NON- NATIVE INVASIVE SPECIES

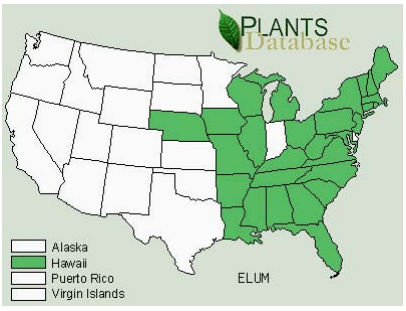
Autumn Olive: *Elaeagnus umbellata*

Native Origin: Introduced to the United States from East Asia in the 1830's

Description: Autumn olive is a deciduous shrub or small tree in the Oleaster family (Elaeagnaceae) that grows to approximately 20 feet in height. Leaves are dark green, alternate, oval to lanceolate, and untoothed. The underside is covered with silver-white scales. The small, light yellow flowers are borne along twigs after the leaves have appeared early in the growing season. The small, round, juicy fruits are reddish to pink, dotted with scales, and produced in great quantity. Birds forage on its fruits and contribute to seed dispersal.

Autumn olive is easily confused with a closely related species, Russian olive, which is also an invasive species. Russian olive has elliptic to lanceolate leaves, its branches are usually thorny, and its fruit is yellow, dry and mealy.

Habitat: It grows well in a variety of soils including sandy, loamy, and somewhat clayey textures with a pH range of 4.8-6.5. It has nitrogen-fixing root nodules which allow it to thrive in poor soils. Mature trees tolerate light shade, but produce more fruits in full sun, and seedlings may be shade intolerant. It does not do well on wet sites or in densely forested areas. It is drought tolerant and may invade grasslands and sparse woodlands. Typical habitats are disturbed areas, roadsides, pastures and fields.



Distribution: This species is reported from states shaded on Plants Database map. It is reported invasive in CT, DC, DE, FL, GA, IL, IN, KY, MD, MI, MO, NC, NH, NJ, NY, OH, PA, RI, TN, VA, VT, and WI

Ecological Impacts: Autumn olive has the potential of becoming one of the most troublesome shrubs in the central and eastern United States. It exhibits prolific fruiting and rapid growth that suppresses native plants. It is widely disseminated by birds and can easily adapt to many sites. Due to its nitrogen-fixing

capabilities, it has the capacity to adversely affect the nitrogen cycle of native communities that may depend on infertile soils.

Control and Management:

- **Manual**- Seedlings and sprouts can be hand-pulled when the soil is moist to insure removal of the root system. Note: On larger plants, cutting alone results in thicker, denser growth. Burning during the dormant season also results in vigorous re-sprouting.

- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as glyphosate. Foliar application has proven effective in controlling these species. Since glyphosate is a nonselective herbicide it will affect all green vegetation with which it comes into contact. Care should be taken to avoid impacting native plant species. Glyphosate herbicides are recommended because they are biodegradable. Follow label and state requirements.

References:

- www.vnps.org/invasive/inveleag.htm
- plants.usda.gov:8080/plants//profile?symbol=ELUM
- http://tncweeds.ucdavis.edu/esadocs/documnts/elaeumb.html
- www.forestryimages.org Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 01-17-06 Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Exotic Bush Honeysuckles: *Lonicera maackii*, *Lonicera morrowii*, *Lonicera tatarica*

Native Origin: Eurasia (Japan, China, Korea, Manchuria, Turkey and southern Russia); introduced to US for use as ornamentals, for wildlife cover and for soil erosion control.

Description: Exotic bush honeysuckles are upright, generally deciduous shrubs that range from 6 to 15 feet in height. The 1-2 ½ inch, egg-shaped leaves are opposite along the stem and short-stalked. Older stems are often hollow. Pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. Flower color varies from creamy white to pink or

Figure 1- *Lonicera maackii*
Amur honeysuckle

Figure 2- *Lonicera morrowii*
Morrow's honeysuckle

Figure 3- *Lonicera tatarica*
Tartarian honeysuckle

crimson in some varieties of Tartarian honeysuckle. The fruits are red to orange, many-seeded berries. Native bush honeysuckles may be confused with these exotic species and cultivars, so proper identification is necessary. Unlike the exotics, most of our native bush honeysuckles have solid stems. Plants reproduce by birds feed on the persistent fruits and widely disseminating seeds across the landscape. Vegetative sprouting also aids in the persistence of these exotic shrubs.

Habitat: Exotic bush honeysuckles are relatively shade-intolerant and most often occur in forest edge, abandoned field, pasture, roadsides and other open, upland habitats. Woodlands, especially those that have been grazed or otherwise disturbed may also be invaded by exotic bush honeysuckles. Morrow's honeysuckle is capable of invading bogs, fens, lakeshores, sand plains and other uncommon habitat types.

Distribution: Amur, Tartarian, and Morrow's honeysuckle generally range from the central Great Plains to southern New England and south to Tennessee, North Carolina, and Georgia as shaded on the map.

Ecological Impacts: Exotic bush honeysuckles can rapidly invade and overtake a site, forming a dense shrub layer that crowds and shades out native plant species. They can alter habitats by decreasing light availability, by depleting soil moisture and nutrients, and possibly by releasing toxic chemicals that prevent other plant species from growing in the vicinity. Exotic bush honeysuckles may compete with native bush honeysuckles for pollinators, resulting in reduced seed set for native species. In addition, the fruits of exotic bush honeysuckles, while abundant and rich in carbohydrates, do not offer migrating birds the high-fat, nutrient-rich food sources needed for long flights, that are supplied by native plant species.
Control and Management: Control methods should be initiated prior to seed dispersal (late summer to early autumn) to minimize reinvasion of treated habitats.

- **Manual**- Hand remove seedlings or small plants for light infestation; repeat yearly
- **Chemical**- apply systemic herbicides
- **Burning-** prescribed burning may be effective for exotic bush honeysuckles growing in open habitats.

References: www.nps.gov/plants/alien/map/loni1.htm, www.nps.gov/plants/alien/fact/loni1.htm, www.hort.uconn.edu/plants

Crested Late-summer Mint: *Elsholtzia ciliata*

Description: *Elsholtzia ciliata* is a shallow-rooted annual that grows 0.3-1.0 m (1.0-3.3 ft.) in height. The leaves are petioled, ovate to lancolate and 3-7 cm (1.2-2.8 in.) long. The leaves have acute or short-acuminate tips, tapered bases, and crenate-serrate margins. The flowers are located on spikes 2-5 cm (0.8-2 in.) long. The bracts are 3 mm (0.1 in.) in size, rotund, cuspidate, ciliate, and closely imbricate with each being below and close to 2 or 3 flowers. The flowers are 4 mm (0.2 in.) long, pale blue, and second on the spike (which is a good field marker). The corollas of the flowers are villous around the lips. Flowers are in bloom from July to September. Another characteristic of this plant is that it is strongly scented (not necessarily pleasantly) as many mints are.


Reproductive/Dispersal Mechanisms: *Elsholtzia ciliata* spreads by small seeds. These seeds have a very high percent germination. They are most likely spread mechanically.

Distribution: The native range of *Elsholtzia ciliata* is in Asia, from Siberia to China, Japan, India and the countries of Southeast Asia. In the United States it is found in North Dakota, Minnesota, Wisconsin, New York, Pennsylvania, New Jersey, West Virginia and North Carolina. In New England it has been reported from Maine, Vermont, Massachusetts and Connecticut.

History of Introduction: The first report of this plant in North America was in the small town of Notre Dame du Lac in Termiscouata County, Quebec in 1887. It was found in a clearing near a mill, and there was no evidence of cultivation. The next report of this plant was in a railroad yard in New Limerick, Maine in 1909. New Limerick is located approximately 100 miles south of Notre Dame du Lac, Quebec. In 1938, it was found in Chelsea, Vermont in a dooryard and in 1943 in Revere Beach, Massachusetts along a sidewalk (again, in an "ill-kept" dooryard).

Habitats: Abandoned Field, Edge, Pasture, Railroad Right-of-Way, Roadside, Utility Right-of-Way, Vacant Lot, Yard or Garden. This plant has been found in railroad yards, along roads/sidewalks and at the edges of forests. It can be abundant along natural trap rock ridge tops. It appears to require some disturbance to become established.

Threats: While the actual status of this plant as an invasive is still under question, *Elsholtzia ciliata* can form rather dense stands and has obviously been spreading.

References:
http://www.eddmaps.org/ipane/ipanespecies/herbs/Elsholtzia_ciliata.htm

Garlic Mustard: *Alliaria petiolata*

Native Origin: Europe

Description: Garlic mustard is a cool season biennial herb in the mustard family (Brassicaceae) with stalked, triangular to heart-shaped, coarsely toothed leaves that give off an odor of garlic when crushed. First-year plants appear as a rosette of green leaves close to the ground. Rosettes remain green through the winter and develop into mature flowering plants the following spring. Flowering plants of garlic mustard reach from 2 to 3-1/2 feet in height and produce buttonlike clusters of small white flowers, each with four petals in the shape of a cross. Beginning in May (in the mid-Atlantic Coast Plain region), seeds are produced in erect, slender pods and become shiny black when mature. By late June, when most garlic mustard plants have died, they can be recognized only by the erect stalks of dry, pale brown seedpods that remain, and may hold viable seed, through the summer.

Habitat: Garlic mustard frequently occurs in moist, shaded soil of river floodplains, forests, and roadsides, edges of woods and trails edges and forest openings. Disturbed areas are most susceptible to rapid invasion and dominance. Though invasive under a wide range of light and soil conditions, garlic mustard is associated with calcareous soils and does not tolerate high acidity. Growing season inundation may limit invasion of garlic mustard to some extent.

Distribution: Garlic mustard is located from eastern Canada, south to Virginia and as far west as Kansas and Nebraska. See shaded areas on the distribution map.

Ecological Impacts: Garlic mustard poses a severe threat to native plants and animals in forest communities. Once introduced to an area, garlic mustard out-competes native plants by aggressively monopolizing light, moisture, nutrients, soil and space.

Control and Management:

- **Mechanical-**Hand removal of entire root system of plant is practical for light

infestations. For larger infestations cut stems at ground level or within several inches of the ground, to prevent seed production.

- **Chemical-** Herbicide (e.g., Roundup) may be applied for very heavy infestations. Fire can be used but can encourage germination of stored seeds and promote growth of emerging garlic mustard seedlings.

- **Bio-control-** Five weevils and one flea beetle feed on garlic mustard

References: http://plants.usda.gov, www.nps.gov/plants/alien/fact/alpe1.htm Biological Control of Invasive Plants in the Eastern United States p. 365-369

Japanese Stiltgrass: *Microstegium vimineum*

Common Names: Japanese stiltgrass, Nepalese browntop, Asian stilt grass, Vietnamese stilt grass, Nepal microstegium, and Chinese packing grass

Native Origin: Japan, Korea, China, Malaysia and India

Description: Japanese stiltgrass is an annual grass (family Poaceae) with a sprawling habit that may grow to 3 feet in height. Its thin, pale green, lance shaped leaves, about 3 inches in length, alternate along a branched stalk and have a silvery stripe of reflective hairs down the middle of the upper leaf surface. Delicate spikes of flowers emerge from slender tips beginning in late summer and continuing into the fall. Seeds may persist through the fall. It spreads by rooting at nodes along the stem. A new plant emerges from each node. It also spreads by seed and each plant can produce an estimated 1001,000 seeds.

Habitat: It occurs on stream banks, river bluffs, floodplains, emergent and forested wetlands, moist woodlands, early succession fields, uplands, thickets, roadside ditches, gas and power line corridors and home lawns and gardens. It is common in disturbed shaded areas like floodplains that are prone to natural scouring, and areas subject to mowing, tilling and other soil disturbing activities. Japanese stilt grass appears to be associated primarily with moist, acidic to neutral soils that are high in nitrogen. It occurs in areas of open soil that are generally not already occupied by other species. Japanese stilt grass is adapted to low light conditions and threatens native under story vegetation in open to shady locations.

Distribution: Japanese stiltgrass has been reported to be invasive in natural areas in fourteen eastern states (Connecticut, Delaware, Georgia, Indiana, Kentucky, Maryland, North Carolina, New Jersey, New York, Pennsylvania, Tennessee, Virginia, Wisconsin, West Virginia) and Washington, D.C.

Ecological Impacts: Japanese stiltgrass is especially well adapted to low light conditions. It

threatens native plants and natural habitats in open to shady, and moist to dry locations. Stilt grass spreads to form extensive patches, displacing native species that are not able to compete with it. Where white-tail deer are over-abundant, they may facilitate its invasion by feeding on native plant species and avoiding stilt grass.

Control and Management: Avoid introduction if possible.

- **Mechanical-**Hand pull or mechanical cutting of plants using a mower or "weed whacker" on vegetative shoots of small infestations.

- **Chemical-**For extensive infestations, where mechanical methods are not feasible, a systemic herbicide like glyphosate (e.g., Roundup), an herbicidal soap that kills the plants back (e.g., Scythe) and herbicides specific to annual grasses may be a more effective choice. If applying glyphosate to stilt grass in wetland sites, use the formulation labeled for wetland areas (e.g., Rodeo).

Japanese Barberry: *Berberis thunbergii*

Native Range: Japan

Description: Japanese barberry is a compact, spiny, deciduous shrub in the barberry family (*Berberidaceae*) that commonly grows from 2 to 3 feet tall (although it can grow up to six feet in height). Roots are shallow but tough. The smooth-edged leaves range from oval to spoon-shaped and are clustered in tight bunches close to the branches. The single spines bear small leaves in their axils. Yellow flowers bloom in May, are about one third of an inch wide, and are solitary or in small clusters of 2-4 blossoms. The bright-red fruits mature in mid-summer and hang from the bush during autumn and into winter. The berries are small, oblong, and found singly or in clusters. The plant regenerates by seed and creeping roots. Birds and rabbits are known to eat the seeds and distribute the species. Branches root freely when they touch the ground; thus allowing single plants to become quite large.

Habitat: Japanese barberry prefers well-drained soils, although it has been found in wet, calcareous situations, (specifically in a black ash swamp). It is typically found in locations of partial sunlight such as woodland's edge; it can survive well under the shade of an oak canopy. It is also found along roadsides, fences, old fields, forest edges, and open woods. Japanese barberry can be found invading oak woodlands and oak savannas; it is widespread in Wisconsin

woodlands south of the tension zone. A related non-native species, *B. vulgaris*, was widely planted for similar purposes, but has been exterminated because it is the alternate host of black rust, a disease that affects wheat crops. Japanese barberry competes poorly with grasses and may succumb to drought conditions.

Distribution: This species is reported from states shaded on the Plants Database map. It is reported invasive in CT, DC, DE, IN, KY, MA, MD, ME, MO, NC, NH, NJ, NY, OH, PA, RI, TN, VA, VT, WI, and WV.

Environmental Impact: It often escapes cultivation. Plants shade out other understory species. Recent research studies in New Jersey indicted that Japanese barberry changes the soil chemistry in environment it inhabits.

Control and Management:

- **Manual-**Mechanical removal of the plant is recommended in early spring because barberry is one of the first shrubs to leaf out, thereby making identification easier. Cutting, pulling or digging are effective in areas where there are only a few plants. A hoe, weed wrench, or mattock should be used to uproot the bush and all connected roots. Thick gloves are recommended for protection from the shrub's spines. Japanese barberry may be relatively easy to control in fire-adapted communities. Fire is thought to kill these plants and prevent future establishment.
- **Chemical-** Triclopyr has been used as a cut-stump treatment with success. Other herbicides labeled for brush control, such as glyphosate, may prove to be effective. Care in application is essential because glyphosate is a non-selective herbicide that can kill native species as well. Herbicides are suggested only for plants that are difficult to remove mechanically.

Reference: http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/b..., http://plants.usda.gov/ http://webapps.lib.uconn.edu/ipane/browsing.cfm?descriptionid=26, www.forestryimages.org/ www.nps.gov/plants/alien, Czarapata, Elizabeth J. Invasive Plants of the Upper, *an Illustrated Guide to their Identification and Control,* 2005, p. 88-89

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 06-13-05 Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Japanese Knotweed: *Polygonum cuspidatum*

Common Names: Japanese knotweed, Mexican bamboo

Native Origin: Eastern Asia

Description: Japanese knotweed, a member of the buckwheat family (*Polygonaceae*), is an upright, shrub like, herbaceous perennial that can grow to over 10 feet in height. As with all members of this family, the base of the stem above each joint is surrounded by a membranous sheath. Stems are smooth, stout and swollen at joints where the leaf meets the stem. Although leaf size may vary, they are normally about 6 inches long by 3 to 4 inches wide, broadly oval to somewhat triangular and pointed at the tip. The minute greenish-white flowers occur in attractive, branched sprays in summer and are followed soon after by small winged fruits. Seeds are triangular, shiny, and about 1/10 inch long. It reproduces primarily by seed and by vegetative means with the help of long, stout rhizomes. It can be transported to new sites by water, wind, as a contaminant in fill-dirt, or on the soles of shoes.

Habitat: It can tolerate a variety of adverse conditions including full shade, high temperatures, high salinity, and drought. It is found near water sources, such as along streams and rivers, in low-lying areas, waste places, utility rights-of-way, and around old home sites. It can quickly become an invasive pest in natural areas after escaping from cultivated gardens.

Distribution: This species is reported from states shaded on Plants Database map. It is reported invasive in AK, CT, DC, DE, GA, IN, MA, MD, ME, MI, MO, NC, NH, NJ, NY, OH, OR, PA, RI, TN, VA, VT, WA, WI, and WV.

Ecological Impacts: It spreads quickly to form dense thickets that exclude native vegetation and greatly alter natural ecosystems. It poses a significant threat to riparian areas, where it can survive severe floods and is able to rapidly colonize scoured shores and islands. Once established, populations are extremely persistent.

Control and Management: It is difficult to control because of its ability to re-grow from vegetative pieces and from seed.

- **Manual**- Hand pull young plants; remove all roots and runners to prevent re-sprouting

- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as glyphosate or triclopyr. Apply herbicides to freshly cut stems or to foliage. Follow label and state requirements.

References: www.forestimages.org, http://plants.usda.gov, www.nps.gov/plants/alien, Plant Invaders of Mid-Atlantic Areas, NPS, p. 20-21

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 09-14-04 Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Multiflora Rose: *Rosa multiflora*

Common Names: multiflora rose, rambler rose

Native Origin: Eastern Asia (Japan, Korea and eastern China) introduced for ornamental purposed in the mid to late 1800's

Description: Multiflora rose is a thorny, perennial shrub in the rose family (*Rosaceae*) growing 10–15 feet in height and 9-13 feet in width. Stems are wide arching canes covered with hard thorns. Leaves are alternate, pinnately compound, and have five to eleven sharply toothed oval leaflets. Clusters of showy, fragrant, white to pink flowers begin blooming in May or June. Flowers are 0.5-1 inch wide and have 5 petals. Small bright red fruits, or rose hips, develop during the summer, becoming leathery, and remain on the plant through the winter. It reproduces by seed and by forming new plants that root from the tips of arching canes that contact the ground. Fruits are readily sought after by birds which are the primary dispersers of its seed. It has been estimated that an average plant may produce a million seeds per year, which may remain viable in the soil for up to twenty years.

Habitat: It grows in old fields, pastures, prairies, roadsides, and open woods. It thrives in full and partial sun with well-drained soils. It cannot tolerate winter temperatures below -28^0 F.

Distribution: This species is reported from states shaded on Plants Database map. It is reported invasive in AR, CA, CO, CT, DC, DE, GA, IL, IN, KY, LA, MA, MD, ME, MI, MO, MS, NC, NH, NJ, NY, OH, OR, PA, RI, SC, TN, VA, VT, WI, and WV.

Ecological Impacts: Multiflora rose is extremely prolific and can form impenetrable thickets that exclude native plant species. It invades a large number of habitats such as hillside pastures, fence rows, right-ofways, roadsides, forest edges, margins of swamps and marshes.

Roadside infestation

Control and Management:

- **Manual**- cutting or mowing at the rate of three to six times per growing season, for two to four years is effective
- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as glyphosate or triclopyr. Because of the long-lived stores of seed in the soil, follow-up treatments may be necessary. Follow label and state requirements.
- **Biological Control-** Four agents show potential for biological control in the US. Multiflora rose is vulnerable to defoliation by Japanese beetles. It also suffers from rose rosette disease, a virus like disease that causes plants to turn a deep red color, sprout broom-like growth, and produce more thorns than usual.

References: www.forestimages.org, http://plants.usda.gov, www.nps.gov/plants/alien, http://tncweeds.ucdavis.edu/esadocs/rosamult.html, Czarapata, Elizabeth J. Invasive Plants of the Upper Midwest, An Illustrated Guide to their Identification and Control, 2005 p. 43-45, Biological Control of Invasive Plants in the Eastern United States p. 280

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 03-15-06 Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Chinese/European Privet: *Ligustrum sinense*

May - photo by J. Miller

Plant: Semievergreen to evergreen, thicket-forming shrubs to 30 feet (9 m) in height that are multiple stemmed and leaning-to-arching with long leafy branches. Essentially this privet is indistinguishable from other privets except at flowering. Chinese privet is the most widely occurring.

Stem: Opposite or whorled, long slender branching that increases upward with twigs projecting outward at near right angles. Brownish gray turning gray green and short hairy (rusty or grayish) with light dots (lenticels). Leaf scars are semicircular with one bundle scar. Bark brownish gray to gray and slightly rough (not fissured).

Leaves: Opposite in two rows at near right angle to stem, ovate to elliptic with rounded tip (often minutely indented), 0.8 to 1.6 inches (2 to 4 cm) long and 0.4 to 1.2 inches (1 to 3 cm) wide. Margins are entire. Lustrous green above and pale green with hairy

midvein beneath (European privet not hairy beneath). Petioles 0.04 to 0.2 inch (1 to 5 mm) long, rusty hairy. Leaves usually persistent during winter.

Flowers: April to June. Abundant, terminal and upper axillary clusters on short branches forming panicles of white flowers. Corolla four-lobed, tube 0.06 to 0.1 inch (1.5 to 2 mm) long and equal or shorter than the lobes, with stamens extending from the corolla on Chinese privet and within the corolla on European privet. Fragrant.

Fruit and seeds: July to March. Dense ovoid drupes hanging or projecting outward, 0.2 to 0.3 inch (6 to 8 mm) long and 0.16 inch (4 mm) wide, containing one to four seeds. Pale green in summer ripening to dark purple and appearing almost black in late fall to winter.

Ecology: Aggressive and troublesome invasives, often forming dense thickets, particularly in bottom-land forests and along fencerows, thus gaining access to forests, fields, and right-of-ways. Shade tolerant. Colonize by root sprouts and spread widely by abundant bird- and other animal-dispersed seeds.

History and use: Introduced from China and Europe in the early to mid-1800s. Traditional southern ornamentals. Deer browse Chinese privet sprouts.

Resources:

Miller, James H. 2003. Nonnative invasive plants of southern forests: a field guide for identification and control. Gen. Tech. Rep. SRSâ “62. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 93 p.

May
Photo by T. Bodner

October
Photo by T. Bodner

September
Photo by J. Miller

Recommended control procedures:

- Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (August to December): a glyphosate herbicide as a 3-percent solution (12 ounces per 3-gallon mix) or Arsenal AC* as a 1-percent solution (4 ounces per 3-gallon mix).

- For stems too tall for foliar sprays, apply Garlon 4 as a 20-percent solution in commercially available basal oil, diesel fuel, or kerosene (2.5 quarts per 3-gallon mix) with a penetrant (check with herbicide distributor) to young bark as a basal spray. Or, cut large stems and immediately treat the stumps with Arsenal AC* or Velpar L* as a 10-percent solution in water (1 quart per 3-gallon mix) with a surfactant. When safety to surrounding vegetation is desired, immediately treat stumps and cut stems with Garlon 3A or a glyphosate herbicide as a 20-percent solution in water (2.5 quarts per 3-gallon mix) with a surfactant.

* Nontarget plants may be killed or injured by root uptake.

Oriental Bittersweet: *Celastrus orbiculatus*

Common Names: Oriental, round-leaved and Asiatic bittersweet

Native Origin: Eastern Asia, Korea, China and Japan

Description: It is a deciduous, woody, perennial vine or trailing shrub. Light brown stems may reach 2 – 4 inches in diameter and up to 59 feet in length. Leaves (2-5 inch) are glossy, rounded, finely toothed and arranged alternately along the stem. Clusters of small whitish- greenish flowers emerge, May – June, from leaf axils, allowing each plant to produce large numbers of seeds. At maturity, globular, green to yellow fruits split open to reveal three red-orange, fleshy arils that contain the seeds. These showy fruits have made oriental bittersweet popular for use in floral arrangements. They reproduce by seed and vegetatively by root suckering.

Habitat: Oriental bittersweet infests forest edges, woodlands, early succession fields, hedgerows, coastal areas and salt marsh edges, particularly those suffering some form of land disturbance. While often found in more open, sunny sites, its tolerance for shade allows oriental bittersweet to invade forested areas.

Distribution: Oriental bittersweet currently occurs from New York to North Carolina, and westward to Illinois.

Ecological Impacts: Oriental bittersweet is an aggressive invader that threatens all vegetation levels of forested and open areas. It grows over other vegetation, completely covering it, and kills other plants by preventing photosynthesis, girdling, and uprooting by force of its massive weight. In the northeastern U.S., exotic Oriental bittersweet appears to be displacing the native climbing bittersweet, *Celastrus scandens*, which occurs in similar habitats, through competition and hybridization.

Control and Management:

- **Mechanical**- hand pull by the roots and removed from the site, preferably before fruiting; if fruits are present, vines should be bagged and disposed of in a landfill, or left in the bags and allowed to bake in the sun long enough to kill the seeds.

- **Chemical**-Herbicides, such as glyphosate (e.g., Roundup) or triclopyr (e.g., Garlon) are successful. These herbicides are taken into the roots and kill the entire plant.

References: http://plants.usda.gov, http://www.nps.gov/plants/alien/ Invasive Plants Field and Reference Guide: An Ecological Perspective of Plant Invaders of Forests and Woodlands

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 07-14-05 Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Russian Olive: *Elaeagnus angustifolia*

Description: Russian-olive is a small, thorny shrub or small tree that can grow to 30 feet in height. Its stems, buds, and leaves have a dense covering of silvery to rusty scales. Plants begin to flower and fruit at three years of age. Highly aromatic, creamy yellow flowers appear in June and July and are later replaced by clusters of abundant silvery fruits.

Ecological Threat Posed by Plant:
Russian-olive can interfere with natural plant succession, nutrient cycling, and tax water reserves. Because Russian-olive is capable of fixing nitrogen in its roots, it can grow on bare, mineral substrates and dominate riparian vegetation where overstory cottonwoods have died. Although Russian-olive provides a plentiful source of edible fruits for birds, ecologists have found that bird species richness is actually higher in riparian areas dominated by native vegetation.

Distribution in the United States: Russian-olive is on the State noxious weed lists for 35 states.

It is found primarily in the central and western U.S., as well as in the East (e.g., Virginia to Pennsylvania), where it occurs with its exotic partner, autumn-olive (*Elaeagnus umbellata*). In the West, Russian-olive occurs mainly in the Great Basin Desert region at 800-2000 feet elevation and is also abundant in riparian zones of the Great Plains, for example, the Platte River in Nebraska.

Habitat in the United States: Russian-olive is found along streams, fields and open areas. Seedlings are tolerant of shade and it thrives in a variety of soil and moisture conditions, including bare mineral substrates.

Current Management Approaches: Mowing hedges with a brush type mower, followed by removal of cut material may be the most effective method for eradication. Herbivorous animals are not known to feed on it and few insects seem to utilize or bother it. Canker disease is occasionally a problem but not enough to be useful as a control agent.

Tree-of-Heaven: *Ailanthus altissima*

Common Names: tree-of-heaven, ailanthus, Chinese sumac, and stinking sumac, copal tree and varnish tree

Native Origin: Eastern and central China

Description: Tree-of-heaven is a rapidly growing, deciduous tree in the mostly tropical quassia family (Simaroubaceae). Mature trees can reach 80 feet or more in height. It has smooth stems with pale gray bark, twigs which are light chestnut brown and large compound leaves. Small yellow-green flowers have 56 petals and are borne in dense clusters near ends of upper stems. Pink to tan fruit is winged with a single seed in the middle. Roots have aggressive rhizomes. All parts of the tree, especially the flowers, have a strong, offensive odor similar to peanuts or cashews. Tree-of-heaven reproduces both sexually (seeds) and asexually (vegetative sprouts). Established trees also produce numerous suckers from the roots and re-sprout vigorously from cut stumps and root fragments.

Habitat: Disturbed soils, fields, roadsides, fencerows, woodland edges, forest openings, and rocky areas. It thrives in poor soils and tolerates pollution. It is not found in wetlands or shaded areas.

Distribution: This wide-spreading species is reported from states shaded on Plants Database

map. It is reported invasive in AZ, CA, CT, DC, DE, FL, HI, IN, KY, LA, MA, MD, MI, MO, NC, NH, NJ, NM, NY, OH, OK, OR, PA, RI, SC, TN, VA, WA, WI, and WV.

Ecological Impacts: Tree-of-heaven is a prolific seed producer, grows rapidly, forms thickets, dense stands, and can overrun native vegetation. It colonizes by root sprouts and spreads by prolific wind- and water-dispersed seeds. Once established, it can quickly take over a site and form an impenetrable thicket. They produce toxins that prevent the establishment of other plant species.

Control and Management:

- **Manual-**Young seedlings may be pulled or dug up, preferably when soil is moist. Care must be taken to remove the entire plant including all roots and fragments. Cutting large seed producing female trees would at least temporarily reduce spread by this method.
- **Chemical-** It can be effectively controlled using any of several readily available general use herbicides such as triclopyr or imazapyr. Follow label and state requirements. The herbicides may be applied as a foliar (to the leaves), basal bark, cut stump, or hack and squirt treatment. Basal bark application is one of the easiest methods and does not require any cutting. It works best during late winter/early spring and in summer. The cut stump method is useful in areas where the trees need to be removed from the site and will be cut as part of the process. The hack-and-squirt or injection method is very effective and minimizes sprouting and suckering when applied during the summer.
- **Biocontrol -**A potential biological control for ailanthus may lie in several fungal pathogens, (*Verticillium dahliae* and *Fusarium oxysporum*) that have been isolated from dead and dying ailanthus trees in New York and in southern and western Virginia.

References: http://www.nps.gov/plants/alien/fact/aial1.htm, www.nps.gov/plants/alien, www.forestryimages.org, Czarapata, Elizabeth J. Invasive Plants of the Upper, *an Illustrated Guide to their Identification and Control,* 2005, p. 87-88, Miller, James H., Nonnative Invasive Plants of Southern Forests, *A Field Guide for Identification and Control* USDS FS, SRS-62 p. 2-3