Regulatory Accomplishments

1999 - National Invasive Species Law EO 13112

2000 - NH Invasive Species Law (RSA 430:51-430:57)
  - NH Invasive Species Committee (ISC)

2004 - NH Invasive Species Rules (Agr 3800)

2005 - NHDES includes invasive conditions in:
  - Wetland Dredge & Fill permits
  - Alteration of Terrain permits

2007 – Agr 3800 inclusion of Norway maple, Burning bush, and Japanese barberry

2012 – NH DAMF Pesticide Rules (Pes 500)
  - Exemptions for invasive species
Purple loosestrife Biocontrol Program

Galerucella calmariensis Larva

Galerucella calmariensis
NH DOT Invasive Species Control & Management

STATE OF NEW HAMPSHIRE
NHDOT Project No. 146331

Town of Londonderry
NH 193 Corridor Widening

INVASIVE SPECIES CONTROL & MANAGEMENT PLAN

Contractor: Weaver Brothers Construction Company, Inc
741 Route 3A
Bow, NH 03304
Contact: Peter Bates
(603) 228-5375

Submitted to: NH Department of Transportation
Bureau of Environment
Contact: Randy Talon
(603) 419-6252

Prepared by: TFMoran, Inc.
48 Constitution Drive
Bedford, NH 03110
Contact: Dan Blais, CPESC
(603) 472-4488

Submitted: February 14, 2017
Revised:

[Signature]
N.H. DEPT. OF TRANSPORTATION
BUREAU OF ENVIRONMENT

[Stamp: Approved]
Outreach & Education

- ~40,000 Book
- 5,000 Posters
- 30-50 Presentations/Year
It is illegal in New Hampshire to collect, transport, sell, distribute, propagate or transplant any living or viable portion of any listed prohibited invasive plant species including all of their cultivars, varieties, and specified hybrids.

Many of the invasive pests that are introduced as a result of escaping from a managed environment occur among landscape plants. Initially planted in yards because of their attractive appearance and low-maintenance, these plants can quickly overrun and dominate natural environments, where they out compete native plants. This is why some formerly popular landscaping plants (purple loosestrife, burning bush, Norway maple) are on the list of prohibited invasive plants in New Hampshire.

- Grants & Funding Sources for Invasive Species Control
- Invasive Species Frequently Asked Questions
- Invasive Trees, Shrubs, Vines, and Herbaceous Plants
- Prohibited Invasive Species
- Restricted Invasive Species
- Alternative Plants for Prohibited Species
- Invasive Species Booklet and Poster
  - New Hampshire Guide to Upland Invasive Species
  - NH Prohibited Invasive Upland Plants Poster
- Invasive Species Control
  - Japanese Knotweed Control
  - Integrated Pest Management (IPM) for Woody Plants
  - Control of Invasive Species by Numbers
- Invasive Plant Control Project (IPCP) Yearly Reports
  - 2012 IPCP Yearly Report
  - 2013 IPCP Yearly Report
  - 2014 IPCP Yearly Report
Oriental bittersweet
*Celastrus orbiculatus*

**Control Guidelines**

**NH Department of Agriculture, Markets & Food, Division of Plant Industry, 29 Hazen Dr., Concord, NH 03301 (603) 271-3485**

**Common Name:** Oriental Bittersweet

**Latin Name:** *Celastrus orbiculatus*

**New Hampshire Invasive Species Status:** Prohibited (Age 1821)

**Photos by:** Douglas Nygren

**Description:** Deciduous vine reaching heights of 40–60 ft. Bark: Tannish, furrowed. Leaves: Alternate, ovate, bluntly notched, 3–4 long by 2½ as wide, tapering at the base. Flowers: Small, greenish, blooming in spring. Fruit: Yellow oblong ovoid capsules surrounding an orange-red seed. Fruits occur in the scales of the stem whereas native bittersweet (*Celastrus scandens*) fruits at the ends. Zones: 4–8

**Habitat:** Disturbed edges, roadsides, fields, forests and along rivers and streams. Spreads: Birds and humans. Concerns: Very aggressive, clings up and over trees and shrubbery. Do not buy vines made of these vines. Controls: Difficult to manage. Cutting, pulling, or recommended herbicide use applied to foliage, bark, or cut-stumps.

**General Considerations:**

The introduction of Oriental bittersweet to non-infested areas is generally associated with birds and small mammals feeding on the abundant fruits in the fall and carrying the seeds as they move from one area to another. Dispersal is also associated with human activities where earth-moving activities occur or when the vines and fruits are collected in the fall for ornamental wreaths and decorations (which is prohibited) and then carelessly discarded. Seed viability and germination rate is relatively high at 90% in the spring of the subsequent growing season, but drops off significantly the following year. Fruits that remain on the vine eventually drop to the ground and decompose leaving behind three seeds per berry. These seeds ultimately become part of the seed bank, which usually remains viable for only 1 year. Anyone involved with control practices or site development should take precautionary measures to ensure that fruit and soil material containing seeds are not moved off site. Preventative measures to avoid this may necessitate the creation of a cleaning station where soil, seeds and/or propagules can be removed from vehicles, tools, and equipment. Heavy deposits of soil may require pressure washing.

Another factor that warrants consideration is the rejuvenation of Oriental bittersweet from root fragments left in the ground. Control measures that involve cutting the upper portion of the vine and leaving the rooting system intact typically result in new shoot emergence, known as suckering. These can form at the crown or along the root itself. Subsequent monitoring and control measures may be necessary to manage this occurrence.

Since there are no known biological controls, and cultural controls are generally ineffective, the standard management practices involve mechanical and chemical controls. Depending on the method employed it can take less than one year or up to several years to eliminate Oriental bittersweet from the management area.

To easily identify and locate where Oriental bittersweet occurs in any habitat, simply scout areas of concern in the fall when native plant species have reached their peak colors. At this point most native species will have dropped their leaves leaving the bright lemon-yellow foliage of Oriental bittersweet as a key indicator. In New Hampshire, this generally occurs around late October to early November. This method is very effective for early detection and rapid response (EDRR) by enabling managers to map out areas of concern and implement control strategies early on.

**Control Options:**

See the following control guide: Integrated Pest Management (IPM) for Woody Plants or the Control of Invasive Species by Numbers (Although native American bittersweet, *Celastrus occidentalis*, is not prevalent in New Hampshire, it is important to properly identify which bittersweet you have and confirm that it is Oriental bittersweet before control measures begin.)

**Sources:**


**Celastrus orbiculatus Oriental bittersweet**

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat Type</td>
<td>Mostly forest edge</td>
</tr>
<tr>
<td>USDA Hardiness</td>
<td>4–8</td>
</tr>
<tr>
<td>Zone</td>
<td>Lateral</td>
</tr>
<tr>
<td>Rooting Structure</td>
<td>Lateral</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Hybridizing with American bittersweet, weakening mature trees by girdling the trunk and weighting the crown.</td>
</tr>
<tr>
<td>Wildlife Impacts</td>
<td></td>
</tr>
<tr>
<td>Leaf Arrangement</td>
<td>Alternate</td>
</tr>
<tr>
<td>NVR Ranking</td>
<td>UPL, FACU</td>
</tr>
<tr>
<td>Soil Type</td>
<td></td>
</tr>
<tr>
<td>Soil pH Range</td>
<td>5.5–7.5</td>
</tr>
<tr>
<td>Light Requirements</td>
<td>Perennial partial to full sun</td>
</tr>
<tr>
<td>Growing Season</td>
<td>13–18 weeks</td>
</tr>
<tr>
<td>Life Span</td>
<td>3–5 years</td>
</tr>
<tr>
<td>Reproductive Age</td>
<td>13–18 weeks</td>
</tr>
<tr>
<td>Flowering Period</td>
<td>May–June</td>
</tr>
<tr>
<td>Fruiting Type</td>
<td>Diagrams de croissance, fruits de terre</td>
</tr>
<tr>
<td>Pollination</td>
<td>Insects, mostly bees, and wind</td>
</tr>
<tr>
<td>Seed Set</td>
<td>August through September</td>
</tr>
<tr>
<td>Seed Per Plant</td>
<td>3 seeds per fruit</td>
</tr>
<tr>
<td>Seed Germination</td>
<td>99%</td>
</tr>
<tr>
<td>Seedling Size</td>
<td>Typically 1 year, possibly 2 years</td>
</tr>
</tbody>
</table>

**Dispersal Vectors:** Bird seed, small mammals, humans

Statewide Invasive Species Management Program

2016 Invasive Treatment Plan

<table>
<thead>
<tr>
<th>17</th>
<th>Parks, conservation lands, town roads, special projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>State &amp; Interstate Highway Systems</td>
</tr>
</tbody>
</table>
Chemical Control – Safe Storage
Chemical Control

- **Low Volume Basal Bark**: This technique is only effective on small woody plants that have a DBH of 6” or less. The herbicide is mixed with a penetrating oil and is applied to the lower 12 to 18 inches of the stem. Best applied when leaves are absent.
## Statewide Invasive Species Management Program 2016

### 2016 Invasive plant treatment sites

<table>
<thead>
<tr>
<th>Location</th>
<th>Town Beginning</th>
<th>Town End</th>
<th>Length</th>
<th>Square Feet of treatment</th>
<th>Land Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route 1A</td>
<td>Hampton</td>
<td>Rye</td>
<td>13 Miles</td>
<td>-15,000</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 3</td>
<td>Ashland</td>
<td>Meredith</td>
<td>11 Miles</td>
<td>-2,000</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 25</td>
<td>Wentworth</td>
<td>Rumney</td>
<td>7 Miles</td>
<td>-26,000</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 25</td>
<td>Ashland</td>
<td></td>
<td>3 miles</td>
<td>-3,500</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 25</td>
<td>Meredith</td>
<td>Sandwich</td>
<td>14 Miles</td>
<td>-1,500</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 106</td>
<td>Loudon</td>
<td>Meredith</td>
<td>31 Miles</td>
<td>-6,000</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 109</td>
<td>Moultonborough</td>
<td></td>
<td>5 Miles</td>
<td>-3,500</td>
<td>ROW</td>
</tr>
<tr>
<td>Route 113</td>
<td>Sandwich</td>
<td>Plymouth</td>
<td>4.5 Miles</td>
<td>-3,500</td>
<td>ROW</td>
</tr>
<tr>
<td>I-93</td>
<td>New Hampton</td>
<td>Plymouth</td>
<td>11.5 Miles</td>
<td>-2,300</td>
<td>ROW</td>
</tr>
<tr>
<td>DOT Shed</td>
<td>New Hampton</td>
<td></td>
<td></td>
<td>500</td>
<td>State</td>
</tr>
<tr>
<td>Giant knotweed</td>
<td>Rye</td>
<td></td>
<td></td>
<td>-13,800</td>
<td>Residential</td>
</tr>
<tr>
<td>Boscawen Town Forest</td>
<td>Boscawen</td>
<td>Boscawen</td>
<td></td>
<td>-60,500</td>
<td>ROW</td>
</tr>
<tr>
<td>F&amp;G Chapmans Landing</td>
<td>Stratham</td>
<td></td>
<td></td>
<td>-38,000</td>
<td>State</td>
</tr>
<tr>
<td>F&amp;G Merrimack River Boat Launch</td>
<td>Boscawen</td>
<td></td>
<td></td>
<td>3,140</td>
<td>State</td>
</tr>
<tr>
<td>Laconia Stump Dump</td>
<td>Laconia</td>
<td></td>
<td></td>
<td>500</td>
<td>Municipal</td>
</tr>
<tr>
<td>Meredith Neck Rd</td>
<td>Meredith</td>
<td>Meredith</td>
<td>6 Miles</td>
<td>-13,000</td>
<td>State Maintained</td>
</tr>
<tr>
<td>Moultonboro Neck Rd</td>
<td>Moultonborough</td>
<td></td>
<td>5.5 Miles</td>
<td>-35,000</td>
<td>State Maintained</td>
</tr>
<tr>
<td>Odiorne State Park</td>
<td>Rye</td>
<td></td>
<td></td>
<td>-171,000</td>
<td>State Park</td>
</tr>
<tr>
<td>Rye Harbor State Park</td>
<td>Rye</td>
<td></td>
<td></td>
<td>-9,500</td>
<td>State Park</td>
</tr>
<tr>
<td>UNH Dairy Farm</td>
<td>Lee</td>
<td></td>
<td></td>
<td>-3,000</td>
<td>Agriculture</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>83 Miles</td>
<td>411,240</td>
<td></td>
</tr>
</tbody>
</table>
# Statewide Invasive Species Management Program

**Table 5 - Invasive species treated and application method used**

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Plant type</th>
<th>Application method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn olive</td>
<td>Elaeagnus umbellata</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Black swallow-wort</td>
<td>Cynanchum louiseae</td>
<td>Herbaceous Vine</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Burning bush</td>
<td>Euonymus alatus</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Common buckthorn</td>
<td>Rhamnus cathartica</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Glossy buckthorn</td>
<td>Frangula alnus</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Honeysuckle</td>
<td>Lonicera spp.</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Japanese barberry</td>
<td>Berberis thunbergii</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Japanese knotweed</td>
<td>Reynoutria japonica</td>
<td>Herbaceous</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Multiflora rose</td>
<td>Rosa multiflora</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Norway maple</td>
<td>Acer platanoides</td>
<td>Woody</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Oriental bittersweet</td>
<td>Celastrus orbiculatus</td>
<td>Woody vine</td>
<td>Foliar Spray</td>
</tr>
<tr>
<td>Perennial pepperweed</td>
<td>Lepidium latifolium</td>
<td>Herbaceous</td>
<td>Foliar Spray</td>
</tr>
</tbody>
</table>

**Table 6 - Invasive species treated**

<table>
<thead>
<tr>
<th>Treatment Year</th>
<th># of Stems Spot Treated</th>
<th>Acres of Woody Foliar Treatments</th>
<th>Acres of ROW/Knotweed Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>-2,690</td>
<td>Undetermined</td>
<td>23 Acres</td>
</tr>
<tr>
<td>2013</td>
<td>-7,000</td>
<td>Undetermined</td>
<td>43 Acres</td>
</tr>
<tr>
<td>2014</td>
<td>-6,589</td>
<td>Undetermined</td>
<td>25 Acres</td>
</tr>
<tr>
<td>2015</td>
<td>-1,000</td>
<td>&gt;1</td>
<td>21.5 Acres</td>
</tr>
<tr>
<td>2016</td>
<td>-3,300</td>
<td>&gt;4</td>
<td>-5.5 Acres</td>
</tr>
<tr>
<td>Total</td>
<td>-17,279</td>
<td>&gt;5</td>
<td>-118 Acres</td>
</tr>
</tbody>
</table>
NH DOT Pesticide Program

- DOT Initiated this program in 2016 in an effort to manage Japanese knotweed and several other invasive species along highway ROW’s

- Two personnel from each district are licensed as Supervisory Level, Not for Hire.

- All but one district are up and running.
Odiorne State Park Habitat Restoration Project

5 Acres

7 Acres
Odiorne State Park Habitat Restoration Project
Japanese Knotweed

Polygonum cuspidatum
Preventing the Spread of
Japanese knotweed
*Reynoutria japonica*
(AKA: *Fallopia japonica, Polygonum cuspidatum*)

Best Management Practices

New Hampshire Department of Agriculture, Markets & Food
2018
Prepared by: Douglas Cygan
Japanese Knotweed
Rejuvenation from stem tissue
Japanese Knotweed
Rejuvenation from stem tissue

www.pinterest.com

15-Feet
10-Feet

2” Diameter Rhizome

15-Feet
Smothering – 7mil Black Plastic

Cover with heavy black plastic and cover with wood chips or other material

Periodically check the site and make repairs as necessary
Cut the Japanese knotweed stalks off near the base and dispose of properly so they dry out. Put down a layer of woodchips or bark mulch on top of the cut stems to protect the plastic from punctures. Lay heavy mil black plastic on top of the cushion material and extend at least 5-10 feet beyond the limit of cut stems. Place another 4-inch thick layer of woodchips or bark mulch on top of the plastic to prevent the plastic from deteriorating.
Japanese knotweed
Honeybees Foraging
Japanese knotweed invasion at a DOT site in Barrington 2013
Japanese knotweed site - Barrington
5% Roundup-Pro & 0.05% Milestone
Controls – Herbicide
5% Roundup-Pro
Japanese knotweed Control –
Epistatic Growth
Controls – Herbicide

5% Roundup-Pro

I-93 From New Hampton to Plymouth - Photo taken in Sept. 2014
EDRR
Species for NH
Japanese stiltgrass & Mile-a-minute vine
Japanese Stiltgrass
Microstegium vimineum
Japanese Stiltgrass
*Microstegium vimineum*
Japanese Stiltgrass
*Microstegium vimineum*
Japanese Stiltgrass
Microstegium vimineum
Japanese Stiltgrass
Microstegium vimineum

**Japanese Stiltgrass**
*Microstegium vimineum*
Fact Sheet for Identifying and Controlling

NH Department of Agriculture, Markets & Food, Division of Plant Industry, 29 Hazen Dr, Concord, NH 03301 (603) 719-3481

Common Name: Japanese Stiltgrass  
Latin Name: *Microstegium vimineum*  
New Hampshire Invasive Species Status: Prohibited (Ag 2139)
Native to Asia

**Description:** Wide-stemmed annual grass 2-4 ft tall. Leaves: Lanceolate, tapered at both ends, 2-3" long with silvery sheen of reflective hairs along midrib. Flowers: Rosette form in August. Fruit: Achene develop in fall . Zones: 5-11

**Habitat:** Rich conditions, broadleaf forests and meadows, adaptable to cool wet and light conditions. Spread: Seeds spread by water, wildlife & humans. Comments: Plants spread quickly into natural areas leading to competition and displacement of native species. Controls: Small populations can be hand pulled, but large populations can be continuously cut back to prevent flowering and seed production. Herbicide treatments are also effective.

**General Considerations:**

*Microstegium vimineum* is tall annual grass originating from Japan. It is thought to have been introduced to North America as a packing material for oriental china. It typically grows to 2-4 ft (0.6-1.2 m) tall. Adventitious roots can form at the nodes along the stem when the stems grow prostate making contact with soil. Both the nodes and stem are glabrous. The alternate light green leaves are 2-3" (5-7.5 cm) long and up to 3/8" (15 mm) wide. They are lanceolate in shape and taper at both ends. Both upper and lower leaf surfaces are slightly pubescent, except for the hairy midrib running down the center of the blade. The end of the leaf sheath collar is fringed; the ligule is also fringed. (Refer to the generic page image for the following.) The terminal inflorescence is 0.5-2.5" (1.3-6.4 cm) in length, usually only one or two branches, but can have up to five. Glumes are simple and do not have awns. Each spikelet has two lanar, which may carry a single awn. Japanese Stiltgrass usually flowers in mid-September with fruits developing from late September to early October. In late fall, the foliage turns a pale-greenish-yellow or purplish color.

Japanese stiltgrass is a C4 photosynthetic type plant and, therefore, is highly adapted to stress and drought. This and other characteristics allow it to form dense monocultures, crowd out vegetation and proliferate in low light conditions. Once established, populations can rapidly increase and occupy areas of several acres in size. Native plants that are heavily invaded upon are easily displaced by Japanese stiltgrass. It also has the ability to increase soil pH levels, which can result in increased rates of decomposition and a reduction in organic soil horizons. This disturbance also appears to play a role in the establishment of Japanese stiltgrass. Undisturbed sites are less prone to invasion than disturbed sites.

**Control Recommendations:**
If you feel that you have found Japanese stiltgrass at your nursery then we strongly urge you to contact us immediately for confirmation. Once it has been verified then it is up to you to take positive measures to prevent it from being moved in plant stocks and from spreading throughout your facility. If left unchecked, Japanese stiltgrass can, and in most cases does, become a serious problem and a maintenance issue. If it is found prior to it being seed then apply a 3% solution of glyphosate based product prior to October to achieve effective control. It should also be assured that a seed bank has developed from previous years in which case a pre-emergent is suggested. Pre-emergent herbicides will kill all viable seeds that begin to germinate including all other types of weed-seed. This can be greatly beneficial to improving the maintenance aspect of managing your property. To ensure effective treatment, begin applying an approved pre-emergent in early spring, either March or April. If the application is done too late it will be ineffective. The type of herbicide you select needs to be approved for use in NH and the target species.

**Common Look-alikes:**
- Crabgrass (Digitaria spp.)
- Whitegrass (Leersia virginica)
- Deer tongue/panic grass (Ochotona spp.)
- Smartweed/ lady's thumb (Polygonum spp.)
Mile-a-minute

Persicaria perfoliata
Mile-a-minute

*Persicaria perfoliata*
Mile-a-minute

*Persicaria perfoliata*
Japanese Stiltgrass & Mile-a-minute
Mile-a-minute

*Persicaria perfoliata*
Mile-a-minute

*Persicaria perfoliata*
New Invasive Finds in NH
Ornamental jewelweed – *Impatiens glandulifera*
Tree of Heaven Control Project

Spotted lanternfly
*Lycorma delicatula*
EDDMapS.org / Bugwood App

Outsmart Invasive Species

The goal of the project is to strengthen ongoing invasive-species monitoring efforts in Massachusetts by enlisting help from citizens. The web- and smartphone-based approach enables volunteers to identify and collect data on invasive species in their own time, with little or no hands-on training.

The Center for Invasive Species & Ecosystem Health

The Center is involved in numerous grant funded projects and cooperative agreements relating to invasive species, integrated pest management and forest health.

The Center integrates science based resources with information technology applications and graphic design tools to provide a wide array of services. The Center's award-winning staff works with the client organization to efficiently develop and deliver the best product in a timely fashion to meet their specific needs.

Available Apps

View all apps currently available from the Center for Invasive Species and Ecosystem Health on iTunes and Google Play.

Available on the App Store

Available on Google Play
And just to make it interesting....