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

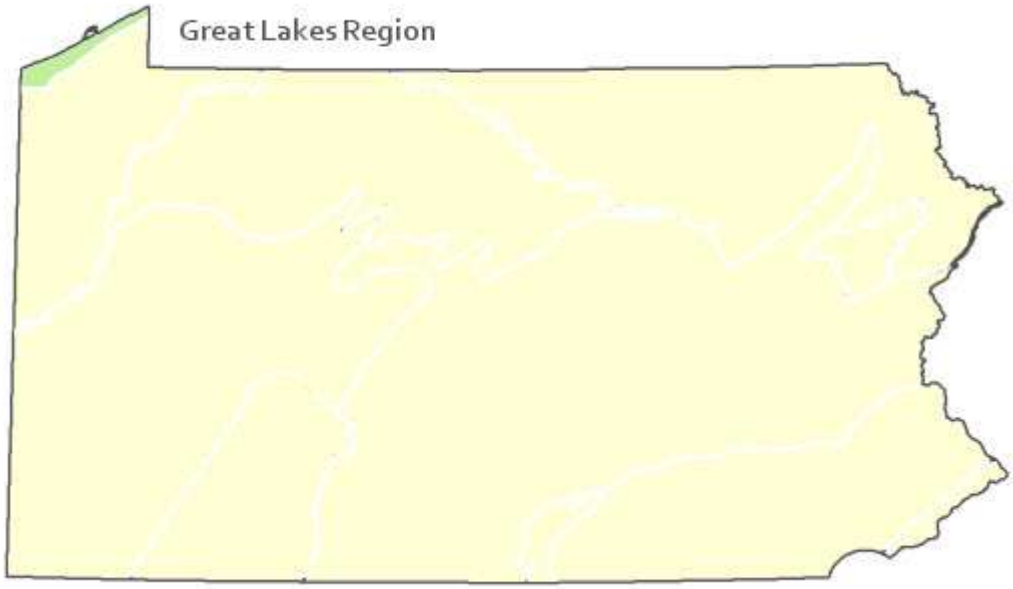
Insects, including lepidopterans may form a substantial part of the biodiversity in these communities, relatively little inventory work has been done for these taxa. There is a continuing need to survey and document high quality examples of this community in Pennsylvania to understand distribution patterns 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.

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