Narrow River Land Trust

Invasive Species Policy

Part 1

Overview and General Planning

1. Introduction

The properties owned and managed by the NRLT, as well as the properties under conservation easements, are adversely affected by populations of exotic, invasive species. These invasives, which usually lack natural predators, outcompete and displace native plants, disrupting the natural habitat. 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. This problem must be addressed proactively.

Failure to control invasives on NRLT properties will lead to certain further spread of the plants. It also will lead to certain further spread to neighboring properties.

2. Purposes

The purposes of the NRLT Invasive Species Policy (ISP) include the following:

- Education of NRLT Board members and volunteers in the identification of invasive species
- Identification of invasive species threatening the native habitat on NRLT properties
    - Documentation of invasive species locations
    - Establishment of treatment priorities
- Development of a consistent plan for setting priorities for invasive species control or removal on NRLT properties
- Identification of best practices for control or removal of invasive species
- Improvement and restoration of the native habitat on NRLT properties
- Implementation of the ISP on affected NRLT properties
- Establishment of the NRLT as a leader in invasive species control as a way to promote our efforts to preserve our properties and to demonstrate to donors and grant providers the quality of our stewardship
- Education of the general public about invasive species
- Motivation of the general public to control or remove invasive species on their properties

3. Invasive Species of Concern to NRLT

The following species are known to grow on NRLT properties and are of concern for habitat disruption and further propagation.

- Japanese knotweed *(Polygonum cuspidatum*)

- Asiatic bittersweet *(Celastrus orbiculatus*)
- Japanese barberry (*Berberis thunbergia*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Garlic mustard (*Alliaria petiolata*)
- Multiflora rose (*Rosa multiflora*)
- Black swallowwort (*Cynanchum nigrum*)
- Pale swallowwort (*Cynanchum rossicum*)
- Autumn olive (*Elaeagnus umbellata*)
- Japanese angelica tree (*Aralia elata*)
- Japanese honeysuckle (*Lonicera japonica*)
- Burning bush (*Euonymus alatus*), also known as euonymous or winged euonymous
- Wineberry *(Rubus phoenicolasius)*
- Tree of heaven (*Ailanthus altissima*)
- Common reed (*Phragmites australis*)
- Glossy buckthorn (*Rhamnus frangula*)
- Common buckthorn (*Rhamnus cathartica*)
- Common mugwort (*Artemisia vulgaris*)
- Privet (*Ligustrum* spp.)
- Morrow's honeysuckle *(Lonicera morrowii*)
- Lesser celandine (Ficaria verna)
- Norway maple (Acer platanoides)

Porcelain Berry?

4. General Considerations

Control of invasive species on NRLT properties is a labor-intensive process, diverting Board, staff, and volunteer resources from other productive stewardship and management activities. Priorities should be set based upon the seriousness of the invasive species population, upon the use of the property, and upon the reasonable likelihood of effective suppression or elimination. For example, mechanical elimination of swallowwort requires an intensive effort to effectively remove rhizomes, but mowing before seed pods mature is an important and relatively easy interim method to suppress the spread of the plant. Methods should be chosen that will have minimal impact on the soil, water, and other species.

Use of herbicides which are known to have minimal (if any) collateral impact when properly used may also be chosen as a method of control on NLRT properties when and where appropriate, and when not precluded by property deeds or other agreements.

The primary herbicides suggested for selective use are formulations of glyphosate (commonly known as Roundup), and triclopyr (commonly known as Brush-B-Gone or Turflon Amine). Appendix A reprints detailed information on these herbicides from the Nature Conservancy's Weed Control Methods Handbook, Tools & Techniques for Natural Areas. These products are available in hardware stores, which reflects their consumer level user-friendliness. Herbicide use is strictly governed by the label requirements on the products; misuse is a violation of Federal law. Labeling will also indicate the level of protective equipment required, if any, and will instruct on environmental conditions appropriate for applications. Generally, herbicides should not be sprayed with the temperature is very high (over 85º), or if there is any wind greater than a light breeze (7 mph).

5. Integrated Treatment Schedule

Integrated treatment of invasive species on NRLT land is, of course, dependent on the time available from board members and volunteers, as well as the priorities for various properties. The schedule addresses ideal timing but not necessarily a work schedule for any individual property.

Spring (up to early June)

Garlic Mustard: Pull. If pulled before flowering, dispose on site; if the plants have flowered, bag, solarize, and dispose in landfill.

Black/Pale swallowwort: Pull young seedlings, being sure to get all roots/rhizomes (monitor for re-growth and follow-up treatment)

Woody seedlings (buckthorn, honeysuckles, bittersweet, roses, tree of heaven, etc.): Pull seedlings

Smaller woody plants (buckthorn, honeysuckles, privet, tree of heaven): foliar herbicide spray before fruit sets.

Mid-June – Early July

Japanese stiltgrass: Mow to ground level with string mower before flowering; after flowering, pull and bag for removal

Pale/Black swallowwort:. If treating mechanically, mow after flowering but before seed pods mature; hand remove and dispose of seed pods if they have formed (do not mow mature seed pods). If treating chemically, apply foliar spray with glyphosate mixture with surfactant, or triclopyr

July-August

Woody plants (buckthorn, Japanese angelica tree, bittersweet, barberry, tree of heaven, olive, burning bush, honeysuckles): Pull plants if possible with Weed Wrench. If plants have not set seed, allow to dry on site (keep roots away from soil). If mechanical removal is not an option, cut plants to stump level, treat stumps with herbicide mixture, being sure to coat the entire cambium edge (use a dye to verify coverage).

Multiflora rose: mow repeatedly to reduce vitality. Apply foliar spray on re-growth when it is roughly knee high.

Late Summer-Fall

Japanese knotweed: Apply foliar spray of glyphosate mixture with thorough coverage. Apply after flowering to avoid harm to pollinating insects.

Woody plants: Continue pulling whole trees and shrubs where possible, and otherwise, continue cutting to stump level and treating stump with herbicides. If seeds are present and it is possible to do so, dispose of seeds (which is why it's better to do this earlier in the year)

Multiflora rose: Continue repeated mowing; foliar herbicide spray of re-growth when it is roughly knee high.

Late Fall – Early Winter

Garlic Mustard: Mechanical: Pull young plants and leave on site. Chemical: Dab first-year rosettes with herbicide mixture to prevent sprouting in spring. Can be done as long as no snow is present.

Sources and Further Reading:

The Connecticut Invasive Plant Working Group has an excellent slide presentation on the control of a wide range of invasive species. https://tinyurl.com/zkezsnnc

Invasives.org, Control Options; General Guidance for Most Shrubs, https://www.invasive.org/alien/pubs/midatlantic/control-shrubsandsubshrubs.htm

USDA National Invasive Species Information Center. Multiple links to resources. https://tinyurl.com/4t9vseew

Invasive Plant Management for Every Property, Tom Groves, Senior Botanist, BSC Group

6. Permitting

CRMC permits are required for invasives management within the 200-foot buffer. An approved invasives species management plan is required. For areas over 25% but not more than 50% of the property, a contract with an invasives species manager is required.

General Acknowledgements

Invasive Plant Management for Every Property, Tom Groves, Senior Botanist, BSC Group (presentation at URI Extension Invasive Species Management training, 10/2003)

Invasive Plants: The Threat They Pose, Friends of Canonchet Farm

Invasive Preparedness for Land Stewards, Hope Lesson and David W. Gregg, Rhode Island Natural History Survey, https://tinyurl.com/33cp7c5k

Weed Control Methods Handbook, Tools & Techniques for Natural Areas, The Nature Conservancy, https://tinyurl.com/yjpjm2jj

Narrow River Land Trust

Invasive Species Policy

Part 2

Species Discussion

Japanese Knotweed (*Polygonum cuspidatum*)

Overview. Japanese knotweed is an aggressive alien species introduced from Japan as an ornamental in the late 1800s. A member of the buckwheat family, this pervasive plant thrives on disturbed ground, especially in moist places, but will grow almost anywhere. It squeezes out native species throughout Rhode Island. The plant evolved in the extreme environment of volcanic ash and recent lava flows in Japan, and other harsh environments in Asia, which explains its resilience and toughness. It can go dormant for years. The plant is not only widespread, it is destructive and extremely difficult to eradicate. In fact, it make take several years of persistent effort to kill a stand. Dense knotweed stands crowd out native vegetation, reducing species diversity.

Description. The plant is easy to identify. It has a bamboo-like appearance with semi-woody hollow stems. The alternate leaves have dark red veins when you, and when mature are large, 3-6 inches, broadly oval or heart-shaped, margins entire (smooth), pointed at the tip, and are attached to the stem with a membrane that surrounds the stem (typical of the buckwheat family). It has an abundance of cream white flowers in panicles in late summer/early fall. The seeds are small white winged fruits which have the dark, glossy, triangular seeds within. The plant can grow up to ten feet tall in established stands which may be large and dense.

Propagation. Japanese knotweed has roots that may extend 15 feet into the soil, and it may spread by rhizomes. The smallest remaining remnant of a root may be sufficient for regeneration. It can also regenerate from bits of stems, and thus can be spread by mowing. It can also grow from its seeds.

Control. There are no natural native pests or diseases of this plant, so it has spread with impunity. Hope, however, is on the horizon. The USDA and the US Forest Service have recently authorized an experimental release of an insect known as the Japanese knotweed psyllid. If the experiment is successful, some relief may eventually be available in New England. But that is likely years away. The decision to pursue mechanical controls vs. chemical treatment balances the availability of volunteers for long term (several years) mechanical control vs. a likely excellent result with a single chemical treatment, freeing volunteers for other stewardship activities.

- **Mechanical Control**. Dig or pull the plants, then bag them for disposal, or dry carefully on site, being sure to prevent contact with soil. Small pieces of the plant are amazingly capable of regenerating, so they should be removed to the extent possible. It will take years to kill the weed by this means; persistence is the key.

Covering the affected area with a thick dark tarp is also effective, but again, this will need to be kept in place for years. Hold the tarp down with rocks or bricks, and walk on it occasionally to crush the sprouts that are trying to poke up. This plant is tough; it can even grow through two inches of asphalt.

- **Chemical Treatment.** Herbicide application is the most effective and labor-efficient measure for eradication. According to some thinking, the plants should be cut in late spring (and the plant material removed) to reduce plant vitality. Others suggest forgoing the spring cutting as it may stimulate rhizome growth. In either event, in late summer or early fall, the plants should receive a thorough foliar spray with a glyphosate or triclopyr mixture. The spraying should be done after the flowers have finished blooming, as the flowers attract a variety of bees and other pollinators. Foliar treatment is reported to up to 95% effective because, in the fall, nutrients are returning to the root structures, and the herbicide will reach underground parts of the plant. Repeat spraying in the following year(s) may be required to completely eradicate the plant.

NRLT Affected Properties

- Walmsley Woods
- Lower Pond Overlook (extensive)
- Watts Overlook
- Benson
- Garrison
- Winter
- Huff and Butcher

Sources and Further Reading:

History of Japanese knotweed: https://tinyurl.com/5n734wxc

Japanese knotweed, National invasive species information center: https://www.invasivespeciesinfo.gov/terrestrial/plants/japanese-knotweed

Killing Japanese Knotweed: https://www.japaneseknotweedspecialists.com/resources/killing

Penn State Extension Service https://extension.psu.edu/japanese-knotweed

Asiatic Bittersweet (*Celastrus orbiculatus*)

Overview. Asiatic bittersweet (also called Oriental or Asian bittersweet) is a woody vine that is native to China, Japan and Korea. It was brought to the U.S. as an ornamental around 1860. The colorful fruit is still used in decorations, such as wreathes, which regrettably helps spread this invasive. The vine will climb any other plant nearby, and will overtop mature trees. Its vegetation shades the plant it is growing on, and the weight of the vine may cause the tree to fall in the wind or branches to break. Because the vine will twist around the tree, it may eventually choke the tree to death.

Description. Asiatic bittersweet is a woody vine that can grow to 60 feet long and 5 inches in diameter. It is commonly found along forest edges and in open woodlands. Leaves are simple,

alternate, 2-5 inches long, finely toothed, glossy, with a rounded tip. The leaves turn yellow in the fall, often before other leaves change color, making the invasive vine easy to spot for several weeks. Flowers are small and greenish-yellow. Fruits are initially green, then turn yellow, orange and red in the fall.

Propagation. The seeds of Asiatic bittersweet are spread by birds. Sprouts may generate from the extensive root structure. Small root fragments left in the soil may regenerate after mechanical control.

Control. Well established Asiatic bittersweet vines may require years of attention before they are fully eradicated due to the extensive root structure and natural resilience of the plant.

- **Mechanical Control.** Smaller Asiatic bittersweet vines can be pulled up by the roots. Pulling larger plants may leave some root material behind, so the area should be inspected in the following years.

  Larger vines can be cut, and if the cutting is performed before the fruit forms, the treatment will suppress propagation. Repeated cutting of bittersweet at 1-2 ft. above the soil line exhausts the plant's energy reserves, as the plants will resprout from the nodes below the cut rather than from the soil line. Cut at 2 ft. for the first cut; subsequent cuts may be at 1 ft. Repeated cutting (at least 1-3x/year, for multiple years, depending on the size of the plant) at the 1-2 ft. line weakens the plant to the point that a small to medium sized plant may be easily pulled from the soil. Cut vines that are left hanging in the canopy will eventually deteriorate. Commitment and follow through are required to achieve control.

- **Chemical Control.** Herbicides may be considered in conjunction with mechanical control. After large vines are cut, glyphosate can be applied to new sprouts from the remaining trunk. This should be done not sooner than eight weeks after the growth has begun. Large vines can also be treated by hacking the stems in places, then applying herbicide to the cuts (being careful to keep the application off of other plants). Herbicide may also be applied to stems when they are cut; this should be done in late summer/early fall. In most cases, further treatment will be required.

NRLT Affected Properties

- Walmsley Woods
- Lower Pond Overlook
- Watts Overlook
- Viall
- Benson
- Bridgetown Salt Marsh

Sources and Further Reading

Penn State Extension Service https://extension.psu.edu/oriental-bittersweet

Brush Management – Invasive Plant Control – Oriental Bittersweet (*Celastrus orbiculatas),* Natural Resource Conservation Service (USDA), https://tinyurl.com/mr3xr2r2

Japanese stiltgrass (*Microstegium vimineum*)

Overview. Japanese stiltgrass is an invasive annual grass which is a widespread invader of woodlands. It was brought to the U.S. as a packing material for imported porcelain from China, and was first reported in 1919 in Tennessee. It is widespread in most of the eastern U.S. Japanese stiltgrass germinates in the spring and dies back in the fall. It is a prolific seeder.

Description. Japanese stiltgrass usually grows one to three feet in a tangled mass. Delicate stems grow from runners. Leaves are elongate and lance shaped with a central, slightly off-center silver stripe. The three-branch flower spikes emerge in late summer. The dead stems may form a dense mat of vegetation.

Propagation. As mentioned, Japanese stiltgrass is a prolific seeder. Each plant can produce up to 1,000 seeds. The seeds are easily transported on footwear or tires. The seeds float. The seeds remain viable in the soil for up to five years.

Control. Since Japanese stiltgrass is an annual, it presents several possible methods for control. Because of the viability of the local seedbed, repeated treatment will likely be required.

- **Mechanical Control.** Japanese stiltgrass can be easily be pulled by hand because the roots are shallow. String trimmers can be used to cut the plant at ground level, which will prevent regrowth. Mowing, on the other hand, is less effective, as there will be enough stem remaining to allow regrowth. Mechanical controls should be conducted after June to prevent a second flush of germination from the existing seedbed, but before the seed head emergence in August. If seed heads have emerged, the plants should be pulled, bagged, and disposed of.

- **Chemical Control.** Japanese stiltgrass can be controlled with pre-emergent herbicides, such as formulations which are commonly used to prevent crabgrass. Prodiamine or the similar active ingredient pendimethalin can be used for selective preemergence suppression. Also available**:** Trifluralin (tradenames include Preen Garden Weed Preventer® and Treflan®). Granular formulations are available.

NRLT Affected Properties

- Winter
- Watts Overlook
- Reed Overlook
- Garrison
- Benson

Sources and Further Reading

Japanese stiltgrass, Penn State Extension, https://extension.psu.edu/japanese-stiltgrass

Japanese Stiltgrass Control in the Home Lawn and Landscape, Rutgers University, https://njaes.rutgers.edu/fs1237/

Japanese barberry (*Berberis thunbergia*)

Overview. Japanese barberry is a spiny deciduous shrub which was introduced into the United States from Japan in the 1860s as an ornamental. The plant resists deer browse, is available in

various cultivars, and is easy to grow in the sun or shade, hence its popularity. It is still available commercially in Rhode Island. Note: Sale of barberry has been prohibited in Massachusetts since 2009. Leaves appear on Japanese barberry in early spring, making it easy to spot. There are no natural predators.

Description. Japanese barberry is typically 2-3 feet tall, with arching branches which grow from a central rhizome. Leaves are small oval to spoon-shape with smooth margins. The stems are grooved with spines at the nodes. The inside of the stem is a bright yellow. The shrubs has small yellow flowers in clusters, which appear in the spring. The shrubs bear small (1 cm.) red fruits which ripen in mid-summer and remain on the shrubs into winter. These are disbursed by birds and deer.

Propagation. Propagation in primarily by seed. Arching branches which come in contact with the soil may root. The plant also spreads by clonal shoots in the ground.

Control. Mechanical control is effective, but likely will require monitoring for repeat treatment. Combining chemical control with mechanical control also yields good results.

- **Mechanical Control.** Shrubs should be dug or pulled in order to eliminate as much rootstock/rhizome stock as possible. Ensure that the roots will dry out to completely kill the plant. If the plant is bearing fruit, the removed plant should be disposed of at a landfill. Repeated mowing will also stress and weaken the plant and ultimately should provide good control.

- **Chemical Control.** Herbicides can be applied to cut stumps. The ideal time for this treatment is late season, when the plant is returning carbohydrates to the root structures. Glyphosate is suitable for this purpose. Foliar spraying can also be used, but will require greater quantities of chemicals. Trichlopyr or glyphosate are suitable for foliar spray.

NRLT Affected Properties

- Benson
- Huff
- Butcher
- Pausacaco Lodge
- Walmsley Woods

Sources and Further Reading

Japanese barberry, MI Dept of Natural Resources, https://tinyurl.com/5ca2c8kw

Japanese Barberry: An Exotic Invasive Plant Fact Sheet, Ecological Landscape Alliance, https://www.ecolandscaping.org/11/landscape-challenges/invasive-plants/japanese-barberry-exotic-invasive-plant-fact-sheet/

Garlic mustard (*Alliaria petiolata*)

Overview. Garlic mustard in an herbaceous biennial which was brought to the United States in the 1860s by European settlers for food and medicinal purposes. The life cycle begins with a small rosette of leaves which sprout in the summer, and which remain green all winter. The

following spring, a single stalk up to 3 feet tall will grow, and which will bear flowers later in the spring. This invasive seeds prolifically, and thus can spread fast into forested lands.

Description. In its first year, the plant will grow a few inches tall and have a basal rosette of kidney shaped leaves with rounded teeth and of varying sizes. The leaves are a bright green and stand out amid the fall die-back of other plants. Crushed leaves smell like garlic.

In the second year, the stalk grows up to three feet tall. The leaves are heart-shaped with pointed, irregular teeth. White flowers with four petals emerge in the early spring at the uppermost portion of the plant. The seed pods, or siliques, are long and thin. The pods remain on the plant as it dies. The pods become brittle and shatter, scattering the seeds.

Propagation. Propagation is solely by seed. Each plant will produce hundreds of seeds which are light enough to be carried by the wind. Seed may remain viable for up to five years.

Control. Pulling, herbicide treatment, and mulching are all effective methods to control garlic mustard.

- **Mechanical Control.** Garlic mustard will not regenerate from root fragments. The whole plant should be pulled. Garlic mustard blooms and sets seed over an extended period, thus increasing the probability that some seeds will be present on the plants even if they are still flowering. The plants should be bagged and disposed of. Mulching a heavily invested site may prevent regrowth. Given the likelihood of a seed bank, it will take years of repeated attention to eliminate the plants from a site.

- **Chemical Control.** Preemergent herbicides are not recommended. Spot treatment (dabbing with Weed Wand, e.g.) of rosettes on growing plants in the fall with glyphosate or other mixtures is effective. Care must be paid in order to prevent inadvertent treatment of non-target species.

NRLT Affected Properties

- Lower Pond Overlook
- Viall
- Walmsley Woods

Sources and Further Reading

Garlic Mustard, Penn State Extension, https://extension.psu.edu/garlic-mustard

Garlic Mustard Management Options, Michigan State University, https://www.canr.msu.edu/ipm/Invasive_species/garlic_mustard/management_options

Multiflora rose (*Rosa multiflora*)

Overview. Like so many of the invasive species in Rhode Island, multiflora rose was introduced from Asia in 1866 as an ornamental shrub. It found use as ornamental rootstock for roses, in hedgerows, and for erosion control. The plant grows by layering, and can reach fifteen feet tall. It will find its way up tree trunks, often with bittersweet and/or bull briar. It is a prolific seeder and the seedbank is viable for up to twenty years. Eradication is a multi-year project.

Description. Multiflora rose is a woody shrub creating dense thickets by layering. It has abundant sharp thorns which maintain their sharpness even on dead canes. Multiflora rose leafs out early in the spring, making it easy to spot. The leaves are pinnately compound, ovate, and toothed. The plant will have prolific 5-petal flowers which are white or light pink with yellow pollen. The fruits are red hips in clusters.

Propagation. Propagation is primarily by seed. However, canes which come in contact with the ground may form roots at the point of contact and then grow from that new root location. A mature plant produces hundreds of thousands of seeds, and they are reported to remain viable up to twenty years. The seeds are contained in the hips, which turn red, and which are carried over into the next growing season, providing food for birds which then scatter the seeds.

Control. Multiflora rose is difficult to eradicate due to its vitality, its size, and its seed bank. A combination of mechanical and chemical methods should be considered.

- **Mechanical Control** Small plants are easily pulled. Large plants are more challenging. Mowing larger plants will reduce their vitality, allowing more control in the years ahead. Repeated mowing will eventually exhaust the rootstock, but vigilance will be required to monitor for re-infestation from the seed bank.

- **Chemical Control.** After mowing, allow the plant to grow back to knee height, then apply a foliar spray. Glyphosate, triclopyr and metsulfuron methyl are effective foliar sprays; care should be taken to avoid spraying non-target species. Herbicide can also be applied directly to the cut stems after mowing.

NRLT Affected Properties

- Walmsley Woods
- Viall
- Garrison House Acres

Sources and Further Reading

Multiflora rose, Penn State Extension, https://extension.psu.edu/multiflora-rose

Fact Sheet: Multiflora Rose, Plant Conservation Alliance, https://tinyurl.com/37u4bcnf

Black swallowwort (*Cynanchum nigrum*)

Pale swallowwort (*Cynanchum rossicum*)

Overview. These two swallowwort species are similar in appearance, the primary difference being the color of their flowers. The plants are native to the Mediterranean (black) and Ukraine and S.E. Russia (pale) and were brought to the United Sates in the late 1800s as ornamentals. These moderately aggressive plants can thrive in sun or shade, tolerate disturbance, and spread rapidly once they are established, suppressing native species. The plants are members of the milkweed family, and occasionally attract Monarch butterflies. Monarch larvae cannot survive on swallowwort.

Description. Swallowwort vines can grow to from 3-9 feet, are intertwining, and can climb if supported by other plants. The plants may form dense mats. The leaves are opposite, 3-4 inches long, 2-3 inches wide, dark green, with smooth edges. The flowers are small and star shaped, with five petals. The pale swallowwort flowers are dull pink to burgundy; black swallowwort flowers are dark purple. Seed pods are 1.5-3 inches long and slender. When they mature they split and release seeds attached to fluffy hairs and are disbursed by the wind, similar to milkweed. The roots are dense and fibrous. The plant can spread by rhizomes. Pulling the plant often results in the snapping the above ground portion, leaving the underground structures that survive.

Propagation. As mentioned, by wind-blown seeds and rhizomes.

Control. Control of swallowwort is a multi-year effort, and multiple strategies should be employed. Focus initially should be on preventing the spread of seeds.

- **Mechanical Control.** Small plants can be dug or pulled, but it is critical to get the entire root structure, otherwise the plant simply regenerates. Mowing should be done shortly after flowers have bloomed and as seed pods are just beginning to be set. If the seed pods have developed, mowing will not prevent their ripening and dispersal. Seed pods can be removed by hand, but this is labor-intensive. Repeated mowing will not deplete the vitality of swallowwort. Dug plants should be bagged and discarded.

- **Chemical Control.** Foliar sprays of glyphosate with a surfactant should be applied once the plant has flowered (June) and again in August. Triclopyr should be applied as a foliar spray once the pods have developed.

NRLT Affected Properties

- Viall

Sources and Further Reading

Invasive Plant Factsheet: Black and pale swallow-wort, UConn College of Agriculture, https://ipm.cahnr.uconn.edu/invasive_plants_black_pale_swallow-wort/

Swallow-wort, Pale and Black, New York Invasive Species Information, Cornell University, https://nyis.info/invasive_species/swallow-wort/

Autumn olive (*Elaeagnus umbellata*)

Overview. Autumn olive was imported from East Asia and was introduced into the United States in the mid-1800s. It was used as an ornamental, as a windbreak, and to restore deforested and degraded areas. Its abundant fruit provides food for wildlife. It is drought tolerant and is able to fix nitrogen, which allows the plant to grow in poor soils. An autumn olive may mature and begin producing fruit in three years. The fruit has less nutritional value for wildlife than the native species it displaces.

Description. Deciduous woody shrub growing up to 20 feet tall with a spread of 30 feet. The bark is grey-brown with thorns that may grow to two inches. Leaves are simple, alternate, elongate, pale green on the upper side, silvery green on the undersides, 1-3 inches long.

Flowers appear in clusters along the stems and are pale yellow and appear in June/July. The red fruit is pulpy, juicy and sweet, and is produced in abundance (as many as 10,000 berries per tree).

Propagation. Propagation is by seed, which is spread by birds and mammals. Some vegetative propagation.

Control Autumn olive is hardy and will re-sprout after cutting or burning. Persistence is required. Chemical control is effective.

- **Mechanical Control** Small plants and seedlings may be pulled up by the roots when soil is moist. Cutting the root crown multiple times during the growing season over several years may kill the plant, but diligence is required. Mowing can prevent seedlings from establishing.

- **Chemical Control** Herbicides are effective as foliar applications (glyphosate or triclopyr solution) June to early October; cut-stump application (glyphosate or triclopyr solution applied immediately after cutting except in early spring), or basal bark application (triclopyr ester in bark oil) year-round.

NRLT Affected Properties

- Viall
- Garrison
- Huff
- Butcher
- Pierce

Sources and Further Reading

Autumn Olive, Invasives.org, https://www.invasive.org/alien/pubs/midatlantic/elum.htm

Autumn Olive, Penn State Extension, https://extension.psu.edu/autumn-olive

Japanese angelica tree (*Aralia elata*)

Overview. Japanese angelica tree was introduced into the United States from east Asia in the 1830s as an ornamental. It has only recently (since 2000) begun to spread in New England. It is a fast growing plant which spreads by rhizomes and by seed. The plant prefers moist, well-drained soils and sunny locations.

Description. Japanese angelica tree can grow forty feet with a spread of up to 30 feet. The trunk and branches are covered with sharp prickles, and on the leaf petioles have sharp spines. Leaves are large, green, bi- or tri-pinnately compound. Leaves attach to leaflets with no petioles (sessile), and are opposite on the leaflets. Leaf margins are toothed. Large spray of white flowers in late summer. Abundant purple fruits. Similar species is the devil's club, *Aralia spinosa*, which is native to mid-state NY and the Atlantic seaboard, and which probably occurs only rarely in R.I., if at all. *Aralia spinosa* leaves have small petioles, and leaf margins are smooth.

Propagation. Propagation is by seed, spread by birds and mammals, and by rhizomes. A single plant can quickly become a colony. Prompt control is advised.

Control. Japanese angelica tree spreads by seeds and rhizomes, and is difficult to control mechanically. A combination of mechanical and chemical means is the best approach to a developed stand.

- **Mechanical Control.** Pull smaller plants by hand, pull larger plants with a weed wrench. Beware of sharp spines and prickles. Can re-sprout easily from left-behind roots or rhizomes.

- **Chemical Control.** Foliar spray of smaller plants or cut stump treatment of larger plants with concentrated glyphosate mixture or triclopyr mixture. Monitor for recurrence.

NRLT Affected Properties

- Walmsley Woods

Sources and Further Reading

Japanese angelica tree, Adirondack Park Invasive Plant Program (Nature Conservancy), https://adkinvasives.com/Invasive-Species/Detail/54

Japanese Angelica Tree, Town of Natick, MA, https://www.natickma.gov/1857/Japanese-Angelica-Tree

Aralia elata, Japanese angelica tree, Lower Hudson Partnership for Regional Invasive Species Management, New York-New Jersey Trail Conference, https://www.lhprism.org/species/aralia-elata

Japanese honeysuckle (Lonicera japonica)

Overview. Japanese honeysuckle is an invasive climbing vine that was imported from Japan and eastern Asia in the 1800s. As usual, the intentions were good: ornamental, erosion control, food for wildlife.

Description. Japanese honeysuckle is a fast growing vine that will cover and may smother other vegetation. The woody stem is reddish brown to light brown. It is deciduous to semi-evergreen. Leaves are opposite, ovate to oblong-ovate, 1-3 inches long, ½-1½ inches wide. The margins of mature leaves are entire. Flowers are bi-lobe (paired), white turning yellow, highly fragrant with nectar. Fruits are black, in pairs, produced in the fall.

Propagation. Spreads by seed carried by birds. Vines may grow nodes where they touch the ground.

Control. Difficult to control because of its hardy, extensive nature. No biological controls.

- **Mechanical Control.** Small plants can be pulled by hand. Cutting and mowing more mature plants will weaken the plant, but long term follow-up will be required.

- **Chemical Control.** Foliar applications of glyphosate or triclopyr are effective, but may need multiple applications as well. Best applied in the fall when the plant is still physiologically active but other plants are dormant.

NRLT Affected Properties

- Walmsley Woods
- Lower Pond Overlook
- Viall
- Benson
- Garrison House Acres

Sources and Further Reading

The Invasive Japanese Honeysuckle, Penn State Extension, https://extension.psu.edu/the-invasive-japanese-honeysuckle

Japanese Honeysuckle, Invasives.org, https://www.invasive.org/alien/pubs/midatlantic/loja.htm

Japanese Honeysuckle, Invasive Plants Species Awareness Working Group, https://tinyurl.com/5bwrn32h

Burning bush (*Euonymus alatus*), also known as euonymous or winged euonymous

Overview. Burning bush was introduced into the United States from northeast Asia and central China in the 1860s. The shrub is attractive for its brilliant red foliage in the fall. Sale of the plant is now illegal in some states (Massachusetts, e.g.) but it is still available for sale in Rhode Island and has been widely planted. The shrub grows on a variety of soils and is shade tolerant.

Description. Woody shrub growing ten to fifteen feet, sometimes more. Green stems have distinctive keels or wings that are light brown. Leaves are opposite, green, 1-2 inches long, finely toothed margins. Flowers are small, inconspicuous, greenish, blooming in late spring. Abundant fruit is red-purple, maturing in late summer, each with four orange seeds.

Propagation. Primarily propagates through spread of seeds by birds. Will drop seeds around the plant itself resulting in large numbers of seedlings.

Control

- **Mechanical Control.** Small seedlings can be easily pulled. Larger plants can be weed wrenched or cut repeatedly. Watch for re-growth.

- **Chemical Control.** Foliar spray of glyphosate or triclopyr in late summer. Treatment of cut stump with same herbicides. Monitor for regrowth or new seedlings in following spring.

NRLT Affected Properties

- Walmsley Woods

- Viall

Sources and Further Reading

Burning Bush, Penn State Extension, https://extension.psu.edu/burning-bush

Invasive Species Spotlight: Burning Bush (*Euonymus alatus)*, https://www.brandywine.org/conservancy/blog/invasive-species-spotlight-burning-bush-euonymus-alatus

Winged Burning Bush, Invasives.org, https://www.invasive.org/alien/pubs/midatlantic/eual.htm

Wineberry *(Rubus phoenicolasius)*

Overview. Wineberry is a perennial shrub introduced into the United States in the 1890s as breeding stock for raspberries. It is in the same family as and resembles native raspberries and blackberries, but can be distinguished by the fine red thorny hairs on the stems. The canes are biennial; fruits set on the second-year canes. New canes propagate from the roots each year. Dense thickets crowd out native species and form dense thickets.

Description. Stems are long shoots up to six feet long, arching, covered with fine red hairs and prickers. Leaflets have three leaves (as opposed to raspberries and blackberries which have five leaves per leaflet), dark green, silvery below, toothed margins. Five petal white flowers appear in clusters in May. Fruits are bright red drupes, larger than native raspberries or blackberries (and delicious).

Propagation. Propagation is primarily by seeds, spread by birds and mammals. Root tips in contact with the soil may root, forming a new clump.

Control. Control is by mechanical, chemical, or combination of means.

- **Mechanical Control.** Young plants can be pulled. Older plants should be removed with a four-prong fork, taking care to remove all rootstock. Follow-up treatment for re-sprouts from remaining rootstock.

- **Chemical Control.** Wineberry can be treated with glyphosate or triclopyr. Foliar and cut-stump applications are both appropriate.

NRLT Affected Properties

- Walmsley Woods
- Benson
- Winter

Sources and Further Reading

Wineberry, New York Invasive Species Information, https://nyis.info/invasive_species/wineberry/

Wineberry, Mass Audubon, https://www.massaudubon.org/nature-wildlife/invasive-plants-in-massachusetts/wineberry

Tree of heaven (*Ailanthus altissima*)

Overview. Tree of heaven is a rapidly growing deciduous tree native to China and Taiwan, imported to the United States in the late 1700s. The fast growing tree was widely planted in cities because it tolerated poor soil conditions and was considered ornamental. It is now widespread and difficult to control, requiring follow-up treatment for years.

Description. May grow up to 80 feet tall and six feet in diameter. Leaves are pinnately compound, with 10 to 40 leaflets. Margins of leave are entire (smooth), with two protruding bumps at the base of each leaflet. Plants are dioecious (male and female). Flowers appear in spring, and female plants set abundant seeds (up to 300,000 per plant) in early summer. The seeds are winged samaras (like maples), and are wind dispersed. Plants may start producing seeds after two years.

Propagation. Propagation is by seed and root suckering. A single plant will grow into a colony, and may send roots up to fifty feet away.

Control. Mechanical control is limited. A combination of mechanical and chemical will ultimately yield control.

- **Mechanical Control.** Pull young seedlings. Young suckers will be difficult or impossible to pull. Cutting trees will result in stump sprouts and suckering.

- **Chemical Control.** Foliar spray on smaller trees with glyphosate or triclopyr. Basal bark spray with concentrated herbicide is effective. Hack-and-squirt herbicides are effective (the bark is hacked in places and herbicide is applied to the wound). Stump treatment is effective only in preventing resprouting of the cut tree; it will not prevent suckering. Herbicides should be applied in late summer when the plant is returning nutrients to the root system.

NRLT Affected Properties

- Winter (near mine and along trail from Middlebridge)
- Benson (?)
- Garrison House Acres (near entrance)

Sources and Further Reading

Tree-of-heaven, Penn State Extension, https://extension.psu.edu/tree-of-heaven

Invasive Plant Fact Sheet, UConn College of Agriculture, Health and Natural Resources, https://ipm.cahnr.uconn.edu/invasive-species/invasive_plants_tree-of-heaven/

Glossy buckthorn (*Rhamnus frangula*)

Common buckthorn (*Rhamnus cathartica*)

Overview. Common (European) buckthorn (Rhamnus cathartica) and smooth (glossy) buckthorn (R. frangula) are exotic shrubs that readily invade natural communities. Common

buckthorn is native to Eurasia and was imported to the United States in the 1880s. Glossy buckthorn in native to Africa, Asia and Europe. Both may grow to 25 feet and may form dense thickets. The species leaf out early and hold their leaves, which gives them a competitive advantage.

Description. Both species have leaves that are broadly oval, one to three inches in length, shiny on the upper surface. If a twig is cut, both species have inner bark that is yellow. Both bear abundant dark fruits.

Propagation. Fruit each contain four seeds and are widely disbursed by birds.

Control. Effective control will require multiple seasons to treat resprouting and new plants emerging from the seedbed.

- **Mechanical Control.** Pull small seedlings. Weed wrench larger specimens, being careful about soil disturbance. Mowing over several seasons effectively suppresses infestations. Mechanical methods should be used before the seed matures. Larger specimens can be girdled.

- **Chemical Control.** Glyphosate and triclopyr are effective herbicides. Foliar spray may be done in the spring before fruits mature. Cut stump treatment should be done in August/September. Foliar spray is also an option for the fall, since the plant holds its leaves well into the season. Monitor for regrowth and retreat as necessary.

NRLT Affected Properties

- Garrison

Sources and Further Reading

Glossy Buckthorn, Invasive Plant Species Working Group, https://tinyurl.com/bdtjafjm

Common Buckthorn, Weed of the Week, USDA, https://tinyurl.com/3ttjmhcv

Common Buckthorn, Michigan Department of Natural Resources, https://tinyurl.com/2upaemsn

Common European Buckthorn and Smooth Glossy Buckthorn, Connecticut Invasive Plant Working Group, https://cipwg.uconn.edu/buckthorns/

Common reed (*Phragmites australis*)

Overview. The well-known *Phragmites australis* is a non-native reed originally from Europe which has spread throughout inland and coastal wetlands in the United States. Control is difficult, and complicated by the fact that the stands are in wetlands which are heavily regulated. Herbicide treatment, along with mechanical (and in some regions fire) are combined over a course of years for control and restoration. The topic is a huge one. Therefore, skip to Sources and Further Reading for more information and ideas. Major commitment required to overcome these infestations.

Properties Affected

- Watts Overlook
- Reed Overlook
- Training Lot Salt Marsh
- Bridgetown Salt Marsh
- Garrison House Acres
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Sources and Further Reading

A Guide to the Control and Management of Invasive Phragmites, Invasives.org, https://tinyurl.com/yn6z3nzk

Monitoring Approaches for the Treatment of Non-Native Phragmites australis in Rhode Island, Matthew Wallace, https://tinyurl.com/2a8fc2xe

Invasive Species Removal: Restoration of a Coastal Pond [in Westerly] https://www.solitudelakemanagement.com/invasive-species-removal-coastal-freshwater-pond/

Common mugwort (*Artemisia vulgaris*)

Overview. Common mugwort is an perennial herbaceous plant from Europe, imported for medicinal and culinary purposes. The plant grows vigorously and spreads by rhizomes rapidly crowding out other vegetation.

Description. Grows 2-5 feet tall. Leaves are alternate with large pinnate lobes, green on top, undersides with grey or white hairs. Foliage is aromatic. Stems are purplish brown, covered with dense hairs. Flowers are inconspicuous, without petals, in terminal clusters. Plants can produce tens of thousands of tiny seeds.

Propagation. Rapid propagation via horizontal rhizomes. Seeds can be carried by air, water, machinery, shoes. They rapidly grow on disturbed soil.

Control. The dense root system of mugwort makes it difficult to control. Mugwort will rapidly colonize bare ground. Seeding ground with cover prevents its spread. Multi-year effort usually required for elimination of serious infestations.

Mechanical Control. Small/young plants can be pulled before rhizomes form. Suppression of seed dispersal accomplished by mowing in early summer to mid-September. Immature seeds will not continue to mature after cutting. Landscape fabric can smother larger patches.

Chemical Control. Foliar spraying of triclopyr or clopyralid is recommended. If glyphosate is used, a surfactant should be added due to the dense hairs on the plant. Follow up treatment likely required. Aminopyralid containing herbicides are also recommended for foliar spray, but are less widely available and substantially more expensive, and appropriate for application to larger infestations.

NRLT Affected Properties

- Viall
- Benson
- Walmsley Woods

Sources and Further Reading

Invasive Plant Factsheet: Common Mugwort, UConn College of Agriculture, Health and Natural Resources, https://ipm.cahnr.uconn.edu/invasive_plants_common_mugwort/

Mugwort, New York Invasive Species Information, https://nyis.info/invasive_species/mugwort-draft/

Privet (*Ligustrum* spp.)

Overview. Privet species were introduced into the United States in the 1800s from China, Europe and North Africa, and have been used extensively for landscaping, particularly hedges. Privet has escaped into a wide range of sites, including fields, hedgerows, and forests. It is easy to identify and stays green during the winter, which aids in identification and treatment.

Description. Stems are brownish-grey to grey and opposite. Bark may have rough dots called lenticels. Sharp pointed branches often present. Twigs are grey-green. Leaves are small, .8-1.6 inches, shiny green above, pale green below, opposite, smooth margins. Abundant small white trumpet-shaped flowers in May-June. Fruits form in late summer in clusters. Fruits turn from green to dark purple to nearly black and remain on the plant.

Propagation. Propagation is by birds which eat the fruits year-round. Plants do not spread by rhizomes, but will regenerate after cutting.

Control. Mechanical control alone will likely not be sufficient; a combined approach of mechanical and chemical means should be considered.

- **Mechanical Control**. Pull small plants in their entirety, being sure to get all of the roots to prevent regeneration. Medium-size plants can be removed with a Weed Wrench. Mowing and cutting will suppress seed production, but the plant will regenerate from the cut stump.

- **Chemical Control.** Large plants should be cut before treatment. Regrowth of larger plants or smaller plants can be treated with foliar spray of a combination of glyphosate and triclopyr. Cut stumps should be immediately treated with glyphosate or triclopyr. Basal spraying of an oil/herbicide mixture is also recommended for larger plants.

NRLT Affected Properties

- Winter
- Walmsley Woods

Sources and Further Reading

Privet, Penn State Extension, https://extension.psu.edu/privet

Controlling Non-Native Invasive Plants in Ohio Forests: Privet (Ligustrum spp.), Ohio State University Extension, https://ohioline.osu.edu/factsheet/F-103

Morrow's honeysuckle *(Lonicera morrowii*)

Overview. Non-native bush honeysuckles (*Lonicera* spp.) were introduced into United States from Eurasia in the 1700s as ornamentals, for wildlife habitat, and for erosion control. Plants leaf out early and hold leaves longer than most species. Tolerant of a variety of soil conditions. Essentially free of diseases and predators.

Description. Woody shrub growing to seven feet tall. Older shrubs with shaggy bark and hollow stems. Flowers are paired, tubular, fragrant, white in late April – early May. Fruits are paired. Berries mature in July, are red, many-seeded, and persist into winter.

Propagation. Propagation is primarily spreading of seeds by birds. Some local vegetative propagation.

Control. Control is through removal or a combination of cutting and herbicide application.

- **Mechanical Control.** Young seedlings can be pulled. Larger (but not largest) specimens can be removed with a Weed Wrench. Repeated mowing will suppress growth, but plants will resprout from cut stumps. Winter clipping should be avoided as it promotes new shoot production.
- **Chemical Control.** Foliar application of glyphosate or triclopyr on smaller plants late in the growing season; limit foliar spray on larger plants due to risk of injury to non-target plants (treat re-growth the following summer after cutting or mowing); application of herbicide to cut stumps in late summer through the dormant season. Cut stumps should be immediately treated with glyphosate or triclopyr. Monitor for regrowth.

NRLT Affected Properties

- Winter

Sources and Further Reading

Morrow's honeysuckle, Invasives.org, https://www.invasive.org/alien/pubs/midatlantic/lomo.htm

An Assessment of Non-Native Bush Honeysuckle in Northern U.S. Forests, USDA, https://tinyurl.com/jpbkc64b

Lonicera spp., Michael S. Batcher, Global Invasive Species Team, The Nature Conservancy, https://wiki.bugwood.org/Lonicera_spp (comprehensive article)

Overview

Description

Propagation

Control

Mechanical Control

Chemical Control

NRLT Affected Properties

Sources and Further Reading

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