In the Weeds

A Guide for Maintaining Vegetation in Stormwater Treatment Systems in Rhode Island

Produced by URI Cooperative Extension with funding from the RI Department of Transportation and support from the Rhode Island Department of Environmental Management.

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In the Weeds: A Guide for Maintaining Vegetation in Stormwater Treatment Systems in Rhode Island

Prepared for:

Rhode Island Department of Transportation
Office of Stormwater Management
360 Lincoln Ave
Warwick, RI 02888

Rhode Island Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, RI 02908

Authors:

Alicyn Murphy, Lorraine Joubert, and Lisa DeProspo Philo
University of Rhode Island
Cooperative Extension, RI Nonpoint Education for Municipal Officials (NEMO)
Coastal Institute, 1 Greenhouse Road
Kingston, RI 02881

Acknowledgements:

This guide was prepared with funding from the RI Department of Transportation to assist RI municipalities to implement effective stormwater management programs. The authors are grateful for their support and to the RI Department of Environmental Management for their technical assistance and oversight. We would also like to recognize the individuals who generously assisted in reviewing this document, including:

- Wenley Ferguson of Save the Bay
- Megan Gardner RLA of Providence Parks Department
- Dr. Susan Gordon of Kinney Azalea Gardens & RINLA, Cert. Chair
- Meg Kerr of the Audubon Society of Rhode Island
- Brian Kuchar of Horsley Witten Group
- Hope Leeson of Rhode Island Natural History Survey
- Kate Venturini of URI Cooperative Extension

This is Contribution #5463 of the University of Rhode Island, College of the Environment and Life Sciences and Rhode Island Cooperative Extension. Cooperative Extension in Rhode Island provides equal opportunities without regard to race, age, color, national origin, sex or preference, creed, or handicap.

Suggested citation:

Murphy, A., L. Joubert and L.D. Philo. 2018. In the Weeds: A Guide for Maintaining Vegetation in Stormwater Treatment Systems in Rhode Island. University of Rhode Island, RI Cooperative Extension. Kingston, RI.

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In the Weeds: A Guide for Maintaining Vegetation in Stormwater Treatment Systems in Rhode Island

Purpose This illustrated guide is a short list of weedy plants known to invade and compromise the function of vegetated stormwater systems such as rain gardens, bioretention, bioswales, and tree filters.* This guide is designed to help maintenance staff and supervisors to identify problem plants in the field. It targets aggressive plants most likely to take over a stormwater treatment system.

Plants vs. Weeds Abiding by the philosophy that "a weed is a plant out of place," the plants shown in this guide are those most likely to compete with the desired plants in vegetated stormwater systems. These systems are designed to soak up, filter, and store stormwater in order to reduce polluted runoff. They also may be designed as habitat for birds and pollinators, or for their beauty as a garden or naturalized landscape. But when unwanted aggressive plants invade (even those that are considered beneficial native species), they can crowd or shade out the selected plants and alter the system function and appearance over time.

Invasive vs. Native The majority of the plants listed in this guide are considered invasive*. Many of them flourish in disturbed areas, such as newly planted stormwater systems. There are also some native plants that are adept at rapidly colonizing disturbed areas, resulting in their overabundance. In this guide the term "native" means that plants are native to Rhode Island, unless otherwise noted. Though these weedy native plants have value to other native pollinators and wildlife, they can compromise the functionality of bioretention areas and therefore are included in this guide.

Organization This guide is organized into four categories: Trees, Shrubs, Herbaceous/Grasses, and Vines. (For information on aquatic invasive species, see the resources section of this guide.) Under each category, the plants are alphabetized by common name. When multiple plants have a shared name they are listed by that name. For example, to find "Common Barberry" and "Japanese Barberry" look for the alphabetic placement of "Barberry."

The photos illustrating each species were chosen to show different stages of the plant through the growing season. Because it is much easier to control invasive species through frequent inspection and weeding before they get firmly established, many photos show seedlings and young plants. Photos also emphasize distinctive plant features, such as large flowers, fruits, seedpods, and different bark textures. Each plant is labelled as either "**Invasive**" or "**Native and weedy**" as this distinction may inform methods of control or removal. It can be a challenge to describe plants without using botanical terms, so following the plant entries there is an illustrated glossary. Finally, an index is included where the plants are listed alphabetically by scientific name.

* For more information on these subjects see the Appendix.

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Access online from a mobile device: web.uri.edu/riss/in-the-weeds
Download the PDF: web.uri.edu/riss/files/In-the-Weeds.pdf

Trees

Black Locust

Robinia pseudoacacia

Native and weedy

This tree is native to the southeastern part of the U.S. It has compound leaves with smooth edges, white flowers that form seedpods, and reddish thorns that grow from the trunk and branches.

Photo credit: (Left) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (right) T. Davis Sydnor, The Ohio State University, Bugwood.org.

Callery Pear

Pyrus calleryana

Invasive

Has vase-shaped growth form, and many white flowers that bloom early in spring. Leaf blade is simple and edge of leaf is smooth. Leaves are arranged opposite.

Photo credit: (Left, bottom right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (top right) David Stephens, Bugwood.org.

Amur Maple

Acer ginnala

Invasive

Has longer leaves compared to most other maples. Bark of adult plant is thin and mostly smooth. Native Red maples have similarly-sized leaves that are a much shorter shape. Leaves are arranged opposite.

Photo credit: (Left top and bottom) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (right) Karan A. Rawlins, University of Georgia, Bugwood.org.

Norway Maple

Acer platanoides

Invasive

Tell apart from a Sugar maple in winter by larger, plumper cherry-brown buds. During growing season, plucking leaf stem off of branch will cause a bead of white sap to appear on the node of a Norway maple. Adult plants have evenly-ridged gray bark. Leaves are arranged opposite.

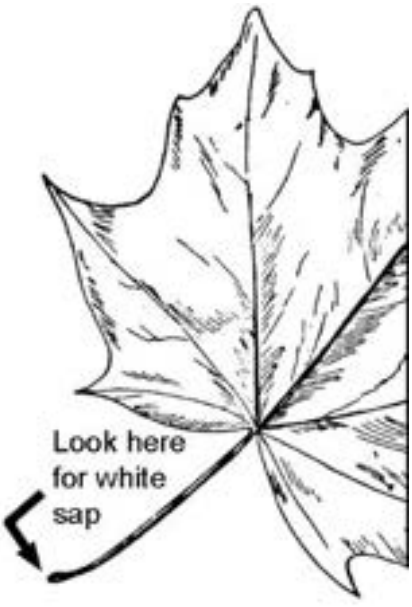


Photo credit: (Left) Clipart courtesy FCIT, (top right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (bottom right) David Stephens, Bugwood.org.

Descriptions for Amur Maple and Norway Maple obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Sycamore Maple

Acer pseudoplatanus

Invasive

Bark is scaly and flakes away leaving orange patches. Leaves are thick and leathery. Buds stay green throughout the winter. Leaves are arranged opposite. Plump buds are greenish in winter.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Princess Tree

Paulownia tomentosa

Invasive

A fast-growing tree. Sweet-smelling purple flowers are produced early in spring. On young trees the leaves can look similar to those of native catalpa tree—check to see if leaves rise from stem in a whorl (catalpa) or opposite (princess tree).

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Description for Sycamore Maple obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org
Description for Princess Tree referenced from https://extension.umd.edu/hgic/paulownia-empress-or-princess-tree

Tree-of-Heaven

Ailanthus altissima

Invasive

Fast-growing tree with large compound leaves. All parts of the plant have an unpleasant smell. Tell apart from native sumac plants by observing whether bark has horizontal (sumac) or vertical patterning and that the sap is clear (tree-of-heaven).




Photo credit: (Top left, right) Richard Gardner, UMES, Bugwood.org, (bottom left) Annemarie Smith, ODNR Division of Forestry, Bugwood.org.

White Poplar

Populus alba

Invasive

Leaves have three lobes and appear bright silver-white on underside. Bark on mature plant can be both smooth and thin or ridged and thick. Big-toothed aspen is a native look-alike, but its leaves are not white underneath.



Photo credit: (Left) Chris Evans, University of Illinois, Bugwood.org, (top right) Wendy VanDyk Evans, Bugwood.org, (bottom) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Description for Tree-of-Heaven referenced from https://extension.umd.edu/hgic/tree-heaven-ailanthus/
Description for White Poplar obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Shrubs

Burning Bush

Euonymus alatus

Invasive

Can grow up to 10 ft tall and wide. Leaves turn bright red in fall. Has green-brown branches with flaky "wings" and small red fruits. Opposite leaves with toothed edges. ***Euonymus alatus* 'Compactus'** is a smaller variety with thin green twigs and much harder to discern "wings".

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Common Barberry

Berberis vulgaris

Invasive

Can reach 10 feet in height. Has toothed, simple leaves, three-pronged spines and yellow flowers that develop into fleshy berries.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Descriptions for Burning Bush and Common Barberry obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Japanese Barberry

Berberis thunbergii

Invasive

Ranges from 3-6 feet in height. Has dense growth pattern and one spine per node. Unlike Common barberry, leaf edges are smooth. Berries are chalky.




Photo credit: (Top row, bottom right) Richard Gardner, UMES, Bugwood.org, (bottom left) Chris Evans, University of Illinois, Bugwood.org.

Common Buckthorn

Rhamnus cathartica

Invasive

Thorny plant that forms dense thickets. It has dark fruits, and leaf veins curve in so that they are somewhat parallel to each other. Leaf edge is toothed. Be sure that leaves are arranged opposite to tell apart from similar-looking native plants.



Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Glossy False Buckthorn

Frangula alnus

Invasive

Has shiny leaves and small white flowers. Berries ripen from green to red to blue-black. Glossy buckthorn grows in the shade under trees. Be sure that leaves are arranged alternate and leaf edges are smooth to tell apart from similar-looking natives plants.

Photo credit: (Left) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (right) Davis Sydnor, The Ohio State University, Bugwood.org.

Gray Willow

Salix cinerea

Invasive

Tell apart from native willows by peeling bark off a twig and observing fine white ridges underneath. Leaves are simple and edges are smooth. The leaves have fine silver hairs on their underside and leaf edges roll under on *S. cinerea* while they are flat on native willows.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Descriptions for Glossy False Buckthorn and Gray Willow obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org/

Heather

Calluna vulgaris

Invasive

Heather is known for its many purple flowers. It is a low shrub that grows close together with leaves that remain green through winter. Has two leaves per node, edges of leaves can have teeth or be smooth.

Photo credit: (Left) John M. Randall, The Nature Conservancy, Bugwood.org, (right) Dan Aamlid, Bugwood.org.

Amur Honey-suckle

Lonicera maackii

Invasive

Flowers are fragrant and appear late in May. The flowers are white at first and turn yellow as they age. Opposite leaves come to narrow tip.

Photo credit: (Top left) T. Davis Sydnor, The Ohio State University, Bugwood.org, (bottom left) John Hilty, Illinois Wildflowers, (top & bottom right) Richard Gardner, UMES, Bugwood.org.

Morrow's Honey-suckle

Lonicera morrowii

Invasive

Flowers are white-pink and finely-hairy. Leaves are hairy on underside with smooth edges. Often found in shade under trees.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Showy Honey-suckle

Lonicera x bella

Invasive

Leaves are widest at or below middle, with short hairs on underside. Leaves are arranged opposite. Flowers develop in pairs. Unlike Amur and Morrow's honeysuckle it can grow in full sun.

Photo credit: (Left) John Hilty, Illinois Wildflowers, (right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Description for Morrow's Honeysuckle obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org
Description for Showy Honeysuckle referenced from www.illinoiswildflowers.info/trees/plants/shw_honeysck.html

Tatarian Honey-suckle

Lonicera tatarica

Invasive

Has thick tangles of leafless branches. It usually has many pink flowers which are strongly asymmetrical. Leaves have smooth edges that end in blunt point.

Photo credit: John Hilty, Illinois Wildflowers.

Japanese Beach Rose

Rosa rugosa

Invasive

Most often found on or near coastal dunes. Has rough, toothed leaves, pink flowers, and orange-to-red fruits called hips. The hips are 1” or more in size, larger than native rose hips. *Rosa rugosa* can spread by putting down roots where branches touch the ground.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Multiflora Rose

Rosa multiflora

Invasive

Has thorny, arching stems that can root at tips. Leaves are compound and toothed, and flowers are white. Fruits are noticeably smaller than those of *Rosa rugosa*. Distinguish from native species by confirming that stipules are fringed like eyelashes (as shown at upper right).

Photo credit: (Top left) Rob Routledge, Sault College, Bugwood.org, (top right) Karan A. Rawlins, University of Georgia, Bugwood.org, (bottom) Richard Gardner, UMES, Bugwood.org.

Autumn Olive

Elaeagnus umbellata

Invasive

Leaves are simple and edges are smooth. This plant is hardy with clusters of light-colored flowers. Berries ripen in the fall. The undersides of the leaves are silvery.

Photo credit: (Left, bottom right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (top right) Kathy Smith, Ohio State University Extension, Bugwood.org.

Description for Multiflora Rose referenced from https://extension.umd.edu/hgic/multiflora-rose/
Description for Autumn Olive obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Russian Olive

Elaeagnus angustifolia
Invasive

Found in moist soils, it has narrow silvery-blue leaves, yellow flowers, and olive fruits. The bark of young trees is shiny brown and smooth, and on older trees appears to be in long strips. Leaf edges are smooth.




Photo credit: (Left, top right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (bottom right) Davis Sydnor, The Ohio State University, Bugwood.org.

Privets

Ligustrum spp.
Invasive

Several species of privets are locally invasive. All have clusters of white flowers with short anthers, developing into dark fruits. Leaves are generally glossy with smooth edges, and are partially evergreen (or green year-round). Can reach 30 feet in height.




Photo credit: (Top row) Richard Gardner, UMES, Bugwood.org, (bottom row) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Herbaceous/Grasses

Common Reed

Phragmites australis

Invasive

This wetland grass is often found in large monocultures and can reach a height of fifteen feet. It is green during growing months and gold through the winter. A native look-alike is the rare *Phragmites americanus*, on which middle and upper stems appear reddish.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Drooping Brome Grass

Bromus tectorum

Invasive

Usually 1-3 feet tall and found on dry, sunny sites. The central stalk and lateral branches tend to droop. Immature florets are whitish or reddish and shiny (see bottom right).

Photo credit: (Left, top right) Randall G. Prostak, University of Massachusetts Extension, (bottom right) John Hilty, Illinois Wildflowers.

Description for Common Reed obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org
Description for Drooping Brome Grass referenced from http://www.illinoiswildflowers.info/grasses/plants/downy_brome.htm/

Garlic Mustard

Alliaria petiolata

Invasive

Found in shady areas. It has a two-year life cycle. In the first year, leaves are round and grow in rosettes (top left). In second year grows 1-4 feet tall (bottom left) with toothed leaves that are triangular in shape and clusters of white flowers.




Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Horseweed

Conyza Canadensis

Native and weedy

Horseweed can be beneficial to native insects and will not affect functioning of stormwater system. But it is very common, successful, and may impact aesthetics. Leaves are narrow, hairy and whorled. Plant grows 3-6 feet tall and is largely unbranched.



Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Description for Garlic Mustard referenced from https://extension.umd.edu/hgic/garlic-mustard/
Description for Horseweed referenced from https://extension.umd.edu/hgic/horseweed/

Japanese Knotweed

Polygonum cuspidatum/ Fallopia japonica

Invasive

This tenacious invasive forms monocultures in moist, well-drained soil. Can grow up to 10 feet tall. Bamboo-like appearance, with red and green stems. Has upright clusters of small white flowers.





Photo credit: (Top row entire and bottom right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (bottom right) Nisa Karimi, Wisconsin Department of Natural Resources, Bugwood.org.

Japanese Stiltgrass

Microstegium vimenium

Invasive

Grows 1-3 feet tall, in shady areas near wetlands and streams. Identify by fine hairs where the leaf sheath meets the stem. Tell apart from native Whitegrass when Stiltgrass stems turn red in mid-autumn. Mid-vein appears iridescent.

DON'T SPREAD IT: Japanese stiltgrass has tiny seeds that stick to shoes, tools, and especially equipment tires.


Photo credit: (Left) © Arthur Haines, New England Wild Flower Society, (right) Randall G. Prostak, University of Massachusetts Extension.

Description for Japanese Knotweed referenced from https://extension.umd.edu/hgic/japanese-knotweed/
Description for Japanese Stiltgrass obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Knap-weeds

Centaurea spp.

Invasive

Found in full sun and poor soils. The knapweeds are generally 2-3 feet tall and are topped by pink-to-purple flower heads with slim spreading petals. Root system includes a taproot.

Photo credit: (Left) Rob Routledge, Sault College, Bugwood.org, (right) William M. Ciesla, Forest Health Management International, Bugwood.org.

Lesser Celandine

Ficaria verna

Invasive

Found in shady areas with moist soil. Has shiny, dark green leaves and glossy yellow flowers. It grows, blooms and reproduces all during the spring—is dormant in summer. Tell this invasive apart from native Marsh-marigold by Lesser Celandine's tuberous roots.

Photo credit: (Top left, right) Randall G. Prostak, University of Massachusetts Extension, (bottom left) David L. Clement, University of Maryland, Bugwood.org.

Description for Knapweed referenced from http://www.illinoiswildflowers.info/weeds/plants/sp_knapweed.htm/
Description for Lesser Celandine referenced from https://extension.umd.edu/hgic/lesser-celandine/

Moneywort

Lysimachia nummularia

Invasive

This herbaceous vine grows across the ground instead of climbing. Stems are light green and angular and leaves are opposite. Yellow flowers usually have 5 petals but will occasionally form 6.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Mugwort/ Chrys-anthemum Weed

Artemisia vulgaris

Invasive

Highly invasive. Leaves have a strong smell similar to chrysanthemum. Leaves are silvery on their underside and deeply lobed. Has small white flowers and can grow up to 4 feet tall. Spreads by rhizomes, usually is found growing in groups and is very difficult to pull up.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Description for Moneywort referenced from www.illinoiswildflowers.info/weeds/plants/moneywort.htm/
Description for Mugwort referenced from https://extension.umd.edu/hgic/mugwort/

Pokeweed

Phytolacca americana

Native and weedy

A native plant with reddish stems and a tree-like shape that grows 3-8 feet tall. Has light flowers, clusters of berries that are dark purple when ripe, and a fleshy taproot. Leaves are alternate.

Photo credit: (Left) Alicyn Murphy, (right top and bottom) Randall G. Prostak, University of Massachusetts Extension.

Purple Loosestrife

Lythrum salicaria

Invasive

Has persistent purple flowers and is found in sunny wetlands. Leaves can appear alternate, opposite, or whorled (see top right.) Averages five feet tall. The native narrow-leaved fireweed has 4-petal flowers while purple loosestrife has 6-petal flowers.

DON'T SPREAD IT: Purple loosestrife has tiny seeds that stick to shoes, tools, and especially equipment tires.

Photo credit: (Left) Caleb Slemmons, National Ecological Observatory Network, Bugwood.org, (top right) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (bottom right) Richard Gardner, UMES, Bugwood.org.

Description for Pokeweed referenced from https://extension.umd.edu/hgic/pokeweed
Description for Purple Loosestrife obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org/

Reed Canary Grass

Phalaris arundinacea

Invasive

This hairless grass is found growing in dense clumps. The flowering heads are up to 10 inches long and are tan when mature (far right). Best way to tell apart from native grasses is that reed canary grass exceeds 4.5 feet tall.

Photo credit: (Left) Randall G. Prostak, University of Massachusetts Extension, (right) John Hilty, Illinois Wildflowers.

Smart-weed

Persicaria maculosa

Invasive

Reaches 1-4 feet tall, purplish thumbprint shape sometimes marks the leaf (see middle image). Stems are reddish. Found in a range of soil types.

Photo credit: (Left) Alicyn Murphy, (middle and right) Randall G. Prostak, University of Massachusetts Extension.

Description for Reed Canary Grass referenced from http://www.illinoiswildflowers.info/grasses/plants/rc_grass.htm/
Description for Smartweed referenced from https://extension.umd.edu/hgic/smartweed/

Vines

Bittersweet Night-shade

Solanum dulcamara

Invasive

An invasive vine with compound leaves and delicate blue-purple and yellow flowers that develop into bright red berries. It grows along stream banks and other open wet areas.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

English Ivy

Hedera helix

Invasive

A climbing ivy with dark green leaves and round bunches of small yellow-green flowers. Leaf shape simplifies when plant reaches maturity. Compare circled leaves: The one on the left is from an immature plant, the one at right from a mature one.

Photo credit: (Left top) David Stephens, Bugwood.org, (left bottom) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (right) James H. Miller, USDA Forest Service, Bugwood.org.

Field Bindweed/ Wild Morning Glory

Convolvulus arvensis

Invasive

Flowers look very much like those of a morning-glory but are smaller and white or whitish-pink. Aggressively invades disturbed sites; can climb up as well as grow along the ground. Leaves are alternate.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Fox Grape

Vitis labrusca

Native and weedy

This native plant has many brown-gray hairs on underside of leaves. Fine tendrils often sprout from where the leaf meets the stem. Leaves are arranged alternate. Pith is brown.

Photo credit: (Left) Randall G. Prostak, University of Massachusetts Extension, (top right) Ohio State Weed Lab , The Ohio State University, Bugwood.org, (bottom right) Robert Vidéki, Doronicum Kft., Bugwood.org.

Greenbriar

Smilax rotundifolia

Native and weedy

This common native vine has bright green, alternate oval leaves and dark green prickles. It forms thickets in a wide range of disturbed habitats. The blue-black berries are eaten by birds.

Photo credit: (Left, top right) John Lynch. Copyright © 2017 New England Wild Flower Society, (bottom right) Adelaide Pratt. Copyright © 2017 New England Wild Flower Society.

Japanese Honey-suckle

Lonicera japonica

Invasive

Produces many very fragrant white and pale yellow flowers. It has dark-purple berries favored by birds. Leaves are simple and arranged opposite. The leaves can be either lobed or unlobed.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Mile-a-Minute Vine

Persicaria perfoliata/ Polygonum perfoliatum

Invasive

Found most often in full sun but sometimes in shade. Root system is shallow and fine. Leaf shape is of an equilateral triangle except for cup-shaped leaf under flower. Leaf undersides and stems are barbed. Berries are blue-black.




Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Oriental Bittersweet

Celastrus orbiculatus

Invasive

A woody vine that can grow up into forest canopies, damaging or even killing trees. Leaves are rounded and bluntly toothed. Small green flowers give way to red fruit that remain on the vine after fall leaf-drop.






Photo credit (Top left) Alicyn Murphy, (bottom left) Erin Griffin, University of Georgia, Bugwood, (all others) Randall G. Prostak, University of Massachusetts Extension.

Description for Mile-a-Minute Vine referenced from https://extension.umd.edu/hgic/mile-minute-vine/

Description for Oriental Bittersweet referenced from https://extension.umd.edu/hgic/oriental-bittersweet/

Poison Ivy

Toxicodendron radicans

Native and weedy

This native plant acts as a vine and climbs via fibrous, aerial roots in the shade. It takes on a more shrub-like shape when growing in open coastal areas. Leaves are glossy and grow in groups of three. Thrives under many soil conditions.

CAUTION: Wear protective clothing to guard against toxic oil on leaves and stems. Never burn plants.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Porcelain-Berry/Amur Pepper-vine

Ampelopsis glandulosa

Invasive

This woody vine of the grape family climbs with tendrils. Leaves are alternate, dark-green and look similar in shape to maple leaves. Found in disturbed edge habitat. Observe white pith to distinguish from native look-alikes.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Description for Poison Ivy referenced from https://extension.umd.edu/hgic/poison-ivy/
Description for Porcelain-Berry referenced from https://extension.umd.edu/hgic/porcelainberry/

Sweet Autumn Clematis

Clematis terniflora

Invasive

This vine will climb as well as cover ground. Tell apart from native clematis because the invasive has 3-5 leaflets that are glossy and have smooth margins while native has only 3 leaflets with toothed margins.




Photo credit: (Top left) Chris Evans, University of Illinois, Bugwood.org, (top right, bottom) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Black Swallow-wort

Vincetoxicum nigrum/ Cynanchum nigrum

Invasive

A creeping vine with small, velvety flowers with 5 petals that form a cup-shape. Leaves are arranged opposite. The fruit is a sizeable green pod.



Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Descriptions for Sweet Autumn Clematis and Black Swallowwort obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Pale Swallow-wort

Vincetoxicum rossicum/ Cynanchum rossicum

Invasive

Flowers are lighter and petals are finer than Black swallowwort. Leaves are opposite. Can form monocultures in disturbed areas. Especially competitive in shallow soils over limestone.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Virginia Creeper/ Woodbine

Parthenocissus quinquefolia

Native and weedy

This common native plant has five-part compound leaves that are glossy-green. It uses tendrils for climbing, and birds eat the dark fruits that grow on red stems. Edge of leaf has teeth.

Photo credit: Randall G. Prostak, University of Massachusetts Extension.

Descriptions for Pale Swallowwort and Virginia Creeper obtained from New England Wild Flower Society
www.newenglandwild.org
www.gobotany.newenglandwild.org

Chinese Wisteria

Wisteria sinensis
Invasive

This distinctive vine prefers full sun. It has compound dark green leaves and produces 6-12" clusters of mildly-fragrant flowers. With unchecked growth stems can become trunk-like and strangle other plants.




Photo credit: (Top left and top middle) Chris Evans, University of Illinois, Bugwood.org, (top right) James H. Miller, USDA Forest Service, Bugwood.org, (bottom right) David Stephens, Bugwood.org.

Japanese Wisteria

Wisteria floribunda
Invasive

Japanese wisteria differs from *Wisteria sinensis* in its bright green leaves and longer (12-18") clusters of very fragrant flowers. Both species sport large, long seed pods (circled at right) and compound leaves.




Photo credit: (Bottom left) Leslie J. Mehrhoff, University of Connecticut, Bugwood.org, (all others) Mark H. Brand, University of Connecticut Plant Database.

Description for Chinese Wisteria referenced from https://plants.ces.ncsu.edu/plants/all/wisteria-sinensis/
Description for Japanese Wisteria referenced from https://plants.ces.ncsu.edu/plants/vines/wisteria-floribunda/

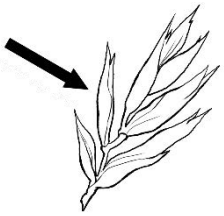
Glossary of Terms

Alternate – when leaves are arranged alternately along stem (as opposed to *opposite*).[1]

Anther – organs at the end of stamens carrying powdery yellow or orange pollen. Stamens and anthers are male organs.[1] Below, **1** shows the anther and **2** shows the stamen.

Compound – a leaf that is divided into two or more *leaflets*.[4]

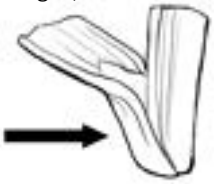
Floret – small flowers which have no petals, found on grasses and sedges.[1]



Genus – a group of plants that scientists have determined are related, and the first part of any plant's scientific name; think "generic".[5]
Example: ***Rosa*** *rugosa* - the genus is Rosa

Lateral branch – a shoot rising off of the main stalk or trunk.[3]

Leaf sheath – seen on grasses and sedges, the portion of the leaf that wraps around the stem.[1]



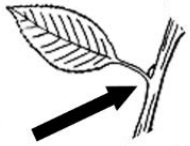
Leaflet – often resembling small leaves, leaflets are the parts of a compound leaf.

Lobed – leaf with large indentations that do *not* reach the middle vein of the leaf as compound leaves do.[4]

Mid-vein – the central vein of a leaf.[2]

Monoculture – an area comprised of mainly one species of plant; very low biodiversity.

Node – position on stem where leaf or branch originates.[3]

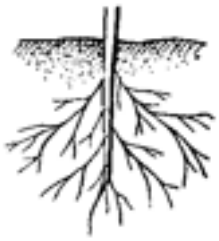


Opposite – leaves arranged in pairs growing from one node directly across from one another on stem (as opposed to *alternate*).[4]

Pistil – the female organ, usually located at the center of the flower.[1] Below, **3** shows the pistil.

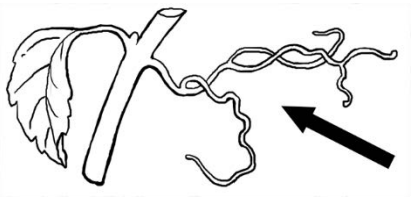
Pith – The spongy, central tissue in some twigs and stems.[5] Break a small twig to discover the color of the pith.

Taproot – a root that originates from center of a plant.[1]



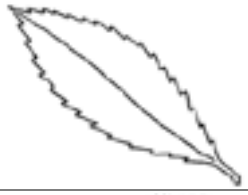
Rosette – leaves overlapping and growing in *whorl* (see below) that is very close to the ground.[2]

Tendril – a slender, twining organ used to grasp support for climbing.[3]



Simple – the most common shape for a leaf, may be lobed but is not divided into leaflets.[3]

Toothed – leaf edge that is saw-like.[4]



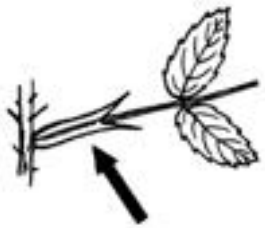
Species – the second part of any plant's scientific name, which has no meaning on its own. Describes one kind of plant within the genus; think "specific".[5] Example: *Rosa* ***rugosa*** - the species is rugosa

Tuberous root – a coarse root, thickened for nutrient storage.[2]

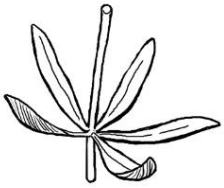
Stamen – thin shaft holding up the pollen-bearing anther. Anther and Stamen are male organs.[1] Below, **1** shows the anther and **2** shows the stamen.

Variety – a population of plants within a species that differs significantly from other members of the species. The third part of a plant's scientific name, appearing in single quotation marks. When intentionally cultivated by people a variety can also be referred to as a *cultivar*.[5] Example: *Euonymus alatus* '**Compactus**' – the variety is Compactus

Stipule – A leaf-like structure that occurs where the leaf joins the stem; stipules occur in pairs.[1]



Whorl – where three or more leaves or petals arise from the same point and form a circle around it.[4]



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Index by scientific names

Appendix

Green Stormwater Infrastructure

Vegetated stormwater systems represent a transition from gray infrastructure to green infrastructure.

Gray Infrastructure is the traditional method of collecting polluted stormwater from roads, parking lots and gutters with storm drains. That water is piped directly to nearby waters, usually without any treatment.

Green Stormwater Infrastructure, often referred to simply as green infrastructure (GI), is a collection of best management practices (BMPs) for stormwater treatment that uses plants, soil, and engineered drainage to filter, soak up, or store runoff from developed land. These are designed to restore the natural water cycle.

Large bioretention area on the University of Rhode Island Kingston campus to offset impervious surface created by the Center for Biotechnology and Life Sciences building.

Cottages on Greene - bioretention, bioswales, and permeable pavement in compact cottage development in East Greenwich.

Roosevelt Lake Recreational Path is comprised of a rain garden, bioswale and restored shoreline buffer in Roger Williams Park, Providence. These areas treat stormwater from nearby roads and parking lots and discourage geese.

Bio-infiltration swale at a commercial parking lot in North Kingston. The curb cut allows stormwater to enter the system.

DON'T SPREAD IT

Thwart these expert invaders by keeping field gear clean and thoroughly removing plant matter from sites:
Purple loosestrife and **Japanese stiltgrass** have tiny seeds that stick to shoes, tools, and especially equipment tires.
Mugwort is spread by root fragments, sometimes existing in soil brought to an area. Check soil source!
Japanese knotweed can root from as little as a fragment of the stem, so mowing is not recommended.

Weeding Tips

Hand-pulling is very effective in a densely planted area such as a vegetated stormwater system.

Remove roots. It is not enough to remove the portion of the plant that is aboveground–often weeds will sprout back from roots left buried in the soil. If hand-pulling is leaving roots behind, consider grabbing a garden hoe or trowel. Or plan to weed the area after watering or rainfall when the soil is moist.

Don't let it go to seed. Remove a plant before it has the chance to flower and go to seed, giving new weeds the opportunity to sprout everywhere. The seeds of species like garlic mustard will continue to mature even after the plant has been pulled.

Herbicides may be needed on particularly aggressive invasive plants*. This MUST be done by a certified applicator using the least amount of chemical necessary. Applying the herbicide to the freshly cut stem near ground level is safest. Do not apply herbicide when plants are in flower.

Bag it up. Many invasive plants can resprout if they have contact with soil, so drying them out on a paved surface or bagging them for disposal is important. Many plants can form roots when their stems are left in contact with soil. Japanese knotweed can root from as little as a fragment of stem. ALWAYS bag and remove any invasive plants you pull.

Tools to have on hand: work gloves, knee pads, full-sized and hand-held garden hoes, flat shovel, and trash bags.

The Importance of Revegetation

The removal of invasive plants or weeds opens up the newly-exposed soil for invasion, so replanting is important. Be prepared to replace those weeds or invasive species with a native plant that will be well-suited to the bioretention area. Head to the Rhode Island Coastal Plant Guide and use the drop-downs to specify the site conditions of the bioretention area to generate a list of appropriate plants from which to choose.

*For more information go to the Credits and Sources section.

Invasive Plants Outcompete Native Plants

The invasive *Phragmites australis* (also known as common reed) has taken over wetlands all over Rhode Island and the eastern seaboard, blocking native salt marsh vegetation, eliminating natural refuge and feeding areas for local species, and even altering the hydrologic function of wetland areas.

Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Invasive Plants Can Harm Valuable Species

Monarch butterflies rely on native milkweed plants as their major food source and a place to lay their eggs. However female monarchs often confuse milkweed with its non-native look-alike black swallow-wort. Larvae that hatch on swallow-wort cannot mature due to a toxin produced by the plant. Swallow-wort infestations that go unchecked jeopardize the success of the monarch butterfly population. This is just one example of how invasive plants can harm valuable pollinator species.

What Is An Invasive Species?

Rhode Island Natural History Survey describes an invasive species as a species of plant, animal, or microbe that is:

1. Introduced to a country or region where it is not native.
2. Is reproducing and spreading without human cultivation.
3. Is causing harm to native species or the areas in which they live.

Invasive species have a competitive advantage that allows them to grow and spread more aggressively than native species. In the absence of their natural predators or usual competing species, invasive plants make themselves at home quickly and can be very difficult to control. Not only that, but they also can greatly harm our natural areas by outcompeting many native species so that only the invader is left.

Invasive species can harm the breeding and nesting activities of animals, reduce food sources for native predators and pollinators, and disrupt natural water flow and filtration. Learning to identify invasive plants and removing them not only helps to keep Green Infrastructure working (to keep our local waters clean) but also safeguards our natural areas, fish, and wildlife.

For more information and resources about invasive species in Rhode Island visit: rinhs.org/invasive-species-portal/

Credits and Sources

The Rhode Island Natural History Survey (RINHS) maintains current lists of invasive and weedy plants in Rhode Island on which this guide is based. RINHS strives to connect those with knowledge about Rhode Island's native species with each other and with those who can use that knowledge for research, education, or conservation. rinhs.org/

University of Massachusetts Amherst Extension Landscape, Nursery & Urban Forestry Program Weed Herbarium, which is a primary source for images in this guide, is an excellent online resource complete with brief descriptions of plants. extension.umass.edu/landscape/weed-herbarium

Go Botany: Discover thousands of New England plants by New England Wild Flower Society, is an in-depth plant guide including photos and detailed descriptions of plants all over New England. gobotany.newenglandwild.org/

The RI Coastal Plant Guide is an interactive and extensive list of RI's coastal plants, created by the Coastal Resources Management Council (CRMC) in partnership with the URI Cooperative Extension. cels.uri.edu/testsite/coastalPlants/CoastalPlantGuide.htm/

Mistaken Identity? Invasive Plants and their Native Look-alikes: an Identification Guide for the Mid-Atlantic is an illustrated publication of the Delaware Department of Agriculture. Many of the invasive species and native look-alikes covered in *Mistaken Identity?* overlap with the ones found in southern New England. nybg.org/files/scientists/rnaczi/Mistaken_Identity_Final.pdf

The Coastal Landscapes Program, created by CRMC in partnership with URI Cooperative Extension has a variety of resources available for landscape management on suburban coastal properties. crmc.ri.gov/coastallandscapes.html

Rhody Native, a native plant initiative of RINHS offers a variety of genetically native plants for sale to nurseries, garden centers and landscape and restoration professionals. rinhs.org/who-we-are-what-we-do/programs-projects/rhody-native-home/

The Rhode Island Department of Environmental Management (RIDEM) has compiled resources for combatting the spread of aquatic invasive plants, including how to identify and control them. dem.ri.gov/programs/water/quality/surface-water/aisplant.php

Freshwater Aquatic Invasive Species in Rhode Island, 2018 update, is a guide to invasive freshwater plants in RI and where they have been found. dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/aisridist.pdf

Pesticide Safety & Integrated Pest Management Training is conducted by URI to prepare for certification by RIDEM. dem.ri.gov/programs/agriculture/safety-ipm.php

Rhode Island Pesticide General Permit, applies to pesticide use patterns that result in discharge of pesticides to Waters of the State. dem.ri.gov/programs/benviron/water/permits/ripdes/pdfs/pestgenperm.pdf

Pollinator Working Group, or The Working Group to Make Findings and Recommendations with Regard to Maintaining, Protecting and Enhancing Pollinator Habitat and Health in Rhode Island, provides guidance for the use of pesticides around pollinators. dem.ri.gov/programs/agriculture/pollinator-working-group.php

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Cover Photograph by Alicyn Murphy of vegetated stormwater system in Roger Williams Park, Providence, RI.

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