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

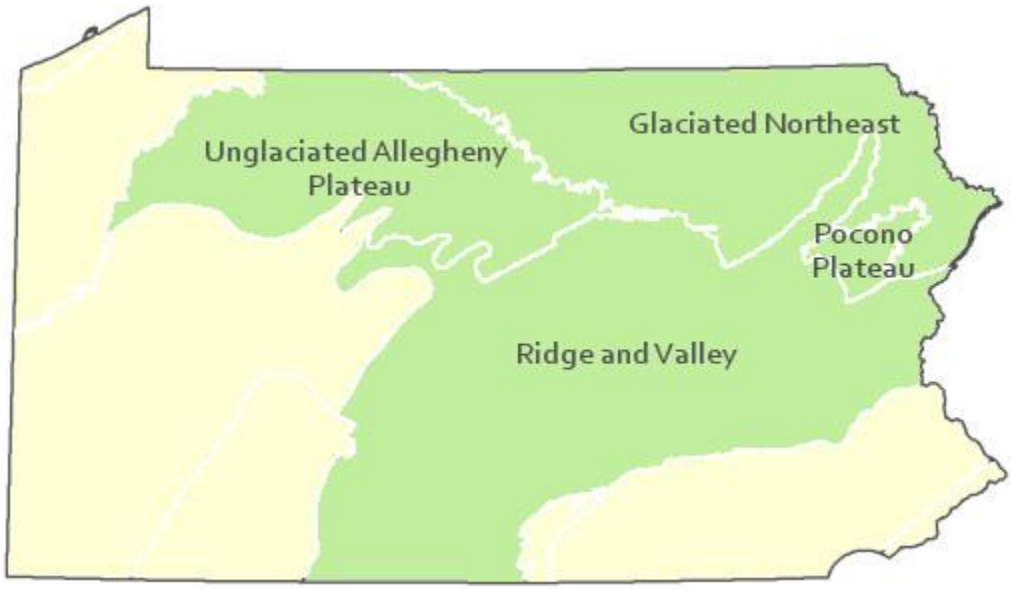
There is a need to monitor this community type to assess if potential climate change will alter the environmental conditions required for this community to persist.

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,

References

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