Natural Resource Inventory and Management Recommendations: Lower Morrisville Road Wetlands (Price Tract) Falls Township, Bucks County, Pennsylvania

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Prepared for the Falls Township Supervisors

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Disciplines
Botany

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Natural Resource Inventory and Management Recommendations

Lower Morrisville Road Wetlands
(Price Tract)

Falls Township, Bucks County, Pennsylvania

Prepared for the Falls Township Supervisors
by
Ann F. Rhoads, PhD and Timothy A. Block, PhD
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Philadelphia, PA 19118

October 1, 2003
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INTRODUCTION

**Location** - This approximately 100-acre tract of township-owned open space is located between Lower Morrisville Road, Route 13, and Tyburn Road east of the historic village of Fallsington, Bucks County, Pennsylvania. It consists of the Price tract (62 acres) and the contiguous Koretsky tract (46 acres). It is mapped on the USGS Trenton West 7 ½ minute quadrangle (Figure 1). The property contains a large wetland complex, ponds, swamp forest, upland forest, and successional thickets.

The site contains headwaters wetlands associated with Rock Run a tributary of Martins Creek, which in turn flows into the Delaware River at Tullytown. It appears to have been part of a larger wetland complex that existed before the construction of Route 13, which was bisected by the highway. Rock Run was apparently channelized on the east side of the road at that time. Water from the remaining wetland on the west side now flows under the highway and into Rock Run just above the Tyburn Road intersection.

The tract is bordered on the west and south by residential housing developments, including one now under construction along Lower Morrisville Road. Several industrial facilities and a railroad complex occupy the land to the north, across Lower Morrisville Road. To the east, Route 13, a limited access highway, forms the site boundary. The intersection of Tyburn Road and Route 13 is at the south end the site.

**Geology** - The entire tract is located in the Atlantic Coastal Plain Physiographic Province of Pennsylvania (Figure 2) and is underlain by Quaternary sands and gravels (Willard et al. 1959).

**Former land use** - A portion of the upland area, along Lower Morrisville Road, was used as a municipal dump prior to 1964. Aerial photography from 1951 indicates that most of the eastern half of the tract was being farmed at that time, but that the wetland and adjacent wooded areas were in a natural condition.

METHODS

Information on plants and plant communities was gathered during site visits by the authors of this report on September 19, 1996; October 8, 2000; June 7, 2001, and August 26, 2002, and September 25, 2003 and review of cited reports. Locations of PNDI-listed plants shown on the accompanying map (Figure 3) are based on GPS (global positioning system) data recorded in the field.

Inventories of birds, reptiles, amphibians, and mammals were obtained through subcontracts with other field biologists. A survey of breeding birds was conducted by Richard Mellon, of Mellon Biological Services, between May 29 and July 4, 2003. Data on reptiles and amphibians were collected by Marlin Core, naturalist at the Churchville Nature Center, during 28 visits to the site between March 5, 2003 and June 30, 2003. Marlin also provided notes on mammals, birds, and plants that he observed during his visits.
RESULTS

Flora

Rare plants
Two hundred and twenty-two different plant species were found at the site; the total included 163 native plants and 59 (27%) non-natives. A complete list is included in Appendix A.

The wetland complex includes five plants currently listed by the Pennsylvania Natural Heritage Program (DCNR 1983) as endangered, threatened, or undetermined. Their locations are shown in Figure 3. The presence of state endangered and threatened species defines the wetland as an exceptional value wetland. All of the plants listed below are coastal plain wetland species; see Appendix B for descriptive fact sheets.

- netted chain fern
- round-leaved oe-pye-weed
- short-hair sedge
- sweetbay magnolia
- willow oak

- Woodwardia areolata
- Eupatorium rotundifolium
- Carex crinita var. brevicrinis
- Magnolia virginiana
- Quercus phellos

Plant communities
A map of vegetation types (Figure 3) was prepared from aerial photography interpretation supplemented by on site inspections. Plant community types as defined by Fike (1999) that are represented on the site include the following.

Sweetgum – oak coastal plain forest - This forest type is classified as critically imperiled (S1) in Pennsylvania because so much of the Atlantic Coastal Plain in the state has been developed. It is characterized by sweetgum (Liquidambar styraciflua), willow oak (Quercus phellos), pin oak (Quercus palustris), red maple (Acer rubrum), and blackgum (Nyssa sylvatica). Shrubs include highbush blueberry (Vaccinium corymbosum), arrow-wood (Viburnum dentatum, V. recognitum), and sweet pepperbush (Clethra alnifolia). The herbaceous layer often contains extensive colonies of Canada mayflower (Maianthemum canadense). New York fern (Thelypteris noveboracensis), swamp dewberry (Rubus hispidus), poison ivy (Toxicodendron radicans), and Virginia creeper (Parthenocissus quinquefolia) are frequently present. Moisture levels can range from seasonally wet to more upland and well-drained conditions.

Red maple – magnolia Coastal Plain palustrine forest - This forest type occurs on wet soils along stream channels or in low, poorly drained areas. Red maple (Acer rubrum) is the dominant tree, but sweetgum (Liquidambar styraciflua) and sweetbay magnolia (Magnolia virginiana) are also present. The shrub layer includes sweet pepperbush (Clethra alnifolia), highbush blueberry (Vaccinium corymbosum), and arrow-wood (Viburnum dentatum, V. recognitum). Herbaceous plants include the endangered plants short-hair sedge (Carex crinita var. brevicrinus) and netted chain fern (Woodwardia areolata), plus skunk-cabbage (Symplocarpus foetidus), sensitive fern
(Onoclea sensibilis), and false nettle (Boehmeria cylindrica). This forest type is classified as critically imperiled (S1) in Pennsylvania.

**Red maple – sedge palustrine woodland** - This community type occupies the northern end of the large wetland on the site. It consists of scattered young red maple (Acer rubrum) trees and a dense herbaceous layer of tussock sedge (Carex stricta) and rice cutgrass (Leersia oryzoides). It represents a successional stage in which a former tussock sedge meadow is being invaded by red maple and may have occurred due to changes in hydrology. If the quantity of water in the wetland decreases, this area will become a palustrine forest in a few years. Conversely, increased water level could inhibit the tree invasion.

**Mixed forb marsh** - This community type occupies the central area of the large wetland and surrounds the open water at the extreme south end of the tract. Dominant species are rosemallow (Hibiscus moscheutos), jewelweed (Impatiens capensis), halberd-leaved tearthumb (Polygonum arifolium), common cat-tail (Typha latifolia), swamp rose (Rosa palustris), false indigo (Amorpha fruticosa), purple loosestrife (Lythrum salicaria), and occasional patches of common reed (Phragmites australis). By late summer the vegetation is 5-6 feet tall and very robust. Other parts of the open marsh have lower herbaceous cover dominated by rushes (Juncus spp. and sedges).

**Highbush blueberry – meadowsweet wetland** - This shrub-dominated wetland type includes highbush blueberry (Vaccinium corymbosum), winterberry holly (Ilex verticillata), arrow-wood (Viburnum dentatum, V. recognitum), speckled alder (Alnus serrulata), black elderberry (Sambucus canadensis) and in more open areas hardhack (Spiraea tomentosa). Swamp dewberry (Rubus hispidus) is a prominent groundcover and often grows in sphagnum moss; also present in the herbaceous layer is royal fern (Osmunda regalis) and dotted smartweed (Polygonum punctatum), and in the wettest areas bur-reed (Sparganium americanum) grows abundantly in the channels.

**Successional thickets** - The remainder of the tract, which was farm fields in 1951, is now a successional forest and thicket containing many non-native invasive species as well as native canopy trees such as white ash (Fraxinus americana), red maple (Acer rubrum), wild black cherry (Prunus serotina), black locust (Robinia pseudoacacia), and tuliptree (Liriodendron tulipifera). Invasive non-native species such as multiflora rose (Rosa multiflora), several bush honeysuckles (Lonicera morrowii and L. maackii), autumn-olive (Elaeagnus umbellata) and hybrid crabapple (Malus hybrids) dominate the shrub layer.

**Invasive species**
In parts of the site that were formerly agricultural, successional growth is heavily influenced by non-native invasive species such as multiflora rose (Rosa multiflora), Japanese honeysuckle (Lonicera japonica), shrub honeysuckles (Lonicera maackii, L. morrowii), autumn-olive (Elaeagnus umbellata), hybrid crabapple (Malus hyb.), and Oriental bittersweet (Celastrus orbiculatus). Furthermore, recent excavations of the former municipal dump site has resulted in additional disturbance and opportunities for spread of invasives.
Fauna

Birds
A total of 81 species of birds were observed in or flying over the site. Forty-six species were present at the site during their nesting season and/or engaged in behavior that indicated that they were definitely or at least probably breeding in or near the tract.

The following list of confirmed or probable breeding species reflects the combined observations of Richard Mellon and Marlin Corn.

- American Robin
- American Woodcock
- Baltimore Oriole
- Blue Jay
- Blue-gray Gnatcatcher
- Canada Goose
- Carolina Chickadee
- Carolina Wren
- Common Grackle
- Common Yellowthroat
- Downy Woodpecker
- Eastern Kingbird
- Eastern Towhee
- Eastern Wood-pewee
- English House Sparrow
- European Starling
- Gray Catbird
- Great Crested Flycatcher
- Green Heron
- Hairy Woodpecker
- Hooded Warbler
- House Finch
- House Wren
- Mallard
- Mourning Dove
- Northern Cardinal
- Northern Flicker
- Northern Mockingbird
- Ovenbird
- Red-bellied Woodpecker
- Red-eyed Vireo
- Red-tailed Hawk
- Red-winged Blackbird
- Rose-breasted Grosbeak
- Ruby-throated Hummingbird
Scarlet Tanager  
Song Sparrow  
Swamp Sparrow  
Tree Swallow  
Tufted Titmouse  
White-breasted Nuthatch  
White-eyed Vireo  
Willow Flycatcher  
Wood Duck  
Wood Thrush  
Yellow Warbler

Although no rare species of birds were found, 46 is a high number of breeding species for a tract of its size (approximately 100 acres). The site is important in maintaining local bird diversity because it provides interior forest conditions and a diversity of wetland habitats. The mixed forest marsh contains a large breeding population of Swamp Sparrows, one of only a few locations in Bucks County where this bird is known to nest.

A complete list of birds recorded at the site is included in Appendix C.

**Reptiles and Amphibians**
Seventeen species of reptiles and amphibians were detected on the site by surveys conducted in the spring of 2003, including six species of frogs and toads, one species of salamander, seven species of turtles, and three snakes. See Appendix D for species profiles.

**Frogs and Toads**
- spring pepper  
- green frog  
- bullfrog  
- American toad  
- Fowler's toad  
- gray tree frog

**Pseudacris crucifer**  
**Rana clamitans**  
**Rana catesbiana**  
**Bufo americanus**  
**Bufo woodhousii fowleri**  
**Hyla chrysoscelis**

**Salamanders**
- red-backed salamander

**Plethodon cinereus**

**Turtles**
- snapping turtle  
- common musk turtle  
- spottecl turtle  
- painted turtle  
- red-eared slider  
- redbelly turtle  
- box turtle

**Chelydra serpentina**  
**Sternotherus odoratus**  
**Clemmys guttata**  
**Chrysemys picta**  
**Trachemys scripta elegans**  
**Pseudemys rubriventris**  
**Terrapene carolina carolina**
Snakes
northern water snake  Nerodia sipedon
  garter snake  Thamnophis sirtalis
  black racer  Coluber constrictor

Mammals
Incidental observations made during herpetological and bird surveys revealed the following species to be present:
opossum
short-tailed shrew
least shrew
big brown bat
little brown myotis
raccoon
striped skunk
red fox
groundhog
gray squirrel
deer mouse
meadow vole
muskrat
cotton-tail rabbit
white-tailed deer

A formal survey of mammals would likely reveal additional diversity.

Significance of the Biological Resources
Pennsylvania contains only a narrow strip of the Atlantic Coastal Plain lying along the Delaware River From Morrisville south to the Delaware state line. Most of the coastal plain in the state has been subjected to urban and suburban development beginning with the first European settlements in the 1600s; today little is left in a natural or even semi-natural state. For this reason native coastal plain habitat is very rare, and those remaining fragments contain many species of plants and animals found nowhere else in Pennsylvania. Many coastal plain species of plants and animals are listed as endangered, threatened, or rare by the Pennsylvania Natural Heritage Program (DCNR 1983).

The complex of wetlands and adjacent coastal plain forest in this location was identified in the Bucks County Natural Areas Inventory as a Priority 3 site for preservation (Rhoads and Block 1999, pg. 64); and as a high value site for protection in the Falls Township Open Space Plan (Bush and Mellon 1999, pg. 27).
Rare Species and Plant Communities - The site contains eight plants, animals, or natural communities classified by the Pennsylvania Natural Heritage Program. All are coastal plain wetland elements, reflecting the significance of this site in preserving one of the few fragments of native coastal plain wetland habitats remaining in Pennsylvania.

<table>
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<td>Magnolia virginiana</td>
<td>PA threatened</td>
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<tr>
<td>willow oak</td>
<td>Quercus phellos</td>
<td>PA endangered</td>
</tr>
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<td>short-hair sedge</td>
<td>Carex crinita var. brevicrinis</td>
<td>PA endangered</td>
</tr>
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<td>round-leaved eupatorium</td>
<td>Eupatorium rotundifolium</td>
<td>undetermined</td>
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<td>Woodwardia areolata</td>
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<td>Sweetgum-oak coastal plain forest</td>
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<td>tentative rank S1, critically imperiled in PA</td>
</tr>
<tr>
<td>Red maple-sweetbay magnolia palustrine forest</td>
<td></td>
<td>tentative rank S1, critically imperiled in PA</td>
</tr>
<tr>
<td>redbelly turtle</td>
<td>Pseudemys rubriventris</td>
<td>PA threatened</td>
</tr>
</tbody>
</table>

Breeding bird diversity - This site has a high diversity of breeding birds. The total of 46 probable breeders compares to an average of 63 species per block (1/6 of a USGS topographic quadrangle map or about 100 times larger than the study area) for Bucks County during the Pennsylvania Breeding Bird Atlas Project (Brauning 1992). Five Mile Woods Preserve, in Lower Makefield Township, Bucks County, Pennsylvania, which is almost three times the size of this tract, has approximately 50 breeding species when the master plan was completed in 1980 (Mellon 1980).

The forested portion of the site has a surprising diversity of interior forest species (Wood Thrush, Red-eyed Vireo, Scarlet Tanager, etc.) considering its small size. It also has good diversity of typical ecotonal (edge) species (Carolina Chickadee, Tufted Titmouse, Common Yellowthroat, etc.). The continued presence of the interior forest species is probably more dependent on extralimital breeding success, rather than on-site breeding success, since this habitat is marginal for these birds due to its relatively small size (Robbins et al. 1989), and therefore continued immigration contributes to maintaining the population. American Redstart and Chestnut-sided Warbler were found once (June 17, 2003) during the breeding dates and much later than migrants would be expected, but were not observed on subsequent visits, suggesting the species did not breed successfully. Additional interior forest species like Hooded, Kentucky, Worm-eating, and Black and White Warblers are probably absent due to the small habitat size.

Marsh birds were not detected, suggesting that the expanse of mixed forb marsh may be too small to accommodate a number of species that normally frequent this habitat type. Least and American Bitterns and Virginia and Sora Rails are all rare regionally, yet possible breeders in the marsh; however none were detected during the field visits. The apparent absence of these secretive birds may be due to: 1) none were present and no breeding has occurred in recent years nor is any expected in future years, possibly due to the small size of the wetlands; 2) none are present this year, but some or all may breed on an irregular basis; or 3) some were present, but
went undetected during the survey. Even though none were detected, it seems reasonable to assume that although these are rare breeders regionally, there is a chance that one or more breed at the site on an irregular basis, as the habitat appears to be of high enough quality.

Of special interest in the marsh was the abundance of Swamp Sparrows and territorial Willow Flycatchers. The forested wetland appears to provide possible habitat for the rare Prothonotary Warbler, and to a lesser degree, Kentucky Warbler and Veery; but the tract appears to be too small and too close to Rt. 13 to provide suitable conditions for these species.

Considering the small size and limited diversity of habitats, the avian diversity is above average for this part of Bucks County. In addition, the mixed forb marsh community is unusual for our area. The most notable record is the Swamp Sparrow, which is an abundant breeder in the herbaceous wetlands at this site, but was only recorded in 13 of approximately 65 blocks in Bucks County in the Atlas of Breeding Birds in Pennsylvania (Brauning 1992; Kitson 1998).

Reptiles and Amphibians – The tract that is the subject of this study is home to at least 17 species of reptiles and amphibians. One species, the redbelly turtle, is listed as a threatened by the Pennsylvania Natural Heritage Program. The wetland at the south end of the tract contained several adult redbelly turtles and hatchlings were found there also indicating an active breeding population.

The total site apparently contains sizeable populations of spotted turtles and box turtles, both species of concern due to declining populations statewide. Bog turtles were not found despite extensive searches. A single specimen of Fowler’s toad, another species of concern in the state, was seen on the north side of Lower Morrisville Road directly opposite the tract.

Although all of the other species found in the inventory are considered to be common, reptiles and amphibians in general are sensitive to ecological disturbances. The general paucity of salamander and snake species may reflect the lack of rocks and fallen logs that are necessary habitat elements for many species, or the effects of physical isolation from other large habitat areas.

Other - In addition these wetlands are part of the headwaters of Martins Creek, a tributary of the Delaware River, which is known habitat for a population of eastern mud minnow (Umbra pygmaea), a candidate for listing as threatened or endangered at the state level.

MANAGEMENT CONCERNS AND RECOMMENDATIONS

Goals
1. Protect sensitive wetland flora and fauna.
3. Provide opportunities for environmental education.
Issues

Hydrology – The wetlands that dominate this site are dependent on the maintenance of both water quantity and water quality. Highway runoff and possible leaching from industries located on the north side of Lower Morrisville Road are potential sources of water quality degradation.

Water quantity in the wetland is a function of surface flow and ground water discharge. The newly constructed berm and canal that separate the woods and wetlands from the site of the earlier municipal dump along Lower Morrisville Road will undoubtedly affect the movement of surface water. What impact that will have on the wetland is uncertain. Discharge from the drainage canal flows into a small stream channel that parallels the west side of the semicircular canal. This unnamed stream flows through the southern part of the wetland and eventually under Route 13 to join Rock Run. Lawn fertilizers, pesticides and other lawn care products used by residents may affect water quality.

Amphibians are particularly sensitive to degradation of water quality. We recommend that a regular program of water quality monitoring be initiated and suggest contacting the Delaware Riverkeeper Network for technical assistance in getting a program started.

Access and public use – There is evidence that the woods and wetland borders have been used by all terrain vehicle (ATV) riders and for paintball competitions. Some tree cutting has also taken place. Trails have been cut through the woods and along the edge of the wetland in several areas. The recently constructed berm and canal system have increased the ease of access to these trails and may result in even greater use.

Trails along the wetland are of concern because of the movement of turtles and some amphibians between wetlands and adjacent forested areas for nesting, foraging, etc. Increased access to the wetlands could also facilitate illegal collecting of reptiles for sale in the pet trade. Box turtles and spotted turtles are especially vulnerable. Tree cutting is of concern as breaks in the canopy allow invasive species to become established.

We suggest that the area of successional forest/thicket enclosed by the recently constructed berm and canal system would be an appropriate area for active recreation. Trails for use by ATVs could be developed in this area, which could be accessed from Lower Morrisville Road without posing a threat to the sensitive forests and wetlands to the east and south. Round-leaved eupatorium, a rare plant that grows in this area, could actually benefit from the creation of additional openings and edges.

Educational use – The wetlands and adjacent forests on this site are an excellent outdoor laboratory for environmental education. We suggest that the township permit authorized groups to access the site for this purpose and that an interpretive brochure be prepared to facilitate this type of use.

Invasive species - Twenty-seven percent of the plants identified on the tract are non-native species, some of which are seriously invasive. Areas of successional forest and thickets along Lower Morrisville Road are the most seriously affected. Although native canopy trees are
References Cited


Rhoads, Ann F. and Timothy A. Block. 1999. Natural Areas Inventory of Bucks County Pennsylvania. Bucks County Commissioners, Doylestown, PA.


## Appendix A
### Plant List

<table>
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<td><em>Solanum carolinense</em></td>
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<td><em>Solanum dulcamara</em></td>
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<td><em>Trifolium repens</em></td>
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<td><em>Vaccinium corymbosum</em></td>
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<td><em>Viburnum recognitum</em></td>
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<td>yucca</td>
<td>Yucca filamentosa</td>
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Appendix B.
Rare Species Fact Sheets

Sweetbay magnolia
Willow oak
Short-hair sedge
Netted chain fern
Round-leaved eupatorium
Sweetbay magnolia
_Magnolia virginiana_ L.
Magnolia Family - Magnoliaceae

**Description**
Sweetbay magnolia is an understory tree with semi-evergreen leaves and highly fragrant white flowers. It is usually about 30 feet tall and often multi-stemmed with smooth gray bark. The leaves of sweetbay magnolia are oval, about 5 inches long and thick and leathery. They are bright green with whitish undersides and may remain on the tree for most of the winter.

In June sweetbay magnolia produces creamy white flowers that are 2–3 inches across and intensely fragrant. The flowers are followed by 2 inch-long knobby fruits from which bright red seeds dangle.

**Habitat**
Naturally, sweetbay magnolia is a tree of acidic, sandy, peaty soils of wet woods or swamps. It often grows with American holly, possum-haw, sweet pepperbush, willow oak, and red maple.

**Range**
A tree primarily of the Atlantic Coastal Plain, sweetbay occurs naturally as far north as eastern Massachusetts. Its range extends south to Florida and Louisiana. In Pennsylvania, sweetbay occurs in southern Bucks County, on Islands in the Lower Susquehanna River and at a few scattered locations in the Piedmont.

The Nature Conservancy ranks sweetbay magnolia as globally secure; however at the northern and western edges of its range it is considered critically imperiled in New York and Massachusetts and imperiled in Pennsylvania and Tennessee. It is abundant and secure in New Jersey, Delaware and North Carolina.

In recent years, however, sweetbay magnolia has become a very popular landscape plant; today it is readily available at landscape nurseries. The geographic source of the nursery plants is rarely specified and therefore it is hard to judge the impact of planted trees on native gene pools. It is the genetic variability in native populations that rare plant programs are designed to protect.

**Management concerns**
Native populations of sweetbay require acidic soils and moist conditions. Water quantity and quality must both be protected to preserve habitat. Too little water or an influx of
nutrients from lawn fertilizers or agriculture would allow more aggressive weedy, non-native species to out compete native acid soil plants such as sweetbay. The population at this site is small, but others are nearby.

References
http://www.natureserve.org/explorer
Willow oak  
*Quercus phellos* L.  
Beech Family - *Fagaceae*

**Status:** Pennsylvania endangered

**Description**
Willow oak is a deciduous tree that can grow to 80 feet tall with a straight trunk and rounded crown. The bark is gray-brown and becomes somewhat fissured and scaly with age. Its leaves are unlike those of most oak species as they have a smooth, even edge rather than a lobed shape. The narrow, 3–5 inch-long leaves give the crown of willow oak a fine texture. Like all oaks, willow oak produces acorns.

**Habitat**
In its natural habitat willow oak is a tree of wet coastal plain forests, its roots can withstand inundation for weeks at a time in the winter and early spring. It often grows with sweetgum, red maple, American holly, and sweet pepperbush.

**Range**
Native to the southeastern states, willow oak is near the northern limit of its natural range in southeastern Pennsylvania. Its range extends from Florida and Texas north to southern Illinois and along the coast to Long Island, New York. Extant Pennsylvania populations are limited to extreme southern Bucks County.

The Nature Conservancy ranks willow oak as globally secure; however at the periphery of its range it is critically imperiled in New York and imperiled in Pennsylvania and Illinois. It is abundant and secure in New Jersey and North Carolina.

Willow oak is also frequently planted as a street tree in cities from Philadelphia south, but it is intolerant of alkaline soils.

**Management concerns**
Maintenance of soil acidity is important to protecting native populations of willow oak; an influx of nutrient-rich runoff from lawns, roads, or agriculture would threaten this native tree and the plant community of which it is a part. Seasonally wet soils are also important. Although a single tree may live many years, meaningful protection requires a population composed of many individuals that contribute to the local gene pool.

Several trees of varying ages have been located in the Fallsington wetland tract.

**References**
http://www.naturereserve.org/explorer
Short-hair sedge
Carex crinita Lam. var. brevicirinus Fern.
Sedge Family – Cyperaceae

Description
Short-hair sedge is a grass-like plant with a clump of narrow leaves that are about 2-3 feet tall. The flowering or fruiting stems are up to 4½ feet tall with long graceful, drooping spikes.

Habitat
Short-hair sedge is a plant of swamps, wet meadows, and wet, open woods

Range
This sedge is known form southern New England to Louisiana and Missouri. In Pennsylvania it grows at only a handful of locations in Bucks County; all known extant populations are small, consisting of only a few clumps. Several clumps have been located on the edges of the large wetland at this site.

Short-hair sedge is ranked globally secure by The Nature Conservancy; but is critically imperiled in Pennsylvania and Illinois and imperiled in Mississippi. It is secure in New Jersey, Delaware, and Virginia.

Management concerns
One of the greatest threats to short-hair sedge is competition from non-native invasive plants. Protection of coastal plain wetlands is essential and requires preservation of water quality and quantity as well as adequate wetland buffers.

References
http://www.natureserve.org/explorer
Netted chain fern

Status: Pennsylvania threatened (suggested)

*Woodwardia areolata* (L.) T.Moore

Chain Fern Family - Blechnaceae

**Description**

Netted chain fern is a coarsely lobed fern that resembles the common sensitive fern. It frequently forms dense patches of fronds that arise singly from an underground rhizome. The spore-bearing fronds have narrower lobes and are darker in color.

**Habitat**

Netted chain fern is found naturally in humus-rich, strongly acidic soils of bogs, seeps, and wet woods.

**Range**

This fern is primarily a plant of the southeastern coastal plain, although scattered populations occur further inland. Its total range extends from New England to Florida and eastern Texas. In Pennsylvania it is found mainly in Bucks, Montgomery, Delaware and Chester counties.

The Nature Conservancy ranks netted chain fern as globally secure; but at the periphery of its range it is extirpated in Michigan, critically imperiled in West Virginia, and imperiled in Missouri, Illinois, Indiana, Ohio, Pennsylvania and Nova Scotia.

**Management concerns**

Maintenance of moist acidic soils is essential to the continued existence of netted chain fern. Surface runoff of nutrient-rich water from lawns, road, or agriculture could allow weedy non-native species to dominate. Similarly reduced moisture would also change the balance. Protection of both water quality and quantity of coastal plain wetlands is important to maintaining this plant and the natural community of which it is a part. Adequate buffers are also important to preserving intact wetland habitat. One small colony at this site was destroyed by recent construction activity, but several others have subsequently been discovered within the preserved wetland.

**References**

http://www.naturcserve.org/explorer
Round-leaved eupatorium  
*Eupatorium rotundifolium* L.  
Aster Family - Asteraceae

**Status:** Pennsylvania undetermined

**Description**  
Round-leaved eupatorium is an herbaceous perennial 2-3 feet tall. The stem is unbranched below the inflorescence and has paired leaves. It is a late summer or early fall-blooming species with small white flowers grouped in small heads.

**Habitat**  
This plant is found in the southeastern corner of Pennsylvania, in or near the coastal plain where it grows in moist sandy or clayey fields or thickets.

**Range**  
Round-leaved eupatorium occurs from Maine to Florida and west to southern Ohio, Kentucky, Tennessee, Oklahoma and Texas. It is considered critically imperiled in Pennsylvania but secure in New Jersey and globally secure.

**Management concerns:**  
Although round-leaved eupatorium will grow in wooded areas, it is not vigorous under shaded conditions and is less likely to flower. Optimal conditions are moist, sandy-peaty open fields, sphagnum bogs, or edge habitat.

Its undetermined status reflects uncertainty regarding the relationship of a similar and perhaps intergrading species, *Eupatorium pilosum*, which has been considered a variety of *Eupatorium rotundifolium* by some botanists.

**References**  
http://www.natureserve.org/explorer
## Appendix C.

### Combined Bird List

<table>
<thead>
<tr>
<th>Species</th>
<th>R. Mellon</th>
<th>M. Corn</th>
<th>Breeding</th>
<th>Abundance**</th>
<th>Comments</th>
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<td>U</td>
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<tr>
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<td>M. Corn</td>
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<td>Abundance**</td>
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<td>N</td>
<td>C</td>
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<td>American Goldfinch</td>
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<td>N</td>
<td>Y</td>
<td>Probable</td>
<td>C</td>
<td>Common in adjacent residential areas</td>
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</table>

* locally breeding species that require large geographic areas for breeding success
** A=abundant, C=common, U=uncommon
Appendix D
Reptile and Amphibian Species Profiles
Species Profiles
By Marlin Corn

Spring Peeper, *Pseudacris crucifer*

Virtually all wetland areas in and around the Price Tract are home to spring peepers. Too numerous to count, the numbers are likely in the thousands. Judging from the choruses, the majority seemed concentrated at the east and west end of the large wetland. In general I was surprised by the lack of other frog species throughout the large wetland - the spring peeper was the only species that was widespread here.

Green Frog, *Rana clamitans*

Localized in the large wetland; throughout the small wetland. I was surprised that this species was not more numerous. The few dozen that I heard were concentrated in very few locations; at the northeastern and western ends of the large wetland, and in the small wetland.

Bullfrog, *Rana catesbeiana*

Absent from the large wetland, but numerous in the small wetland and the pond. Bullfrogs are voracious predators of other frogs, which may partially explain the lack of other species, and low numbers of green frogs in the small wetland. It is my understanding that bullfrogs are sensitive to acidic water conditions - the lack of bullfrogs, and other frog species in the large wetland may possibly indicate something about the water quality.

American Toad, *Bufo americanus*

Only two observations of this species, which is surprising given their cosmopolitan nature. We never heard them calling at night, but obviously they are breeding somewhere. It is possible they are more common in the gardens of the nearby houses. Toads are often attracted to human dwellings because porch lights attract night-flying insects.

Fowler's Toad, *Bufo woodhousii fowleri*

Only one observation, made on the Conrail property across the street from the Price Tract. Never heard any calling.

Red-backed Salamander, *Plethodon cinereus*

The only salamander species found on the Price Tract. Most were found under human debris, some under dead wood. The lack of stones (particularly in wet situations) and short supply of large, vernal ponds, downfall trees would help explain the lack of other salamander species.
Snapping Turtle, *Chelydra serpentina*

Nine observations indicate a healthy population - these turtles are not always easy to find as they often spend a good deal of time bottom-walking under water or burrowing through mud. Seen in both wetlands.

Common Musk Turtle, *Sternotherus odoratus*

Only three observations; one in the pond and two in the adjacent wetlands. This species is secretive, spending most of its time underwater, so it is not always an easy species to find. Three sightings likely indicates a stable population.

Spotted Turtle, *Clemmys guttata*

Fourteen observations indicate this turtle is doing well on the Price Tract. We found them in both wetlands. Some exhibited enlarged orange patches on the side of the head - possibly suggesting hybridization with bog turtles at some time in the past. We found no bog turtles, despite many hours of probing the mud, but perhaps they lived here in the past. One disturbing observation - several spotted turtles exhibited deformed limbs.

Painted Turtle, *Chrysemys picta*

Numerous in the pond and small wetland - no observations in the large wetland. Probably the most common turtle in Pennsylvania, but it might be outnumbered by the spotted turtle here.

Red-bellied Turtle, *Pseudemys rubriventris*

A small population lives in the small wetland and pond. Never saw more than four larger specimens at one time. Observed two hatchlings as well.

Red-eared Slider, *Trachemys scripta elegans*

One specimen observed basking in the pond. Probably a released pet, as this species is not native to Pennsylvania. There is concern about this species becoming naturalized to our area. One reason is that they are aggressive competitors for basking sites, which aquatic turtles need for the absorption of vitamin D to maintain shell hardness.

Box Turtle, *Terrapene carolina carolina*

Seven observations indicate a nice population for a tract of land of this size. All observations were at the northwestern end of the tract. Since they utilize both forests and wetlands, it is important that what is left of both habitats be protected for the benefit of this turtle.
Northern Water Snake, *Nerodia sipedon*

As with the other snakes, very few observations. Generally speaking, finding snakes requires a bit of luck and being at the right place at the right time. However, considering the size of the wetlands, I am surprised we did not see more of this snake.

Eastern Garter Snake, *Thamnophis sirtalis*

Again, a bit disappointed we did not find more of these - only three sightings. It is an edge species that does well in a variety of habitats, including suburbia. Garter snakes are great wanderers and probably move off and onto the tract.

Black Racer, *Coluber constrictor*

Only one specimen found, under a trash heap. This species also may wander over great distances, and probably comes and goes from the Price Tract.
Appendix E.
Invasive Species Fact Sheets

Autumn-olive
Common reed
Empress-tree
Japanese stiltgrass
Multiflora rose
Obtuse-leaved privet
Oriental bittersweet
Purple loosestrife
Shrub honeysuckles
Autumn olive
Elaeagnus umbellata Thunberg
and
Russian olive
Elaeagnus angustifolia L.
Oleaster Family (Elaeagnaceae)

DESCRIPTION
Autumn olive and Russian olive are deciduous, somewhat thorny shrubs or small trees, with smooth gray bark. Their most distinctive characteristic is the silvery scales that cover the young stems, leaves, flowers, and fruit. The two species are very similar in appearance; both are invasive, however autumn olive is more common in Pennsylvania.

Height - These plants are large, twiggy, multi-stemmed shrubs that may grow to a height of 20 feet. They occasionally occur in a single-stemmed, more tree-like form.

Leaves - Leaves are alternate, oval to lanceolate, with a smooth margin; they are 2–4 inches long and \( \frac{3}{4} - \frac{3}{2} \) inches wide. The leaves of autumn olive are dull green above and covered with silvery-white scales beneath. Russian olive leaves are grayish-green above and silvery-scaly beneath. Like many other non-native, invasive plants, these shrubs leaf out very early in the spring, before most native species.

Flowers - The small, fragrant, light-yellow flowers are borne along the twigs after the leaves have appeared in May.

Fruit - The juicy, round, edible fruits are about \( \frac{1}{4} - \frac{1}{2} \) inch in diameter; those of Autumn olive are deep red to pink. Russian olive fruits are yellow or orange. Both are dotted with silvery scales and produced in great quantity August–October. The fruits are a rich source of lycopene. Birds and other wildlife eat them and distribute the seeds widely.
**Roots** - The roots of Russian olive and autumn olive contain nitrogen-fixing symbionts, which enhance their ability to colonize dry, infertile soils.

**DISTRIBUTION AND HABITAT**
Autumn olive was introduced to the United States from East Asia in the 1830s. It was extensively planted in Pennsylvania and other states for revegetation of severely disturbed areas such as strip mines. The Pennsylvania Game Commission has also planted it for wildlife food and cover. Russian olive, native to Eurasia, was planted as an ornamental and for wildlife value. Both species have naturalized extensively in Pennsylvania, and in states from Maine south to Virginia, and west to Wisconsin. Russian olive is also a problem further west.

**EFFECTS OF INVASION**
Both autumn olive and Russian olive are very troublesome invasive species; their nitrogen-fixing root nodules allow them to thrive in poor soils. Typical habitats are disturbed areas, roadsides, pastures, and successional fields in a wide range of soils. They are drought tolerant and often invade grasslands and sparse woodlands. Neither species does well in densely forested areas, but Russian olive can be found in moist soils, and does particularly well in sandy floodplains. Both species create heavy shade that suppresses shorter plants requiring direct sunlight.

**REPRODUCTION AND METHODS OF DISPERsal**
Autumn olive and Russian olive spread by seeds disseminated throughout the landscape by birds and other wildlife that consume the fruits. These shrubs grow rapidly, begin to produce fruit as early as 3 years of age, and have the ability to thrive in poor soil. They also resprout vigorously after cutting or burning.

**CONTROL**
Mechanical - Seedlings and sprouts can be pulled by hand when the soil is moist enough to insure removal of the root system. On larger plants, cutting alone results in thicker, denser growth upon resprouting. Burning during the dormant season also results in vigorous production of new shoots.

Chemical - Glyphosate can be used to control larger plants. Foliar application has proven effective in controlling these species. Since glyphosate is nonselective and will affect all green vegetation, care should be taken to avoid impacting native plants. At sites where this is a concern, application of the herbicide to the freshly cut stumps of the invasive shrubs should achieve the desired results. This method minimizes damage to other plants.

Biological - No biological control options are currently known.

**LANDSCAPE ALTERNATIVES**
The following native plants are suggested as alternatives to autumn olive or Russian olive in revegetation and wildlife habitat plantings: sweet-fern (*Comptonia peregrina*),
bayberry (*Myrica pensylvanica*), shining sumac (*Rhus copallina*), fragrant sumac (*Rhus aromatica*), staghorn sumac (*Rhus typhina*), black-haw (*Viburnum prunifolium*), shadbush (*Amelanchier arborea, A. laevis*), clammy locust (*Robinia viscosa*), redbud (*Cercis canadensis*), New Jersey tea (*Ceanothus americanus*).

**REFERENCES**


![](image)

*aestivalis olive in fruit*

**Invasive species fact sheet prepared by:**
Ann F. Rhoads and Timothy A. Block
Morris Arboretum of the University of Pennsylvania
100 Northwestern Ave., Philadelphia, PA 19118
April 2002
Common Reed
Phragmites australis (Cav.) Trin. ex Steud.
Grass Family (Poaceae)

DESCRIPTION
Common reed is a tall, perennial, wetland grass. Horizontal stems (rhizomes) give rise to annual erect shoots that support broad sheath-like leaves and a plume-like flower head. Leaves and stems are stiff and sharp, due to a high content of cellulose and silica. Plants often originate from a rhizome fragment or occasionally from seed, and can form colonies hundreds of acres in size. Reed canary grass (Phalaris arundinacea), which can be 4–5 feet tall, also forms large uniform stands in wetlands, however, it is neither as large nor as stiffly erect as common reed.

Height - Common reed ranges in height from 3–15 feet.

Stem - The stiff, smooth, erect stems are hollow, round, and unbranched. The stems can be almost woody, and are sometimes purplish.

Leaves - The leaf blade is 2–24 inches long and ¼–1½ inches wide. It tends to be stiff and flat, with rough margins. The leaf surface is hairless and prominently veined above, the underside is smooth or sparsely hairy. Leaf blades taper to a long point and narrow slightly toward the stem. The foliage is gray-green during the growing season. The plant turns tan in the fall and most leaves drop off but the erect stems with their plume-like tips remain conspicuous in the winter landscape.

Flower and seed - The feathery, purple-brown, plume-like flower heads appear at the tips of the stems by late June and are 5–16 inches long. Individual clusters of flowers are arranged densely along the branches of the plume. The flowers are surrounded by silky white hairs, and are purplish at first, becoming tawny to dark brown in fruit. Seeds are brown, thin and delicate; they are approximately ½ inch long including a long, narrow bristle. Large quantities of seed are produced, however research has shown that few are viable.

Roots - Common reed has long, stout, scaly, creeping rhizomes (horizontal underground stems) that form extensive mats just below the soil surface. Roots and erect shoots are produced at the joints (nodes) of the rhizomes.
DISTRIBUTION AND HABITAT
Recent research in molecular genetics has shown that although there are native North American strains of common reed, they have been largely replaced by an invasive form from Eurasia in the Northeast.

See below for a preliminary comparison of characteristics separating native and non-native forms of common reed. In attempting to distinguish between native and non-native forms it is important to remember that many of the characteristics listed in the table are qualitative differences, rather than absolutes, and may be affected by local growing conditions.

<table>
<thead>
<tr>
<th>Source</th>
<th>Stem Color</th>
<th>Stem Texture</th>
<th>Stem Density</th>
<th>Flowering Time</th>
<th>Inflorescence</th>
<th>Leaf Color</th>
<th>Expansion Rate</th>
<th>Rhizome Density</th>
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<td>smooth, shiny</td>
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<td>July-Aug.</td>
<td>sparse</td>
<td>yellow-green</td>
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<td>tan</td>
<td>ribbed</td>
<td>high</td>
<td>Aug.-Sept.</td>
<td>dense</td>
<td>gray-green</td>
<td>fast</td>
<td>high</td>
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Common reed occurs throughout most of the United States and southern Canada. It grows in all areas of Pennsylvania in open wetland habitats such as along the shores of lakes, ponds, streams, brackish and freshwater marshes, and even wet fields. The species is particularly frequent in disturbed or polluted soils along roadways, ditches, dredged areas, and almost anywhere there are slight depressions that hold moisture. One of the most common means of spread appears to be by fragments of rhizome that are transported by road maintenance equipment. Common reed is known to tolerate both alkaline and acidic conditions. Once established, it spreads rapidly.

EFFECTS OF INVASION
The invasive Eurasian strain of common reed grows aggressively in areas that are disturbed or stressed by pollution, dredging or other alteration of the natural hydrologic regime. Invaded wetlands have reduced native plant diversity compared to areas without common reed.

REPRODUCTION AND METHODS OF DISPERsal
Common reed spreads mainly by elongation and fragmentation of rhizomes. Although occasional establishment of new populations may occur from seed, it appears that few viable seeds are produced.

CONTROL
Careful planning and long-term management can yield varying levels of control of common reed. Because a healthy wetland ecosystem is generally resistant to invasive species, long-term control of common reed depends upon restoration of the health of the ecosystem.

Mechanical - Cutting, pulling, or mowing can be done in late July and should be repeated for several years. All cut shoots should be carefully removed to prevent resprouting. The placement of black plastic over cut stems has produced some success and burning in combination with herbicide application has also been effective in some situations. Hydrologic controls such as flooding for an extended period during the growing season may also be successful.
Chemical - Herbicide application with glyphosate is most effective in the early fall, after flowering; because common reed often grows in or near water, only formulations approved for aquatic use (Rodeo) should be utilized. Applications will need to be made at least two years in a row. Fusilade DX®, a grass specific herbicide, can be applied in non-aquatic areas.

Methods of application will depend on the associated plant community but may include aerial spraying, hand-held or backpack sprayers, and hand wicking. Herbicide use in combination with burning has generally proven to be the most effective means of control, and results in minimal disturbance to wetlands. Only a biodegradable herbicide that is licensed for use in wetlands and is non-toxic to animals can be used.

Biological - No biological controls are known at this time, however research is being conducted by Bernd Blossey at Cornell University (see web site listed below).

REFERENCES


Invasive species fact sheet prepared by:
Ann F. Rhoads and Timothy A. Block
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April 2002
Empress-tree, Princess-tree
Paulownia tomentosa (Thunb.) Steud.
Trumpet-creeper Family (Bignoniaceae)

DESCRIPTION
Empress-tree is a fast growing, upright, deciduous tree with a rounded crown and spreading branches. Young shoots can grow as much as 8–10 feet in a single year. Whether flowering, in leaf, in fruit, or dormant, this tree is hard to miss. In mid-May its bare branches support immense upright clusters of tubular purple flowers. The leaves are huge, more than 2 feet long on vigorous shoots, and in the winter the fuzzy brown flower buds are very conspicuous. The egg-shaped capsules, which hang on through the winter are about 1½ inches long.

Large trees with a straight, solid trunk are worth several thousand dollars each for their wood, which is valued in Japan for making ceremonial wedding chests and other specialty items.

Height - Empress-tree grows to 60 feet in height; the canopy may be 50 feet wide.

Stem - The bark is dark brown and rough on mature specimens. The twigs are thick and coarse with a large, thick, pinkish-orange pith and conspicuous, 3-lobed leaf scars.

Leaves - The leaves of the empress-tree can be up to 2 feet long; they are especially large on young, vigorous shoots. Rounded or heart-shaped at the base and pointed at the tip, they are opposite or whorled on the stem. Both surfaces of the leaves are hairy and the margin is smooth or may have a few coarse teeth or shallow lobes. In the fall the leaves turn yellow or brown.

Flowers - Large tubular purple flowers are borne in erect clusters in May before the leaves open. They are insect pollinated.

Fruits and seeds - The fruits are 1½–2 inch-long, egg-shaped capsules each of which may contain several thousand small, winged seeds.

Roots - Roots are shallow and wide spreading. They can be the source of very vigorous, erect shoots.
DISTRIBUTION AND HABITAT
Empress-tree is native to China where it is an early successional component of mixed deciduous forests. It was introduced from Asia in the 1840s as an ornamental and has naturalized in urban waste ground, along highways and railroad tracks, and in disturbed urban or suburban woodlots. It is still occasionally grown for ornament, as in Logan Circle in Philadelphia, or in plantations for its valuable wood.

EFFECTS OF INVASION
Empress-tree appears to be limited to edges or openings; however, it is occasionally found on steep rocky slopes or along stream banks. It is tolerant of dry, infertile soils and can be quite invasive in rocky areas with a naturally open canopy. Most of the documented occurrences are in southeastern Pennsylvania and the Pittsburgh vicinity, however empress-tree probably occurs elsewhere in the state also; its northern spread is limited by the vulnerability of the flower buds to winter injury.

REPRODUCTION AND METHODS OF DISPERsal
The small winged seeds of empress-tree are disseminated by wind and water. A single mature specimen is capable of producing millions of seeds, which grow quickly and begin to flower in as few as 8–10 years. Established trees are also capable of sprouting prolifically from the lower stem and roots.

CONTROL
Mechanical - Girdling is an effective way to kill the tops of mature trees, but they will resprout below. Follow-up will be required to remove sprouts or treat with glyphosate or triclopyr.

Chemical - Cutting and immediately treating the stump with a 50% solution of glyphosate or triclopyr is recommended. Basal bark applications using a 25% solution of triclopyr in oil applied from the ground level to a height of 12–15 inches is another alternative.

Biological - No biological control options are currently known.

NATIVE ALTERNATIVES FOR LANDSCAPE USE
A variety of large native trees could be substituted for empress-tree for landscape use: tuliptree (Liriodendron tulipifera), basswood (Tilia americana), red oak (Quercus rubra), sweetgum (Liquidambar styraciflua). For timber plantations black walnut (Juglans nigra) would be a good substitute.

REFERENCES


_Invasive species fact sheet prepared by:_
Ann F. Rhoads and Timothy A. Block
Morris Arboretum of the University of Pennsylvania
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April 2002
Japanese stiltgrass
_Microstegium vimineum_ (Trin.) A. Camus
Grass Family (Poaceae)

**DESCRIPTION**
Japanese stiltgrass, formerly _Eulalia vimineum_, is an annual grass that forms dense mats. Japanese stiltgrass is similar to jointed grass (_Arthraxon hispidus_), another non-native, invasive annual, warm-season grass species; however, _Arthraxon_ has broader leaf blades with a distinctly heart-shaped (cordate) base.

**Stems** - The weak, somewhat reclining stems of Japanese stiltgrass grow up to 40 inches long and may root at the stem nodes where they contact the soil surface.

**Leaves** - The lime green leaf blades are 4–5 inches long and ½ inch wide; they taper at both ends and have a silvery streak along the midrib.

**Inflorescence** - The inflorescence is inconspicuous, it may be at the end of the stem, or arise from leaf axils. Flowering occurs late in the season, often not until late September or early October.

**DISTRIBUTION AND HABITAT**
Native to Asia from India to Japan, Japanese stiltgrass was first discovered in the United States in 1919 in Tennessee. Since then, it has spread to all states east of the Mississippi from Connecticut south. It was used as a packing material for porcelain from China, and this was the likely means of its introduction to our area. Japanese stiltgrass prefers moist soils that are shaded from full sun. It is found in marshes, ditches, moist woods, floodplains, woodland borders, damp meadows, shady lawns, and along streamside trails, and roadsides. Wet soils that have periods of standing water are not suitable for Japanese stiltgrass, although its seeds can survive and germinate after extended periods of inundation.

In Pennsylvania, Japanese stiltgrass was first collected in Berks County in 1938. It has spread quickly in the southeastern region and continues to expand its range every year.

**EFFECTS OF INVASION**
Japanese stilt grass can spread rapidly following a disturbance such as flooding or soil moving. Within three to five years it can form dense monotypic stands which crowd out native herbaceous vegetation. It is also well adapted to low light levels and is able to grow and produce seed in as little as 5 percent of full sunlight.
Research carried out in New Jersey suggests that infestations of Japanese stiltgrass and Japanese barberry may alter soil pH and litter depth.

**REPRODUCTION AND METHOD OF DISPERsal**
Although Japanese stiltgrass does not produce prolific amounts of seed, a single plant typically giving rise to 100–1000 seeds, the seeds remain viable in the soil for 3–5 years. Seeds are dispersed by humans, animals, and water.

**CONTROLS**
Mechanical - The best strategy for controlling Japanese stiltgrass is removal of the plant by hand or mechanical means late in the growing season but before seed production. Pulled plants must be bagged and removed to avoid post-pulling seed maturation. This practice must be carried out for seven consecutive years due to the long seed bank viability. Mowing or burning early in the season does not control the plant; new seeds germinate following such measures and can still produce seed by the end of the season.

Chemical - Glyphosate is effective against Japanese stiltgrass, but its use in a natural area may also affect desirable species. Glyphosate is recommended because it is biodegradable; however, it is a nonselective, systemic herbicide that affects all green plants. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application.

**Biological** - No biological controls are available at this time.

**REFERENCES**


**Invasive species fact sheet prepared by:**
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**Multiflora rose**  
*Rosa multiflora* Thunb.  
Rose Family (Rosaceae)

**DESCRIPTION**
Multiflora rose is a vigorous, prickly shrub with green or reddish, arching branches. In late May–June it is covered with clusters of small white (or slightly pinkish) flowers. The fringed stipules at the base of the leaf stalk are the best characteristic to use to distinguish multiflora rose from other species. No other species that occur in our region have both an upright-arching growth form and fringed stipules.

**Height** - Vigorous plants can grow to 8–9 feet high and up to twice as wide.

**Stem** - The stems are green or reddish and bear stout prickles that curve downward. In the open, stems often arch down to touch the ground, or they can extend even higher than 9 feet when supported by the branches of adjacent trees or shrubs.

**Leaves** - Leaves are pinnately compound with 5–11 toothed leaflets; they are alternate on the stem. The stipules, leaf-like strips along both sides of the leaf stalk near the base, are prominently fringed. The leaves begin to emerge very early in the spring, well before any native woody plants.

**Flowers** - Flowers are white, or slightly pinkish, individually they are ½–¾ inch wide. They appear in large, showy clusters at the ends of the branches in late May or early June.

**Fruit and seed** - The flowers are followed by numerous small red fruits (hips) that persist into the winter and are eaten by birds and small mammals. A single plant can produce as many as a million seeds. Seed germination is high; seeds can also remain viable in the soil for as long as 20 years.

**Roots** - Roots are wide-ranging and capable of resprouting. In addition, stem tips that contact the soil surface are capable of rooting, through a process known as layering, to form new plants. Extensive thickets are formed in this way.
DISTRIBUTION AND HABITAT
Multiflora rose is native to Asia, it was brought to the United States originally in the 1800s for use as rootstock for grafted ornamental roses. In the 1930s through the 1950s it was promoted by the United States Department of Agriculture as a "living fence". Millions of seedlings were distributed to farmers and planted throughout the East and Midwest. Natural resource agencies such as the Pennsylvania Game Commission and the Pennsylvania Bureau of Forestry also included the plant in their revegetation and wildlife enhancement programs until the 1960s.

Multiflora quickly established itself as part of the naturalized flora. Today it is estimated to infest 45 million acres nationally, and is classified as a noxious weed by many states including Pennsylvania. It is found throughout the state in old fields, roadsides, pastures, open woods, forest edges, and riparian areas. While it grows most vigorously in full sun, it can grow in the shade too, and will persist for many years under a tree canopy although it may not flower or fruit very heavily.

EFFECTS OF INVASION
Multiflora rose forms such dense stands that it can interfere with establishment of other woody species in old-field succession. It also replaces native vegetation in forest edges and riparian areas. However, once trees break through the dense thickets of rose and begin to shade it, the multiflora loses vigor.

REPRODUCTION AND METHODS OF DISPERsal
Most spread of multiflora rose is by seed, but there is also some vegetative spread through layering, to form large clumps or thickets. Multiflora rose is so common in many areas of Pennsylvania that any open habitat such as lawn, meadow, pasture, or prairie is vulnerable to infestation due to the constant "seed rain" from birds. Regular monitoring of such areas is recommended so invading plants can be pulled while they are still in the seedling stage.

CONTROL
Mechanical - Seedlings can be pulled by hand. Small plants can be dug out or larger ones can be pulled using a chain or cable and a tractor, but care needs to be taken to remove roots also. Dense thickets may need to be attacked using a bulldozer. Repeated mowing for 2–4 years can be effective.

Chemical - Perhaps the most effective strategy is to cut the stems and immediately treat them with an herbicide such as glyphosate or triclopyr. The same chemicals can be employed as a foliar spray.
**Biological** - Rose rosette disease has been found in several areas of Pennsylvania, however it is not yet clear how much impact this virus disease, that was first reported in 1941, will have. The virus is spread naturally by a tiny mite. Plants affected by rose rosette disease develop witches'-brooms and small reddish leaves and shoots. The disease can kill plants in two years.

**NATIVE ALTERNATIVES FOR LANDSCAPE USE**
The native rose species, pasture rose (*Rosa carolina*), wild rose (*R. virginiana*), and swamp rose (*R. palustris*) are preferred landscape alternatives.

**REFERENCES**


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Obtuse-leaved privet, Border privet
*Ligustrum obtusifolium* Siebold & Zucc.
Olive Family (Oleaceae)

**DESCRIPTION**
Obtuse-leaved privet is a deciduous shrub that is multi-stemmed from the base, with spreading, twiggy, branches. It that has become extensively naturalized in disturbed woods and stream valleys. Several other species, Amur privet (*L. amurense*), California privet (*L. ovalifolium*), and common or European privet (*L. vulgare*) are also present as naturalized species in Pennsylvania; however, obtuse-leaved privet is the most common and invasive of these in our area.

*fruited stem*

**Height** - This shrub grows 10–12 feet tall and 8–10 feet wide.

**Stem** - Branches are slender, light gray, and exhibit an opposite arrangement along the stem. Young stems are hairy.

**Leaves** - Leaves are opposite, firm, smooth, and 1–2 inches long, tapering slightly to a blunt tip and base. Summer leaf color is dark green, becoming purplish in the fall.

**Flowers** - The small white flowers are in clusters at the ends of the branches; they are tubular with 4 spreading petal lobes, and about ½ inch long. Blooming occurs in June.

**Fruit and seed** - The small (½ inch), black fruits mature in September and often persist on the plant all winter.

**Roots** - Sprouting can occur from the roots when the tops are cut back severely.

*flowering stem*

**DISTRIBUTION AND HABITAT**
Obtuse-leaved privet is native to Japan; it was introduced as a landscape plant in 1860. It has subsequently become naturalized from New Hampshire to North Carolina and west to Michigan, Indiana, and Tennessee. It is present throughout the southern half of Pennsylvania, and at scattered sites elsewhere in the state. Obtuse-leaved privet is particularly abundant in stream valleys, old fields, forest gaps, and disturbed urban and suburban forest remnants.
EFFECTS OF INVASION
Obtuse-leaved privet can form dense thickets and out-compete native shrub species. Native wildflower species are also inhibited by the dense cover it produces.

REPRODUCTION AND METHODS OF DISPERAL
The spread of privet is mainly by seeds, which are dispersed by birds. Established plants can also regenerate from root and stump sprouts.

CONTROL
Mechanical - Seedlings can be pulled by hand or a weed wrench can be used to remove larger plants. Mowing or cutting is effective, although resprouting will necessitate repeating the process.

Chemical - Herbicides can be used effectively to control privet; glyphosate and triclopyr are recommended. Either can be used in water as a foliar application or to treat cut stumps. Treatment of the basal 12–15 inches of woody stems with 25% triclopyr in oil is another alternative.

Biological - No practical biological control options have been identified.

NATIVE ALTERNATIVES FOR LANDSCAPE USE
Privet, often used for hedges in the past, should be replaced with native species such as: winterberry holly (Ilex verticillata), inkberry holly (Ilex glabra), New Jersey tea (Ceanothus americanus), bayberry (Myrica pensylvanica), wild hydrangea (Hydrangea arborescens), ninebark (Physocarpus opulifolius), silky dogwood (Cornus racemosa), arrow-wood (Viburnum dentatum or V. recognitum), nannyberry (V. lentago).

REFERENCES


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Oriental bittersweet  
*Celastrus orbiculatus* Thunb.  
Staff-tree Family (*Celastraceae*)

**DESCRIPTION**
Oriental bittersweet is a woody, deciduous vine that twines around and drapes itself over other trees and shrubs in successional fields and along forest edges, often completely covering the supporting vegetation. In the shade it grows less vigorously, sometimes forming small trailing shrubs.

Oriental bittersweet is very similar to the native American bittersweet (*C. scandens*). The female flowers and fruits of oriental bittersweet are located in the leaf axils along the stem; American bittersweet, in contrast, blooms at the tips of the stems.

The two species cannot reliably be distinguished in the absence of female flowers or fruits. Although American bittersweet has generally narrower leaves, this difference is not reliable.

**Height** - Bittersweet climbs to heights of 50 feet or more when large trees are available to provide support.

**Stem** - The twining stems may reach a diameter of 4 inches, they often deform and eventually girdle the trunks or branches of trees around which they have grown.

**Leaves** - Mature leaves of oriental bittersweet are usually broadly rounded to nearly orbicular; however on young shoots they can be much more narrow, leading to confusion with the native species. The leaves are arranged alternately on the stem, and are deciduous, they turn yellow in the fall.

**Flowers** - Bittersweet flowers, which appear in May or June, are small and greenish. In general male and female flowers are produced on separate plants, however sometimes a few perfect flowers are also present.

**Fruit and seed** - The fruits are yellow or orange capsules that open to reveal 3 or 4 bright red seeds with their fleshy arils. The seeds are bird-dispersed. The fruiting branches are frequently used in the florist trade for autumn decorations, resulting in human dispersal of seeds. Pollen viability and seed germination are much higher in Oriental bittersweet than in the native species.
DISTRIBUTION AND HABITAT
Oriental bittersweet is native to China, Korea, and Japan; it was introduced for ornamental use about 1870, and has become naturalized from Maine to Louisiana and west to the Great Plains. In Pennsylvania it occurs mainly in the southern half of the state. It festoons itself on trees and shrubs on roadsides, along forest edges, fencerows, and old fields.

EFFECTS OF INVASION
Oriental bittersweet grows extremely vigorously in open and edge habitats; it covers and kills other vegetation and inhibits old-field succession. It also appears to be replacing the less vigorous native species, Celastrus scandens, which grows in similar habitats. American bittersweet is classified as a threatened species in Connecticut.

REPRODUCTION AND METHODS OF DISPERsAL
Bittersweet reproduces prolifically by seed, which is dispersed by birds. It also spreads by stolons and rhizomes, modified horizontal stems that grow at (stolons) or below (rhizomes) the soil surface. Shoots may also develop from the roots.

CONTROL
Mechanical - High growing vines can be cut; or small plants can be pulled out by hand. Fruiting stems should be bagged and removed from the site. Frequent monitoring is suggested for areas not yet infested, so that invading plants can be removed while they are still small.

Chemical - Cutting large stems and immediately treating the cut surface with glyphosate or triclopyr has been a successful control strategy.

Biological - No biological control options are currently known.

NATIVE ALTERNATIVES FOR LANDSCAPE USE
American bittersweet (Celastrus scandens) should be planted instead of the invasive, non-native species. Other native vines that might be considered include trumpet-creeper (Campsis radicans), virgin's-bower (Clematis virginiana), and Dutchmen's-pipe (Aristolochia macrophylla).

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Purple Loosestrife
*Lythrum salicaria* L.
Loosestrife Family (Lythraceae)

**DESCRIPTION**
Purple loosestrife is a stout, erect, perennial herb with a strongly developed taproot. From a distance, purple loosestrife may be confused with several other tall, native herbs with long red or purple spike-like inflorescences. Up close, however, it is easily distinguished from native plants.

**Height** - the plant ranges in height from 2 to 6 feet.

**Stem** - the four-angled stem can be glabrous to pubescent.

**Leaves** - leaves are opposite or in whorls; they are narrow to narrowly oblong, with a heart-shaped base that connects directly to the stem.

**Flowers** - Purple loosestrife flowers are magenta, or occasionally white or light pink, with 5–7 petals. The inflorescence is spike-like, 4–20 inches tall.

**Fruit** - The fruit is a capsule generally containing, 100 or more, tiny, dark colored seeds. The flowers open in July and continue to bloom through September or October.

**DESCRIPTION**
Purple loosestrife is an herbaceous perennial that grows in swamps, marshes, along riverbanks, and other wet, open areas. It is conspicuous from late June through September when the tall spikes of magenta-purple flowers are present.

**Height** - The flowering stems are 3–4 feet tall.

**Stem** - Purple loosestrife stems are herbaceous from a semi-woody base.

**Leaves** - The leaves occur in pairs (opposite) or whorled on the stems. The base of the leaf clasps the stem.

**Flowers** - The magenta-purple flowers are borne in narrow, upright spikes.

**Fruit and seed** - Seed capsules remain on the plants through the winter, disseminating seed on a continual basis.

**Roots** - The roots of purple loosestrife form a dense mass around the semi-woody base.
Mode of spread - Purple loosestrife spreads by seeds that may be distributed by water, by wind over ice in the winter, or by clinging to the feet of waterfowl. Individual plants form dense persistent clumps with a semi-woody base.

DISTRIBUTION AND HABITAT
Purple loosestrife is native to Eurasia and was first reported on the coast of northeastern North America in 1814. By 1830 purple loosestrife was well established along the New England seaboard. Although purple loosestrife occurs in nearly all sections of the United States, the heaviest concentrations are in the glaciated wetlands of the northeast. Purple loosestrife is found in wetlands such as cat-tail marshes, sedge meadows, and open bogs. It also occurs along streams, riverbanks, and lakeshores. It is opportunistic in areas that have received recent soil disturbance. It is not uncommon to find it growing in manmade storm water retention ponds and in ditches adjacent to parking lots and roads.

Purple loosestrife grows best in high organic soils, but tolerates a wide range of conditions including clay, sand, muck, and silt. Generally, the plant is found in full sun, but it can survive in partial shade. Infestations of purple loosestrife appear to follow a pattern of establishment, maintenance at low numbers, and then dramatic population increases when conditions are optimal. It flourishes in wetland habitats that have been disturbed or degraded by draining, natural draw down in dry years, bulldozing, siltation, shore manipulation, cattle trampling, or dredging. Mudflats exposed at low water levels will quickly be colonized if a loosestrife seed source is present.

EFFECTS OF INVASION
An invasion of purple loosestrife leads to a loss of plant and wildlife diversity. Seeds are usually present in large numbers and germinate in such high densities that growth of native seedlings is prevented. High seed viability and prolific seed production can build up a seed bank of massive proportions. The build up of other debris around the roots enables loosestrife to invade deeper water and to form dense stands that shade out and push out floating vegetation by closing open water spaces. The impact of purple loosestrife is seen in loss of native flora and fauna in affected wetlands, degradation of wetland pastures and wild hay meadows, clogging of irrigation systems, and the loss of natural habitat for recreational enjoyment.
REPRODUCTION AND METHODS OF DISPERAL
Its prolific seed production, up to 2.7 million per plant per year, enables the purple loosestrife to establish dense stands within a few years. It can also spread vegetatively by formation of adventitious shoots and roots from clipped, trampled, or buried stems.

CONTROL
Several control methods have been attempted with varying degrees of success, but current methods for eradicating large, dense populations of loosestrife are not totally effective. Natural area managers must determine their objectives first. Large populations extending over three acres or more will be difficult, if not impossible, to completely eradicate using presently known methods. These large populations should be contained at their present position. Preventing the expansion can be accomplished through hand-pulling new plants along the periphery or spraying herbicide on plants extending beyond the main body of the population.

Smaller populations can be controlled through eradication. Populations up to three acres can be cleared with herbicides or hand-pulled, depending upon the size of the work crew and time available.

Mechanical - Hand-removal is recommended for small populations and isolated stems. Ideally, the plants should be pulled out before they have set seed. The entire rootstock must be removed since regeneration from root fragments is possible. Be sure to minimize disturbances to the soil and native plant cover. Uprooted plants and broken stems must be removed from the area since the broken stems can resprout.

Chemical - Glyphosate is most commonly used for purple loosestrife control. However, its non-selective action can cause native vegetation to die back leading to even greater explosions of loosestrife invading from the seed bank. Where possible, spot applications targeting loosestrife plants should ensure that no large holes appear in adjacent vegetation. The safest method of applying glyphosate herbicide is to cut off all stems at about 6 inches and then paint or drip a 20–30% solution onto the cut surfaces. Spraying should be done after the period of peak bloom, usually late August. It is critical that any control effort be followed up the same growing season and for several years afterwards since some plants will be missed, new seedlings may sprout from the extensive seed bank, and some plants might survive the treatment. For larger infestations where spot application of glyphosate is not practical, broadleaf herbicides can be used. They have the advantage of not harming grasses and other grass-like species, which are the dominant plants in many wetland types.

Biological - Three host-specific insect species approved by USDA-APHIS have been released in the United States. These species are Hyllobius transversovittatus, a root-mining weevil, Galerucella calamiensis, and Galerucella pusilla, two leaf-eating beetles, and Nanophyes marmoratus, a flower-feeding weevil. When these insects are present in high densities they cause defoliation of mature plants, death of seedlings, and the destruction of flowering spikes or
prevention of their formation. Indications of successful introduction and control of purple loosestrife have been recorded at a number of release sites. On-going experiments have successfully demonstrated that certain loosestrife-eating insects can cause populations to decrease in size. Although these beneficial insects do not completely eliminate purple loosestrife from a site, they can reduce populations to more manageable and less harmful densities.

**NATIVE ALTERNATIVES FOR LANDSCAPE USE**

Purple loosestrife has long been used as a garden ornamental because of its attractive, long-lasting spikes of purple flowers. The claim is frequently made that horticultural cultivars do not produce viable seed and thus are not a threat to natural areas. However, it has been shown experimentally that garden forms of purple loosestrife do cross-pollinate with naturalized stands resulting in seed production.


**REFERENCES**


Morrow’s honeysuckle
*Lonicera Morrowii* A. Gray

and

Amur honeysuckle
*Lonicera maackii* (Rupr.) Maxim.
Honeysuckle Family (Caprifoliaceae)

**DESCRIPTION**
These non-native honeysuckles are both upright, multistemmed, deciduous shrubs with a dense twiggy growth habit. In addition to the 2 species described here, other non-native bush honeysuckles including Tatarian honeysuckle (*L. tatarica*), pretty honeysuckle (*L. x bella*), fragrant honeysuckle (*L. fragrantissima*), and honeysuckle (*L. standishii*) are also naturalized in Pennsylvania.

**Height** - These shrubs can reach a height of 8–15 feet and a spread of 8–10 feet.

**Stem** - branches are stiff with a light gray-brown bark, they have a hollow white or tan pith.

**Leaves** - The honeysuckles have opposite leaves with smooth (entire) margins. Morrow’s honeysuckle has elliptical leaves that are 1–2 inches long and softly hairy and slightly gray-green. The leaves of Amur honeysuckle are ovate, about 2–3 inches long with a long tapering tip, they are dark green in color. Both species leaf out very early in the spring, before most native plants, and hold their leaves far into the fall.

**Flowers** - Both species have ¾–1 inch-long white, tubular flowers with flaring petals that turn yellow as they age. The flowers are produced in pairs on a single stalk, they bloom in May. Pretty honeysuckle (*Lonicera x bella*), which is otherwise very similar to Morrow’s honeysuckle, has pink flowers.

**Fruit and seed** - All the bush honeysuckles produce small juicy red or orange berries that are eaten by many species of birds and small mammals. The fruit of Morrow’s honeysuckle ripens late June–early August, that of Amur honeysuckle September–November. Like the flowers, honeysuckle fruits are produced in pairs.
DISTRIBUTION AND HABITAT
Morrow's honeysuckle is native to Japan; Amur honeysuckle originated in eastern Asia and was first brought to the United States in 1898. Planted as ornamentals and for wildlife habitat, they have spread throughout the East and Midwest and are found in old fields, open woods, edges, and roadsides.

Non-native bush honeysuckles are widely established throughout Pennsylvania. They have increased rapidly in the past 40–50 years. Fragmented forest remnants in agricultural, suburban, and urban areas are particularly vulnerable to invasion, especially in areas of limestone geology. Although the plants need full sunlight to flower and fruit heavily, they can also persist in shaded situations.

EFFECTS OF INVASION
Morrow's honeysuckle and Amur honeysuckle are a threat to the integrity of the forest communities they invade because of their aggressive growth. They not only compete with native shrubs, they also inhibit forest floor wildflowers due to their dense growth and early leaf-out.

A study of the nesting success of native songbirds found increased predation of nests of robins built in Amur honeysuckle and glossy buckthorn compared with native shrubs.

REPRODUCTION AND DISPERsal
Most reproduction is by seed; Amur honeysuckle seeds do not require stratification and germination rates of 50–80 percent have been documented. They do not form a persistent seed bank. Amur honeysuckle begins to produce seed as early as 3–5 years of age; large crops are produced annually. The plants also sprout from cut stems or the root crown, the sprouting response is particularly vigorous if the plants are cut back in the winter. Other non-native shrub honeysuckles show similar patterns.

CONTROL
Mechanical - Pulling out seedlings and mature plants is effective especially early in an infestation or in the case of small populations where use of a herbicide is not possible. The process will have to be repeated for several years, and monitored thereafter, to achieve lasting control. Clipping stems at the base is effective, but also must be repeated until resprouting ceases. Clipping during the winter should be avoided as the plants resprout exceptionally vigorously the following spring.

Chemical - Glyphosate and triclopyr have been used effectively to control bush honeysuckles either as foliar sprays (2%) or when applied to cut stems (20–25%). Late season treatment is most effective.

Biological - No biological control options are currently known, however a aphid that feeds on the tips of the branches of several species of bush honeysuckles causes "witches-brooming" and appears to reduce flowering.
NATIVE ALTERNATIVES FOR LANDSCAPE USE
Many native shrubs can provide attractive flower and fruit displays and serve as food for birds and other wildlife: winterberry holly (*Ilex verticillata*), red or black chokeberry (*Aronia arbutifolia, A. melanocarpa*), bayberry (*Myrica pensylvanica*), arrow-wood (*Viburnum recognitum* or *V. dentatum*), wild hydrangea (*Hydrangea arborescens*), ninebark (*Physocarpus opulifolius*), spicebush (*Lindera benzoin*), blackhaw (*Viburnum prunifolium*), silky dogwood (*Cornus racemosa*), buttonbush (*Cephalanthus occidentalis*).

REFERENCES


Morrow's honeysuckle in fruit

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