecological Systems:

Boreal-Laurentian Bog (CES103.581)

Origin of Concept

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

Pennsylvania Community Code

SS : Alder – Sphagnum Wetland

Similar Ecological Communities

Acidic Mixed Shrub – Sphagnum Wetland differs from Circumneutral Mixed Shrub Wetland in that the Acidic Mixed Shrub – Sphagnum Wetland occupies the lower end of the pH spectrum while the latter is circumneutral to somewhat calcareous. The associate species reflect this shift, with acidophiles such as highbush blueberry (*Vaccinium corymbosum*) and maleberry (*Lyonia ligustrina*) occurring as associate species in the Acidic Mixed Shrub – Sphagnum Wetland, while shrubs like dogwoods (*Cornus* spp.) and viburnums (*Viburnum* spp.) occur in a more circumneutral setting. The presence of a substantial sphagnum layer within the Acidic Mixed Shrub – Sphagnum Wetland generally distinguishes the two community types.

Fike Crosswalk

Alder - sphagnum wetland

Conservation Value

This community may serve as important habitat for breeding birds, including woodcocks (*Scolopax minor*) and yellow-bellied flycatchers. Plant species of conservation concern may include screwstem (*Bartonia paniculata*) and Mountain Alder (*Alnus viridis*).

Threats

Acidic Mixed Shrub – Sphagnum Wetlands are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). Invasive species such as reed canary-grass (*Phalaris arundinacea*) may alter the species composition of this community type.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Soil erodibility in terms of the 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. Impervious surfaces surrounding the wetland should be minimized to prevent thermal pollution. Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetland) and low impact alternatives (e.g., elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland can not 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.

Acidic Mixed Shrub – Sphagnum Wetland is one example of declining shrubland habitat found in Pennsylvania. Shrubland habitats are early successional plant communities, often formed by disturbance event(s), which represent a short-lived transitional stage between more stable community types. Repeated disturbance events over time (either natural or anthropogenic) are needed to reset the community back to its earlier successional state. In the absence of disturbance, shrubland habitats may only remain a component of the landscape for 15-20 years before reverting to young forests. Shrublands provide habitat for many early successional-dependent species such as birds. Management activities such as removal of tree species, assisted disturbance, and invasive species control may be needed to maintain this community type.

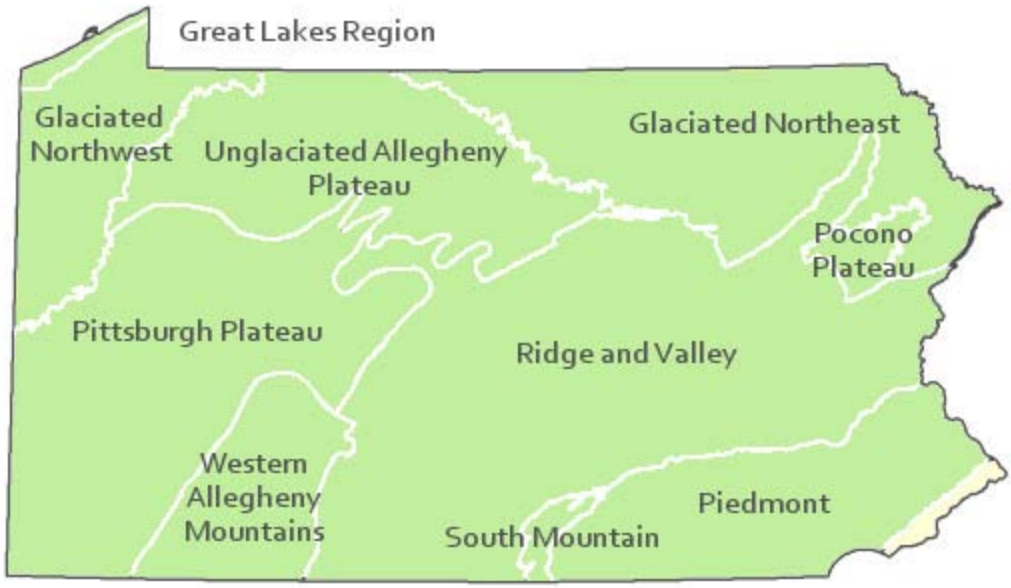
Research Needs

Variations may occur at eco-regional levels. There is a need to collect community plot data to examine eco-regional differences that may help to further refine the classification of this community.

Trends

Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is most likely stable or may be declining slightly due to hydrological alterations.

Range Map



Pennsylvania Range

This community is found in the entire state except within the Coastal Plains.

Global Distribution

Pennsylvania, New York, New Hampshire, Vermont, Maine, and possibly Massachusetts and extends into eastern Canada.

Alder – Dogwood Floodplain Thicket

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): River Floodplain

Global Rank: G5
State Rank: S4

General Description

This community occurs in the upper portions of the major drainages on smaller order streams. The Alder – Dogwood Riverine Shrubland is found on broad cobble flats or sand-over-cobble floodplain levees within the active channel, typically surrounded by and separated from the low-flow channel by the Periodically Exposed Shoreline Community. Alder – Dogwood Riverine Shrubland is subject to frequent flooding, high stream velocity, and ice scour since it occurs within the active stream channel.

The shrub component is moderately dense to dense and is dominated by speckled alder (*Alnus incana* ssp*. rugosa*), smooth alder (*Alnus serrulata*), black willow (*Salix nigra*), and silky dogwood (*Cornus amomum*). Steeplebush (*Spiraea tomentosa*), ninebark (*Physocarpus opulifolius*), sycamore (*Platanus occidentalis*), silky willow (*Salix sericea*), and silver maple (*Acer saccharinum*) are also commonly found. The moderately dense, diverse herbaceous layer contains many wetland species, such as reed canary-grass (*Phalaris arudinacea*), deer-tongue grass (*Dichanthelium clandestinum*), Virginia cutgrass (*Leersia virginica*), late goldenrod (*Solidago gigantea*), sedge (*Carex intumescens*), Virginia wild-rye (*Elymus virginicus*), gill-over-the-ground (*Glechoma hederacea*), wild germander (*Teucrium canadense*), tall meadow-rue (*Thalictrum pubescens*), big bluestem (*Andropogon gerardii*), muhly (*Muhlenbergia* spp.), Joe-Pye-weed (*Eutrochium fistulosum*), twisted sedge (*Carex torta*), violets (*Viola* spp.), boneset (*Eupatorium perfoliatum*), wild mint (*Mentha arvensis*), Allegheny monkey-flower (*Mimulus ringens*), and cleavers (*Galium aparine*). Riverbank grape (*Vitis riparia*) and virgin's-bower (*Clematis virginiana*) are often found scattered throughout this community. This community is also susceptible to invasion by Japanese knotweed (*Fallopia japonica*), Japanese stiltgrass (*Microstegium vimineum*), and multiflora rose (*Rosa multiflora*).

Rank Justification

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

Identification

- Dominated by alders and/or silky dogwood
- Growth of tree species is limited due to the flooding, high stream velocity, and ice scour to which these areas are frequently exposed
- Typically occurs within the active stream channel
- Substrate is usually cobble or sandy alluvium
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Smooth alder (*Alnus serrulata*)
- Black willow (*Salix nigra*)
- Ninebark (*Physocarpus opulifolius*)
- Silky dogwood (*Cornus amomum*)
- Sycamore (*Platanus occidentalis*)
- Silky willow (*Salix sericea*)
- Silver maple (*Acer saccharinum*)

Herbs

- Reed canary-grass (*Phalaris arundinacea*)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- Cutgrass (*Leersia virginica*)
- Smooth goldenrod (*Solidago gigantea*)
- Sedge (*Carex intumescens*)
- Virginia wild-rye (*Elymus virginicus*)
- Wild germander (*Teucrium canadense*)
- Tall meadow-rue (*Thalictrum pubescens*)
- Big bluestem (*Andropogon gerardii*)
- Joe-pye-weed (*Eutrochium fistulosum*)
- Twisted sedge (*Carex torta*)
- Violets (*Viola* spp.)
- Boneset (*Eupatorium perfoliatum*)
- Cleavers (*Galium aparine*)
- Muhly (*Muhlenbergia* spp.)

Vines

- Riverbank grape (*Vitis riparia*)
- Virgin's-bower (*Clematis virginiana*)

Exotic Species

- Japanese knotweed (*Fallopia japonica*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Multiflora rose (*Rosa multiflora*)
- Gill-over-the-ground (*Glechoma hederacea*)

International Vegetation Classification Associations:

Allegheny Floodplain Alder Thicket (CEGL006251)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501., Zimmerman 2008

Pennsylvania Community Code

SA : Hawthorn – Mixed Species Shrub Wetland

Similar Ecological Communities

Acidic Mixed Shrub – Sphagnum Wetland and Alder – Dogwood Floodplain Thicket can both be dominated by alders (*Alnus* spp.) but Acidic Mixed Shrub – Sphagnum Wetland is typically found in upland depression settings, contains sphagnum moss (*Sphagnum* spp.), and is generally more acidic. Alder – Dogwood Floodplain Thickets typically occur along active stream channels, lack sphagnum moss, and are circumneutral.

Mixed Hardwood Floodplain Thicket and Alder – Dogwood Floodplain Thicket contain similar species and occur along riverine settings. The main difference is that Mixed Hardwood Floodplain Thicket is dominated by a combination of species such as sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), eastern cottonwood (*Populus deltoides*), river birch (*Betula nigra*), and black willow (*Salix*

nigra), but may be co-dominated by alders and the Alder – Dogwood Floodplain Thicket is clearly dominated by alders and dogwoods (*Cornus* spp.).

Fike Crosswalk

Alder - dogwood riverine shrubland

Conservation Value

The community is an important part of the river floodplain ecosystem, which provides significant ecosystem services in addition to wildlife habitat, such as sediment control, filtering runoff, and cooling overland flow of water. Floodplain shrublands provide important habitat for many bird species of conservation concern such as alder flycatchers (*Empidonax alnorum*), willow flycatchers (*Empidonax traillii*), and wood-warbler species (*Parulidae* spp.).

Threats

Alteration to the frequency and duration of flood events and the development of river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, pollution, and sedimentation. This community can be threatened by Japanese knotweed (*Fallopia japonica*), Japanese stiltgrass (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), and gill-over-the-ground (*Glechoma hederacea*), which can displace native grass and herb species.

Management

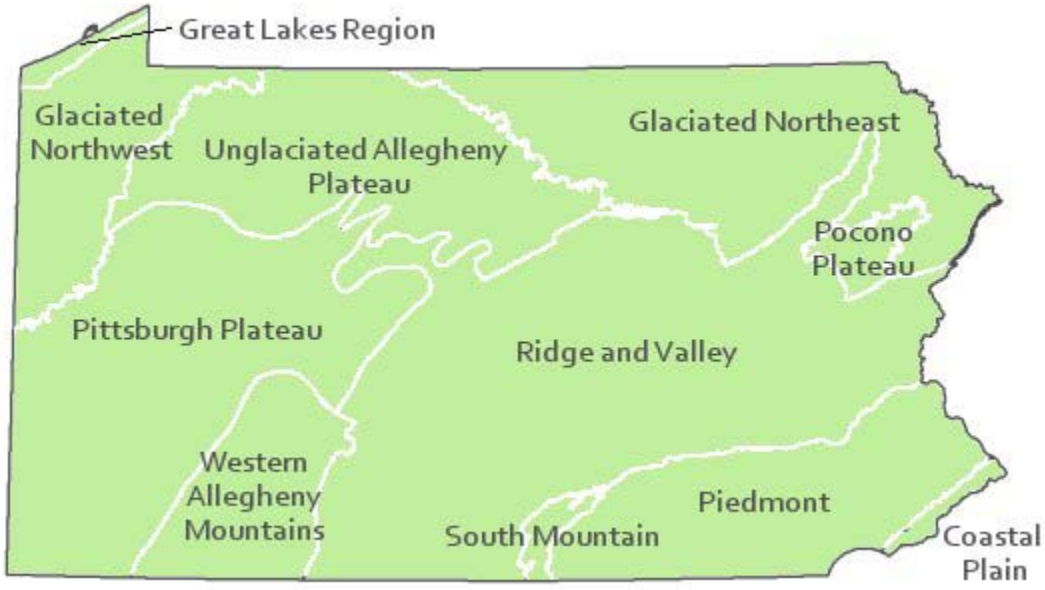
Direct impacts to floodplain ecosystems (e.g., channelization, road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality floodplain wetlands is recommended to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites. As floodplains are dependent on periodic disturbance, natural flood frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding construction of roads and utility lines through riparian habitat areas, and restoring degraded riparian

habitat. In general, unaltered and intact river systems are more resilient to environmental stress than human-impacted or engineered river systems.

Trends

Alder – Dogwood Floodplain Thickets were undoubtedly more common historically and have declined due to dam impoundments, habitat conversion to agriculture or other development, and farming; modification of the adjacent upland has further impacted the quality of this type. The relative trend for this community is likely stable or may be declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with the invasion of exotic plant species (e.g., Japanese knotweed (*Fallopia japonica*), Japanese stiltgrass (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*)), lack of recruitment due to deer browse, and altered frequency and duration of flooding events.

Range Map



Pennsylvania Range

This type is found statewide.

Global Distribution

Maryland, New Hampshire, New York, Ohio, Pennsylvania, West Virginia, and potentially in Virginia.

Alder-leaved Buckthorn – Inland Sedge – Golden Ragwort Shrub Fen

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: G2Q
State Rank: S2

General Description

In Pennsylvania, this community type is most characteristic of the northwestern glaciated section, although it may occur elsewhere. These are wetlands that have developed under the influence of base-rich water, and usually have a substantial organic layer. The pH of surface water during the growing season ranges from 6.9 to 7.9. Structurally, they are dominated by a mixture of shrubs and herbaceous plants (predominantly sedges). Most sites have an area in the wettest portion that is without woody growth. Also, within the wetland complex, there are frequently areas of visible surface flow (seeps). Characteristic shrubs include alder-leaved buckthorn (*Rhamnus alnifolia*), willows (*Salix* spp.), velvetleaf blueberry (*Vaccinium myrtilloides*), dwarf raspberry (*Rubus pubescens*), highbush blueberry (*Vaccinium corymbosum*), speckled alder (*Alnus incana* ssp. *rugosa*), arrow-wood (*Viburnum recognitum*), and red-osier dogwood (*Cornus sericea*). The herbaceous species vary; some typical representatives are golden ragwort (*Packera aurea*), water avens (*Geum rivale*), rough-leaved goldenrod (*Solidago patula* ssp. *patula*), boneset (*Eupatorium perfoliatum*), field horsetail (*Equisetum arvense*), fowl mannagrass (*Glyceria striata*), sedge (*Carex interior*), many-fruited sedge (*Carex lasiocarpa*), sedge (*Carex hystericina*), turtlehead (*Chelone glabra*), marsh fern (*Thelypteris palustris*), skunk-cabbage (*Symplocarpus foetidus*), sedge (*Carex lacustris*), and common cat-tail (*Typha latifolia*). Some sites may contain calciphilic species such as golden-fruited sedge (*Carex aurea*), yellow sedge (*Carex flava*), prairie sedge (*Carex prairea*), Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), thin-leaved cotton-grass (*Eriophorum viridicarinatum*), spike muhly (*Muhlenbergia glomerata*), and grass-of-Parnassus (*Parnassia glauca*). Characteristic bryophytes include *Campylium stellatum*, *Plagiomnium ellipticum*, *Sphagnum palustre*, *Bryum pseudotriquetrum*, and *Climaceum americanum*. On many of these sites,

microtopography and vegetation response creates a tight mosaic of locally different chemical conditions. Hummocks of mosses, especially *Sphagnum* spp., form at the base of shrubs and stumps and lower the pH in their immediate surroundings. This provides a suitable habitat for acid-loving species like blueberries (*Vaccinium* spp.), bluebead and speckled wood lilies (*Clintonia* spp.), teaberry (*Gaultheria procumbens*), and Eastern hemlock (*Tsuga canadensis*).

Rank Justification

Imperiled in the jurisdiction due to a very restricted range, very few populations, steep declines, or other factors making it extremely vulnerable to extirpation.

Identification

- Dominated by alder-leaved buckthorn (*Rhamnus alnifolia*), sedge (*Carex interior*), many-fruited sedge (*Carex lasiocarpa*), sedge (*Carex hystericina*), and sedge (*Carex lacustris*)
- Occurs in western Pennsylvania
- Calcareous soils

Characteristic Species

Shrubs

- Dwarf blackberry (*Rubus pubescens*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Northern arrow-wood (*Viburnum recognitum*)
- Red-osier dogwood (*Cornus sericea*)
- Alder-leaved buckthorn (*Rhamnus alnifolia*)
- Willows (*Salix* spp.)
- Sour-top blueberry (*Vaccinium myrtilloides*)

Herbs

- Golden ragwort (*Packera aurea*)
- Water avens (*Geum rivale*)
- Spreading goldenrod (*Solidago patula* ssp. *patula*)
- Boneset (*Eupatorium perfoliatum*)

- Field horsetail (*Equisetum arvense*)
- Fowl mannagrass (*Glyceria striata*)
- Sedge (*Carex interior*)
- Many-fruited sedge (*Carex lasiocarpa*)
- Sedge (*Carex hystericina*)
- Turtlehead (*Chelone glabra*)
- Marsh fern (*Thelypteris palustris*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Sedge (*Carex lacustris*)
- Common cat-tail (*Typha latifolia*)
- Golden-fruited sedge (*Carex aurea*)
- Yellow sedge (*Carex flava*)
- Prairie sedge (*Carex prairea*)
- Atlantic sedge (*Carex sterilis*)
- Wood's sedge (*Carex tetanica*)
- Thin-leaved cotton-grass (*Eriophorum viridicarinatum*)
- Spike muhly (*Muhlenbergia glomerata*)
- Grass-of-parnassus (*Parnassia glauca*)

Bryophytes

- *Campylium stellatum*
- *Plagiomnium ellipticum*
- *Sphagnum palustre*
- *Bryum pseudotriquetrum*
- *Climacium americanum*

International Vegetation Classification Associations:

Western Allegheny Tall Shrub Rich Fen (CEGL005088)

NatureServe Ecological Systems:

None

Origin of Concept

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

Pennsylvania Community Code

ST : Buckthorn – Sedge (Carex Interior) – Golden Ragwort Fen

Similar Ecological Communities

The presence of heaths in these systems may at first be confusing, but a closer look should reveal a number of calciphilic species. Calciphiles that may occur include golden-fruited sedge (*Carex aurea*), yellow sedge (*Carex flava*), prairie sedge (*Carex prairea*), Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), thin-leaved cotton-grass (*Eriophorum viridicarinatum*), spike muhly (*Muhlenbergia glomerata*), and grass-of-Parnassus (*Parnassia glauca*). The presence of these calciphiles separates this community from Hemlock Palustrine Forest, Hemlock – mixed hardwood palustrine forest, Highbush Blueberry – Sphagnum Wetland, and Acidic Mixed Shrub – Sphagnum Wetland community types which may be in close proximity to this type.

Fike Crosswalk

Buckthorn - sedge (*Carex interior*) - golden ragwort fen

Conservation Value

Alder-leaved Buckthorn – Inland Sedge – Golden Ragwort Shrub Fen is a rare community in the state and may include rare plant species such as golden-fruited sedge (*Carex aurea*), yellow sedge (*Carex flava*), Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), spike muhly (*Muhlenbergia glomerata*), and grass-of-Parnassus (*Parnassia glauca*).

Threats

The greatest threats to Alder-leaved Buckthorn – Inland Sedge – Golden Ragwort Shrub Fen communities are disruptions to bedrock or glacial deposits such as drilling or mining in nearby areas and groundwater extraction, which can contaminate or alter the flow patterns of the groundwater that feeds the seepage. Groundwater pollution can also occur from improperly installed septic systems, from improperly lined underground waste disposal, and in agricultural areas from infiltration of pesticides, fertilizer, and bacteria from animal wastes. Invasive plant species can threaten the biological integrity of the community. Wetland soils and vegetation are sensitive and will be damaged by foot traffic or recreational vehicles as they are easily compacted.

Management

Drilling, mining, or other disruptions to bedrock or glacial deposits should not be undertaken within half a mile of a seepage wetland without a thorough understanding of bedrock layers and groundwater flows. Groundwater flow patterns do not always mirror surface watersheds, and in some cases aquifers may be contiguous over large areas. Seepage wetlands are also sensitive to trampling and other physical disturbance from recreational activities; trails should be sited away from the wetland, or elevated structures employed to prevent traffic in the wetland. These wetlands may require periodic disturbance such as burning or grazing to maintain their open canopy which is indicative of this community and the rare species that occupy the community.

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. 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 and habitat alteration should be avoided (e.g., roads, trails, filling of wetland) 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.

Research Needs

More site inventory and classification work is needed to refine the definition of this community type and resolve its relationship to other types. It appears that some of these wetlands will succeed to shrubland if not maintained. Management of these wetlands would be informed by an understanding of natural successional pathways, and of the historical frequency of disturbances such as fire and grazing in these wetlands.

Trends

Specific information on the loss and degradation of this community is not available. However, most calcareous soils in Pennsylvania occur in valleys or glaciated regions that are also favorable for agriculture and settlement, and have been extensively cleared of natural vegetation for these purposes. This community type is likely to have been lost or altered at a disproportionately high rate to other wetland type

Pennsylvania Range

NW Pennsylvania

Global Distribution

Unknown

Black Willow Floodplain Thicket

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): River Floodplain

Global Rank: G4?
State Rank: S3

General Description

This community is found in the lower portion of the Susquehanna River watershed on the downstream ends of small and large islands in the river's main stem and along back channels where sediment deposition occurs. This type also occurs in the slackwater wetlands behind dams. These areas are likely to experience lower stream velocity than vegetation types on island heads. Due to the reduced stream velocity, the substrates characteristic of this community tend to contain predominantly silt, sand, clay, and loam, with little gravel and cobbles.

A dense tall shrub layer of black willow (*Salix nigra*) covering greater than 30% of the area characterizes this community. Other common tall shrubs include shining willow (*Salix lucida* ssp. *lucida*), river birch (*Betula nigra*), and silver maple (*Acer saccharinum*).

The herbaceous layer can be sparse or dense and contains common dodder (*Cuscuta gronovii*), jewelweed (*Impatiens capensis*), water-willow (*Justicia americana*), hedge bindweed (*Calystegia sepium*), false nettle (*Boehmeria cylindrica*), water smartweed (*Persicaria amphibia*), and other common herbaceous wetland species. Invasive species may include purple loosestrife (*Lythrum salicaria*) and garden loosestrife (*Lysimachia vulgaris*).

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Dominated by black willow (*Salix nigra*)
- Occurs on the downstream ends of islands and back channels
- Substrate is silt, sand, clay and/or loam

Characteristic Species

Shrubs

- Black willow (*Salix nigra*)
- Shining willow (*Salix lucida* ssp. *lucida*)
- River birch (*Betula nigra*)
- Silver maple (*Acer saccharinum*)

Herbs

- Jewelweed (*Impatiens capensis*)
- Water-willow (*Justicia americana*)
- False nettle (*Boehmeria cylindrica*)
- Water smartweed (*Persicaria amphibia*)

Vines

- Common dodder (*Cuscuta gronovii*)
- Hedge bindweed (*Calystegia sepium*)

Exotic Species

- Purple loosestrife (*Lythrum salicaria*)
- Garden loosestrife (*Lysimachia vulgaris*)

International Vegetation Classification Associations:

Willow River-Bar Shrubland (CEGL006065)

NatureServe Ecological Systems:

Central Appalachian Stream and Riparian (CES202.609)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

SU : Black Willow Scrub/Shrub Wetland

Similar Ecological Communities

Black Willow Floodplain Thicket and Mixed Hardwood Floodplain Thicket both occur on islands but the Black Willow Floodplain Thicket occurs on the downstream sides of islands and the Mixed Hardwood Floodplain Thicket typically occurs on areas that receive more intensive flooding such as the head and middle portions of islands. The nearly pure dominance of black willow (*Salix nigra*) distinguishes Black Willow Floodplain Thicket from Mixed Hardwood Floodplain Thicket, which has a more diverse suite of species defining the shrub layer. Black Willow Floodplain Thicket differs from the Willow – Indian-grass Floodplain Shrub Wetland in that the former occurs on depositional sediment along lower velocity channels or on the downstream ends of islands while the latter occurs on sand and cobbles at the heads of islands and along scour zones.

Fike Crosswalk

Black willow scrub/shrub wetland

Conservation Value

The community is an important component of the river floodplain ecosystem, which provides significant ecosystem services such as sediment control, filtering runoff, and cooling overland flow of water. The shrublands provide habitat for rare insect species, namely ground beetles (order *Carabidae*) and others during the drier periods of the year.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Development of adjacent land can lead to an accumulation of agricultural run-off, pollution, and sedimentation. Non-native invasive plants such as purple loosestrife (*Lythrum salicaria*) may displace native floodplain plants. Construction of flood-control and navigational dams have resulted in drastic changes to the timing and duration of flood events. These dams have, in

some cases, slowed the river flow, resulting in the deposition of finer sediments favored by the invasive plants.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites, as Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinense*), and purple loosestrife (*Lythrum salicaria*) may invade this community.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Free-flowing intact riparian systems provide a wide-range of ecological services that are expensive and difficult to replace through human intervention.

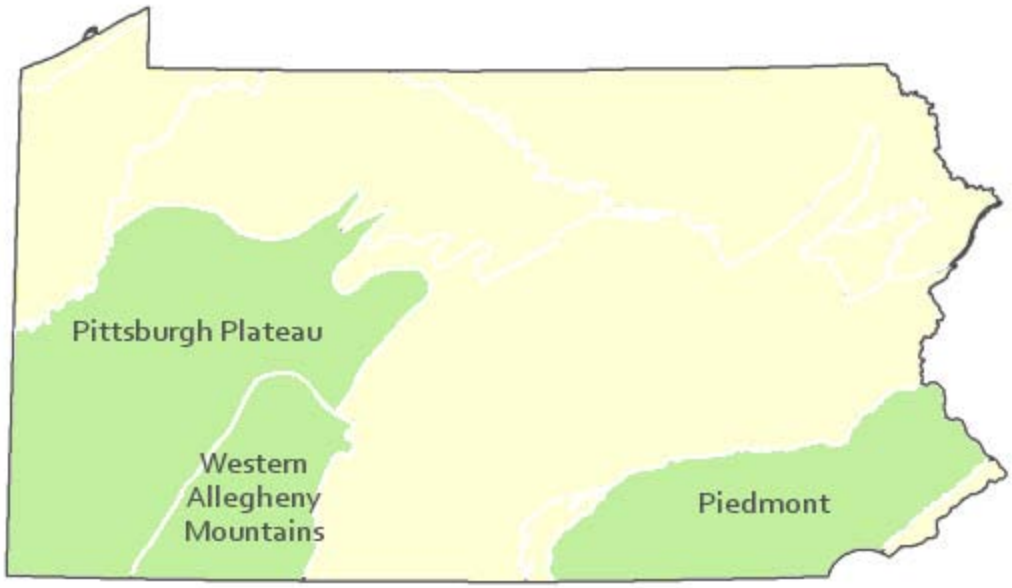
Research Needs

Variations may occur at eco-regional levels. There is need to assess and quantify soils, site hydrology, and other factors to further assess differences between these riverine shrublands.

Trends

There is little to suggest that the occurrence of this type is currently increasing or decreasing. Invasive plants able to tolerate flooded conditions may contribute to an overall reduction in quality region-wide. Wide-spread development of fertile floodplains in the past, particularly for agriculture, may have eliminated suitable habitat for this community.

Range Map



Pennsylvania Range

Western Allegheny Plateau, Central Applachian Forest, and Lower New England/Northern Piedmont

Global Distribution

Alabama, Arkansas, Florida, Georgia, Illinois, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

Buttonbush Wetland

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): River Floodplain and Basin Wetland and Vernal Pool

Global Rank: G4G5
State Rank: S4

General Description

These wetlands are characterized by prolonged or semi-permanent flooding. The substrate may be organic or mineral soil. This community type may occur in shallow water along lake or pond shores, associated with river systems in oxbows, in wet swales or along floodplains, or in upland depressions. In some cases, this community represents a zone of vegetation between forest on the upland side and herbaceous vegetation downslope. Other shrubs, such as water-willow (*Decodon verticillatus*), swamp azalea (*Rhododendron viscosum*), silky dogwood (*Cornus amomum*), red-osier dogwood (*Cornus sericea*), silky willow (*Salix sericea*), diamond willow (*Salix eriocephala*), elderberry (*Sambucus canadensis*), highbush blueberry (*Vaccinium corymbosum*), and red maple (*Acer rubrum*) seedlings and saplings may occur, but buttonbush (*Cephalanthus occidentalis*) is usually a clear dominant. It is not uncommon for buttonbush to occur in near monotypic stands. Characteristic herbs include three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), marsh St. John's-wort (*Triadenum virginicum*), bugleweed (*Lycopus uniflorus*), spatterdock (*Nuphar advena/ N. variegata*), false water-pepper (*Persicaria hydropiperoides*), water-pepper (*Persicaria punctata*), water smartweed (*Persicaria amphibia*), common mermaid-weed (*Proserpinaca palustris* var. *crebra*), sedges (*Carex lurida*, *Carex vesicaria*), wool-grass (*Scirpus cyperinus*), Virginia chain fern (*Woodwardia virginica*), and marsh fern (*Thelypteris palustris*).

Rank Justification

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

Identification

- Shallow water along lake or pond shores, associated with river systems in oxbows, in wet swales or along floodplains, or in upland depressions
- Clear dominance of buttonbush (*Cephalanthus occidentalis*)
- Mucky substrate
- Seasonal to semi-permanent flooding

Characteristic Species

Shrubs

- Buttonbush (*Cephalanthus occidentalis*)
- Red-osier dogwood (*Cornus sericea*)

- Water-willow (*Decodon verticillatus*)
- Swamp azalea (*Rhododendron viscosum*)
- Silky dogwood (*Cornus amomum*)
- Silky willow (*Salix sericea*)
- Diamond willow (*Salix eriocephala*)
- American elder (*Sambucus canadensis*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Swamp rose (*Rosa palustris*)
- Red maple (*Acer rubrum*)

Herbs

- Three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*)
- Marsh St. John's-wort (*Triadenum virginicum*)
- Bugleweed (*Lycopus uniflorus*)
- Spatterdock (*Nuphar advena*)
- Spatterdock (*Nuphar variegata*)
- Mild water-pepper (*Persicaria hydropiperoides*)
- Dotted smartweed (*Persicaria punctata*)
- Water smartweed (*Persicaria amphibia*)
- Common mermaid-weed (*Proserpinaca palustris* var. *crebra*)
- Sedge (*Carex lurida*)
- Sedge (*Carex vesicaria*)
- Sedge (*Carex lupulina*)
- Short hair sedge (*Carex crinita* var. *crinita*)
- Wool-grass (*Scirpus cyperinus*)
- Bulrush (*Scirpus georgianus*)

- Black bulrush (*Scirpus atrovirens*)
- Virginia chain fern (*Woodwardia virginica*)
- Marsh fern (*Thelypteris palustris*)
- Royal fern (*Osmunda regalis*)
- Pale meadowgrass (*Torreyochloa pallida*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Northeastern Buttonbush Shrub Swamp (CEGL006069)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

SB : Buttonbush Wetland

Similar Ecological Communities

The Circumneutral Mixed Shrub Wetland can occur in similar environmental settings and may also contain buttonbush (*Cephalanthus occidentalis*) but it is not the clear dominant shrub species that characterizes the Buttonbush Wetland.

Buttonbush Wetland and Water-willow Shrub Wetland occur in similar environmental settings and both contain buttonbush (*Cephalanthus occidentalis*) but it is not the clear dominant shrub species that characterizes the Buttonbush Wetland.

Fike Crosswalk

Buttonbush Wetland

Conservation Value

This community type can be associated with vernal pools and serve as important habitat for reptile and amphibian species such as wood frogs (*Rana sylvatica*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), and Jefferson salamander (*Ambystoma jeffersonianum*). 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 this wetland.

Threats

Alteration to the hydrological regime is a major threat to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution as well as sedimentation. Invasive plant species such as cat-tails (*Typha* spp.) can dominate this community. Heavy logging upslope of buttonbush-dominated wetlands may impact value to reptiles and amphibians.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

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.

Trends

Buttonbush Wetlands were probably more common but declined due to dam impoundments, wetland draining/filling, and sedimentation. Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations and exotic species invasions.

Range Map

Pennsylvania Range

Statewide.

Global Distribution

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Virginia, Vermont, and West Virginia.

Circumneutral Mixed Shrub Wetland

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

Global Rank: G4G5
State Rank: S3

General Description

This shrub-dominated wetland community occurs in a variety of palustrine settings, including the upland edge of marshes, at the wetter edge of red maple wetlands, in small upland depressions, stream floodplains, and at the base of slopes. The community may represent a successional stage between abandoned agricultural land and a forest community. The substrate is generally very poorly drained shallow peat or mineral soil with a thin organic layer. These wetlands are generally seasonally flooded and may remain saturated for much of the growing season. Nutrient enrichment is generally the result of discharge from groundwater or inflow from the surrounding watershed. The pH of these systems is broadly circumneutral to somewhat calcareous, and calciphiles may be present. Many of these wetlands were or currently are influenced by beaver activity or other impoundments. Grazing (past and present) and previous land use history (e.g., farming) may also be a factor. Community size ranges from small inclusions to extensive acreage.

The community is characterized by a substantial tall-shrub layer that may be dominated by a single shrub species or a patchwork of mixed shrubs. Shrub species typically found in this community include: smooth alder (*Alnus serrulata*)**,** speckled alder (*A. incana* ssp. *rugosa*), ninebark (*Physocarpus opulifolius*), willows (*Salix* spp.), American elder (*Sambucus canadensis*), dogwoodc (*Cornus* spp.), water-willow (*Decodon verticillatus*), buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticillata*), viburnum (*Viburnum* spp.), meadow-sweet (*Spiraea* spp.), and swamp rose (*Rosa palustris*). Scattered seedling/sapling sized trees may be present such as red maple (*Acer rubrum*). The herbaceous layer can be dense and contains a variety of species, including royal fern (*Osmunda regalis*), marsh fern (*Thelypteris palustris*), common cat-tail (*Typha latifolia*), arrow-arum (*Peltandra virginica*), tussock sedge (*Carex stricta*), and bedstraw (*Galium* spp.). A sphagnum (*Sphagnum* spp.) layer is usually minimal to absent.

Rank Justification

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

Identification

- Occurs on saturated soils in a variety of palustrine settings, including the upland edge of marshes, at the wetter edge of red maple wetlands, in small upland depressions, stream floodplains, and at the base of slopes
- Soils are generally very poorly drained shallow peat or mineral soil with a thin organic layer
- The pH of this wetland type is circumneutral to somewhat calcareous and is reflected in vegetational composition

- Shrub layer may be dominated by a single species or consists of a mix of shrub species that may form clonal patches within the community

Characteristic Species

Shrubs

- Viburnum (*Viburnum* spp.)
- Smooth alder (*Alnus serrulata*)
- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Ninebark (*Physocarpus opulifolius*)
- Willows (*Salix* spp.)
- American elder (*Sambucus canadensis*)
- Silky dogwood (*Cornus amomum*)
- Gray dogwood (*Cornus racemosa*)
- Red-osier dogwood (*Cornus sericea*)
- Water-willow (*Decodon verticillatus*)
- Buttonbush (*Cephalanthus occidentalis*)
- Winterberry (*Ilex verticillata*)
- Swamp rose (*Rosa palustris*)
- Meadow-sweet (*Spiraea* spp.)

Herbs

- Royal fern (*Osmunda regalis*)
- Marsh fern (*Thelypteris palustris*)
- Common cat-tail (*Typha latifolia*)
- Arrow-arum (*Peltandra virginica*)
- Tussock sedge (*Carex stricta*)
- Bedstraw (*Galium* spp.)
- Jewelweed (*Impatiens capensis*)

- Pale jewelweed (*Impatiens pallida*)
- False nettle (*Boehmeria cylindrica*)
- Wood-nettle (*Laportea canadensis*)
- Stinging nettle (*Urtica dioica*)
- Smartweeds (*Persicaria* spp.)
- Rice cutgrass (*Leersia oryzoides*)
- Cutgrass (*Leersia virginica*)

International Vegetation Classification Associations:

Smooth Alder Swamp (CEGL005082)

NatureServe Ecological Systems:

Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582)

Origin of Concept

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

Pennsylvania Community Code

SN : Alder – Ninebark Wetland

Similar Ecological Communities

Circumneutral Mixed Shrub Wetland differs from Buttonbush Wetland in that buttonbush may be a component of the Circumneutral Mixed Shrub Wetland but is not the dominant shrub type. If buttonbush is the dominant shrub species, the community is classified as Buttonbush Wetland.

Circumneutral Mixed Shrub Wetland differs from Acidic Mixed Shrub – Sphagnum Wetland in that the pH of Circumneutral Mixed Shrub Wetland is circumneutral to somewhat calcareous while the latter occupies the lower end of the pH spectrum. The associate species reflect this shift, with shrubs like ninebark and silky dogwood occurring in a circumneutral environment, while [acid-loving] heaths like highbush blueberry (*Vaccinium corymbosum*) and maleberry (*Lyonia ligustrina*) are more typical under acidic conditions. The presence of a substantial sphagnum layer is a distinguishing characteristic that differentiates the two community types.

Fike Crosswalk

Alder - Ninebark Wetland

Conservation Value

This community may serve as important habitat for breeding birds, including woodcocks (*Scolopax minor*). Plant species of conservation concern may include screwstem (*Bartonia paniculata*), broad-winged sedge (*Carex alata*), Bebb's sedge (*Carex bebbii*), lesser panicled sedge (*Carex diandra*), cloud sedge (*Carex haydenii*), many-fruited sedge (*Carex lasiocarpa*), Wood's sedge (*Carex tetanica*), Indian paintbrush (*Castilleja coccinea*), marsh willow-herb (*Epilobium palustre*), downy willow-herb (*Epilobium strictum*), slender cotton-grass (*Eriophorum gracile*), cleavers (*Galium trifidum*), small-headed rush (*Juncus brachycephalus*), marsh pea (*Lathyrus palustris*), swamp lousewort (*Pedicularis lanceolata*), broad-leaved willow (*Salix myricoides*), autumn willow (*Salix serissima*), bog goldenrod (*Solidago uliginosa*), shining ladies'-tresses (*Spiranthes lucida*), and highbush-cranberry (*Viburnum trilobum*).

Threats

Circumneutral Mixed Shrub Wetlands are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table, changes in streamflow). Invasive species such as reed canary-grass (*Phalaris arundinacea*), Morrow's honeysuckle (*Lonicera morrowii*), and multiflora rose (*Rosa multiflora*) may alter the species composition of this community type.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Soil erodibility in terms of the 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. Impervious surfaces surrounding the wetland should be minimized to prevent thermal pollution. Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetland) 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. If the community is found streamside, streambed alteration could affect community longevity.

Circumneutral Mixed Shrub Wetland is one example of declining shrubland habitat found in Pennsylvania. Shrubland habitats are early successional plant communities, often formed by disturbance event(s), which represent a short-lived transitional stage between more stable community types. Repeated disturbance events over time (either natural or anthropogenic) are needed to reset the community back to its earlier successional state. In the absence of disturbance, shrubland habitats may only remain a component of the landscape for 15-20 years before reverting to young forests. Shrublands provide habitat for many early successional-dependent species such as birds. Management activities such as removal of tree species, assisted disturbance, and invasive species control may be needed to maintain this community type.

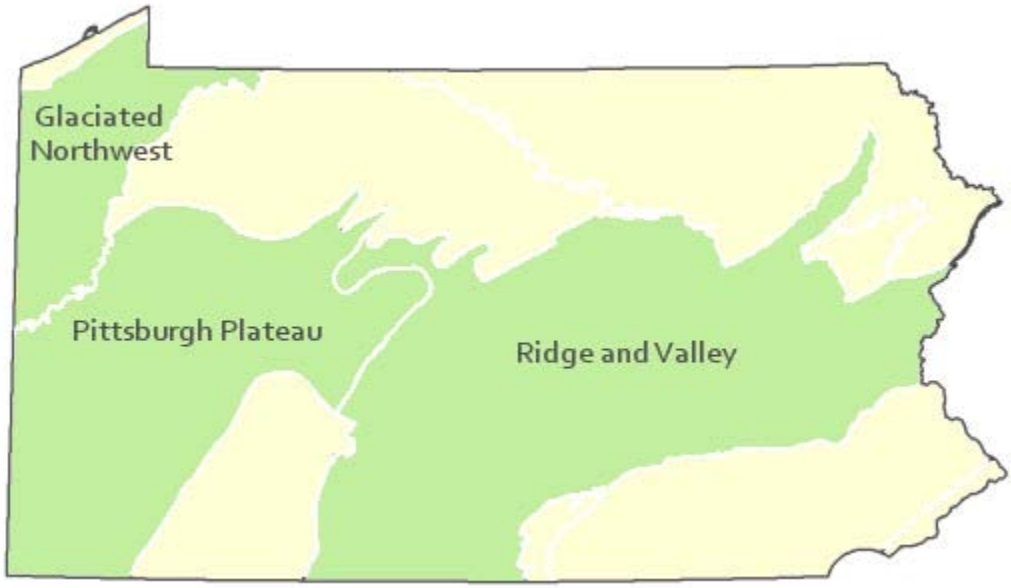
Research Needs

Variations may occur at eco-regional levels. There is a need to collect community plot data to examine eco-regional differences that may help to further refine the classification of this community.

Trends

Wetland protection has most likely stabilized the decline of this community type. Because some examples of this community type may represent a successional stage between fallow farmland and forest, this community may have increased as a result of abandoned agricultural land.

Range Map



Pennsylvania Range

Glaciated Northwest, Pittsburgh Plateau, and Ridge and Valley

Global Distribution

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and extends into eastern Canada.

Great Lakes Bayberry – Mixed Shrub Wetland

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Great Lakes Region Wetland

Global Rank: GNR
State Rank: S1

General Description

In Pennsylvania, this community type occurs only on Presque Isle, on the shore of Lake Erie. It is found as a zone surrounding swale ponds, slightly higher in elevation than the ponds but lower than the dune ridges. The substrate is sand, and the water table fluctuates seasonally; it is at or near the surface during the spring, and by autumn it falls below the surface but remains accessible to deep-rooted shrubs. The community is dominated by a mixture of bayberry (*Myrica pensylvanica*), silky dogwood (*Cornus amomum*), red-osier dogwood (*Cornus sericea*), Morrow's honeysuckle (*Lonicera morrowii*), and willows (*Salix* spp.), with scattered eastern cottonwood (*Populus deltoides*) and European white birch (*Betula pendula*). Herbaceous species include bluejoint (*Calamagrostis canadensis*), sedge (*Carex scoparia*), Bebb's sedge (*Carex bebbii*), blackish wool-grass (*Scirpus atrocinctus*), Canada goldenrod (*Solidago canadensis*), sharp-fruited rush (*Juncus acuminatus*), and southern blue flag (*Iris virginica*). The community tolerates fluctuation of water levels within a season, due to weather fronts or seasonal variation in precipitation; fluctuations in lake levels over decades may move the community around on the landscape or eliminate it during some years.

This community type is part of the "Great Lakes Region Beach – Dune – Sandplain Complex" (Fike 1999). This complex occurs on a substrate of glacial sand and gravel deposits. This material is constantly being eroded and redeposited by the action of currents, waves, and storm events. The dynamic nature of the substrate maintains a variety of successional stages. Additionally, the porous nature of the substrate causes the water table to respond quickly to changes in lake level. As a result, natural communities

occur as a complicated mosaic of different hydrologic conditions, seral stages, physiognomies, and floristic assemblages that shift over time. Great Lakes Region Bayberry – Mixed Shrub Palustrine Shrubland is successional, and may transition to woodland or forest if it does not experience major disturbances.

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Sandy substrate
- Located along Great Lakes shoreline, protected from open water by the leading dune or sand ridge.
- Water levels vary seasonally. Saturated or inundated areas may be visible in spring, or the area may appear dry, especially later in the season, but wetland indicator plant species will be present.
- Vegetation is at least 25% shrubs. Scattered trees may be present, but shrub cover is greater than tree cover.

Characteristic Species

Trees

- Eastern cottonwood (*Populus deltoides*)

Shrubs

- Bayberry (*Myrica pensylvanica*)
- Silky dogwood (*Cornus amomum*)
- Red-osier dogwood (*Cornus sericea*)
- Morrow's honeysuckle (*Lonicera morrowii*)
- Willows (*Salix* spp.)

Herbs

- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)
- Broom sedge (*Carex scoparia*)
- Bebb's sedge (*Carex bebbii*)

- Blackish wool-grass (*Scirpus atrocinctus*)
- Canada goldenrod (*Solidago canadensis*)
- Sharp-fruited rush (*Juncus acuminatus*)
- Southern blue flag (*Iris virginica*)

International Vegetation Classification Associations:

None

NatureServe Ecological Systems:

Great Lakes Wooded Dune and Swale (CES201.726)

Origin of Concept

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

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

The Great Lakes Region Bayberry – Cottonwood community may be similar, but dry-adapted species predominate instead of wetland indicators. Because of the sandy soils on which both types occur, the wetter type may appear dry for much of the year.

Fike Crosswalk

Great Lakes Region bayberry - mixed shrub palustrine shrubland

Conservation Value

This community is only found along the shores of the Great Lakes. Pennsylvania has a limited extent of shoreline along Lake Erie, and the only remaining examples of this community in Pennsylvania are found at Presque Isle State Park. The lake shore habitat, with its sandy substrate and fluctuating water levels, hosts a substantially different flora and fauna than other Pennsylvania habitats. Because there are no other examples of this habitat within Pennsylvania, there are 77 state rare, threatened, or endangered plant species in Presque Isle communities (Beach 2007). While many plant species found here are common in Ohio, Michigan , and other Midwestern states, some species are specifically adapted to the freshwater shoreline conditions of the Great Lakes and cannot live anywhere else. The lake shore complex also hosts a unique suite of invertebrates such as tiger beetles, spiders, and sand wasps. It is an important refuge for migrating waterbirds and shorebirds. Presque Isle is also used by migrating

passerine bird species, which cross the lake at the narrow point between Presque Isle and Long Point on the north shore.

Threats

The invasive exotic species Morrow's honeysuckle (*Lonicera morrowii*) is a major threat to the Great Lakes Region Bayberry – Mixed Shrub Palustrine Shrubland. Presque Isle State Park is heavily used for recreation; in some areas overuse damages plant communities.

Management

The addition of engineered structures to the shoreline, such as breakwaters and jetties, has altered the natural erosion and deposition processes that develop the lake shoreline. Shoreline development is part of the long-term physical process that creates the palustrine shrubland habitat behind the leading dune.

Research Needs

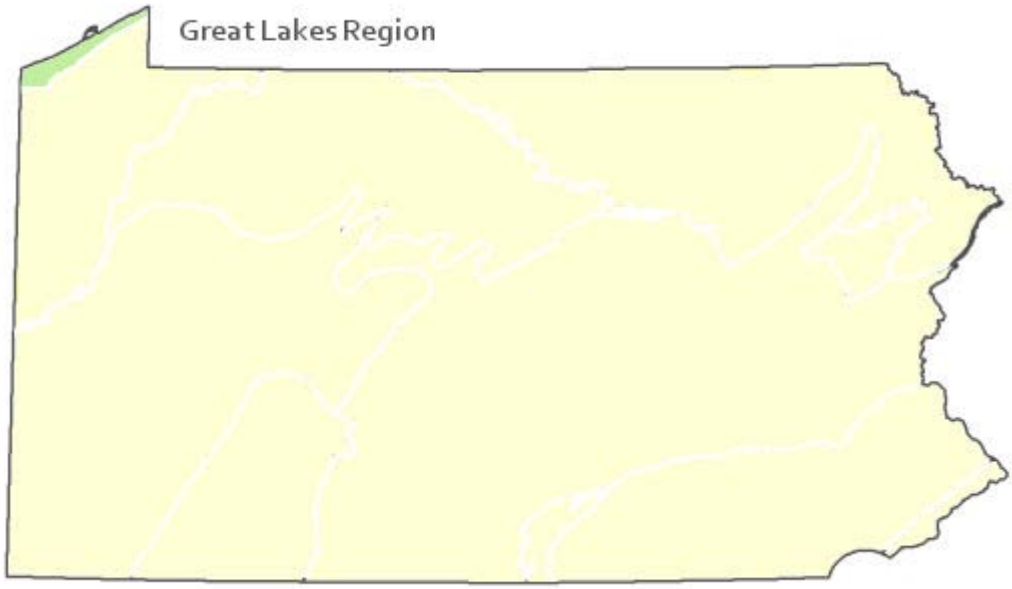
Long-term management of Presque Isle could benefit from a better understanding of the natural erosion and deposition processes, as well as how these processes may be affected by artificially created barriers such as breakwaters and jettys.

It is understood that the natural communities of Presque Isle are highly dynamic, affected by movement of the substrate by wind, currents, and storms; and by changes in the water level over seasons and decades. However, there remains much to learn about how these processes affect communities over longer time scales, including the frequency of disturbances, the rate of dune development and movement of communities on the landscape, and the process of succession in plant communities.

Trends

Because the shorelines of the Great Lakes have been extensively developed for industry, recreation, and residences, the extent of natural wetland communities has been greatly diminished. Pennsylvania has limited shoreline area along Lake Erie, and most of it is bluff topography or artificially hardened. Presque Isle State Park is the only remaining area that hosts the bayberry – mixed shrub palustrine shrubland community, and it is unlikely there were other historic examples in Pennsylvania. While the site is protected as a state park, the community may currently be experiencing some declines in quality and extent from invasive species and recreational overuse. The current extent of this community in the larger Great Lakes region is not known, but it is likely limited, as the sand-spit / swale topography found at Presque Isle is somewhat unusual. The percentage of historic wetland area lost in the Great Lakes states is the closest available approximation of trends over time for this community. Wetland loss, measured from pre-settlement times to 1990, has occurred at a higher rate in Great Lakes states (60%) than the national average of 53% (Dahl 1990, Dodge et al. 1994). In recent years, the rate of wetland loss has slowed ((the acreage of wetland area lost between 1998 and 2004 was one-quarter of the acreage that was lost between 1974 and1984), but wetland loss continues to be higher in the Great Lakes region than in other parts of the country (Dahl 2006).

Range Map



Pennsylvania Range

Great lakes region

Global Distribution

Great Lakes Bluff Seep

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Great Lakes Region Wetland

Global Rank: GNR
State Rank: S1

General Description

The bluff face communities are characteristically open with a mixture of shrubs and sometimes with scattered trees. This is a very dynamic system and the structure of the vegetation depends largely on its successional status. Recently slumped areas are first colonized by bryophytes and Equisetum spp. (horsetails). As the substrate becomes more stable, and organic matter accumulates, graminoids, other herbs, and shrubs colonize the seep. Eventually, due to erosion from below and perhaps also because of the weight of the vegetation and organic matter, the entire community will slump or slide downslope and the cycle begins again.

Physiognomic differences generally reflect different seral stages in this dynamic system. Common trees and woody species include shadbush (*Amelanchier arborea*), Canada hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), eastern cottonwood (*Populus deltoides*), hop-hornbeam (*Ostrya virginiana*), round-leaved dogwood (*Cornus rugosa*), red-osier dogwood (*C. sericea*), alternate-leaved dogwood (*C. alternifolia*), speckled alder (*Alnus incana*), spicebush (*Lindera benzoin*), purple-flowering raspberry (*Rubus odoratus*) willows (*Salix spp.*), and staghorn sumac (*Rhus typhina*).

Herbaceous species include zigzag goldenrod (*Solidago flexicaulis*), jewelweed (*Impatiens pallida*), field horsetail (*Equisetum arvense*), grass-of-Parnassus (*Parnassia glauca*), golden ragwort (*Packera aurea*), fowl mannagrass (*Glyceria striata*), golden-fruited sedge (*Carex aurea*) and brook lobelia (*Lobelia kalmii*).

Exotic species include common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and colt's foot (*Tussilago farfara*).

Rank Justification

Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining individuals or acres.

Identification

- Located on steep slopes of lacustrine sediment, glacial till or shale bedrock, either adjacent to streams or to Lake Erie, in northwestern PA
- Perennial seepage is present along parts of the scarp slope
- Substrate and vegetation may range from bare soil to a shrub layer, depending on where the community is in the cycle of slump and regrowth

Characteristic Species

Trees

- Shadbush (*Amelanchier arborea*)
- Canada hemlock (*Tsuga canadensis*)
- Sugar maple (*Acer saccharum*)
- Eastern cottonwood (*Populus deltoides*)
- Hop-hornbeam (*Ostrya virginiana*)

Shrubs

- Round-leaved dogwood (*Cornus rugosa*)
- Alternate-leaved dogwood (*Cornus alternifolia*)
- Speckled alder (*Alnus incana*)
- Spicebush (*Lindera benzoin*)
- Purple-flowering raspberry (*Rubus odoratus*)
- Red-osier dogwood (*Cornus sericea*)
- Willows (*Salix* spp.)
- Staghorn sumac (*Rhus typhina*)

Herbs

- Field horsetail (*Equisetum arvense*)
- Variegated scouring rush (*Equisetum variegatum*)
- Small-headed rush (*Juncus brachycephalus*)
- Zigzag goldenrod (*Solidago flexicaulis*)
- Pale jewelweed (*Impatiens pallida*)
- Jewelweed (*Impatiens capensis*)
- Fowl mannagrass (*Glyceria striata*)
- Golden-fruited sedge (*Carex aurea*)

- Alpine rush (*Juncus alpinoarticulatus*)

International Vegetation Classification Associations:

None

NatureServe Ecological Systems:

Great Lakes Coastal Wetlands Complex (CECX005702)
Great Lakes Alkaline Rocky Shore and Cliff (CES201.995)
Great Lakes Freshwater Estuary and Delta (CES202.033)

Origin of Concept

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

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

This type shares characteristics of seepage wetlands and fen communities occurring in the glaciated region of Northwestern Pennsylvania. In contrast to the River Bluff Seeps, which are herbaceous, dominated by grasses and sedges and occurring on steep escarpments of shale bedrock of tributaries to Lake Erie, the Bluffs occurring on the Lake Erie Coast are typically shrubby, with patches of herbaceous cover and occur on the sand, clay or bedrock of the bluffs above the Lake.

In addition, the Great Lakes Bluff Seep may resemble the Calcareous Opening/Cliff Community; however, this is a terrestrial type occurs on calcareous cliffs, outcrops, and rocky slopes throughout the Appalachian Region.

Fike Crosswalk

Related to Great Lakes Region Scarp Seep. This type was modified from Fike (1999) basd on inventory studies of Erie County and community mapping and assessment work at Erie Bluffs State Park by PNHP. This type was separated into two types based on differences in vegetation, geographic location, and substrate observed in the seepage wetlands of the River Bluffs and Lake Erie Bluffs.

Conservation Value

Great Lakes Bluff Seeps are unique to the Great Lakes Ecoregion, where they are limited to the steep bluff slopes above the Lake Erie shore. While historically rare in Pennsylvania due to limited lake frontage, much of the historic area has been greatly impacted by development and agriculture.

Exposed areas along the lakeshore bluffs are important nesting areas for bank swallows (*Riparia riparia*). This type supports several rare plants including grass-of-Parnassus (*Parnassia glauca*), golden-fruited sedge (*Carex aurea*), brook lobelia (*Lobelia kalmii*), variegated scouring rush (*Equisetum variegatum*), smallhead rush (*Juncus brachycephalus*), and alpine rush (*Juncus alpinoarticulatus*).

Threats

The greatest threats to these communities are direct physical disturbance, invasive plant species, and hydrological alterations affecting groundwater flows to the seeps along the bluffs. The slumping, or retreat, of the bluff escarpments is due to a combination of natural and anthropogenic forces. This action can be exacerbated by anthropogenic activity, including developments on the bluffs or alteration of groundwater flow from activities that increase or decrease groundwater flow or changes in the amount of impervious surface within the basin. The rate of slumping is thought to have increased in recent decades due to reduced long-shore sand transport.

Invasion of non-native plant species such as colt's foot (*Tussilago farfara*), common reed (*Phragmites australis*), and European alder (*Alnus glutinosa*) threaten native plants and may alter physical and chemical processes along the bluffs.

Management

Great Lakes Bluff Seeps occur in an environmental setting where disturbance, in the form of soil collapse on the steep slopes, is naturally frequent. In one study by Pennsylvania Department of Environmental Protection's Coastal Zone Management Program, researchers documented bluff recession at five control points along the escarpment top at what is now Erie Bluffs State Park from 1982 to 2003. During this time period, the bluff 14 face lost between 16 and 64 feet, at a rate of 0.75 feet per year to 3.82 feet per year.

The plants of the community are not generally harmed in the long-term by slumps. However, upslope disturbances to the deep glacial soils or bedrock could destabilize these habitats and should be avoided. They are somewhat sensitive habitats, and as steep slopes are frequently attractive to hikers and climbers, care should be taken when accessing these sites. While the steep terrain and unstable, often saturated soils prevent most development, trail construction along the top of lakeshore bluffs should be limited to avoid impacting high-quality examples of this community. Care should also be taken to control and prevent the spread of invasive species.

This community should be protected as a part of a large system of scarp woodlands, forested seeps, lakeplain forests and tributary ravines. Protecting larger landscape will ensure flow of nutrients and plant propagules, and facilitate wildlife movement between patches of similar habitat.

Research Needs

Insects, including lepidopterans may form a substantial part of the biodiversity in these communities, relatively little inventory work has been done for these taxa. There is a continuing need to survey and

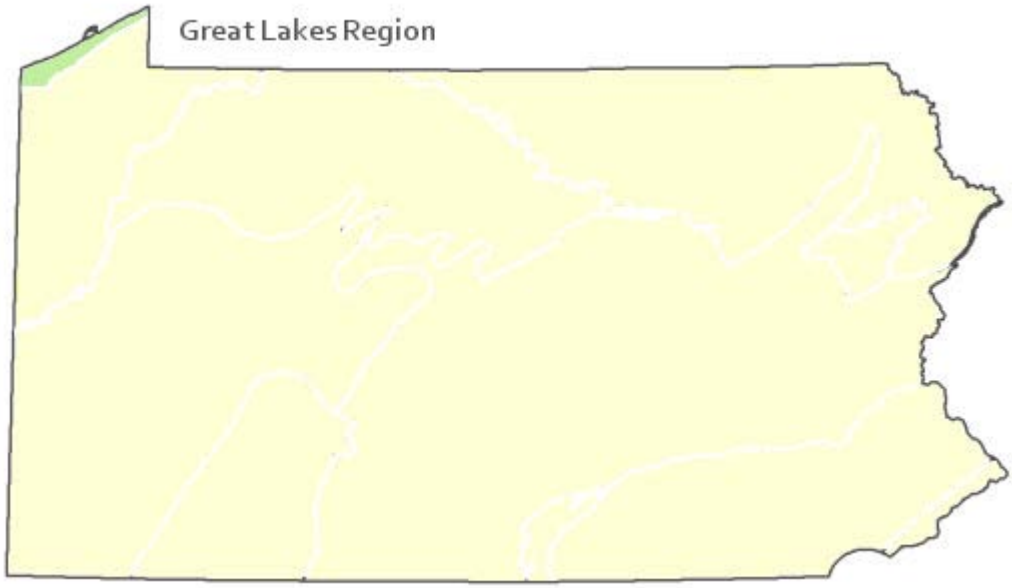
document high quality examples of this community in Pennsylvania to understand distribution patterns and guide future classification of this association.

Although the basic pattern of succession in these communities is understood, the response of individual plant species populations to slumps is not fully documented. This is especially important for the species of special concern in Pennsylvania.

Trends

The current extent of this community in Pennsylvania and in the larger Great Lakes region is not known. Long, continuous examples of this community have been fragmented by development and their acreage in Pennsylvania has declined as a result of development and recreation. Invasive species, especially giant reed, continue to threaten the quality of the bluff community.

Range Map



Pennsylvania Range

Northwestern Pennsylvania

Global Distribution

Northeastern Ohio to New York along the southern shore of Lake Erie.

Highbush Blueberry – Meadow-sweet Wetland

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

Global Rank: G4, G3G5
State Rank: S5

General Description

This community type usually occurs in small upland depressions or in basins surrounding small streams and drainages. The substrate is typically very poorly drained but lacks a thick organic layer. These wetlands are seasonally to permanently flooded, often influenced by beaver or other impoundments. The pH of these wetlands is less acidic to circumneutral.

Highbush blueberry (*Vaccinium corymbosum*) and meadow-sweet (either *Spiraea latifolia* or *Spiraea alba*) are usually both present. Additional woody species include shadbush (*Amelanchier* spp.), speckled alder (*Alnus incana* ssp. *rugosa*), arrow-wood (*Viburnum recognitum*), steeplebush (*Spiraea tomentosa*), swamp dewberry (*Rubus hispidus*), winterberry (*Ilex verticillata*), elderberry (*Sambucus canadensis*), and seedling and sapling size red maple (*Acer rubrum*). The herbaceous layer is generally dominated by graminoids such as tussock sedge (*Carex stricta*), rushes (*Juncus* spp.), and spike-rushes (*Eleocharis* spp.), and by ferns, especially cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), sensitive fern (*Onoclea sensibilis*), and marsh fern (*Thelypteris palustris*). Forbs like marsh St. John's-wort (*Triadenum virginicum*), skunk-cabbage (*Symplocarpus foetidus*), and jewelweed (*Impatiens* spp.) may also occur. Sphagnum either forms a continuous layer or occurs on hummocks.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Occurs on saturated soils in small upland depressions or basins surrounding small streams and drainages
- Soils are typically very poorly drained shallow peat or mineral soils that lack a thick organic layer
- The pH of this wetland type ranges from less acidic to circumneutral
- Highbush blueberry (*Vaccinium corymbosum*) and meadow-sweet (either *Spiraea latifolia* or *Spirea alba*) are usually both present and dominant in the shrub layer along with other less abundant shrub species
- A sphagnum layer is present

Characteristic Species

Shrubs

- Highbush blueberry (*Vaccinium corymbosum*)
- Meadow-sweet (*Spiraea alba*)
- Meadow-sweet (*Spiraea latifolia*)
- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Northern arrow-wood (*Viburnum recognitum*)
- Swamp dewberry (*Rubus hispidus*)
- Winterberry (*Ilex verticillata*)
- American elder (*Sambucus canadensis*)
- Red maple (*Acer rubrum*)
- Shadbush (*Amelanchier* spp.)

Herbs

- Tussock sedge (*Carex stricta*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Sensitive fern (*Onoclea sensibilis*)
- Marsh fern (*Thelypteris palustris*)
- Skunk cabbage (*Symplocarpus foetidus*)

- Jewelweed (*Impatiens* spp.)
- Rushes (*Juncus* spp.)
- Spike-rushes (*Eleocharis* spp.)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Highbush Blueberry – Swamp Azalea – Coastal Sweet-pepperbush Shrubland (CEGL006371)
Highbush Blueberry Bog Thicket (CEGL006190)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)
Northern Atlantic Coastal Plain Basin Peat Swamp (CES203.522)

Origin of Concept

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

Pennsylvania Community Code

SH : Highbush Blueberry – Meadow-Sweet Wetland

Similar Ecological Communities

The Highbush Blueberry – Sphagnum Wetland is a similar community type to the Highbush Blueberry – Meadow-sweet Wetland but the Highbush Blueberry -Sphagnum Wetland is found in more acidic conditions, is more often glacial in origin, and has a stronger heath component such as swamp azalea (*Rhododendron viscosum*) and leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*).

Fike Crosswalk

Highbush blueberry - meadow-sweet wetland

Conservation Value

Plant species of conservation concern found in this community may include screwstem (*Bartonia paniculata*). 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 this wetland.

Threats

Highbush Blueberry – Meadow-sweet Wetlands are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). Invasive species such as reed canary-grass (*Phalaris arundinacea*) may alter the species composition of this community type.

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 (e.g., degree of slope) should be considered when establishing buffers. 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 and habitat alteration 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.

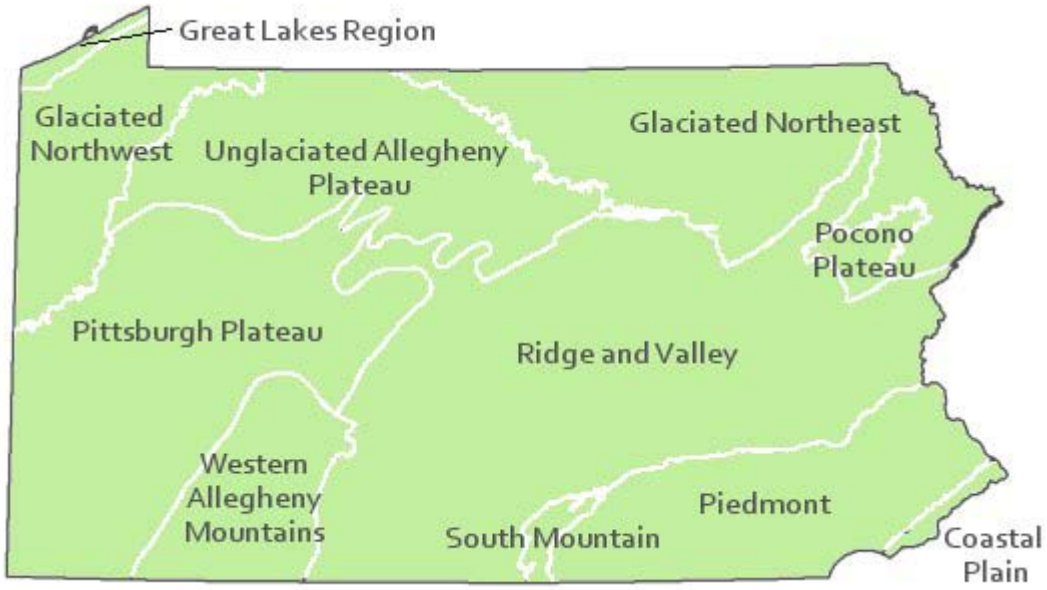
Research Needs

Research is needed to fill information gaps about the longevity of this community type since, under some conditions, it may represent a successional community type.

Trends

Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is most likely stable or may decline slightly due to hydrological alteration or ecological succession, although this community can be created through beaver impoundments.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey New York, Pennsylvania, and Rhode Island

Highbush Blueberry – Sphagnum Wetland

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: G3G5
State Rank: S5

General Description

This community type generally occurs in shallow upland depressions (mostly in the glaciated regions of the state) or along the banks of slow moving acidic streams, or often as an intermediate zone between a structurally diverse wetland complex. It may also represent a successional phase, especially in beaver-influenced or otherwise impounded systems. Significant seasonal water level fluctuation can occur, especially in isolated basins without inlet or outlet streams. The substrate may be peat or mineral soil with a substantial accumulation of organic matter. The pH of this community is usually at the lower end of the pH spectrum as indicated by the presence of more acidophilic species.

These communities are heath-dominated with a wide-spreading sphagnum layer beneath. This community type is characterized by a dense tall-shrub layer composed mostly of heath species. Highbush blueberry (*Vaccinium corymbosum*) is usually the dominant shrub species. Other shrubs commonly present include swamp azalea (*Rhododendron viscosum*), mountain holly *(Ilex mucronata*), leatherleaf *(Chamaedaphne calyculata* var. *angustifolia*), witherod (*Viburnum cassinoides*), and maleberry (*Lyonia ligustrina*). Seedlings or stunted red maple (*Acer rubrum*), gray birch (*Betula populifolia*), or other tree species may also be present at low densities. Sphagnum moss (*Sphagnum* spp.) blankets well-developed hummocks and hollows. The herbaceous layer is usually sparse and scattered over the sphagnum mat and is composed mostly of cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris palustris*), swamp dewberry (*Rubus hispidus*), and sedges (*Carex* sp.). This community may occur as part of the acidic glacial peatland complex.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Occurs in shallow upland depressions (mostly in the glaciated regions of PA) or along the banks of slow moving acidic streams, or as an intermediate zone between a structurally diverse wetland complex
- Soils may be peat or mineral with a substantial accumulation of organic matter
- The pH of this community is acidic and is reflected in the vegetational composition
- The shrub layer is dominated by highbush blueberry (*Vaccinium corymbosum*) but other heath shrubs may also be present

- An extensive sphagnum layer is present
- The herbaceous layer is usually sparse and scattered

Characteristic Species

Trees

- Red maple (*Acer rubrum*)
- Gray birch (*Betula populifolia*)

Shrubs

- Highbush blueberry (*Vaccinium corymbosum*)
- Swamp azalea (*Rhododendron viscosum*)
- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Witherod (*Viburnum cassinoides*)
- Maleberry (*Lyonia ligustrina*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)
- Marsh fern (*Thelypteris palustris*)
- Swamp dewberry (*Rubus hispidus*)
- Sedges (*Carex* spp.)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Highbush Blueberry Bog Thicket (CEGL006190)
Highbush Blueberry Poor Fen (CEGL005085)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

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

Pennsylvania Community Code

SG : Highbush Blueberry – Sphagnum Wetland

Similar Ecological Communities

The Highbush Blueberry – Meadow-sweet Wetland type is typically found in less acidic to circumneutral conditions. The Highbush Blueberry – Sphagnum Wetland is more characteristic of glaciated regions, is dominated by heaths such as swamp azalea (*Rhododendron viscosum*) and leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), and is often associated with larger peatland complexes, while the meadow-sweet type is more often found in upland depressions or areas of past impoundment.

Fike Crosswalk

Highbush Blueberry – Sphagnum Wetland

Conservation Value

Plant species of conservation concern found in this community may include marsh willow-herb (*Epilobium palustre*) and thread rush (*Juncus filiformis*). 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 this wetland.

Threats

Highbush Blueberry – Sphagnum Wetlands are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). This habitat type may be exposed to limited foot traffic disturbance due to recreational fruit harvesting. Invasive species such as reed canary-grass (*Phalaris arundinacea*) may alter the species composition of this community type.

Management

Because Highbush Blueberry – Sphagnum Wetlands are relatively acidic and low in nutrients, they are susceptible to alteration by elevated nutrient inputs. This wetland may require larger buffers than other wetland types because of their high susceptibility to changes in nutrient concentrations.

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 (e.g., degree of slope) should be considered when establishing buffers. 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 and habitat alteration 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.

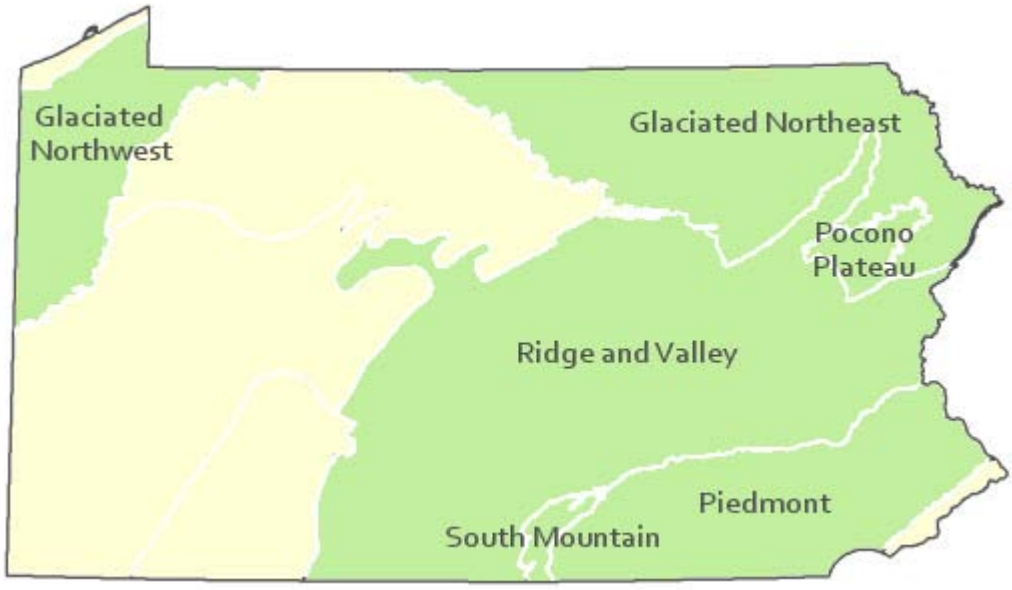
Research Needs

Research is needed to fill information gaps about this community type, especially to advance our understanding of their classification, ecological processes, hydrology, floristic variation, development, and succession.

Trends

Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is most likely stable or may decline slightly due to hydrological alteration or ecological succession.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, Ridge and Valley, South Mountain, and possibly Piedmont.

Global Distribution

Connecticut, Maine, Massachusetts, New Hampshire, New Jersey New York, Pennsylvania, Rhode Island, and Vermount

Leatherleaf – Bog-rosemary Bog

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: GNR
State Rank: S2S3

General Description

This short shrub-dominated community (usually less than 1 m in height) is often part of the classic floating/quaking bog-mat community matrix found in glaciated areas of northern Pennsylvania. This community type usually occurs in oligotrophic, peat-accumulating basins as part of the acidic glacial peatland complex. Substrate is organic and may be flooded at times but remains saturated throughout the growing season. The peatland where this community usually occurs may be oligotrophic or influenced by groundwater.

Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) is the dominant shrub. Associate species include sheep laurel (*Kalmia angustifolia*), bog-rosemary (*Andromeda polifolia* var. *glaucophylla*), purple chokeberry (*Photinia prunifolia*), black huckleberry (*Gaylussacia baccata*), and Labrador-tea (*Rhododendron groenlandicum*). Herbaceous species include pitcher-plant (*Sarracenia purpurea*), round-leaved sundew (*Drosera rotundifolia*), white beak-rush (*Rhynchospora alba*), cranberry (*Vaccinium macrocarpon*), and tawny cotton-grass (*Eriophorum virginicum*). There is usually a continuous sphagnum layer. This type occurs on organic soil, sometimes on a floating mat. This community type may occur as part of the acidic glacial peatland complex.

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Occurs in oligotrophic, peat-accumulating basins in the glaciated areas of northern Pennsylvania
- May be a community within the acidic glacial peatland complex
- Substrate is organic and remains saturated throughout the growing season
- The shrub layer is usually less than 1 m in height and dominated by leatherleaf
- Unlike the Leatherleaf – Sedge Wetland community type, other associate shrub species may be present but leatherleaf is generally the dominant shrub
- A continuous sphagnum layer is present that may feel like it is "floating" when walked upon
- Characteristic herbaceous bog species are present such as pitcher-plant, round-leaved sundew, cranberry, and cotton-grass

Characteristic Species

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sheep laurel (*Kalmia angustifolia*)
- Bog-rosemary (*Andromeda polifolia* var. *glaucophylla*)
- Black chokeberry (*Photinia melanocarpa*)
- Black huckleberry (*Gaylussacia baccata*)
- Labrador-tea (*Rhododendron groenlandicum*)

Herbs

- Pitcher-plant (*Sarracenia purpurea*)
- Round-leaved sundew (*Drosera rotundifolia*)
- White beak-rush (*Rhynchospora alba*)
- Cranberry (*Vaccinium macrocarpon*)
- Tawny cotton-grass (*Eriophorum virginicum*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Leatherleaf Boggy Fen (CEGL006513)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)
Atlantic Coastal Plain Northern Bog (CES203.893)

Origin of Concept

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

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Leatherleaf – Bog-rosemary Bog is most similar to Leatherleaf – Sedge Wetland and Leatherleaf – Cranberry Bog. In terms of pH and nitrogen availability, Leatherleaf – Bog-rosemary Bog is probably the intermediate between the other two leatherleaf types. Leatherleaf – Sedge Wetland generally has associated species that are less ericaceous and insectivorous plants are less common than the other two leatherleaf communities. Leatherleaf – Bog-rosemary Bog has a taller and denser shrub cover and more associated species than Leatherleaf – Cranberry Bog.

Fike Crosswalk

Leatherleaf – Bog-rosemary Bog

Conservation Value

Rare plant species that may be found in this community include bog-rosemary (*Andromeda polifolia* var. *glaucophylla*), dragon's mouth (*Arethusa bulbosa*), many-fruited sedge (*Carex lasiocarpa*), mud sedge (*Carex limosa*), few-seeded sedge (*Carex oligosperma*), bog sedge (*Carex paupercula*), few-flowered sedge (*Carex pauciflora*), twig-rush (*Cladium mariscoides*), rough cotton-grass (*Eriophorum tenellum*), white fringed-orchid (*Platanthera blephariglottis*), Labrador-tea (*Rhododendron groenlandicum*), pod-grass (*Scheuchzeria palustris*), and horned bladderwort (*Utricularia cornuta*). 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 this wetland.

Threats

Leatherleaf – Bog-rosemary Bogs are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). This community type may be more susceptible to degradation due to the fact that it is often associated with small, isolated basins. Plant collection pressure may add to the degradation of this community type.

Management

Leatherleaf – Bog-rosemary Bogs are pH < 4.0 and low in nutrients, they are susceptible to alteration by elevated nutrient inputs. This wetland may require larger buffers than other wetland types because of their high susceptibility to changes in nutrient concentrations. 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. 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 and habitat alteration 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.

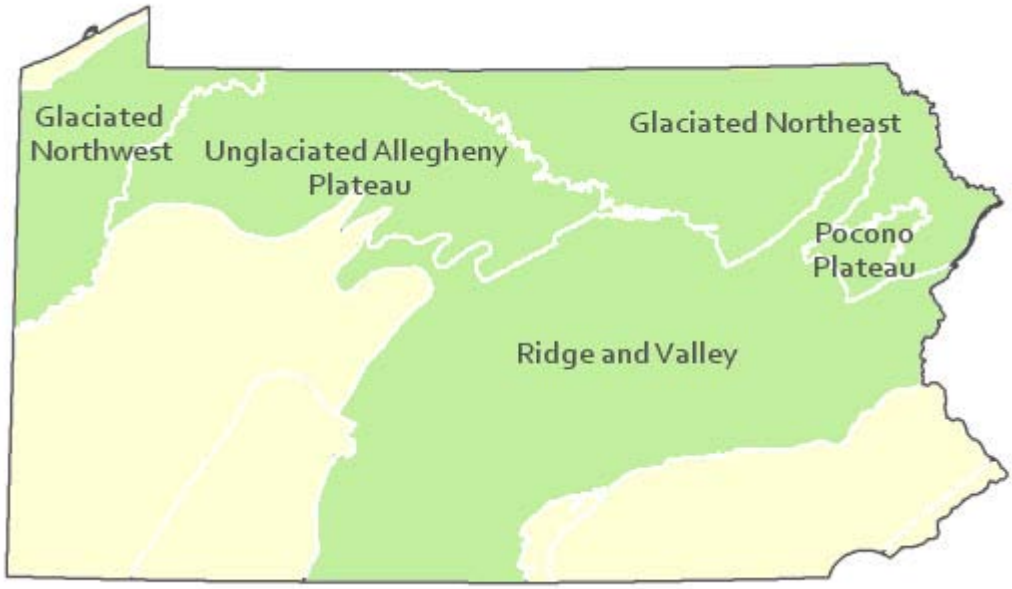
Research Needs

Research is needed to fill information gaps about this community type, especially to advance our understanding of their classification, ecological processes, hydrology, floristic variation, development, and succession.

Trends

Wetland protection has most likely stabilized the decline of this community, which was heavily impacted by peat mining activities. There may be cases of slight decline due to alteration of hydrology from impoundments (conversion to other palustrine community types).

Range Map



Pennsylvania Range

Allegheny Plateaus Province, Glaciated Low Plateau, Glaciated High Plateau and Glaciated Pocono Plateau Sections.

Global Distribution

Connecticut, Massachusetts, Maine, New Hampshire, New York, New Jersey, Ohio, Pennsylvania, and Rhode Island. This community type also extends into Ontario.

Leatherleaf – Cranberry Bog

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: G5
State Rank: S2S3

General Description

This dwarf shrub-dominated community (less than 0.5 m in height) is often part of the classic floating/quaking bog-mat community matrix found in glaciated areas of northern Pennsylvania. In glacial bogs, this community often occupies the central zone or one of the final zones of rooted vegetation surrounding an open water interior (also see water-willow (*Decodon verticillatus*) wetland type). This community type usually occurs in oligotrophic, peat-accumulating basins as part of the acidic glacial peatland complex. Substrate is organic and may be flooded at times but remains saturated throughout the growing season. The peatland where this community usually occurs may be oligotrophic or influenced by groundwater.

The dominant species are leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) – stunted form, cranberry (*Vaccinium oxycoccos* and *macrocarpon*), and sphagnum. Associates include pitcher-plant (*Sarracenia purpurea*), round-leaved sundew (*Drosera rotundifolia*), white beak-rush (*Rhynchospora alba*), yellow-eyed-grass (*Xyris torta* spp.), and tawny cotton-grass (*Eriophorum virginicum*).

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Occurs in oligotrophic, peat-accumulating basins in the glaciated areas of northern Pennsylvania

- May be a community within the acidic glacial peatland complex
- In glacial bogs, this may be the central community or final zone of rooted vegetation before open water
- Substrate is organic and remains saturated throughout the growing season
- The shrub layer is less than 0.5 m in height and dominated exclusively by dwarf leatherleaf
- A continuous sphagnum layer is present that may feel like it is "floating" when walked upon
- In addition to dwarfed leatherleaf, characteristic herbaceous bog species are present such as cranberry, pitcher-plant, round-leaved sundew, and cotton-grass

Characteristic Species

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)

Herbs

- Small cranberry (*Vaccinium oxycoccos*)
- Cranberry (*Vaccinium macrocarpon*)
- Pitcher-plant (*Sarracenia purpurea*)
- Round-leaved sundew (*Drosera rotundifolia*)
- Tawny cotton-grass (*Eriophorum virginicum*)
- Yellow-eyed-grass (*Xyris* spp.)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Southern New England Bog (CEGL006008)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

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

Pennsylvania Community Code

SR : Leatherleaf – Cranberry Peatland

Similar Ecological Communities

Leatherleaf – Cranberry Bog is most similar to Leatherleaf – Bog-rosemary Bog in terms of plant species. Vegetation assemblage may be similar, but the overwhelming dominance of stunted leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) distinguishes Leatherleaf – Cranberry Bog from the taller, more diverse Leatherleaf – Bog-rosemary Bog.

Fike Crosswalk

Leatherleaf - cranberry peatland

Conservation Value

Rare plant species that may be found in this community include dragon's mouth (*Arethusa bulbosa*), lesser panicled sedge (*Carex diandra*), many-fruited sedge (*Carex lasiocarpa*), few-seeded sedge (*Carex oligosperma*), few-flowered sedge (*Carex pauciflora*), bog sedge (*Carex paupercula*), bog muhly (*Muhlenbergia uniflora*), Labrador-tea (*Rhododendron groenlandicum*), bog goldenrod (*Solidago uliginosa*) and hooded ladies'-tresses (*Spiranthes romanzoffiana*). 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 this wetland.

Threats

Leatherleaf – Cranberry Bogs are threatened by habitat alteration (e.g. logging in adjacent uplands, flooding), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). This community type may be more susceptible to degradation due to the fact that it is often associated with small, isolated basins. Plant collection pressure may add to the degradation of this community type.

Management

Because Leatherleaf – Cranberry Bogs are very acidic and low in nutrients, they are susceptible to alteration by elevated nutrient inputs. This wetland may require larger buffers than other wetland types because of their high susceptibility to changes in nutrient concentrations.

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. 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 and habitat alteration 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.

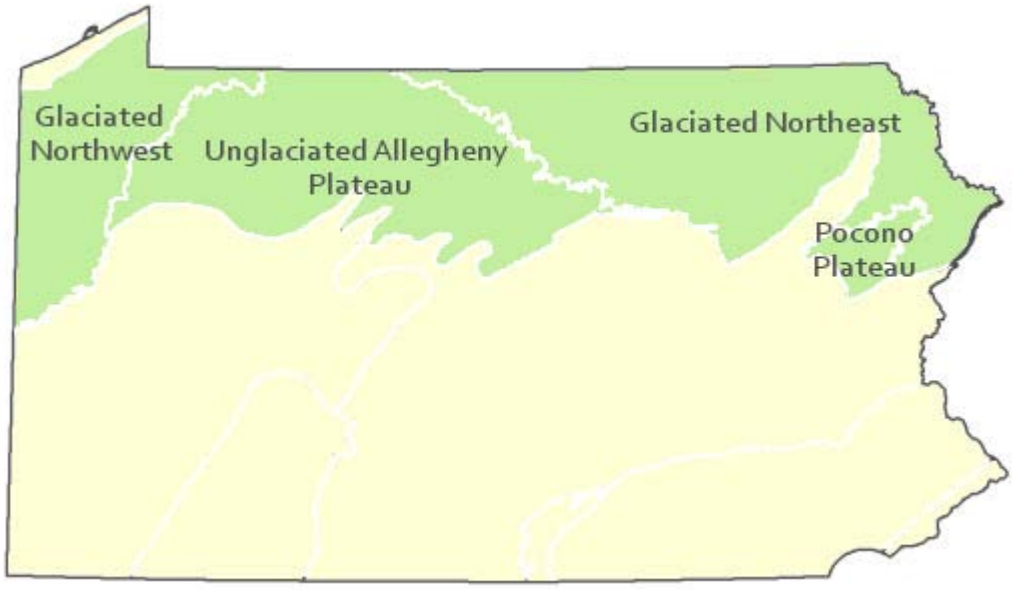
Research Needs

Research is needed to fill information gaps about this community type, especially to advance our understanding of their classification, ecological processes, hydrology, floristic variation, development, and succession.

Trends

Wetland protection has most likely stabilized the decline of this community, which was heavily impacted by peat mining activities. There may be cases of slight decline due to alteration of hydrology from impoundments (conversion to other palustrine community types).

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, and Unglaciated Allegheny Plateau.

Global Distribution

Connecticut, Massachusetts, Maine, New Hampshire, New York, New Jersey, Ohio, Pennsylvania, and Rhode Island. This community type also extends into Ontario.

Leatherleaf – Sedge Wetland

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: G4G5
State Rank: S3

General Description

This short shrub-dominated (less than 1 m in height) community occurs in upland depressions and areas with a past impoundment history (often beaver influenced) and may also occur at the lake-bog mat interface. This community type, when formed under disturbance conditions (e.g., impoundment), may be ephemeral. The community may occur over an extensive area or occupy a narrow fringe between herbaceous vegetation and taller shrub and tree dominated zones. The substrate may be either organic or mineral soil with a substantial accumulation of organic matter. This community experiences an extended hydroperiod ranging from standing water to saturated soils.

Leatherleaf (*Chamaedaphne calyculata var. angustifolia*) dominates this community along with a mix of sedges and other herbs. There is usually at least a partial layer of sphagnum. In more nitrogen-poor situations, round-leaved sundew (*Drosera rotundifolia*) and occasionally pitcher-plant (*Sarracenia purpurea*) may occur. Graminoids are common including sedges (*Carex canescens*, *Carex trisperma*, *Carex folliculata*, *Carex lasiocarpa*, *Carex rostrata*, and *Carex stricta*), cotton-grass (*Eriophorum vaginatum*), and three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*). Other herbs include wapato (*Sagittaria latifolia*), marsh cinquefoil (*Potentilla palustris*), swamp-candles (*Lysimachia terrestris*), cranberry (*Vaccinium macrocarpon*), and marsh St. John's-wort (*Triadenum virginicum*).

Rank Justification

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

Identification

- Occurs in upland depressions, areas with past impoundment histories, and at the lake-bog mat interface
- Substrate is either organic or mineral with a substantial organic horizon
- Evidence of an extended hydroperiod (e.g., standing water or saturated soils)
- The shrub layer is usually less than 1 m in height and almost exclusively dominated by leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sedges and herbs are present along with at least a partial sphagnum layer

Characteristic Species

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)

Herbs

- Round-leaved sundew (*Drosera rotundifolia*)
- Sedge (*Carex canescens*)
- Sedge (*Carex trisperma*)
- Sedge (*Carex folliculata*)
- Many-fruited sedge (*Carex lasiocarpa*)
- Tussock sedge (*Carex stricta*)
- Cotton-grass (*Eriophorum vaginatum*)
- Three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*)
- Wapato (*Sagittaria latifolia*)
- Marsh cinquefoil (*Potentilla palustris*)
- Cranberry (*Vaccinium macrocarpon*)
- Marsh St. John's-wort (*Triadenum virginicum*)
- Sedge (*Carex rostrata*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Medium Fen (CEGL006302)

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

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

Pennsylvania Community Code

SD : Leatherleaf – Sedge Wetland

Similar Ecological Communities

The Leatherleaf – Cranberry Bog and Leatherleaf – Bog-rosemary Bog community types are typically found in glacial bogs, are more acidic, and have a deeper organic layer, sometimes occurring on a floating mat of sphagnum peat. The Leatherleaf – Sedge Wetland community generally has a greater cover and diversity in the herbaceous layer (mostly sedge dominated).

Fike Crosswalk

Leatherleaf – Sedge Wetland

Conservation Value

Rare plant species that may be found in this community include many-fruited sedge (*Carex lasiocarpa*), few-seeded sedge (*Carex oligosperma*), bog sedge (*Carex paupercula*), marsh willow-herb (*Epilobium palustre*), bog muhly (*Muhlenbergia uniflora*), Labrador-tea (*Rhododendron groenlandicum*), and bog goldenrod (*Solidago uliginosa*). 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 this wetland.

Threats

Leatherleaf – Sedge Wetlands are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). This community type may be more susceptible to degradation due to the fact that it is often associated with small, isolated basins. Invasive species such as reed canary-grass (*Phalaris arundinacea*) may alter

the species composition of this community type. Plant collection pressure may add to the degradation of this community type.

Management

Because Leatherleaf – Sedge Wetlands are relatively acidic and low in nutrients, they are susceptible to alteration by elevated nutrient inputs. This wetland may require larger buffers than other wetland types because of their high susceptibility to changes in nutrient concentrations.

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. 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 and habitat alteration 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.

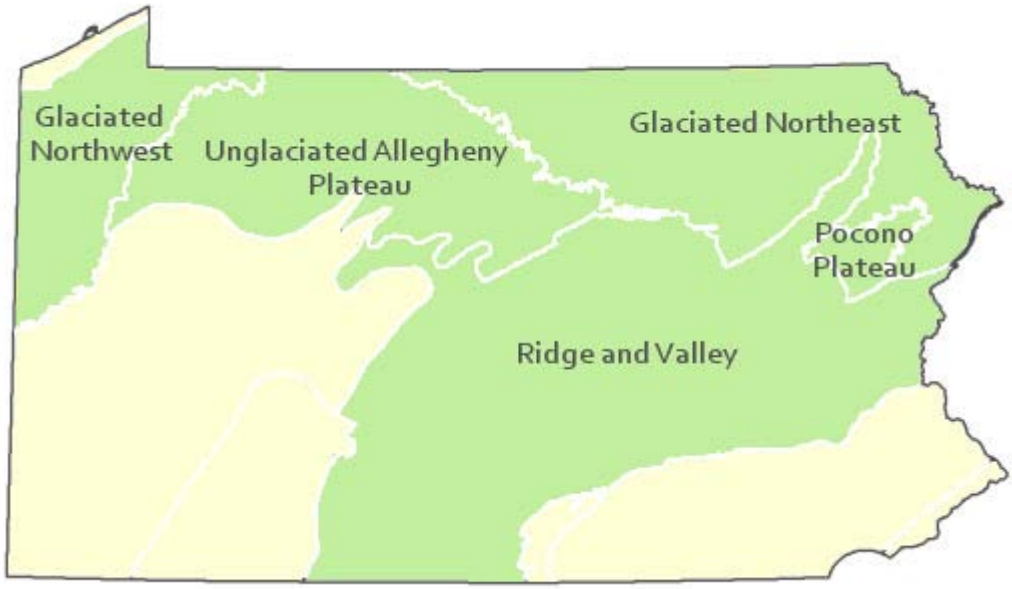
Research Needs

Research is needed to fill information gaps about this community type, especially to advance our understanding of their classification, ecological processes, hydrology, floristic variation, development, and succession.

Trends

Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is most likely stable or may decline slightly due to hydrological alteration or ecological succession.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, Ridge and Valley, and Unglaciated Allegheny Plateau.

Global Distribution

Connecticut, Massachusetts, Maine, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont.

Mixed Hardwood Floodplain Thicket

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): River Floodplain

Global Rank: G4G5
State Rank: S4

General Description

This floodplain shrubland occurs in all major river basins of Pennsylvania. They are subject to frequent floods, high stream velocity, and ice scour. Sites commonly occur on cobble bars and sand/gravel bars that are adjacent to or contiguous with the riverbank. The Periodically Exposed Shoreline Community often separates the shrubland from flowing water. In cases where the bar is attached to the shoreline, a steep forested slope or high terrace floodplain forest typically occurs on the riverbank adjacent to the shrubland. The Mixed Hardwood Floodplain Thicket can also occur towards the heads of islands in between dwarf shrublands or herbaceous communities and the floodplain forest.

This community is characterized by an open to dense layer of tall shrubs, dominated by sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), eastern cottonwood (*Populus deltoides*), river birch (*Betula nigra*), black willow (*Salix nigra*), and other trees that rarely grow taller than shrub species due to disturbance from annual flooding and ice scour events. At times, however, there may be a sparse tree subcanopy. Associated shrub species are variable and include silky dogwood (*Cornus amomum*), red-osier dogwood (*Cornus sericea*), arrow-wood (*Viburnum recognitum*), ninebark (*Physocarpus opulifolius*), diamond willow (*Salix eriocephala*), silky willow (*S. sericea*), sandbar willow (*S. exigua*), red raspberry (*Rubus idaeus*), American elm (*Ulmus americana*), box-elder (*Acer negundo*), and buttonbush (*Cephalanthus occidentalis*). The herbaceous layer ranges from sparse to moderately dense and can contain a wide variety of typical wetland and prairie species. Common species include late goldenrod (*Solidago gigantea var. gigantea*), beggar-ticks (*Bidens* spp.), deer-tongue grass (*Dichanthelium clandestinum*), false nettle (*Boehmeria cylindrica*), clearweed (*Pilea pumila*), common sneezeweed (*Helenium autumnale*), Joe-Pye-weed (*Eutrochium fistulosum*), spotted Joe-Pye-weed (*Eutrochium maculatum*), boneset (*Eupatorium perfoliatum*), wingstem (*Verbesina alternifolia*), Indian-grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), common yellow wood-sorrel (*Oxalis stricta*), Virginia cutgrass (*Leersia virginica*), cordgrass (*Spartina pectinata*), Indian-hemp (*Apocynum cannabinum*), and great St. John's-wort (*Hypericum pyramidatum*). Vines such as virgin's-bower (*Clematis virginiana*), hedge bindweed (*Calystegia sepium*) and grape (*Vitis* spp.) are often found throughout this tall sycamore-dominated shrubland.

This community is highly susceptible to colonization by Japanese knotweed (*Fallopia japonica*), multiflora rose (*Rosa multiflora*), crown-vetch (*Coronilla varia*), reed canary-grass (*Phalaris arundinacea*), and other invasive plants.

Rank Justification

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

Identification

- Occurs on cobble bars and sand/gravel bars that are adjacent to or contiguous with the riverbank; near the heads and edges of islands
- Substrate is variable.
- Maintained by annual episodes of high intensity flooding and ice scour.

Characteristic Species

Trees

- Sycamore (*Platanus occidentalis*)
- River birch (*Betula nigra*)
- Silver maple (*Acer saccharinum*)
- Black willow (*Salix nigra*)

Shrubs

- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- Black willow (*Salix nigra*)
- Eastern cottonwood (*Populus deltoides*)
- Sandbar willow (*Salix exigua*)
- Diamond willow (*Salix eriocephala*)
- Silky willow (*Salix sericea*)
- Silky dogwood (*Cornus amomum*)
- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Smooth alder (*Alnus serrulata*)
- Steeple-bush (*Spiraea tomentosa*)
- Red-osier dogwood (*Cornus sericea*)
- Northern arrow-wood (*Viburnum recognitum*)
- Ninebark (*Physocarpus opulifolius*)

- Red raspberry (*Rubus idaeus* var. *strigosus*)
- American elm (*Ulmus americana*)
- Box-elder (*Acer negundo*)
- Buttonbush (*Cephalanthus occidentalis*)

Herbs

- Smooth goldenrod (*Solidago gigantea*)
- Beggar-ticks (*Bidens* spp.)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- False nettle (*Boehmeria cylindrica*)
- Clearweed (*Pilea pumila*)
- Common sneezeweed (*Helenium autumnale*)
- Joe-pye-weed (*Eutrochium fistulosum*)
- Spotted joe-pye-weed (*Eutrochium maculatum*)
- Boneset (*Eupatorium perfoliatum*)
- Wingstem (*Verbesina alternifolia*)
- Indian-grass (*Sorghastrum nutans*)
- Big bluestem (*Andropogon gerardii*)
- Common yellow wood-sorrel (*Oxalis stricta*)
- Cutgrass (*Leersia virginica*)
- Freshwater cordgrass (*Spartina pectinata*)
- Indian hemp (*Apocynum cannabinum*)
- Great St. John's-wort (*Hypericum pyramidatum*)

Vines

- Virgin's-bower (*Clematis virginiana*)
- Hedge bindweed (*Calystegia sepium*)

- Grape (*Vitis* spp.)

International Vegetation Classification Associations:

Piedmont / Central Appalachian Sycamore - River Birch Scour Woodland (CEGL003896)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501.

Pennsylvania Community Code

SY : River Birch – Sycamore Floodplain Scrub

Similar Ecological Communities

The Mixed Hardwood Floodplain Thicket contains a mixture of shrub species and is distinguishable from Black Willow Floodplain Thicket as it lacks the pure dominance of black willow (*Salix nigra*) found in the latter type. The black willow-dominated type is usually found growing in soils that are markedly more silty and saturated or flooded for much of the growing season.

Fike Crosswalk

Related to River birch - sycamore floodplain scrub. This type was modified based on results of river floodplain classification studies in the Susquehanna River Basin and changes were made to reflect a more diverse species composition observed in this community.

Conservation Value

This community is an important component of the river floodplain ecosystem, which provides significant ecosystem services such as sediment control, filtering runoff, and cooling overland flow of water, in addition to wildlife habitat. This habitat, while common, provides important habitat for a number of important and rare insect species, namely tiger beetles (genus *Cicindela*), ground beetles (order Carabidae), and others during the drier periods of the year.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts

in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution.

Management

A natural buffer to high quality examples of this floodplain forest 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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species into high quality examples of these wetlands.

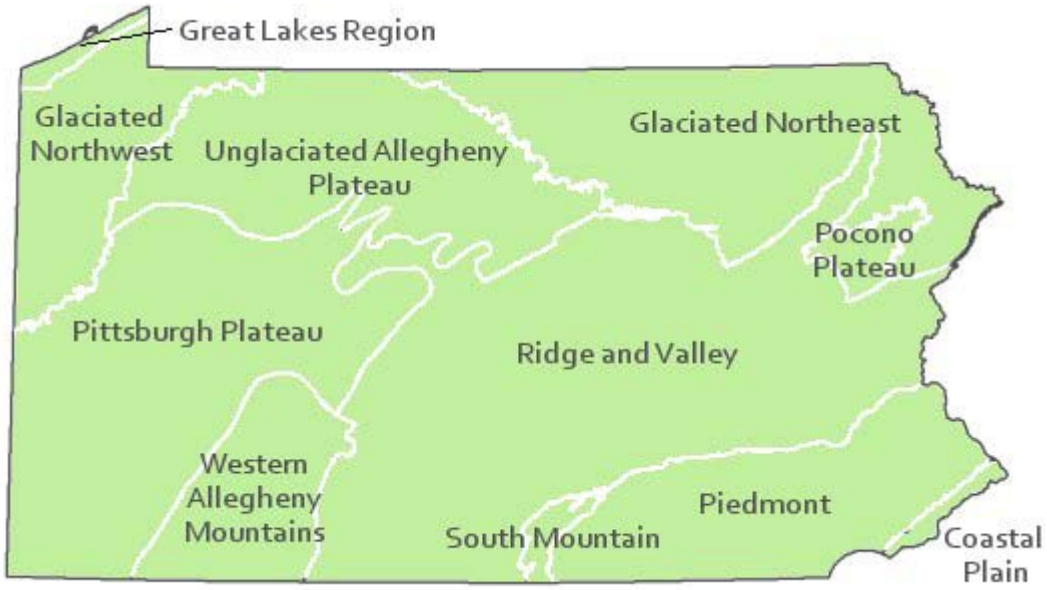
Research Needs

This type is highly variable and species present are greatly influenced by the timing and duration of inundation. Variations occur at eco-regional levels. Plot data collected during floodplain studies to characterize floodplain communities indicated that floodplain shrublands differ significantly between different drainages, most importantly, river birch (*Betula nigra*) shares dominance with sycamore in the Susquehanna drainage. Differences in soils, site hydrology, stream order and landscape position, and other factors contribute to differences in species composition between this type, primarily found in the Susquehanna and Delaware river basins, and the similar mixed hardwood floodplain shrublands associated with the Ohio River Basin. As this type requires high velocity flows, alteration of the natural flooding regime (duration and frequency) has most likely been the most critical factor influencing the quality and persistence of this type.

Trends

Mixed Hardwood Floodplain Thickets were undoubtedly more common historically and have declined due to dam impoundments, human development, and farming; modification of the adjacent upland has further impacted the quality of this type. The relative trend for this community is likely stable or may be declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and lack of periodic flooding events.

Range Map



Pennsylvania Range

Statewide.

Global Distribution

This community occurs throughout the mid-Atlantic U.S. and has been identified in plant community classifications from Pennsylvania, New York, Maryland, and Delaware.

Poison Sumac – Red-cedar – Bayberry Fen

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: GNR
State Rank: S1

General Description

This community type is specific to northeastern Pennsylvania and western New Jersey. These are wetlands that have developed under the influence of base-rich water and usually have a substantial organic layer. The pH of surface water during the growing season ranges from 7.0 to 8.1. Structurally, they are dominated by a mixture of shrubs and herbaceous plants (predominantly sedges). Most sites have areas in the wettest portions that are without woody vegetation. Depth of organic matter ranges from zero in actively seeping areas to over a meter in basins. The dominant shrubs include eastern red-cedar (*Juniperus virginiana*), bayberry (*Myrica pensylvanica*), poison sumac (*Toxicodendron vernix*), willows (*Salix* spp.), shrubby cinquefoil (*Potentilla fruticosa*), gray dogwood (*Cornus racemosa*), alder-leaved buckthorn (*Rhamnus alnifolia*), and ninebark (*Physocarpus opulifolius*). Herbaceous species include Atlantic sedge (*Carex sterilis*), yellow sedge (*Carex flava*), sedge (*Carex tetanica*), sedge (*Carex lurida*), tussock sedge (*Carex stricta*), spike muhly (*Muhlenbergia glomerata*), capillary beak-rush (*Rhynchospora capillacea*), white beak-rush (*Rhynchospora alba*), brook lobelia (*Lobelia kalmii*), spotted Joe-Pye-weed (*Eutrochium maculatum*), swamp thistle (*Cirsium muticum*), marsh fern (*Thelypteris palustris*), mountain-mint (*Pycnanthemum virginianum*), meadow spikemoss (*Selaginella apoda*), bugleweed (*Lycopus uniflorus*), round-leaved sundew (*Drosera rotundifolia*), grass-of-Parnassus (*Parnassia glauca*), calico aster (*Symphyotrichum lateriflorum*), and New York ironweed (*Vernonia noveboracensis*). Characteristic bryophytes include *Campylium stellatum*, *Aulacomnium palustre*, *Fissidens adiantoides*, and *Bryum pseudotriquetrum*. *Chara* spp. (stoneworts) occur in seeps and in unvegetated flats.

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Dominated by eastern red-cedar (*Juniperus virginiana*), bayberry (*Myrica pensylvanica*), poison sumac (*Toxicodendron vernix*), and shrubby cinquefoil (*Potentilla fruticosa*)
- Occurs in eastern Pennsylvania
- Calcareous soils

Characteristic Species

Shrubs

- Eastern red-cedar (*Juniperus virginiana*)
- Bayberry (*Myrica pensylvanica*)
- Poison sumac (*Toxicodendron vernix*)
- Willows (*Salix* spp.)
- Shrubby cinquefoil (*Potentilla fruticosa*)
- Gray dogwood (*Cornus racemosa*)
- Alder-leaved buckthorn (*Rhamnus alnifolia*)
- Ninebark (*Physocarpus opulifolius*)

Herbs

- Atlantic sedge (*Carex sterilis*)
- Yellow sedge (*Carex flava*)
- Wood's sedge (*Carex tetanica*)
- Sedge (*Carex lurida*)
- Tussock sedge (*Carex stricta*)
- Spike muhly (*Muhlenbergia glomerata*)
- Capillary beak-rush (*Rhynchospora capillacea*)
- White beak-rush (*Rhynchospora alba*)
- Brook lobelia (*Lobelia kalmii*)
- Spotted joe-pye-weed (*Eutrochium maculatum*)
- Swamp thistle (*Cirsium muticum*)
- Marsh fern (*Thelypteris palustris*)
- Mountain-mint (*Pycnanthemum virginianum*)
- Meadow spikemoss (*Selaginella apoda*)
- Bugleweed (*Lycopus uniflorus*)

- Round-leaved sundew (*Drosera rotundifolia*)
- Grass-of-parnassus (*Parnassia glauca*)
- Calico aster (*Symphyotrichum lateriflorum*)
- New York ironweed (*Vernonia noveboracensis*)

Exotic Species

- Common reed (*Phragmites australis* ssp. *australis*)

International Vegetation Classification Associations:

Northern Piedmont Rich Fen (CEGL006103)

NatureServe Ecological Systems:

North-Central Appalachian Seepage Fen (CES202.607)

Origin of Concept

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

Pennsylvania Community Code

SP : Poison Sumac – Red-Cedar – Bayberry Fen

Similar Ecological Communities

This type is ecologically similar to and shares many species with the Alder-leaved Buckthorn – Inland Sedge – Golden Ragwort Shrub Fen type. The two differ in their distribution and species composition with the Posion Sumac – Red-cedar – Bayberry Fen occurring in the eastern portion of Pennsylvania and dominated by eastern red-cedar (*Juniperus virginiana*), bayberry (*Myrica pensylvanica*), poison sumac (*Toxicodendron vernix*), and shrubby cinquefoil (*Potentilla fruticosa*).

Fike Crosswalk

Poison Sumac – Red-cedar – Bayberry Fen

Conservation Value

Poison Sumac – Red-cedar – Bayberry Fen occurs in calcareous wetlands, which are especially unusual in Pennsylvania, where the predominant geology in most regions is acidic. There are a number of plants, aquatic invertebrates, and lepidopterans adapted specifically to this high-pH wetland habitat. Plants of special concern in Pennsylvania that are found in this habitat include Atlantic sedge (*Carex sterilis*),

yellow sedge (*Carex flava*), sedge (*Carex tetanica*), capillary beak-rush (*Rhynchospora capillacea*), brook lobelia (*Lobelia kalmii*), and grass-of-Parnassus (*Parnassia glauca*).

Threats

The greatest threats to these communities are extraction of bedrock and glacial deposits or disruption to groundwater flow from activities such as drilling or mining in nearby areas and groundwater extraction, which can contaminate or alter the flow patterns of the groundwater that feeds the seepage. Groundwater pollution can also occur from improperly installed septic systems, from improperly lined underground waste disposal, and in agricultural areas, from infiltration of pesticides, fertilizer, and bacteria from animal wastes. Invasive plant species, such as common reed (*Phragmites australis* ssp. *australis*) and both native and invasive cat-tail species (*Typha* spp.) can threaten the biological integrity of the community. Wetland soils and vegetation are sensitive and will be damaged by foot traffic or recreational vehicles as they are easily compacted.

Management

Drilling, mining, or other disruptions to bedrock or glacial deposits should not be undertaken within a half mile of a seepage wetland without a thorough understanding of bedrock layers and groundwater flows. Groundwater flow patterns do not always mirror surface watersheds, and in some cases aquifers may be contiguous over large areas. Seepage wetlands are also sensitive to trampling and other physical disturbance from recreational activities; trails should be sited away from the wetland or elevated structures employed to prevent traffic in the wetland. 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. 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. These wetlands may require periodic disturbance such as burning or grazing to maintain their open canopy which is indicative of this community and the rare species that occupy it.

Research Needs

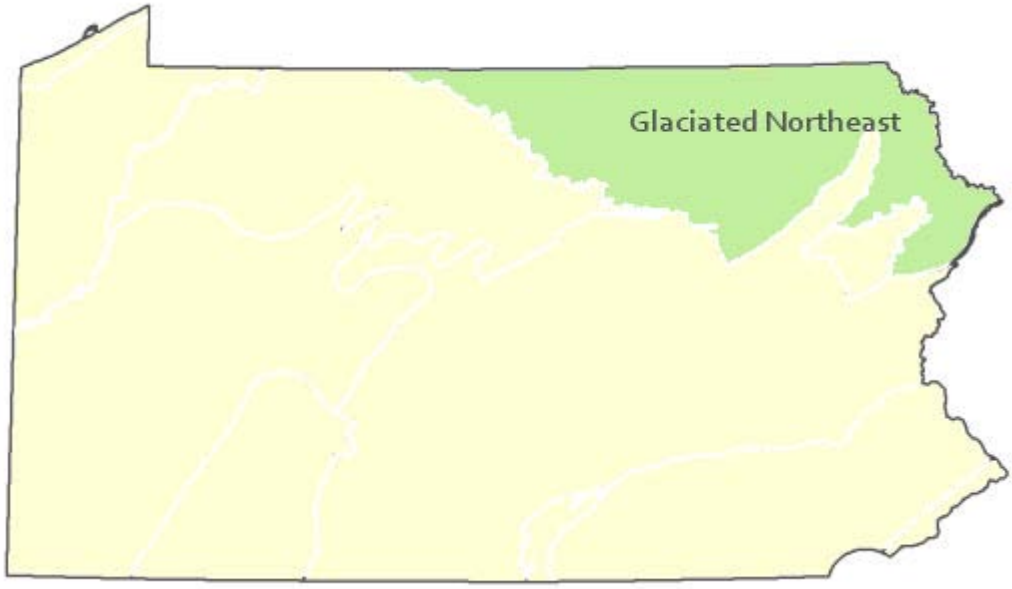
More site inventory and classification work is needed to refine the definition of this community type and resolve its relationship to other types. It appears that some of these wetlands will succeed to shrubland if not maintained. Management of these wetlands would be informed by an understanding of natural successional pathways and of the historical frequency of disturbances such as fire and grazing in these wetlands.

Trends

Specific information on the loss and degradation of this community is not available. However, most calcareous soils in Pennsylvania occur in valleys or glaciated regions that are also favorable for agriculture and settlement, and have been extensively cleared of natural vegetation for these purposes.

This community type is likely to have been lost or altered at a disproportionately high rate to other wetland types.

Range Map



Pennsylvania Range

NE Pennsylvania

Global Distribution

New Jersey, New York, and Pennsylvania

Sweet-gale – Leatherleaf Shrub Fen

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): Peatland Wetland

Global Rank: GNR
State Rank: S1

General Description

Leatherleaf (*Chamaedaphne calyculata*) is dominant or co-dominant with sweet-gale (*Myrica gale*) and the shrubs are typically one-meter high and very dense. Other low shrubs like rhodora (*Rhododendron canadense*), sheep laurel (*Kalmia angustifolia*), black chokeberry (*Photinia melanocarpa*), Labrador-tea (*Rhododendron groenlandicum*), and bog laurel (*Kalmia polifolia*) are common. Tall shrubs like highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*), witherod (*Viburnum cassinoides*), alder (*Alnus* spp.), and arrow-wood (*Viburnum recognitum*) as well as red maple (*Acer rubrum*), red spruce (*Picea rubens*), tamarack (*Larix laricina*), and pitch pine (*Pinus rigida*) saplings are scattered throughout. Sedges are common and may include sedge (*Carex trisperma*), sedge (*Carex canescens*), tussock sedge *(Carex stricta)* and sedge (*Carex utriculata*). Other herbaceous species may include pitcher-plant (*Sarracenia purpurea*), sundews (*Drosera* spp.), coastal mannagrass (*Glyceria obtusa*), and water bulrush (*Schoenoplectus subterminalis*). hummock and hollow microtopography is pronounced with narrow and deep pools. Sphagnum moss (*Sphagnum* spp.) forms a thick carpet on hummocks.

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Dominated by sweet-gale (*Myrica gale*) and leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Occurs within Pocono Plateau
- Hummock and hollow microtopography

Characteristic Species

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sweet-gale (*Myrica gale*)
- Rhodora (*Rhododendron canadense*)
- Sheep laurel (*Kalmia angustifolia*)
- Black chokeberry (*Photinia melanocarpa*)
- Labrador-tea (*Rhododendron groenlandicum*)
- Bog laurel (*Kalmia polifolia*)

Herbs

- Sedge (*Carex trisperma*)
- Sedge (*Carex canescens*)
- Tussock sedge (*Carex stricta*)
- Sedge (*Carex utriculata*)
- Pitcher-plant (*Sarracenia purpurea*)
- Coastal mannagrass (*Glyceria obtusa*)
- Water bulrush (*Schoenoplectus subterminalis*)
- Sundews (*Drosera* spp.)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

None

NatureServe Ecological Systems:

North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Sweet-gale – Leatherleaf Shrub Fen may have a similar appearance to Leatherleaf – Sedge Wetland but the Sweet-gale – Leatherleaf Shrub Fen is distinguishable by the prominence of sweet-gale (*Myrica gale*).

Fike Crosswalk

Sweet-gale (leatherleaf) - sedge shrub fen

Conservation Value

This is a rare plant community known to occur at one location within the state. Plants of concern found in the wetland or in adjacent waterways include sweet-gale (*Myrica gale*), Labrador-tea (*Rhododendron groenlandicum*), coastal mannagrass (*Glyceria obtusa*), and water bulrush (*Schoenoplectus subterminalis*). This community also serves as a buffer for sediment and pollution runoff from adjacent developed lands by slowing the flow of surface water causing sediment to settle within this wetland.

Threats

Beavers may be a threat to this community or may be integral to its maintenance through periodic disturbance.

Management

Hydrologically, this type receives surface water from creeks that flow through the system or from an adjacent open water body. It is likely that ground and surface water move through this wetland and provide greater nutrient availability and higher pH (acidity) than what would be expected in a bog. As long as there is sufficient water, occasional hydrologic disturbances and ample buffers, this community should be able to maintain itself. Monitoring water quality and exotic invasive species is recommended.

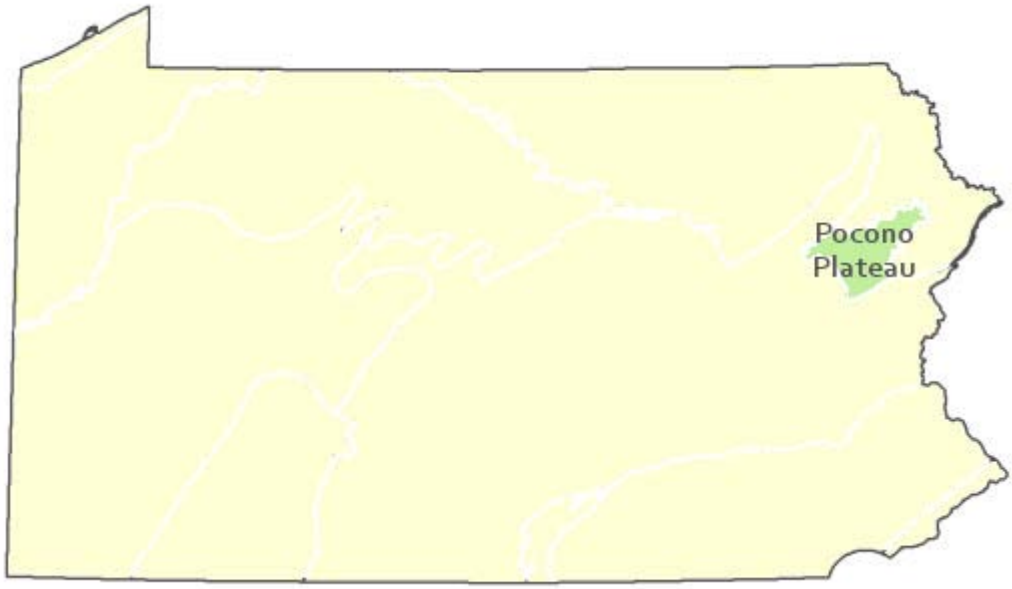
Research Needs

In addition to further studying the range of this type, there is need to monitor high quality examples of this community. Large expanses of this type should be inventoried for rare plants and animals, especially insects.

Trends

Little is known about this community and it is difficult to suggest that this type is increasing or decreasing in occurrence.

Range Map



Pennsylvania Range

Pocono Plateau

Global Distribution

Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont

Water-willow (*Decodon verticillatus*) Shrub Wetland

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

Global Rank: GNR
State Rank: S3

General Description

Water-willow (*Decodon verticillatus*) has the ability to extend itself laterally over open water and thus forms a fringe along the aquatic edge of lakeside, creekside, or bog-lake-side wetlands. The associated species vary widely; some common examples are spatterdock (*Nuphar advena/ N. variegata*), arrow-arum (Peltandra virginica), pickerel-weed (Pontederia cordata), bladderworts (*Utricularia* spp.), and buttonbush (*Cephalanthus occidentalis*). This community type may occur as part of the acidic glacial peatland complex.

Rank Justification

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

Identification

- May occur as part of a complex and usually on fringes of lakes, bogs, and waterways.
- Mucky substrate
- Clear dominance of water-willow (*Decodon verticillatus*)

Characteristic Species

Shrubs

- Water-willow (*Decodon verticillatus*)
- Buttonbush (*Cephalanthus occidentalis*)

Herbs

- Spatterdock (*Nuphar advena*)
- Spatterdock (*Nuphar variegata*)
- Pickerel-weed (*Pontederia cordata*)
- Bladderworts (*Utricularia* spp.)

International Vegetation Classification Associations:

Swamp-loosestrife Shrub Swamp (CEGL005089)

NatureServe Ecological Systems:

Northern Atlantic Coastal Plain Stream and River (CES203.070)
Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh (CES203.516)
Northern Atlantic Coastal Plain Pond (CES203.518)

Origin of Concept

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

Pennsylvania Community Code

SW : Water-Willow (Decodon Verticillatus) Shrub Wetland

Similar Ecological Communities

Buttonbush Wetland and Water-willow Shrub Wetland occur in similar environmental settings and both contain buttonbush (*Cephalanthus occidentalis*), but unlike the Buttonbush Wetland, it is not the clear dominant shrub species.

Fike Crosswalk

Water-willow (*Decodon verticillatus*) Shrub Wetland

Conservation Value

This community 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 this wetland. Water-willow (*Decodon verticillatus)* can also be an aggressive competitor and can degrade peatland habitats, especially where bog pools and ponds are present.

Threats

While impoundments and hydrological alteration of free flowing streams often facilitated development of this community in many areas, continued changes to site hydrology may impact this community (e.g., impoundments, beaver dams) and lead to shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis* ssp. *australis*) can dominate this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

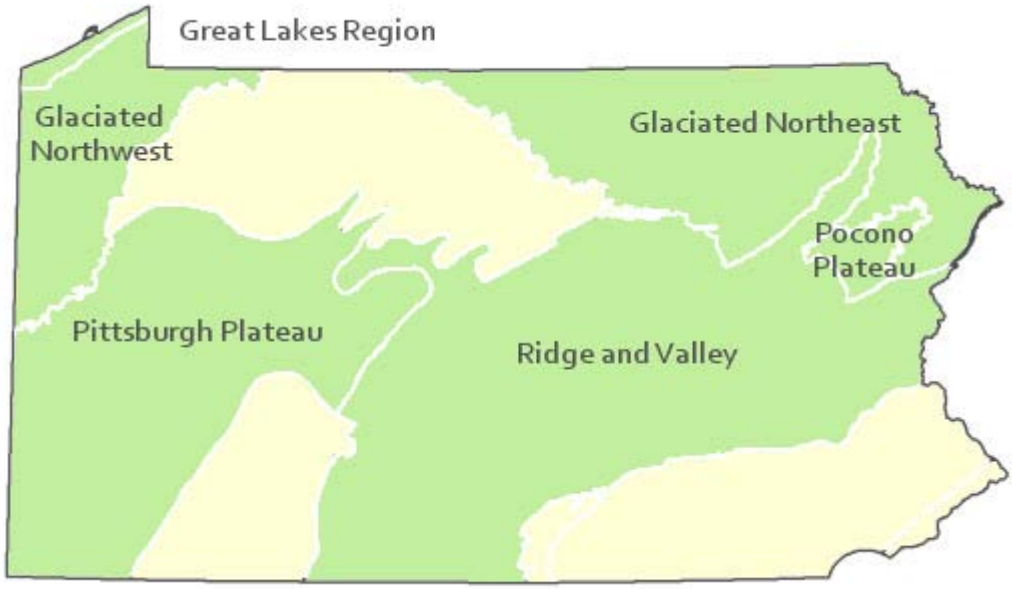
Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations of this community.

Trends

Shrub wetlands were probably more common but declined due to dam impoundments, wetland draining/filling, and clearing of the adjacent lands and subsequent sedimentation. Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Great Lakes Region, Pocono Plateau, Ridge and Valley, and the Pittsburgh Plateau.

Global Distribution

Connecticut, Delaware, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, and West Virginia. The community also occurs in Canada in Ontario and Quebec.

Willow – Indian-grass Floodplain Shrub Wetland

System: Palustrine
Subsystem: Shrubland
PA Ecological Group(s): River Floodplain

Global Rank: GNR
State Rank: S3

General Description

This community occurs on island heads and river bars,where the substrate is sand, sandy gravel, and/or cobbles. It typically occurs between the Periodically Exposed Shoreline Community and tall shrub communities or floodplain forest. These areas tend to be drier and droughty due to the elevation above the water and rapidly draining, coarse substrate. In times of high water , these areas are frequently inundated and subject to high stream velocity and ice scour. This community represents the transition between herbaceous- or graminoid-dominated areas that may be frequently stripped of vegetation and established shrublands from which the vegetation is rarely completely removed by river processes.

This community is characterized by a thick herbaceous and graminoid layer with scattered short shrubs (cover between 25-50%). Sandbar willow (*Salix exigua*) and black willow (*Salix nigra*) are typically the dominant short shrubs (<2 m in height), with occasional sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), box-elder (*Acer negundo*), steeplebush (*Spiraea tomentosa*), silky dogwood (*Cornus amomum*), and honey-locust (*Gleditsia triacanthos*). Scattered individuals of these same species may be present as tall shrubs (2-5 m in height). The scattered shrubs occur in a matrix of dense prairie grasses and forbs. The most common species include Indian-grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), Indian-hemp (*Apocynum cannabinum*), pink dogbane (*Apocynum androsaemifolium*), garden loosestrife (*Lysimachia vulgaris*), water smartweed (*Persicaria amphibia*), smartweed (*P. pensylvanica*), reed canary-grass (*Phalaris arundinacea*), water-willow (*Justicia americana*), boneset (*E. perfoliatum*), white boneset (*Eupatorium album*), Joe-Pye-weed (*Eutrochium fistulosum*), and spotted spurge (*Euphorbia maculata*). Common vine species includes riverbank grape (*Vitis riparia*), which can be absent or moderately dense. This community is also susceptible to colonization by purple loosestrife (*Lythrum salicaria*).

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Found on sand mixed with cobbles situated between the Periodically Exposed Shoreline and tall shrub communities or forest
- Dominated by warm season grasses, battered shrubs and trees comprising up to 50% of the cover

- Maintained by periodic high intensity flooding and ice scour
- Found in the Susquehanna and Delaware river basins in Pennsylvania

Characteristic Species

Shrubs

- Sandbar willow (*Salix exigua*)
- Black willow (*Salix nigra*)
- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- Box-elder (*Acer negundo*)
- Steeple-bush (*Spiraea tomentosa*)
- Silky dogwood (*Cornus amomum*)
- Honey-locust (*Gleditsia triacanthos*)

Herbs

- Indian-grass (*Sorghastrum nutans*)
- Big bluestem (*Andropogon gerardii*)
- Indian hemp (*Apocynum cannabinum*)
- Pink dogbane (*Apocynum androsaemifolium*)
- Water smartweed (*Persicaria amphibia*)
- Smartweed (*Persicaria pensylvanica*)
- Water-willow (*Justicia americana*)
- Boneset (*Eupatorium perfoliatum*)
- White-bracted eupatorium (*Eupatorium album*)
- Joe-pye-weed (*Eutrochium fistulosum*)
- Spotted spurge (*Euphorbia maculata*)

Vines

- Riverbank grape (*Vitis riparia*)

Exotic Species

- Garden loosestrife (*Lysimachia vulgaris*)
- Reed canary-grass (*Phalaris arundinacea*)
- Purple loosestrife (*Lythrum salicaria*)

International Vegetation Classification Associations:

Willow River-Bar Shrubland (CEGL006065)
Midwest Willow Sandbar Shrubland (CEGL005078)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501.

Pennsylvania Community Code

HI : Big Bluestem – Indian Grass River Grassland

Similar Ecological Communities

Big Bluestem – Indian-grass Floodplain Grassland and Willow – Indian-grass Floodplain Shrub Wetland are similar in species composition and environmental setting. The main distinguishing feature between the two communities is that Willow – Indian-grass Floodplain Shrub Wetland has greater than 25% shrub cover.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna River Basin.

Conservation Value

Willow – Indian-grass Riverine Shrubland, while common, provides habitat for a number of important and rare insect species, namely tiger beetles (genus *Cicindela*), ground beetles (order Carabidae), and others during the drier periods of the year.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

In addition, reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), giant knotweed (*Fallopia sacchalinensis*), and purple loosestrife (*Lythrum salicaria*) may invade sites supporting Willow – Indian-grass Riverine Shrubland; vulnerable sites tend to be those with deeper sand deposits. Construction of flood-control and navigational dams has resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by the invasive plants.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

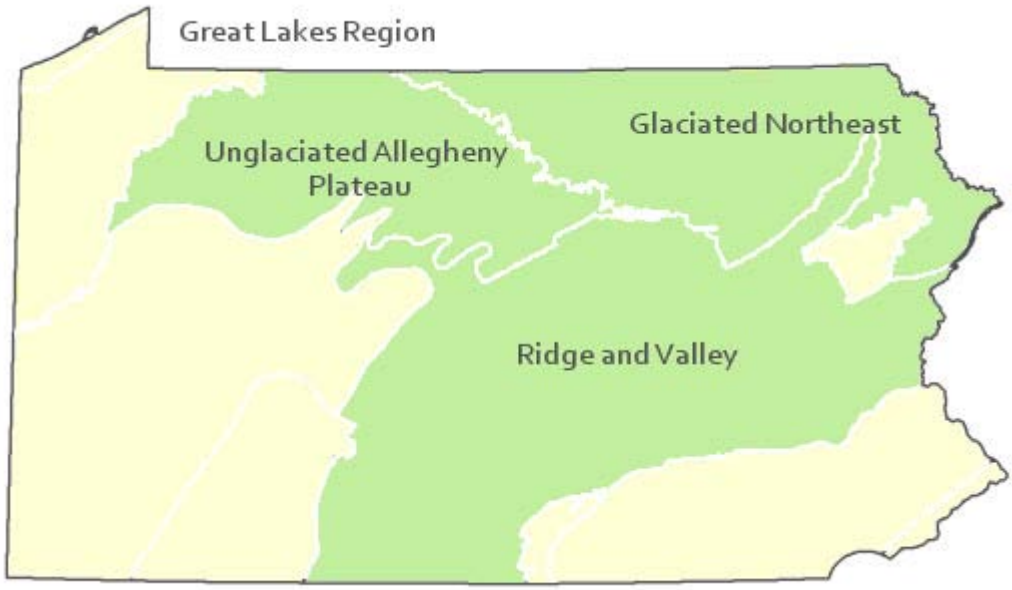
Research Needs

Variations may occur at ecoregional levels. There is a need to analyze plot data collected during floodplain studies to characterize variations of this community between different drainages. There is need to assess and quantify soils, site hydrology, and other factors to further assess differences between plant communities on floodplains supporting large patches of warm season grasses within the Ohio, Delaware, and Susquehanna river basins.

Trends

Willow – Indian-grass Floodplain Shrub Wetlands were undoubtedly more common along stretches of the large rivers in Pennsylvania. Construction of dam impoundments and conversion of these areas for human uses greatly impacted this type's extent, resulting in occurrences only in the free flowing sections of the larger rivers. Alteration of the natural flooding regime (duration and frequency) has most likely been the most critical piece influencing the quality and persistence of this type. Barring construction of new flood-control and navigational dams, the relative trend for this community is likely stable. High quality examples are most likely declining with exotic species invasion.

Range Map



Pennsylvania Range

Large patches of this type are limited to free flowing sections of the Susquehanna and Upper Delaware rivers. Specifically, in the Susquehanna Basin, this community occurs along the North Branch, the West Branch, and the upper portions of the main stem of the Susquehanna River. It is also found within the upper portion of the Delaware River in Pennsylvania, New York, and New Jersey.

Global Distribution

Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont.

Herbaceous Wetlands

Emergent Wetlands

Big Bluestem – Indian-grass Floodplain Grassland

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: G2G3
State Rank: S3

General Description

Big Bluestem – Indian-grass River Grassland occurs on sand/gravel deposits and broad cobble/boulder shores along the banks of large rivers. This community may also occur on islands within the active channel of large rivers in mountainous regions of Pennsylvania. These sites are subject to high intensity flooding and ice scour. This community is found in the Ohio, Susquehanna, and Delaware river basins of Pennsylvania. Large patches of this type are primarily found along free flowing sections of larger rivers of Pennsylvania, where river discharge, basin size, surficial geology, and stream gradient result in significant annual flooding events that restrict the growth and establishment of tree species.

This community is characterized by a dense graminoid layer with scattered short shrubs (less than 25% cover). Scattered shrubs and trees may be present, including sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), black willow (*Salix nigra*), steeplebush (*Spiraea tomentosa*), ninebark (*Physocarpus opulifolius*), and silky dogwood (*Cornus amomum*), but the community is predominantly composed of warm season grasses: big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), and Indian-grass (*Sorghastrum nutans*). Associate species include cordgrass (*Spartina pectinata*), water-pepper (*Persicaria punctata*), tearthumb (*Persicaria sagittata*), hedge bindweed (*Calystegia sepium*), rice cutgrass (*Leersia oryzoides*), purple-leaved willow-herb (*Epilobium coloratum*),

Indian-hemp (*Apocynum cannabinum*), beggar-ticks (*Bidens spp.*), false nettle (*Boehmeria cylindrica*), jewelweed (*Impatiens capensis*), bugleweed (*Lycopus uniflorus*), late goldenrod (*Solidago gigantea*), wrinkle-leaf goldenrod (*Solidago rugosa*), grass-leaved goldenrod (*Euthamia graminifolia*), wild mint (*Mentha arvensis*), boneset (*Eupatorium perfoliatum*), Joe-Pye-weed (*Eutrochium fistulosum*), ox-eye (*Heliopsis helianthoides*), tall tickseed (*Coreopsis tripteris*), flowering spurge (*Euphorbia corollata*) flat-topped white aster (*Doellingeria umbellata*), calico aster (*Symphyotrichum lateriflorum*), twisted sedge (*Carex torta*), riverbank wild-rye (*Elymus riparius*), blue false-indigo (*Baptisia australis*), deer-tongue grass (*Dichanthelium clandestinum*), and common yellow wood-sorrel (*Oxalis stricta*). Reed canary-grass (*Phalaris arundinacea*), which is often present in this type, represents a significant threat as it can form large single species colonies.

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Typically on broad gravel and cobble deposits of large river floodplains
- Sites are open, dominated by warm season grasses with scattered, often battered shrubs and trees
- Substrate is sandy gravel and/or cobbles
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- Black willow (*Salix nigra*)
- Steeple-bush (*Spiraea tomentosa*)
- Ninebark (*Physocarpus opulifolius*)
- Silky dogwood (*Cornus amomum*)

Herbs

- Big bluestem (*Andropogon gerardii*)
- Switchgrass (*Panicum virgatum*)

- Indian-grass (*Sorghastrum nutans*)
- Freshwater cordgrass (*Spartina pectinata*)
- Dotted smartweed (*Persicaria punctata*)
- Tearthumb (*Persicaria sagittata*)
- Rice cutgrass (*Leersia oryzoides*)
- Purple-leaved willow-herb (*Epilobium coloratum*)
- Indian hemp (*Apocynum cannabinum*)
- Beggar-ticks (*Bidens* spp.)
- False nettle (*Boehmeria cylindrica*)
- Jewelweed (*Impatiens capensis*)
- Bugleweed (*Lycopus uniflorus*)
- Smooth goldenrod (*Solidago gigantea*)
- Grass-leaved goldenrod (*Euthamia graminifolia*)
- Boneset (*Eupatorium perfoliatum*)
- Joe-pye-weed (*Eutrochium fistulosum*)
- Ox-eye (*Heliopsis helianthoides*)
- Tall tickseed (*Coreopsis tripteris*)
- Flowering spurge (*Euphorbia corollata*)
- Flat-topped white aster (*Doellingeria umbellata*)
- Calico aster (*Symphyotrichum lateriflorum*)
- Twisted sedge (*Carex torta*)
- Riverbank wild-rye (*Elymus riparius*)
- Blue false-indigo (*Baptisia australis*)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- Common yellow wood-sorrel (*Oxalis stricta*)

Vines

- Virginia-creeper (*Parthenocissus quinquefolia*)
- Poison-ivy (*Toxicodendron radicans*)
- Fox grape (*Vitis labrusca*)
- Riverbank grape (*Vitis riparia*)
- Hedge bindweed (*Calystegia sepium*)

Exotic Species

- Reed canary-grass (*Phalaris arundinacea*)

International Vegetation Classification Associations:

Big Bluestem – Switchgrass – Tall Blue Wild Indigo Herbaceous Vegetation (CEGL006283)
Sandcherry / Big Bluestem – Yellow Indiangrass Herbaceous Vegetation (CEGL006518)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman 2008, also Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501.

Pennsylvania Community Code

HI : Big Bluestem – Indian Grass River Grassland

Similar Ecological Communities

Willow – Indian-grass Floodplain Shrub Wetland differs from the Big Bluestem – Indian-grass Floodplain Grassland in its co-dominance of woody species (shrub cover > 25%) and presence of river birch (*Betula nigra*). The Willow – Indian-grass Floodplain Shrub Wetland is found along the Susquehanna and Delaware rivers but not in the Ohio River Basin. Floodplain Scour Community can share many species and a prairie-like appearance with the Big Bluestem – Indian-grass Floodplain Grassland. Both are often dominated by tall, warm season grasses and species common to tall grass prairies of the upper Midwest. However substrate and hydrology (seasonally flooded rock outcrops) distinguish this type from the other riverside herbaceous types. River Scour communities are primarily found on rock outcrops and bare cobbles that are subject to winter ice scour and periodic flooding, whereas the Big Bluestem –

Indian-grass River Grassland type is found on depositional sand, gravel, and cobble. Floodplain Scour Community patches are generally less-vegetated, as plants grow in the sediment that accumulates between large cobbles or cracks in the bedrock. Reed Canary-grass Floodplain Grasslands are found along river and stream reaches in Pennsylvania with slower moving water, due to lower stream gradient, smaller sub-basin, or lower discharge. This type is distinguished from the Big Bluestem – Indian-grass River Grassland by the absence of large warm-season grasses and near domination of reed canary-grass (*Phalaris arundinacea*). Reed Canary-grass Floodplain Grasslands are also more often found on deeper, sandy soils. Hairy-fruited Sedge (*Carex trichocarpa*) Floodplain Wetland differs from this community in that it has a near domination of hairy-fruit sedge (*Carex trichocarpa*) and the absence of large warm-season grasses. Hairy-fruit Sedge Herbaceous Riverine Communities are also more often found on deeper, sandy soils.

Fike Crosswalk

Big Bluestem - Indian Grass River Grassland

Conservation Value

The community is an important part of the river floodplain ecosystem and is rare in the state, occurring only along free flowing portions of larger rivers. Due to water flow regulation of large stretches of these rivers with dams, and widespread conversion of floodplain to agriculture and development, large patches of floodplain grasslands are uncommon in Pennsylvania and are of high conservation significance. Floodplain grasslands and meadows support rare plant and animal species, such as flat-stemmed spike-rush (*Eleocharis compressa*), sand cherry (*Prunus pumila* var. *depressa*), blue false-indigo (*Baptisia australis*), and tiger beetles (*Cicindela* spp.).

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation and pollution.

In addition, reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), giant knotweed (*Fallopia sachalinensis*), and purple loosestrife (*Lythrum salicaria*) may invade sites supporting Big Bluestem – Indian-grass River Grasslands; vulnerable sites tend to be those with deeper sand deposits. Construction of flood-control and navigational dams have resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow, resulting in deposition of finer sediments, favored by the invasive plants.

Management

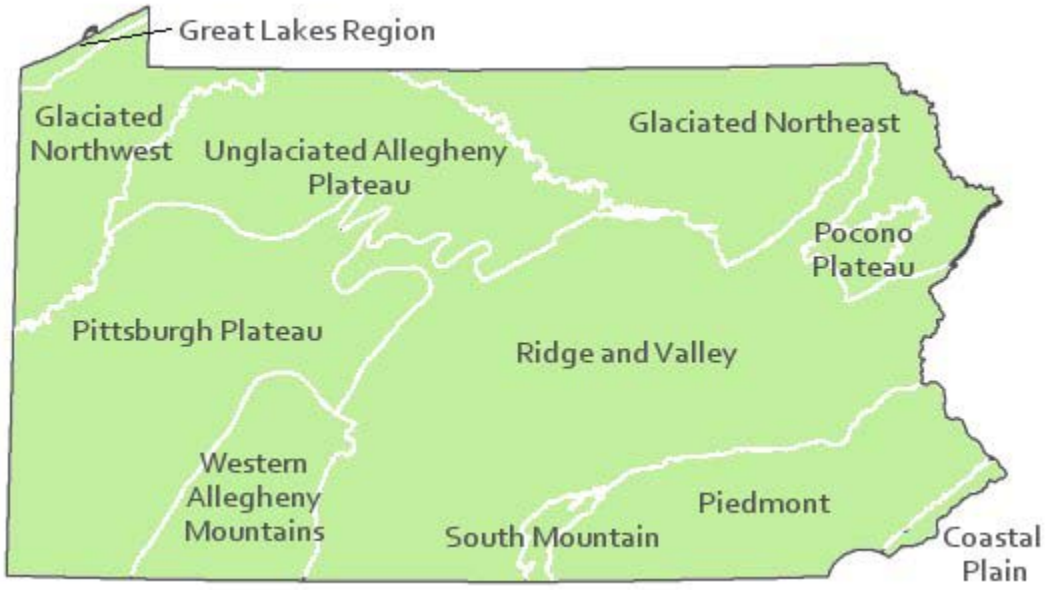
A natural buffer to high quality examples of these floodplain wetlands should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. The potential for soil erosion based on soil

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. Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetlands). Care should also be taken to control and prevent the spread of invasive species into high quality examples of these wetlands.

Trends

Big Bluestem – Indian-grass Floodplain Grasslands were undoubtedly more common historically along stretches of the large rivers in Pennsylvania. Construction of dam impoundments and conversion of these once expansive areas for human uses greatly impacted this type's extent, resulting in occurrences only in the free flowing sections of the larger rivers. Alteration of the natural flooding regime (duration and frequency) has most likely been the most critical piece influencing the quality and persistence of this type. Barring construction of new flood-control and navigational dams, the relative trend for this community is likely stable. High quality examples are most likely declining with exotic species invasion.

Range Map



Pennsylvania Range

This type is found statewide. Large patches of this type are limited to free flowing sections of major rivers in Pennsylvania, primarily the Upper Allegheny, Youghiogheny, Clarion, Susquehanna, and Upper Delaware rivers.

Global Distribution

This community is found in Connecticut, Maine, Maryland, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Vermont, Virginia, and West Virginia.

Bluejoint – Reed Canary-grass Marsh

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

Global Rank: GNR
State Rank: S5

General Description

These marshes occur in a variety of landscape settings, from river backwaters to upland depressions. The most typical species are bluejoint (*Calamagrostis canadensis* var. *canadensis*) and reed canary-grass (*Phalaris arundinacea*). Associates vary widely, but commonly include mannagrass (*Glyceria* spp.), rice cutgrass (*Leersia oryzoides*), three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), Joe-Pye-weed (*Eutrochium fistulosum, E. maculatum*), common cat-tail (*Typha latifolia*), swamp dewberry (*Rubus hispidus*), wool-grass (*Scirpus cyperinus*) and other *Scirpus* spp. The invasive species, common reed (*Phragmites australis* ssp. *australis*), purple loosestrife (*Lythrum salicaria*), narrow-leaved cat-tail (*Typha angustifolia*) and Japanese knotweed (*Fallopia japonica*), are frequently a major problem in these systems.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Dominated by bluejoint (*Calamagrostis canadensis* var. *canadensis*) and co-dominated by reed canary-grass (*Phalaris arundinacea*)
- Soils are typically mineral soil or well-decomposed peat, with a thick root mat

- Water regime varies between temporarily and seasonally flooded
- Graminoid cover is typically dense

Characteristic Species

Herbs

- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)
- Reed canary-grass (*Phalaris arundinacea*)
- Rice cutgrass (*Leersia oryzoides*)
- Three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*)
- Swamp dewberry (*Rubus hispidus*)
- Wool-grass (*Scirpus cyperinus*)
- Joe-pye weed (*Eupatorium* spp.)
- Cat-tail (*Typha* spp.)

Exotic Species

- Common reed (*Phragmites australis* ssp. *australis*)
- Purple loosestrife (*Lythrum salicaria*)
- Narrow-leaved cat-tail (*Typha angustifolia*)
- Japanese knotweed (*Fallopia japonica*)

International Vegetation Classification Associations:

Bluejoint - Spotted Joe-pyeweed Herbaceous Vegetation (CEGL005174)

NatureServe Ecological Systems:

Great Lakes Coastal Wetlands Complex (CECX005702)
High Allegheny Wetland (CES202.069)
Central Appalachian River Floodplain (CES202.608)
North-Central Interior Wet Meadow-Shrub Swamp (CES202.701)

Origin of Concept

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

Pennsylvania Community Code

HB : Bluejoint – Reed Canary Grass Marsh

Similar Ecological Communities

Reed Canary-grass Floodplain Grasslands and Bluejoint – Reed Canary-grass Marsh communities may contain some similar species and occur in similar settings. The main distinguishing feature between the two communities is that Reed Canary-grass Floodplain Grasslands is almost completely dominated by reed canary-grass (*Phalaris arundinacea*) and Bluejoint – reed canary-grass marsh is co-dominated by bluejoint (*Calamagrostis canadensis* var. *canadensis*) and reed canary-grass. Tussock Sedge Marsh communities may contain reed canary grass and/or bluejoint but is strongly dominated by tussock sedge (*Carex stricta*). Bluejoint – reed canary-grass marsh may contain tussock sedge, but it is not dominant within the community. Sedge – Mixed Forb Fen and Bluejoint – Reed Canary-grass Marsh can be similar in appearance and environmental setting but Sedge – Mixed Forb Fen is strongly dominated by calciphilic species such as prairie sedge (*Carex prairea*), Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), and mountain-mint (*Pycnanthemum virginianum*). Mixed Forb – Graminoid Wet Meadow and Bluejoint – Reed Canary-grass Marsh can be similar in appearance and environmental setting but Mixed Forb – Graminoid Wet Meadow communities are dominated by a mixture of sedges (*Carex* spp.)and rushes (*Juncus* spp. and *Scirpus* spp.).

Fike Crosswalk

Bluejoint – Reed Canary-grass Marsh

Conservation Value

This community can serve as a buffer for sediment runoff and pollution from adjacent cleared or developed lands. Bluejoint – Reed Canary-grass Marsh communities can serve as important habitat for rare bird species such as sedge wrens (*Cistothorus platensis),* American bitterns (*Botaurus lentiginosus*), yellow-crowned night herons (*Nyctanassa violacea*), and black-crowned night herons (*Nycticorax nycticorax*).

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution as well as sedimentation. Invasive plant species such as purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Fallopia japonica*), and common reed (*Phragmites australis* ssp. *australis*) can occur in this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

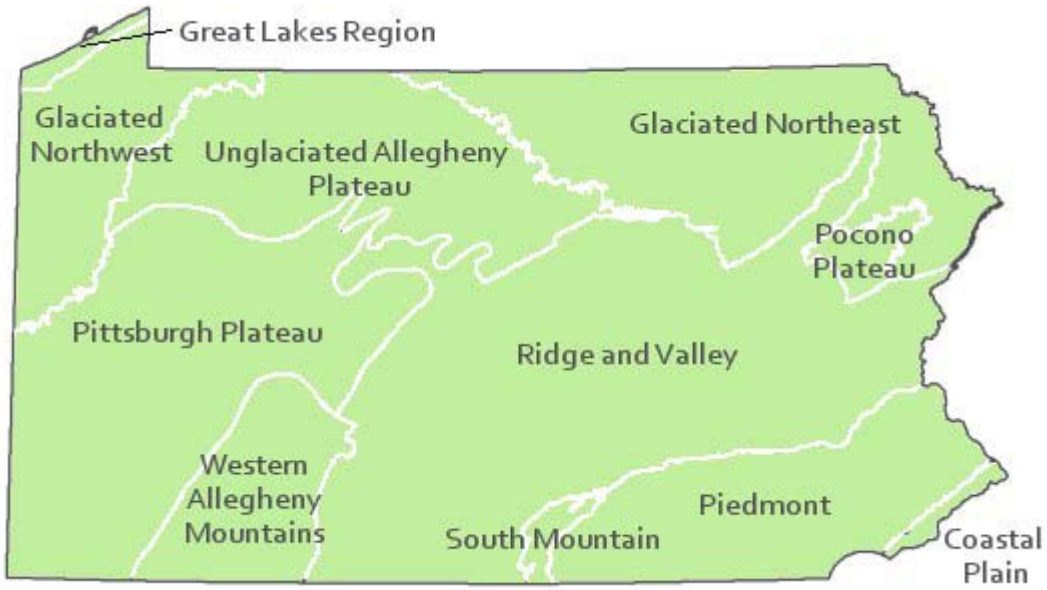
Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling, hydrological alterations, and clearing of the adjacent lands leading to increased evaporation of the standing water and sedimentation. As a result, Reed Canary-grass Floodplain Grasslands and Common Reed Marsh may have replaced historic occurrences of Bluejoint – reed canary-grass marsh communities. The relative trend for this community is likely declining slightly due to hydrological alterations and invasion by exotic species.

Range Map



Pennsylvania Range

Statewide.

Global Distribution

Delaware, Maine, Massachusetts, Michigan, Minnesota, New York, Pennsylvania, Vermont, and Wisconsin.

Bulrush Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Marsh Wetland

Global Rank: GNR
State Rank: S3

General Description

These are communities dominated by soft-stem bulrush (*Schoenoplectus tabernaemontani*), and/or hard-stem bulrush (*Schoenoplectus acutus*), or less commonly threesquare (*Schoenoplectus pungens*), bulrush (*Schoenoplectus purshianus*), river bulrush (*Schoenoplectus fluviatilis*), or Torrey's bulrush (*Schoenoplectus torreyi*). This community type occurs along slow moving sections of large rivers, lake and pond margins, on mudflats, and in shallow water – both tidal and non-tidal.

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Clear dominance of great bulrush (*Schoenoplectus tabernaemontani*), and/or great bulrush (*Schoenoplectus acutus*)
- Found in a variety of wetland settings, most commonly in quiet-water areas along the shores of ponds, lakes, rivers, and larger streams, but also in flooded basins and ditches
- Deep water (usually 0.5-1 m deep)
- Seasonal spring flooding and heavy rainstorms provide nutrient input
- Substrate is usually either gravel and sand or deep muck overlying mineral soil; where wave action is more prevalent, the mineral soil may be exposed

Characteristic Species

Herbs

- Soft-stemmed bulrush (*Schoenoplectus tabernaemontani*)
- Hard-stemmed bulrush (*Schoenoplectus acutus*)
- Threesquare (*Schoenoplectus pungens*)
- Bulrush (*Schoenoplectus purshianus*)
- River bulrush (*Schoenoplectus fluviatilis*)
- Torrey's bulrush (*Schoenoplectus torreyi*)

International Vegetation Classification Associations:

Bulrush Deepwater Marsh (CEGL006275)

NatureServe Ecological Systems:

Laurentian-Acadian Freshwater Marsh (CES201.594)
High Allegheny Wetland (CES202.069)

Origin of Concept

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

Pennsylvania Community Code

HR : Bullrush Marsh

Similar Ecological Communities

Bulrush Marsh is easily distinguished by its clear dominance of bulrushes (*Schoenoplectus* spp.). It may occur in combination with virtually any community type that approaches a water body having the appropriate substrate.

Fike Crosswalk

Bulrush Marsh

Conservation Value

Several rare plants such as the state threatened hard-stem bulrush (*Schoenoplectus acutus*), state vulnerable river bulrush (*Schoenoplectus fluviatilis*), or state endangered Torrey's bulrush (*Schoenoplectus torreyi*) can occur in this community. This community may serve as important habitat for fish by providing cover and foraging grounds.

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to accumulation of agricultural run-off and pollution as well as sedimentation.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

Research Needs

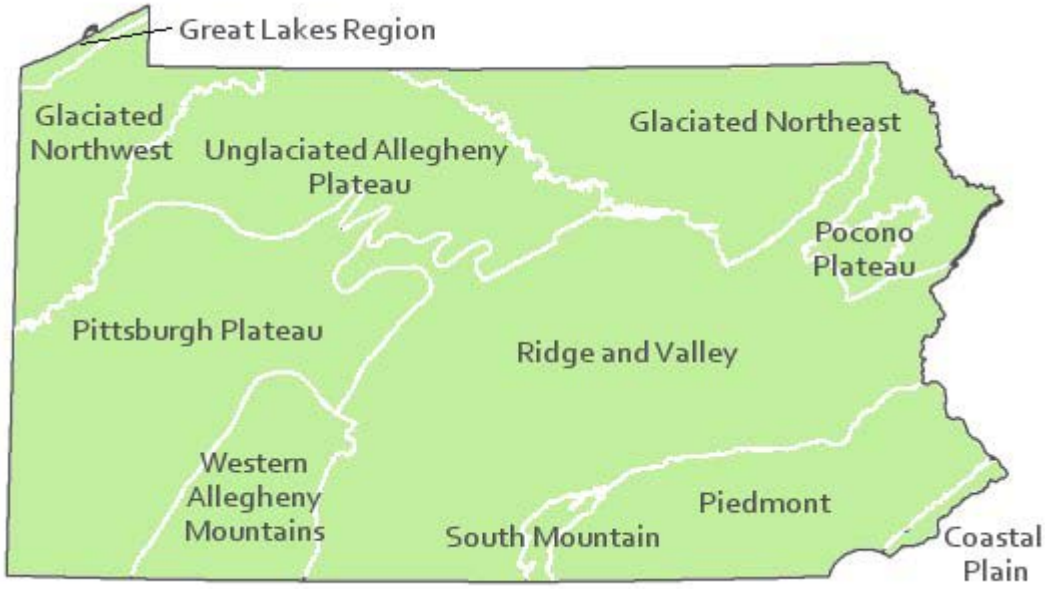
There is a need to collect plot data to characterize variations and guide further classification of this community. There is also a need to document how fauna use this habitat.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased evaporation of the standing water and sedimentation. The

relative trend for this community is likely stable or may be declining slightly due to hydrological alterations.

Range Map



Pennsylvania Range

Statewide.

Global Distribution

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont, and West Virginia.

Cat-tail Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Marsh Wetland and Basin Wetland

Global Rank: GNR
State Rank: S5

General Description

These are robust emergent marshes dominated by common cat-tail (*Typha latifolia*), or less commonly, narrow-leaved cat-tail (*Typha angustifolia*). This type can occur in a variety of landscape positions including river backwaters, protected pond and lakeshores, and upland depressions. Shrubs may be present but cover less than 20%. This community is also common in disturbed landscapes (e.g., roadside ditches, storm water detention basins, disturbed portions of other wetland communities), where bare soil is available for colonization. This community may also occur where other wetland types have experienced an increase in nutrients, such as fertilizer run-off. The substrate may be muck or mineral soil. The surface is usually flooded for most of the year. Associated species include wool-grass (*Scirpus cyperinus*), arrow-arum (*Peltandra virginica*), bur-reed (*Sparganium americanum*), sensitive fern (*Onoclea sensibilis*), jewelweed (*Impatiens capensis*), pickerel-weed (Pontederia cordata), wapato (*Sagittaria latifolia*), beggar-ticks (*Bidens* spp.), smartweeds (*Persicaria* spp.), duckweed (*Lemna minor*), and sedges (*Carex* spp.) – especially tussock sedge (*C. stricta*). The invasive species common reed (*Phragmites australis* ssp. *australis*), narrow-leaved cat-tail (*Typha angustifolia*), and purple loosestrife (*Lythrum salicaria*) are frequently a major problem in these systems.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- River backwaters, protected pond and lakeshores, and upland depressions

- Often associated with disturbed wetlands
- Substrate may be muck or mineral soil
- Surface is usually flooded for most of the year
- Dominated by common cat-tail (*Typha latifolia*)

Characteristic Species

Herbs

- Common cat-tail (*Typha latifolia*)
- Narrow-leaved cat-tail (*Typha angustifolia*)
- Wool-grass (*Scirpus cyperinus*)
- Bur-reed (*Sparganium americanum*)
- Sensitive fern (*Onoclea sensibilis*)
- Jewelweed (*Impatiens capensis*)
- Pickerel-weed (*Pontederia cordata*)
- Wapato (*Sagittaria latifolia*)
- Beggar-ticks (*Bidens* spp.)
- Tearthumb (*Persicaria sagittata*)
- Dotted smartweed (*Persicaria punctata*)
- Mild water-pepper (*Persicaria hydropiperoides*)
- Sedge (*Carex stipata*)
- Sedge (*Carex lurida*)
- Sedge (*Carex gynandra*)
- Broom sedge (*Carex scoparia*)
- Sedge (*Carex tribuloides*)
- Sedge (*Carex projecta*)
- Sedge (*Carex lacustris*)

- Sedges (*Carex* spp.)
- Tussock sedge (*Carex stricta*)
- Duckweed (*Lemna* spp.)

Exotic Species

- Narrow-leaved cat-tail (*Typha angustifolia*)
- Common reed (*Phragmites australis* ssp. *australis*)
- Purple loosestrife (*Lythrum salicaria*)
- Hairy willow-herb (*Epilobium hirsutum*)

International Vegetation Classification Associations:

Eastern Cattail Marsh (CEGL006153)

NatureServe Ecological Systems:

Laurentian-Acadian Freshwater Marsh (CES201.594)

Origin of Concept

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

Pennsylvania Community Code

HC : Cattail Marsh

Similar Ecological Communities

Clear dominance by cat-tail (*Typha* spp.) distinguishes this type from the other marsh/palustrine herbaceous types that occur in similar settings.

Fike Crosswalk

Cat-tail Marsh

Conservation Value

Cat-tail Marsh can serve as an important habitat and food source for muskrats and shorebirds, such as the Marsh Wren (*Cistothorus palustris*) and American Bittern (*Botaurus lentiginosus*). 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 this wetland.

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution as well as sedimentation. Invasive plant species such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*) can occur in this community. Cat-tail Marsh communities themselves can be a threat to other wetland communities through the clonal growth of cat-tails and displacement of other vegetation types.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

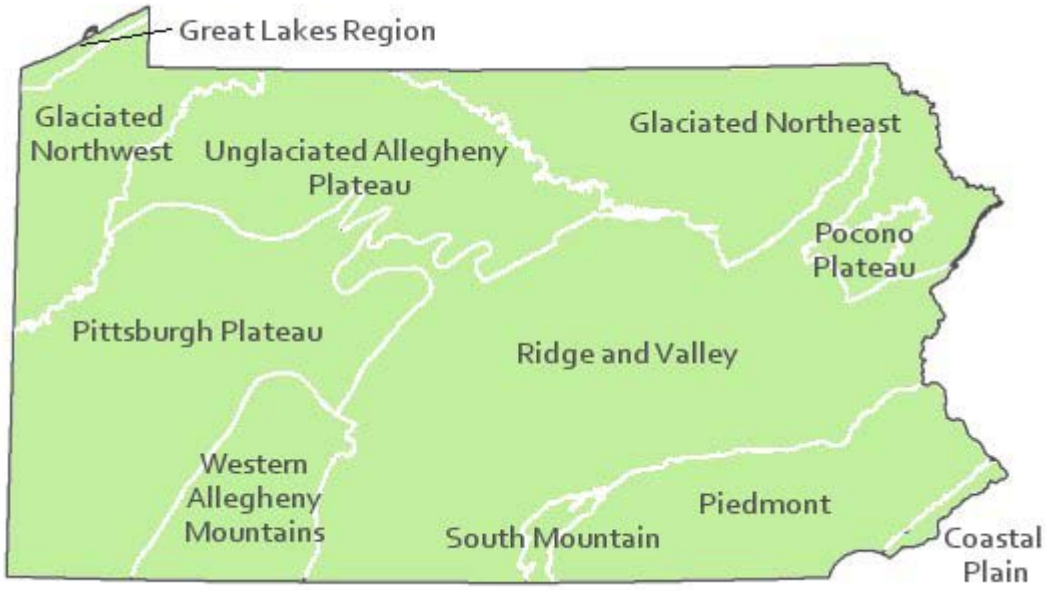
Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

It is difficult to characterize the trend of this community but it typically occurs in degraded wetlands. Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is likely stable or may be increasing slightly due to hydrological alterations.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Connecticut, Delaware, Maine, Maryland, Massachusetts, North Carolina, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont, and West Virginia.

Common Reed Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Marsh Wetland and Basin Wetland

Global Rank: GNA
State Rank: S5

General Description

Common Reed Marsh occurs in standing water for most or all of the year and is often associated with impounded drainages, ponded areas near streams, or saturated areas surrounding drainages. The community occurs on poorly drained soils, usually mucky silt loam or shallow mucky peat. Vegetation is strongly dominated by common reed (*Phragmites australis* ssp. *australis*), which can form nearly monotypic stands. Other associated species may include common cat-tail (*Typha latifolia*), wool-grass (*Scirpus cyperinus*), smartweeds (*Persicaria* spp.), bonesets (*Eupatorium* spp.), sensitive fern (*Onoclea sensibilis*), and rice cutgrass (*Leersia oryzoides*). The exotic invasive species narrow-leaved cat-tail (*Typha angustifolia*) and purple loosestrife (*Lythrum salicaria*) can be present in these wetlands.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Near monotypic stands of common reed (*Phragmites australis* ssp. *australis*)
- Occurs on impounded drainages, ponded areas near streams, or saturated areas surrounding drainages

Characteristic Species

Herbs

- Common cat-tail (*Typha latifolia*)
- Wool-grass (*Scirpus cyperinus*)
- Smartweeds (*Persicaria* spp.)
- Joe-pye weed (*Eupatorium* spp.)
- Sensitive fern (*Onoclea sensibilis*)
- Rice cutgrass (*Leersia oryzoides*)

Exotic Species

- Common reed (*Phragmites australis* ssp. *australis*)

- Purple loosestrife (*Lythrum salicaria*)
- Narrow-leaved cat-tail (*Typha angustifolia*)

International Vegetation Classification Associations:

Eastern Reed Marsh (CEGL004141)

NatureServe Ecological Systems:

North-Central Interior Freshwater Marsh (CES202.899)

Origin of Concept

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

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Common Reed Marsh can have similar species as Bluejoint – Reed Canary-grass Marsh and Mixed Forb – Graminoid Wet Meadow but differs between these types as it is clearly dominated by an almost monotypic stand of common reed (*Phragmites australis* ssp. *australis*).

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from PNHP inventory studies.

Conservation Value

This community can colonize disturbed ponds, impounded drainages, ponded areas near streams, or saturated areas surrounding drainages and displace native plant species and communities. However while this community is associated with decreasing native species diversity, the 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 this wetland.

Threats

This community can be a threat to other wetland communities through the clonal growth of common reed (*Phragmites australis* ssp. *australis*) and displacement of other vegetation types.

Management

It is important to prevent the spread of this community through invasive species control, and a natural buffer around the wetland should be maintained in order to minimize the spread of this community into adjacent vegetation.

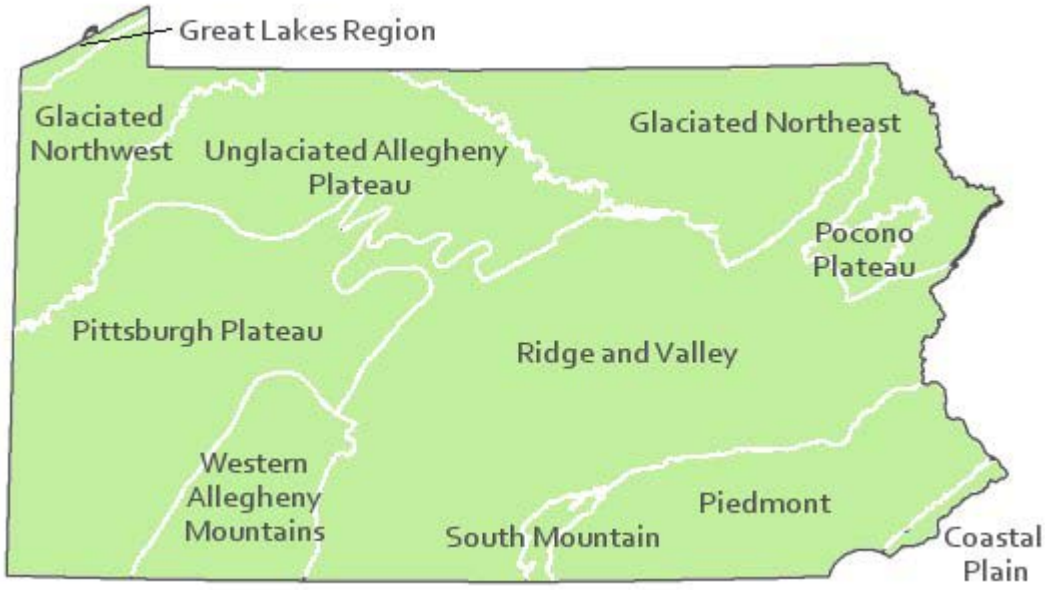
Research Needs

This community is dominated by an exotic invasive species and there is an increasing need to document the impacts of this community on native plant species and communities.

Trends

The trend of this community is increasing due to the strong competitive nature of common reed (*Phragmites australis* ssp. *australis*) within altered environments. Common reed is able to colonize disturbed areas and form monotypic clonal stands which decrease both light and nutrient availability to native species.

Range Map



Pennsylvania Range

Statewide.

Global Distribution

Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Iowa, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, North Carolina, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas, Virginia, Vermont, Wisconsin, and West Virginia.

Cotton-grass Poor Fen

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Peatland Wetland

Global Rank: G3
State Rank: S3

General Description

This acidic herbaceous community occurs on temporarily flooded, semi-permanently flooded or saturated peat at relatively high elevations. Cotton-grass Poor Fens are often referred to as bogs, and in fact the degree of groundwater influence is variable and usually much lower than for other fen communities. They often occur in small-patches, and occupy flat-lying land (0- to 1-degree slopes) in headwater basins. Bedrock is sometimes exposed in places, creating a mosaic that includes dry patches with lowbush blueberry (*Vaccinium angustifolium*), certain lycopods (especially *Lycopodium clavatum* and *Diphasiastrum digitatum*), and other upland species. The community is typically dominated by a combination of tawny cotton-grass (*Eriophorum virginicum*), sedge (*Carex folliculata*), soft rush (*Juncus effusus*), narrow-panicled rush (*Juncus brevicaudatus*), and cinnamon fern (*Osmunda cinnamomea*). Other herbaceous species may include sedge (*Carex trisperma*), round-leaved sundew (*Drosera rotundifolia*), wool-grass (*Scirpus cyperinus*), and white beak-rush (*Rhynchospora alba*).

Older stands typically occur over shallow bedrock, where they are kept open by high water tables. Younger stands often occur in beaver-influenced wetland mosaics, often behind breached dams on the site of former beaver ponds. The type also occurs as a successional community on formerly forested peatlands that have been logged and/or burned within the last century. Hummock and hollow microtopography can be moderately well-developed, and bedrock is typically acidic sandstone and, less commonly, shale. The substrate is poorly to very poorly drained peat or muck. Peat deposits are shallow, ranging from 10-75 cm in depth, underlain by clay-rich soils or bedrock.

Rank Justification

Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Saturated for much or most of the year, usually wet and springy to the touch.
- High cover of peat (*Sphagnum* spp.) or haircap (*Polytrichum* spp.) moss.
- Tawny cotton-grass (*Eriophorum virginicum*) present, co-dominant at least in patches.
- Occurs in high-elevation headwaters basins of non-glaciated regions, often where bedrock is shallow
- Peat layer may be shallow (ranging 10 – 75 cm).
- Woody vegetation is rare or absent

Characteristic Species

Shrubs

- Highbush blueberry (*Vaccinium corymbosum*)
- Chokeberries (*Photinia* spp.)

Herbs

- Tawny cotton-grass (*Eriophorum virginicum*)
- Sedge (*Carex folliculata*)
- Sedge (*Carex trisperma*)
- Soft rush (*Juncus effusus*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Northern bog clubmoss (*Lycopodiella inundata*)
- Round-leaved sundew (*Drosera rotundifolia*)
- Wool-grass (*Scirpus cyperinus*)
- White beak-rush (*Rhynchospora alba*)

Bryophytes

- *Sphagnum* spp.
- *Polytrichum* spp.

International Vegetation Classification Associations:

Cottongrass Bog (CEGL006570)

NatureServe Ecological Systems:

High Allegheny Wetland (CES202.069)

Origin of Concept

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

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

The Sphagnum – Beak-rush Peatland community occurs in glaciated areas of Pennsylvania. Although sphagnum (*Sphagnum* spp.), tawny cotton-grass (*Eriophorum virginicum*), and beak rush species (*Rhynchospora* spp.) are important in both types, they differ in the overall species composition and in the environmental setting with the Cotton-grass Poor Fen being heavily dominated by tawny cotton-grass (*Eriophorum virginicum*) and rushes (*Juncus* spp.) and Sphagnum – Beak-rush Peatland being dominated by white beak-rush (*Rhynchospora alba*). Degraded Sphagnum – Beak-rush Peatland may occur as Cotton-grass Poor Fens.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from PNHP inventory studies.

Conservation Value

The wetlands that Cotton-grass Poor Fens are a part of host a unique assemblage of plant and animal species, including some rare plants and insects such as the creeping snowberry (*Gaultheria hispidula*), bog sedge (*Carex paupercula*), northern pygmy clubtail (*Lanthus parvulus*), ocellated darner (*Boyeria grafiana*), ski-tailed emerald (*Somatachlora elongata*), Appalachian jewelwing (*Calopterysx angustipennis*), and superb jewelwing (*Calopteryx amata*).

Threats

Alteration to the hydrological regime such as impoundments, diking, draining, and beaver dams can lead to habitat destruction and/or shifts in community function and dynamics. However, beaver have been a

part of these ecosystems, thus many of the component species of this community are adapted to the cyclical community shifts caused by beaver. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution as well as sedimentation.

Management

A natural buffer should be maintained around wetlands in order to minimize nutrient runoff, pollution, and sedimentation. Buffer design should consider factors such as the slope of adjacent lands, soil erosion potential, the migration distance of amphibians and insect species using the wetlands, and the condition of surrounding vegetation. Direct impacts and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

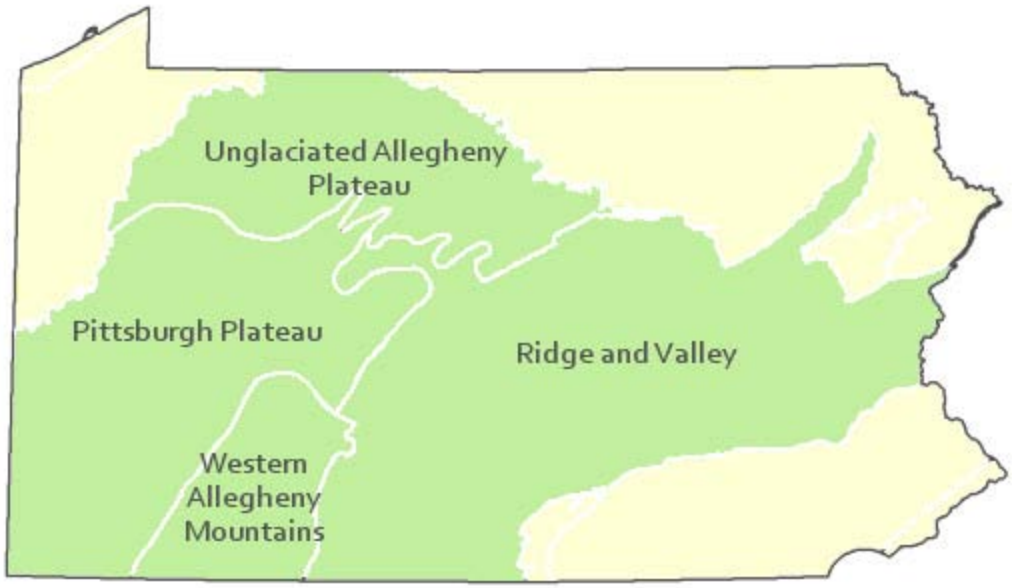
Research Needs

The process of succession in these wetlands, which may maintain the Cotton-grass Poor Fen over time or result in natural transition to shrub or forest wetlands, is also not well understood. It is important to understand the impact of fire, logging, and changes in beaver population density on the successional process.

Trends

While this is considered a naturally occurring wetland community, occurrences of Cotton-grass poor fen communities expanded following extensive logging and fires that occurred in the late 19th and early 20th centuries that impacted most forested wetlands. The almost complete extirpation of the beaver in central Pennsylvania in the late 19th century, and its subsequent population recovery in the second half of the 20th century, also contributed to the number of occurrences and extent of these wetlands. It is known generally that fire, logging, and beaver activity can all influence water levels and plant community structure in wetlands, changing the suitability of the wetland as habitat for many species. However, the full effects and long term impacts of these changes are not known.

Range Map



Pennsylvania Range

Central Pennsylvania – high elevations in the ridge and valley, Allegheny Mountains, and high Allegheny plateau physiographic provinces.

Global Distribution

Maryland, Pennsylvania, and West Virginia.

Floodplain Meadow

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: GNR
State Rank: S4

General Description

This community is found on levees and low terraces of most medium to large tributaries in all major watersheds of Pennsylvania. It is also found on islands in the stream channel. The substrate is sand, which varies in depth from deep sand deposits to shallow sandy alluvium over cobble. The community typically occurs at or just above the flowing water but may exist at higher elevations on the floodplain. This type is often separated from the flowing water by the Periodically Exposed Shoreline Community; it may also be situated on terraces undercut by flowing water.

The vegetation is characteristically "meadow-like," composed of a dense herbaceous layer of tall forbs and graminoids. Shrubs, while often present, make up less than 15% of the plant cover. Species include goldenrods (*Solidago rugosa*, *S. canadensis, S. gigantea, Euthamia graminifolia*), wingstem (*Verbesina alternifolia*), reed canary-grass (*Phalaris arundinacea*), jewelweed (*Impatiens capensis*), Joe-Pye-weed (*Eutrochium fistulosum*), spotted Joe-Pye-weed (*E. maculatum*), boneset (*Eupatorium perfoliatum*), common sneezeweed (*Helenium autumnale*), twisted sedge (*Carex torta*), tussock sedge (*C. stricta*), cardinal-flower (*Lobelia cardinalis*), smartweed (*Persicaria pensylvanica*), blue vervain (*Verbena hastata*), bulrush (*Scirpus polyphyllus*), big bluestem (*Andropogon gerardii*), deer-tongue grass (*Dichanthelium clandestinum*), muhly (*Muhlenbergia* spp.), creeping bent (*Agrostis stolonifera* var. *palustris*), autumn bent (*A. perennans*), Virginia cutgrass (*Leersia virginica*), Indian-hemp (*Apocynum cannabinum*), beggar-ticks (*Bidens spp.*), field horsetail (*Equisetum arvense*), false nettle (*Boehmeria cylindrica*), bugleweed (*Lycopus uniflorus*), common yellow wood-sorrel (*Oxalis stricta*), violets (*Viola spp.*), wild mint (*Mentha arvensis*), flat-topped white aster (*Doellingeria umbellata*), calico aster (*Symphyotrichum lateriflorus*), marsh pennywort (*Hydrocotyle americana*), and riverbank wild-rye (*Elymus riparius*). Scattered short shrubs may be present, including river birch (*Betula nigra*), diamond willow (*Salix eriocephala*), and spicebush (*Lindera benzoin*). Vines, such as riverbank grape (*Vitis riparia)* and virgin's-bower (*Clematis virginiana*) are often found in this type. This type is particularly susceptible to invasion by Japanese knotweeds (*Fallopia japonica* and *F. sachalinense*).

Rank Justification

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

Identification

- Dominated by goldenrods (*Solidago rugosa, S. canadensis, S. gigantea, Euthamia graminifolia*) and wingstem (*Verbesina alternifolia*)
- Contains a diverse mix of forbs and grasses

- Soils are alluvial and range from deep sand deposits to shallow, sand, and/or gravel over cobble
- Separated from the flowing water by the Periodically Exposed Shoreline

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- River birch (*Betula nigra*)
- Diamond willow (*Salix eriocephala*)
- Spicebush (*Lindera benzoin*)

Herbs

- Wrinkle-leaf goldenrod (*Solidago rugosa*)
- Canada goldenrod (*Solidago canadensis*)
- Smooth goldenrod (*Solidago gigantea*)
- Grass-leaved goldenrod (*Euthamia graminifolia*)
- Wingstem (*Verbesina alternifolia*)
- Jewelweed (*Impatiens capensis*)
- Joe-pye-weed (*Eutrochium fistulosum*)
- Spotted joe-pye-weed (*Eutrochium maculatum*)
- Boneset (*Eupatorium perfoliatum*)
- Common sneezeweed (*Helenium autumnale*)
- Twisted sedge (*Carex torta*)
- Tussock sedge (*Carex stricta*)
- Cardinal-flower (*Lobelia cardinalis*)
- Smartweed (*Persicaria pensylvanica*)
- Blue vervain (*Verbena hastata*)
- Bulrush (*Scirpus polyphyllus*)

- Big bluestem (*Andropogon gerardii*)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- Muhly (*Muhlenbergia* spp.)
- Carpet bentgrass (*Agrostis stolonifera* var. *palustris*)
- Autumn bent (*Agrostis perennans*)
- Cutgrass (*Leersia virginica*)
- Indian hemp (*Apocynum cannabinum*)
- Field horsetail (*Equisetum arvense*)
- False nettle (*Boehmeria cylindrica*)
- Bugleweed (*Lycopus uniflorus*)
- Common yellow wood-sorrel (*Oxalis stricta*)
- Field mint (*Mentha arvensis*)
- Flat-topped white aster (*Doellingeria umbellata*)
- Calico aster (*Symphyotrichum lateriflorum*)
- Marsh pennywort (*Hydrocotyle americana*)
- Riverbank wild-rye (*Elymus riparius*)
- Beggar-ticks (*Bidens* spp.)
- Violets (*Viola* spp.)

Vines

- Riverbank grape (*Vitis riparia*)
- Virgin's-bower (*Clematis virginiana*)

Exotic Species

- Reed canary-grass (*Phalaris arundinacea*)
- Japanese knotweed (*Fallopia japonica*)
- Morrow's honeysuckle (*Lonicera morrowii*)

- Multiflora rose (*Rosa multiflora*)

International Vegetation Classification Associations:

Piedmont / Central Appalachian Riverbank Tall Herbaceous Vegetation (CEGL006480)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmmerman 2008

Pennsylvania Community Code

HM : Wet Meadow

Similar Ecological Communities

Twisted Sedge (*Carex Torta*) Stream Margin, Periodically Exposed Shoreline Community, and Big Bluestem – Indian-grass Riverine Grassland can occur adjacent to the Floodplain Meadow Community, but Floodplain Meadow is distinguishable due to the dominance of goldenrod (*Solidago* spp.) and other forbs as well as the substrate consisting of deeper sandy deposits.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

This community represents a mixed herbaceous community within the river floodplain complex where a combination of saturated soils, flood scour, ice flow, and often historic farming, land clearing or other human disturbance have resulted in a community type without a strong canopy tree component. These areas serve as vegetated buffers between agricultural land, pastures, or developed areas and thus hold high conservation significance. These communities rarely harbor plant species of conservation concern, tall herbaceous communities on the river floodplain are important breeding, nesting, and foraging areas for bird and insect species.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, pollution, and sedimentation.

In addition, reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinense*), and purple loosestrife (*Lythrum salicaria*) may invade this community. Construction of flood-control and navigational dams has resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by the invasive plants.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Free-flowing intact riparian systems provide a wide-range of ecological services that are expensive and difficult to replace thru human intervention.

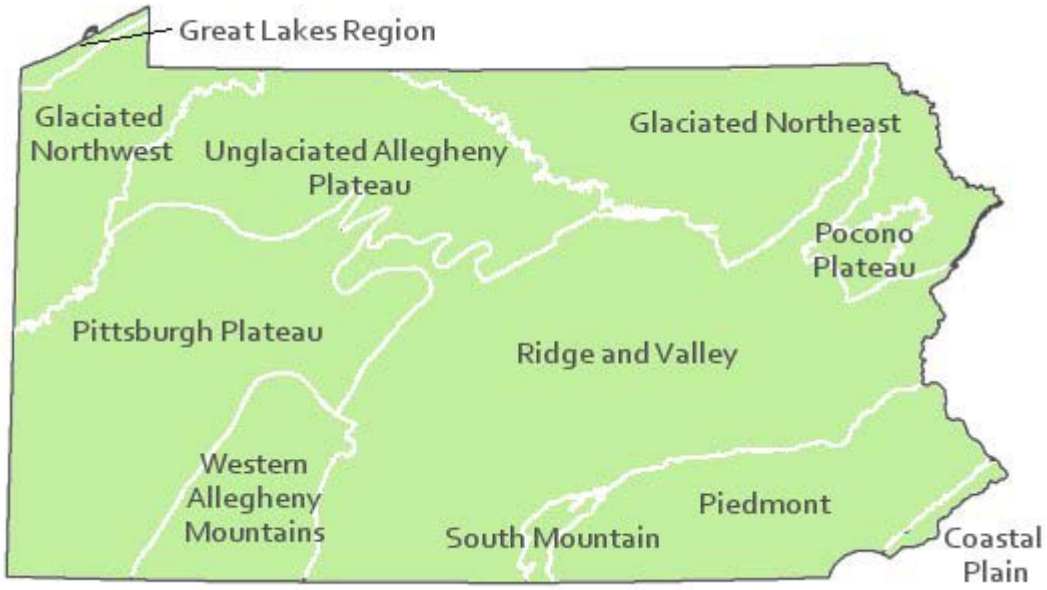
Research Needs

Variations may occur at ecoregional levels. There is need to assess and quantify soils, site hydrology, and other factors to further assess differences between floodplain grasslands on the Ohio, Delaware, and Susquehanna river basins. There is need to monitor high quality examples of this community type.

Trends

There is little to suggest that the occurrence of this type is currently increasing or decreasing. Invasive plants able to tolerate flooded conditions may gain a foothold in these sites and contribute to an overall reduction in quality region-wide. Sites supporting tall herbaceous species near urban areas are most invaded. Wide-spread development of fertile floodplains in the past, particularly for agriculture, may have eliminated suitable habitat for this community.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Kentucky, Maryland, Virginia, and West Virginia

Freshwater Tidal Mixed High Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Tidal Wetland and River Floodplain

Global Rank: GNR
State Rank: S1

General Description

Intertidal high marsh occupies areas of low-lying, nearly level land adjacent to the upper edge of the sloping river bank. These areas are not flooded at every high tide but rather at times of the highest tides (new moon, full moon, or storms). However, high marsh often includes small tidal channels in which the water level varies with the tide. Unlike riverbank tidal marsh, high marsh is not distinctly zoned, except occasionally along the engraved channels. The vegetation is typically dense and is dominated by a large variety of robust herbaceous wetland species.

Species include tidal marsh specialists such as wild-rice (*Zizania aquatica*), swamp beggar's-ticks (*Bidens bidentoides*), showy bur-marigold (*Bidens laevis*), and salt-marsh water-hemp (*Amaranthus cannabinus*). Numerous more widespread wetland plants may also be present such as sweet-flag (*Acorus calamus*), common cat-tail (*Typha latifolia*), arrow-arum (*Peltandra virginica*), pickerel-weed (*Pontederia cordata*), wapato (*Sagittaria latifolia*), water-pepper (*Persicaria punctata*), halberd-leaf tearthumb (*Persicaria arifolia*), marsh-purslane (*Ludwigia palustris*), rice cutgrass (*Leersia oryzoides*), jewelweed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), rose-mallow (*Hibiscus moscheutos*), and climbing hempweed (*Mikania scandens*). Other species that may be present include false nettle (*Boehmeria cylindrica*), purple-stemmed aster (*Symphyotrichum puniceum*), wingstem (*Verbescina alternifolia*), beggar-ticks(Bidens frondosa), mad-dog skullcap (*Scutellaria lateriflora*), common dodder (*Cuscuta gronovii*) and the dodder (*Cuscuta campestris*) may also be present growing on a variety of herbaceous hosts.

Invasive, non-native species that may be present include common reed (*Phragmites australis*), grass (*Arthraxon hispidus*), purple loosestrife (*Lythrum salicaria*), and yellow flag (*Iris pseudacorus*).

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s), such as very steep declines, making it especially vulnerable to extirpation .

Identification

- The lack of zonation distinguishes this tidal marsh type
- Dominated by wild-rice (*Zizania aquatica*), salt-marsh water-hemp (*Amaranthus cannabinus*), and swamp beggar-ticks (*Bidens bidentoides*)
- Occurs on Coastal Plain

Characteristic Species

Herbs

- Wild-rice (*Zizania aquatica*)
- Swamp beggar-ticks (*Bidens bidentoides*)
- Showy bur-marigold (*Bidens laevis*)
- Salt-marsh water-hemp (*Amaranthus cannabinus*)
- Rose-mallow (*Hibiscus moscheutos*)
- Common cat-tail (*Typha latifolia*)
- Sweet flag (*Acorus calamus*)
- Arrow-arum (*Peltandra virginica*)
- Pickerel-weed (*Pontederia cordata*)
- Wapato (*Sagittaria latifolia*)
- Tussock sedge (*Carex stricta*)
- Dotted smartweed (*Persicaria punctata*)
- Tearthumb (*Persicaria sagittata*)
- Rice cutgrass (*Leersia oryzoides*)
- Clearweed (*Pilea pumila*)
- Marsh-purslane (*Ludwigia palustris*)

International Vegetation Classification Associations:

Freshwater Tidal Mixed High Marsh (CEGL006325)

NatureServe Ecological Systems:

Northern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh (CES203.516)

Origin of Concept

Rhoads and Block

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Freshwater Tidal Mixed High Marsh overlaps with the upper zone of Riverbank Freshwater Tidal Marsh, the two types have a number of species in common. The main difference between them is the elevation above mean high tide and the lack, in the high marsh, of a distinct slope and the resulting zonation of the vegetation. Freshwater Tidal Mixed High Marsh may also resemble Mixed Forb – Graminoid Wet Meadow community. However, the presence of tidal marsh species such as wild-rice (*Zizania aquatica*), salt-marsh water-hemp (*Amaranthus cannabinus*), and swamp beggar's-ticks (*Bidens bidentoides*) is definitive.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from inventory studies of Bucks County by Morris Arboretum.

Conservation Value

Freshwater Tidal Mixed High Marsh is a rare community type in Pennsylvania and provides habitat for species not found elsewhere in Pennsylvania. 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 this wetland, providing a flood buffer along the Delaware Estuary. Rare species may include wild-rice (*Zizania aquatica*), showy bur-marigold (*Bidens laevis*), salt-marsh water-hemp (*Amaranthus cannabinus*), swamp beggar's-ticks (*Bidens bidentoides*), river bulrush (*Schoenoplectus fluviatilis*), Walter's barnyard grass (*Echinochloa walteri*), and gypsy-wort (*Lycopus rubellus*).

Threats

Threats to intertidal high marsh communities include sea level rise; conversion to residential, commercial, or industrial uses, water pollution, and colonization by non-native invasive species, especially common reed (*Phragmites australis* ssp. *australis*). Inappropriate land use, such as planned waterfront housing developments, continues to threaten the remaining unprotected tidal marsh occurrences.

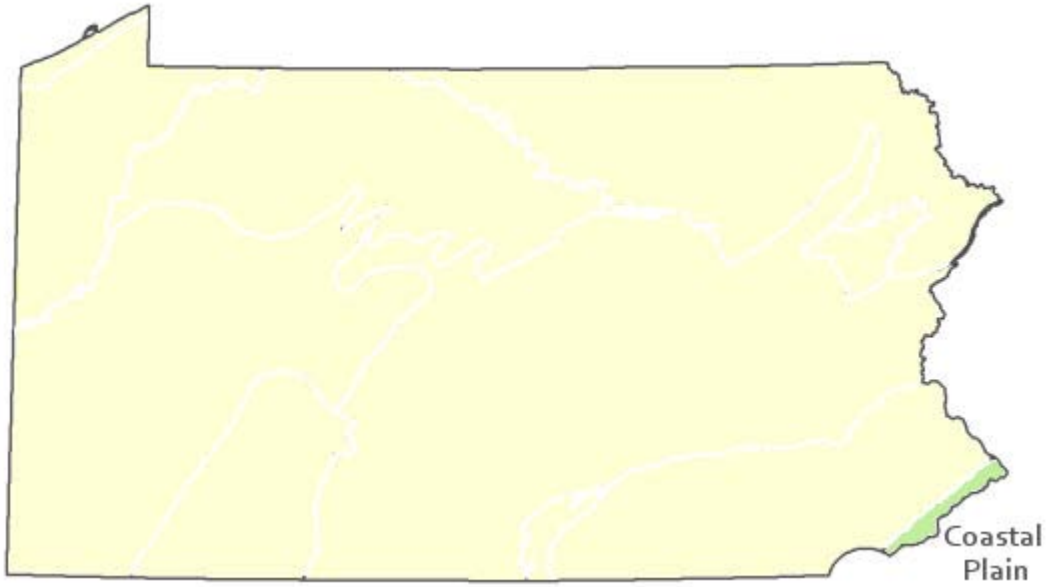
Management

There is a need to identify sites where existing land use could allow for inland migration of freshwater tidal marsh communities as sea level rises and secure theses sites as protected open space. All remaining freshwater tidal marsh communities should be protected from incompatible land use. Opportunities for restoration of freshwater tidal marsh communities should also be pursued. Invasive species control should be implemented at sites where common reed (*Phragmites australis* ssp. *australis*) is established.

Research Needs

All remaining freshwater tidal marsh sites should be inventoried, evaluated, and mapped. In addition, quantitative inventory data are needed to refine descriptions of species composition. Regular monitoring should be instituted at selected sites.

Range Map



Pennsylvania Range

Tidal high marsh is very limited in Pennsylvania, the best remaining examples are found in Bucks County along the Neshaminy Creek at Neshaminy State Park and at Biles Island.

Global Distribution

Northeastern North America coastal region from Quebec to Virginia (NatureServe 2011)

Golden Saxifrage – Pennsylvania Bitter-cress Spring Run

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Seepage Wetland

Global Rank: GNR
State Rank: S3S4

General Description

This community occurs in and immediately adjacent to springs. Springs are places where groundwater flows to the surface, and eventually coalesces into a channel of flowing water. Water flow is relatively constant and uniform in temperature. Golden saxifrage (*Chrysosplenium americanum*), Pennsylvania bittercress (*Cardamine pensylvanica*), and the exotic species watercress (*Nasturtium officinale*) are often the most dominant plant species. Other species may include horsetails (*Equisetum sp.*), lettuce saxifrage (*Saxifraga micranthidifolia*), mountain watercress (*Cardamine rotundifolia*), and spring cress (*Cardamine bulbosa*). There is often high cover of bryophytes (mosses and liverworts) in and around the spring.

Rank Justification

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

Identification

- Presence of a spring (ground-water fed upwelling of water coalescing to form a channel)
- Vegetation surrounding the spring is dominated by golden saxifrage (*Chrysosplenium americanum*), Pennsylvania bittercress (*Cardamine pensylvanica*), and/or the exotic species watercress (*Nasturtium officinale*).

Characteristic Species

Herbs

- Golden saxifrage (*Chrysosplenium americanum*)
- Pennsylvania bittercress (*Cardamine pensylvanica*)
- Lettuce saxifrage (*Saxifraga micranthidifolia*)
- Mountain watercress (*Cardamine rotundifolia*)
- Bittercress (*Cardamine bulbosa*)

International Vegetation Classification Associations:

Golden-saxifrage Forested Seep (CEGL006193)

NatureServe Ecological Systems:

None

Origin of Concept

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

Pennsylvania Community Code

HS : Golden Saxifriage – Pennsylvania Bitter-Cress Spring Run

Similar Ecological Communities

Seep communities are differentiated from this spring run community because seepages are diffuse groundwater flow, while at a spring the groundwater flow coalesces into a recognizable channel. Generally the volume of springs is higher.

Fike Crosswalk

Golden Saxifrage – Pennsylvania Bitter-cress Spring Run

Conservation Value

The springs where the Golden Saxifrage – Pennsylvania Bittercress Spring Run community is found are valuable to aquatic habitat and water quality in-streams. Springs, which are fed by groundwater, are usually a source of clean water that flows at a relatively constant rate and temperature throughout the growing season. Springs help to maintain cool water temperatures, water quality, and constancy of flow in streams, which is valuable for aquatic ecosystems and human use.

Threats

The greatest threats to these communities are groundwater extraction and bedrock disruptions such as drilling or mining in nearby areas, which can contaminate or alter the flow patterns of the groundwater

that feeds the seepage. Groundwater pollution can also occur from improperly installed septic systems, improperly lined underground waste disposal, and in agricultural areas, infiltration of pesticides, fertilizer, and bacteria from animal wastes. Removal of natural vegetation cover adjacent to the wetland can affect water levels and temperatures by increasing solar heating, surface run-off, and sedimentation. Invasive plant species can threaten the biological integrity of the community.

Management

Extraction, drilling, mining, or other activities that impact the bedrock or flow of groundwater should not be undertaken within half a mile of a spring run wetland without a thorough understanding of bedrock layers and groundwater flows. Groundwater flow patterns do not always mirror surface watersheds, and in some cases aquifers may be contiguous over large areas. Seepage wetlands are also sensitive to trampling and other physical disturbance from recreational activities; trails should be sited away from the wetland, or elevated structures employed to prevent traffic in the wetland. 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. 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 and habitat alteration 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.

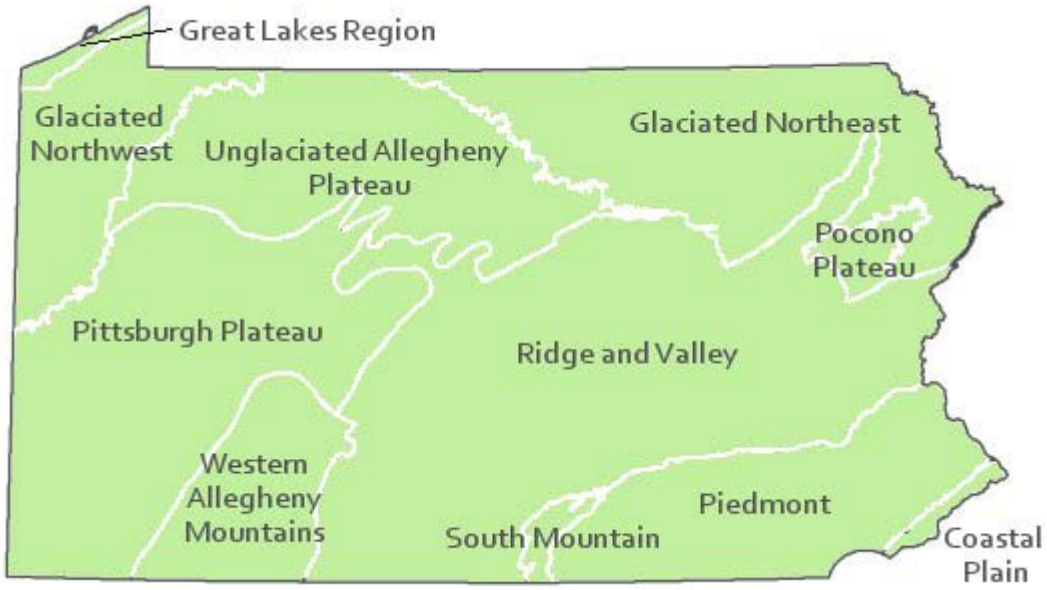
Research Needs

Groundwater flows are not well understood in many areas, and this information is very useful in managing seepage wetlands. Management may also be improved with a better understanding of natural successional pathways in these wetlands.

Trends

Specific information on the loss and degradation of springs is not available. Because springs generally provide a constant source of clean water, many have been developed for human use by the construction of a spring house or water spout. These modifications often result in vegetation removal, channelization or elimination of surface water flow.

Range Map



Pennsylvania Range

Statewide

Global Distribution

New Jersey, New York, and Pennsylvania

Golden Saxifrage – Sedge Rich Seep

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Seepage Wetland

Global Rank: GNR
State Rank: S2

General Description

This community occurs in small (less than 0.5 hectare) patches, fed by groundwater seepage. The species composition is diverse and variable. Wetlands that are more open will tend to be dominated by graminoids, while wetlands shaded by forest canopy will tend to be dominated by broad-leaved plants. It may occur as part of a fen wetland complex, in areas of active seepage flow, often around edges. Plants of seepage habitats represent a broad range of pH tolerances, including Pennsylvania bittercress (*Cardamine pensylvanica*), golden ragwort (*Packera aurea*), jewelweed (*Impatiens* spp.), skunk-cabbage (*Symplocarpus foetidus*), golden saxifrage (*Chrysosplenium americanum*), New York ironweed (*Vernonia noveboracensis*), field horsetail (*Equisetum arvense*), swamp saxifrage (*Saxifraga pensylvanica*), sedge (*Carex leptalea*), and turtlehead (*Chelone glabra*). Some of the following indicators of more alkaline pH should also be present: yellow sedge (*Carex flava*), Atlantic sedge (*Carex sterilis*), thin-leaved cotton-grass (*Eriophorum viridicarinatum*), capillary beak-rush (*Rhynchospora capillacea*), grass-of-Parnassus (*Parnassia glauca*), brook lobelia (*Lobelia kalmii*). Stoneworts (*Chara spp.*), an aquatic algae that resembles an aquatic plant, may cover areas of open seepage. Other species may include bog sedge (*Carex atlantica*), sedge (*Carex granularis*), fowl bluegrass (*Poa palustris*), water horsetail (*Equisetum fluviatile*), white beak-rush (*Rhynchospora alba*), and marsh fern (*Thelypteris palustris*).

Rank Justification

Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation.

Identification

- Presence of seepage (diffuse ground-water fed upwelling of water that does not coalesce into a free-flowing channel)
- Calcareous species such as golden ragwort (Packera aurea), golden saxifrage (*Chrysosplenium americanum*), yellow sedge (*Carex flava*), Atlantic sedge (*Carex sterilis*), capillary beak-rush (*Rhynchospora capillacea*), grass-of-Parnassus (*Parnassia glauca*), and brook lobelia (*Lobelia kalmii*)
- Relatively more open than the Skunk Cabbage – Golden Saxifrage Forest Seep, unlikely to have skunk cabbage as a community dominant

Characteristic Species

Herbs

- Yellow sedge (*Carex flava*)
- Atlantic sedge (*Carex sterilis*)
- Capillary beak-rush (*Rhynchospora capillacea*)
- Grass-of-parnassus (*Parnassia glauca*)
- Brook lobelia (*Lobelia kalmii*)
- Pennsylvania bittercress (*Cardamine pensylvanica*)
- Golden ragwort (*Packera aurea*)
- Jewelweed (*Impatiens capensis*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Golden saxifrage (*Chrysosplenium americanum*)
- New York ironweed (*Vernonia noveboracensis*)
- Field horsetail (*Equisetum arvense*)
- Swamp saxifrage (*Saxifraga pensylvanica*)
- Turtlehead (*Chelone glabra*)

International Vegetation Classification Associations:

Mid-Atlantic Rich Seep (CEGL006448)

NatureServe Ecological Systems:

None

Origin of Concept

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

Pennsylvania Community Code

HX : Golden Saxifrage – Sedge Rich Seep

Similar Ecological Communities

Seep communities are differentiated from the Golden Saxifrage – Pennsylvania Bittercress Spring Run because seepages are diffuse groundwater flow, while Golden Saxifrage – Pennsylvania Bitter-cress Spring Run has groundwater flow that coalesces into a recognizable channel. Generally, the volume of springs is also higher. This seep community may occur as part of a fen complex, and is differentiated from the shrub and sedge fen communities by the presence of active seepage flow, in high enough volume to be visible and usually to prevent peat accumulation. This community can be differentiated from the Skunk-cabbage – Golden Saxifrage Seep because it tends to be more open, and skunk-cabbage will not be the dominant species.

Fike Crosswalk

Golden Saxifrage – Sedge Rich Seep

Conservation Value

The Golden Saxifrage – Sedge Rich Seep occurs where mineral-enriched, circumneutral pH groundwater reaches the surface, which is an especially unusual condition in Pennsylvania as the predominant geology in most regions is acidic. Plants of special concern in Pennsylvania found in this habitat include yellow sedge (*Carex flava*), Atlantic sedge (*Carex sterilis*), capillary beak-rush (*Rhynchospora capillacea*), grass-of-Parnassus (*Parnassia glauca*), brook lobelia (*Lobelia kalmii*), thin-leaved cotton-grass (*Eriophorum viridicarinatum*), and sedge (*Carex tetanica*).

Threats

The greatest threats to these communities are groundwater extraction and bedrock disruptions such as drilling or mining in nearby areas, which can contaminate or alter the flow patterns of the groundwater that feeds the seepage. Groundwater pollution can also occur from improperly installed septic systems, improperly lined underground waste disposal, and in agricultural areas, infiltration of pesticides, fertilizer, and bacteria from animal wastes. Removal of natural vegetation cover adjacent to the wetland can affect water levels and temperatures by increasing solar heating, surface run-off, and sedimentation. Invasive plant species can threaten the biological integrity of the community.

Management

Extraction, drilling, mining, or other activities that impact the bedrock or flow of groundwater should not be undertaken within half a mile of a seepage wetland without a thorough understanding of bedrock layers and groundwater flows. Groundwater flow patterns do not always mirror surface watersheds, and in some cases aquifers may be contiguous over large areas. Seepage wetlands are also sensitive to trampling and other physical disturbance from recreational activities; trails should be sited away from the wetland, or elevated structures employed to prevent traffic in the wetland. 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. 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 and habitat alteration 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.

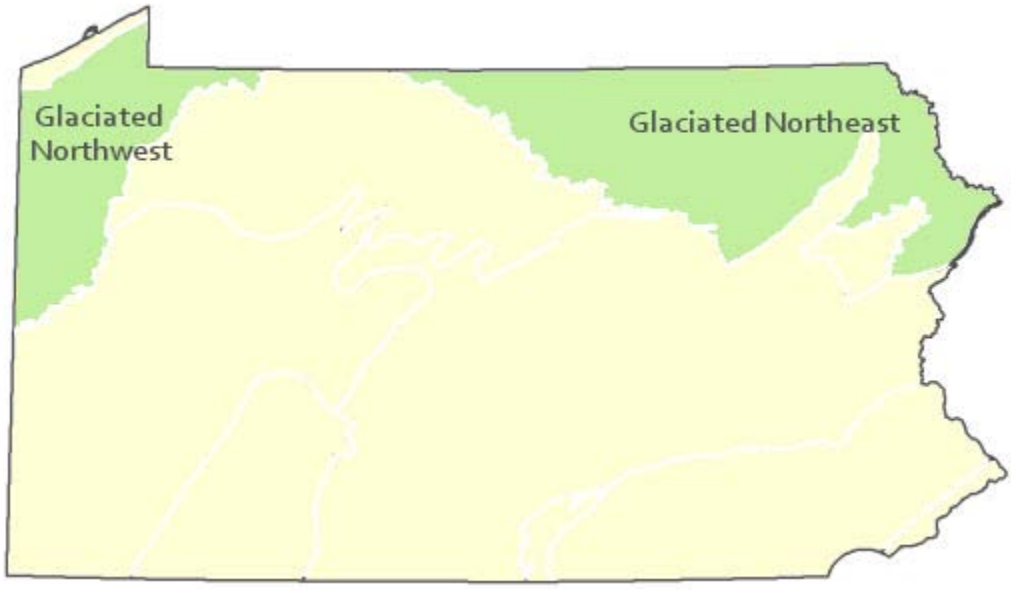
Research Needs

Groundwater flows are not well understood in many areas, and this information is very useful in managing seepage wetlands. Management may also be improved with a better understanding of natural successional pathways in these wetlands.

Trends

Specific information on the loss and degradation of the calcareous seepage wetlands that host the Golden Saxifrage – Sedge Rich Seep community is not available.

Range Map



Pennsylvania Range

Northwest and northeast Pennsylvania.

Global Distribution

New Jersey, New York, and Pennsylvania

Great Lakes Palustrine Sandplain

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Great Lakes Region Wetland

Global Rank: GNR
State Rank: S1

General Description

In Pennsylvania, this community type occurs only on Presque Isle, on the shore of Lake Erie. This is a sparsely vegetated herbaceous community that occurs on moist sandy flats. These typically occur behind the leading dune or as a zone surrounding a swale pond. The sandplain may be saturated in some areas, or may appear dry, with water levels below the surface but accessible to plant roots. This complex occurs on a substrate of glacial sand and gravel deposits. This material is constantly being eroded and re-deposited by the action of currents, waves, and storm events. The dynamic nature of the substrate maintains a variety of successional stages. Additionally, the porous nature of the substrate causes the water table to respond quickly to changes in lake level. As a result, natural communities occur as a complicated mosaic of different hydrologic conditions, seral stages, physiognomies, and floristic assemblages that shift over time. The community is composed primarily by rushes (*Juncus spp.*), sedges (*Carex* spp.), and umbrella/nut-sedges (*Cyperus* spp.) including jointed rush (*Juncus articulatus*), umbrella sedge (*Cyperus bipartitus*), umbrella sedge (*Cyperus flavescens*), and larger Canadian St. John's-wort (*Hypericum majus*). This type contains many rare species due to its limited extent in Pennsylvania including alpine rush (*Juncus alpinoarticulatus* ssp. *nodulosus*), Baltic rush (*Juncus arcticus* var. *littoralis*), small-flowered gerardia (*Agalinis paupercula*), green sedge (*Carex viridula* var. *viridula*), and elk sedge (*Carex garberi*).

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Sparsely to moderately densely vegetated, comprised of rushes, sedges, and opportunistic herbaceous species
- Limited to wet sandy-expanses of shoreline along the coast of Lake Erie, primarily on the Presque Isle Peninsula
- Substrate may be saturated in some areas, or may appear dry, with water levels below the surface but accessible to plant roots

Characteristic Species

Herbs

- Alpine rush (*Juncus alpinoarticulatus* ssp. *nodulosus*)
- Baltic rush (*Juncus arcticus* var. *littoralis*)
- Jointed rush (*Juncus articulatus*)
- Umbrella sedge (*Cyperus bipartitus*)
- Umbrella sedge (*Cyperus flavescens*)
- Purple gerardia (*Agalinis paupercula*)
- Elk sedge (*Carex garberi*)
- Brook lobelia (*Lobelia kalmii*)
- Canadian St. John's-wort (*Hypericum majus*)

International Vegetation Classification Associations:

None

NatureServe Ecological Systems:

Great Lakes Wooded Dune and Swale (CES201.726)

Origin of Concept

Beach, David. (Ed.) 2007. A Legacy of Living Places: conserving the diversity of nature in the Lake Erie Allegheny ecoregion. Lake Erie Allegheny Partnership for Biodiversity: Cleveland, OH.

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

The Great Lakes Region Dry Sandplain is drier and less sparse, with dry-adapted species predominating instead of wetland indicators. Scattered trees and shrubs may be present. Because of the sandy soils on which both types occur, the wetter type may appear dry for much of the year.

Fike Crosswalk

Great Lakes Palustrine Sandplain

Conservation Value

This community is only found along the shores of the Great Lakes. Pennsylvania has a limited extent of shoreline along Lake Erie, and the only large remaining examples of this community in Pennsylvania are found at Presque Isle State Park. The lake shore habitat, with its sandy substrate and fluctuating water levels, hosts a substantially different flora and fauna than other Pennsylvania habitats. Due to the limited extent of the shoreline in Pennsylvania, many of these species are rare in the state. In addition to plants, the lakeshore hosts a unique suite of invertebrates such as tiger beetles, spiders, and sand wasps. It is important nesting and foraging habitat for shorebirds and refuge for migrating species, including migrating passerine bird species, which cross the lake at the narrow point between Presque Isle and Long Point on the north shore.

Threats

The invasive exotic subspecies of common reed (*Phragmites australis* ssp. *australis*) is a major threat to the palustrine sandplain community. It establishes in shallow water zones and can spread out onto the sandplain flats. Management efforts should ensure proper identification of the exotic subspecies so that the native subspecies, *Phragmites australis* spp. *americanus*, is not targeted, as it is of conservation concern. Presque Isle State Park is heavily used for recreation; in some areas overuse damages plant communities.

Management

Shoreline stabilization efforts have altered natural erosion and deposition processes that develop the lake shoreline. The shoreline development is part of the long-term physical process that creates the sandplain habitat behind the leading dune. The jetty at Conneaut, Ohio is a large obstruction to the natural flow of sediments.

Research Needs

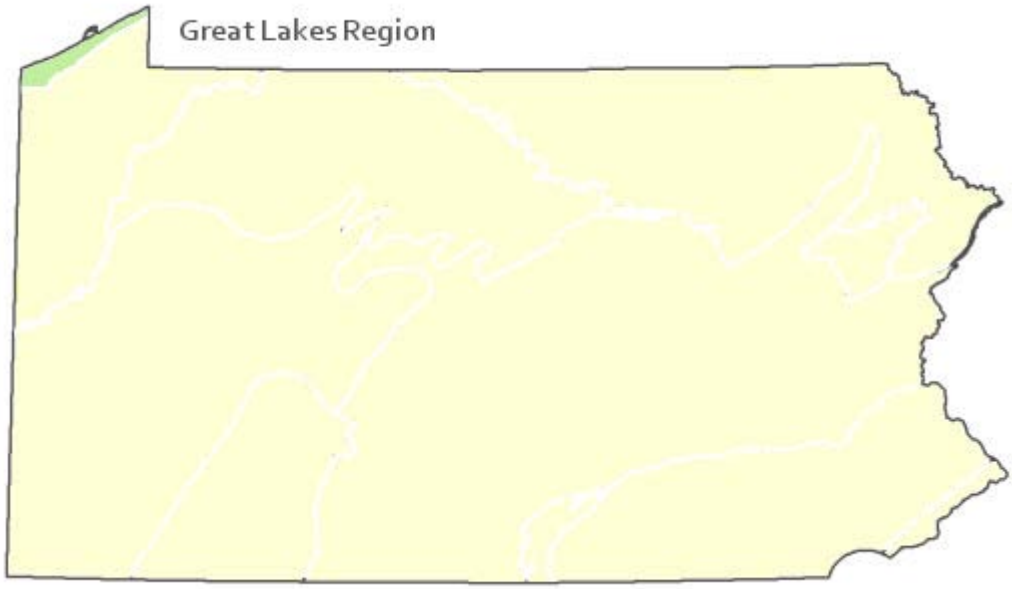
Long-term management of Presque Isle could benefit from a better understanding of the natural erosion and deposition processes, as well as how these processes may be affected by artificially created barriers such as breakwaters and jettys.

It is understood that the natural communities of Presque Isle are highly dynamic, affected by movement of the substrate by wind, currents, and storms; and by changes in the water level over seasons and decades. However, there remains much to learn about how these processes affect communities over longer time scales, including the frequency of disturbances, the rate of movement of communities on the landscape, and the process of succession in plant communities.

Trends

Because the shorelines of the Great Lakes have been extensively developed for industry, recreation, and residences, the extent of natural wetland communities has been greatly diminished. Pennsylvania has limited shoreline area along Lake Erie, and most of it is composed of cobble below steep Lake Erie bluffs; flatter areas were often developed. Presque Isle State Park is the only remaining area that hosts the palustrine sandplain community, and it is unlikely there were other historic examples in Pennsylvania. While the site is protected as a state park, the community may currently be experiencing some declines in quality and extent from invasive species and recreational overuse. The current extent of this community in the larger Great Lakes region is not known, but it is likely limited, as sandplain topography is somewhat unusual. The percentage of historic wetland area lost in the Great Lakes states is the closest available approximation of trends over time for this community. Wetland loss, measured from pre-settlement times to 1990, has occurred at a higher rate in Great Lakes states (60%) than the national average of 53% (Dahl 1990, Dodge et al. 1994). In recent years, the rate of wetland loss has slowed (the acreage of wetland area lost between 1998 and 2004 was one-quarter of the acreage that was lost between 1974 and1984), but wetland loss continues to be higher in the Great Lakes region than in other parts of the country (Dahl 2006).

Range Map



Pennsylvania Range

Found only at Presque Isle State Park.

Global Distribution

Great Lakes shorelines, mainly eastern Lake Erie.

Hairy-fruit Sedge (*Carex trichocarpa*) Floodplain Wetland

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: G4
State Rank: S4

General Description

This community occurs in small patches on floodplain edges, deposition bars, and islands where tree canopy is lacking, on medium- to large-sized rivers in the Allegheny, Susquehanna, and Delaware River Basins. This community commonly occurs on low flats associated with the active floodplains, either directly adjacent to the channel or in association with backwater depressions and slough, and is routinely flooded during most high-water events. This community also occurs on the lower portion of sloping shorelines of the Upper Delaware River, often giving the appearance of an extensive "lawn." High energy flood-scour and ice floes limit the establishment and growth of trees and shrubs. Hairy-fruit sedge (*Carex trichocarpa*) is the dominant species in this community. Shrubs, which may be present, include sycamore (*Platanus occidentalis*), silky dogwood (*Cornus amomum*), and common blackberry (*Rubus allegheniensis*), as well as the invasive multiflora rose (*Rosa multiflora*). However, shrubs rarely comprise more than 25% of the plant cover.

In some areas there are nearly pure stands of hairy-fruit sedge. In other areas, this type may include a more diverse plant composition that includes sedge (*Carex emoryi*), rice cutgrass (*Leersia oryzoides*), wool-grass (*Scirpus cyperinus*), skunk-cabbage (*Symplocarpus foetidus*), soft rush (*Juncus effusus*), short hair sedge (*Carex crinita* var. *crinita*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), boneset (*Eupatorium perfoliatum*), jewelweed (*Impatiens capensis*), giant mannagrass (*Glyceria grandis*), tearthumb (*Persicaria sagittata*), ostrich fern (*Matteuccia struthiopteris*), late goldenrod (*Solidago gigantea*), false nettle (*Boehmeria cylindrica*), deer-tongue grass (*Dichanthelium clandestinum*), grass-leaved goldenrod (*Euthamia graminifolia* var. *graminifolia*), blue vervain (*Verbena hastata*), flat-topped white aster (*Doellingeria umbellata* var. *umbellata*), common milkweed (*Asclepias syriaca*), Jack-in-the-pulpit (*Arisaema triphyllum*), sensitive fern (*Onoclea sensibilis*), and Turk's-cap lily (*Lilium superbum*). This type is susceptible to invasion by reed canary-grass (*Phalaris arundinacea*). Near monotypic stands of reed canary-grass can occur in similar locations, and in some areas patches of the two species are intermixed. Vine species found in this type include virgin's-bower (*Clematis virginiana*).

Rank Justification

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

Identification

- Dominated by hairy-fruit sedge (*Carex trichocarpa*)
- Relatively low diversity of herbaceous species

- Soils are silty alluvial deposits (substrate may be gravel and cobbles on sloping shores in the Upper Delaware River) and are often saturated throughout the year
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Silky dogwood (*Cornus amomum*)
- Sycamore (*Platanus occidentalis*)
- Common blackberry (*Rubus allegheniensis*)

Herbs

- Sedge (*Carex trichocarpa*)
- Sedge (*Carex emoryi*)
- Rice cutgrass (*Leersia oryzoides*)
- Wool-grass (*Scirpus cyperinus*)
- Skunk cabbage (*Symplocarpus foetidus*)
- Soft rush (*Juncus effusus*)
- Short hair sedge (*Carex crinita* var. *crinita*)
- Soft-stemmed bulrush (*Schoenoplectus tabernaemontani*)
- Boneset (*Eupatorium perfoliatum*)
- Jewelweed (*Impatiens capensis*)
- American mannagrass (*Glyceria grandis*)
- Tearthumb (*Persicaria sagittata*)
- Ostrich fern (*Matteuccia struthiopteris*)
- Smooth goldenrod (*Solidago gigantea*)
- False nettle (*Boehmeria cylindrica*)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- Grass-leaved goldenrod (*Euthamia graminifolia*)

- Blue vervain (*Verbena hastata*)
- Flat-topped white aster (*Doellingeria umbellata*)
- Common milkweed (*Asclepias syriaca*)
- Jack-in-the-pulpit (*Arisaema triphyllum*)
- Sensitive fern (*Onoclea sensibilis*)
- Turk's-cap lily (*Lilium superbum*)
- Reed canary-grass (*Phalaris arundinacea*)

Vines

- Virgin's-bower (*Clematis virginiana*)

Exotic Species

- Multiflora rose (*Rosa multiflora*)
- Reed canary-grass (*Phalaris arundinacea*)

International Vegetation Classification Associations:

Hairy-fruit Sedge Wetland (CEGL006447)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Reed Canary-grass Floodplain Grassland shares a similar environmental setting as the Hairy-fruited Sedge (*Carex trichocarpa*) Floodplain Wetland but differs from this community as Reed Canary-grass Floodplain Grassland contains a near dominance of reed canary-grass (*Phalaris arundinacea*). The

Floodplain Meadow community is significantly more diverse and dominated by robust broad-leaved herbs, with hairy-fruit sedge (*Carex trichocarpa*) a minor component or absent.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

The community is an important part of the river floodplain ecosystem, which provides significant ecosystem services in addition to wildlife habitat, such as sediment control, filtering runoff, and cooling overland flow of water. Hairy-fruited Sedge (*Carex trichocarpa*) Floodplain Wetland patches are important breeding, nesting, and foraging areas for several rare dragonflies and damselflies that use the open habitat for basking and hunting.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution. In addition, reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinense*), and purple loosestrife (*Lythrum salicaria*) may invade sites supporting this community type. Construction of flood-control and navigational dams have resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by the invasive plants.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian

buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

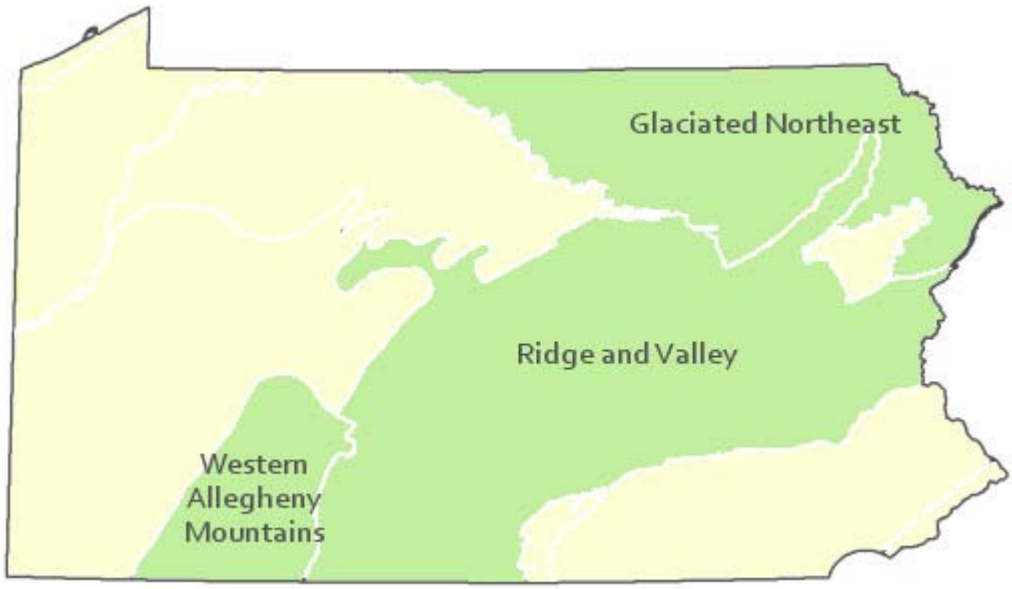
Research Needs

Variations may occur at eco-regional levels. Many of the known locations of large occurrences of this type are found on the floodplains immediately above impoundments, along slower reaches, or deltas of smaller tributaries, which may have created the conditions for its establishment. More recently, reed canary-grass has grown in dominance and may be replacing this type. There is a need to assess occurrences of this type throughout its range to determine the impact of the impoundments on the establishment and persistence of this community.

Trends

Construction of dam impoundments may have resulted in an expansion of this type in areas where floodwaters were slowed and sediments were deposited, especially on broad flat floodplain wetlands at the edges of the impoundments, which were rapidly colonized by the hairy-fruit sedge. Recent expansion of reed canary-grass, however, has altered the composition of these sites and thus this type may be declining overall.

Range Map



Pennsylvania Range

Allegheny Front and Deep Valleys Section of the Applachaian Plateau Region; Appalachian Mountain Section of the Ridge and Valley Region.

Global Distribution

New Jersey, New York, Pennsylvania, Virginia, and West Virginia.

Japanese Knotweed Floodplain Thicket

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: GNA
State Rank: S5

General Description

These are primarily monotypic stands of Japanese knotweed (*Fallopia japonica*) with few other plant species. Some disturbance-oriented forbs may be present, such as jewelweed (*Impatiens* spp.), reed canary-grass (*Phalaris arundinacea*), Virginia cutgrass (*Leersia virginica*), water-pepper (*Persicaria hydropiper*), false water-pepper (*Persicaria hydropiperoides*), lady's-thumb (*Persicaria maculosa*), and false nettle (*Boehmeria cylindrica* var. *cylindrica*), along with seedlings of some woody plants such as sycamore (*Platanus occidentalis*) and black willow (*Salix nigra*). The invasive exotic herbs garlic-mustard (*Alliaria petiolata*) and Japanese stiltgrass *(Microstegium vimineum*) may be present. This community occurs on islands and along the shoreline of the rivers and streams that are subject to frequent floods and scour. The substrate is typically well-drained, moist, sandy alluvium.

Rank Justification

Common, widespread, and abundant in the jurisdiction. The community type is composed of and dominated by a species that is not native to North America.

Identification

- Near monotypic stands of Japanese knotweed (*Fallopia japonica*)
- Occurs on islands and along the shoreline of the rivers and streams
- Subject to frequent floods and scour

Characteristic Species

Herbs

- Cutgrass (*Leersia virginica*)
- Water-pepper (*Persicaria hydropiper*)
- Mild water-pepper (*Persicaria hydropiperoides*)
- Lady's-thumb (*Persicaria maculosa*)
- False nettle (*Boehmeria cylindrica*)

Exotic Species

- Japanese knotweed (*Fallopia japonica*)
- Reed canary-grass (*Phalaris arundinacea*)
- Garlic-mustard (*Alliaria petiolata*)
- Japanese stiltgrass (*Microstegium vimineum*)

International Vegetation Classification Associations:

Polygonum Cuspidatum Temporarily Flooded Herbaceous Vegetation (CEGL008472)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmerman, E., and G. Podniesinski. 2008. Classification, Assessment and Protection of Floodplain Wetlands of the Ohio Drainage. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA. Report to: The United States Environmental Protection Agency and the

Pennsylvania Department of Conservation and Natural Resources, Office of Conservation Science. US EPA Wetlands Protection State Development Grant no. CD-973081-01-0.

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Japanese Knotweed Floodplain Thicket is found on similar environmental settings as the Floodplain Meadow, Periodically Exposed Shoreline Community, Reed Canary-grass Floodplain Grassland, and Mixed Forb Marsh but is clearly dominated by an almost monotypic stand of Japanese knotweed (*Fallopia japonica*).

Fike Crosswalk

None; this type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

Japanese Knotweed Floodplain Thicket can colonize disturbed flood and scour zones and displace native plant species and communities. While this community is associated with decreasing native species diversity, the 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 this wetland.

Threats

Japanese knotweed is able to colonize disturbed areas and form monotypic clonal stands which decrease both light and nutrient availability to native species. This community can be a threat to and completely displace other wetland communities.

Management

It is important to prevent the spread of this community through invasive species control (herbicide and manual removal) and a natural buffer around the wetland should be maintained in order to minimize the spread of this community into adjacent vegetation.

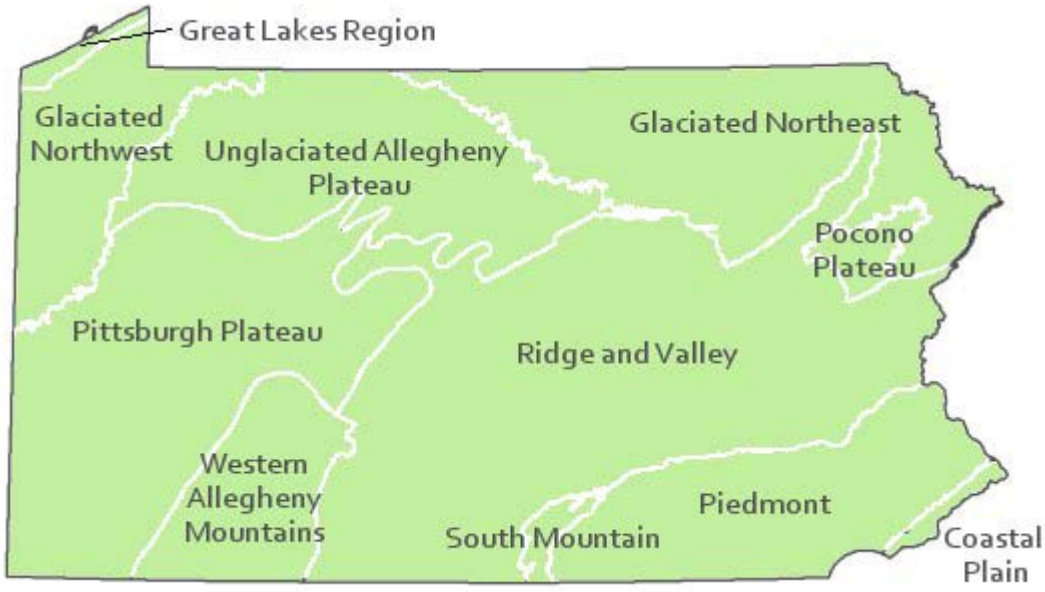
Research Needs

This community is dominated by an exotic invasive species and there is an increasing need to document the impacts of this community on native plant species and communities.

Trends

The trend of this community is increasing due to the strong competitive nature of Japanese knotweed (*Fallopia japonica*) within altered environments.

Range Map



Pennsylvania Range

Throughout Pennsylvania.

Global Distribution

Alabama, Georgia, Kentucky, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia.

Lizard's-tail Emergent Bed

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: G2G3
State Rank: S4

General Description

This community is found along river floodplains throughout Pennsylvania, most commonly in the Juniata and Susquehanna River drainages and the smaller tributaries of the main stem of the Susquehanna in the Ridge and Valley Province. The emergent beds typically occur near bars, islands, and river banks, or in shallow portions of the river channel where silt accumulates. It can also be found in back-channels, abandoned oxbow wetlands and other wet depressions on river floodplains. The lower portion of the lizard's-tail stems are under water for most of the year, with the tops of the plants emerging above the flowing water. These beds are frequently submerged during flood events.

Lizard's-tail (*Saururus cernuus*) is the dominant species in this community, often forming single-species beds. Many other species may be present, including water-willow (*Justicia americana*), water smartweed (*Persicaria amphibia*), marsh-purslane (*Ludwigia palustris*), purple loosestrife (*Lythrum salicaria*), annual bluegrass *(Poa annua*), false nettle (*Boehmeria cylindrica*), clearweed (*Pilea pumila*), garden loosestrife (*Lysimachia vulgaris*), rice cutgrass (*Leersia oryzoides*), beggar-ticks (*Bidens frondosa*), threesquare (*Schoenoplectus pungens*), and nutsedges (*Cyperus* spp.). A few scattered silver maple (*Acer saccharinum*) seedlings may also be present.

Rank Justification

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

Identification

- Dominated by lizard's-tail (*Saururus cernuus*), often growing in large, monotypic beds
- Sites are often inundated most of the year
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Herbs

- Lizard's-tail (*Saururus cernuus*)
- Water-willow (*Justicia americana*)
- Water smartweed (*Persicaria amphibia*)

- Marsh-purslane (*Ludwigia palustris*)
- Purple loosestrife (*Lythrum salicaria*)
- Annual bluegrass (*Poa annua*)
- False nettle (*Boehmeria cylindrica*)
- Clearweed (*Pilea pumila*)
- Garden loosestrife (*Lysimachia vulgaris*)
- Rice cutgrass (*Leersia oryzoides*)
- Beggar-ticks (*Bidens frondosa*)
- Threesquare (*Schoenoplectus pungens*)
- Nutsedges (*Cyperus* spp.)

International Vegetation Classification Associations:

Floodplain Pool (CEGL007696)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501., Zimmerman 2008

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Periodically Exposed Shoreline Community community patches contain a wider variety of plant species, often weedy or non-native plants. Lizard's-tail Emergent Beds are often inundated for longer periods of time than the Periodically Exposed Shoreline Community community patches.

Water-willow (*Justicia americana*) is dominant in Water-willow Emergent Bed communities. Water-willow Emergent Bed are more typically found in faster moving, high energy systems.

Fike Crosswalk

None; this type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna River Basin.

Conservation Value

Although considered common, this community provides important habitat for a number of important and rare insect species which require submerged aquatic vegetation for foraging habitat, which may be limited in flowing water systems. Emergent beds are important habitat for larval life stages of mayflies, damselflies, and dragonflies.

Threats

Within floodplain ecosystems, alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Invasive non-native plants, such as purple loosestrife (*Lythrum salicaria*), commonly dominate this community, especially near human development. Construction of flood-control and navigational dams have resulted in drastic changes to the timing and duration of flood events.

Management

Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetlands). Care should also be taken to control and prevent the spread of invasive species into these wetlands.

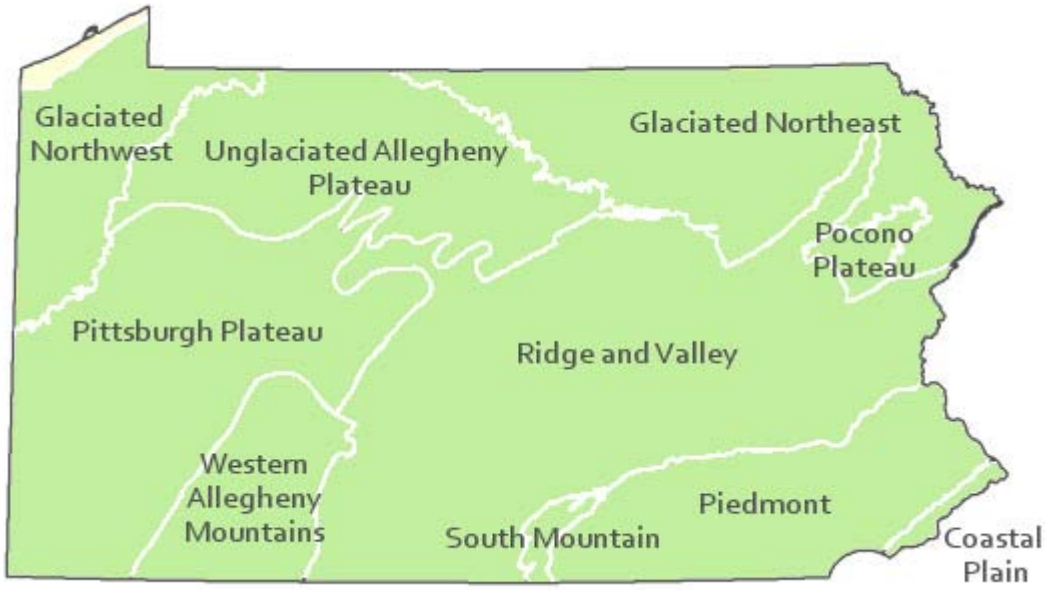
Research Needs

In addition to further studying the range of this type, there is need to monitor high quality examples of this community. Large expanses of this type should be inventoried for rare plants and animals, especially insects.

Trends

There is little to suggest that this type is increasing or decreasing in occurrence. Invasive plants able to tolerate flooded conditions may gain a foothold in these sites and contribute to an overall reduction in quality region-wide. Sites near urban areas are most invaded.

Range Map



Pennsylvania Range

Statewide, except the Great Lakes region.

Global Distribution

Unknown

Many-Fruited Sedge – Bladderwort Poor Fen

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Peatland Wetland

Global Rank: GNR
State Rank: S2

General Description

These are peatlands or "poor fens" influenced to some degree by groundwater and surface water enrichment (pH 5-5.5). They are dominated by sedges, of which many-fruited sedge (*Carex lasiocarpa*) is the most characteristic. Flat-leaved bladderwort (*Utricularia intermedia*) is also characteristic. Other species commonly found in these systems include the sedge *Carex lacustris,* leatherleaf (*Chamaedaphne calyculata*), marsh cinquefoil (*Potentilla palustris*), bogbean (*Menyanthes trifoliata*), marsh St. John's-wort (*Triadenum virginicum*), tussock sedge (*Carex stricta*), meadow-sweet (*Spiraea latifolia*), common cat-tail (*Typha latifolia*), bluejoint (*Calamagrostis canadensis*), marsh fern (*Thelypteris palustris*), and cranberry (*Vaccinium macrocarpon*).

Rank Justification

Critically imperiled in the nation or state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

Identification

- Dominated by many-fruited sedge (*Carex lasiocarpa*)
- Has a floating mat comprised of the roots of sedges
- Typically there is open water adjacent to the fen

Characteristic Species

Shrubs

- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sweet-gale (*Myrica gale*)

Herbs

- Many-fruited sedge (*Carex lasiocarpa*)
- Sedge (*Carex lacustris*)
- Flat-leaved bladderwort (*Utricularia intermedia*)

- Twig-rush (*Cladium mariscoides*)

International Vegetation Classification Associations:

Wiregrass Sedge Shore Fen (CEGL005229)

NatureServe Ecological Systems:

Laurentian-Acadian Alkaline Fen (CES201.585)

Origin of Concept

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

Pennsylvania Community Code

HU : Many Fruited Sedge – Bladderwort Peatland

Similar Ecological Communities

Many-Fruited Sedge – Bladderwort Poor Fen differs from the Sphagnum – Beak-rush Peatland in that this community is characterized by a lack of leatherleaf (*Chamaedaphne calyculata*) and many-fruited sedge (*Carex lasiocarpa*) and the Sphagnum – Beak-rush Peatland lacks the groundwater enrichment that characterizes this type. This type lacks the heavy sphagnum layer that characterizes the Sphagnum – Beak-rush Peatland.

Fike Crosswalk

Many fruited sedge - bladderwort peatland

Conservation Value

Several rare plants are known to occur in this community type including many-fruited sedge (*Carex lasiocarpa*) and flat-leaved bladderwort (*Utricularia intermedia*). This community serves as foraging habitat for waterfowl, swallows, rails, and bats, as well as habitat for many species of dragonflies and damselflies.

Threats

Beaver are likely the greatest threat to this type and ironically may be the cause of some of the occurrences as well. Exotic invasive plants such as common reed (*Phragmites australis* ssp. *australis*) and purple loosestrife (*Lythrum salicaria*) may become established as well as aggressive native species like common cat-tail (*Typha latifolia*).

Management

Where disturbances are unavoidable, the wetland should be monitored for changes in vegetation, especially invasive species.

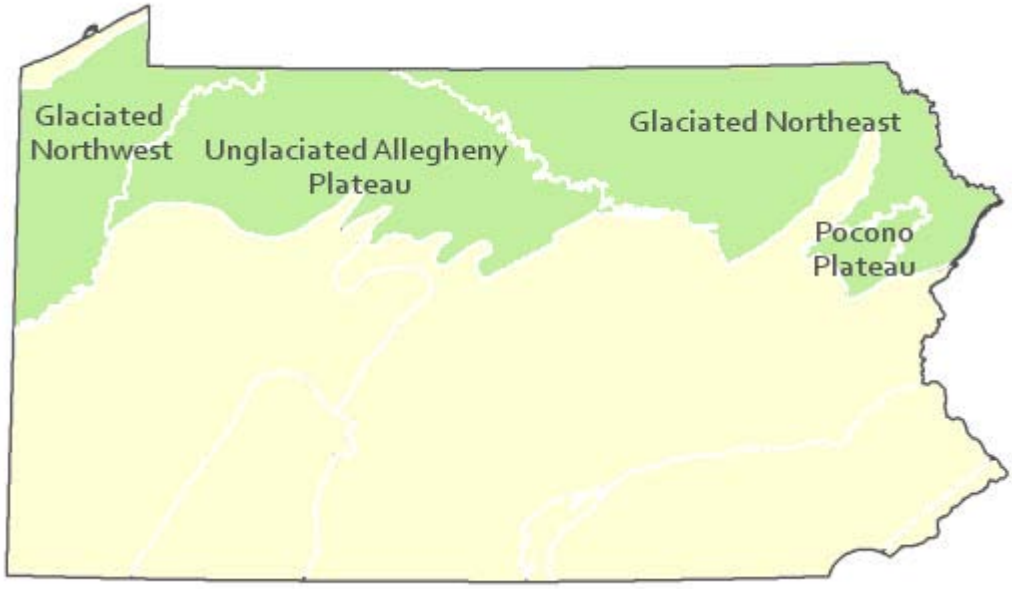
Research Needs

Additional research is needed to document the environmental drivers for the origin and persistence of the community type.

Trends

There are insufficient data to assess whether this community is increasing or decreasing in abundance. Beaver activity and resulting hydrologic alterations to some wetlands may favor the formation of the community type, but trend data are lacking.

Range Map



Pennsylvania Range

Glaciated Northeast, Glaciated Northwest, Pocono Plateau, Unglaciated Allegheny Plateau.

Global Distribution

Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. This community also extends into Quebec.

Mixed Forb – Graminoid Wet Meadow

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Basin wetland

Global Rank: GNR
State Rank: S5

General Description

This is an open, commonly occurring plant community dominated by herbaceous vegetation. They are typically saturated or inundated early in the growing season, but may be dry by mid- to late-summer. The substrate is typically mineral soil with or without a layer of muck at the surface. Although flooded or saturated soils may help to keep these systems open, most are also grazed or mowed.

This plant composition of this association is diverse, though some sites may be dominated by one or two species. Representative species include a combination of graminoid and forb species. Species include goldenrods (*Solidago* spp.), rice cutgrass (*Leersia oryzoides*), wool-grass (*Scirpus cyperinus*), bugleweed (*Lycopus uniflorus*), smartweeds (*Persicaria* spp.), sedges (*Carex stipata* var. *stipata, C. canescens, C. lurida, C. cristatella, C. tribuloides, C. vesicaria, C. stricta*), soft rush (*Juncus effusus*), Joe-Pye-weed (*Eutrochium* spp.), boneset (*Eupatorium perfoliatum*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), Canadian St. John's-wort (*Hypericum canadense*), bluejoint (*Calamagrostis canadensis* var. *canadensis*), New York ironweed (*Vernonia noveboracensis*), Virginia chain fern (*Woodwardia virginica*), beggar-ticks (*Bidens* spp.), dwarf St. John's-wort (*Hypericum mutilum*), bulrush (*Scirpus* spp.), marsh St. John's-wort (*Triadenum virginicum*), rattlesnake mannagrass (*Glyceria canadensis*), and spike-rushes (*Eleocharis* spp.). Scattered shrubs may be present, representative species include steeplebush (*Spiraea tomentosa*), silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), red-osier dogwood (*Cornus sericea*), and arrow-wood (*Viburnum recognitum*). Exotic species

such as purple loosestrife (*Lythrum salicaria*) and a variety of non-native grasses, such as reed canary-grass (*Phalaris arundinacea*), are frequently found in these meadows.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Wet alluvial bottomlands, beaver ponds, as well as wet portions of old fields and open grasslands
- Soils are poorly drained, acidic clay loams
- Dominated by grasses and forbs, with scattered trees and shrubs

Characteristic Species

Shrubs

- Steeple-bush (*Spiraea tomentosa*)
- Buttonbush (*Cephalanthus occidentalis*)
- Silky dogwood (*Cornus amomum*)
- Gray dogwood (*Cornus racemosa*)
- Red-osier dogwood (*Cornus sericea*)
- Northern arrow-wood (*Viburnum recognitum*)

Herbs

- Rice cutgrass (*Leersia oryzoides*)
- Wool-grass (*Scirpus cyperinus*)
- Bugleweed (*Lycopus uniflorus*)
- Pale meadowgrass (*Torreyochloa pallida*)
- Smartweeds (*Persicaria* spp.)
- Three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*)
- Marsh fern (*Thelypteris palustris*)
- Sedge (*Carex stipata*)

- Sedge (*Carex canescens*)
- Sedge (*Carex lurida*)
- Sedge (*Carex cristatella*)
- Sedge (*Carex tribuloides*)
- Sedge (*Carex vesicaria*)
- Tussock sedge (*Carex stricta*)
- Soft rush (*Juncus effusus*)
- Virginia chain fern (*Woodwardia virginica*)
- Beggar-ticks (*Bidens* spp.)
- Dwarf St. John's-wort (*Hypericum mutilum*)
- Joe-pye-weed (*Eutrochium* spp.)
- Boneset (*Eupatorium perfoliatum*)
- Cinnamon fern (*Osmunda cinnamomea*)
- Royal fern (*Osmunda regalis*)
- Canadian St. John's-wort (*Hypericum canadense*)
- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)
- New York ironweed (*Vernonia noveboracensis*)
- Marsh St. John's-wort (*Triadenum virginicum*)
- Goldenrods (*Solidago* spp.)
- Rattlesnake mannagrass (*Glyceria canadensis*)
- Black bulrush (*Scirpus atrovirens*)
- Bulrush (*Scirpus pendulus*)
- Spike-rushes (*Eleocharis* spp.)

Exotic Species

- Reed canary-grass (*Phalaris arundinacea*)

- Purple loosestrife (*Lythrum salicaria*)

International Vegetation Classification Associations:

Central Appalachian Cutgrass Marsh (CEGL006461)

NatureServe Ecological Systems:

High Allegheny Wetland (CES202.069)
Central Appalachian Stream and Riparian (CES202.609)

Origin of Concept

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

Pennsylvania Community Code

HM : Wet Meadow

Similar Ecological Communities

Mixed Forb - Graminoid Wet Meadow represents a community that has a mixture of forbs and graminoids and can be distinguished from other types by the diverse mixture of species and lack of a clear dominant. Although reed canary-grass (*Phalaris arundinacea*) and bluejoint (*Calamagrostis canadensis* var. *canadensis*) may occur in this community type, they are not dominant. If one of these species or a combination of the two dominates the community, the community may be better represented by Bluejoint – Reed Canary-grass Marsh. If tussock sedge (*Carex stricta*) strongly dominates the community, then the community would better be represented by Tussock Sedge Marsh. If the community is a seasonally flooded basin that collects water during the winter and spring, then the community is better represented by the Rice Cutgrass – Bulrush Vernal Pool or Wool-grass – Mannagrass – Mixed Shrub Vernal Pool. This community may also be similar is species composition with the Floodplain Meadow. It differs from the floodplain type in landscape position, as it is usually located outside of the active floodplain, and the presence of riparian plant species.

Fike Crosswalk

Wet Meadow

Conservation Value

This community serves as habitat for small mammals and may serve as a foraging area for raptor species. 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 this wetland.

Threats

Alteration to the hydrological regime and development are the major threats to this community and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*) can occur in this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

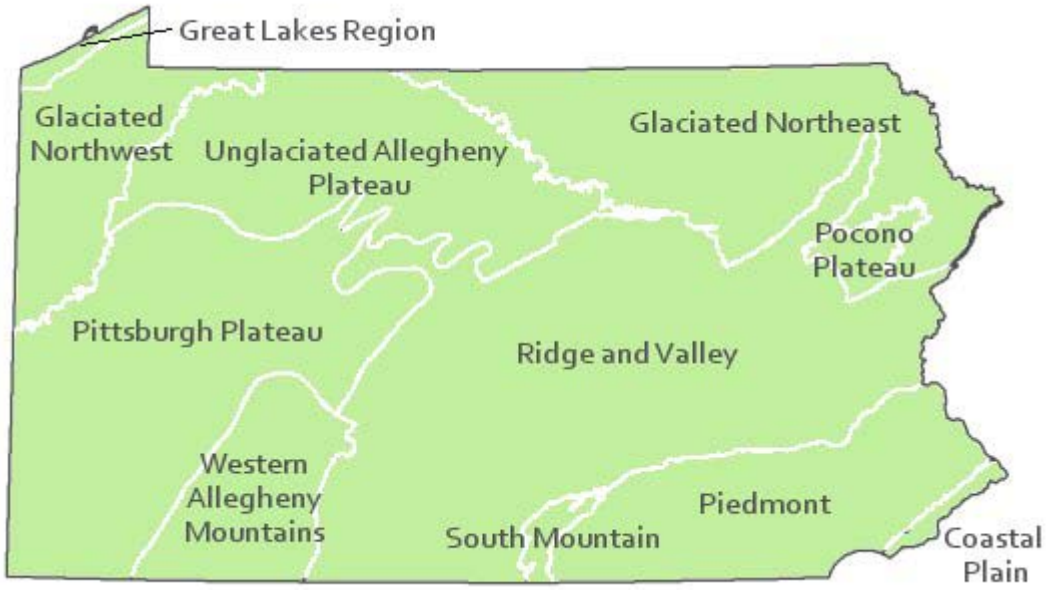
Research Needs

There is a need to characterize variations of this community to refine the description and classification of this type.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased sedimentation. Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations.

Range Map



Pennsylvania Range

Statewide.

Global Distribution

New York, Pennsylvania, Virginia, and West Virginia.

Mixed Forb Marsh

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

Global Rank: GNR
State Rank: S3

General Description

This is a highly variable type which community occurs along lake margins, flooded depressions, and other wetlands that remain inundated throughout the growing season. The plant composition is variable and includes aquatic emergent plants as well as submerged aquatic species. Characteristic species include three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), halberd-leaf tearthumb (*Persicaria arifolia*), tearthumb (*Persicaria sagittata*), dock (*Rumex* spp.), sharp-fruited rush (*Juncus acuminatus*), beggar-ticks (*Bidens* spp.), jewelweed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), wapato (*Sagittaria latifolia*), sedges (*Carex stricta, C. lacustris, C. lurida, C. crinita, C. stipata, C. tribuloides, C. scoparia, C. projecta, C. comosa, C. hystericina, C. baileyi*), sweet-flag (*Acorus calamus*), and rice cutgrass (*Leersia oryzoides*). The invasive species purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis* ssp. *australis*) are frequently a major problem in these systems.

Rank Justification

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

Identification

- Occurs along lake margins, flooded depressions, and other wetlands that remain inundated throughout the growing season
- Substrate is variable, often muck or sandy soil
- Composition is variable and includes aquatic emergent plants as well as submerged aquatic species

Characteristic Species

Herbs

- Sedge (*Carex lacustris*)
- Sedge (*Carex lurida*)
- Short hair sedge (*Carex crinita* var. *crinita*)
- Sedge (*Carex stipata*)
- Sedge (*Carex tribuloides*)

- Broom sedge (*Carex scoparia*)
- Sedge (*Carex comosa*)
- Sedge (*Carex hystericina*)
- Three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*)
- Halberd-leaf tearthumb (*Persicaria arifolia*)
- Tearthumb (*Persicaria sagittata*)
- Sedge (*Carex baileyi*)
- Sharp-fruited rush (*Juncus acuminatus*)
- Beggar-ticks (*Bidens* spp.)
- Jewelweed (*Impatiens capensis*)
- Sensitive fern (*Onoclea sensibilis*)
- Wapato (*Sagittaria latifolia*)
- Sedge (*Carex projecta*)
- Rice cutgrass (*Leersia oryzoides*)

Exotic Species

- Reed canary-grass (*Phalaris arundinacea*)
- Narrow-leaved cat-tail (*Typha angustifolia*)
- Sweet flag (*Acorus calamus*)
- Purple loosestrife (*Lythrum salicaria*)
- Common reed (*Phragmites australis* ssp. *australis*)

International Vegetation Classification Associations:

None

NatureServe Ecological Systems:

High Allegheny Wetland (CES202.069)
Southern and Central Appalachian Bog and Fen (CES202.300)

Origin of Concept

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

Pennsylvania Community Code

HF : Mixed Forb Marsh

Similar Ecological Communities

This type is distinguished from the various graminoid-dominated marsh types by its broad-leaf dominants. The Herbaceous Vernal Pond type is related to this, but occurs exclusively in upland depressions that dry out substantially to completely in the dry season. This type is distinguished from the various forb and graminoid-dominated marsh types by species composition and landscape position. It is distinguished from the graminoid-dominated marsh types by the dominance of broad-leaved species. Although reed canary-grass (*Phalaris arundinacea*) and bluejoint (*Calamagrostis canadensis* var. *canadensis*) may occur in this community type, they are not dominant. If one of these species or a combination of the two dominates the community, the community may be better represented by Bluejoint – Reed Canary-grass Marsh. If tussock sedge (*Carex stricta*) strongly dominates the community, then the community would better be represented by Tussock Sedge Marsh. The Rice Cutgrass – Bulrush Vernal Pool or Wool-grass – Mannagrass – Mixed Shrub Vernal Pool types may resemble the Mixed Forb Marsh type but these two occurs exclusively in upland depressions that dry out substantially to completely in the dry season. The Mixed Forb Marsh community may also resemble the Freshwater Tidal Mixed High Marsh and Riverbank Freshwater Tidal Marsh communities. However, the presence of tidal marsh species such as wild-rice (*Zizania aquatica*), salt-marsh water-hemp (*Amaranthus cannabinus*), and swamp beggar's-ticks (*Bidens bidentoides*) in these types differentiates from the more Mixed Forb Marsh.

Fike Crosswalk

Mixed Forb Marsh

Conservation Value

This community can serve as habitat for odonate and bird species and may host rare plant species such as cyperus-like sedge (*Carex pseudocyperus*), backward sedge (*Carex retrorsa*), downy willow-herb (*Epilobium strictum*), purple fringeless orchid (*Platanthera peramoena*), and bedstraw (*Galium trifidum*). 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 this wetland.

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as

purple loosestrife (*Lythrum salicaria*), narrow-leaved cat-tail (*Typha angustifolia*), and common reed (*Phragmites australis* ssp. *australis*) can occur in this community.

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. 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 and habitat alteration 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 can not 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.

Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

These wetlands are probably less common due to wetland draining/filling and clearing of the adjacent lands leading to sedimentation. The relative trend for this community is likely stable or may be decreasing slightly due to hydrological alterations.

Range Map

Pennsylvania Range

Statewide

Global Distribution

New York, Pennsylvania, and West Virginia

Reed Canary-grass Floodplain Grassland

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: GNR
State Rank: S5

General Description

This community is typically found on sand and cobble bars attached to the banks or wide alluvial flats along tributaries. These areas are exposed to frequent floods, high stream velocity, and ice scour. The substrate is sand to sand over cobble and often represents sites where flooding frequency and duration, while still high, is less than that of the Big Bluestem – Indian-grass River Grassland or Periodically Exposed Shoreline Community. An area of sparsely vegetated cobbles often separates this community from the flowing water.

This community is characterized by thick herbaceous and graminoid vegetation, dominated by reed canary-grass (*Phalaris arundinacea*). Bluejoint (*Calamagrostis Canadensis*) or hairy-fruit sedge (*Carex trichocarpa*) are often present and may represent the historically dominant species of these riverine meadows prior to invasion by reed canary-grass. While the diversity of this type is often low, common

associate species are Virginia cutgrass (*Leersia virginica*), false nettle (*Boehmeria cylindrica*), spotted joe-pye-weed (*Eupatorium maculatum*), twisted sedge (*Carex torta*), flatsedges (*Cyperus* spp.), water-pepper (*Persicaria punctata*), and beggar-ticks (*Bidens* spp.). A few scattered willows (*Salix* spp.) and sycamore *(Platanus occidentalis*) may be present as short shrubs; however, their relative cover rarely exceeds 10%.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Clearly dominated by reed canary-grass (*Phalaris arundinacea*)
- Soils are alluvial and range from deep sand deposits to shallow sandy alluvium over cobble
- Occurs at or just above the flowing water
- Found on broad gravel and cobble deposits of the river floodplains of major rivers
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- Willows (*Salix* spp.)

Herbs

- Reed canary-grass (*Phalaris arundinacea*)
- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)
- Sedge (*Carex trichocarpa*)
- Cutgrass (*Leersia virginica*)
- Spotted joe-pye-weed (*Eutrochium maculatum*)
- Twisted sedge (*Carex torta*)
- Field mint (*Mentha arvensis*)
- Nutsedges (*Cyperus* spp.)
- Dotted smartweed (*Persicaria punctata*)

- Beggar-ticks (*Bidens* spp.)

International Vegetation Classification Associations:

Reed Canarygrass Wet Meadow (CEGL006044)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmmerman 2008

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

Floodplain Meadow and Big Bluestem – Indian-grass Riverine Grassland are similar to the Reed Canary-grass Floodplain Grassland in position on the floodplain and in soils but differs in species composition. The near monotypic stand of reed canary-grass (*Phalaris arundinacea*) is the most defining character for the Reed Canary-grass Floodplain Grasslands and it is often found on deeper, sandy soils.

Fike Crosswalk

None; this type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

This habitat represents a modified grassland community type on the river floodplain, influenced by human disturbance, alteration of the natural flooding regime, deposition of sediment from excessive erosional events upstream and invasion of the non-native species reed canary-grass (*Phalaris arundinacea*). Native plants, often those of native floodplain grasslands and herbaceous communities are threatened by the expanding reed canary-grass. This invasion into native communities results in loss of habitat for a number of important and rare insect species, namely tiger beetles (genus *Cicindela*), and ground beetles (order Carabidae) and others. While this community is associated with decreasing native species diversity, the 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 this wetland.

Threats

This type is not threatened and represents a plant community type dominated by one plant species: reed canary-grass (*Phalaris arundinacea*). Invasion by non-native plants may be equally devastating as native floodplain plants are displaced and has lead to destruction and/or shifts in community function

and dynamics within other plant communities. In particular, this community can completely displace Hairy-fruited Sedge (*Carex trichocarpa*) Floodplain Wetland and Twisted Sedge (*Carex Torta*) Stream Margin.

In addition to reed canary-grass, Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), and purple loosestrife (*Lythrum salicaria*) may be present in this type. Construction of flood-control and navigational dams has resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by many invasive plants.

Management

It is important to prevent the spread of this community through invasive species control (herbicide and manual removal) and to maintain a natural buffer around the wetland to minimize the spread of this community into adjacent vegetation.

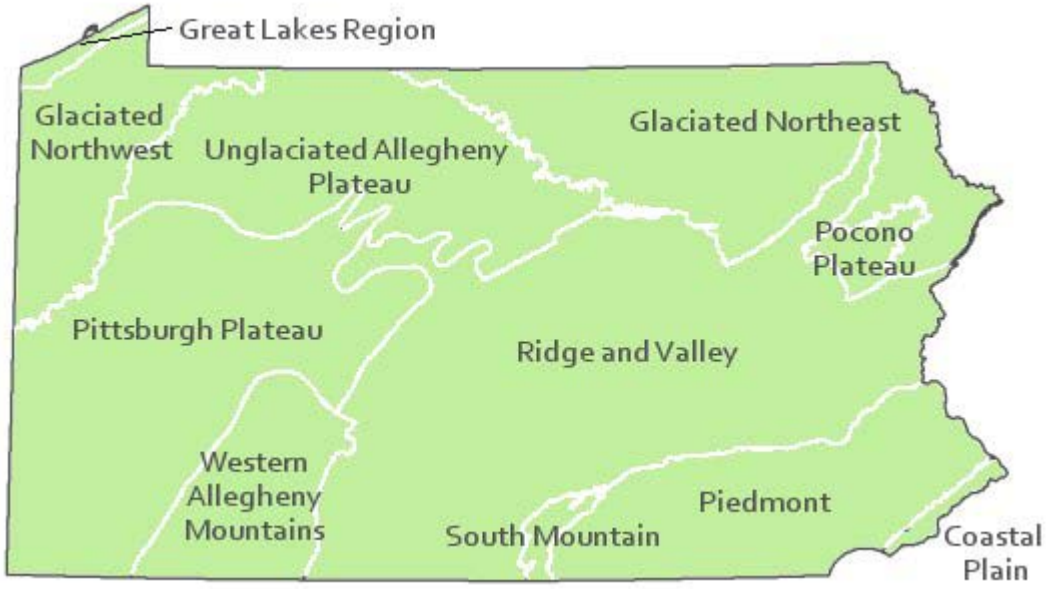
Research Needs

There is need to assess and quantify soils, site hydrology, and other factors to further assess differences between floodplain grasslands on the Ohio, Delaware, and Susquehanna river basins. There continues to be a debate over the presence of native and introduced populations of reed canary-grass, suggesting the need for genetic studies.

Trends

This community type is becoming more common as reed canary-grass populations continue to expand.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Colorado, Connecticut, Delaware, Idaho, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, and Wyoming. This community also occurs in Canada in Ontario, British Columbia, and Alberta.

Rice Cutgrass – Bulrush Vernal Pool

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Vernal Pool

Global Rank: GNR, G1
State Rank: S2?

General Description

This community is characterized as an open, seasonally flooded, mixed-herbaceous wetland meadow with defined basin boundaries and usually occurs within dry, oak-dominated forests with open canopies. Common dominant species include pale meadowgrass (*Torreyochloa pallida*), mannagrass (*Glyceria acutiflora*), rattlesnake mannagrass (*Glyceria canadensis*), three-way sedge (*Dulichium arundinaceum*), Canada bluejoint (*Calamagrostis canadensis*), rice cutgrass (*Leersia oryzoides*), sedges (e.g. *Carex tribuloides*, *C. lurida*, *C. gynandra*, *C. vesicaria*, *C. folliculata*), dotted smartweed (*Persicaria punctata*), marsh St. Johns-wort (*Triadenum fraseri*), royal fern (*Osmunda regalis*), needle spike-rush (*Eleocharis acicularis*), and white beak-rush (*Rhynchospora alba*). The federally endangered species, northeastern

bulrush (*Scirpus ancistrochaetus*), is also found in this type, and can sometimes comprise a significant area within the pool. The invasive low smartweed (*Persicaria longiseta*) was present within this type in some pools and stiltgrass (*Microstegium vimineum*), can form dense patches on the edges of the pools. Shrubs such as winterberry (*Ilex verticillata*) and swamp dewberry (*Rubus hispidus*) are present, but never dominant and canopy trees most often include white oak (*Quercus alba*), sourgum (*Nyssa sylvatica*), and red maple (*Acer rubrum*). The pools may also contain a substantial bryophyte layer that includes several species of peat moss (*Sphagnum*); there is relatively little area not covered by vegetation.

Rank Justification

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

Identification

- Open, seasonally flooded depression, dominated by herbaceous plants, usually graminoids
- Occurs in seasonally inundated depressions most often on saddles between ridges and high plateaus within the Central Appalachian Forest Ecoregion in Pennsylvania
- Generally shallow, composed of several herbaceous species, and usually dry completely over the summer months, allowing herbaceous species to establish throughout the pool
- Northeastern bulrush (*Scirpus ancistrochaetus*), is also found in this type, and can sometimes comprise a significant area within the pool

Characteristic Species

Trees

- White oak (*Quercus alba*)
- Blackgum (*Nyssa sylvatica*)
- Red maple (*Acer rubrum*)

Shrubs

- Spicebush (*Lindera benzoin*)
- Winterberry (*Ilex verticillata*)
- Swamp dewberry (*Rubus hispidus*)

Herbs

- Pale meadowgrass (*Torreyochloa pallida*)

- Mannagrass (*Glyceria acutiflora*)
- Rattlesnake mannagrass (*Glyceria canadensis*)
- Three-way sedge (*Dulichium arundinaceum*)
- Canada bluejoint (*Calamagrostis canadensis*)
- Rice cutgrass (*Leersia oryzoides*)
- Sedge (*Carex tribuloides*)
- Sedge (*Carex lurida*)
- Sedge (*Carex gynandra*)
- Sedge (*Carex vesicaria*)
- Sedge (*Carex folliculata*)
- Dotted smartweed (*Persicaria punctata*)
- Marsh st. johns-wort (*Triadenum fraseri*)
- Royal fern (*Osmunda regalis*)
- Needle spike-rush (*Eleocharis acicularis*)
- White beak-rush (*Rhynchospora alba*)
- Northeastern bulrush (*Scirpus ancistrochaetus*)
- Low smartweed (*Persicaria longiseta*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Central Appalachian Mountain Pond (Threeway Sedge - Buttonbush Type) (CEGL003746)
Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)

NatureServe Ecological Systems:

None

Origin of Concept

Leppo, B., Zimmerman, E., Ray, S., Podniesinski, G., and Furedi, M. 2009. Pennsylvania Statewide Seasonal Pool Ecosystem Classification: Description, mapping, and classification of seasonal pools, their associated plant and animal communities, and the surrounding landscape. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA.

Pennsylvania Community Code

HV : Herbaceous Vernal Pond

Similar Ecological Communities

The Wool-grass – Mannagrass Mixed Shrub Marsh also occurs in seasonally to somewhat permanently inundated depressions throughout Pennsylvania. This type differs from the Rice cutgrass – Bulrush Marsh vernal pool type in that it is generally deeper than the Rice cutgrass – Bulrush Marsh and may not dry completely over the summer months and that some examples of this type are more "marsh-like" and exhibit somewhat poorly defined boundaries. Shrub species typically are more prevalent in the Wool-grass – Mannagrass Mixed Shrub Marsh type than in the Rice cutgrass – Bulrush Marsh.

Fike Crosswalk

Related to Herbaceous Vernal Pool. This type is new to the Pennsylvania Plant Community Classification developed fromstudies of vernal pool ecosystems of Pennsylvania.

Conservation Value

Vernal pools are primarily found in forested areas and are characterized by absence of fish, lack of flowing water, small size, shallow depth, and presence of plants and animals that can withstand a period of drought (Brown and Jung 2005). Their seasonal nature is important because it excludes fish that would otherwise prey upon the eggs and larvae of amphibians breeding in them.

In the mid-Atlantic states, 26 percent of all state-listed threatened and endangered amphibians are dependent on vernal pools.

Vernal pools provide critical breeding habitat for several species of amphibians and a type of crustacean that use vernal pools almost exclusively during some stage of their life cycle. The amphibian species are:

- Marbled Salamander (*Ambystoma opacum*)
- Spotted Salamander (*Ambystoma maculatum*)
- Jefferson Salamander (*Ambystoma jeffersonianum*)
- Wood Frog (*Rana sylvatica*)
- Eastern Spadefoot (*Scaphiopus holbrookii holbrookii*)
- Springtime Fairy Shrimp (*Eubranchipus vernalis*).

A plant species found only in vernal pools in Pennsylvania is the northeastern bulrush (*Scirpus ancistrochaetus*).

Threats

Threats include habitat fragmentation, alteration of hydrology and water chemistry, alteration of substrate, loss of vegetation, and global climate change.

Filling vernal pools, and disturbances to the vegetation and soil around pools from building and road construction, quarries, and logging operations lead to direct mortality of animals and habitat destruction or degradation. Vernal pools are often not identified as wetlands due to their temporary nature.

Clearing and development of adjacent land can lead to accumulation of agricultural run-off and pollution, sedimentation, and pollution in the pools. Removal or change in composition of vegetation in and around a pool affects which species can use the pool. For species that lay their eggs in plant material, loss of vegetation eliminates egg-laying sites. For species that lay their eggs in the water, removal of vegetation reduces shade.

Roads near vernal pools present a physical obstacle to animals moving from their upland feeding habitats to their vernal pool breeding habitats. Many animals are killed as they attempt these crossings. The presence of roads also provides opportunities for undesirable elements to get into the pools. Roads bring invasive plant species, sediments, and contaminants to pools through runoff. During the winter the application of road salt poses a problem for pools located near roads. As the snow melts, salt-laden water flows into these pools and increases the salinity of the water, making the water less hospitable to wildlife.

All aspects of life in a vernal pool, from amphibian migration to egg and larval development to adult feeding, thermoregulation, and reproductive success, depend on certain environmental cues and conditions. Climate change is of increasing concern for species of special concern, especially in regard to species that are geographically restricted.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Protecting vernal pools and the surrounding 1000 feet of upland habitat is critical for protection of water quality, amphibian breeding, and terrestrial habitat for adult and juvenile amphibians. Soil erodibility in terms of the 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. Impervious surfaces surrounding the wetland should be minimized to prevent thermal pollution. Direct impacts and habitat alteration should be avoided (i.e. roads, trails, filling of wetland) and low impact alternatives (i.e. elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

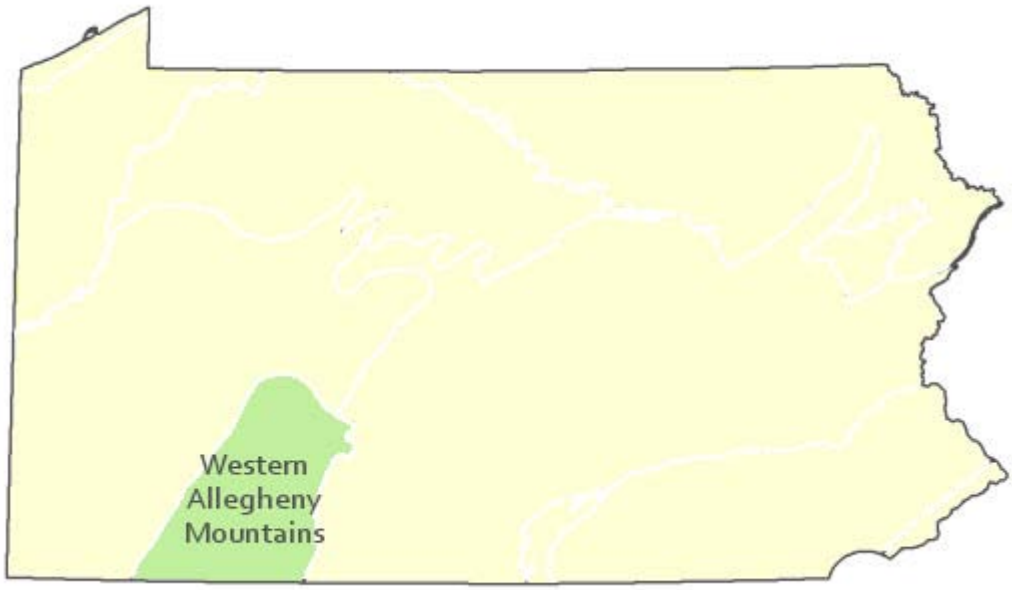
Research Needs

There is a need to collect community plot data to characterize variations of this community to assist further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased evaporation of the standing water and sedimentation.

Range Map



Pennsylvania Range

Central Appalachian Forest Ecoregion in Pennsylvania

River Bluff Seep

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Great Lakes Region Wetland

Global Rank: GNR
State Rank: S1

General Description

The River Bluff Seep is characteristically open and herbaceous. Limited to the steep gorge walls of tributaries to Lake Erie, large tree species are often prevented from growth by the saturated conditions, limited soils, and near-vertical conditions. The community may extend to saturated piles of rock and soil that accumulate at the base of the gorge walls. Herbaceous species include zigzag goldenrod (*Solidago flexicaulis*), Indian-tobacco (*Lobelia siphilitica*), jewelweed (*Impatiens pallida*), field horsetail (*Equisetum arvense*), golden ragwort (*Packera aurea*), Jack-in-the-pulpit (*Arisaema triphyllum*), fowl mannagrass (*Glyceria striata*). This type often supports golden-fruited sedge (*Carex aurea*), brook lobelia (*Lobelia kalmii*), and grass-of-Parnassus (*Parnassia glauca*).

Exotic species include common reed (*Phragmites australis*), colt's-foot (*Tussilago farfara*), bittersweet nightshade (*Solanum dulcamara*) and narrow-leaved bittercress (*Cardamine impatiens*).

Unlike the Great Lakes Bluff Seep, this community is more often found on bedrock, where ground water, seeping out of the ground, high above the tributary floor has made growth of plants possible.

Rank Justification

Critically imperiled in the nation or state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

Identification

- Located on steep slopes of shale or mud-stone bedrock of Lake Erie tributary gorges, in northwestern PA
- Found along areas of the scarp-slope with perennial seepage
- Vegetation is characteristically herbaceous dominated by forbs and graminoids

Characteristic Species

Trees

- Several species may be present, but often do not grow beyond seedling stage.

Shrubs

- Round-leaved dogwood (*Cornus rugosa*)
- Red-osier dogwood (*Cornus sericea*)
- Purple-flowering raspberry (*Rubus odoratus*)
- Willows (*Salix* spp.)

Herbs

- Great blue lobelia (*Lobelia siphilitica*)
- Field horsetail (*Equisetum arvense*)
- White-snakeroot (*Ageratina altissima*)
- Jewelweed (*Impatiens capensis*)
- Swamp milkweed (*Asclepias incarnata*)
- Golden ragwort (*Packera aurea*)
- Zigzag goldenrod (*Solidago flexicaulis*)
- Pale jewelweed (*Impatiens pallida*)
- Fowl mannagrass (*Glyceria striata*)
- Grass-of-parnassus (*Parnassia glauca*)
- Golden-fruited sedge (*Carex aurea*)
- Twisted sedge (*Carex torta*)
- Brook lobelia (*Lobelia kalmii*)

- Turtlehead (*Chelone glabra*)
- Bugleweed (*Lycopus* spp.)

International Vegetation Classification Associations:

None

NatureServe Ecological Systems:

None

Origin of Concept

PNHP Data/Erie County Inventory

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

This type shares characteristics of seepage wetlands and fen communities occurring in the glaciated region of Northwestern Pennsylvania. The Great Lakes Bluff Seep differs from this type by its location on slumping escarpments (bluffs) above Lake Erie, whereas the River Bluff Seep occurs primarily along the walls of tributary gorges. The substrate of the Great Lakes Bluff Seep often differs from the River Bluff Seep as it is underlain by a substrate of lake-deposited sand or clays in contrast to the shale geology of the gorges. Trees and shrubs occur with more frequency in the Great Lakes Bluff Seep and because of this, the type is considered more of a shrubland or possibly a woodland depending on the amount of time between slump events – natural disturbance events that keep succession in check along the Lake Erie Coast.

The River Bluff Seep resembles the Sedge – Mixed Forb Fen in species composition as both are fed by base-rich ground water; however, it differs considerably from the basin fen type by physical location, perched high on the rocky escarpments of the tributary walls.

In addition, the River Bluff Seep may resemble the Calcareous Opening/Cliff Community; however, this is a terrestrial type occurs on calcareous cliffs, outcrops, and rocky slopes throughout the Appalachian Region.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from inventory studies of Erie County and community mapping and assessment work at Erie Bluffs State Park by PNHP. It is related to the Great Lakes Region Scarp Seep concept in Fike (1999), which was separated into two types based on differences in vegetation, geographic location, and substrate observed in the seepage wetlands of the River Bluffs and Lake Erie Bluffs.

Conservation Value

The River Bluff Seep community is a rare type in Pennsylvania occurring only in the Lake Erie Region, on near vertical gorge walls of tributaries to Lake Erie. This herbaceous wetland community hosts several rare plants, including grass-of-parnassus (*Parnassia glauca*), golden fruited sedge (*Carex aurea*), and Kalm's lobelia (*Lobelia kalmii*).

Threats

The greatest threats to these communities are direct physical disturbance, and hydrological alterations affecting groundwater flows to the seeps. Invasive species threats include colt's-foot (*Tussilago farfara*) and common reed (*Phragmites australis*).

Management

These communities occur in an environmental setting where disturbance, in the form of soil collapse on the steep slopes, is relatively frequent. The plants of the community are not generally harmed in the long-term by slumps. However, upslope disturbances to the bedrock could destabilize these habitats and should be avoided. The River Bluffs are sensitive habitats, and as steep slopes are frequently attractive to hikers and climbers, care should be taken when providing access to these sites. The steep terrain is unstable and often saturated. Trail construction along the top of tributary gorges should be limited to avoid impacting high-quality examples of this community. Care should also be taken to control and prevent the spread of invasive species.

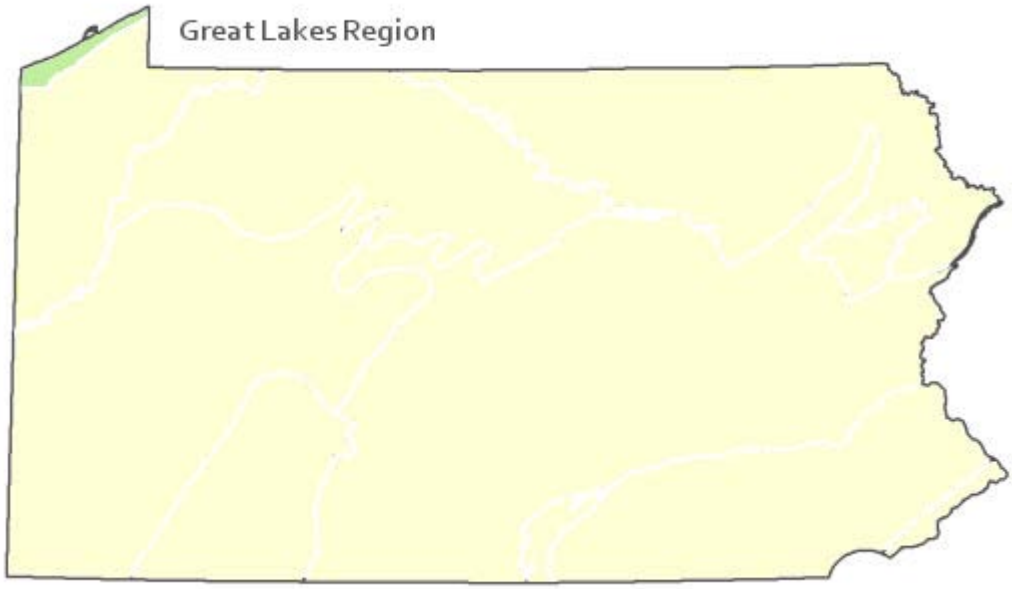
Research Needs

Insects, including lepidopterans, may form a substantial part of the biodiversity in these communities, relatively little inventory work has been done for these taxa. There is a continuing need to survey and document high quality examples of this community in Pennsylvania to understand distribution patterns and guide future classification of this association. Although the basic pattern of succession in these communities is understood, the response of individual plant species populations to slumps is not fully documented. This is especially important for the species of special concern in Pennsylvania.

Trends

Insects, including lepidopterans, may form a substantial part of the biodiversity in these communities, relatively little inventory work has been done for these taxa. There is a continuing need to survey and document high quality examples of this community in Pennsylvania to understand distribution patterns and guide future classification of this association. Although the basic pattern of succession in these communities is understood, the response of individual plant species populations to slumps is not fully documented. This is especially important for the species of special concern in Pennsylvania.

Range Map



Pennsylvania Range

Northwestern Pennsylvania; limited to vertical bluffs along tributaries to Lake Erie.

Global Distribution

Northeastern Ohio to New York along the gorges of Lake Erie tributaries of its southern shore.

Riverbank Freshwater Tidal Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Tidal Wetland and River Floodplain

Global Rank: G4G5, G4?, G2G4
State Rank: S1

General Description

Riverbank Freshwater Tidal Marsh occurs on gradually sloping river banks in the zone between low tide and mean high tide. Tidal amplitude in the Delaware Estuary is approximately 2 meters in vertical height. The width of the intertidal zone on the riverbank depends on the slope of the riverbank.

The riverbank tidal marsh is typically distinctly zoned parallel to the shoreline. The uppermost zone, where the water at high tide is less than 0.5 meter deep, provides habitat for emergent species such as wild-rice (*Zizania aquatica*), salt-marsh water-hemp (*Amaranthus cannabinus*), swamp beggar's-ticks (*Bidens bidentoides*), showy bur-marigold (*Bidens laevis*), pickerel-weed (*Pontederia cordata*), arrow-arum (Peltandra virginica), and water-pepper (*Persicaria punctata*). These species are also found in the high marsh community. The non-native invasive species common reed (*Phragmites australis* ssp. *australis*) and Chinese lobelia (*Lobelia chinensis*) also occur in this zone.

The middle zone is dominated by threesquare (*Schoenoplectus pungens*), grading into spatterdock (*Nuphar advena*). The leaves of spatterdock, which grow singly from horizontal rhizomes up to 3 inches in diameter, form a canopy in the mid-section of the intertidal zone. They are emergent at low tide and below the water surface at high tide. Several of the lower-growing intertidal species grow under the *Nuphar* canopy including subulate arrowhead (*Sagittaria subulata*), long-lobed arrowhead (*Sagittaria calycina*), arrowhead (*Sagittaria rigida*), mud-plantain (*Heteranthera multiflora*), and Smith's bulrush (*Schoenoplectus smithii*). The non-native invasive umbrella sedge (*Cyperus serotinus*) also occurs in this zone

The lowest vegetated zone on the intertidal riverbank occurs below the band of spatterdock. It is under as much as two meters of water at high tide and is typically sparsely vegetated. Subulate arrowhead (*Sagittaria subulata*) is often present. In addition, horned pondweed (*Zanichellia palustris*), waterweed (*Elodea nuttallii*), and tape-grass (*Vallisneria americana*), truly aquatic species, may also be present on the exposed mudflats at low tide.

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Zoned herbaceous vegetation on tidal riverbanks

- Late in the season the wild rice at the upper edge is very conspicuous
- The spatterdock zone in the mid-section is conspicuous except at high tide when it is under water
- At low tide exposed vegetation is often coated with a film of dried mud
- Not visible in the winter, even at low tide

Characteristic Species

Herbs

- Spatterdock (*Nuphar advena*)
- Threesquare (*Schoenoplectus pungens*)
- Wild-rice (*Zizania aquatica*)
- Walter's barnyard-grass (*Echinochloa walteri*)
- Dotted smartweed (*Persicaria punctata*)
- Subulate arrowhead (*Sagittaria subulata*)
- Mud-plantain (*Heteranthera multiflora*)

Exotic Species

- Common reed (*Phragmites australis* ssp. *australis*)
- Chinese lobelia (*Lobelia chinensis*)
- Umbrella sedge (*Cyperus serotinus*)

International Vegetation Classification Associations:

Broadleaf Pond-lily Tidal Marsh (CEGL004472)
Atlantic Coast Wild Rice Tidal Marsh (CEGL004202)
North Atlantic Coastal Plain River Brackish Intertidal Mudflat (CEGL004473)
Atlantic Coast Brackish Tidal Marsh (CEGL004188)

NatureServe Ecological Systems:

Atlantic Coastal Plain Embayed Region Tidal Freshwater Marsh (CES203.259)

Origin of Concept

Rhoads and Block

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

There is overlap in species composition between Riverbank Freshwater Tidal Marsh and Freshwater Tidal Mixed High Marsh. One grades into the other at the level of mean high tide.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from inventory studies of Bucks County by Morris Arboretum.

Conservation Value

Riverbank Freshwater Tidal Marsh is a rare community type in Pennsylvania that may have rare plant species including salt-marsh water-hemp (*Amaranthus cannabinus*), swamp beggar's-ticks (*Bidens bidentoides*), small beggar-ticks (*Bidens discoidea*), showy bur-marigold (*Bidens laevis*), Walter's barnyard grass (*Echinochloa walteri*), American waterwort (*Elatine americana*), spike-rush (*Eleocharis obtusa* var. *peasii*), dwarf spike-rush (*Eleocharis parvula*), mud-plantain (*Heteranthera multiflora*), gypsy-wort (*Lycopus rubellus*), goldenclub (*Orontium aquaticum*), long-lobed arrowhead (*Sagittaria calycina*), subulate arrowhead (*Sagittaria subulata*), river bulrush (*Schoenoplectus fluviatilis*), Smith's bulrush (*Schoenoplectus smithii*), and wild-rice (*Zizania aquatica*). This community also provides a flood buffer along the Delaware Estuary as well as habitat for fish, birds, and aquatic invertebrates.

Threats

Threats to intertidal marsh communities include sea level rise; conversion to residential, commercial, or industrial uses; water pollution and colonization by non-native invasive species, especially common reed (*Phragmites australis* ssp. *australis*), Chinese lobelia (*Lobelia chinensis*), and umbrella sedge (*Cyperus serotinus*).

Loss of fine sediments due to erosion from the wakes of commercial ships and pleasure craft is also a major threat to riverbank tidal marsh communities. In several locations the surface layer of fine sediments and its stabilizing algal crust, which together provide a seed bed for intertidal plants, have been washed away leaving the riverbank bare of plants. Many of the intertidal species are annuals (*Bidens bidentoides, Sagittaria calycina, Zizania aquatica, Amaranthus cannabinus, Echinochloa walteri*) thus their persistence depends on an appropriate seedbed.

Management

There is a need to identify sites where existing land use could allow for inland migration of freshwater tidal marsh communities as sea level rises, and secure theses sites as protected open space. All remaining freshwater tidal marsh communities should be protected from incompatible land use. Opportunities for restoration of freshwater tidal marsh communities should also be pursued.

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. 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 and habitat alteration 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. Invasive species control should be implemented at sites where common reed (*Phragmites australis* ssp. *australis*) is established.

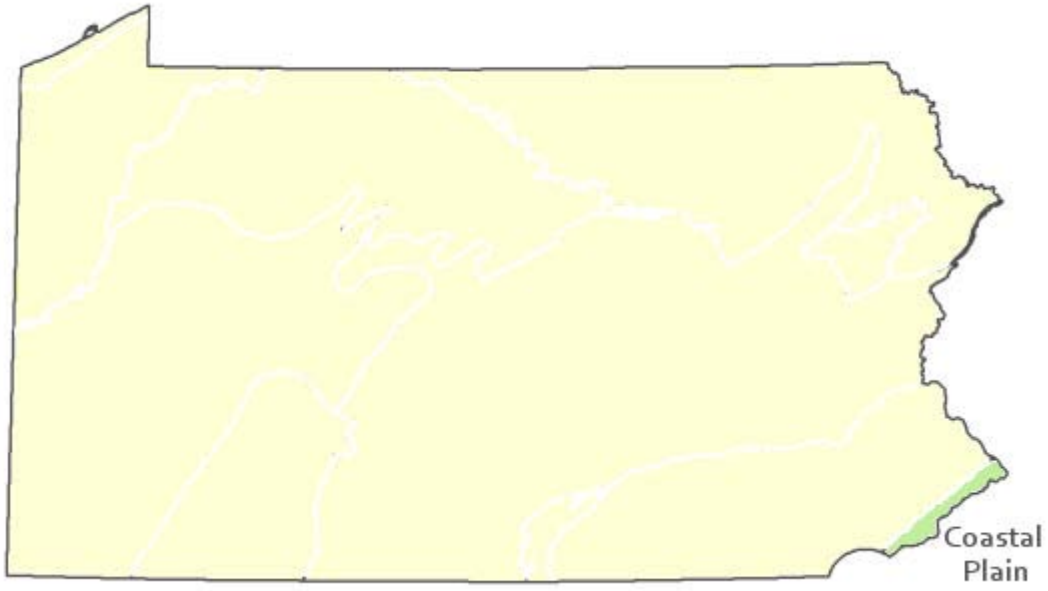
Research Needs

Regular monitoring should be instituted at selected sites.

Trends

Urban development of the Coastal Plain, and hydrological alterations from boat traffic and dredging have greatly decreased the extent of this community type.

Range Map



Pennsylvania Range

Coastal Plain

Global Distribution

Connecticut, Delaware, Maine, Maryland, Massachusetts, North Carolina, New Hampshire, New Jersey, New York, Pennsylvania, and Virginia

Sedge – Mixed Forb Fen

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Peatland Wetland

Global Rank: GNR
State Rank: S1

General Description

These are open, sedge-dominated wetlands that usually occur on organic substrate (sedge peat), saturated throughout most of the year by base-rich groundwater. These sites usually lack the distinct seepage areas associated with other fen types. Sedge species dominate, including prairie sedge (*Carex prairea*), Atlantic sedge (*Carex sterilis*), and/or sedge (*Carex tetanica*). Other species may include mountain-mint (*Pycnanthemum virginianum*), blue vervain (*Verbena hastata*), starry false Solomon's-seal (*Maianthemum stellatum*), common cat-tail (*Typha latifolia*), willow-herb (*Epilobium leptophyllum*), bedstraw (*Galium tinctorium*), sensitive fern (*Onoclea sensibilis*), jewelweed (*Impatiens capensis*), swamp thistle (*Cirsium muticum*), and Greek valerian (*Polemonium reptans*).

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.

Identification

- Presence of calcareous indicator plant species such as Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), and mountain-mint (*Pycnanthemum virginianum*)
- Peat is usually present.
- Dominance of grass-like plants
- Surface water pH is between 6.0 and 7.9 during the growing season.

Characteristic Species

Herbs

- Prairie sedge (*Carex prairea*)
- Atlantic sedge (*Carex sterilis*)
- Wood's sedge (*Carex tetanica*)
- Mountain-mint (*Pycnanthemum virginianum*)
- Blue vervain (*Verbena hastata*)
- Starflower (*Maianthemum stellatum*)
- Common cat-tail (*Typha latifolia*)
- Willow-herb (*Epilobium leptophyllum*)
- Bedstraw (*Galium tinctorium*)
- Sensitive fern (*Onoclea sensibilis*)
- Jewelweed (*Impatiens capensis*)
- Swamp thistle (*Cirsium muticum*)
- Spreading Jacob's-ladder (*Polemonium reptans*)
- Baltic rush (*Juncus arcticus* var. *littoralis*)
- Spotted joe-pye-weed (*Eutrochium maculatum*)

Exotic Species

- Common reed (*Phragmites australis* ssp. *australis*)

International Vegetation Classification Associations:

Prairie Sedge - Tussock Sedge Fen (CEGL006551)

NatureServe Ecological Systems:

North-Central Appalachian Seepage Fen (CES202.607)

Origin of Concept

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

Pennsylvania Community Code

HO : Open Sedge (Carex Stricta, C. Prairea, C. Lacustris) Fen

Similar Ecological Communities

The Sedge – Mixed Forb Fen is distinguished from other groundwater-fed community types by presence of calciphilic species, shrub cover, or landscape position. Other basin-fen types fed by calcium-rich groundwater include the Poison Sumac - Red-cedar - Bayberry Fen and Alder-leaved Buckthorn – Inland Sedge – Golden Ragwort Shrub Fen, which differ from the Sedge – Mixed Forb Fen in that they exhibit a significantly higher shrub-cover. The Sedge – Mixed Forb Fen type, which is found primarily in basins or depressions, differs in landscape position from the Great Lakes Bluff Seep and River Bluff Seep, most often found on nearly vertical walls of tributary gorges and lake bluffs and This type is distinquished from the “poor fens” (Many-Fruited Sedge – Bladderwort Poor Fen, Cotton-grass Poor Fen) and other acidic peatlands by the presence and sometimes dominance of calciphilic species such as prairie sedge (*Carex prairea*), Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), and mountain-mint (*Pycnanthemum virginianum*). Tussock Sedge Marsh is strongly dominated by tussock sedge (*Carex stricta*). Bluejoint – Reed Canary-grass Marsh may contain tussock sedge, but it is dominated by bluejoint (*Calamagrostis canadensis* var. *canadensis*) and co-dominated by reed canary-grass (*Phalaris arundinacea*).

Fike Crosswalk

Open sedge (*Carex stricta, C. prairea, C. lacustris*) fen

Conservation Value

The Sedge – Mixed Forb Fen occurs in calcareous wetlands, which are especially unusual in Pennsylvania, where the predominant geology in most regions is acidic. There are a number of plants, aquatic invertebrates, and lepidopterans adapted specifically to this high-pH wetland habitat. Plants of special concern in Pennsylvania found in this habitat include prairie sedge (*Carex prairea*), sedge (*Carex tetanica*), and Schweinitz' sedge (*Carex schweinitzii*). These wetlands are irreplaceable, as their specific environmental conditions have formed over hundreds or thousands of years.

Threats

The greatest threats to these communities are disruptions to bedrock or glacial deposits such as drilling or mining in nearby areas and groundwater extraction, which can contaminate or alter the flow patterns of the groundwater that feeds the seepage. Groundwater pollution can also occur from improperly installed septic systems, from improperly lined underground waste disposal, and in agricultural areas, from infiltration of pesticides, fertilizer, and bacteria from animal wastes. Invasive plant species, such as common reed (*Phragmites australis* ssp. *australis*), can threaten the biological integrity of the community. Wetland soils and vegetation are sensitive and will be damaged by foot traffic or recreational vehicles as they are easily compacted.

Management

Drilling, mining, or other disruptions to bedrock or glacial deposits should not be undertaken within half a mile of a seepage wetland without a thorough understanding of bedrock layers and groundwater flows. Groundwater flow patterns do not always mirror surface watersheds, and in some cases aquifers may be contiguous over large areas. Seepage wetlands are also sensitive to trampling and other physical disturbance from recreational activities; trails should be sited away from the wetland, or elevated structures employed to prevent traffic in the wetland. 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. 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. These wetlands may require periodic disturbance, such as burning or grazing, to maintain their open canopy which is indicative of the Sedge – Mixed Forb Fen and the rare species that occupy the community.

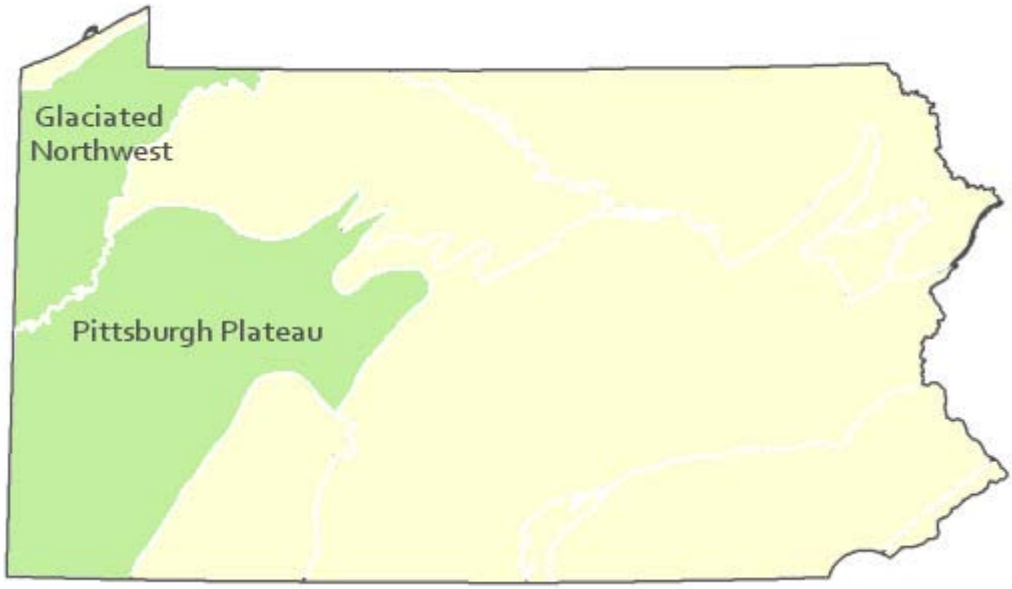
Research Needs

More site inventory and classification work is needed to refine the definition of this community type and resolve its relationship to other types. It appears that some of these wetlands will succeed to shrubland if not maintained. Management of these wetlands would be informed by an understanding of natural successional pathways, and of the historical frequency of disturbances such as fire and grazing in these wetlands.

Trends

Specific information on the loss and degradation of the Sedge – Mixed Forb Fen community is not available. However, most calcareous soils in Pennsylvania occur in valleys or glaciated regions that are also favorable for agriculture and settlement, and have been extensively cleared of natural vegetation for these purposes. Thus Sedge – Mixed Forb Fen wetlands, always few in number in Pennsylvania, are likely to have been lost or altered at a disproportionately high rate to other wetland types.

Range Map



Pennsylvania Range

NW and SW PA

Global Distribution

Pennsylvania

Serpentine Seep

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Seepage Wetland

Global Rank: GNR
State Rank: S1

General Description

This community type is restricted to areas underlain by serpentinite bedrock. Seeps occur on gentle slopes at the base of low hills and are adjacent to streams or may be stream headwater areas. Groundwater enriched with magnesium and various heavy metals (i.e., chromium and nickel) saturates the surface for a substantial portion of the growing season. Graminoids dominate; tufted hairgrass (*Deschampsia cespitosa*), rice cutgrass (*Leersia oryzoides*), spike-rush (*Eleocharis tenuis* var. *pseudoptera*), and deer-tongue grass (*Dichanthelium clandestinum*) are common. Other species that are characteristic of these seeps include straw-colored nutsedge (*Cyperus strigosus*), muhly (*Muhlenbergia mexicana*), swamp thistle (*Cirsium muticum*), smartweeds (*Polygonum* spp.), bugleweed (*Lycopus uniflorus*), a moss (*Philonotis capillaris*), Indian-grass (*Sorghastrum nutans*), whip-grass (*Scleria triglomerata*), purple gerardia (*Agalinis purpurea*), American burnet (*Sanguisorba canadensis*), and boneset (*Eupatorium perfoliatum*). This community type is part of the serpentine barrens complex.

Rank Justification

Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

Identification

- Groundwater seep areas of low slope (1-3 degrees) and variable aspect
- Soils are typically very wet thin sapric peats (muck) (saturated) and clay loams derived from serpentine bedrock
- Soil depth is generally greater than 30 cm and can exceed 60 cm
- Only occurs on serpentinite bedrock
- Dominated by grasses and rushes such as tufted hairgrass (*Deschampsia cespitosa*), rice cutgrass (*Leersia oryzoides*), spike-rush (*Eleocharis tenuis* var. *pseudoptera*), and deer-tongue grass (*Dichanthelium clandestinum*)

Characteristic Species

Herbs

- Tufted hairgrass (*Deschampsia cespitosa*)

- Rice cutgrass (*Leersia oryzoides*)
- Slender spike-rush (*Eleocharis tenuis* var. *pseudoptera*)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- False nutsedge (*Cyperus strigosus*)
- Muhly (*Muhlenbergia mexicana*)
- Swamp thistle (*Cirsium muticum*)
- Smartweeds (*Persicaria* spp.)
- Bugleweed (*Lycopus uniflorus*)
- Indian-grass (*Sorghastrum nutans*)
- Whip-grass (*Scleria triglomerata*)
- False-foxglove (*Agalinis purpurea*)
- American burnet (*Sanguisorba canadensis*)
- Boneset (*Eupatorium perfoliatum*)

Bryophytes

- *a moss (Philonotis capillaris)*

International Vegetation Classification Associations:

Serpentine Emergent Wetland (CEGL006316)

NatureServe Ecological Systems:

Eastern Serpentine Woodland (CES202.347)

Origin of Concept

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

Pennsylvania Community Code

HE : Serpintine Seepage Wetland

Similar Ecological Communities

This community is distinguished from other types of seeps primarily by its landscape context. This type occurs exclusively in areas underlain by serpentinite bedrock and influenced by groundwater rich in calcium, magnesium, chromium, nickel, and iron.

Fike Crosswalk

Serpentine Seepage Wetland

Conservation Value

This community is rare in the state and serves as important habitat for reptile and amphibian species such as wood frogs (*Rana sylvatica*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), and Jefferson salamander (*Ambystoma jeffersonianum*).

Threats

Alteration to the hydrological regime and development are the major threats to this community and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, and sedimentation. This community is limited to areas where serpentine bedrock is near the surface, resulting in a limited range of potential habitats.

Management

Extraction, drilling, mining, or other activities that impact the bedrock or flow of groundwater should not be undertaken within half a mile of a seepage wetland without a thorough understanding of bedrock layers and groundwater flows. 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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

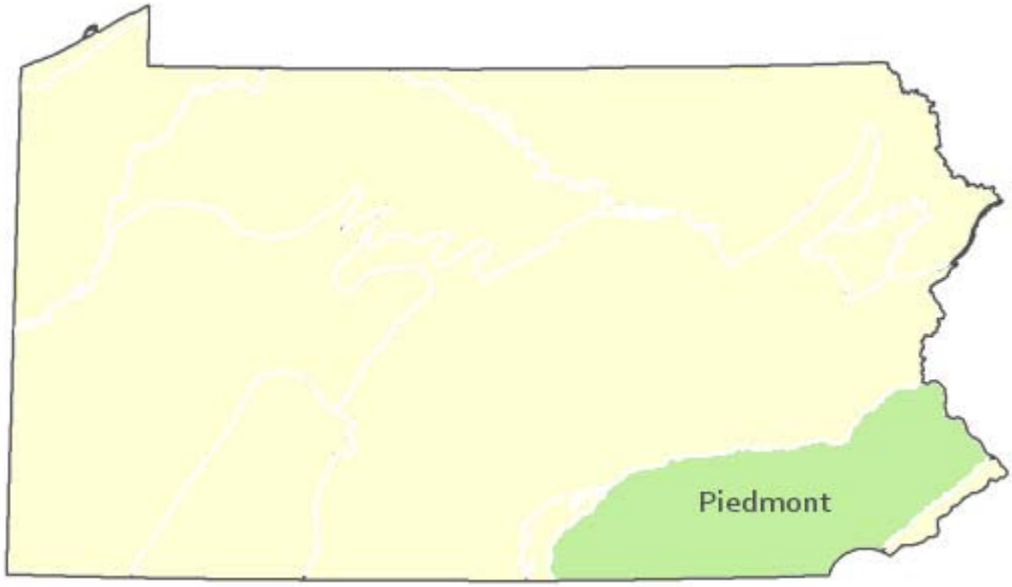
Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

The general trend has been decline as many of the smaller serpentine barrens have been lost to development and agriculture. Most extant occurrences are likely on protected public or private lands and are relatively secure.

Range Map



Pennsylvania Range

Southeastern Pennsylvania.

Global Distribution

Pennsylvania, possibly in Maryland.

Skunk-cabbage – Golden Saxifrage Seep

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Seepage Wetland

Global Rank: GNR
State Rank: S4S5

General Description

A seep is where groundwater flow meets the surface and diffuses through soil before emerging over a significant area (as opposed to a spring, where groundwater emerges as a concentrated flow). The constant flow of groundwater keeps the soil saturated. The water is always clear and cool, and may have mineral enrichment, because it comes from groundwater sources. This unique habitat hosts several plant and animal species that cannot utilize other wetlands where water levels fluctuate seasonally. Where groundwater flow is sufficient to form a channel of water, it is called a spring. Pennsylvania has many seeps because of the predominance of sedimentary rock formations; water infiltrates from the surface, flows downwards until it hits an impervious layer of rock, then follows this layer until it surfaces, forming a seep.

This type includes small herbaceous seepage areas with scattered to moderately dense cover of broadleaf and grass-like plants. Typically the community is over-topped by trees and shrubs from the surrounding forest, although large examples will be open. Herbaceous species are strongly dominant and tend to be relatively diverse, especially where there is greater mineral enrichment.

Species composition is highly variable, but can include turtlehead (*Chelone glabra*), red maple (*Acer rubrum*), Jack-in-the-pulpit (*Arisaema triphyllum*) Pennsylvania bittercress (*Cardamine pensylvanica*), sedge (*Carex prasina*), winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), hornbeam (*Carpinus caroliniana*), skunk-cabbage (*Symplocarpus foetidus*), golden saxifrage (*Chrysosplenium americanum*), cinnamon fern (*Osmunda cinnamomea*), sedge (*Carex scabrata*), jewelweed (*Impatiens capensis*),

spinulose wood fern (*Dryopteris carthusiana*), Pennsylvania bittercress (*Cardamine pensylvanica*), clearweed (*Pilea pumila*), , slender mannagrass (*Glyceria melicaria*), swamp saxifrage (*Saxifraga pensylvanica*), and sensitive fern (*Onoclea sensibilis*). Bryophytes include *Brachythecium rivulare, Bryhnia novae-angliae, Rhynchostegium serrulatum, Rhizomnium punctatum, Sphagnum* spp., and *Thuidium delicatulum.* Shrubs may be present, common representatives include alders (*Alnus* spp.), spicebush (*Lindera benzoin*), viburnums (*Viburnum* spp.), and dogwoods (*Cornus* spp.).

The pH of these forested seep communities varies widely and this significantly influences species composition. Seeps with moderately to strongly calcareous groundwater ([Ca] >15mg/l) often contain one to several calciphilic species in addition to the speices listed above.

Rank Justification

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

Identification

- Seeps are best identified by groundwater discharge all or most of the year (some seeps may go dry by late summer)
- They often occur at the base of slopes, although they may also occupy a mid-slope position.
- Golden saxifrage, *Carex scabrata*, *Carex prasina*, and *Carex trisperma* are good indicators of seepage, as these species rarely occur in areas that have seasonally fluctuating water levels.
- The Skunk-cabbage – Golden Saxifrage Forest Seep occurs within a forested landscape, typically with skunk-cabbage and/or golden saxifrage as dominants, and it has a moderately acidic to calcareous pH.
- The calcareous subtype will have high pH (6.5 or greater) and will have some calcium-loving plant species present.

Characteristic Species

Trees

- Alders (*Alnus* spp.)
- Viburnum (*Viburnum* spp.)
- Spicebush (*Lindera benzoin*)
- Dogwoods (*Cornus* spp.)
- Hornbeam (*Carpinus caroliniana*)
- Winterberry (*Ilex verticillata*)

Herbs

- Skunk cabbage (*Symplocarpus foetidus*)
- Golden saxifrage (*Chrysosplenium americanum*)
- Sedge (*Carex folliculata*)
- Sedge (*Carex prasina*)
- Jewelweed (*Impatiens capensis*)
- Spinulose wood fern (*Dryopteris carthusiana*)
- Pennsylvania bittercress (*Cardamine pensylvanica*)
- Clearweed (*Pilea pumila*)
- Slender mannagrass (*Glyceria melicaria*)
- Swamp saxifrage (*Saxifraga pensylvanica*)
- Sensitive fern (*Onoclea sensibilis*)
- Turtlehead (*Chelone glabra*)
- Jack-in-the-pulpit (*Arisaema triphyllum*)

Bryophytes

- *Sphagnum* spp.
- *Thuidium delicatulum*
- *Brachythecium rivulare*
- *Bryhnia novae-angliae*
- *Rhynchostegium serrulatum*
- *Rhizomnium punctatum*

International Vegetation Classification Associations:

Skunk-cabbage - Orange Jewelweed Seep (CEGL006567)

NatureServe Ecological Systems:

Central and Southern Appalachian Spruce-Fir Forest (CES202.028)
High Allegheny Wetland (CES202.069)
Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

Origin of Concept

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

Pennsylvania Community Code

HK : Skunk Cabbage – Golden Saxifrage Forest Seep

Similar Ecological Communities

The Golden Saxifrage – Sedge Rich Seep receives more light than does this type. The greater light availability is reflected in the species composition. The Golden Saxifrage – Pennsylvania Bitter-cress Spring Run Community is also groundwater fed, but in the case of a spring, water comes to the surface in a concentrated rather than diffuse flow.

Fike Crosswalk

Skunk cabbage - golden saxifrage forest seep

Conservation Value

Seepage wetlands are unique because they provide a constant source of water at a relatively even flow and temperature throughout the growing season. They are utilized by amphibians and aquatic insects for breeding. Some plant species are also specifically adapted for seepage wetlands. This community type is currently broadly defined and includes forested seeps with a range of pH values. In examples of this community type receiving calcium enriched groundwater, several plants of special concern in Pennsylvania can be found: rough-leaved aster (*Eurybia radula*), spreading globe-flower (*Trollius laxus*), hemlock-parsley (*Conioselinum chinense*), and grass-of-Parnassus (*Parnassia glauca*).

Threats

The greatest threat to these communities is bedrock disruptions such as drilling or mining in nearby areas, which can contaminate or alter the flow patterns of the groundwater that feeds the seepage. Groundwater pollution can also occur from improperly installed septic systems, from improperly lined underground waste disposal, and in agricultural areas from infiltration of pesticides, fertilizer applications on lawns and agricultural fields, and bacteria from animal wastes. Removal of natural vegetation cover adjacent to the wetland can affect water levels and temperatures by increasing solar heating and evaporation. Invasive plant species can threaten the biological integrity of the community. The terrain and vegetation within this community are sensitive to foot traffic.

Management

Drilling, mining, or other disruptions to bedrock should not be undertaken within a half mile of a seepage wetland without a thorough understanding of bedrock layers and groundwater flows. Groundwater flow patterns do not always mirror surface watersheds, and in some cases aquifers may be contiguous over large areas. Seepage wetlands are also sensitive to trampling and other physical disturbance from recreational activities; trails should be sited away from the wetland, or elevated structures employed to prevent traffic in the wetland.

Research Needs

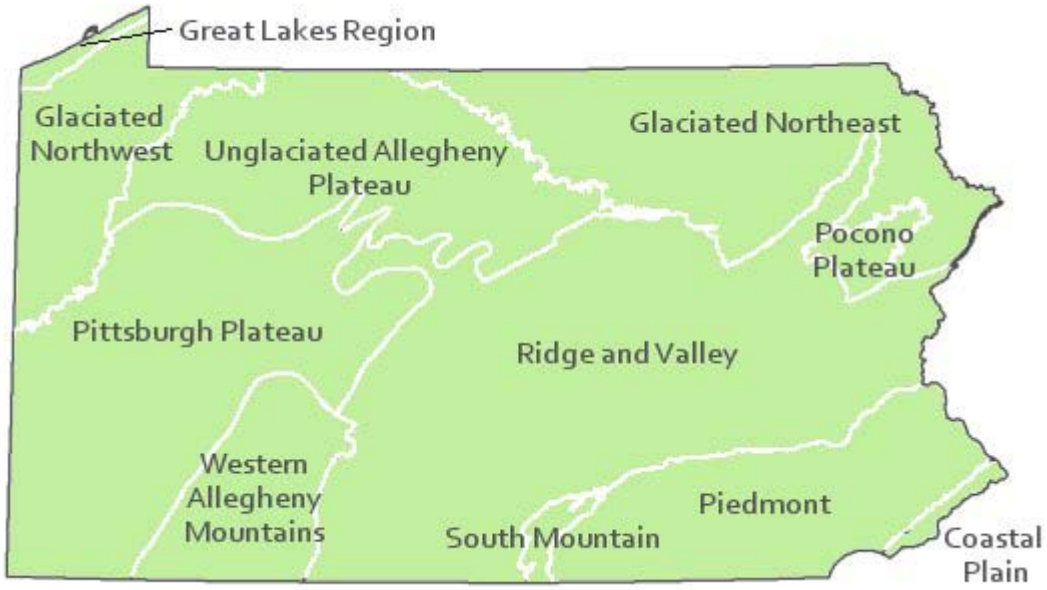
Fike (1999) described a "calcareous subtype," of the Skunk Cabbage - Golden Saxifrage Seep, which differentiated from the what is described here by the influence of moderately to strongly calcareous groundwater ([Ca] >15mg/l). Fike's stated that the subtype included the species in the more general concept, but usually with the additional presence of one to several calciphilic species. The species of calciphile present varies; typical representatives include spreading globeflower (*Trollius laxus*), hemlock parsley (*Conioselinum chinense*), and grass-of-Parnassus (*Parnassia glauca*). These species also have higher light requirements, so sites or portions of sites on which they occur tend to be somewhat open. Becuase of this, there is a high degree of overlap with the Golden Saxifrage - Sedge Rich Seep and more work needs to be done to determine if this calcareous subtype should be recognized.

Calcareous and circumneutral seepage wetlands in Pennsylvania have been studied and classified, but acidic seepage wetlands have not. These may have different floristic composition and merit further study. Different types may have different conservation needs; for example, the calcareous subtype is certainly less prevalent in Pennsylvania than acidic seepage wetlands.

Trends

Specific figures for this wetland community type are not available.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Connecticut, Delaware, Massachusetts, Maryland, New Hampshire, New York, Rhode Island, Virginia, Vermount, and West Virginia.

Sphagnum – Beak-rush Peatland

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Peatland Wetland

Global Rank: GNR
State Rank: S3

General Description

This type occurs in the open areas of many acidic peatlands. The substrate is sphagnum peat, often a floating mat. Typical species include white beak-rush (*Rhynchospora alba*), pitcher-plant (*Sarracenia purpurea*), spatulate-leaved sundew (*Drosera intermedia*), round-leaved sundew (*Drosera rotundifolia*), yellow-eyed-grass (*Xyris montana*), brown-fruited rush (*Juncus pelocarpus*), sedge (*Carex trisperma*), white fringed-orchid (*Platanthera blephariglottis*), horned bladderwort (*Utricularia cornuta*), cotton-grass (*Eriophorum vaginatum*), and tawny cotton-grass (*Eriophorum virginicum*). Cranberry (*Vaccinium macrocarpon*), and small cranberry (*Vaccinium oxycoccos*) are abundant in some areas. Shrubs, such as leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), bog laurel (*Kalmia polifolia*), and bog-rosemary (*Andromeda polifolia* var. *glaucophylla*), may also occur but do not dominate the community. This community usually occupies one of the interior zones of a larger peatland complex that may also include shrub, woodland, and forest physiognomies.

Rank Justification

Vulnerable in the nation or state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Identification

- Thick sphagnum moss layer (*Sphagnum* spp.)
- Herbaceous layer dominated by white beak-rush (*Rhynchospora alba*) with tawny cotton-grass (*Eriophorum virginicum*), cranberry (*Vaccinium macrocarpon*), and small cranberry (*Vaccinium oxycoccos*) as co-dominate species
- Substrate is peat, often a floating mat
- Open canopy

Characteristic Species

Shrubs

- Cranberry (*Vaccinium macrocarpon*)
- Small cranberry (*Vaccinium oxycoccos*)
- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)

- Bog laurel (*Kalmia polifolia*)
- Bog-rosemary (*Andromeda polifolia* var. *glaucophylla*)

Herbs

- White beak-rush (*Rhynchospora alba*)
- Pitcher-plant (*Sarracenia purpurea*)
- Spatulate-leaved sundew (*Drosera intermedia*)
- Round-leaved sundew (*Drosera rotundifolia*)
- Yellow-eyed-grass (*Xyris montana*)
- Brown-fruited rush (*Juncus pelocarpus*)
- Sedge (*Carex trisperma*)
- White fringed-orchid (*Platanthera blephariglottis*)
- Horned bladderwort (*Utricularia cornuta*)
- Cotton-grass (*Eriophorum vaginatum*)
- Tawny cotton-grass (*Eriophorum virginicum*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Oligotrophic Peatland Moss Lawn (CEGL006135)

NatureServe Ecological Systems:

Boreal-Laurentian Bog (CES103.581)
North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Origin of Concept

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

Pennsylvania Community Code

HG : Sphagnum – Beaked Rush Peatland

Similar Ecological Communities

Many-Fruited Sedge – Bladderwort Poor Fen type has a very similar structure and setting, but occurs under the influence of groundwater that raises the pH to at least 5. There is a corresponding difference in species composition with the change in pH. Cotton-grass Poor Fen and Sphagnum – Beak-rush Peatland communities occur in glaciated and non-glaciated areas of Pennsylvania. Although sphagnum (*Sphagnum* spp.), tawny cotton-grass (*Eriophorum virginicum*), and beak-rush species (*Rhynchospora* spp.) are important in both types, the two communities differ in the overall species composition and in the environmental setting. The Cotton-grass Poor Fen is heavily dominated by tawny cotton-grass (*Eriophorum virginicum*) and rushes (*Juncus* spp.) while the Sphagnum – Beak-rush Peatland is dominated by white beak-rush (*Rhynchospora alba*). Degraded or modified Sphagnum – Beak-rush Peatlands may be very similar to Cotton-grass Poor Fen.

Fike Crosswalk

Sphagnum - Beak Rush Peatland

Conservation Value

Sphagnum – Beak-rush Peatland is rare in the state and rare plant species found in this community type may include yellow-eyed-grass (*Xyris montana*), horned bladderwort (*Utricularia cornuta*), mud sedge (*Carex limosa*), and bog-rosemary (*Andromeda polifolia* var. *glaucophylla*). 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 this wetland.

Threats

Alteration to the hydrological regime is a major threat to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as cat-tails (*Typha* spp.) can dominate this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

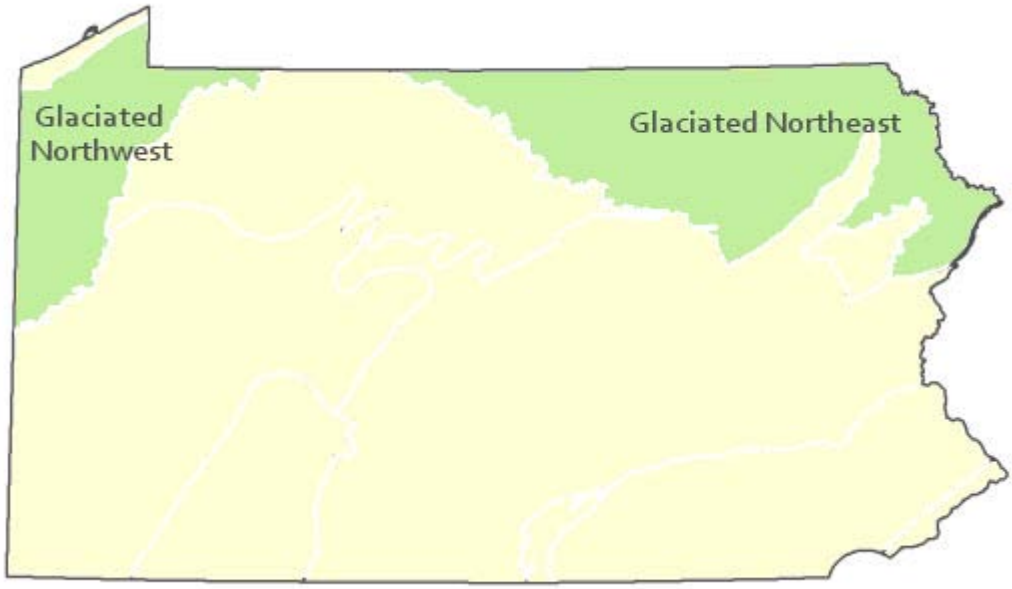
Research Needs

Variations may occur at ecoregional levels. There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

Sphagnum – Beak-rush Peatlands were probably more common but declined due to wetland draining/filling and sedimentation. Wetland protection has most likely stabilized the decline of these communities. Degraded occurrences of this community may exist as the Cottongrass Fen Community.

Range Map



Pennsylvania Range

Glaciated NE and glaciated NW

Global Distribution

Connecticut, Massachusetts, Maine, New Hampshire, New York, Pennsylvania, and Vermont.

Tussock Sedge Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Marsh Wetland

Global Rank: GNR
State Rank: S4

General Description

These are tussock sedge (*Carex stricta*) dominated marshes. The majority of these systems are influenced by past impoundment. The substrate may be peat, muck, or mineral soil. There is generally standing water between the tussocks for much of the year. Associated species include other sedges (e.g., *Carex canescens*, C*. lurida*, *C. stipata*, *C. tribuloides*), rushes (*Juncus* spp), bluejoint (*Calamagrostis canadensis* var*. canadensis*), tall meadow-rue (*Thalictrum pubescens*), rough bentgrass (*Agrostis scabra*), Joe-Pye-weed (*Eutrochium* spp.), wool-grass (*Scirpus cyperinus*), water-parsnip (*Sium suave*), marsh St. John's-wort (*Triadenum virginicum*), scattered common cat-tail (*Typha latifolia*), and small red maples (*Acer rubrum*). The invasive species common reed (*Phragmites australis* ssp. *australis*) and purple loosestrife (*Lythrum salicaria*) are frequently a major problem in these systems.

Rank Justification

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

Identification

- Seasonally flooded basins or on stream or lake margins
- Often influenced by past impoundment
- Substrate may be peat, muck, or mineral soil

- Microtopography is characterized by large tussocks with standing water between the tussocks for much of the year
- Dominated by tussock sedge (*Carex stricta*)

Characteristic Species

Trees

- Red maple (*Acer rubrum*)

Herbs

- Tussock sedge (*Carex stricta*)
- Sedge (*Carex canescens*)
- Sedge (*Carex lurida*)
- Sedge (*Carex stipata*)
- Sedge (*Carex tribuloides*)
- Rushes (*Juncus* spp.)
- Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*)
- Tall meadow-rue (*Thalictrum pubescens*)
- Fly-away grass (*Agrostis scabra*)
- Joe-pye weed (*Eupatorium* spp.)
- Wool-grass (*Scirpus cyperinus*)
- Water-parsnip (*Sium suave*)
- Marsh St. John's-wort (*Triadenum virginicum*)
- Common cat-tail (*Typha latifolia*)

Exotic Species

- Common reed (*Phragmites australis* ssp. *australis*)
- Purple loosestrife (*Lythrum salicaria*)

International Vegetation Classification Associations:

Eastern Tussock Sedge Meadow (CEGL006412)

NatureServe Ecological Systems:

Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582)
High Allegheny Wetland (CES202.069)

Origin of Concept

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

Pennsylvania Community Code

HT : Tussock Sedge Marsh

Similar Ecological Communities

Tussock Sedge Marsh, Sedge – Mixed Forb Fen, and Bluejoint – Reed Canary-grass Marsh communities can occur in similar settings but the Tussock Sedge Marsh is distinguished by the dominance by tussock sedge (*Carex stricta*). Bluejoint – Reed Canary-grass Marsh may contain tussock sedge, but it is dominated by bluejoint (*Calamagrostis canadensis* var. *canadensis*) and co-dominated by reed canary-grass (*Phalaris arundinacea*). Sedge – Mixed Forb Fen is strongly dominated by calciphilic species such as prairie sedge (*Carex prairea*), Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), and mountain-mint (*Pycnanthemum virginianum*).

Fike Crosswalk

Tussock Sedge Marsh

Conservation Value

This community can serve as habitat for the federally endangered bog turtle (*Glyptemys muhlenbergii*) as well as marsh birds, and foraging habitat for small mammals. 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 this wetland.

Threats

Alteration to the hydrological regime and development are the major threats to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Invasive plant species such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis* ssp. *australis*) can occur in this community.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

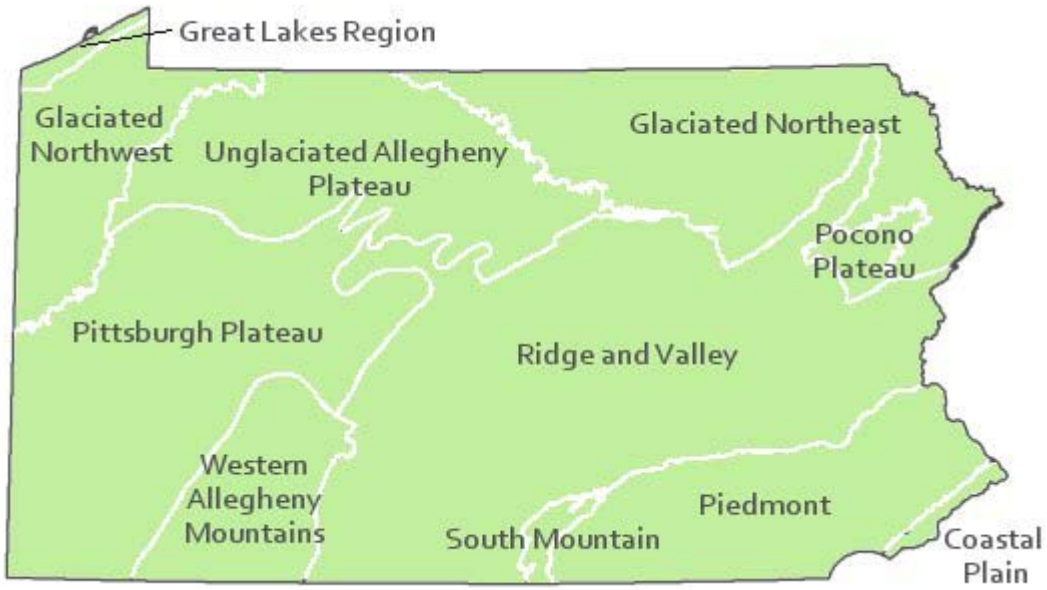
Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and sedimentation. Tussock Sedge Marsh can result from converting wetlands to pastures. Wetland protection has most likely stabilized the decline of these communities. The relative trend for this community is likely stable or may be declining slightly due to hydrological alterations and exotic species invasions by common reed (*Phragmites australis* ssp. *australis*) and purple loosestrife (*Lythrum salicaria*).

Range Map



Pennsylvania Range

Throughout Pennsylvania

Global Distribution

Connecticut, Delaware (potential), Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia.

Twisted Sedge (*Carex Torta*) Stream Margin

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: G3G4
State Rank: S4

General Description

This community is found throughout Pennsylvania on smaller tributaries within the major river basins. It occurs at or near the water's edge on island heads, sandy bars, low river banks and in other areas that experience frequent floods, high stream velocity, and ice scour. The soil is typically sand to sandy loam over cobble and gravel, occasionally overlain with a thin layer of muck. Bare cobbles or the Periodically Exposed Shoreline Community often separate this type from flowing water.

Twisted sedge (*Carex torta*), Joe-Pye-weed, (*Eutrochium fistulosum*), and pale St. John's-wort (*Hypericum ellipticum*) are typically the dominant species, covering 30% to 100% of the area. A wide variety of other graminoid and herbaceous species can be present. The most common species are reed canary-grass (*Phalaris arundinacea*), sensitive fern (*Onoclea sensibilis*), Indian-hemp (*Apocynum*

cannabinum), pink dogbane (*Apocynum androsaemifolium*), field horsetail (*Equisetum arvense*), grass-leaved goldenrod (*Euthamia graminifolia*), late goldenrod (*Solidago gigantea*), bugleweed (*Lycopus uniflorus*), deer-tongue grass (*Dichanthelium clandestinum*), violets (*Viola* spp.), Virginia cutgrass (*Leersia virginica*), false nettle (*Boehmeria cylindrica*), boneset (*Eupatorium perfoliatum*), cardinal-flower (*Lobelia siphilitica*), and marsh St. John's-wort (*Triadenum virginianum*). Scattered short shrubs may be present, including black willow (*Salix nigra*), diamond willow (*Salix eriocephala*), river birch (*Betula nigra*), and meadow-sweet (*Spiraea alba*).

Rank Justification

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

Identification

- Dominated by twisted sedge (*Carex torta*), Joe-Pye-weed, (*Eutrochium fistulosum*), and pale St. John's-wort (*Hypericum ellipticum*)
- Contains a diverse mix of forbs and grasses
- Soils are alluvial and range from deep sand deposits to shallow sand and gravel alluvium over cobble
- Occurs at or just above the flowing water
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- Black willow (*Salix nigra*)
- Diamond willow (*Salix eriocephala*)
- River birch (*Betula nigra*)
- Meadow-sweet (*Spiraea alba*)

Herbs

- Twisted sedge (*Carex torta*)
- Joe-pye-weed (*Eutrochium fistulosum*)
- Pale St. John's-wort (*Hypericum ellipticum*)
- Sensitive fern (*Onoclea sensibilis*)

- Indian hemp (*Apocynum cannabinum*)
- Pink dogbane (*Apocynum androsaemifolium*)
- Smooth goldenrod (*Solidago gigantea*)
- Bugleweed (*Lycopus uniflorus*)
- Deer-tongue grass (*Dichanthelium clandestinum*)
- Violets (*Viola* spp.)
- Cutgrass (*Leersia virginica*)
- False nettle (*Boehmeria cylindrica*)
- Boneset (*Eupatorium perfoliatum*)
- Great blue lobelia (*Lobelia siphilitica*)
- Marsh St. John's-wort (*Triadenum virginicum*)

International Vegetation Classification Associations:

Rocky Bar and Shore (Twisted Sedge Type) (CEGL004103)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmmerman 2008

Pennsylvania Community Code

HX : Golden Saxifrage – Sedge Rich Seep

Similar Ecological Communities

The Periodically Exposed Shoreline Community contains many of the same species as the Twisted Sedge (*Carex Torta*) Stream Margin; however, it is considerably less vegetated as it represents sparsely vegetated banks, gravel spits, and shores that are underwater much of the year. The plant composition of the Periodically Exposed Shoreline Community often contains many more exotic species. Floodplain Meadow differs from the Twisted Sedge (*Carex Torta*) Stream Margin in species composition and position on the floodplain. Floodplain Meadow community is typically less frequently scoured/flooded. Soils also are much deeper and the composition is typically more diverse than the Twisted Sedge (*Carex Torta*) Stream Margin.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

This community, while common, provides habitat for a number of important and rare insect species, namely tiger beetles (genus *Cicindela*), ground beetles (order Carabidae), and others. Twisted Sedge (*Carex Torta*) Stream Margin patches are important breeding, nesting, and foraging areas for several rare dragonflies and damselflies.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

In addition, reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinense*), and purple loosestrife (*Lythrum salicaria*) may invade sites supporting the Twisted Sedge (*Carex Torta*) Stream Margin; however, vulnerable sites tend to be those with deeper sand deposits. Construction of flood-control and navigational dams has resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by the invasive plants. Twisted sedge tends not to persist in riverine impoundments with slow-moving water and is usually replaced by vegetation more suited to those conditions.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality examples of floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding

livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding the construction of roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

Research Needs

Variations may occur at ecoregional levels. There is need to assess and quantify soils, site hydrology, and other factors to further assess differences between Twisted Sedge (*Carex Torta*) Stream Margin occurrences on the Ohio, Delaware, and Susquehanna river basins.

Trends

There is little to suggest that this type is increasing or decreasing in occurrence. Invasive plants able to tolerate flooded conditions may gain a foothold in these sites and contribute to an overall reduction in quality region-wide. Sites supporting this type near urban areas are typically most invaded.

Range Map

Pennsylvania Range

Statewide

Global Distribution

Alabama, Delaware, Georgia, Kentucky, Maryland, North Carolina, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

Water-willow (*Justicia americana*) – Smartweed Riverbed Community

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): River Floodplain

Global Rank: G4G5
State Rank: S4

General Description

This community is found throughout Pennsylvania along creeks and rivers within all major river basins. Water-willow (*Justicia americana*) Emergent Bed communities occur at the heads of islands, along the edges of bars, banks, terraces, and spits, and in shallow sections of the river channel. The lower portion of the water-willow stems are under water for most of the year, with the tops of the plants emerging above the flowing water. These beds are entirely submerged by most flood events. During extreme low water periods, the substrate below the beds may be exposed, showing a varied mixture of sand, gravel, cobbles, silt, and/or muck. Water-willow is the dominant species in this community, and is often the only species present in an extensive colonial bed. Many other herbaceous species may be present, as frequent disturbance of these areas from floodwater and ice-scour creates conditions that promote continual colonization by a wide variety of plants. Lizard's-tail (*Saururus cernuus*), threesquare (*Schoenoplectus pungens*), rice cutgrass (*Leersia oryzoides*), nut-sedges (*Cyperus* spp.), and spike-rushes (*Eleocharis* spp.) may be present in significant numbers. Scattered individuals of field horsetail (*Equisetum arvense*), halberd-leaved rose-mallow (*Hibiscus laevis*), water smartweed (*Persicaria amphibia*), sedges (*Carex* spp.), spotted spurge (*Euphorbia maculata*), and wild mint (*Mentha arvensis*) may also be present. A few scattered tree and shrub seedlings may also be present, including river birch (*Betula nigra*), black willow (*Salix nigra*), silver maple (*Acer saccharinum*), and sycamore (*Platanus occidentalis*). Purple loosestrife (*Lythrum salicaria*), garden loosestrife (*Lysimachia vulgaris*), and creeping yellowcress (*Rorippa sylvestris*) are non-native species that may be found within this type.

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Occurs on most orders of streams, at the heads of islands, along the edges of bars, banks, terraces, and spits, and in shallow sections of the river channel
- Dominated by water-willow (*Justicia americana*) often in large, monotypic colonies
- Sites are often inundated much of the year
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- River birch (*Betula nigra*)
- Black willow (*Salix nigra*)
- Silver maple (*Acer saccharinum*)

Herbs

- Water-willow (*Justicia americana*)
- Lizard's-tail (*Saururus cernuus*)
- Threesquare (*Schoenoplectus pungens*)
- Rice cutgrass (*Leersia oryzoides*)
- Spike-rushes (*Eleocharis* spp.)
- Field horsetail (*Equisetum arvense*)
- Halberd-leaved rose-mallow (*Hibiscus laevis*)
- Water smartweed (*Persicaria amphibia*)
- Sedges (*Carex* spp.)
- Spotted spurge (*Euphorbia maculata*)
- Field mint (*Mentha arvensis*)

- Nutsedges (*Cyperus* spp.)

Exotic Species

- Purple loosestrife (*Lythrum salicaria*)
- Garden loosestrife (*Lysimachia vulgaris*)
- Creeping yellowcress (*Rorippa sylvestris*)

International Vegetation Classification Associations:

Water-willow Rocky Bar and Shore (CEGL004286)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmmerman 2008, Pennsylvania Natural Heritage Program. 2004. Classification, Assessment and Protection of Non-Forested Floodplain Wetlands of the Susquehanna Drainage. Report to: The United States Environmental Protection Agency and the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Ecological Services Section. US EPA Wetlands Protection State Development Grant no. CD-98337501., Zimmerman 2008

Pennsylvania Community Code

HW : Water-Willow (J. Americana) – Smartweed Riverbed Community

Similar Ecological Communities

Periodically Exposed Shoreline Community patches contain a wider variety of plant species, often weedy or non-native plants. Water-willow (*Justicia americana*) emergent bed communities are dominated by water-willow (*Justicia americana*) and are often inundated for longer periods of time than the Periodically Exposed Shoreline Community patches. Lizard's-tail Emergent Bed and Water-willow (*Justicia americana*) emergent bed can occur in similar settings but Water-willow (*Justicia americana*) emergent bed is dominated by water-willow (*Justicia americana*) and lizard's-tail (*Saururus cernuus*) is dominant in Lizard's-tail Emergent Bed communities. Lizard's-tail Emergent Bed are more typically found in slower moving, lower energy systems where the dominant species is rooted in deposits of sand and silt.

Fike Crosswalk

Water-willow (*Justicia americana*) - smartweed riverbed community

Conservation Value

This type represents water-willow (*Justicia americana*) – dominated banks, gravel spits, and shores underwater much of the year. These near monotypic stands are a component of the river floodplain and occur along many creeks and rivers in the state. This habitat, while common, provides habitat for a number of important and rare insect species, namely tiger beetles (genus *Cicindela*), ground beetles (order Carabidae), and others.

Threats

Within floodplain ecosystems, alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Invasive non-native plants such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*) commonly dominate this community, especially near human development. Construction of flood-control and navigational dams have resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by the invasive plants.

Management

Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetlands). Care should also be taken to control and prevent the spread of invasive species into high quality examples of these wetlands.

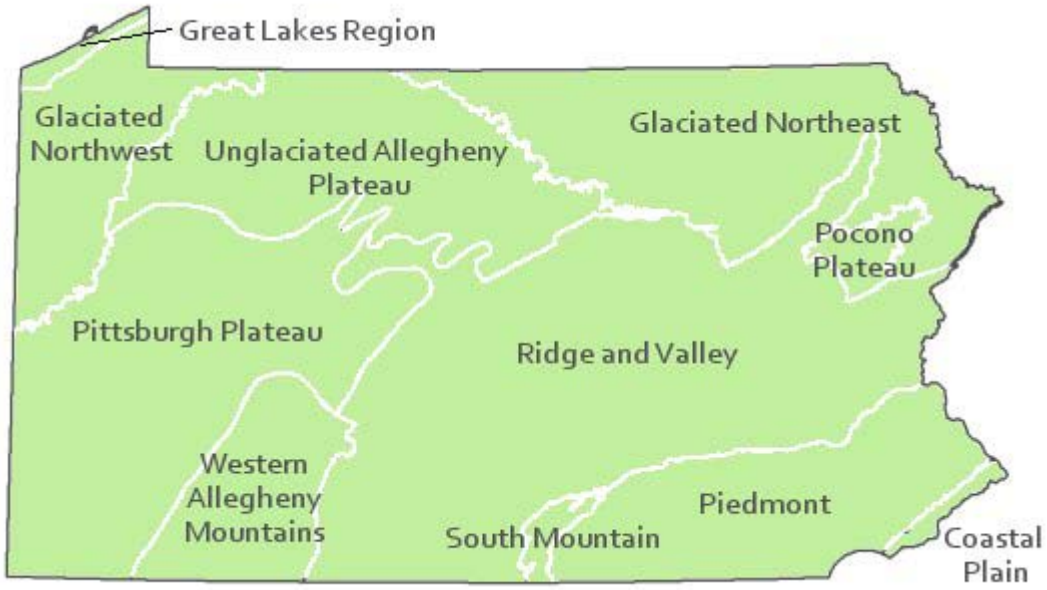
Research Needs

Large expanses of open gravel supporting this type should be inventoried for rare plants and animals, especially insects.

Trends

There is little to suggest that this type is increasing or decreasing in occurrence. Invasive plants able to tolerate flooded conditions may gain a foothold in these sites and contribute to an overall reduction in quality region-wide. Sites near urban areas are most invaded.

Range Map



Pennsylvania Range

Statewide.

Global Distribution

Alabama, Arkansas, Georgia, Kentucky, Maryland, North Carolina, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Also occurs in Quebec, Canada.

Wool-grass – Mannagrass Mixed Shrub Marsh

System: Palustrine
Subsystem: Herbaceous
PA Ecological Group(s): Vernal Pool

Global Rank: GNR
State Rank: S4

General Description

The Wool-grass – mannagrass mixed shrub marsh pool occurs in seasonally to somewhat permanently inundated depressions throughout Pennsylvania. The type can be described as a seasonally flooded, herbaceous swamp with well defined boundaries; some pools of this type exhibit somewhat poorly defined boundaries. The surrounding plant community varies with region, soils, and geology. The pools

are generally deeper than those of the Rice cutgrass – bulrush marsh pool and may not dry completely over the summer months.

This community is characterized as an open, seasonally to permanently flooded depression, dominated by herbaceous and shrubby species; wool-grass (*Scirpus cyperinus*) is usually dominant. Common co-dominant and associate species include floating mannagrass (*Glyceria septentrionalis*), rattlesnake mannagrass (*Glyceria canadensis*), rice cutgrass (*Leersia oryzoides*), pale meadowgrass (*Torreyochloa pallida*), sedges (e.g. *Carex crinita, C. lurida*, *C. lupulina*, *C. vesicaria*, *C. folliculata*), three-way sedge (*Dulichium arundinaceum*), mild water-pepper (*Persicaria hydropiperoides*), marsh-purslane (*Ludwigia palustris*), marsh St. Johns-wort (*Triadenum fraseri*). The federally endangered species, northeastern bulrush (*Scirpus ancistrochaetus*), is also found in this type. Shrubs include hardhack (*Spiraea tomentosa*), meadow-sweet (*S. alba*), northern arrow-wood (*Viburnum recognitum*), highbush blueberry (*Vaccinium corymbosum*), and buttonbush (*Cephalanthus occidentalis*). Canopy trees, which are limited to the pool margins, most often include white oak (*Quercus alba*), sourgum (*Nyssa sylvatica*), and red maple (*Acer rubrum*).

Rank Justification

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

Identification

- Open, seasonally flooded depression, dominated by herbaceous plants, usually graminoids.
- Moderately deep water for vernal pools, 1-3 feet in the spring and composed of herbaceous and shrubby plant species
- “Marsh-like” – pool boundaries are sometimes poorly defined and may not dry completely over the summer months
- Wetlands may be influenced by groundwater

Characteristic Species

Trees

- White oak (*Quercus alba*)
- Blackgum (*Nyssa sylvatica*)
- Red maple (*Acer rubrum*)

Shrubs

- Steeple-bush (*Spiraea tomentosa*)
- Meadow-sweet (*Spiraea alba*)

- Northern arrow-wood (*Viburnum recognitum*)
- Highbush blueberry (*Vaccinium corymbosum*)
- Buttonbush (*Cephalanthus occidentalis*)
- Winterberry (*Ilex verticillata*)

Herbs

- Wool-grass (*Scirpus cyperinus*)
- Floating mannagrass (*Glyceria septentrionalis*)
- Rattlesnake mannagrass (*Glyceria canadensis*)
- Rice cutgrass (*Leersia oryzoides*)
- Pale meadowgrass (*Torreyochloa pallida*)
- Sedge (*Carex crinita*)
- Sedge (*Carex lurida*)
- Sedge (*Carex lupulina*)
- Sedge (*Carex vesicaria*)
- Sedge (*Carex folliculata*)
- Three-way sedge (*Dulichium arundinaceum*)
- Mild water-pepper (*Persicaria hydropiperoides*)
- Marsh-purslane (*Ludwigia palustris*)
- Marsh st. johns-wort (*Triadenum fraseri*)
- Northeastern bulrush (*Scirpus ancistrochaetus*)

International Vegetation Classification Associations:

Scirpus cyperinus Seasonally Flooded Herbaceous Vegetation (CEGL006349)
Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)

NatureServe Ecological Systems:

None

Origin of Concept

Leppo, B., Zimmerman, E., Ray, S., Podniesinski, G., and Furedi, M. 2009. Pennsylvania Statewide Seasonal Pool Ecosystem Classification: Description, mapping, and classification of seasonal pools, their associated plant and animal communities, and the surrounding landscape. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA.

Pennsylvania Community Code

Similar Ecological Communities

Rice cutgrass – bulrush marsh pools are generally shallow, composed of several herbaceous species, and usually dry completely over the summer months, allowing herbaceous species to establish throughout the pool and is restricted to saddles between ridges and high plateaus within the Central Appalachian Forest Ecoregion in Pennsylvania.

Fike Crosswalk

Related to Herbaceous Vernal Pool. This type is new to the Pennsylvania Plant Community Classification developed fromstudies of vernal pool ecosystems of Pennsylvania.

Conservation Value

Vernal pools are primarily found in forested areas and are characterized by absence of fish, lack of flowing water, small size, shallow depth, and presence of plants and animals that can withstand a period of drought (Brown and Jung 2005). Their seasonal nature is important because it excludes fish that would otherwise prey upon the eggs and larvae of amphibians breeding in them.

In the mid-Atlantic states, 26 percent of all state-listed threatened and endangered amphibians are dependent on vernal pools.

Vernal pools provide critical breeding habitat for several species of amphibians and a type of crustacean that use vernal pools almost exclusively during some stage of their life cycle. The amphibian species are:

- Marbled Salamander (*Ambystoma opacum*)
- Spotted Salamander (*Ambystoma maculatum*)
- Jefferson Salamander (*Ambystoma jeffersonianum*)
- Wood Frog (*Rana sylvatica*)
- Eastern Spadefoot (*Scaphiopus holbrookii holbrookii*)
- Springtime Fairy Shrimp (*Eubranchipus vernalis*).

A plant species found only in vernal pools in Pennsylvania is the northeastern bulrush (*Scirpus ancistrochaetus*).

Threats

Threats include habitat fragmentation, alteration of hydrology and water chemistry, alteration of substrate, loss of vegetation, and global climate change.

Filling vernal pools, and disturbances to the vegetation and soil around pools from building and road construction, quarries, and logging operations lead to direct mortality of animals and habitat destruction or degradation. Vernal pools are often not identified as wetlands due to their temporary nature.

Clearing and development of adjacent land can lead to accumulation of agricultural run-off and pollution, sedimentation, and pollution in the pools. Removal or change in composition of vegetation in and around a pool affects which species can use the pool. For species that lay their eggs in plant material, loss of vegetation eliminates egg-laying sites. For species that lay their eggs in the water, removal of vegetation reduces shade.

Roads near vernal pools present a physical obstacle to animals moving from their upland feeding habitats to their vernal pool breeding habitats. Many animals are killed as they attempt these crossings. The presence of roads also provides opportunities for undesirable elements to get into the pools. Roads bring invasive plant species, sediments, and contaminants to pools through runoff. During the winter the application of road salt poses a problem for pools located near roads. As the snow melts, salt-laden water flows into these pools and increases the salinity of the water, making the water less hospitable to wildlife.

All aspects of life in a vernal pool, from amphibian migration to egg and larval development to adult feeding, thermoregulation, and reproductive success, depend on certain environmental cues and conditions. Climate change is of increasing concern for species of special concern, especially in regard to species that are geographically restricted.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Protecting vernal pools and the surrounding 1000 feet of upland habitat is critical for protection of water quality, amphibian breeding, and terrestrial habitat for adult and juvenile amphibians. Soil erodibility in terms of the 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. Impervious surfaces surrounding the wetland should be minimized to prevent thermal pollution. Direct impacts and habitat alteration should be avoided (i.e. roads, trails, filling of wetland) and low impact alternatives (i.e. elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

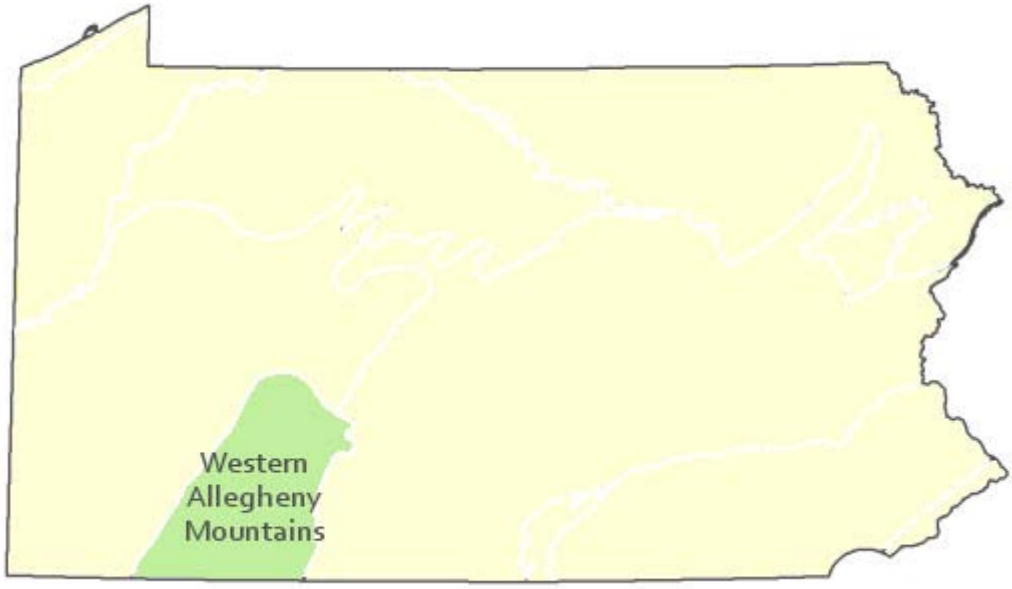
Research Needs

There is a need to collect community plot data to characterize variations of this community to assist further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased evaporation of the standing water and sedimentation.

Range Map



Pennsylvania Range

Central Appalachian Forest Ecoregion in Pennsylvania

Global Distribution

Non-Persistent Emergent Wetlands

Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetland

System: Palustrine
Subsystem: Non-persistent
PA Ecological Group(s): Emergent Wetland and Marsh Wetland

Global Rank: GNR
State Rank: S4

General Description

This community type is dominated by broad-leafed, emergent vegetation; it occurs in upland depressions, borders of lakes, large slow-moving rivers, and shallow ponds. The aspect of these systems changes seasonally from nearly unvegetated substrate in winter and early spring, when plants are dormant, to dense vegetation during the height of the growing season. The most characteristic species are pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), and wapato (*Sagittaria latifolia*). Other species commonly present include showy bur-marigold (*Bidens laevis*), mannagrass (*Glyceria* spp.), goldenclub (*Orontium aquaticum*), bur-reed (*Sparganium* spp), arrowhead (*Sagittaria rigida*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), spike-rush (*Eleocharis palustris*), false water-pepper (*Persicaria hydropiperoides*), water-pepper (*Persicaria punctata*), water smartweed (*Persicaria amphibia*), jewelweed (*Impatiens* spp.), common bladderwort (*Utricularia macrorhiza*), duckweed (*Lemna minor*), water-meal (*Wolffia* spp.), and broad-leaved water-plantain (*Alisma subcordatum*). This community is often interweaved with aquatic beds on the deep side, and shallower marsh or swamp communities on the shore side, and thus species characteristic of those communities are often present. This type is restricted to shallow (less than 2 meters at low water) depressions, or the edges of lakes, ponds, and rivers.

Rank Justification

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

Identification

- Emergent marsh dominated by broad-leaved, aerenchymatous plants filling small depressions, as well as along pondshores, lakeshores, impoundments, and quiet riverbanks
- Occurs in perennial standing water up to about a meter deep
- Usually develops muck soils over a sand or gravel substrate
- Typical species include pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), and wapato (*Sagittaria latifolia*)

Characteristic Species

Herbs

- Pickerel-weed (*Pontederia cordata*)
- Arrow-arum (*Peltandra virginica*)
- Wapato (*Sagittaria latifolia*)
- Showy bur-marigold (*Bidens laevis*)
- Mannagrass (*Glyceria* spp.)
- Goldenclub (*Orontium aquaticum*)
- Arrowhead (*Sagittaria rigida*)
- Soft-stemmed bulrush (*Schoenoplectus tabernaemontani*)
- Creeping spike-rush (*Eleocharis palustris*)
- Mild water-pepper (*Persicaria hydropiperoides*)
- Dotted smartweed (*Persicaria punctata*)
- Jewelweed (*Impatiens* spp.)
- Broad-leaved water-plantain (*Alisma subcordatum*)
- Common bladderwort (*Utricularia macrorhiza*)
- Duckweed (*Lemna minor*)

- Water smartweed (*Persicaria amphibia*)
- Lizard's-tail (*Saururus cernuus*)
- Water-hemlock (*Cicuta bulbifera*)

Exotic Species

- Purple loosestrife (*Lythrum salicaria*)

International Vegetation Classification Associations:

Northeastern Leafy Forb Marsh (CEGL006191)

NatureServe Ecological Systems:

Laurentian-Acadian Freshwater Marsh (CES201.594)

Origin of Concept

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

Pennsylvania Community Code

HA : Pickerel-Weed – Arrow-Arum – Arrowhead Wetland

Similar Ecological Communities

Some examples of the Wool-grass – Mannagrass – Mixed Shrub Vernal Pool community type may resemble this floristically. The two differ in their hydrologic regime; the vernal pool type occurs in small upland depressions that are seasonally flooded, but experience substantial or complete annual draw-down. Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetland is usually permanently to semi-permanently flooded. Spatterdock – Water-lily Emergent Wetland may occur intermingled with or surrounded by the Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetland. These two types may intergrade but the Spatterdock – Water-lily Emergent Wetland represents a wetland comprised of floating aquatic vegetation dominated by spatterdock (*Nuphar advena/ N. variegata*) and fragrant water-lily (*Nymphaea odorata*)), where as the Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetland is often classified as a broad-leaved emergent wetland.

Fike Crosswalk

Pickerel-weed - arrow-arum - arrowhead wetland

Conservation Value

Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetland can serve as habitat for rare marsh birds and odonates as well as provide cover for small fish, reptiles, and amphibians. Rare plant species such as

hard-stem bulrush (*Schoenoplectus acutus*), river bulrush (*Schoenoplectus fluviatilis*), and water bulrush (*Schoenoplectus subterminalis*) may be present within this community. 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 this wetland.

Threats

Alteration to the hydrological regime is a major threat to this community (e.g., impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics. Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Purple loosestrife (*Lythrum salicaria*) can be an exotic plant species that invades this community and displaces native species.

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

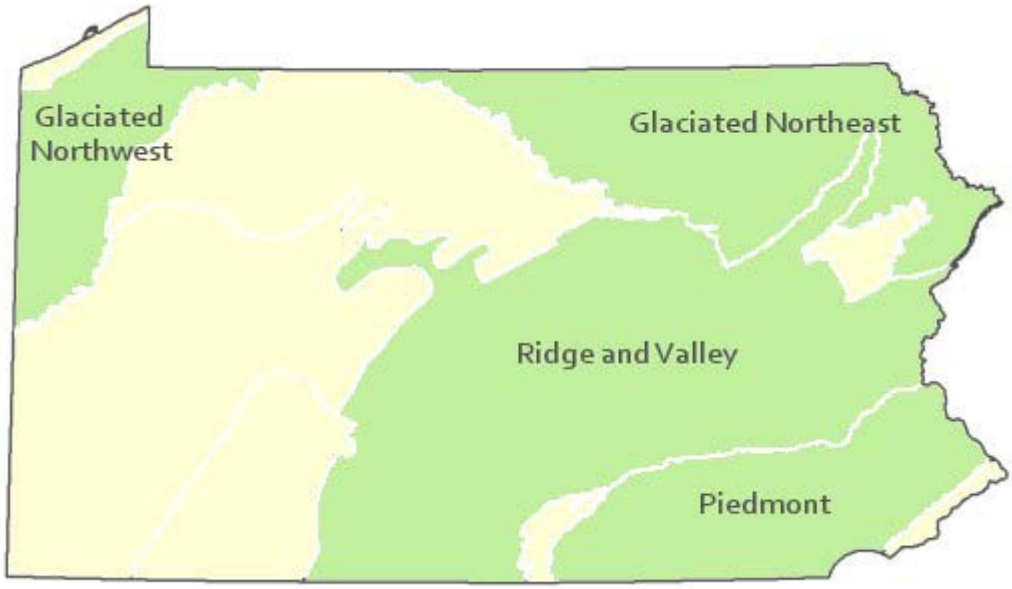
Research Needs

There is a need to collect plot data to characterize variations and guide further classification of this community.

Trends

While it is true that naturally occurring wetlands have most likely declined due to wetland draining/filling activities and clearing of the adjacent lands, the construction of dams and artificial reservoirs, lakes and ponds has probably resulted a greater number of emergent Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetlands than were present historically. The relative trend for this community is likely stable.

Range Map



Pennsylvania Range

Glaciated NE, Glaciated NW, Ridge and Valley, Piedmont.

Global Distribution

Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

Spatterdock – Water-lily Emergent Wetland

System: Palustrine
Subsystem: Non-persistent
PA Ecological Group(s): Emergent Wetland and Marsh Wetland

Global Rank: G4G5
State Rank: S4

General Description

A combination of emergent and floating-leaved, rooted hydromorphic vegetation dominates this community type. This type occurs in lakes, ponds, and slow-moving streams. The substrate is usually mineral soil overlain by loose sediments that vary from mineral to organic. Water levels may fluctuate seasonally, but the substrate is seldom dry. The most typical species are spatterdock (*Nuphar advena/ N. variegata*) and fragrant water-lily (*Nymphaea odorata*). Other species include water smartweed (*Persicaria amphibia*), bur-reed (*Sparganium* spp), wapato (*Sagittaria latifolia*), broad-leaved water-plantain (*Alisma subcordatum*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), and arrow-arum (*Peltandra virginica*). There is usually an admixture of submerged and free-floating aquatic species such as pondweeds (*Potamogeton* spp.), water-milfoils (*Myriophyllum* spp.), coontail (*Ceratophyllum demersum*), and duckweeds (*Lemna* spp.).

Rank Justification

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

Identification

- Rooted aquatic or open marsh community occupies shallow-water depressions, oxbow ponds, backwater sloughs of river floodplains, slow-moving streams, ponds, and borders of lakes
- Dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics
- Spatterdock (*Nuphar advena and N. variegata* (split)) and fragrant water-lily (*Nymphaea odorata*) are dominants, either in combination together, or singly

Characteristic Species

Herbs

- Spatterdock (*Nuphar advena*)
- Spatterdock (*Nuphar variegata*)
- Water smartweed (*Persicaria amphibia*)
- Wapato (*Sagittaria latifolia*)

- Broad-leaved water-plantain (*Alisma subcordatum*)
- Soft-stemmed bulrush (*Schoenoplectus tabernaemontani*)
- Arrow-arum (*Peltandra virginica*)
- Bur-reed (*Sparganium spp*)

International Vegetation Classification Associations:

Water-lily Aquatic Wetland (CEGL002386)

NatureServe Ecological Systems:

Great Lakes Coastal Wetlands Complex (CECX005702)
Laurentian-Acadian Freshwater Marsh (CES201.594)
Northern Great Lakes Coastal Marsh (CES201.722)
Central Interior Highlands and Appalachian Sinkhole and Depression Pond (CES202.018)

Origin of Concept

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

Pennsylvania Community Code

HY : Spatterdock – Water Lily Wetland

Similar Ecological Communities

Spatterdock – Water-lily Emergent Wetland may occur intermingled with or surrounded by the Pickerel-weed – Arrow-arum – Arrowhead Emergent Wetland. These two types may intergrade but the Spatterdock – Water-lily Emergent Wetland represents the rooted aquatic vegetation dominated by spatterdock (*Nuphar advena/ N. variegata*) and fragrant water-lily (*Nymphaea odorata*).

Fike Crosswalk

Spatterdock - water lily wetland

Conservation Value

Spatterdock – Water-lily Wetland may serve as important habitat cover for amphibian, reptile, fish, and shore and marsh bird species.

Threats

Alteration to the hydrological regime is a major threat to this community (e.g., draining, impoundments, beaver dams) and can lead to habitat destruction and/or shifts in community function and dynamics.

Clearing and development of adjacent land can lead to an accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution.

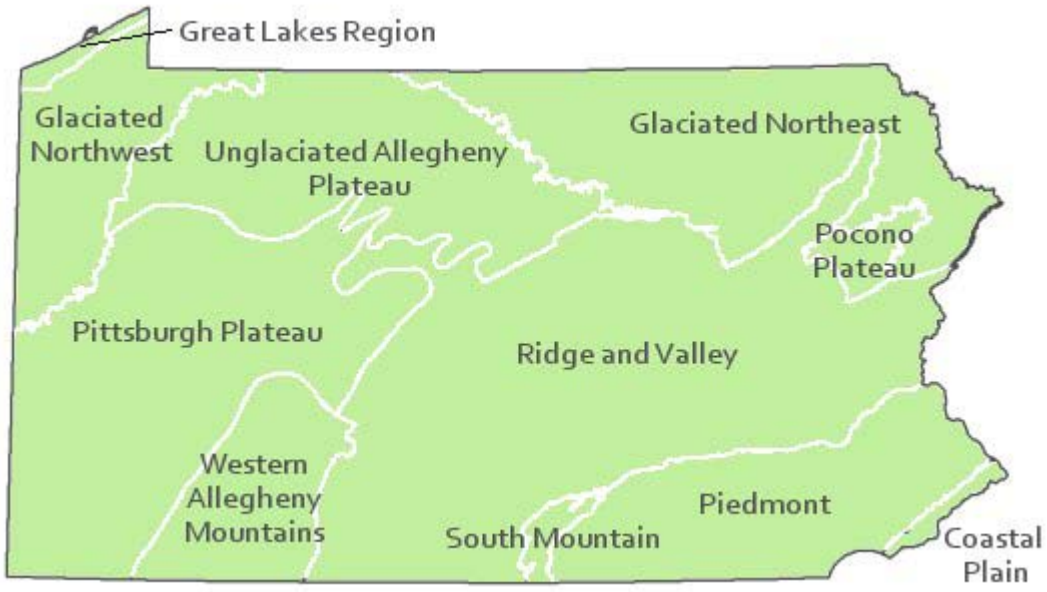
Management

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. 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 and habitat alteration 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 can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

Trends

These wetlands were probably more common but declined due to wetland draining/filling. Wetland protection has most likely stabilized the decline of these communities.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Iowa, Illinois, Indiana, Kentucky, Louisiana, Maryland, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, North Carolina, New Jersey, New York, Oklahoma, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Wisconsin, West Virginia, and Ontario, Canada.

Sparsely Vegetated Wetland Communities

Floodplain Scour Community

System: Palustrine
Subsystem: Sparse Vegetation
PA Ecological Group(s): River Floodplain and Sparse Vegetation

Global Rank: G1, G2
State Rank: S1S2

General Description

This community type occurs along the banks of major rivers where rock outcrops are subject to winter ice scour and high-velocity flooding. The term scour suggests removal of soil and plants, but most of this material is deposited locally rather than being washed downstream away from the scoured portion of the river. The result is an alteration of scour and deposition spatially, and sometimes temporally, within a small area along the banks of the river. Plants grow in soil that accumulates in cracks in the rock. The community shares ecological characteristics with river banks, floodplains, wetlands and prairies. This combination of conditions leads to a unique grouping of species generally associated with one or more of those ecosystems. Trees, including sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), and river birch (*Betula nigra*), are often contorted and battered and are limited in growth by the high velocity of the floodwaters and ice. Common shrub species include willows (*Salix* spp.), wild hydrangea (*Hydrangea arborescens*), smooth azalea (*Rhododendron arborescens*), swamp azalea (*R. viscosum*), rosebay (*R. maximum*), buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), and ninebark (*Physocarpus opulifolius*). Herbaceous plants include Indian-grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), cordgrass (*Spartina pectinata*), indian hemp (*Apocynum cannabinum*), great St. John's-wort (*Hypericum pyramidatum*), pale St. John's-wort (*H. ellipticum*), dwarf St. John's-wort (*H. mutilum*), false-indigo (*Amorpha fruticosa*), royal fern (*Osmunda regalis)*, Joe-Pye weed

(*Eutrochium* spp.), reed canary-grass (*Phalaris arundinacea*), groundsel (*Packera* spp.), and golden Alexanders (*Zizia aurea*). Vines include poison ivy (*Toxicodendron radicans*) and grapes (*Vitis* spp.).

Several rare species are found in this community including Barbara's-buttons (*Marshallia grandiflora*), sand grape (*Vitis rupestris*), Carolina tassel-rue (*Trautvetteria caroliniensis*), stiff-leaved aster (*Ionactis linariifolius*), umbrella-tree (*Magnolia tripetala*), cowbane (*Oxypolis rigidior*), aster-like boltonia (*Boltonia asteroides*), bushy St. John's-wort (*Hypericum densiflorum*), sand cherry (*Prunus pumila* var. *depressa*), arrow-feather (*Aristida purpurascens*), halberd-leaved rose-mallow (*Hibiscus laevis*), Chamisso's miners-lettuce (*Montia chamissoi*), and Virginia mallow (*Sida hermaphrodita*).

Rank Justification

Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from jurisdiction.

Identification

- Sparse to dense vegetation growing amidst large expances of exposed bedrock, boulders, or cobble substrate
- Plants grow in soil that accumulates in cracks in the rock
- Various warm season grasses, ferns, and herbaceous species with scattered, often battered shrubs and trees
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- River birch (*Betula nigra*)
- Willows (*Salix* spp.)
- Wild hydrangea (*Hydrangea arborescens*)
- Smooth azalea (*Rhododendron arborescens*)
- Rosebay (*Rhododendron maximum*)
- Swamp azalea (*Rhododendron viscosum*)
- Ninebark (*Physocarpus opulifolius*)

- Buttonbush (*Cephalanthus occidentalis*)
- Swamp rose (*Rosa palustris*)

Herbs

- Indian-grass (*Sorghastrum nutans*)
- Big bluestem (*Andropogon gerardii*)
- Freshwater cordgrass (*Spartina pectinata*)
- Indian hemp (*Apocynum cannabinum*)
- Great St. John's-wort (*Hypericum pyramidatum*)
- Pale St. John's-wort (*Hypericum ellipticum*)
- Dwarf St. John's-wort (*Hypericum mutilum*)
- False-indigo (*Amorpha fruticosa*)
- Royal fern (*Osmunda regalis*)
- Sensitive fern (*Onoclea sensibilis*)
- Joe-pye-weed (*Eutrochium* spp.)
- Reed canary-grass (*Phalaris arundinacea*)
- Groundsel (*Packera* spp.)
- Golden-alexander (*Zizia aurea*)
- Barbara's-buttons (*Marshallia grandiflora*)
- Aster-like boltonia (*Boltonia asteroides*)
- Carolina tassel-rue (*Trautvetteria caroliniensis*)
- Bushy St. John's-wort (*Hypericum densiflorum*)
- Sand cherry (*Prunus pumila* var. *depressa*)
- Arrow-feather (*Aristida purpurascens*)
- Halberd-leaved rose-mallow (*Hibiscus laevis*)
- Chamisso's miner's-lettuce (*Montia chamissoi*)

- Virginia mallow (*Sida hermaphrodita*)

Vines

- Virginia-creeper (*Parthenocissus quinquefolia*)
- Poison-ivy (*Toxicodendron radicans*)
- Fox grape (*Vitis labrusca*)
- Riverbank grape (*Vitis riparia*)
- Sand grape (*Vitis rupestris*)

International Vegetation Classification Associations:

Northern Riverside Rock Outcrop (CEGL006284)
Barbara's-buttons Riverscour Prairie (CEGL006598)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmmerman 2008, PNHP 2010. Natural Resources Inventory and Management Recommendations for Ohiopyle State Park.Report to Bureau of State Parks Pennsylvania Department of Conservation and Natural Resources. Pittsburgh, PA

Pennsylvania Community Code

HD : Riverside Ice Scour Community

Similar Ecological Communities

Big Bluestem – Indian-grass Floodplain Grassland and Willow – Indian-grass Floodplain Shrub Wetland share many species and a prairie-like appearance with the Floodplain Scour Community. Both may be dominated by tall, warm season grasses and species common to tall grass prairies of the upper Midwest. However the Floodplain Scour Community is distinguished from the grassland type by the site hydrology and substrate. Floodplain Scour Community patches are typically smaller than the Big Bluestem – Indian-grass Floodplain Grassland and Willow – Indian-grass Floodplain Shrub Wetland and are primarily found in association with outcrops of bedrock or large boulders and are subject to winter ice scour and catastrophic, annual flooding. The Floodplain Scour Community patches are generally less-vegetated than the Big Bluestem – Indian-grass Floodplain Grassland, as plants grow in the soil that accumulates between large boulders and cracks in the bedrock. The Periodically Exposed Shoreline Community community patches are more widespread and contain a wider variety of plant species, often non-native plants, and generally lack the warm season grasses, royal fern, and shrub species. The substrate

underlying the Periodically Exposed Shoreline Community community is variable, most often alluvial deposits, including sand, silt, and gravel and rarely is composed of consolidated boulders or bedrock, which characterizes the substrate of most Floodplain Scour Community patches.

Fike Crosswalk

Riverside Ice Scour Communitiy

Conservation Value

The scour community is an important part of the river floodplain ecosystem and is rare in the state, occurring only along free flowing portions of larger rivers. Several rare species are found in this community in different parts of the state including Barbara's-buttons (*Marshallia grandiflora*), sand grape (*Vitis rupestris*), Carolina tassel-rue (*Trautvetteria caroliniensis*), stiff-leaved aster (*Ionactis linariifolius*), umbrella-tree (*Magnolia tripetala*), cowbane (*Oxypolis rigidior*), aster-like boltonia (*Boltonia asteroides*), bushy St. John's-wort (*Hypericum densiflorum*), sand cherry (*Prunus pumila* var. *depressa*), arrow-feather (*Aristida purpurascens*), halberd-leaved rose-mallow (*Hibiscus laevis*), Chamisso's miners-lettuce (*Montia chamissoi*), and Virginia mallow (*Sida hermaphrodita*).

This type shares ecological characteristics with river banks, floodplains, wetlands, and prairies. The combination of conditions leads to a unique grouping of species generally associated with one or more of those ecosystems. Several rare dragonflies and damselflies use the open habitat for basking and hunting. Northern water snakes (*Nerodia sipedon*) and copperhead snakes (*Agkistrodon contortrix*) use this community for basking areas. Birds that use the Floodplain Scour Community are common yellowthroats (*Geothlypis trichas*), song sparrows (*Melospiza melodia*), rufous-sided towhees (*Pipilo erythrophthalmus*), and spotted sandpipers (*Actitis macularia*).

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

In addition, reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), giant knotweed (*F. sachalinensis*), and purple loosestrife (*Lythrum salicaria*) may invade sites supporting the Floodplain Scour Community; vulnerable sites tend to be those with deeper sand deposits. Construction of flood-control and navigational dams has resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow resulting in deposition of finer sediments favored by the invasive plants.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) have greatly altered plant community composition, structure, and function of floodplain communities region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. Protection of the river scour plants, often growing in cracks, depressions, and behind rocks, where sand and sediment accumulates is important for sustaining the species that make up this community. Concentrating recreational activity to designated areas (i.e., well marked trails and fishing areas) can greatly reduce impact to sensitive plant species. Maintenance of natural buffers surrounding high quality examples of River Scour is recommended in order to minimize nutrient runoff, pollution, and sedimentation. Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As River Scour communities are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees, or other in-stream modifications should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. Providing the river system some scope to maintain itself may be more cost-effective in the long run than attempts at controlling natural functions through human intervention.

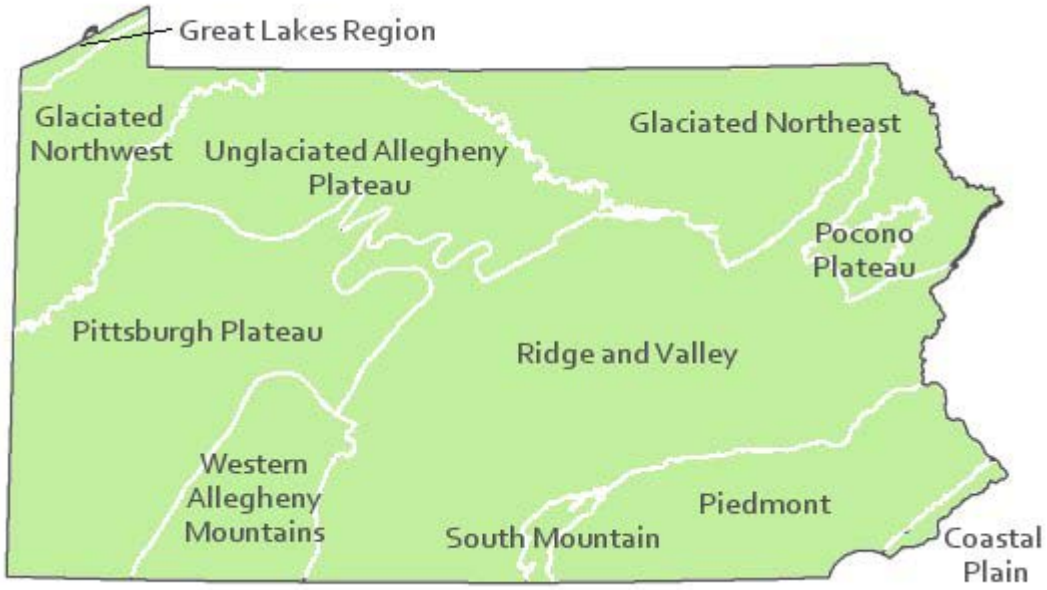
Research Needs

Variations may occur at ecoregional levels. There is a need to assess and quantify soils, site hydrology, disturbance frequency, and other factors to further assess differences between scour habitats on the Ohio, Delaware, and Susquehanna river basins. There is need to monitor high quality examples of this community type.

Trends

Floodplain Scour Community patches are most likely declining due to destruction of plant populations or alteration of ecosystem processes needed to maintain populations. Construction of dam impoundments and conversion of these once expansive areas for human uses greatly impacted the plant composition of this type as alteration of the natural flooding regime (duration and frequency) is the most critical piece maintaining the quality and persistence of this type. High quality examples are most likely declining with exotic species invasion, human impacts (trampling), and alteration to natural disturbance regimes.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont

Great Lakes Sparsely Vegetated Shore

System: Palustrine
Subsystem: Sparse Vegetation
PA Ecological Group(s): Sparse Vegetation and Great Lakes

Global Rank: GNR
State Rank: S1

General Description

This community occupies the cobble, sand, and gravel shores from the normal water line to the upper limit of winter storms. The substrate is very unstable and subject to wave action and ice scour. The vegetation is sparse (usually less than 25% total cover). The most characteristic species are American beachgrass (*Ammophila breviligulata*), sea-rocket (*Cakile edentula*), Canada wild-rye (*Elymus canadensis*), silverweed (*Potentilla anserina*), and cocklebur (*Xanthium strumarium*).

Rank Justification

Critically imperiled in the nation or state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

Identification

- In Pennsylvania, found only in the along the Erie coastline
- Sparsely vegetated herbaceous community with plants growing in the sand-filled crevasses between boulders

Characteristic Species

Shrubs

- Eastern cottonwood (*Populus deltoides*)
- Willows (*Salix* spp.)

Herbs

- American beachgrass (*Ammophila breviligulata*)
- American sea-rocket (*Cakile edentula*)
- Beach pea (*Lathyrus japonicus*)
- Silverweed (*Potentilla anserina*)
- Common cocklebur (*Xanthium strumarium*)

Vines

- Grape (*Vitis* spp.)

International Vegetation Classification Associations:

Great Lakes Shore Sparse Vegetation (CEGL005162)
Inland Freshwater Strand Beach Sparse Vegetation (CEGL002310)

NatureServe Ecological Systems:

Great Lakes Alkaline Rocky Shore and Cliff (CES201.995)

Origin of Concept

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

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

This sparsely vegetated community is distinguished from the Great Lakes Palustrine Sandplain by substrate, vegetation, and geographical location. The Lake Erie Sparsely Vegetated Shore is primarily cobble substrate, nearly devoid of vegetation, and is found along the entirety of the Lake Erie Shore. The Great Lakes Palustrine Sandplain is found primarily on the Presque Isle Peninsula, is sandy, and is more densely vegetated as these sites are more protected from wave and ice scour than the Great Lakes Sparsely Vegetated Shore.

The Periodically Exposed Shoreline Community, which differs from this type in geographic location, is found along river, creek, and lake margins in Pennsylvania; the Great Lakes Sparsely Vegetated Shore is limited to the Lake Erie Coast.

Fike Crosswalk

Great Lakes Region sparsely vegetated beach

Conservation Value

There is limited Lake Erie shoreline in Pennsylvania. The Lake Erie shoreline is a combination of cobble, bedrock, sand and gravel. The Presque Isle Peninsula, a sand-spit that extends into Lake Erie, is one of the only areas where sand is the dominant substrate. Sand beaches are also present at the mouths of the larger creeks flowing into Lake Erie. The Great Lakes Sparsely Vegetated Shore supports a wide variety of plant species, some unique to shoreline areas of the Great Lakes, including American

beachgrass (*Ammophila breviligulata*), sea-rocket (*Cakile edentula*), beach pea (*Lathyrus japonicus*), and silverweed (*Potentilla anserina*).

The lake shore also hosts a unique suite of invertebrates such as tiger beetles, spiders, and sand wasps. It is an important refuge for migrating waterbirds and shorebirds and nesting habitat for others. This type provides important nesting habitat for shorebirds, such as the Piping Plover.

Threats

The greatest threat to the cobble shorelines of the Great Lakes Sparsely Vegetated Shore is from lake shore development and continued impeding of sand migration along the shore. Recreational use is also a major threat to the plants and animals of the Lake Erie Shore. Presque Isle State Park is a popular destination for tourists and receives millions of visitors each year. Beach grooming and foot traffic reduce the amount of habitat available to plants on the small beaches at the mouths of creeks. Non-native plants, such as crown-vetch (*Coronilla varia*) and Japanese knotweed (*Fallopia japonica*) may invade some areas.

Management

Shoreline stabilization efforts have altered natural erosion and deposition processes that develop the lake shoreline. The shoreline development is part of the long-term physical process that creates the sandplain habitat behind the leading dune. The jetty at Conneaut, Ohio is a large obstruction to the natural flow of sediments. Recreation is a major focus of management at Presque Isle State Park and other sites along the Erie Coast. Control of non-native plant species are also important for managers at Presque Isle State Park.

Research Needs

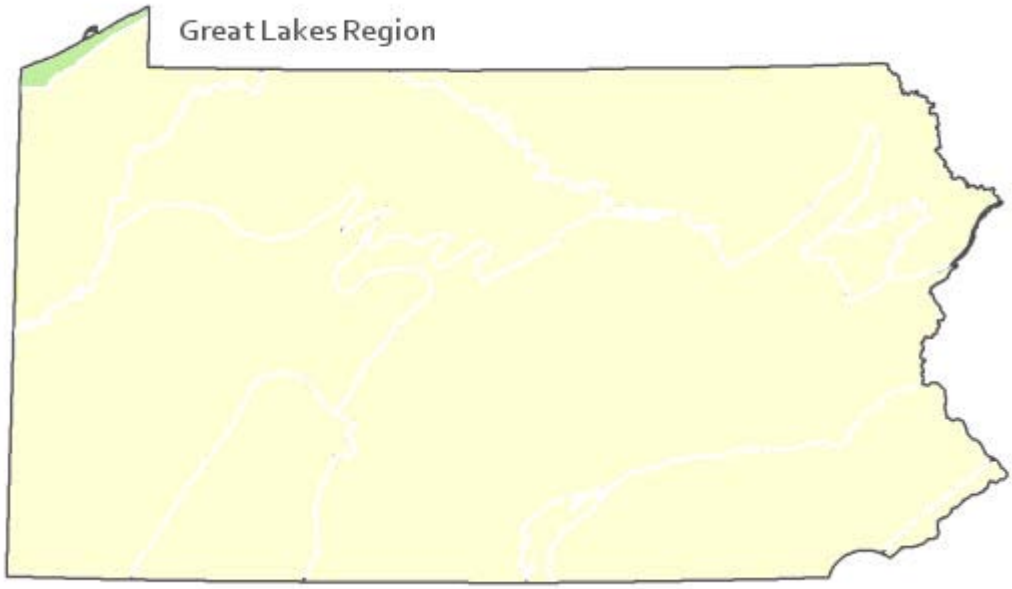
Insects, including beetles and lepidopterans, may form a substantial part of the biodiversity of these communities. Open gravel and cobble areas along the coast should be inventoried for rare plants and animals, especially insects.

Trends

The current extent of this community in Pennsylvania and in the larger Great Lakes region fairly well known. Long, continuous examples of this community have been fragmented by development and their acreage in Pennsylvania has declined as a result of development and recreation.

Long-term management of the Erie Shoreline could benefit from a better understanding of the natural erosion and deposition processes, as well as how these processes may be affected by artificially created barriers such as breakwaters and jetties.

Range Map



Pennsylvania Range

Northwestern Pennsylvania.

Global Distribution

Northeastern Ohio to New York along the southern shore of Lake Erie.

Periodically Exposed Shoreline Community

System: Palustrine
Subsystem: Sparse Vegetation
PA Ecological Group(s): River Floodplain and Sparse Vegetation

Global Rank: G4G5
State Rank: S5

General Description

This community is found on all orders of streams, and in a wide variety of riverine settings including island heads, bars, spits, low terraces, and river banks. The underlying substrate also varies greatly, although it is often cobbles and sand with thin deposits of silt, muck, or organic matter. Species composition also varies greatly from site to site. The unifying factor influencing the species composition is the frequent inundation and scour that these sites experience. This community is generally situated in areas of the active channel that are underwater for the majority of the year and are exposed only at low water or in drought years. These areas are subjected to high water velocities, floods, and ice scour more frequently than many other herbaceous communities within the river floodplain system. The constant scour removes established vegetation and maintains or creates exposed sediments, cobbles, or bedrock. New seeds and plant propagules are constantly being dispersed to these areas by water, air, and animals. This causes a continual flux in species composition that is characteristic of this community.

This type typically describes sparsely vegetated sites. The species composition of the community varies depending upon the available seed bank, surrounding vegetation, type of substrate, ecoregion, and hydrologic conditions. Non-native and opportunistic species, many of which are annuals, make up a high proportion of the vegetation at these sites. The perennial species that do exist are those that can tolerate the frequent disturbance of flood events. Not all of the species listed below will be present at the same site. Many combinations and variations in species composition are possible but may include water-pepper (*Persicaria punctata*), smartweed (*P. pensylvanicum*), water smartweed (*P. amphibia*), straw-colored nutsedge (*Cyperus strigosus*), redroot flatsedge (*Cyperus erythrorhizos*), lovegrass (*Eragrostis frankii*), three-seeded mercury (*Acalypha rhomboidea*), blue vervain (*Verbena hastata*), cordgrass (*Spartina pectinata*), boneset (*Eupatorium perfoliatum*), willow-herb (*Epilobium ciliatum*), pale St. John's-wort (*Hypericum ellipticum*), dwarf St. John's-wort (*H. mutilum*), garden loosestrife (*Lysimachia vulgaris*), swamp-candles (*Lysimachia terrestris*), American barnyard grass (*Echinochloa muricata*), late-flowering thoroughwort (*Eupatorium serotinum*), marsh-purslane (*Ludwigia palustris*), Autumn bent (*Agrostis perennans*), cocklebur (*Xanthium strumarium*), evening-primrose (*Oenothera biennis*), clearweed (*Pilea pumila*), Allegheny monkey-flower (*Mimulus ringens*), false pimpernel (*Lindernia dubia*), bugleweed (*Lycopus uniflorus*), cardinal-flower (*Lobelia cardinalis*), marsh St. John's-wort (*Triadenum virginicum*), marsh pennywort (*Hydrocotyle americana*), field horsetail (*Equisetum arvense*), spikerushes (*Eleocharis erythropoda, E. palustris, E. acicularis, E. tenuis,* and *E. obtusa*), rushes (*Juncus acuminatus, Juncus canadensis*), spotted spurge (*Euphorbia maculata*), carpetweed (*Mollugo verticillata*), lady's-thumb (*Persicaria maculosa*), low smartweed (*Persicaria longiseta*),creeping lovegrass (*Eragrostis hypnoides*), and umbrella sedge (*Cyperus squarrosus*). Exotic species found in this

community include purple loosestrife (*Lythrum salicaria*), reed canary-grass (*Phalaris arundinacea*), Japanese knotweed (*Fallopia japonica*), and Japanese stiltgrass (*Microstegium vimineum*)

Rank Justification

Common, widespread, and abundant in the jurisdiction.

Identification

- Found on all orders of streams, and in a wide variety of riverine settings including island heads, bars, spits, low terraces, and river banks
- Sparsely to densely vegetated, comprised of weedy, opportunistic natives and exotic plants
- Substrate is variable
- Maintained by annual episodes of high intensity flooding and ice scour

Characteristic Species

Shrubs

- Sycamore (*Platanus occidentalis*)
- Silver maple (*Acer saccharinum*)
- Black willow (*Salix nigra*)
- Sandbar willow (*Salix exigua*)
- Diamond willow (*Salix eriocephala*)
- Silky willow (*Salix sericea*)
- Silky dogwood (*Cornus amomum*)
- Speckled alder (*Alnus incana* ssp. *rugosa*)
- Steeple-bush (*Spiraea tomentosa*)

Herbs

- Dotted smartweed (*Persicaria punctata*)
- Smartweed (*Persicaria pensylvanica*)
- Water smartweed (*Persicaria amphibia*)
- False nutsedge (*Cyperus strigosus*)

- Redroot flatsedge (*Cyperus erythrorhizos*)
- Lovegrass (*Eragrostis frankii*)
- Three-seeded mercury (*Acalypha rhomboidea*)
- Blue vervain (*Verbena hastata*)
- Freshwater cordgrass (*Spartina pectinata*)
- Boneset (*Eupatorium perfoliatum*)
- Pale St. John's-wort (*Hypericum ellipticum*)
- Dwarf St. John's-wort (*Hypericum mutilum*)
- Garden loosestrife (*Lysimachia vulgaris*)
- Swamp-candles (*Lysimachia terrestris*)
- Barnyard-grass (*Echinochloa muricata*)
- Late eupatorium (*Eupatorium serotinum*)
- Marsh-purslane (*Ludwigia palustris*)
- Autumn bent (*Agrostis perennans*)
- Common cocklebur (*Xanthium strumarium*)
- Evening-primrose (*Oenothera biennis*)
- Clearweed (*Pilea pumila*)
- Allegheny monkey-flower (*Mimulus ringens*)
- False pimpernel (*Lindernia dubia*)
- Bugleweed (*Lycopus uniflorus*)
- Cardinal-flower (*Lobelia cardinalis*)
- Marsh St. John's-wort (*Triadenum virginicum*)
- Marsh pennywort (*Hydrocotyle americana*)
- Field horsetail (*Equisetum arvense*)
- Spike-rush (*Eleocharis erythropoda*)

- Creeping spike-rush (*Eleocharis palustris*)
- Needle spike-rush (*Eleocharis acicularis*)
- Slender spike-rush (*Eleocharis tenuis* var. *pseudoptera*)
- Wright's spike-rush (*Eleocharis obtusa*)
- Sharp-fruited rush (*Juncus acuminatus*)
- Canada rush (*Juncus canadensis*)
- Water-willow (*Justicia americana*)
- Spotted spurge (*Euphorbia maculata*)
- Carpetweed (*Mollugo verticillata*)
- Lady's-thumb (*Persicaria maculosa*)
- Low smartweed (*Persicaria longiseta*)
- Creeping lovegrass (*Eragrostis hypnoides*)
- Umbrella sedge (*Cyperus squarrosus*)
- Slender fimbry (*Fimbristylis autumnalis*)

Exotic Species

- Purple loosestrife (*Lythrum salicaria*)
- Reed canary-grass (*Phalaris arundinacea*)
- Japanese knotweed (*Fallopia japonica*)
- Japanese stiltgrass (*Microstegium vimineum*)

International Vegetation Classification Associations:

Northeastern Temperate Cobble Scour Rivershore (CEGL006536)

NatureServe Ecological Systems:

Central Appalachian River Floodplain (CES202.608)

Origin of Concept

Zimmmerman 2008, PNHP 2010. Natural Resources Inventory and Management Recommendations for Ohiopyle State Park.Report to Bureau of State Parks Pennsylvania Department of Conservation and Natural Resources. Pittsburgh, PA

Pennsylvania Community Code

na : Not Available

Similar Ecological Communities

The Floodplain Scour Community is also sparsely vegetated and subject to frequent, high intensity flooding and ice scour events. However, this type is limited to rock outcrops along river floodplains, plants grow in the soil that accumulates between large boulders and cracks in the bedrock, while the Periodically Exposed Shoreline Community grows on alluvial deposits, including sand, silt, and gravel.

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from river floodplain classification studies in the Susquehanna and Ohio River Basins.

Conservation Value

This type represents sparsely vegetated banks, gravel spits, and shores that are underwater much of the year. Species composition of this type is variable as it occurs on periodically exposed areas along waterways throughout the state. This type is a component of ponds, lakes, and river floodplains, and occurs along nearly every creek and river. This habitat, while common, provides important habitat for a number of important and rare insect species, namely tiger beetles (genus *Cicindela*), and ground beetles (order Carabidae) and others.

Threats

Within floodplain ecosystems, alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Invasive non-native plants commonly dominate this community, especially near human development. Construction of flood-control and navigational dams has resulted in drastic changes to the timing and duration of flood events. These dams have, in some cases, slowed the river flow, resulting in deposition of finer sediments, favored by the invasive plants.

Management

Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetlands). Care should also be taken to control and prevent the spread of invasive species into these wetlands.

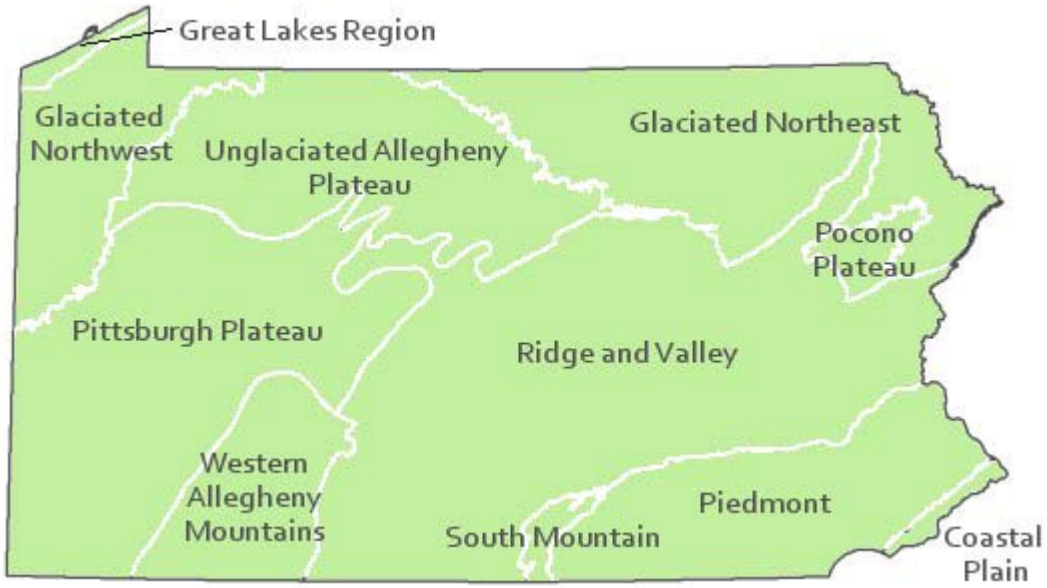
Research Needs

This type is highly variable and species present are greatly influenced by the timing and duration of inundation. Large expanses of open gravel scour should be inventoried for rare plants and animals, especially insects.

Trends

There is little to suggest that this type is increasing or decreasing in occurrence. Invasive plants able to tolerate flooded conditions may gain a foothold in these sites and contribute to an overall reduction in quality region-wide. Scour sites near urban and agricultural areas are susceptible to invasion.

Range Map



Pennsylvania Range

Statewide

Global Distribution

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont, and West Virginia

Sparsely Vegetated Vernal Pool Community

System: Palustrine
Subsystem: Sparse Vegetation
PA Ecological Group(s): Sparse Vegetation and Vernal Pool

Global Rank: GNR
State Rank: S4

General Description

Woodland vernal pools occur in seasonally inundated depressions in dry to mesic uplands throughout Pennsylvania. This community is characterized by the closed canopy forest, often dominated by pin oak (*Quercus palustris*). Associate canopy species include red maple (*Acer rubrum*) and sourgum (*Nyssa sylvatica*). Upland species, with limbs overhanging the pools include northern red oak (*Q. rubra*), white oak (*Q. alba*), and tuliptree (*Liriodendron tulipifera*) that are common in the canopy, but are not rooted in the pool. The understory vegetation is generally sparse, but varies considerably depending on site hydrology and light availability. Under more open canopies, the shrub layer contains buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticillata*), northern arrow-wood (*Viburnum recognitum*), and highbush blueberry (*Vaccinium corymbosum*). The sparse herbaceous layer includes sedges (*Carex intumescens, C. lurida, C. crinita*), marsh fern (*Thelypteris palustris*), beggar-ticks (*Bidens frondosa*), dotted smartweed (*Persicaria punctata*), and floating mannagrass (*Glyceria septentrionalis*). Under closed canopies, species in the pool basin may be limited to bugleweed (*Lycopus uniflorus*), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica* var. *cylindrica*), and other species tolerant of lower light conditions. Pools beneath closed canopies may also contain a substantial bryophyte layer that includes several peat moss (*Sphagnum*) species or may be completely devoid of vegetation altogether.

Rank Justification

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

Identification

- Seasonally fluctuating wetlands ranging from somewhat shallow depressions to deeper pools, but usually dry completely over the summer months.
- Closed canopy forest, often dominated by pin oak (*Quercus palustris*). Moderately deep water for vernal pools, 1-3 feet in the spring and composed of herbaceous and shrubby plant species.
- Closed canopy forest, often dominated by pin oak (*Quercus palustris*).
- Pools beneath closed canopies may also contain a substantial bryophyte layer that includes several peat moss (*Sphagnum*) species or may be completely devoid of vegetation altogether.

Characteristic Species

Trees

- Pin oak (*Quercus palustris*)
- Swamp white oak (*Quercus bicolor*)
- Red maple (*Acer rubrum*)
- Blackgum (*Nyssa sylvatica*)

Shrubs

- Buttonbush (*Cephalanthus occidentalis*)
- Winterberry (*Ilex verticillata*)
- Northern arrow-wood (*Viburnum recognitum*)
- Highbush blueberry (*Vaccinium corymbosum*)

Herbs

- Sedge (*Carex intumescens*)
- Sedge (*Carex lurida*)
- Sedge (*Carex crinita*)
- Marsh fern (*Thelypteris palustris*)
- Beggar-ticks (*Bidens frondosa*)
- Dotted smartweed (*Persicaria punctata*)
- Floating mannagrass (*Glyceria septentrionalis*)
- Bugleweed (*Lycopus uniflorus*)
- Clearweed (*Pilea pumila*)
- False nettle (*Boehmeria cylindrica*)

Bryophytes

- *Sphagnum* spp.

International Vegetation Classification Associations:

Eastern Woodland Vernal Pool Sparse Vegetation (CEGL006453)

NatureServe Ecological Systems:

None

Origin of Concept

Leppo, B., Zimmerman, E., Ray, S., Podniesinski, G., and Furedi, M. 2009. Pennsylvania Statewide Seasonal Pool Ecosystem Classification: Description, mapping, and classification of seasonal pools, their associated plant and animal communities, and the surrounding landscape. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA.

Pennsylvania Community Code

HV : Herbaceous Vernal Pond

Similar Ecological Communities

The Sparsely Vegetated Vernal Pool Community differs from other forested wetlands by the seasonal nature of inundation, moderate to low pH, and isolation from streams and rivers. The seasonal pool wetland ecosystems supporting this type often hold water for only part of the year and experience a noticeable drying phase (usually in the late summer). Landscape position is another factor that differentiates this type, found usually in small basins within uplands, from floodplain or large-basin wetlands, connected to flowing water. Similar communities include other broadleaved palustrine forest types such as Red Maple – Black Ash Palustrine Forest and Red Maple – Black-gum Palustrine Forest. These differ from the Sparsely Vegetated Vernal Pool Community in that they remain flooded throughout the year, are not isolated from streams or rivers, are usually larger, and have poorly defined boundaries. The Red Maple – Black Ash Palustrine Forest occurs under the influence of calcareous waters, and is characterized by the presence of black ash (*Fraxinus nigra*) on most sites and herbaceous calciphiles on some sites. Another wetland type supporting animal species often supporting vernal pools is the Elm - Ash - Maple Lakeplain Forest, which is similar to the Sparsely Vegetated Vernal Pool Community in that it experiences a significant dry-down period in the summer months, nearly drying completely. This wetland type differs from the Sparsely Vegetated Vernal Pool Community in that they are fed by calcium-rich groundwater and exhibit no discernable basin, reflecting a series of small connected wetlands within the lakeplain landform along the coast of Lake Erie.

Fike Crosswalk

Related to Herbaceous Vernal Pool. This type is new to the Pennsylvania Plant Community Classification developed fromstudies of vernal pool ecosystems of Pennsylvania.

Conservation Value

Vernal pools are primarily found in forested areas and are characterized by absence of fish, lack of flowing water, small size, shallow depth, and presence of plants and animals that can withstand a period

of drought (Brown and Jung 2005). Their seasonal nature is important because it excludes fish that would otherwise prey upon the eggs and larvae of amphibians breeding in them.

In the mid-Atlantic states, 26 percent of all state-listed threatened and endangered amphibians are dependent on vernal pools.

Vernal pools provide critical breeding habitat for several species of amphibians and a type of crustacean that use vernal pools almost exclusively during some stage of their life cycle. The amphibian species are:

- Marbled Salamander (*Ambystoma opacum*)
- Spotted Salamander (*Ambystoma maculatum*)
- Jefferson Salamander (*Ambystoma jeffersonianum*)
- Wood Frog (*Rana sylvatica*)
- Eastern Spadefoot (*Scaphiopus holbrookii holbrookii*)
- Springtime Fairy Shrimp (*Eubranchipus vernalis*).

A plant species found only in vernal pools in Pennsylvania is the northeastern bulrush (*Scirpus ancistrochaetus*).

Threats

Threats include habitat fragmentation, alteration of substrate, hydrology and water chemistry, loss of vegetation, and global climate change.

Filling seasonal pools, and disturbances to the vegetation and soil around pools from building and road construction, quarries, and logging operations lead to direct mortality of animals and habitat destruction or degradation. Seasonal pools are often not identified as wetlands due to their temporary nature.

Clearing and development of adjacent land can lead to accumulation of agricultural run-off and pollution, sedimentation, and pollution in the pools. Removal or change in composition of vegetation in and around a pool affects which species can use the pool. For species that lay their eggs in plant material, loss of vegetation eliminates egg-laying sites. For species that lay their eggs in the water, removal of vegetation reduces shade.

Roads near seasonal pools present physical obstacles to animals moving from their upland feeding habitats to their seasonal pool breeding habitats. Many animals are killed as they attempt these crossings. The presence of roads also provides opportunities for undesirable elements to get into the pools. Roads bring invasive plant species, sediments, and contaminants to pools through runoff. During the winter the application of road salt poses a problem for pools located near roads. As the snow melts, salt-laden water flows into these pools and increases the salinity of the water, making the water less hospitable to wildlife.

All aspects of life in a seasonal pool, from amphibian migration to egg and larval development to adult feeding, thermoregulation, and reproductive success, depend on certain environmental cues and conditions. Climate change is of increasing concern for vernal pool obligate species, especially in regard to species that are geographically restricted.

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. Protecting vernal pools and the surrounding 1000 feet of upland habitat is critical for protection of water quality, amphibian breeding, and terrestrial habitat for adult and juvenile amphibians. Soil erodibility in terms of the 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. Impervious surfaces surrounding the wetland should be minimized to prevent thermal pollution. Direct impacts and habitat alteration should be avoided (i.e. roads, trails, filling of wetland) and low impact alternatives (i.e. elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland can not be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland.

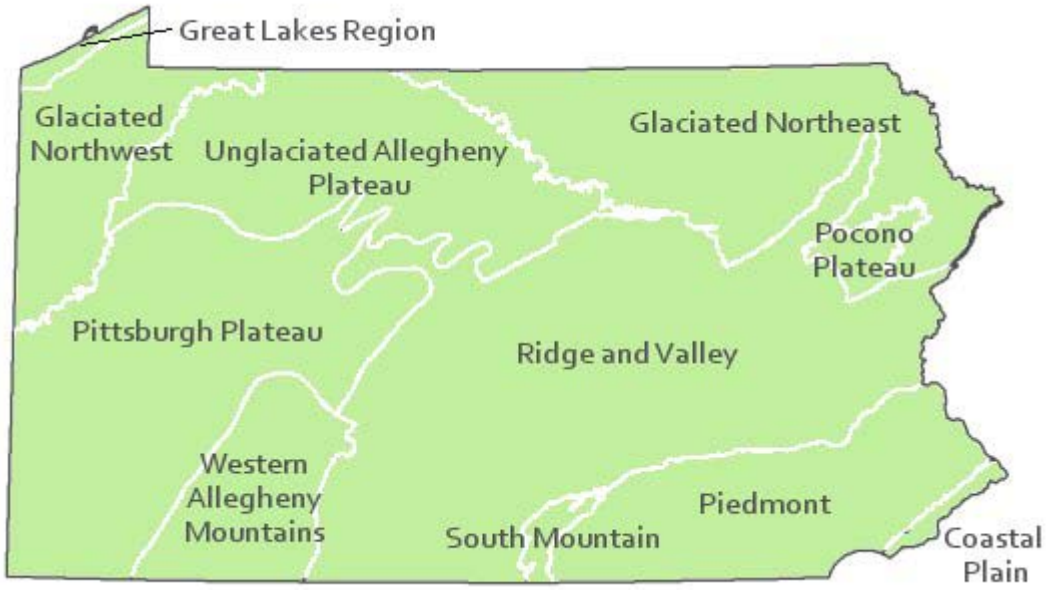
Research Needs

There is a need to collect community plot data to characterize variations of this community to assist further classification of this community.

Trends

These wetlands were probably more common but declined due to wetland draining/filling and clearing of the adjacent lands leading to increased evaporation of the standing water and sedimentation.

Range Map



Pennsylvania Range

Statewide