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.
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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

Global Distribution

References

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