COMMON NAME (PARK-SPECIFIC): CALCAREOUS RIVERSIDE OUTCROP

SYNONYMS

NVC English Name:	**Big Bluestem - Bluebell Bellflower - Sticky Goldenrod Sparse Vegetation**
NVC Scientific Name:	***Andropogon gerardii - Campanula rotundifolia - Solidago simplex* Sparse Vegetation**
NVC Identifier:	**CEGL006284**

LOCAL INFORMATION

Environmental Description: This vegetation type occurs along the shoreline of the Delaware River where winter ice-scouring, limestone outcrops, and natural seepage co-occur. The community is characterized by open, sparsely vegetated sections of smooth Buttermilk Falls limestone outcrops of glacial origin and Devonian age. The outcrops extend for variable lengths from the woodland edge to the river edge. Areas of fractured limestone typically support denser vegetation in the crevices. All of the outcrops have a north-northwest exposure and are fully exposed to the late day sun. The slope of the outcrops ranges from gentle incline rising from the river shoreline to a 28-degree incline at the most steeply sloped sites. Winter ice-scour that removes tall vegetation and woody plants maintains predominantly herbaceous vegetation. The early-successional floristic assemblages include species able to regenerate from buried rootstocks, rosettes protected in crevices or from seeds dispersed along the shoreline. Seasonal and annual variation in water levels is also an important process affecting the vegetation. Calcareous Riverside Seep is often found interspersed with Calcareous Riverside Outcrop along the shoreline of the Delaware River.

Vegetation Description: The limestone bedrock supports many calciphiles that thrive on the calcium-rich substrate. Vegetation is typically sparse and occurs in the cracks and crevices in the bedrock. Typical vegetation is a mixture of riparian species, xeric-loving crevice plants, and calciphiles. Characteristic rare species include tall thimbleweed (*Anemone virginiana* var. *alba*), American vetch (*Vicia americana*), meadow zizia (*Zizia aptera*), white heath aster (*Symphyotrichum ericoides* var. *ericoides*), Crawe's sedge (*Carex crawei*), Crawford's sedge (*Carex crawfordii*), great St. Johnswort (*Hypericum ascyron*), scarlet beebalm (*Monarda didyma*), tall cinquefoil (*Potentilla arguta*), strict blue-eyed grass (*Sisyrinchium montanum*), and calico aster (*Symphyotrichum lateriflorum* var. *lateriflorum*). A wide variety of associated species may be present, including annual agricultural weeds, old-field species, plants common in Riverine Scour Vegetation and calciphiles. Some of the numerous common associates include big bluestem (*Andropogon gerardii*), fowl bluegrass (*Poa palustris*), Canadian bluegrass (*Poa compressa*), northern bedstraw (*Galium boreale*), flat-top goldentop (*Euthamia graminifolia*), bluebell bellflower (*Campanula rotundifolia*), lyrate rockcress (*Arabis lyrata*), black bugbane (*Cimicifuga racemosa*), yellow pimpernel (*Taenidia integerrima*), red columbine (*Aquilegia canadensis*), maidenhair spleenwort (*Asplenium trichomanes*), limestone meadow sedge (*Carex granularis*), woolly sedge (*Carex pellita*), broom sedge (*Carex scoparia*), ox-eye daisy (*Leucanthemum vulgare*), common boneset (*Eupatorium perfoliatum*), moss phlox (*Phlox subulata*), stonecrops (*Sedum* spp.), and eastern poison ivy (*Toxicodendron radicans*). Scattered shrubs may have established in crevices or ledges of the outcrops. Common shrub species include smooth rose (*Rosa blanda*), sycamore (*Platanus occidentalis*), common ninebark (*Physocarpus opulifolius*), river birch (*Betula nigra*), silver maple (*Acer saccharinum*), red

maple (*Acer rubrum*), willows (*Salix* spp.), and alders (*Alnus* spp.). These sites are susceptible to invasion by purple loosestrife (*Lythrum salicaria*) and yellow sweetclover (*Melilotus officinalis*).
Most Abundant Species: The most abundant species varies between seasons, years, and sites.
Characteristic Species: Characteristic species include a mixture of riparian species, xeric-loving crevice species, and calciphiles. See Vegetation Description above.
Other Noteworthy Species: *Anemone virginiana* var. *alba*, *Carex crawei*, *Carex crawfordii*, *Hypericum ascyron*, *Monarda didyma*, *Potentilla arguta*, *Sisyrinchium montanum*, *Symphyotrichum ericoides* var. *ericoides*, *Symphyotrichum lateriflorum* var. *lateriflorum*, *Vicia americana*, *Zizia aptera*.
Subnational Distribution with Crosswalk data:

State	State Rank	Confidence	State Name	Reference
NJ	S1	2	Northern Riverside Rock Outcrop	Walz et al. 2006

Local Range: There are three locations of this type of river shoreline along the Delaware River within the park.
Classification Comments: Calcareous Riverside Seep occurs interspersed with Calcareous Riverside Outcrop, however, it is restricted to areas of groundwater seepage and contains plants that are dependent on the groundwater seepage. By contrast, the Calcareous Riverside Outcrop does not contain groundwater seepage and its plants are generally xerophilic.
Other Comments: None.
Local Description Authors: S. J. Perles (PNHP).
Plots and Data Sources: DEWA.219; Shank and Shreiner 1999, Breden 1989.
Delaware Water Gap National Recreation Area Inventory Notes: Information not available.

GLOBAL INFORMATION

NVC CLASSIFICATION

Physiognomic Class	Sparse Vegetation (VII)
Physiognomic Subclass	Consolidated rock sparse vegetation (VII.A.)
Physiognomic Group	Sparsely vegetated pavement (VII.A.2.)
Physiognomic Subgroup	Natural/Semi-natural sparsely vegetated pavement (VII.A.2.N.)
Formation	Pavement with sparse vascular vegetation (VII.A.2.N.a.)
Alliance	Open Pavement Sparsely Vegetated Alliance (A.1843)
Alliance (English name)	Open Pavement Sparsely Vegetated Alliance
Association	*Andropogon gerardii* - *Campanula rotundifolia* - *Solidago simplex* Sparse Vegetation
Association (English name)	Big Bluestem - Bluebell Bellflower - Sticky Goldenrod Sparse Vegetation
Ecological System(s):	Central Appalachian Riparian (CES202.609) Laurentian-Acadian Ice-Scour Rivershore (CES201.589)

GLOBAL DESCRIPTION

Concept Summary: This riverside rock outcrop community of the northeastern U.S. occurs on open flood-scoured bedrock exposures of major rivers, typically along river narrows. Emergent seepage is absent. Typically a gradient from dry acidic conditions higher on the bank to moist, fairly enriched conditions lower down may exist at any one site. This community is prone to flooding in the upper regions and deposition in the topographically lower areas. It is also prone to severe drought periods that may stress or kill some vegetation. Within the community, the

species are distributed patchily, probably due to microsite conditions. The variability in species composition has not been measured, but it shows substantial variation from site to site and from year to year. Vegetation is typically sparse and occurs in the cracks and crevices of the bedrock. Typical vegetation is a mixture of riparian species, xeric-loving crevice plants, and calciphiles. Characteristic species include *Andropogon gerardii, Schizachyrium scoparium, Campanula rotundifolia, Solidago simplex, Toxicodendron radicans, Ionactis linariifolius, Sisyrinchium montanum, Packera paupercula (= Senecio pauperculus)*, and *Prunus pumila*. Other associates include *Anemone virginiana* var. *alba (= Anemone virginiana* var. *riparia), Symphyotrichum lateriflorum, Carex crawei, Carex crawfordii, Potentilla arguta, Campanula rotundifolia, Arabis lyrata, Aquilegia canadensis*, and *Eupatorium perfoliatum*, among others. *Astragalus robbinsii* var. *jesupii* occurs in limited areas along the upper Connecticut River. These sites are susceptible to invasion by *Lythrum salicaria* and *Melilotus officinalis (= Melilotus alba)*. This association is more temperate than the related *Campanula rotundifolia - Packera paupercula - (Aquilegia canadensis)* Sparse Vegetation (CEGL006532), which occurs on near-boreal rivers and lacks prairie elements such as *Andropogon gerardii*.

Environmental Description: This sparse vegetation occurs on open flood-scoured bedrock exposures of major rivers, typically along river narrows. Emergent seepage is absent. Typically a gradient from dry acidic conditions higher on the bank to moist, fairly enriched conditions lower down may exist at any one site. This community is prone to flooding in the upper regions and deposition in the topographically lower areas. It is also prone to severe drought periods that may stress or kill some vegetation.

Vegetation Description: This community is essentially a rock outcrop with a bit of soil development in the lower reaches. Within the community, the species are distributed patchily, probably due to microsite conditions. The variability in species composition has not been measured but shows substantial variation both spatially and temporally. Vegetation is typically sparse and occurs in the cracks and crevices of the bedrock. Typical vegetation is a mixture of riparian species, xeric-loving crevice plants, and calciphiles. Characteristic species include *Andropogon gerardii, Schizachyrium scoparium, Campanula rotundifolia, Solidago simplex, Toxicodendron radicans, Ionactis linariifolius, Sisyrinchium montanum, Packera paupercula (= Senecio pauperculus)*, and *Prunus pumila*. Other associates include *Anemone virginiana* var. *alba (= Anemone virginiana* var. *riparia), Symphyotrichum lateriflorum, Carex crawei, Carex crawfordii, Potentilla arguta, Campanula rotundifolia, Arabis lyrata, Aquilegia canadensis*, and *Eupatorium perfoliatum*, among others. *Astragalus robbinsii* var. *jesupii* occurs in limited areas along the upper Connecticut River. These sites are susceptible to invasion by *Lythrum salicaria* and *Melilotus officinalis (= Melilotus alba).*

Most Abundant Species: Information not available.

Characteristic Species: *Allium schoenoprasum* var. *sibiricum, Andropogon gerardii, Astragalus robbinsii* var. *jesupii, Campanula rotundifolia, Ionactis linariifolius, Packera paupercula, Prunus pumila, Schizachyrium scoparium, Solidago simplex, Toxicodendron radicans.*

Other Noteworthy Species: *Astragalus robbinsii* var. *jesupii.*

USFWS Wetland System: Palustrine.

DISTRIBUTION

Range: This community is reported from Vermont, New Hampshire, Maine, Connecticut, New Jersey, and New York. It may also occur in Massachusetts.

States/Provinces: CT, MA, ME, NH, NJ, NY, VT.

Federal Lands: NPS (Delaware Water Gap).

CONSERVATION STATUS

Rank: G2 (17-Nov-1997).

Reasons: There are probably fewer than 20 occurrences of this community rangewide. Individual occurrences tend to be small, so there are probably fewer than 500 acres rangewide. Currently five occurrences are documented in New Hampshire, with a total acreage of less than 20 acres. Similar vegetation is reported from Vermont, Maine, and New York, but these still need confirmation. This community is restricted to calcareous or basic bedrock outcrops along ice-scoured upper reaches of major rivers such as the Connecticut River in New Hampshire and Vermont, the Kennebec River in Maine, the Hudson River in New York, and the Delaware River in New Jersey.

CLASSIFICATION INFORMATION

Status: Standard.

Confidence: 2 – Moderate.

Comments: This community may occur in conjunction with seep communities. However, emergent seepage is absent as are the corresponding seepage and wetland plants found in riverside seeps. Sedges are notably lacking. This community differs from rock outcrop/rocky summit communities by the paucity of lichen and woody species intolerant of flooding and the presence of flood-tolerant species on lower, somewhat enriched reaches of the community, where regular erosion and deposition of silty sediments occur.

Similar Associations:

- *Andropogon gerardii - Phlox subulata - Solidago simplex* var. *racemosa - Packera paupercula* Herbaceous Vegetation (CEGL004284).
- *Campanula rotundifolia - Packera paupercula - (Aquilegia canadensis)* Sparse Vegetation (CEGL006532).

Related Concepts:

- Riverine Lower Perennial Emergent Wetland, Seasonally Flooded (R2EMC) (Cowardin et al. 1979) ?
- Rivershore Grassland (Thompson 1996) ?
- Riverside Outcrop Community (Thompson 1996) ?
- SNE Riverside Outcrop Community (Rawinski 1984) ?

SOURCES

Description Authors: M. Anderson, mod. S. L. Neid and S. C. Gawler.

References: Breden 1989, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Gawler 2002, Grossman et al. 1994, Metzler and Barrett 2001, Rawinski 1984, Shank and Shreiner 1999, Sperduto 1992, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000.

Figure 117. Calcareous Riverside Outcrop in Delaware Water Gap National Recreation Area (plot DEWA.219). July 2004.

Figure 118. Calcareous Riverside Outcrop in Delaware Water Gap National Recreation Area (Accuracy Assessment Observation Point DEWA.616). June 2006.

COMMON NAME (PARK-SPECIFIC): SHALE SCREE SLOPE

SYNONYMS
NVC English Name: **Hairy Beardtongue Sparse Vegetation**
NVC Scientific Name: ***Penstemon hirsutus* Sparse Vegetation**
NVC Identifier: **CEGL006535**

LOCAL INFORMATION

Environmental Description: This association occurs on very steep, southeast-facing slopes composed of gravelly shale and siltstone scree along the eastern edge of the Glaciated Low Plateau in Pennsylvania. The parent material is shale and siltstone of the Devonian Mahantango Formation. The Mahantango Formation may also contain thin beds of argillaceous limestone, though expression of calcareous bedrock in this formation within the park is uncertain. The scree is very well-drained with vegetation likely experiencing droughty soil conditions for much of the growing season. Some smaller occurrences are a result of previous quarrying operations.
Vegetation Description: Vegetation on scree slopes varies from nearly absent to sparse woodland. The vegetation, when present, is typical of dry forests and grasslands. Typical tree species include chestnut oak (*Quercus prinus*), eastern white pine (*Pinus strobus*) and eastern red-cedar (*Juniperus virginiana*). Tree heights range from 5 to 20 m, with trees often appearing stunted. The shrub layer typically consists of low shrubs and tree saplings, including staghorn sumac (*Rhus hirta*), Blue Ridge blueberry (*Vaccinium pallidum*), black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium angustifolium*), and common serviceberry (*Amelanchier arborea*). The herbaceous layer ranges from absent to 30% cover and consists of drought-tolerant herbs and grasses. Typical herbaceous species include wavy hairgrass (*Deschampsia flexuosa*), bastard toadflax (*Comandra umbellata*), Pennsylvania sedge (*Carex pensylvanica*), Atlantic goldenrod (*Solidago arguta*), Virginia tephrosia (*Tephrosia virginiana*), and yellow wild indigo (*Baptisia tinctoria*).
Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus prinus, Quercus rubra*
Tree canopy	Needle-leaved tree	*Pinus strobus*
Tree subcanopy	Needle-leaved tree	*Juniperus virginiana*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhus* spp.
Short shrub/sapling	Broad-leaved deciduous shrub	*Gaylussacia baccata, Vaccinium angustifolium, Vaccinium pallidum*
Herb (field)	Forb	*Comandra umbellata, Solidago arguta*
Herb (field)	Graminoid	*Carex pensylvanica, Deschampsia flexuosa*

Characteristic Species: *Deschampsia flexuosa, Juniperus virginiana, Pinus strobus, Rhus* spp., *Quercus prinus, Quercus rubra, Vaccinium pallidum.*
Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk data:

State	State Rank	Confidence	State Name	Reference
PA	S3	1	no crosswalk	Fike 1999

Local Range: This vegetation type is restricted to the lower slope below shale bedrock outcrops west of the Delaware River, where the Glaciated Low Plateau meets the river valley. The majority of occurrences are in the north end of the park, a few miles south of Milford.
Classification Comments: The amount of vegetation present is extremely variable and is often absent. It differs from Sandstone Talus in the source of parent material (shale vs. sandstone) and the nature of the substrate (fine to coarse shale gravel vs. massive sandstone boulders). Hickory - Eastern Red-cedar Rocky Woodland typically occurs above this type on exposed shale bedrock with some thin soil development, higher vegetation cover and general absence of oak tree species (though bear oak (*Quercus ilicifolia*) may be present).
Other Comments: None.
Local Description Authors: G. S. Podniesinski (PNHP), mod. S. C. Gawler.
Plots and Data Sources: DEWA.145.
Delaware Water Gap National Recreation Area Inventory Notes: Information not available.

GLOBAL INFORMATION

NVC CLASSIFICATION

Physiognomic Class	Sparse Vegetation (VII)
Physiognomic Subclass	Boulder, gravel, cobble, or talus sparse vegetation (VII.B.)
Physiognomic Group	Sparsely vegetated talus/scree slopes (VII.B.1.)
Physiognomic Subgroup	Natural/Semi-natural sparsely vegetated talus/scree slopes (VII.B.1.N.)
Formation	Lowland or submontane talus/scree (VII.B.1.N.a.)
Alliance	Lowland Talus Sparsely Vegetated Alliance (A.1847)
Alliance (English name)	Lowland Talus Sparsely Vegetated Alliance
Association	*Penstemon hirsutus* Sparse Vegetation
Association (English name)	Hairy Beardtongue Sparse Vegetation
Ecological System(s):	Central Appalachian Pine-Oak Rocky Woodland (CES202.600)

GLOBAL DESCRIPTION

Concept Summary: This association consists of sparse, mostly herbaceous vegetation occurring on harsh, steep, unstable shale talus and cliffs. Heat, drought and lack of soil development prevent the establishment of many species and limit the community to crevice-rooting herbaceous plants and widely scattered small trees and shrubs. Vegetation cover is variable and patchy. Typical tree species include *Quercus prinus, Pinus strobus, Pinus pungens*, and *Juniperus virginiana*. Shrubs include scattered *Vaccinium pallidum, Rhus hirta, Gaylussacia baccata*, and *Amelanchier arborea*. The herbaceous layer ranges from absent to nearly 30% cover in patches, and consists of drought-tolerant herbs and grasses such as *Deschampsia flexuosa, Comandra umbellata, Solidago arguta, Baptisia tinctoria, Woodsia obtusa, Woodsia ilvensis, Penstemon hirsutus, Geranium robertianum, Schizachyrium scoparium, Dichanthelium linearifolium (= Panicum linearifolium)*, and *Carex pensylvanica*.
Environmental Description: This association occurs on unstable shale talus with shallow, very well-drained soils. The parent material is shale and siltstone. The scree is very well-drained with vegetation likely experiencing droughty soil conditions for much of the growing season.

Vegetation Description: Vegetation cover is variable and patchy. Typical tree species include *Quercus prinus, Pinus strobus, Pinus pungens*, and *Juniperus virginiana*. Shrubs include scattered *Vaccinium pallidum, Rhus hirta, Gaylussacia baccata*, and *Amelanchier arborea*. The herbaceous layer ranges from absent to nearly 30% cover in patches, and consists of drought-tolerant herbs and grasses such as *Deschampsia flexuosa, Comandra umbellata, Solidago arguta, Baptisia tinctoria, Woodsia obtusa, Woodsia ilvensis, Penstemon hirsutus, Geranium robertianum,, Schizachyrium scoparium, Dichanthelium linearifolium (= Panicum linearifolium)*, and *Carex pensylvanica*.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Comandra umbellata, Penstemon hirsutus, Solidago arguta*
Herb (field)	Graminoid	*Carex pensylvanica, Deschampsia flexuosa*

Characteristic Species: *Deschampsia flexuosa, Juniperus virginiana, Pinus strobus, Quercus prinus, Quercus rubra, Woodsia ilvensis, Woodsia obtusa.*

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable.

DISTRIBUTION

Range: This association is known from central New England and New York state south to northern New Jersey and Pennsylvania.

States/Provinces: NJ, NY, PA, VT.

Federal Lands: NPS (Delaware Water Gap).

CONSERVATION STATUS

Rank: GNR (6-Jul-1999).

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard.

Confidence: 3 – Weak.

Comments: This community is apparently distinct, but very poorly documented.

Similar Associations:

- *Quercus rubra - Quercus prinus - Pinus strobus / Penstemon hirsutus* Woodland (CEGL006074).

Related Concepts:

- Shale Talus (Thompson 1996) ?

SOURCES

Description Authors: S. C. Gawler.

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Thompson 1996, Thompson and Sorenson 2000.

Figure 119. Shale Scree Slope in Delaware Water Gap National Recreation Area (along Route 209, near Milford, in Pennsylvania). June 2006.

Figure 120. Shale Scree Slope in Delaware Water Gap National Recreation Area (near Accuracy Assessment Observation Point DEWA.214). April 2005.

COMMON NAME (PARK-SPECIFIC): RIVERINE SCOUR VEGETATION

SYNONYMS
NVC English Name: **Fringed Loosestrife - Indian-hemp Sparse Vegetation**
NVC Scientific Name: ***Lysimachia ciliata - Apocynum cannabinum* Sparse Vegetation**
NVC Identifier: **CEGL006554**

LOCAL INFORMATION

Environmental Description: This type is associated with the Delaware River in a wide variety of riverine settings. Island heads, bars, spits, low terraces, and shorelines can support this broadly defined vegetation type. The underlying substrate 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 that bridges the differences in environmental factors and species composition is the frequent scour that these sites experience. This vegetation type establishes 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. Therefore, these areas are subjected to high water velocities, floods, and ice-scour more frequently than the other riparian communities (with the exception of emergent beds). The constant scour removes established vegetation and maintains or creates exposed sediments or cobbles. Water, air, and animals are constantly dispersing new seeds and plant propagules to these areas. This causes the continual flux in species composition that is characteristic of this community.

Vegetation Description: Frequent disturbance of these areas creates conditions that promote continual colonization by a wide variety of plants. After a disturbance, herbaceous and graminoid species may establish sparsely across bare substrate. As more time elapses between disturbance events, vegetation can become dense, completely covering the area. The species composition of the community varies depending upon the available seedbank, surrounding vegetation, type of substrate, ecoregion, and hydrologic conditions. Some common species include water knotweed (*Polygonum amphibium*), spikerushes (*Eleocharis* spp.), sensitive fern (*Onoclea sensibilis*), American water-willow (*Justicia americana*), Virginia marsh St. Johnswort (*Triadenum virginicum*), tussock sedge (*Carex stricta*), spotted joe-pyeweed (*Eupatorium maculatum*), eastern marsh fern (*Thelypteris palustris*), chufa flatsedge (*Cyperus esculentus*), Indian-hemp (*Apocynum cannabinum*), fringed loosestrife (*Lysimachia ciliata*), smallspike false nettle (*Boehmeria cylindrica*), common marsh bedstraw (*Galium palustre*), whitegrass (*Leersia virginica*), marshpepper knotweed (*Polygonum hydropiper*), swamp smartweed (*Polygonum hydropiperoides*), reed canarygrass (*Phalaris arundinacea*), poverty rush (*Juncus tenuis*), common threesquare (*Schoenoplectus pungens*), wild mint (*Mentha arvensis*), groundnut (*Apios americana*), flat-top goldentop (*Euthamia graminifolia*), American hogpeanut (*Amphicarpaea bracteata*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), and common sneezeweed (*Helenium autumnale*). Numerous other species can be present. The invasive exotic purple loosestrife (*Lythrum salicaria*) can be abundant in this community type. Scattered short and tall shrubs may be present, including river birch (*Betula nigra*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), willows (*Salix* spp.), and/or red maple (*Acer rubrum*).

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Betula nigra, Platanus occidentalis*
Herb (field)	Forb	*Lythrum salicaria, Mentha arvensis, Polygonum amphibium*
Herb (field)	Graminoid	*Carex stricta, Phalaris arundinacea, Eleocharis* spp.
Herb (field)	Fern or fern ally	*Onoclea sensibilis*

Characteristic Species: This vegetation type characteristically includes wide variation in species composition between sites. See the Vegetation Description above for common species.
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk data:

State	State Rank	Confidence	State Name	Reference
NJ	SNR	2	Loosestrife - Dogbane Scoured Rivershore	Walz et al. 2006
PA	S4	2	no crosswalk	Fike 1999

Local Range: This type is common within the Delaware River.
Classification Comments: Calcareous Riverside Outcrop and Calcareous Riverside Seep is distinguished from Riverine Scour Vegetation by the presence of exposed calcareous bedrock along the shoreline of the river that often provides habitat for rare species. Riverine Scour Vegetation occurs in a wide variety of riverine settings and on various substrates, although not bedrock.
Other Comments: None.
Local Description Authors: S. J. Perles (PNHP).
Plots and Data Sources: DEWA.99, DEWA.100, DEWA.102, DEWA.218; Perles et al 2004.
Delaware Water Gap National Recreation Area Inventory Notes: Information not available.

GLOBAL INFORMATION

NVC CLASSIFICATION

Physiognomic Class	Sparse Vegetation (VII)
Physiognomic Subclass	Boulder, gravel, cobble, or talus sparse vegetation (VII.B.)
Physiognomic Group	Sparsely vegetated rock flats (VII.B.2.)
Physiognomic Subgroup	Natural/Semi-natural sparsely vegetated rock flats (VII.B.2.N.)
Formation	Cobble/gravel beaches and shores (VII.B.2.N.b.)
Alliance	Cobble/Gravel Shore Sparsely Vegetated Alliance (A.1850)
Alliance (English name)	Cobble/Gravel Shore Sparsely Vegetated Alliance
Association	*Lysimachia ciliata - Apocynum cannabinum* Sparse Vegetation
Association (English name)	Fringed Loosestrife - Indian-hemp Sparse Vegetation
Ecological System(s):	Central Appalachian Riparian (CES202.609)

GLOBAL DESCRIPTION

Concept Summary: Island heads, bars, spits, low terraces, and riverbanks are all home to this broadly defined community. 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 that bridges the differences in environmental factors and species composition is the frequent scour that these sites experience. This community establishes 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. Therefore, these areas are subjected to high water velocities, floods and ice-scour more frequently than other herbaceous communities or shrublands (with the exception of emergent beds). 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. Typical species are a mix of annuals and perennials, including *Lysimachia ciliata, Lysimachia vulgaris, Lysimachia nummularia, Senecio* spp., *Eupatorium* spp., other Asteraceae spp., *Convolvulus* spp., *Phyla lanceolata,, Justicia americana, Cyperus esculentus, Boehmeria cylindrica, Polygonum* spp., *Apocynum cannabinum, Betula nigra*, and *Platanus occidentalis*. This community is defined mainly by its setting and disturbance regime.

Environmental Description: sland heads, bars, spits, low terraces, and riverbanks are all home to this broadly defined community. 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 that bridges the differences in environmental factors and species composition is the frequent scour that these sites experience. This community establishes 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. Therefore, these areas are subjected to high water velocities, floods and ice-scour more frequently than other herbaceous communities or shrublands (with the exception of emergent beds). 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.

Vegetation Description: Typical species are a mix of annuals and perennials including *Lysimachia ciliata, Lysimachia vulgaris, Lysimachia nummularia, Senecio* sp., Asteraceae spp., *Eupatorium* spp., *Convolvulus* spp., *Phyla lanceolata, Justicia americana, Cyperus esculentus, Boehmeria cylindrica, Polygonum* spp., *Apocynum cannabinum, Betula nigra, Platanus occidentalis*. This community is defined mainly by its setting and disturbance regime.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Lysimachia ciliata*

Characteristic Species: *Apocynum cannabinum, Lysimachia ciliata, Polygonum amphibium.*

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine.

DISTRIBUTION

Range: The full distribution of this type is not well-known. It is currently documented only from Pennsylvania and New Jersey but believed to range further. Lack of samples and inherent variability are challenges.

States/Provinces: NJ, PA.

Federal Lands: NPS (Delaware Water Gap, Johnstown Flood).

CONSERVATION STATUS
Rank: GNR (8-Jul-1999).
Reasons: Information not available.

CLASSIFICATION INFORMATION
Status: Standard.
Confidence: 3 – Weak.
Comments: Information not available.
Similar Associations: Information not available.
Related Concepts: Information not available.

SOURCES
Description Authors: E. Largay, mod. S. C. Gawler.
References: Eastern Ecology Working Group n.d., Fike 1999, Perles et al. 2004

Figure 121. Riverine Scour Vegetation in Delaware Water Gap National Recreation Area (plot DEWA.100). July 2004.

Figure 122. Riverine Scour Vegetation in Delaware Water Gap National Recreation Area (plot DEWA.218). August 2003.

COMMON NAME (PARK-SPECIFIC): BOULDER VERNAL POOL SPARSE VEGETATION

SYNONYMS
NVC English Name: **Boulder Vernal Pool Sparse Vegetation**
NVC Scientific Name: **Boulder Vernal Pool Sparse Vegetation**
NVC Identifier: **CEGL006453**

LOCAL INFORMATION

Environmental Description: This association occurs as boulderfields in shallow depressions atop Kittatinny Ridge. Occurrences have been noted on both the Pennsylvania and New Jersey portions of Kittatinny Ridge. The substrate is coarse boulders derived from sandstone and sandstone conglomerate of the Shawangunk Formation. Boulder vernal pools experience seasonally fluctuating water levels and may dry out completely in the summer. Hydrology is controlled by impervious bedrock below the boulderfield. Vegetation cover is typically sparse. This association typically has little or no canopy cover.
Vegetation Description: Vegetation cover is sparse, except for abundant mosses and lichens which can cover up to 90% of the boulders. Woody plant cover is sparse and usually restricted to shrubs at the margin of the pool. Typical woody shrubs include highbush blueberry (*Vaccinium corymbosum*) and steeplebush (*Spiraea tomentosa*). The herbaceous layer is usually very sparse, with scattered sedges (*Carex* spp.), Pennsylvania smartweed (*Polygonum pensylvanicum*), and swamp smartweed (*Polygonum hydropiperoides*) typical. There may also be mosses (*Sphagnum* spp.) and algae growing on or between boulders that are inundated for extended periods of time.
Most Abundant Species: The most abundant species are mosses and/or lichens. These non-vascular plants were not identified during this study, but should be identified by future studies.
Characteristic Species: *Polygonum* spp., *Spiraea tomentosa*, *Vaccinium corymbosum.*
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk data:

State	State Rank	Confidence	State Name	Reference
NJ	SNR	3	Eastern Woodland Vernal Pool Sparse Vegetation	Walz et al. 2006
PA	S1?	3	no crosswalk	Fike 1999

Local Range: This association is known from five occurrences within the park associated with the top of Kittatinny Ridge. Four examples occur in New Jersey and one example occurs near the former Mount Minsi fire tower in Pennsylvania.
Classification Comments: This vegetation type needs further investigation as it was described from field observations during accuracy assessment sampling. It differs from Eastern Woodland Vernal Pool Sparse Vegetation in having a boulderfield substrate and having a distribution limited to open ridgetops with little or no canopy cover.
Other Comments: Fairy shrimp (*Eubranchipus* sp.) were observed in the Pennsylvania occurrence in September 2003.
Local Description Authors: G. S. Podniesinski (PNHP).
Plots and Data Sources: Accuracy Assessment Observation Points DEWA.1019, DEWA.1024, DEWA.1029, DEWA.1030.
Delaware Water Gap National Recreation Area Inventory Notes: Information not available.

GLOBAL INFORMATION

NVC CLASSIFICATION

Physiognomic Class	Sparse Vegetation (VII)
Physiognomic Subclass	Unconsolidated material sparse vegetation (VII.C.)
Physiognomic Group	Sparsely vegetated soil flats (VII.C.4.)
Physiognomic Subgroup	Natural/Semi-natural sparsely vegetated soil flats (VII.C.4.N.)
Formation	Seasonally / temporarily flooded mud flats (VII.C.4.N.c.)
Alliance	Non-tidal Mud Flat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance (A.1878)
Alliance (English name)	Non-tidal Mud Flat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance
Association	Eastern Woodland Vernal Pool Sparse Vegetation [Provisional]
Association (English name)	Eastern Woodland Vernal Pool Sparse Vegetation
Ecological System(s):	Information not available

GLOBAL DESCRIPTION

Concept Summary: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high water tables, seasonal flooding in nearby streams and drainages, and/or impervious bedrock at or near the surface. The substrate is mineral soil with or without a layer of muck. The species composition is variable among sites, as well as annually and seasonally. Larger examples of this community type may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae.

Environmental Description: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high water tables, seasonal flooding in nearby streams and drainages, and/or impervious bedrock at or near the surface. The substrate in most vernal pools is mineral soil with or without a layer of muck, but some are boulder-filled depressions. Boulder vernal pools may dry out completely in the summer, and their hydrology is controlled by impervious bedrock below the boulderfield.

Vegetation Description: The species composition is variable among sites, variable annually, and variable seasonally. Larger examples may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae. Cover may be sparse and often varies through the season. Species composition is extremely variable, and of the species listed below, only a few are likely to be found on any one site. Typical representatives include *Dulichium arundinaceum, Glyceria* sp., *Leersia oryzoides, Scirpus cyperinus, Lycopus uniflorus, Polygonum* spp., *Thelypteris palustris, Carex gynandra, Carex crinita, Carex leptonervia, Carex stipata, Carex canescens, Carex vesicaria, Juncus effusus, Bidens* spp., *Hypericum mutilum, Hypericum canadense, Osmunda cinnamomea, Osmunda regalis, Agrostis scabra, Utricularia geminiscapa, Triadenum virginicum, Sagittaria* sp., and *Eleocharis* spp. Although this community type is predominantly herbaceous, shrubs and small trees may be present. Typical woody species include *Vaccinium corymbosum, Lyonia ligustrina, Quercus palustris, Nyssa sylvatica, Acer rubrum, Salix* spp., *Cephalanthus occidentalis*, and *Ilex verticillata*.

Most Abundant Species:

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Ilex verticillata*, *Vaccinium corymbosum*
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*
Herb (field)	Forb	*Sagittaria latifolia*
Herb (field)	Graminoid	*Juncus effusus*, *Leersia oryzoides*
Herb (field)	Fern or fern ally	*Thelypteris palustris*

Characteristic Species: *Cephalanthus occidentalis*, *Leersia oryzoides*, *Sagittaria latifolia*, *Thelypteris palustris.*
Other Noteworthy Species: *Scirpus ancistrochaetus.*
USFWS Wetland System: Palustrine.

DISTRIBUTION

Range: This association occurs in the northeastern U.S., and presumably in adjacent Canada, primarily in glaciated or periglacial areas, from Quebec and New Brunswick south through New York to northern Pennsylvania and northern New Jersey.
States/Provinces: CT, MA, ME, NH, NJ, NY, PA, RI, VT.
Federal Lands: NPS (Acadia, Delaware Water Gap); USFWS (Great Swamp).

CONSERVATION STATUS

Rank: GNR (8-Feb-2006).
Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Provisional.
Confidence: 3 – Weak.
Comments: Recognition of vernal pool associations is complicated not only by the lack of good data but by the seasonal and spatial variability in composition. The largest factor, however, is that vernal pools are generally defined by their invertebrate and amphibian communities and often do not have characteristic suites of plant species. This type should be considered tentative pending more data.
Similar Associations: Information not available.
Related Concepts: Information not available.

SOURCES

Description Authors: S. C. Gawler.
References: Colburn 2004, Eastern Ecology Working Group n.d., Fike 1999, Thompson and Sorenson 2000.

Figure 123. Boulder Vernal Pool Sparse Vegetation in Delaware Water Gap National Recreation Area (near Mt. Minsi in Pennsylvania). April 2006.

Figure 124. Boulder Vernal Pool Sparse Vegetation in Delaware Water Gap National Recreation Area (Accuracy Assessment Obersvation Point DEWA.1024). June 2006.

COMMON NAME (PARK-SPECIFIC): EASTERN WOODLAND VERNAL POOL SPARSE VEGETATION

SYNONYMS
NVC English Name: **Eastern Woodland Vernal Pool Sparse Vegetation**
NVC Scientific Name: **Eastern Woodland Vernal Pool Sparse Vegetation [Provisional]**
NVC Identifier: **CEGL006453**

LOCAL INFORMATION

Environmental Description: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high ground water tables, seasonal flooding in nearby streams and drainages, and or impervious bedrock at or near the surface. The substrate is mineral soil with or without a layer of muck. The species composition is variable among sites, as well as annually and seasonally. Larger examples of this community type may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae.
Vegetation Description: Cover may be sparse. Species composition is extremely variable; some typical representatives include (although only a few are likely to be found on any one site) threeway sedge (*Dulichium arundinaceum*), mannagrass (*Glyceria* sp.), rice cutgrass (*Leersia oryzoides*), woolgrass (*Scirpus cyperinus*), barbed-bristle bulrush (*Scirpus ancistrochaetus*), northern bugleweed (*Lycopus uniflorus*), knotweeds (*Polygonum* spp.), eastern marsh fern (*Thelypteris palustris*), nodding sedge (*Carex gynandra*), fringed sedge (*Carex crinita*), nerveless woodland sedge (*Carex leptonervia*), owlfruit sedge (*Carex stipata*), silvery sedge (*Carex canescens*), blister sedge (*Carex vesicaria*), common rush (*Juncus effusus*), beggarticks (*Bidens* spp.), dwarf St. Johnswort (*Hypericum mutilum*), lesser Canadian St. Johnswort (*Hypericum canadense*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), rough bentgrass (*Agrostis scabra*), hidden-fruit bladderwort (*Utricularia geminiscapa*), Virginia marsh St. Johnswort (*Triadenum virginicum*), arrowhead (*Sagittaria* sp.), and spikerushes (*Eleocharis* spp.). Although this community type is predominantly herbaceous, shrubs and small trees may be present. Typical woody species include highbush blueberry (*Vaccinium corymbosum*), maleberry (*Lyonia ligustrina*), pin oak (*Quercus palustris*), blackgum (*Nyssa sylvatica*), red maple (*Acer rubrum*), willows (*Salix* spp.), common buttonbush (*Cephalanthus occidentalis*), and common winterberry (*Ilex verticillata*).
Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum, Nyssa sylvatica, Quercus palustris*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Ilex verticillata, Vaccinium corymbosum, Salix* spp.
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*
Herb (field)	Forb	*Sagittaria latifolia, Polygonum* spp.
Herb (field)	Graminoid	*Juncus effusus, Leersia oryzoides, Eleocharis* spp.
Herb (field)	Fern or fern ally	*Thelypteris palustris*

Characteristic Species: *Cephalanthus occidentalis, Leersia oryzoides, Sagittaria latifolia, Thelypteris palustris, Polygonum* spp., *Bidens* spp., *Eleocharis* spp.
Other Noteworthy Species: *Scirpus ancistrochaetus.*
Subnational Distribution with Crosswalk data:

State	State Rank	Confidence	State Name	Reference
NJ	SNR	3	Eastern Woodland Vernal Pool Sparse Vegetation	Walz et al. 2006
PA	S3	1	Herbaceous vernal pond	Fike 1999

Local Range: This association is found scattered throughout the park, primarily in forested settings.
Classification Comments: This association is characterized by a seasonally flooded depression lined with leaf litter. It differs from Boulder Vernal Pool Sparse Vegetation that has a boulderfield substrate instead of leaf litter.
Other Comments: These ponds lack mature fish populations and therefore can provide critical breeding habitat for several species of amphibians. They are also an important habitat resource for many species of birds, mammals, reptiles, amphibians, and invertebrates.
Local Description Authors: G. S. Podniesinski and J. Fike (PNHP).
Plots and Data Sources: Accuracy Assessment Observation Point DEWA.109; Fike 1999.
Delaware Water Gap National Recreation Area Inventory Notes: Information not available.

GLOBAL INFORMATION

NVC CLASSIFICATION

Physiognomic Class	Sparse Vegetation (VII)
Physiognomic Subclass	Unconsolidated material sparse vegetation (VII.C.)
Physiognomic Group	Sparsely vegetated soil flats (VII.C.4.)
Physiognomic Subgroup	Natural/Semi-natural sparsely vegetated soil flats (VII.C.4.N.)
Formation	Seasonally / temporarily flooded mud flats (VII.C.4.N.c.)
Alliance	Non-tidal Mud Flat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance (A.1878)
Alliance (English name)	Non-tidal Mud Flat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance
Association	Eastern Woodland Vernal Pool Sparse Vegetation [Provisional]
Association (English name)	Eastern Woodland Vernal Pool Sparse Vegetation
Ecological System(s):	Information not available

GLOBAL DESCRIPTION

Concept Summary: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high water tables, seasonal flooding in nearby streams and drainages, and/or impervious bedrock at or near the surface. The substrate is mineral soil with or without a layer of muck. The species composition is variable among sites, as well as annually and seasonally. Larger examples of this community type may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae.
Environmental Description: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high water tables, seasonal flooding in nearby streams and drainages, and/or

impervious bedrock at or near the surface. The substrate in most vernal pools is mineral soil with or without a layer of muck, but some are boulder-filled depressions. Boulder vernal pools may dry out completely in the summer, and their hydrology is controlled by impervious bedrock below the boulderfield.

Vegetation Description: The species composition is variable among sites, variable annually, and variable seasonally. Larger examples may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae. Cover may be sparse and often varies through the season. Species composition is extremely variable, and of the species listed below, only a few are likely to be found on any one site. Typical representatives include *Dulichium arundinaceum, Glyceria* sp., *Leersia oryzoides, Scirpus cyperinus, Lycopus uniflorus, Polygonum* spp., *Thelypteris palustris, Carex gynandra, Carex crinita, Carex leptonervia, Carex stipata, Carex canescens, Carex vesicaria, Juncus effusus, Bidens* spp., *Hypericum mutilum, Hypericum canadense, Osmunda cinnamomea, Osmunda regalis, Agrostis scabra, Utricularia geminiscapa, Triadenum virginicum, Sagittaria* sp., and *Eleocharis* spp. Although this community type is predominantly herbaceous, shrubs and small trees may be present. Typical woody species include *Vaccinium corymbosum, Lyonia ligustrina, Quercus palustris, Nyssa sylvatica, Acer rubrum, Salix* spp., *Cephalanthus occidentalis,* and *Ilex verticillata.*

Most Abundant Species:

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Ilex verticillata, Vaccinium corymbosum*
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis*
Herb (field)	Forb	*Sagittaria latifolia*
Herb (field)	Graminoid	*Juncus effusus, Leersia oryzoides*
Herb (field)	Fern or fern ally	*Thelypteris palustris*

Characteristic Species: *Cephalanthus occidentalis, Leersia oryzoides, Sagittaria latifolia, Thelypteris palustris.*

Other Noteworthy Species: *Scirpus ancistrochaetus.*

USFWS Wetland System: Palustrine.

DISTRIBUTION

Range: This association occurs in the northeastern U.S., and presumably in adjacent Canada, primarily in glaciated or periglacial areas, from Quebec and New Brunswick south through New York to northern Pennsylvania and northern New Jersey.

States/Provinces: CT, MA, ME, NH, NJ, NY, PA, RI, VT.

Federal Lands: NPS (Acadia, Delaware Water Gap); USFWS (Great Swamp).

CONSERVATION STATUS

Rank: GNR (8-Feb-2006).

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Provisional.

Confidence: 3 – Weak.

Comments: Recognition of vernal pool associations is complicated not only by the lack of good data but by the seasonal and spatial variability in composition. The largest factor, however, is

that vernal pools are generally defined by their invertebrate and amphibian communities and often do not have characteristic suites of plant species. This type should be considered tentative pending more data.
Similar Associations: Information not available.
Related Concepts: Information not available.

SOURCES
Description Authors: S. C. Gawler.
References: Colburn 2004, Eastern Ecology Working Group n.d., Fike 1999, Thompson and Sorenson 2000.

Figure 125. Eastern Woodland Vernal Pool Sparse Vegetation in Delaware Water Gap National Recreation Area (near Lock Lomond in Pennsylvania). July 2006.

Figure 126. Eastern Woodland Vernal Pool Sparse Vegetation in Delaware Water Gap National Recreation Area (near Hornbecks Creek in Pennsylvania). July 2006.

COMMON NAME (PARK-SPECIFIC): WOODED SUCCESSIONAL OLD FIELD

SYNONYMS

NVC English Name:	**Red Maple - Oak species / Eastern Red-cedar / Goldenrod species Woodland**
NVC Scientific Name:	***Acer rubrum* - *Quercus* spp. / *Juniperus virginiana* / *Solidago* spp. Woodland**
NVC Identifier:	**CEGL006452**

LOCAL INFORMATION

Environmental Description: This association occurs in fields that are not plowed or planted in crops or hay grasses. Although these fields may be periodically mowed, woody plants have become established and tree cover varies from 25 to 60%. Some of these sites are old homesteads from which the houses have been removed. These sites contain moderately well-drained to well-drained soils, typically of the Manlius, Chenango, Pope, and Venango series, among others. These fields may contain drainage swales in which the vegetation is similar to that of Wet Meadow.

Vegetation Description: Characteristic vegetation for this association is a diverse mixture of goldenrods, cool-season grasses, and agricultural weeds combined with an open woodland of early- and mid-successional tree species. Tree canopy cover varies from 25 to 60% and is variable in composition and may include early-successional species such as eastern red-cedar (*Juniperus virginiana*), gray birch (*Betula populifolia*), choke cherry (*Prunus virginiana*), black walnut (*Juglans nigra*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), as well as mid- to late-successional species such as sugar maple (*Acer saccharum*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), and hickories (*Carya* spp.). Shrubs may be present but with total cover less than 25%. Common shrubs are eastern red-cedar, gray dogwood (*Cornus racemosa*), northern dewberry (*Rubus flagellaris*), Allegheny blackberry (*Rubus allegheniensis*), wine raspberry (*Rubus phoenicolasius*), black raspberry (*Rubus occidentalis*), and the invasive species autumn-olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), and Japanese barberry (*Berberis thunbergii*). The herbaceous layer is typically dense (80-100% cover). Species dominance in this layer shifts through the growing season, with cool-season grasses dominant early in the summer and goldenrods dominant later in the summer. Within each field, species may be locally abundant and often have patchy distribution. The two characteristically dominant species are wrinkleleaf goldenrod (*Solidago rugosa*) and sweet vernalgrass (*Anthoxanthum odoratum*). Other abundant species include flat-top goldentop (*Euthamia graminifolia*), meadow hawkweed (*Hieracium caespitosum*), red fescue (*Festuca rubra*), common cinquefoil (*Potentilla simplex*), wild bergamot (*Monarda fistulosa*), white bergamot (*Monarda clinopodia*), deertongue (*Dichanthelium clandestinum*), broomsedge bluestem (*Andropogon virginicus*), purple foxglove (*Digitalis purpurea*), lanceleaf wild licorice (*Galium lanceolatum*), Kentucky bluegrass (*Poa pratensis*), and common yarrow (*Achillea millefolium*). Other common associates are false baby's breath (*Galium mollugo*), common St. Johnswort (*Hypericum perforatum*), white clover (*Trifolium repens*), Queen Anne's lace (*Daucus carota*), common dandelion (*Taraxacum officinale*), meadow ryegrass (*Lolium pratense*), Virginia mountainmint (*Pycnanthemum virginianum*), little bluestem (*Schizachyrium scoparium*), and common gypsyweed (*Veronica officinalis*).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum, Acer saccharum, Juglans nigra, Quercus velutina*
Tall shrub/sapling	Needle-leaved tree	*Juniperus virginiana*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cornus racemosa, Elaeagnus umbellata, Rosa multiflora*
Short shrub/sapling	Broad-leaved deciduous shrub	*Berberis thunbergii, Rubus allegheniensis, Rubus flagellaris, Rubus occidentalis, Rubus phoenicolasius, Rosa multiflora*
Herb (field)	Forb	*Euthamia graminifolia, Solidago rugosa*
Herb (field)	Graminoid	*Anthoxanthum odoratum, Festuca rubra*

Characteristic Species: *Acer rubrum, Acer saccharum, Achillea millefolium, Anthoxanthum odoratum, Daucus carota, Dichanthelium clandestinum, Elaeagnus umbellata, Euthamia graminifolia, Juglans nigra, Juniperus virginiana, Lolium pratense, Monarda fistulosa, Pycnanthemum virginianum, Quercus velutina, Rosa multiflora, Solidago rugosa, Taraxacum officinale.*

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk data:

State	State Rank	Confidence	State Name	Reference
NJ	SNA	3	no crosswalk	Walz et al. 2006
PA	SNA	3	no crosswalk	Fike 1999

Local Range: This common vegetation type occurs throughout the park.

Classification Comments: Wooded Successional Old Field is identified by a thick layer of herbaceous-graminoid vegetation dominated by a diverse mixture of goldenrods, cool-season grasses, and agricultural weeds in combination with an open hardwood woodland. Tree cover varies from 25 to 60%. This type differs from Northeastern Modified Successional Forest in the lack of vine species, greater cover of mid- to late-successional tree species and lower cover of invasive shrub species. This vegetation type appears to have a clearer successional trajectory towards a native forest type than does Northeastern Modified Successional Forest.

Other Comments: None.

Local Description Authors: G. Podniesinski and S. J. Perles (PNHP).

Plots and Data Sources: Accuracy Assessment Observation Points DEWA.30, DEWA.324, DEWA.412.

Delaware Water Gap National Recreation Area Inventory Notes: Information not available.

GLOBAL INFORMATION

NVC CLASSIFICATION

Physiognomic Class	Information not available.
Physiognomic Subclass	Information not available.
Physiognomic Group	Information not available.
Physiognomic Subgroup	Information not available.
Formation	Information not available.
Alliance	Information not available.
Alliance (English name)	Information not available.
Association	*Acer rubrum* - *Quercus* spp. / *Juniperus virginiana / Solidago* spp. Woodland
Association (English name)	Red Maple - Oak species / Eastern Red-cedar / Goldenrod species Woodland
Ecological System(s):	Information not available

GLOBAL DESCRIPTION

Concept Summary: Information not available.
Environmental Description: Information not available.
Vegetation Description: Information not available.
Most Abundant Species: Information not available.
Characteristic Species: Information not available.
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable.

DISTRIBUTION

Range: Information not available.
States/Provinces: Information not available.
Federal Lands: NPS (Delaware Water Gap).

CONSERVATION STATUS

Rank: GNR (8-Feb-2006).
Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Nonstandard.
Confidence: Information not available.
Comments: Information not available.
Similar Associations: Information not available.
Related Concepts: Information not available.

SOURCES

Description Authors: Information not available.
References: Eastern Ecology Working Group n.d.

Figure 127. Wooded Successional Old Field in Delaware Water Gap National Recreation Area (along Route 209 in Pennsylvania). June 2006.

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As the nation's primary conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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