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# Survey of Tidal Marsh Natural Area, Neshaminy State Park

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# Survey of Tidal Marsh Natural Area, Neshaminy State Park

## **Abstract**

Neshaminy State Park is the only unit of the Bureau of State Parks that lies in the Atlantic Coastal Plain. There is little coastal plain in Pennsylvania, and only a few remnants that retain natural vegetation. As a result any significant fragments that remain are very likely to contain PNDI-listed plants and/or plant communities. This is certainly true of Neshaminy State Park. In addition the park lies along both sides of the Neshaminy Creek at its confluence with the Delaware River Estuary. Some of the best remaining fresh water tidal marsh habitat on the Pennsylvania side of the estuary lies along the Neshaminy Creek in the park. An 8-acre tract of tidal marsh adjacent to the park along State Road has recently been purchased by the Natural Lands Trust and will soon be transferred to the park.

The park also includes populations of several rare coastal plain plants of upland areas or non-tidal wetlands including willow oak, wild bean, jointweed, broom-sedge, and round-leaved eupatorium. In addition we discovered populations of smartweed dodder and American holly.

## **Disciplines**

Botany

## Final Report

# Survey of Tidal Marsh Natural Area, Neshaminy State Park

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 June 2002

Neshaminy State Park is the only unit of the Bureau of State Parks that lies in the Atlantic Coastal Plain. There is little coastal plain in Pennsylvania, and only a few remnants that retain natural vegetation. As a result any significant fragments that remain are very likely to contain PNDI-listed plants and/or plant communities. This is certainly true of Neshaminy State Park. In addition the park lies along both sides of the Neshaminy Creek at its confluence with the Delaware River Estuary. Some of the best remaining fresh water tidal marsh habitat on the Pennsylvania side of the estuary lies along the Neshaminy Creek in the park. An 8-acre tract of tidal marsh adjacent to the park along State Road has recently been purchased by the Natural Lands Trust and will soon be transferred to the park.

The park also includes populations of several rare coastal plain plants of upland areas or non-tidal wetlands including willow oak, wild bean, jointweed, broom-sedge, and round-leaved eupatorium. In addition we discovered populations of smartweed dodder and American holly.

Table 1. PNDI-listed elements at Neshaminy State Park with date of most recent record.

water-hemp ragweed	<i>Amaranthus cannabinus</i>	1999	G5, S3, TU/PR*
bushy bluestem	<i>Andropogon glomeratus</i>	2001	G5, S3, TU/PR
swamp beggar-ticks	<i>Bidens bidentoides</i>	1999	G3, S1, PT/PE
smartweed dodder	<i>Cuscuta polygonorum</i>	1999	G5, SU, TU
walter's barnyard grass	<i>Echinochloa walteri</i>	1986	G5, S1, PE
dwarf spike-rush	<i>Eleocharis parvula</i>	1986	G5, S1, PE
round-leaved eupatorium	<i>Eupatorium rotundifolium</i>	2001	G5, S3, TU
mud-plantain	<i>Heteranthera multiflora</i>	1999	G4, S1, PE
American holly	<i>Ilex opaca</i>	1999	G5, S2, PT*
bugleweed	<i>Lycopus rubellus</i>	1991	G5, S1, PE
jointweed	<i>Polygonella articulata</i>	1993	G5, S1, TU/PE
willow oak	<i>Quercus phellos</i>	2001	G5, S2, PE
long-lobed arrowhead	<i>Sagittaria calycina</i>	1999	G5T4, S1, PE
subulate arrowhead	<i>Sagittaria subulata</i>	1999	G4, S3, PR
wild bean	<i>Strophostyles umbellata</i>	2001	G5, S2, N/PE
purple sandgrass	<i>Triplasis purpurea</i>	2001	G4G5, S1, PE
wild rice	<i>Zizania aquatica</i>	1999	G5, S3, PR
wild rice - water-hemp tidal marsh	natural community	2001	S2S3

The Tidal Marsh Natural Area along the south shore of the Neshaminy Creek contains an excellent examples of fresh water tidal marsh natural community and numerous associated PNDI-listed plants including wild rice, subulate arrowhead, long-lobed arrowhead, swamp beggar's-ticks, water-hemp ragweed, mud-plantain. In addition dwarf spike-rush has also been found there. We have also found a population of smartweed dodder in a portion of the natural area near the marina, which is not now tidal, but probably once was.

**Threats and management concerns** - Tidal marsh along the Delaware River shoreline appears to be disappearing rapidly, presumably because of erosion caused by wakes from passing ships. Photographs from 1982 show robust marsh where today the river shore is bare.

Part of the marsh along State Road immediately downstream from the bridge is invaded by common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*), invasive, non-native weeds. Small populations of Japanese knotweed (*Polygonum cuspidatum*) are also present in along the riverbank in the park. All of these plants have the potential to spread. Another non-native invasive that is rampant in the park is mile-a-minute (*Polygonum perfoliatum*).

#### **Recommendations**

1. Establish a program to monitor the condition of the tidal marsh using aerial photography during the summer season when marsh vegetation is fully developed.
2. Eradicate Japanese knotweed populations and initiate programs to control common reed, purple loosestrife, and mile-a-minute.
3. Add the 8-acre additional tract of tidal marsh to the designated natural area as soon as it is transferred to the park.
4. Add wetlands along the north boundary of the marina site to the designated natural area.

\* **global ranks:** G1=critically imperiled globally, G2=imperiled globally, G3=rare or local throughout its range, G4=apparently secure globally, G5=demonstrably secure globally.

**state ranks:** S1=critically imperiled in PA, S2=imperiled in PA, S3=rare or uncommon in PA, S4=apparently secure in PA, S5=demonstrably secure in PA.

**Pennsylvania status:** PE=PA endangered, PT=PA threatened, PR=PA rare, PV=PA vulnerable, PX=PA extirpated, TU=tentatively undetermined.

## Neshaminy State Park Appendices

GPS data points for PNDI-listed species (ArcView shape file)

Natural community map (ArcView shape file)

Natural community descriptions

Species list for Neshaminy State Park

### PNDI species fact sheets

water-hemp ragweed	<i>Amaranthus cannabinus</i>
bushy bluestem	<i>Andropogon glomeratus</i>
swamp beggar-ticks	<i>Bidens bidentoides</i>
smartweed dodder	<i>Cuscuta polygonorum</i>
walter's barnyard grass	<i>Echinochloa walteri</i>
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round-leaved eupatorium	<i>Eupatorium rotundifolium</i>
mud-plantain	<i>Heteranthera multiflora</i>
American holly	<i>Ilex opaca</i>
bugleweed	<i>Lycopus rubellus</i>
jointweed	<i>Polygonella articulata</i>
willow oak	<i>Quercus phellos</i>
long-lobed arrowhead	<i>Sagittaria calycina</i>
subulate arrowhead	<i>Sagittaria subulata</i>
wild bean	<i>Strophostyles umbellata</i>
purple sandgrass	<i>Triplasis purpurea</i>
wild rice	<i>Zizania aquatica</i>

### Invasive species fact sheets

garlic mustard	<i>Alliaria petiolata</i>
purple loosestrife	<i>Lythrum salicaria</i>
common reed	<i>Phragmites australis</i>
Japanese knotweed	<i>Polygonum cuspidatum</i>
mile-a-minute	<i>Polygonum perfoliatum</i>

# **Plant Community Descriptions for Vegetation Map Tidal Marsh Natural Area, Neshaminy State Park**

(Naming of community types follows Fike (1999), except as noted; however, descriptions and lists of species are based on our observations at Neshaminy State Park.)

## **Forested Plant Communities**

### ***Sweetgum - oak coastal plain forest (S1)\****

Prominent trees in this forest type are sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), pin oak (*Quercus phellos*), willow oak (*Quercus phellos*), white oak (*Quercus alba*), blackgum (*Nyssa sylvatica*), and occasionally Bartram oak (*Quercus x heterophylla*). American holly (*Ilex opaca*) may also be present. At Neshaminy State Park the shrub layer is mainly arrow-wood (*Viburnum recognitum*); at other sites highbush blueberry (*Vaccinium corymbosum*) and sweet pepperbush (*Clethra alnifolia*) are typical. Greenbrier (*Smilax rotundifolia*) is often abundant.

### ***Silver maple floodplain forest (S3)***

This forest type forms a band along the river bank. Silver maple (*Acer saccharinum*) and box-elder (*Acer negundo*) are the most prominent species; other trees include American ash (*Fraxinus americana*), American elm (*Ulmus americana*), and river birch (*Betula nigra*). Shrubs include arrow-wood (*Viburnum recognitum*) and kinnikinnik (*Cornus amomum*).

## **Shrub-dominated Plant Communities**

### ***Alder - black willow- buttonbush tidal swamp***

This vegetation community consists of a shrub-dominated swamp adjacent to the riverbank; the water level is affected by the rise and fall of the tide. Dominant woody plants are alder (*Alnus serrulata*), buttonbush (*Cephalanthus occidentalis*), and black willow (*Salix nigra*); others include black ash (*Fraxinus nigra*), arrow-wood (*Viburnum recognitum*), winterberry holly (*Ilex verticillata*), kinnikinnik (*Cornus amomum*), and false indigo (*Amorpha fruticosa*). Herbaceous openings contain dense stands of arrow-arum (*Peltandra virginica*) and water purslane (*Ludwigia palustris*). Other herbaceous species present include water-willow (*Decodon verticillata*), swamp mallow (*Hibiscus moscheutos*), tall meadow-rue (*Thalictrum pubescens*), tearthumb (*Polygonum arifolium*), climbing hempweed (*Mikania scandens*), smartweed (*Polygonum punctatum*), water-plantain (*Alisma subcordatum*), and jewelweed (*Impatiens capensis*). The non-native invasive species purple loosestrife (*Lythrum salicaria*) is also present. This vegetation type is not described in Fike (1999), it was probably much more common before widespread modification of the riverbank. Only very small remnants of it persist in southeastern Pennsylvania.

### ***Buttonbush wetland (S4)***

This area is a low spot near the Neshaminy Creek, which very likely was once open to tidal influence but has been isolated from the tidal effect for many years. The dominant woody species are river birch (*Betula nigra*), buttonbush (*Cephalanthus occidentalis*) and black willow (*Salix nigra*). American elm (*Ulmus americana*), ash (*Fraxinus* sp.), and silver maple (*Acer saccharinum*) are also present. In openings that are seasonally inundated, the herbaceous layer is primarily smartweed (*Polygonum punctatum* and *P. pennsylvanica*) and beggar-ticks (*Bidens frondosa*). Several species of dodder (*Cuscuta gronovii*, *C. polygonorum*) are present on the smartweeds. The invasive non-native purple loosestrife (*Lythrum salicaria*) is also present.

### **Herbaceous Plant Communities**

#### ***Wild rice - water-hemp tidal marsh (S2S3)***

This natural community actually has two distinct sub-types.

***Low marsh-*** The low riverbank tidal marsh is nearest to the water and regularly inundated at high tide. The dominant plant is spatterdock (*Nuphar lutea*), which forms a canopy under which subulate arrowhead (*Sagittaria subulata*) forms a carpet. Other plants which may be present include long-lobed arrowhead (*Sagittaria calycina*), multi-flowered mud-plantain (*Heteranthera multiflora*), marsh purslane (*Ludwigia palustris*), chairmaker's rush (*Schoenoplectus pungens*), smartweed (*Polygonum punctatum*), Smith's bulrush (*Schoenoplectus smithii*), dwarf spike-rush (*Eleocharis parvula*), spike-rush (*Eleocharis obtusa* var. *peasii*), and at the upper edge, swamp beggar-ticks (*Bidens bidentoides*), showy beggar-ticks (*Bidens laevis*), water-hemp ragwort (*Amaranthus cannabinus*), and wild rice (*Zizania aquatica*). A non-native invasive species, Chinese lobelia (*Lobelia chinensis*), which was first identified at Neshaminy State Park in 1985, is present in some areas.

***High marsh-*** At a higher position on the riverbank, in more-or-less level areas that are inundated only at times of higher than usual tides, a more robust community of marsh vegetation exists. Sweet-flag (*Acorus calamus*), a non-native plant, is a prominent component. Growing with it are water-hemp ragweed (*Amaranthus cannabinus*), wild rice (*Zizania aquatica*), rice cutgrass (*Leersia oryzoides*), purple-stem aster (*Aster puniceus*), wingstem (*Verbesina alternifolia*), jewelweed (*Impatiens capensis*), mad-dog skullcap (*Scutellaria lateriflora*), monkey-flower (*Mimulus ringens*), smartweed (*Polygonum punctatum*), cat-tail (*Typha latifolia*), false nettle (*Boehmeria cylindrica*), and climbing hempweed (*Mikania scandens*), tearthumb (*Polygonum arifolium* and *P. sagittatum*), and arrowhead (*Sagittaria latifolia*). Other invasive species present include reed canary grass (*Phalaris arundinacea*), purple loosestrife (*Lythrum salicaria*), and common reed (*Phragmites australis*).

#### ***Successional old field***

Old fields are present along State Road west of the Neshaminy Creek. Portions of these areas are maintained by regular mowing; in other areas groves of trees are invading including sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and black

locust (*Robinia pseudoacacia*). The rare wild bean (*Strophostyles umbellata*) grows along the edges of the fields in areas that do not receive excessive mowing.

### **Anthropogenic Communities**

#### ***Conifer plantation***

An old planting of white pine (*Pinus strobus*) is present in one location. These trees are becoming very brittle with age and considerable storm breakage has occurred recently. Poison ivy (*Toxicodendron radicans*) is common in the understory.

#### ***Dredge spoil deposition areas***

Sites where dredge spoil from the river was deposited in the past are sandy, open areas with very sparse vegetation. Scattered trees, mostly willow oak (*Quercus phellos*) are present and herbaceous species include purple sandgrass (*Triplasis purpurea*), a state rarity. Common reed (*Phragmites australis*) has invaded the lower, moister, portions of these sites at Neshaminy.

\* State element ranks from DCNR Preliminary list; 1=critically imperiled, S2=imperiled, S3=rare or uncommon, S4=apparently secure, S5=secure.

### **References**

Fike, Jean. 1999. Terrestrial and Palustrine Plant Communities of Pennsylvania. Department of Conservation and Natural Resources, Bureau of Forestry, Harrisburg, PA.



## PNDI-Listed Plants of Neshaminy State Park

### WATER-HEMP RAGWEED *Amaranthus cannabinus* (L.) Sauer Amaranth Family (Amaranthaceae)

State status S3, PR  
Global status G5



*flowering branch of  
water-hemp ragweed*

**Description** - Water-hemp ragweed is an erect branched annual that can reach 6–8 feet in height. The leaves are arranged alternately on the stem and are narrow with a long, tapering tip. The flowers are small and are clustered on short branches from the axils of the upper leaves. Male and female flowers are produced on separate plants, making the species dioecious. The fruits are small and dry utricles.

**Habitat** - This species occupies the upper zone of the freshwater intertidal zone, where only the base of the plant is likely to be inundated at high tide.

**Range** - Water-hemp ragweed grows in tidal marshes along the Atlantic coast from Maine to Florida. In Pennsylvania it is limited to the tidal portions of the Delaware River and its tributaries.

**Traditional uses** - None recorded.

**Management issues** - This species is one of the most tenacious of the PNDI-listed tidal marsh plants; as long as intertidal habitat exists it will persist. However, riverbank erosion caused by turbulence from passing boats, bulk heading, and filling all threaten the overall marsh community and have eliminated this plant in areas where it formerly grew.



*female flower*



*male flower*

**BROOM-SEDGE, BUSHY BLUESTEM**      State status S3, TU/PR  
*Andropogon glomeratus* (Walter) Britton, Stearns & Poggenb.    Global status G5  
Grass Family (Poaceae)



**Description** - Although this perennial, warm season grass doesn't bloom until late in the season (August–October), the old flowering stalks from the previous year often persist making it easy to spot almost any time of the year. The densely clustered tuft of flowers at the stem tip is distinctive; there are only two grasses in our region with this appearance. The other, Elliott's beardgrass (*A. gyrans*) is also a species of concern (TU).

In some manuals broom-sedge is referred to as *Andropogon virginicus* var. *abbreviatus*.

**Habitat** - Broom-sedge occurs in moist, acidic fields, meadows, and openings.

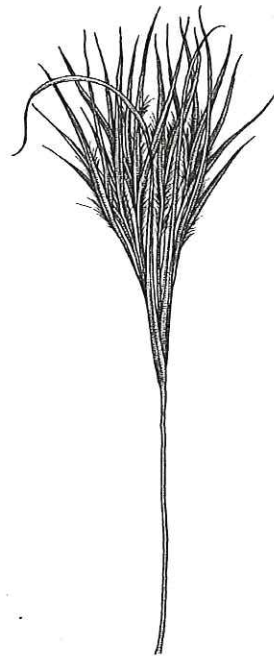
*broom sedge in fruit*

**Range** - Broom-sedge occurs on or near the coastal plain from Massachusetts to North Carolina. Although French Creek State Park is well within the Piedmont, the sandy, moist, acidic soils in the former Kravitz tract mimic coastal plain conditions. Broom-sedge is one of several coastal plain species growing at the site.

**Traditional uses** - none recorded

**Management issues** - The open fields where broom-sedge is growing at French Creek State Park will become forested through the natural process of secondary succession if steps are not taken to keep them open. Red maple is invading rapidly. Annual mowing in the fall or winter is suggested. Cutting the trees and treating the stumps with herbicide would also help to retard the successional process.

The fields also provide habitat for spotted turtles and wood turtles. In the fall thousands of monarch butterflies have been observed feeding on the large stand of asters.



*fruiting stem*

## SWAMP BEGGAR-TICKS

*Bidens bidentoides* (Nutt.) Britton  
Aster Family (Asteraceae)

State status S1, PT/PE  
Global status G3



*swamp beggar-ticks*

**Description** - Swamp beggar-ticks is a smooth, branched annual that grows to a height of 1–2 feet. Its narrow, toothed leaves may be green or reddish in color; they are simple and are arranged in pairs along the stem. Flowers appear in the fall. The flowering heads are entirely composed of yellow disk flowers, there are no rays present.

The most important feature distinguishing swamp beggar-ticks from other species of *Bidens* that may occur in the same habitat, is the upward-pointing barbs on the awns of the achene (seed).



*achene*

**Habitat** - Swamp beggar-ticks is a plant of fresh water intertidal marshes, the portion of riverbank that is exposed at low tide and inundated when the tide is high. It tends to occupy the upper part of the intertidal zone.

**Range** - This species has a very restricted range; it occurs in tidal portions of coastal rivers from New York to Maryland, including the Hudson, Delaware, and Potomac Rivers.

**Traditional uses** - None recorded.

**Management issues** - Riverbank tidal marshes must be protected from erosion from passing boats and the impact of invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*).



*flowering head with surrounding bracts*

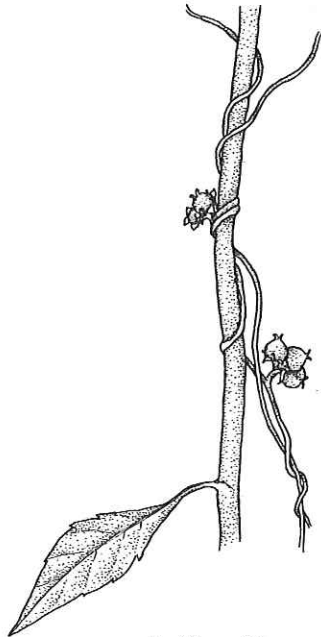
## SMARTWEED DODDER

*Cuscuta polygonorum*

Dodder Family (Cuscutaceae)

State status SU, TU

Global status G5



*a dodder with  
seed capsules*

**Description** - The dodders are inconspicuous plants that do not photosynthesize, but rather extract their nourishment directly from other living plants. Dodder wraps its slender, yellowish-orange stems around the stems of other plants and produces absorbing structures that penetrate the host. By mid to late summer masses of dodder stems sometimes cover other vegetation in wetland areas.

Small white flowers are formed in dense clusters along the stems in late summer; the flowers of smartweed dodder have only 4 petals unlike most species, which are 5-merous. Seed capsules mature in the fall; as annuals, dodder must grow from seed again each year.

Ten species of dodder are known from Pennsylvania and they can be difficult to distinguish, even for experts. The host plant on which they are growing is not a reliable clue, as many have a broad range of species that they can parasitize.

**Habitat** - Dodders grow in moist, open habitats such as wet fields, marshes, and stream banks. At Neshaminy State Park smartweed dodder is growing in a low, wet area that was probably tidal at one time but is now isolated from the river.

Some dodders are considered pests of other plants because of their parasitic life style; in masses they can also serve as a pathway for viruses and other pathogens to move throughout a population of host plants.

**Range** - Smartweed dodder occurs from New York and Ontario west to North Dakota and south to Tennessee and Texas. In Pennsylvania it is known from a handful of locations scattered throughout the state. Because of the difficulty many people have in identifying dodder species, this plant may actually be more common in the state than has been previously recognized.

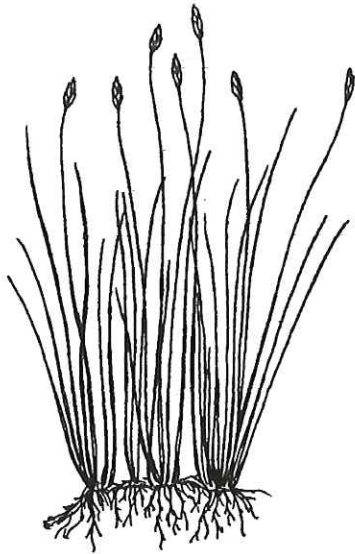
**Traditional Uses** - Referred to as "women without children", some species of dodder were used by Native American women as a contraceptive.

**Management Issues** - Dodder does not require any special management other than the maintenance of the wetland areas that is their habitat.

## DWARF SPIKE-RUSH

State status S1, PE

*Eleocharis parvula* (Roehm. & Schult.) Link ex Buffon & Fingerh. Global status G5  
Sedge Family (Cyperaceae)



**Description** - Dwarf spike-rush is a tiny plant only a few inches tall. Its slender stems form matted tufts connected by rhizomes that creep through the mud just below the surface. This plant has no leaves, its flowering and fruiting heads are located at the tips of the stems.

**Habitat** - Dwarf spike-rush is a plant of tidal shores and mudflats.

**Range** - This species is known from salt marshes in eastern and western North America and at inland locations east of the Mississippi River. In 1994 it was first reported in Ohio, and has apparently only recently arrived in Pennsylvania where it was first found at Neshaminy State Park in 1984. It has subsequently spread to other intertidal marshes along the Delaware River.

**Traditional uses** - None recorded.

**Management issues** - Riverbank tidal marshes must be protected from erosion from passing boats and the impact of invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*).

### Reference

Ungar, Irwin A., Finley A. Bryan, Jackie Adams, and Carolyn H. Keiffer. 1994. *Eleocharis parvula* (R.&S.) Link., a new species record for the flora of Ohio. Ohio J. Sci. 94(3): 74.

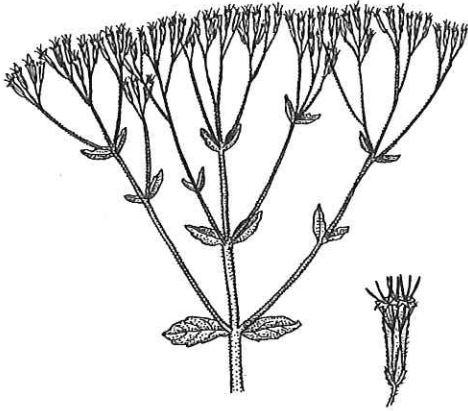
## ROUND-LEAVED EUPATORIUM

*Eupatorium rotundifolium* L. var. *rotundifolium*

Aster Family (Asteraceae)

State status S3, TU

Global status G5



*inflorescence and single flowering head of round-leaved eupatorium*

**Description** - Round-leaved eupatorium is an erect plant that branches only in the inflorescence. The numerous pairs of hairy leaves are attached directly to the stem. The tiny white flowers occur in groups of 5 in small heads at the ends of short branches at the top of the stem.

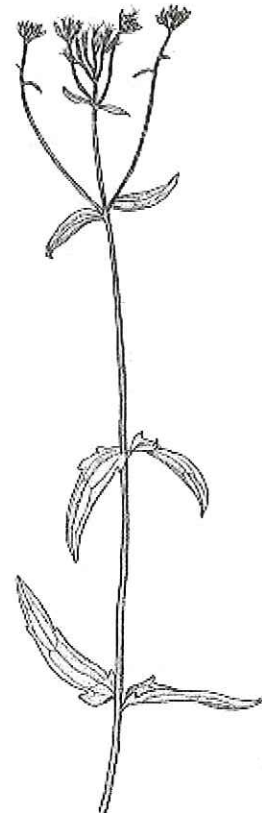
Round-leaved eupatorium intergrades with ragged eupatorium (*Eupatorium pilosum*) and may not always be separable.

**Habitat** - This species grows in successional habitats including old fields, thickets and open woods. It grows in moist, sandy or clayey soil.

**Range** - Round-leaved eupatorium occurs from Maine to Florida and west to southern Ohio, eastern Kentucky, Tennessee, Oklahoma, and Texas. In Pennsylvania is known from only a few sites in the southeast.

**Traditional uses** - *Eupatorium pilosum* was used by Native Americans to treat breast complaints, colds, urinary problems, and as a laxative and tonic.

**Management issues** - Open, successional habitat is necessary for the survival of this species at Neshaminy State Park. The area where it is currently growing is severely threatened by a spreading infestation of mile-a-minute weed (*Polygonum perfoliatum*), an invasive species.

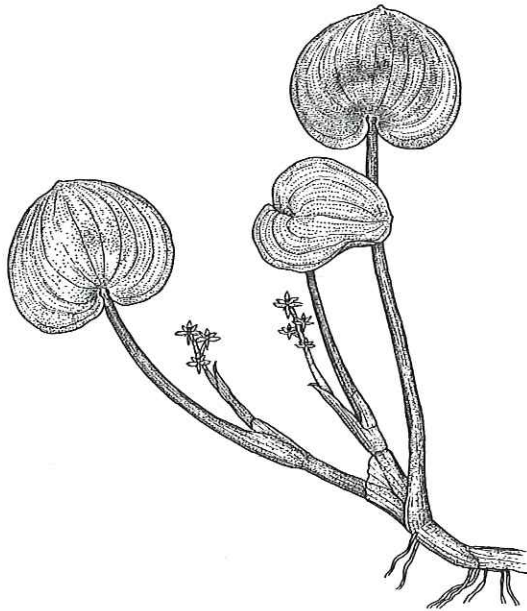


*ragged eupatorium*

## MULTIFLOWERED MUD-PLANTAIN

*Heteranthera multiflora* (Griseb.) Horn  
Water Hyacinth Family (Pontederiaceae)

State status S1, PE  
Global status G4



**Description** - Multiflowered mud-plantain is a low-growing, creeping plant. It may be grow completely inundated or with some leaves floating; it can also grow on moist, exposed mud flats. The leaves are bright green, broadly heart-shaped, and about 2–3 inches long. The flowers are clustered in a sheathing structure in the axils of the leaves.

Multiflowered mud-plantain is very similar to the more common *Heteranthera reniformis*. The most definitive distinguishing characteristics are the longer flowering spike and purple hairs on the filaments of *H. multiflora*.

**Habitat** - This species is a plant of freshwater tidal shores and mud flats.

**Range** - The main range of this species is in the central United States from Nebraska, Kansas, and Oklahoma to Illinois and Mississippi. It also occurs on the Atlantic Coastal Plain from New Jersey to North Carolina. In Pennsylvania it is known only from the few remaining freshwater tidal marshes along the Delaware Estuary.

**Traditional Uses** - Native Americans used hot poultices of the root to treat inflamed wounds and sores.

**Management issues** - Riverbank tidal marshes must be protected from erosion from passing boats and the impact of invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*).

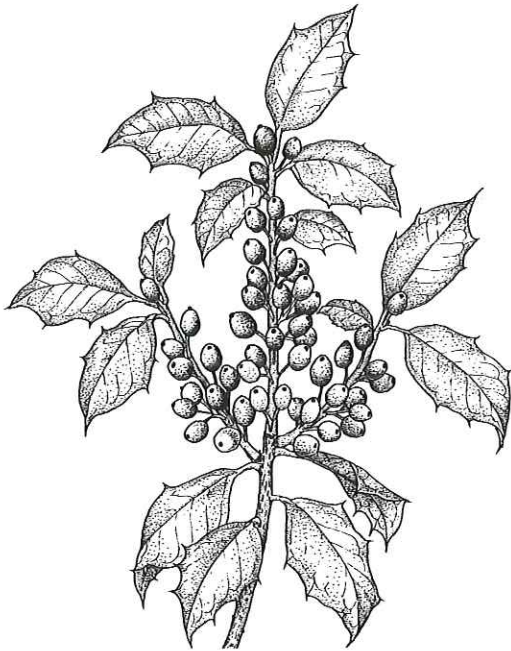
## AMERICAN HOLLY

*Ilex opaca* Aiton

Holly Family (Aquifoliaceae)

State status S2, PT

Global status G5



*fruiting branch of American holly*

**Description** - American holly is a native evergreen tree that is easily recognized by its spiny leaves and red berries used at Christmas time. Holly blooms in May, when the new leaves are expanding; male and female flowers are borne on separate trees. Only the female trees produce berries.

**Habitat** - Holly is an understory tree of moist forests.

**Range** - American holly occurs from Maine to Florida and Texas. In the north it is limited to coastal areas, further south it ranges into the interior. In Pennsylvania holly grows in the lower Susquehanna valley, on the Atlantic Coastal Plain in Bucks County, and at a few other scattered sites.

Scattered plants of American holly frequently seed into urban and suburban woodlots from cultivated sources, making the determination of what constitutes a native occurrence difficult at times.

**Traditional Uses** - Native Americans had many uses for American holly. The wood was used to carve spoons and decorations; a decoction of the bark was prepared to treat sore eyes. The berries were chewed for relief from gastrointestinal problems and infusions of the leaves were employed to treat measles and sores.

**Management issues** - The few remaining native stands of American holly in Pennsylvania should be protected. The most critical issue is preventing further habitat loss or fragmentation.

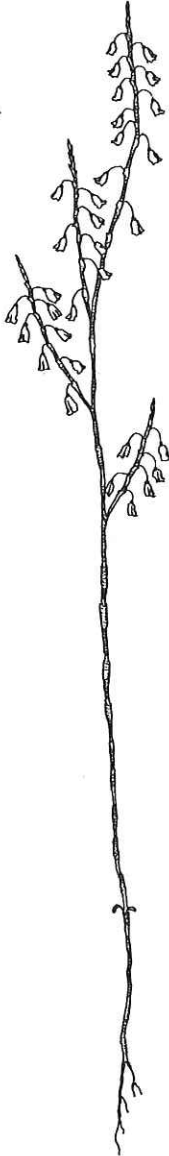


## JOINTWEED

*Polygonella articulata* (L.) Meisn.  
Smartweed Family (Polygonaceae)

State status S1, TU/PE

Global status G5



**Description** - Jointweed is a slender plant with a wiry stem about 10–20 inches tall. It is lightly branched and has narrow leaves that fall early leaving a leafless stem at flowering time. The flowers are small, white or pinkish; they hang from slender stalks that protrude from floral bracts. The bracts give the stem a jointed appearance.

**Habitat** - Jointweed is a plant of dry, open, sandy, acidic soil. At Neshaminy State Park it was found in an open sandy area of old dredge spoil deposits.

**Range** - It occurs from Maine to North Carolina, mostly on the coastal plain. Joint weed is also found on the shores of the Great Lakes and on inland sand dunes in the region of Minnesota to southern Illinois.

In Pennsylvania it has been collected at only a very few sites in Bucks, Montgomery, and Berks Counties.

**Traditional Uses** - None recorded.

**Management issues** - This plant will only persist if areas of dry, open, sandy, acidic soils are available. Threats include invasive species, especially common reed (*Phragmites australis*).

## WILLOW OAK

*Quercus phellos* L.

Beech Family (Fagaceae)

State status S2, PE

Global status G5



*willow oak*

**Description** - Willow oak is a deciduous tree that can grow to almost 100 feet in height. Unlike most oaks, it has narrow leaves about 3–4 inches long that are without lobes or teeth. The flowers are produced as new growth begins in the spring; the male flowers are in slender, drooping catkins that eventually fall off. The female flowers become acorns, however it takes 2 years for an acorn to mature from flower to fruit.

Natural hybrids between willow oak and red oak (*Quercus x heterophylla*) result in trees with narrow, leaves with a few irregular lobes.

**Habitat** - Willow oak is a tree of moist, sandy, acidic soils. It is a canopy tree in coastal plain forests. The roots are tolerant of standing water, which can occur for prolonged periods in the winter and spring at some sites.

**Range** - Willow oak ranges from New Jersey and Pennsylvania to Florida and Texas. In Pennsylvania it grows at several sites in the extreme southeastern corner of the state. It is widely planted as a street tree outside its natural range.

**Traditional Uses** - Native Americans made preparations of willow oak for a variety of medicinal uses. Decoctions of the bark or wood were employed to treat back or limb pains and hemorrhoids. A decoction of wood ashes was placed on the tongue to cleanse the body and strengthen a marriage. The acorns were used for food.

**Management issues** - Patches of coastal plain forest that contain reproducing populations of willow oak (trees of various ages), should be protected from further reduction or fragmentation.



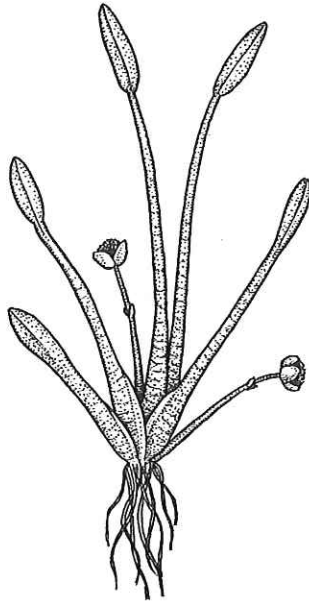
## LONG-LOBED ARROWHEAD

*Sagittaria calycina* Engelm.

Water-plantain Family (Alismataceae)

State status S1, PE

Global status G5T4



*long-lobed arrowhead*

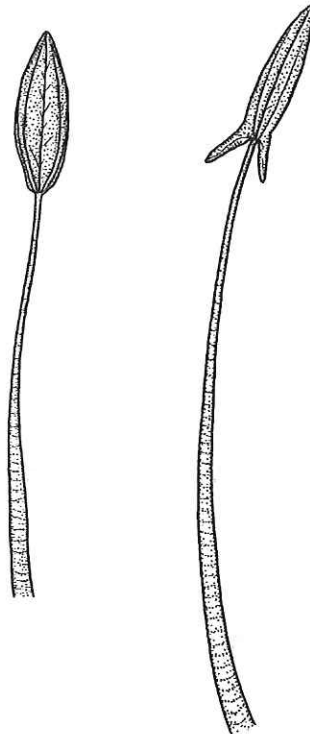
**Description** - Long-lobed arrowhead is an annual plant with a cluster of long-stalked leaves arising from the base. The leaf blades vary in shape from a small oval barely wider than the stalk, to an expanded arrowhead shape. The flowering stalk bears several whorls of flowers of which the upper are male and the lower female. As the fruits form, the stalks bend downward and the sepals clasp the developing fruit.

**Habitat** - This species is a plant of marshes, ponds and streams, especially in alkaline waters. In Pennsylvania is confined to freshwater tidal marshes and mudflats.

**Range** - Long-lobed arrowhead ranges from Lakes Michigan and Erie, through the Mississippi drainage to Texas, New Mexico and Mexico. It also occurs in the east in Delaware and Pennsylvania.

**Traditional Uses** - None reported.

**Management issues** - Riverbank tidal marshes must be protected from erosion from passing boats and the impact of invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*).



## SUBULATE ARROWHEAD

*Sagittaria subulata* (L.) L. Buch

Water-plantain Family (Alismataceae)

State status S3, PR

Global status G4



*subulate arrowhead in flower*

**Description** - Subulate arrowhead is a low-growing plant with narrow leaves about 2–3 inches long. It spreads to form a turf-like carpet on the surface of tidal mudflats. It is completely inundated a high tide and exposed to the sun when the tide is low.

In July flowering stems are produced and small white flowers appear.

**Habitat** - At Neshaminy State Park it forms a carpet in the lower part of the freshwater intertidal zone; it frequently grows under a canopy of spatterdock (*Nuphar lutea*).

**Range** - Subulate arrowhead occurs in coastal regions of Massachusetts, New York, south to Florida and Alabama. In Pennsylvania it is confined to tidal shores and mud flats of the Delaware Estuary and its tributaries.

**Traditional Uses** - None recorded.

**Management issues** - Riverbank tidal marshes must be protected from erosion from passing boats and the impact of invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*).

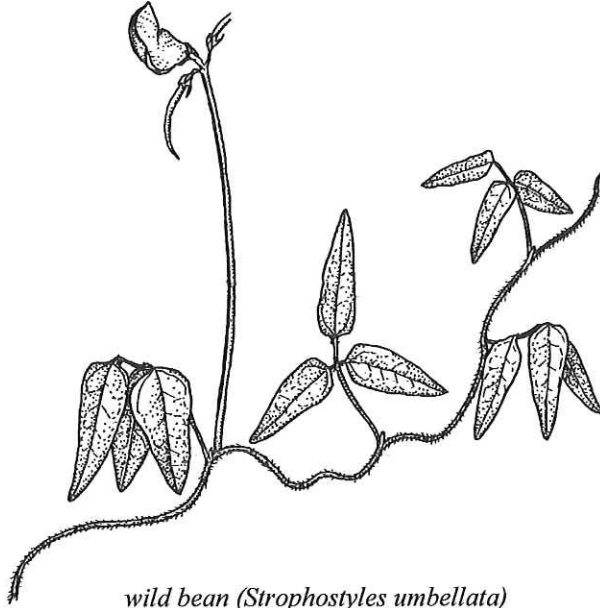


## WILD BEAN

*Strophostyles umbellata* (Muhl. ex Willd.) Britton  
Pea or Bean Family (Fabaceae)

State status S2, N/PE

Global status G5



wild bean (*Strophostyles umbellata*)

**Description** - Wild bean is a twining, herbaceous vine, its leaves are compound with 3 leaflets. The flowers are pinkish-purple and nearly an inch long. The seeds are produced in long slender, rounded pods clustered at the top of a long stalk.

Three species of wild bean (*Strophostyles helvola*, *S. leiosperma*, and *S. umbellata*) grow in Pennsylvania, and all 3 are present at Neshaminy State Park. They are distinguished by leaflet shape and the size of the seeds.

**Habitat** - Dry sandy upland woods and fields; at Neshaminy State Park, wild bean grows at the edge of an old field thicket, twining on such plants as goldenrods and grasses.

**Range** - Wild bean occurs from New York to Florida and Texas, mainly on the coastal plain; it also ranges west to Indiana, Missouri and Oklahoma. In Pennsylvania it is known from only a few sites in the southeastern corner of the state.

**Traditional Uses** - *Strophostyles helvola* was employed by Native Americans to relieve poison ivy and warts and as part of a compound decoction used to treat typhoid. There is no record of the use of *S. umbellata* specifically.

**Management issues** - Succession may alter old field areas at Neshaminy State Park that currently provide habitat for wild bean. It presently is found along the edges near the park roads and would benefit from annual mowing late in the season to keep competing vegetation from becoming too tall. Mowing during the growing season however, is very damaging to this species.

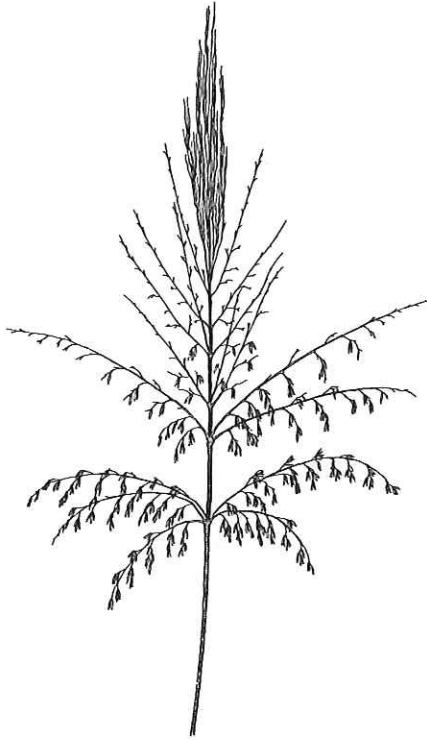
## INDIAN WILD RICE

*Zizania aquatica* L.

Grass Family (Poaceae)

State status S3, PR

Global status G5



*wild rice inflorescence*

**Description** - Indian wild rice is a robust annual grass that grows 7–8 feet tall. It has long strap-shaped leaves and an unbranched stem with a flowering/fruiting head at the top. The flowers are arranged in the inflorescence with the female flowers on erect upper branches and the male flowers on spreading branches below.

**Habitat** - Wild rice grows in tidal marshes and shores and also in non-tidal wetlands. At Neshaminy State Park it occurs in the upper zone of the riverbank tidal marsh and in the high marsh.

**Range** - Wild rice grows from Quebec and New Brunswick south to Pennsylvania and west to Iowa and Minnesota. In Pennsylvania it is found mainly in the southeastern corner of the state and at a few other scattered locations.

**Traditional Uses** - Native Americans made extensive use of wild rice for food.

**Management issues** - Riverbank tidal marshes must be protected from erosion from passing boats and the impact of invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*).

