

## Recording and Reducing Roadside Invaders

By Liz Duff 2010

### Essential Understanding:

Roads are often vectors for transport of invasive species.

Students and citizens can help reduce invasive species by preventing their spread.

Neighboring states have models for “Best Management Practices” that we can learn from.

**Materials:** Maps, GoogleEarth, GPS units,

<http://www.citsci.org> Project: MA-NH-ME Wetland Worries and Roadside Invasives

Mapping Data sheets, Pencils, clipboards

Map(s) of your town (Get this from your city/town hall)

For a look at where your town’s boundaries are go to:

[http://www.massaudubon.org/sightings\\_tool\\_maps/oriole\\_map.php](http://www.massaudubon.org/sightings_tool_maps/oriole_map.php)

Mapping Invasives On-line instructions

**Science Frameworks:** Grades 6-8 Life Science: Changes in Ecosystems Over Time 17,

Living Things and Their Environments 16,

High School: Biology: Ecology 6.1, 6.2

**Engaging Experience:** Students help map invasives in their region, and help inform others about ways to prevent their spread.

### Procedure:

**Brainstorm:** What are potential ways that invasive species spread?

**Discuss:** What are ways that you would suggest people could prevent the spread of invasive species.

Consider: Roadside transport, Transport via waterways, wind, water, haying.

#### 1. Read/Watch Resources:

- a. Watch: Watch “**Dangerous Travelers: Controlling Invasive Plants Along America’s Roadways.**” video on-line <http://www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml>
- b. Read: NH Department of Transportation Best Management Practices for Roadside Invasive Plants 2008 By: **Christine Perron**, Senior Environmental Manager, NHDOT, Bureau of Environment <http://www.nh.gov/dot/bureaus/environment/documents.htm>
- c. Read Perennial Pepperweed Best Management Practices (BMP)

#### 2. Familiarize yourself with identifying our four invaders of concern: Common Reed or Phragmites (*Phragmites australis*) Perennial Pepperweed (*Lepidium latifolium*) Japanese Knotweed (*Polygonum cuspidatum*) Purple Loosestrife (*Lythrum salicaria*)

3. Scout your town’s neighborhoods for invasive species with GPS units and record. If you do not have GPS units, record on a street map, and transfer to Citsci.org by zooming in and mapping points directly onto the map. (See instructions.) Suggestion: Look at your town map and locate where roads go through wetlands. For your initial map, start mapping in those locations. You may want to assign neighborhoods based on where students live.
4. Go on-line and map invasive species in your town or region. (See **Mapping Invasives On-Line** for instructions)
5. Design educational materials to help inform your town about invasive species BMPs.
  - a. Posters
  - b. PowerPoint
6. Present your maps, and the BMPs to your local conservation commission and to your DPWs. Following presentations, display your posters at your local library or city/town hall.

**INVASIVE WEED MAPPING FORM**

Species (common, *Latin*) name:

Observation date:

Observation time(s):

Observation team members:

Contact email address(es):

Contact telephone number(s):

Area searched:

Town -

Map section -

Main road(s) -

Description of area search (e.g. west of Newbury Road to east of High Street):

Surrounding land use:

Landowner(s) contacted:

Name

Property Address

Telephone

Was the area thoroughly searched?

yes  no  uncertain

If uncertain, explain:

Comments:

*(Record data on other side of sheet)*



**INVASIVE WEED MAPPING FORM**

Species (common, *Latin*) name: Perennial Pepperweed, *Lepidium latifolium*

Observation date: Observation time(s):

Observation team members:

Contact email address(es):

Contact telephone number(s):

Area searched:

Town - Map section - Main road(s) -

Description of area search (e.g. west of Newbury Road to east of High Street):

Surrounding land use:

Landowner(s) contacted:

Name

Property Address

Telephone

Was the area thoroughly searched? \_\_\_yes \_\_\_no \_\_\_uncertain

If uncertain, explain:

Comments:

(Record data on other side of sheet)

New Hampshire  
Department of Transportation



**BEST MANAGEMENT  
PRACTICES  
FOR  
ROADSIDE  
INVASIVE PLANTS**

2008

## Acknowledgements

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This manual is available online at:

<http://www.nh.gov/dot/bureaus/environment/documents.htm>

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# Introduction

## Impacts of Invasive Plants

An invasive plant is a non-native plant that is able to persist and proliferate outside of cultivation, resulting in ecological and/or economic harm. These plants readily colonize disturbed areas and habitat edges, such as transportation and river corridors. Once established in these areas, invasive plants often continue to spread to adjacent habitats. All invasive plant species are aggressive competitors with the ability to significantly reduce diversity of native plant and animal species.

The land adjacent to roadways tends to be ideal habitat for invasive plants because of its high level of disturbance and abundant sunlight. According to the Federal Highway Administration, roadside rights-of-way account for more than 10 million acres of land in the United States. This is a significant amount of land on which invasive plants readily establish. The right-of-way environment creates long, linear habitats that serve as pathways for the spread of invasive plants into new regions and onto adjacent lands. Once established, invasive plants can affect the safety and maintenance of transportation infrastructure and wreak havoc on the natural environment.

Invasive plants impact transportation corridors in a variety of ways. Certain invasive plants can reduce sight distance, block signs, increase the risk of fire, and encroach on travel lanes. Some species are capable of pushing up through pavement and damaging shoulders and road edges. In addition, some species plug ditch lines and block culverts, reducing the effectiveness of these drainage structures and hindering their maintenance.

Some invasive plants contain compounds that can cause health problems to people who come into contact with the plants. Two invasive species are of particular concern. Giant hogweed (*Heracleum mantegazzianum*) contains phototoxic sap that can severely burn and blister the skin. Spotted knapweed (*Centaurea biebersteinii*) contains compounds that may be carcinogenic in large quantities. Gloves and long sleeves should be worn when working with or near these plants. Although not an invasive plant, poison ivy can also cause severe skin reactions when any part of the plant comes into contact with skin. (Note: Because it is not an invasive plant, poison ivy is not included in this manual. A separate guidance document will be written to address the presence of poison ivy along roadways.)

When invasive plants become established in natural areas, they can impact native species and ecosystem processes. Next to habitat loss, invasive species are considered the second most important factor in the decline of biodiversity in North America. It has been

estimated that environmental damages and losses caused by invasive species in the United States total \$120 billion each year.<sup>1</sup>

## Invasive Plant Prevention

Invasive plants spread by a variety of mechanisms, including birds, wind, and water. Human activities are also a major factor in the spread of these plants, from gardening and transport of nursery stock to erosion control and wildlife plantings. Routine maintenance and construction activities along transportation corridors can also play a significant role in the spread of invasive plants by dispersing or introducing seeds and other viable plant materials.

Eliminating or reducing the spread and establishment of invasive plants requires a proactive approach, in which there are two key elements. First, new introductions, especially those that occur due to human activities, must be avoided to the maximum extent possible. Second, there must be an emphasis on early detection and eradication of new populations. Control measures are far more likely to be successful, as well as significantly less expensive, on small, young populations rather than on larger, more established populations, as shown in Figure 1.

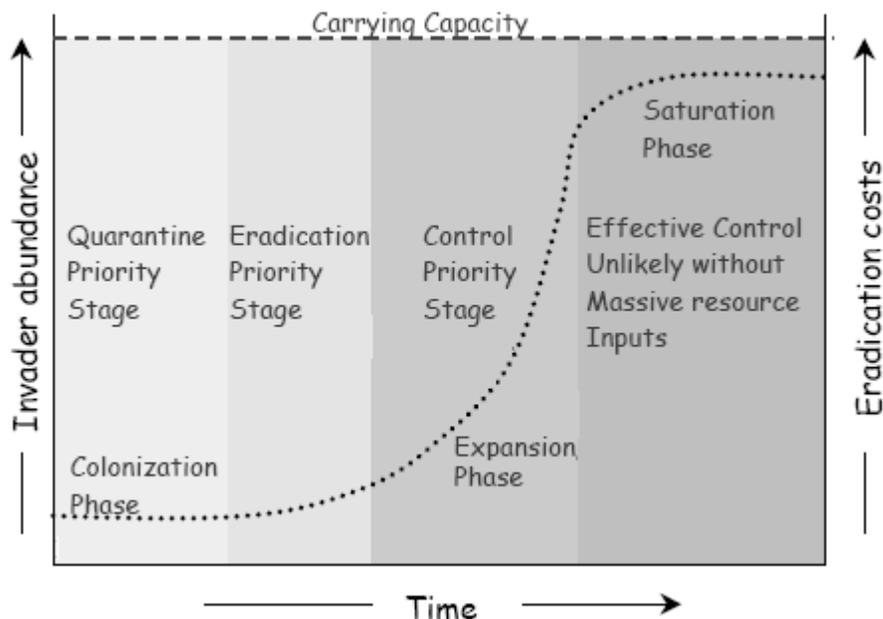


Figure 1. Typical invasive species population curve (from the University of Arizona and USGS Desert Laboratory <http://www.paztcn.wr.usgs.gov>)

<sup>1</sup> Pimental, David, Rodolfo Zunigo and Doug Morrison. "Update on the environmental and economic costs associated with alien-invasive species in the United States." College of Agriculture and Life Sciences, Cornell University, 2004.

## Regulatory Framework

The following federal and state laws and regulations pertain to preventing the spread of invasive species:

- Executive Order 13112 on Invasive Species (February 2, 1999)
- Federal Highway Administration Guidance on Invasive Species (August 18, 1999)
- Noxious Weed Control and Eradication Act (October 30, 2004)
- U.S. Army Corps of Engineers State Programmatic General Permit (June 28, 2007)
- NH Department of Agriculture Code of Administrative Rules, Invasive Species, Chapter Agr 3800; RSA 430:55 (2004)
- NH Department of Environmental Services Code of Administrative Rules, Invasive Aquatic Species, Chapter Env-Wq 1303.02; RSA 487:16-a (1998)

## Prohibited Invasive Plants in NH

Recognizing the problem of invasive plants in New Hampshire, the NH Department of Agriculture, Markets & Foods adopted the Invasive Species Rule, AGR 3800, in June of 2004. The rule was enacted to preserve the integrity of the natural environment and commercial agriculture and states “*no person shall collect, transport, sell, distribute, propagate or transplant any living and viable portion of any listed prohibited invasive plant species, which includes all of their cultivars and varieties.*” Prohibited plant species are listed below.

<u>Scientific Name</u>	<u>Common Name</u>	<u>Growth Form</u>
<i>Acer platanoides</i>	Norway maple	tree
<i>Ailanthus altissima</i>	tree of heaven	tree
<i>Alliaria petiolata</i>	garlic mustard	annual herb
<i>Berberis thunbergii</i>	Japanese barberry	shrub
<i>Berberis vulgaris</i>	European barberry	shrub
<i>Celastrus orbiculatus</i>	Oriental bittersweet	woody vine
<i>Cynanchum nigrum</i>	black swallow-wort	vine
<i>Cynanchum rossicum</i>	pale swallow-wort	vine
<i>Elaeagnus umbellata</i>	autumn olive	shrub
<i>Euonymus alatus</i>	burning bush	shrub
<i>Heracleum mantegazzianum</i>	giant hogweed	perennial herb
<i>Iris pseudacorus</i>	water-flag	aquatic emergent
<i>Ligustrum obtusifolium</i>	blunt-leaved privet	shrub
<i>Lonicera bella</i>	showy bush honeysuckle	shrub
<i>Lonicera japonica</i>	Japanese honeysuckle	woody vine
<i>Lonicera morrowii</i>	Morrow's honeysuckle	shrub
<i>Lonicera tatarica</i>	Tatarian honeysuckle	shrub
<i>Polygonum cuspidatum</i>	Japanese knotweed	perennial herb
<i>Rhamnus cathartica</i>	common buckthorn	shrub
<i>Rhamnus frangula</i>	glossy buckthorn	shrub
<i>Rosa multiflora</i>	multiflora rose	shrub

The Department of Agriculture is currently updating the Prohibited Invasive Species list to add the following species:

<u>Scientific Name</u>	<u>Common Name</u>	<u>Growth Form</u>
<i>Centaurea biebersteinii</i>	spotted knapweed	perennial herb
<i>Hesperis matronalis</i>	dame's rocket	perennial herb
<i>Lepidium latifolium</i>	perennial pepperweed	perennial herb
<i>Microstegium vimineum</i>	Japanese stilt grass	grass
<i>Polygonum perfoliatum</i>	mile-a-minute vine	vine
<i>Reynoutria x bohemica</i>	Bohemian knotweed	perennial herb

In addition to the species regulated by the Department of Agriculture, the Department of Environmental Services prohibits the distribution, propagation, transportation, and introduction of twenty-nine aquatic invasive species (Env-Wq 1303.02):

<u>Scientific Name</u>	<u>Common Name</u>	<u>Growth Form</u>
<i>Butomus umbellatus</i>	flowering rush	aquatic emergent
<i>Cabomba caroliniana</i>	fanwort	aquatic submerged
<i>Crassula helmsii</i>	swamp stonecrop	aquatic submerged
<i>Egeria densa</i>	Brazilian elodea	aquatic submerged
<i>Epilobium hirsutum</i>	great willow herb	aquatic emergent
<i>Glyceria maxima</i>	manna grass	aquatic grass
<i>Hydrilla verticillata</i>	hydrilla	aquatic submerged
<i>Hydrocharis morsus-ranae</i>	frogbit	aquatic floating
<i>Hygrophila polysperma</i>	East Indian hygrophila	aquatic emergent
<i>Ipomoea aquatica</i>	water spinach	aquatic emergent vine
<i>Iris pseudocarus</i>	yellow flag iris	aquatic emergent
<i>Lagarosiphon major</i>	African oxygen weed	aquatic submerged
<i>Limnophila sessiliflora</i>	ambulia	aquatic submerged
<i>Lythrum salicaria</i>	purple loosestrife	aquatic emergent
<i>Marsilea quadrifolia</i>	water fern	aquatic floating
<i>Myosotis scorpioides</i>	water forget-me-not	aquatic emergent
<i>Myriophyllum aquaticum</i>	parrot-feather	aquatic submerged
<i>Myriophyllum heterophyllum</i>	variable milfoil	aquatic submerged
<i>Myriophyllum spicatum</i>	Eurasian milfoil	aquatic submerged
<i>Najas minor</i>	European naiad	aquatic submerged
<i>Nymphoides peltata</i>	yellow floating heart	aquatic floating
<i>Phragmites australis</i>	common reed	aquatic emergent
<i>Potamogeton crispus</i>	curly leaf pondweed	aquatic submerged
<i>Sagittaria japonica</i>	Japanese arrowhead	aquatic emergent
<i>Sagittaria sagittifolia</i>	giant sagittaria	aquatic emergent
<i>Trapa natans</i>	water chestnut	aquatic floating
<i>Typha gracilis</i>	slender cattail	aquatic emergent
<i>Typha laxmanii</i>	dwarf cattail	aquatic emergent
<i>Typha minima</i>	miniature cattail	aquatic emergent

## Using This Manual

The intent of this manual is to bring awareness to invasive plants and the role that the NH Department of Transportation (NHDOT) can play in limiting the spread of these species along our rights-of-way and into adjacent habitats. The information in this manual is meant as guidance for maintenance and construction personnel, as well as contractors working for the Department. This manual is divided into three sections:

Section I: The general Best Management Practices (BMPs) that are discussed are applicable to all invasive plants, including those listed on the NH Prohibited Invasive Species list. When followed, these BMPs will reduce the likelihood of introducing invasive plants into new areas via maintenance and construction activities.

Section II: Priority invasive plant species are discussed, including appropriate species-specific BMPs and Preferred Control Methods. Priority species are those species that have at least two of the following characteristics: 1) easily spread by NHDOT activities, 2) significant negative impact on transportation infrastructure, and 3) very difficult to eradicate. The five priority species are knotweed, purple loosestrife, phragmites, Oriental bittersweet, and spotted knapweed. All of the priority species are on the NH Prohibited Invasive Species list. Most of the priority species are already widespread throughout New Hampshire, with the exception of spotted knapweed, which is currently found only in scattered populations in the state.

Section III: Contacts and other resources are listed to provide sources for more information, especially in regard to invasive plant identification. The websites listed in this section provide detailed identification characteristics and photographs of invasive plants. A glossary is also included to define terms used throughout the manual.



**Section I – General Best Management Practices**

## Soil Disturbance and Stabilization

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- **BMP #1:** Minimize soil disturbance whenever possible. Invasive plants readily colonize areas of disturbed soil. Monitor recent work sites for the emergence of invasive plants for a minimum of two years after project completion.
- **BMP #2:** Stabilize disturbed soils as soon as possible by seeding and/or using mulch, hay, rip-rap, or gravel that is free of invasive plant material. Seeds of native species should be used whenever possible. Species on the prohibited invasive plant list should never be planted.
- **BMP #3:** Materials such as fill, loam, mulch, hay, rip-rap, and gravel should **not** be brought into project areas from sites where invasive plants are known to occur. If the absence of invasive plant parts in these materials cannot be guaranteed, recent work sites should be monitored for the emergence of invasive plants for a minimum of two years after project completion.

## Movement and Maintenance of Equipment

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- **BMP #4:** If work in areas containing invasive plants cannot be avoided, then the movement of maintenance and construction equipment should be from areas not infested by invasive plants to areas infested by invasive plants whenever possible. This is especially important during ditch cleaning and shoulder scraping activities.
- **BMP #5:** Locate and use staging areas that are free of invasive plants to avoid spreading seeds and other viable plant parts.
- **BMP #6:** If equipment must be used in areas where invasive plants occur, all equipment, machinery, and hand tools should be cleaned of all visible soil and plant material before leaving the project site. Equipment should be cleaned at the site of infestation. Acceptable methods of cleaning include, but are not limited to:
  - Portable wash station that contains runoff from washing equipment (containment must be in compliance with wastewater discharge regulations);
  - High pressure air;
  - Brush, broom, or other hand tools (used without water).
- **BMP #7:** If equipment must be used in areas containing Japanese knotweed, phragmites, or purple loosestrife, aboveground plant material should be cut and properly disposed of (see BMP #11) prior to the start of work. *If excavation occurs in these areas, see BMPs #13-16.*

## Mowing

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- **BMP #8:** These invasive plants have the ability to sprout from stem and root fragments: **purple loosestrife, phragmites, and Japanese knotweed**. Mowing these plants should be avoided whenever possible. Staking roadside populations of these plants as “do not mow” is one way to accomplish this. If these plants are cut, all plant material must be rendered nonviable and extra care should be taken to avoid spreading plant fragments (see BMP #11).
- **BMP #9:** In areas where invasive plants occur and the plants listed in BMP #8 (purple loosestrife, phragmites, and Japanese knotweed) are *not* present, an attempt should be made to mow the right-of-way prior to seed maturation (approximately August 1<sup>st</sup>). This could be accomplished by identifying specific roads that are either heavily infested with invasive plants or roads that are in sensitive habitat areas, and making those roads a priority in the mowing schedule.
- **BMP #10:** Mowing equipment should be cleaned at least daily, as well as prior to transport (see BMP #6). This is particularly important if mowing occurs after seed maturation (after August 1<sup>st</sup>).

## Disposal of Plants

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- **BMP #11:** When invasive plants are cut or removed for roadside maintenance, construction, or control of plants, the spread of viable plant material must be avoided by rendering plant material nonviable. The following methods can be used to destroy plant material:
  - **Drying/Liquefying:** For large amounts of plant material or for plants with rigid stems, place the material on asphalt, tarps, or heavy plastic, and cover with tarps or heavy plastic to prevent the material from blowing away. For smaller amounts of plant material or for plants with pliable stems, bag the material in heavy-duty (3-mil or thicker) garbage bags. Keep plant material covered or bagged for at least one month. Material is nonviable when it is partially decomposed, very slimy, or brittle. Once material is nonviable, it can be disposed of in a landfill or brush pile.

**Recommended for:** Japanese knotweed, purple loosestrife, phragmites.
  - **Brush Piles:** Plant material from most invasive plants can be piled on site to dry out. However, when piling purple loosestrife, phragmites, and Japanese knotweed, care must be taken to pile stems so that cut surfaces are not in contact with the soil.

**Recommended for:** Woody shrubs, trees, and vines; spotted knapweed; large quantities of purple loosestrife, phragmites, and Japanese knotweed.

**NOT recommended for:** any invasive plant with seeds or fruit attached, unless plants can be piled within the limits of the infestation.
  - **Burying:** Plant material from most invasive plants can be buried a minimum of three feet below grade. This method is best used on a job site that already has disturbed soils.

**Recommended for:** any invasive plant.

**NOT recommended for:** Japanese knotweed, unless other options are not feasible and knotweed can be buried *at the site of infestation at least five feet below grade.*
  - **Burning:** Plant material should be taken to a designated burn pile. (All necessary permits must be obtained before burning.)

**Recommended for:** any invasive plant, especially purple loosestrife, phragmites, Japanese knotweed.

- **BMP #11 (continued)**
  - Herbicide: Herbicide applications must be carried out by a licensed applicator with a permit from the NH Department of Agriculture Division of Pesticide Control.  
**Recommended for:** any invasive plant, especially purple loosestrife, phragmites, Japanese knotweed.
  
- **BMP #12:** Invasive plant material must be covered during transport.

## Excavated Material

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- **BMP #13:** Excavated material taken from sites that contain invasive plants cannot be used away from the site of infestation until all viable plant material is destroyed. Excavated material from areas containing invasive plants may be reused within the *exact* limits of the infestation.
- **BMP #14:** Any excavated material that contains viable plant material and is not reused within the limits of the infestation must be stockpiled on an impervious surface until viable plant material is destroyed OR the material must be disposed of by burying a minimum of three feet below grade. Japanese knotweed must be buried at least five feet below grade.
- **BMP #15:** Whenever possible, excavation should be avoided in areas containing Japanese knotweed, purple loosestrife, and phragmites. If excavation does occur in these areas, the BMPs described in Section II must be followed.
- **BMP #16:** Soil and other materials containing invasive plants must be covered during transport.



**Section II – NHDOT Priority Invasive Plant Species**

# Knotweed

*Polygonum cuspidatum*  
*Reynoutria x bohemica*  
*Polygonum sachalinense*

Japanese knotweed, Mexican bamboo  
Bohemian knotweed  
Giant knotweed



Close-up of stem



Dead stems

## *Best Management Practices*

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- **Knotweed BMP #1:** Any treatment or control of knotweed should take place prior to seed maturation (late August). While knotweed spreads primarily via vegetative reproduction, it does produce viable seeds that can germinate in the wild.
- **Knotweed BMP #2:** Do not mow knotweed, especially if it is growing near a ditch line, wetland, or surface water. Mowing knotweed creates small stem fragments that can be spread by the mowing equipment or moving water. These fragments can sprout and start new populations of knotweed.
- **Knotweed BMP #3:** If knotweed must be removed (i.e. for safety reasons), a control plan should be implemented using preferred control methods (see following page). If a control plan is not implemented, the preferred method of removal is hand cutting, especially near water. The cut stems must be rendered nonviable by using a method listed in Section I – General Best Management Practices (BMP #11).
- **Knotweed BMP #4:** If hand cutting is not feasible and mowing equipment must be used, the site should be raked immediately after mowing and as much plant material as possible should be collected and rendered nonviable by using a method listed in Section I (BMP #11). All mowing equipment should be cleaned prior to leaving the site (see Section I – BMP #6). *Note that cutting, whether manual or mechanical, is generally not an effective method for eradicating knotweed.*
- **Knotweed BMP #5:** If excavation will occur in areas containing knotweed, one or more of the following methods must be used to avoid spreading viable plant material:
  - a) Treat all knotweed stems with herbicide (see Control Option #1 on the following page). This control method should be carried out at least two years prior to excavation in order to allow time to perform an adequate number of herbicide treatments to kill the entire root system.
  - b) Excavate as needed and spread all material containing roots and stems on an *impervious surface*. Care must be taken not to spread plant material during excavation and transport. Root material should be broken up as much as possible to promote a faster drying time. Once material has completely dried out, it is nonviable and can be used or disposed of on or off site.
  - c) If the above methods are not feasible, excavated material can be buried at the site of infestation at least **five** feet below grade.

## *Preferred Control Methods*

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- **Knotweed Control Option #1: Chemical Control**

Herbicide treatment is the most effective way to eradicate knotweed. The best time to apply herbicide is late summer or early fall, when the plants are just starting to flower. The following application methods are effective; however, treatments will likely be required for at least two consecutive years, regardless of the method used.

Effective herbicide treatments:

- a) Early summer cut followed by a late summer/early fall foliar spray – best for small to medium sized populations
- b) Foliar spray twice in one growing season – best for large, dense populations
- c) Stem injection – best for small to medium sized populations
- d) Cut & fill (stem cut and filled with herbicide) – best for small to medium sized populations

Important considerations:

- Any method that requires cutting the knotweed stems necessitates proper disposal of the cut stems.
- Presently, the NH Department of Agriculture Division of Pesticides requires knotweed to be listed on the herbicide label as a target species for a specific application method.
- A permit from the Division of Pesticides must be obtained prior to applying herbicide. Application of herbicide must be consistent with herbicide label and carried out by a licensed applicator.
- Currently, the Division of Pesticides allows only cut stem treatments along public road rights-of-way during the period of green foliage.
- Applying herbicide to the right-of-way between June 1<sup>st</sup> and October 15<sup>th</sup> requires going through a public notification process to obtain a permit. However, cut stem treatments do not require public notification.
- Avoid herbicide drift and spillage to minimize impacts to non-target species.

- **Knotweed Control Option #2: Mechanical Control**

If herbicide treatment is not an option, cutting is sometimes successful in eradicating knotweed, but only with small, young populations, and only when done repeatedly (at least 4 times each growing season) for several years. Cutting by hand with a scythe or loppers is preferable to mowing. Cut material should be destroyed as described in Section I (BMP #11), and all equipment should be cleaned prior to leaving the site (see Section I - BMP #6).

# Purple Loosestrife

*Lythrum salicaria*

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## *Best Management Practices*

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- **Loosestrife BMP #1:** Any treatment or control of loosestrife should take place prior to seed maturation (early August). A mature loosestrife plant can produce more than 2 million seeds.
- **Loosestrife BMP #2:** Do not mow loosestrife if it can be avoided. Mowing loosestrife creates small stem fragments that can be spread by the mowing equipment or moving water. These fragments can sprout and start new populations of loosestrife.
- **Loosestrife BMP #3:** If excavation will occur in areas containing purple loosestrife, one or more of the following methods must be used to avoid spreading viable plant material:
  - a) Treat all loosestrife stems with herbicide (see Control Option #3 on the following page). This control method should be carried out at least two years prior to excavation in order to allow time to perform an adequate number of herbicide treatments to kill the entire root system.
  - b) Excavate as needed and spread all material containing roots and stems on an *impervious surface*. Care must be taken not to spread plant material during excavation and transport. Root material should be broken up as much as possible to promote a faster drying time. Once material has completely dried out, it is nonviable and can be used or disposed of on or off site.
  - c) Excavated material can be buried on or off site at least **three** feet below grade.

## *Preferred Control Methods*

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- **Loosestrife Control Option #1: Mechanical Control**

Cutting or pulling by hand can be effective in eradicating small, young populations. However, this treatment must be continued for several years and any disturbed soil must be stabilized. Any material that is cut or pulled must be rendered non-viable (see Section I - BMP #11). Both stem and root fragments can sprout new plants.

- **Loosestrife Control Option #2: Biological Control**

Biological control measures have been developed for loosestrife and consist of leaf-feeding and root-feeding beetles. This control method is best for large, dense populations. More information about this option can be obtained from the NHDOT Bureau of Environment or the NH Department of Agriculture.

- **Loosestrife Control Option #3: Chemical Control**

Herbicide can be applied in late July. The selected herbicide must be approved for use in wetlands. Treatments will likely be required for at least two consecutive years, regardless of the method used.

Effective herbicide treatments:

- a) Foliar spray
- b) Cut stem

Important considerations:

- Presently, the NH Department of Agriculture Division of Pesticides requires loosestrife to be listed on the herbicide label as a target species for a specific application method.
- A permit from the Division of Pesticides must be obtained prior to applying herbicide. Application of herbicide must be consistent with herbicide label and carried out by a licensed applicator.
- Currently, the Division of Pesticides allows only cut stem treatments along public road rights-of-way during the period of green foliage.
- Applying herbicide to the right-of-way between June 1<sup>st</sup> and October 15<sup>th</sup> requires going through a public notification process to obtain a permit. However, cut stem treatments do not require public notification.
- Avoid herbicide drift and spillage to minimize impacts to non-target species.

# Phragmites

*Phragmites australis*

Common Reed



## *Best Management Practices*

---

- **Phragmites BMP #1:** Do not mow phragmites if it can be avoided. Phragmites spreads vigorously by vegetative reproduction. Mowing phragmites creates small stem fragments that can be spread by the mowing equipment or moving water. These fragments can sprout and start new populations.
- **Phragmites BMP #2:** Cutting by any method, when done at the wrong time, can increase stand density. Cutting should be timed to coincide with tasseling (when flowers begin to develop at the top of stem - late July/early August). This is when most of the plant's food reserves are aboveground.
- **Phragmites BMP #3:** If excavation will occur in areas containing phragmites, one or more of the following methods must be used to avoid spreading viable plant material:
  - a) Treat all phragmites stems with herbicide (see Control Option #2 on the following page). This control method should be carried out at least two years prior to excavation in order to allow time to perform an adequate number of herbicide treatments to kill the entire root system.
  - b) Excavate as needed and spread all material containing roots and stems on an *impervious surface*. Care must be taken not to spread plant material during excavation and transport. Root material should be broken up as much as possible to promote a faster drying time. Once material has completely dried out, it is non-viable and can be used or disposed of on or off site.
  - c) Excavated material can be buried on or off site at least three feet below grade.

## *Preferred Control Methods*

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- **Phragmites Control Option #1: Mechanical Control**

Cutting by hand, pulling, or digging can be effective in eradicating small, new populations. These methods should be used in late July or early August when the plants are close to or in tasseling stage. This treatment must be continued for several years and any disturbed soil must be stabilized. Any material that is removed must be rendered non-viable (see Section I - BMP #11). Both stem and root fragments can sprout into new plants.

- **Phragmites Control Option #2: Chemical Control**

Herbicide can be applied in late summer (after tasseling). The selected herbicide must be approved for use in wetlands. Treatments will likely be required for at least two consecutive years, regardless of the method used.

Effective herbicide treatments:

- a) Foliar spray
- b) Stem injection

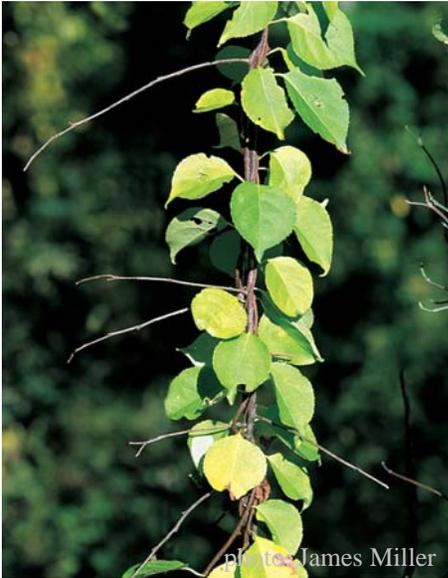
Important considerations:

- Presently, the NH Department of Agriculture Division of Pesticides requires phragmites to be listed on the herbicide label as a target species for a specific application method.
- A permit from the Division of Pesticides must be obtained prior to applying herbicide. Application of herbicide must be consistent with herbicide label and carried out by a licensed applicator.
- Currently, the Division of Pesticides allows only cut stem treatments along public road rights-of-way during the period of green foliage.
- Applying herbicide to the right-of-way between June 1<sup>st</sup> and October 15<sup>th</sup> requires going through a public notification process to obtain a permit. However, cut stem treatments do not require public notification.
- Avoid herbicide drift and spillage to minimize impacts to non-target species.

## Oriental Bittersweet

*Celastrus orbiculatus*

Round-leaved bittersweet



## *Best Management Practices*

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- **Bittersweet BMP #1:** Any treatment or control of bittersweet should take place prior to seed maturation (August). Bittersweet produces abundant, colorful fruit that is spread primarily by birds and people.

## *Preferred Control Methods*

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- **Bittersweet Control Option #1: Chemical Control**

Herbicide treatment is the most effective way to control bittersweet. The best time to apply herbicide is late summer. The following application methods are effective; however, treatments will likely be required for at least two consecutive years, regardless of the method used.

Effective herbicide treatments:

- a) Foliar spray – best for small, young plants
- b) Cut stem – best for large plants

Important considerations:

- Presently, the NH Department of Agriculture Division of Pesticides requires bittersweet to be listed on the herbicide label as a target species for a specific application method.
- A permit from the Division of Pesticides must be obtained prior to applying herbicide. Application of herbicide must be consistent with herbicide label and carried out by a licensed applicator.
- Currently, the Division of Pesticides allows only cut stem treatments along public road rights-of-way during the period of green foliage.
- Applying herbicide to the right-of-way between June 1<sup>st</sup> and October 15<sup>th</sup> requires going through a public notification process to obtain a permit. However, cut stem treatments do not require public notification.
- Avoid herbicide drift and spillage to minimize impacts to non-target species.

- **Bittersweet Control Option #2: Mechanical Control**

If herbicide treatment is not an option, cutting can be successful, but usually only with small, young stems, and only when done repeatedly (at least 4 times each growing season for several years). Cut material should be destroyed as described in Section I - BMP #11.

# Spotted Knapweed

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*Centaurea biebersteinii*



## *Best Management Practices*

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- **Knapweed BMP #1:** Any treatment or control of knapweed should take place prior to seed maturation (early August). Knapweed produces copious amounts of seeds that are spread by wind, by sticking to passing vehicles and machinery, and through contaminated hay and fill. These seeds can remain viable in the soil for up to eight years.

## *Preferred Control Methods*

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- **Knapweed Control Option #1: Mechanical Control**

Small populations of knapweed can be controlled by pulling or cutting by hand (gloves should be worn), and larger populations can be controlled by mowing. These control options are most effective when carried out just prior to seed maturation and must be continued for several years to achieve eradication.

- **Knapweed Control Option #2: Chemical Control**

Herbicide can be applied in late summer (before seed maturation). Treatments will likely be required for at least two consecutive years, regardless of the method used.

Effective herbicide treatments:

- c) Foliar spray
- d) Cut stem

Important considerations:

- Presently, the NH Department of Agriculture Division of Pesticides requires knapweed to be listed on the herbicide label as a target species for a specific application method.
- A permit from the Division of Pesticides must be obtained prior to applying herbicide. Application of herbicide must be consistent with herbicide label and carried out by a licensed applicator.
- Currently, the Division of Pesticides allows only cut stem treatments along public road rights-of-way during the period of green foliage.
- Applying herbicide to the right-of-way between June 1<sup>st</sup> and October 15<sup>th</sup> requires going through a public notification process to obtain a permit. However, cut stem treatments do not require public notification.
- Avoid herbicide drift and spillage to minimize impacts to non-target species.



**Section III – Resources**

## Contacts

### Bureau of Environment, NH Department of Transportation

- **Christine Perron**, Senior Environmental Manager

cperron@dot.state.nh.us

271-3717

Contact for information on: plant identification, best management practices, and control methods

- **Marc Laurin**, Senior Environmental Manager

mlaurin@dot.state.nh.us

271-4044

Contact for information on: plant identification, best management practices, and control methods

### Roadside Development, Bureau of Highway Design, NH Department of Transportation

- **Guy Giunta**, Landscape Specialist Supervisor

ggiunta@dot.state.nh.us

271-6476

Contact for information on: herbicides

### NH Department of Agriculture, Markets, & Food

- **Doug Cygan**, Invasive Species Coordinator

dcygan@agr.state.nh.us

271-2561

Contact for information on: plant identification, control methods

## Websites

<http://www.lib.uconn.edu/webapps/ipane/search.cfm> Invasive Plant Atlas of New England—photographs and information on habitat

[http://www.na.fs.fed.us/fhp/invasive\\_plants/weeds/](http://www.na.fs.fed.us/fhp/invasive_plants/weeds/) US Forest Service—fact sheets on invasive plants in the northeastern United States

<http://tncweeds.ucdavis.edu/esadocs.html> The Global Invasive Species Initiative—photographs, management information

<http://www.invasivespeciesinfo.gov/plants/main.shtml> National Invasive Species Information Center—species profiles with links to other resources

[http://agriculture.nh.gov/divisions/plant\\_industry/documents/InvasivesBooklet2005.pdf](http://agriculture.nh.gov/divisions/plant_industry/documents/InvasivesBooklet2005.pdf) NH Department of Agriculture—Guide to Invasive Upland Plant Species in New Hampshire

<http://www.fhwa.dot.gov/modiv/invasive.htm> Federal Highway Administration—Guide to Roadside Invasives—photographs grouped by flower color; includes many weeds that are not considered invasive in NH.

## Publications

*Vehicle Cleaning Technology for Controlling the Spread of Noxious Weeds and Invasive Plants*

USDA Forest Service (2005)

[www.fs.fed.us/eng/pubs/](http://www.fs.fed.us/eng/pubs/)

*Control of Invasive Species: A Synthesis of Highway Practice*

National Cooperative Highway Research Program - Synthesis 363 (2006)

[www.trb.org](http://www.trb.org)

*Dangerous Travelers: Controlling Invasive Plants Along America's Roadways*

USDA Forest Service (Training Video)

[www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml](http://www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml)

Copies are available to borrow from the NHDOT Bureau of Environment

*Roadside Weed Management*

US Department of Transportation, Federal Highway Administration

Contact the NHDOT Bureau of Environment for a hardcopy

## Glossary

**Annual** – a plant that completes its life cycle in one year.

**Emergent** – having most vegetative growth above water.

**Germination** – beginning of growth, as from a seed.

**Herb** – a plant that does not produce woody, persistent tissue.

**Herbaceous** – having aboveground stems that are fleshy instead of woody.

**Native** – occurring naturally in a given range; not introduced by humans.

**Non-native** – introduced to areas outside of the species' natural geographic range.

**Nonviable** – not capable of living or developing.

**Perennial** – a plant that lives for two years or more.

**Rhizome** – a horizontal, underground stem that can produce roots and aboveground stems.

**Vegetative reproduction** – propagation by means other than seeds, including rhizomes, runners, stem cuttings, and root cuttings.

**Viable** – capable of growing or developing.

**Woody** – having hard, lignified stem tissue that persists throughout the year.

## Perennial Pepperweed Best Management Practices (BMP)

This document presents best management practices (BMPs) for the control of perennial pepperweed (*Lepidium latifolium*). Perennial pepperweed is a non-native invasive plant that typically invades the upper reaches of salt marshes and is a threat to wetlands and wildlife. It frequently grows in areas where salt marsh hay is harvested, and when present in these areas it contaminates and reduces the value of the hay. Harvesting of hay or collection of mulch from salt marshes where perennial pepperweed is present can result in spreading pepperweed to new locations. Perennial pepperweed has also been found to spread along roadways, possibly due to the use of hay contaminated with pepperweed seeds for erosion control.

The intent of this document is to identify BMPs that will prevent the further spread of perennial pepperweed and describe effective measures for eradication where pepperweed is already present. Mass Audubon and Parker River National Wildlife Refuge are leading efforts to control pepperweed in Essex County, and we are seeking to recruit local support.

The BMPs described below were compiled by Mass Audubon staff and include BMPs from Best Management Practices for Roadside Invasive Plants (2008), prepared by Christine Perron, Senior Environmental Manager, New Hampshire Department of Transportation, Bureau of Environment. Although the BMPs presented here are primarily recommended for the control of perennial pepperweed, most are also useful in preventing the spread of or controlling other invasive plant species.

### Getting Informed, and Helping to Inform Others

The first step in controlling perennial pepperweed is learning to recognize it and avoiding activities that might spread it into areas where it is already present.

**BMP #1:** Learn to recognize perennial pepperweed in all its life stages. See the Invasive Plant Atlas of the United States (<http://www.invasiveplantatlas.org/subject.html?sub=5931>) for images of perennial pepperweed.

**BMP #2:** Help Mass Audubon and Parker River Wildlife Refuge find, mark, and map perennial pepperweed. <http://citsci.org/>  
Project “Great Marsh Pepperweed Eradication Project”

**BMP #3:** Before collecting or harvesting salt marsh hay, check with Parker River National Wildlife Refuge Invasives Coordinator, Sarah Janson ([Sarah\\_Janson@fws.gov](mailto:Sarah_Janson@fws.gov)), for up to date information on pepperweed in the Great Marsh Region.

**BMP #4:** If you are gathering mulch for your garden by collecting salt marsh hay wrack from the upland edge of a salt marsh, choose sites at least 1,000 feet away from areas infested with perennial pepperweed.

**BMP #5:** Areas where salt hay is used for erosion control, garden mulch, or other purposes should be periodically inspected for the presence of perennial pepperweed.

**Movement, Use, and Maintenance of Equipment in Areas where Pepperweed or other Invasive Plants are Present**

Perennial pepperweed and many other invasive plants are easily spread by means of seeds and/or plant fragments. Precautions are needed when working in areas where invasive plants are present to avoid the accidental transport of seeds and/or plant fragments to new areas. Employing the following BMPs will reduce the likelihood of spreading pepperweed and other invasive plants to new locations.

**BMP #6:** If working in several areas, some of which have invasive plants present and others of which do not, always work in the areas that do not have invasive plants present first to avoid accidentally transporting invasive plants into the areas where they are not yet present.

**BMP #7:** When working in areas where perennial pepperweed or other invasive plants are present, clean all equipment, machinery, clothing, boots, or other objects that may transport seeds or plant fragments before entering uninfested areas. Preferred method of cleaning: Brush, broom, or other hand tools (used without water). Be sure to clean soil from boots and tires.

**BMP #8:** Pepperweed has the ability to sprout from stem and root fragments. Use alternative control methods to avoid mowing these plants whenever possible. Staking populations of these plants as “do not mow” is one way to accomplish this. If these plants are cut, all plant material must be rendered nonviable and extra care should be taken to avoid spreading plant fragments. **BMPs for Salt Hay Harvesting**

Because perennial pepperweed may grow in areas where salt hay is harvested, special precautions are needed to prevent contaminating salt hay with perennial pepperweed seeds or plant fragments. The following BMPs are recommended:

**BMP #9:** Inspect all salt hay harvest areas before cutting to determine if perennial pepperweed is present. Inspections are recommended in late spring or early summer, when perennial pepperweed is in flower.

**BMP #10:** If haying must be done in areas containing perennial pepperweed, aboveground pepperweed plant material should be cut and properly disposed of prior to the start of work.

Since plant parts can re-sprout and reestablish, care should be taken to ensure plant parts are not spread (see BMP# 20 below).

**BMP #11:** Avoid cutting hay and mowing in infested areas when pepperweed has gone to seed. Cutting hay and mowing should also be avoided during grassland bird nesting season (June and July). Are these two recommendations in conflict? Doesn't seed-set begin in July?

**BMP #12:** Get informed about pepperweed presence and control status: Mass Audubon and the Fish and Wildlife Service are working on a plan to control pepperweed in the Great Marsh Region and have identified many areas where pepperweed is present.

**BMP #13:** Work with Sarah Janson (Sarah\_Janson@fws.gov) of PRNWR to learn about how to get permission to treat the pepperweed on the site that you are haying. Invasives Coordinator, Sarah Janson, in the Great Marsh Region.

**BMP #14:** Let Liz Duff (lduff@massaudubon.org) know whether you are willing to help control the pepperweed at your site. If you do this, and report on the time you are involved, your time may be used as match to help us acquire funds to help treat pepperweed at additional sites.

### **Planning and Implementing Perennial Pepperweed Control Projects**

The following BMPs are recommended for planning and implementing perennial pepperweed and other invasive plant control projects:

**BMP #15:** The full extent of the pepperweed infestation should be determined and mapped prior to the initiation of any control measures. The ownership of the land where the infestation occurs should be determined, and the landowners permission obtained in writing. Any necessary permitting, such as review under the Massachusetts Wetlands Protection Act, should be completed prior to the initiation of any control measures.

**BMP #16:** The method of pepperweed control (mechanical, chemical, or cultural) should be selected based on the specific conditions and situation of the target infestation and the feasibility of success of the control methods available. The potential impacts of control measures on non-target organisms should be fully evaluated. Eradication may take many years of treatment. A combination of methods and years of monitoring and follow-up treatment may be necessary to achieve success.

**BMP #17:** Control of perennial pepperweed should be performed before mid July to prevent the setting of seed. Follow-up control should be performed in July and August to prevent late flowering of surviving plants.

**BMP #18:** Pepperweed control involving the use of herbicides must be in compliance with federal and state laws. In Massachusetts, herbicide applicators must be licensed by the Department of Agricultural Resources unless applying herbicides on land they own and herbicides used to control pepperweed must be licensed for use in the habitat by the Massachusetts Pesticide Board. Directions on the pesticide label must be strictly followed. As with most herbicide applications, it is best to apply herbicide when plants are dry of dew and rainwater, and to plan application at least 6 hours before a rain event. Effective herbicides include metsulfuron methyl, glyphosate, and triclopyr.

**BMP #19:** When mechanical control measures such as pulling or mowing are used, care should be taken to avoid leaving the cut plants or fragments of the cut plants where they may sprout and begin to grow. For very large pepperweed plants with extensive root systems and/or in areas with compacted soils where it is difficult to remove most of the root system by pulling, treatment with herbicide may be preferable to hand pulling. Cutting of perennial pepperweed should be performed in late spring or early summer before seed-set occurs.

**BMP#20:** Pulled or cut plants should be dried on an impervious surface in the sun for at least week prior to composting. Where an impervious surface is not available, pepperweed should be composted for at least a month in the sun in sealed contractor grade black plastic garbage bags. You may need to double bag if pepperweed has poked through and made holes. If you have permission, you may dispose of pepperweed into dumpsters that are headed to be incinerated.

### **Follow up to Treatment and Prevention**

Controlling perennial pepperweed typically takes several years of work and the repeated use of control methods. The following BMPs are recommended as a follow-up to treatment

**BMP #21:** Areas where perennial pepperweed has been removed and is believed to be eradicated should be revisited annually or biennially to detect reinfestation.

**BMP #22:** Areas used for hay harvest in coastal regions where perennial pepperweed is present should be inspected annually and any pepperweed should be removed prior to further hay harvest.

## Instructions for Mapping Invasives On-Line

By Liz Duff 2010

Help map invasive species in Massachusetts, New Hampshire and Maine. <http://citsci.org>

There are 4 invasive species that Mass Audubon's Salt Marsh Science Project and the U.S. Fish and Wildlife Service's Parker River National Wildlife Refuge are particularly concerned about. We are seeking help in mapping these invasives.

### The four primary species of concern:

Perennial Pepperweed (*Lepidium latifolium*)

Japanese Knotweed (*Polygonum cuspidatum*)

Purple loosestrife (*Lythrum salicaria*)

Phragmites or Common Reed (*Phragmites australis*)

Additionally, we will add recent roadside invaders shared with us by Mass Highways. Mile a minute vine is one example.

We have set up a **project** on CitSci.org "**MA-NH-ME Wetland Worries & Roadside Invasives.**"

"CitSci.org is website in support of citizen science. It allows citizens, school groups, and professionals to enter species observations into a global database. The observations are then used for natural resource management, scientific studies, and environmental education. CitSci.org provides an opportunity for students and volunteers to perform field studies that contribute to our collective biological understanding. Submit your observations today!"

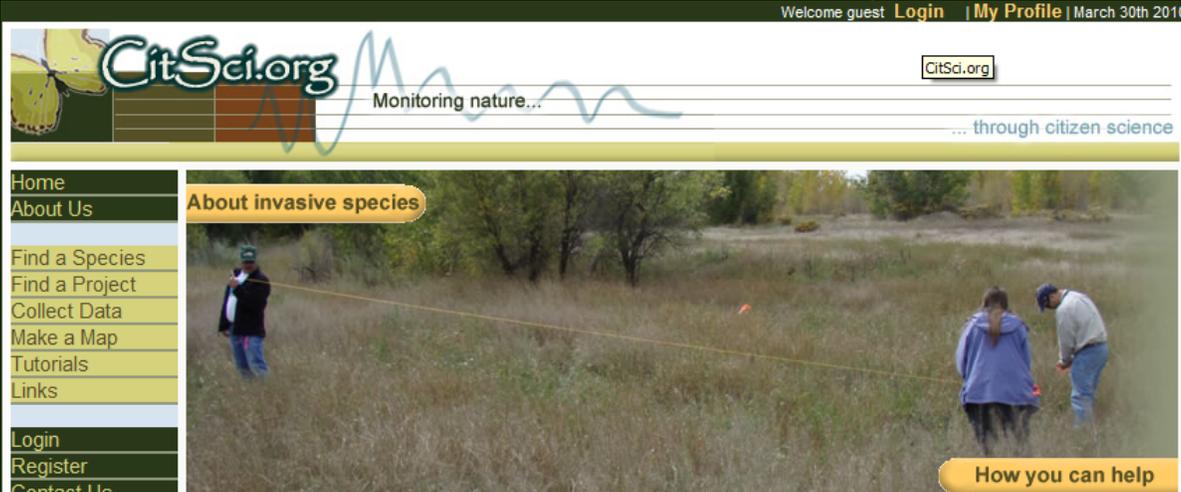
What is cool about CitSci is, if you create a map, it instantly includes locations of other sightings from other mappers who have mapped the same species.

Steps:

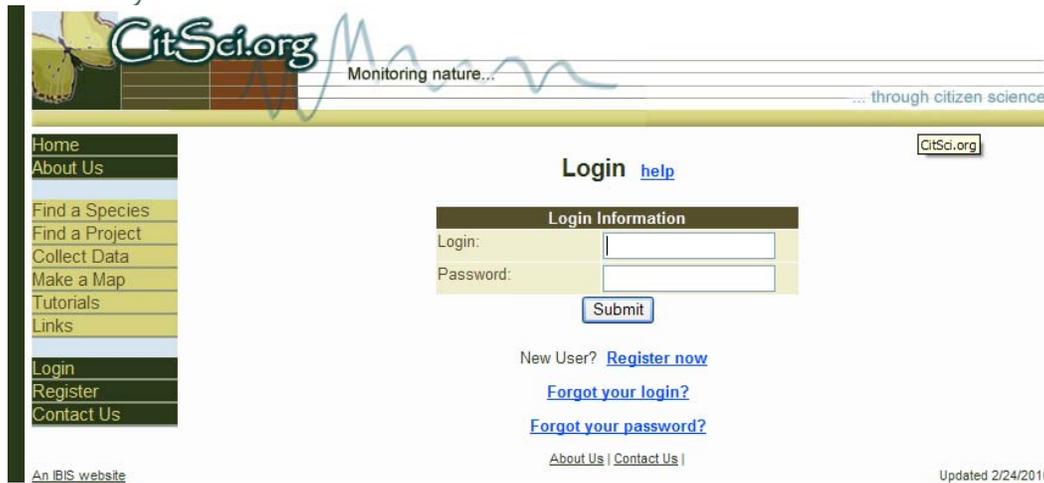
1. Set up an account for yourself or for you and your classroom.

Go to:

<http://citsci.org/>



Click on "Login"  
Click on  
"Register Now"



CitSci.org  
Monitoring nature... through citizen science

Home  
About Us  
Find a Species  
Find a Project  
Collect Data  
Make a Map  
Tutorials  
Links  
Login  
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Login help

Login Information

Login:   
Password:

Submit

New User? [Register now](#)  
[Forgot your login?](#)  
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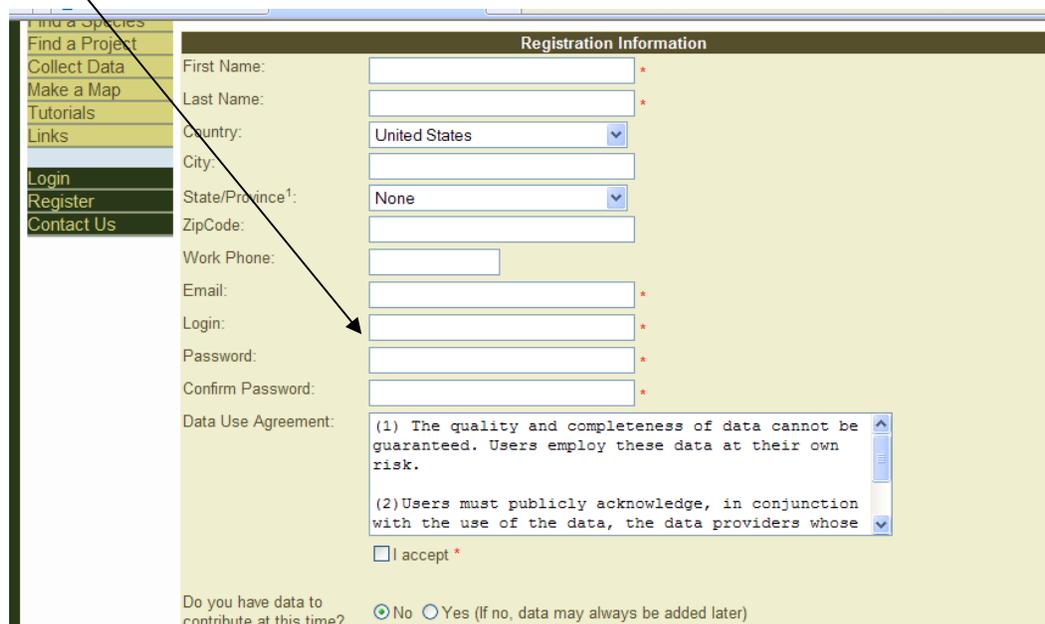
An IBIS website Updated 2/24/2010

## To Login

Using only numbers and letters, **create a username and password** (6 to 20 characters) for your class.

Type in the Username where it says “Login”.

**Fill in the form with the rest of the information, and click “submit”.**



Registration Information

First Name:  \*  
Last Name:  \*  
Country:  \*  
City:   
State/Province¹:  \*  
ZipCode:   
Work Phone:   
Email:  \*  
Login:  \*  
Password:  \*  
Confirm Password:  \*

Data Use Agreement: (1) The quality and completeness of data cannot be guaranteed. Users employ these data at their own risk.  
(2) Users must publicly acknowledge, in conjunction with the use of the data, the data providers whose

I accept \*

Do you have data to contribute at this time?  No  Yes (If no, data may always be added later)

## Details on Website Registration

How to register:

1. Enter contact information and specify a Login and Password
  - o Login and Password should contain no special characters (only letters and numbers)
  - o Passwords should be 6 to 20 characters long
2. Make sure you fill in all required fields
3. Agree to the 'Data Use Agreement' which is a document specifying how data you view on the website may be used
4. Got Data: Let us know if you have data you could share with the website
5. Click 'Submit'
6. You should immediately receive an email asking you to validate your registration.
7. Click on the provided link in the email to validate your email address, and you will be successfully registered!

Next Steps:



Finding our project:

You can either click on:

“Find a Project”

And then click on “M” to pull up a list. Click on [“MA-NH-ME Wetland Worries & Roadside Invasives”](#)

**Do you have some invasive species data points to add?**

**Entering Data Points:** Things you should know:

We need to **enter the data in decimal degrees**. When collecting data with a GPS, set the GPS to decimal degrees. To do this get to the screen where you can click on “setup” then click on “units” and toggle until you see “ddd.dddd<sup>o</sup>” and click on that.

Accuracy: When entering data from a GPS Unit, or marking a point on the map, we also need to enter **accuracy**. (When mapping invasives by GPS, write down how accurate each reading is. After you acquire enough satellites, Before you mark a point, your screen will read “ready to navigate, Accuracy \_\_\_\_\_ ft. Record the number shown. It must be less than 50 meters.) **Our rule of thumb for accuracy of mapping is 5 meters.**

If you have more than one species, click on “Roadside Invasive Mapping Form.” If you mapped one species, click on the form for the appropriate species.

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## MA-NH-ME Wetland Worries & Roadside Invasives

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Project Profile

**Name:** MA-NH-ME Wetland Worries & Roadside Invasives

**Project Manager:** Elizabeth Duff [Email Elizabeth](#)

**Number of Surveys:** 18

**Start Date:** March 29th, 2010

**End Date:** March 29th, 2015

**Description:** This project is focussed on mapping invasive species found in or adjacent to wetlands and are often transported roadsides in Massachusetts, New Hampshire and Maine. Species of major concern are Phragmites (*Phragmites australis*), Perennial Pepperweed (*Lepidium latifolium*), Purple Loosestrife (*Lythrum salicaria*) and Japanese Knotweed (*Polygonum cuspidatum*).

**Purpose:** We hope to reduce the spread of invasive species. Mapping roadside invasives will help us do this.

Study Extent: Multi-state/multi-province  
Project status: In progress  
Sample design(s): Opportunistic  
Quality assurance/control procedure(s): Data collection training, no data review  
Detailed sampling design description:  
Quality assurance/control description: Teachers will be trained to recognize the species their classrooms will be identifying. Other citizen volunteers will receive training.

[Edit Project Profile](#) | [Manage Project Members](#)

Untitled



Statistics

View Map

Sightings

Treatments

Data Entry Forms

Roadside Invasive Mapping Form	<a href="#">Enter Data</a>   <a href="#">Print</a>   <a href="#">Edit</a>
Perennial Pepperweed Mapping Form	<a href="#">Enter Data</a>   <a href="#">Print</a>   <a href="#">Edit</a>
Japanese Knotweed ( <i>Polygonum cuspidatum</i> ) Mapping Form	<a href="#">Enter Data</a>   <a href="#">Print</a>   <a href="#">Edit</a>
Phragmites ( <i>Phragmites australis</i> ) Mapping Form	<a href="#">Enter Data</a>   <a href="#">Print</a>   <a href="#">Edit</a>
Purple Loosestrife ( <i>Lythrum salicaria</i> ) Mapping Form	<a href="#">Enter Data</a>   <a href="#">Print</a>   <a href="#">Edit</a>
Mile a Minute Vine	<a href="#">Enter Data</a>   <a href="#">Print</a>   <a href="#">Edit</a>

[Manage Data Entry Forms](#)



Welcome Elizabeth | [Logout](#) | [My Profile](#) | May 8th 2010



Monitoring nature... 

... through citizen science

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## Perennial Pepperweed Mapping Form

[To Form List](#) | [To Project Information](#)

Enter roadside perennial pepperweed locations here.

**Date of the observation**

Date:

Recorder:

Authority:

Comments:

**Location Information**

Name:  Required

Datum:  Required

Longitude <sup>1</sup>:  Required

Latitude <sup>2</sup>:  Required

Accuracy <sup>3</sup> (meters):  Required

<sup>1</sup> X coordinate; data must be in decimal degrees and should contain at least 5 decimal places. (Example: -72.99999)  
<sup>2</sup> Y coordinate; data must be in decimal degrees and should contain at least 5 decimal places. (Example: 41.99999)  
<sup>3</sup> Approximate uncertainty of your GPS unit in meters. We only accept data below 50 meters in accuracy

**Site Characteristics**

**Organism Information**

Perennial Pepperweed (*Lepidium latifolium*) 0

Presence:

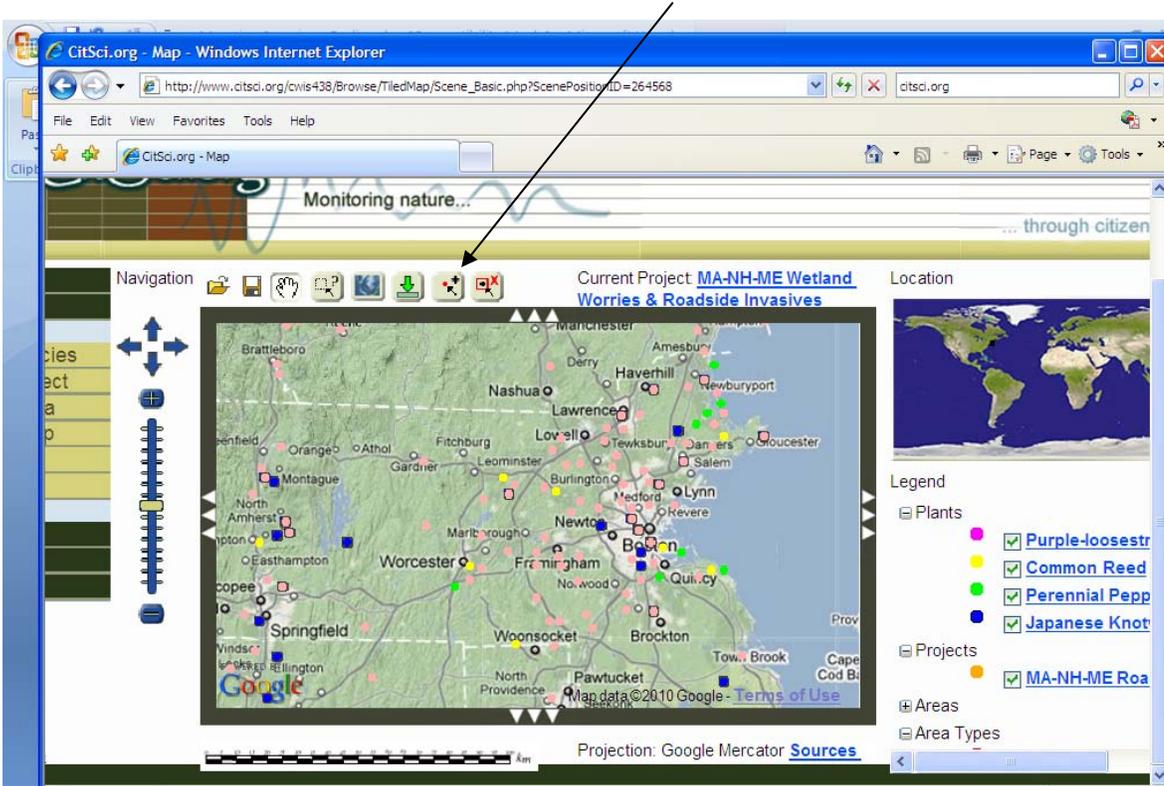
Percent Cover:  %

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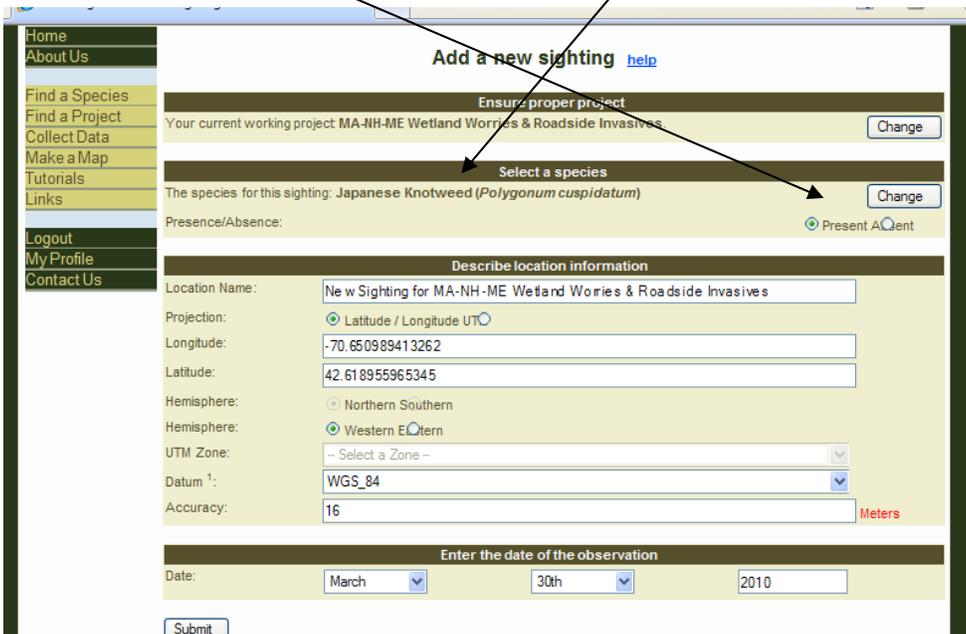
To enter data you recorded on a data sheet, copy the data from your data sheets into the mapping form, and then submit.

**To add points directly to the map:**

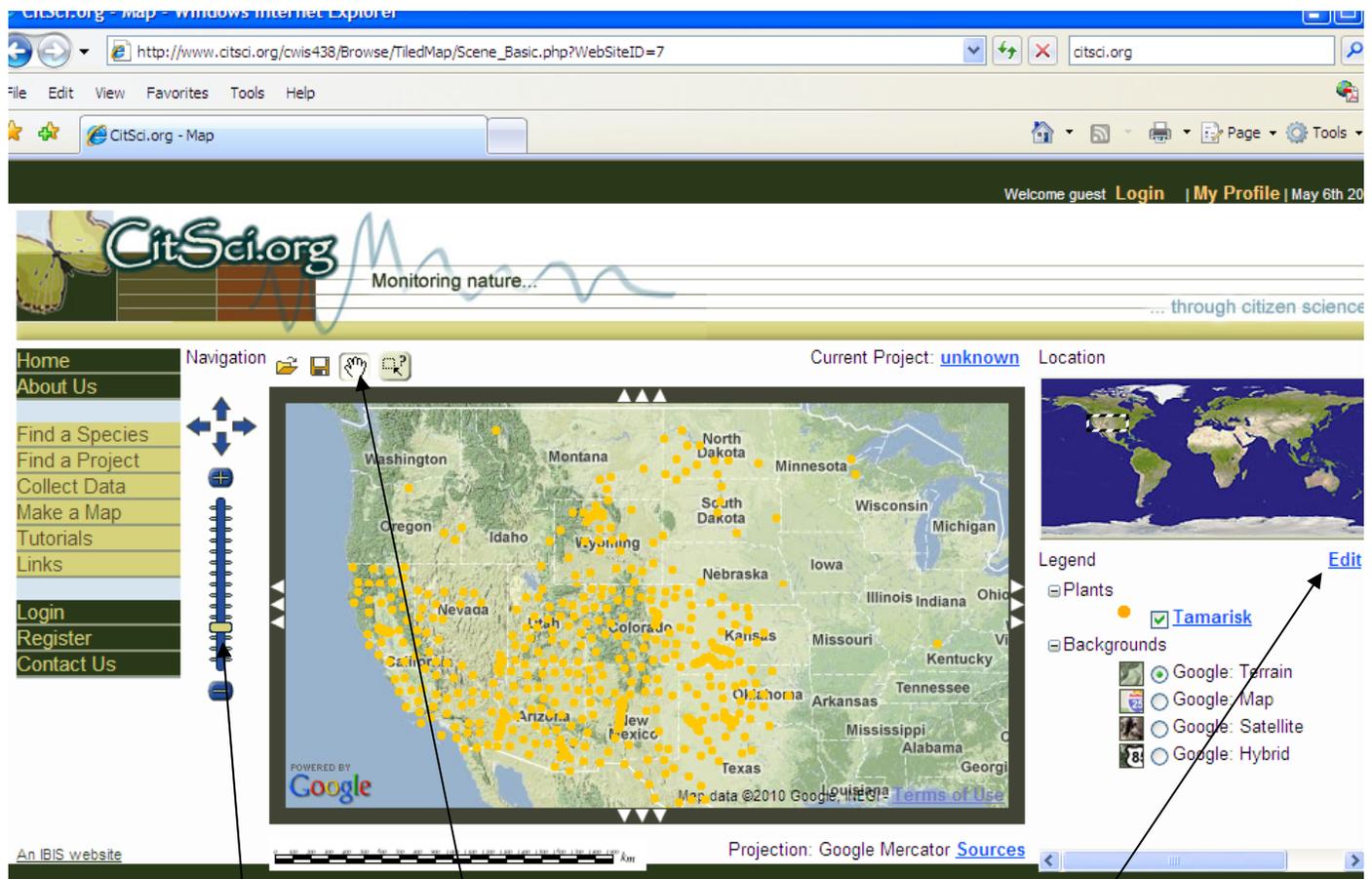
You can zoom into the CitSci map and enter a point. Click on the "Add Point" button below.



Make sure you are adding information for the correct species. If a different species than what you are entering is showing, change it. Hit the submit button. CHECK THE MAP. Make sure the point shows up where it ought to. If it shows up in the wrong place, delete it! It is important that we do this accurately. No data is better than wrong data.



Thanks for taking the time to map invasives with us!



### Making a Map:

When you click on “Make a Map”

As of March 2010: You will initially end up with an image like the one below: Western USA, with the invasive “Tamarisk” mapped.

To map our species of concern, do the following:

1. Click on the hand tool and then on the map, and drag over until you are over MA, NH, and ME.
2. Using the navigation bar, slide the slider up to zoom in on the screen so you are closer to our region.
3. To get rid of “Tamarisk” and add our species, click on “Edit”

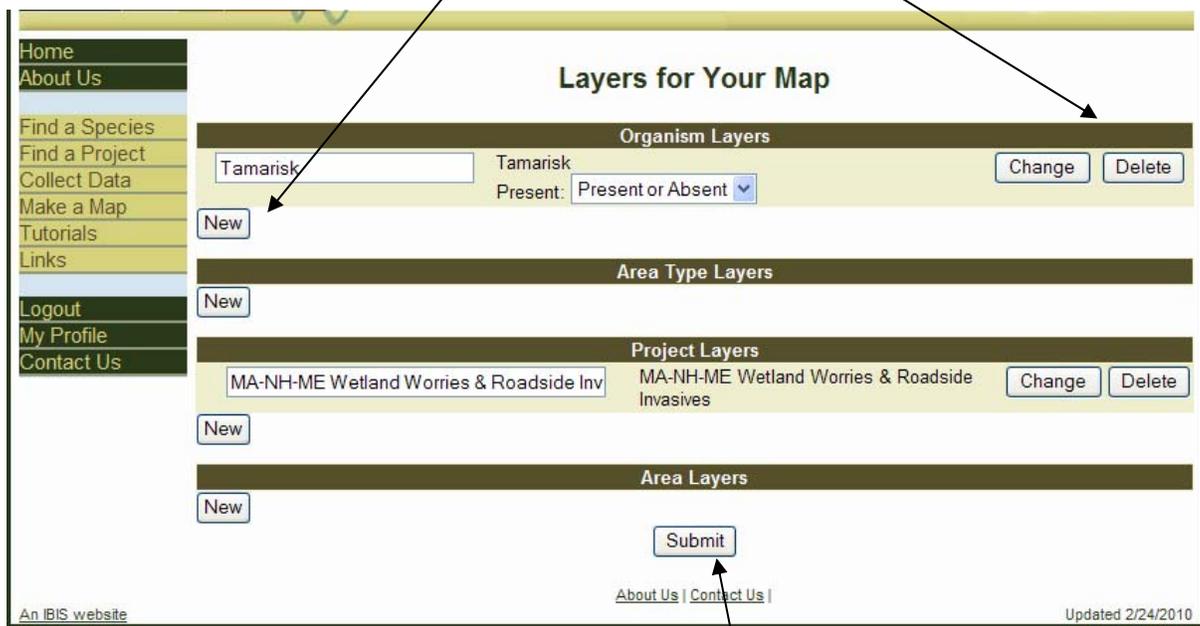
If you have not yet logged on, it may ask you to do so at this point.

If you don’t have a login and password yet, feel free to use

Login: “Mapper2008”

Password: ParkerRiver

4. Click on "Delete" to get rid of Tamarisk.
5. Click on "New" to add new species.
6. Add species of interest to you and your classroom. Click on the letter of the first word of the common name. Scroll down to find your species and click on the name. If you are not sure of the common name you can type the scientific name in the "Search" box.



Suggestion: Make a map including the four main species on which the **"MA-NH-ME Wetland Worries & Roadside Invasives" project is focused:**

Perennial Pepperweed (*Lepidium latifolium*)  
 Japanese Knotweed (*Polygonum cuspidatum*)  
 Purple loosestrife (*Lythrum salicaria*)  
 Phragmites or Common Reed (*Phragmites australis*)

As of March, 2010, the species on line are listed by their common name. You will find them by clicking the letter they begin with. Phragmites is found listed under "C" as Common Reed on this website.

7. Once you have added all the species, click on "Submit"

CitSci.org - Saved Map List

### Layers for Your Map

Organism Layers			
Common Reed	Common Reed	Present: Present	Change Delete
Perennial Pepperweed	Perennial Pepperweed	Present: Present	Change Delete
Purple-loosestrife	Purple-loosestrife	Present: Present	Change Delete
Japanese Knotweed	Japanese Knotweed	Present: Present	Change Delete

New

Area Type Layers

File Edit View Favorites Tools Help

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CitSci.org - Invasive Species Mapper

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Navigation

Current Project: [MA-NH-ME Wetland Worries & Roadside Invasives](#) Location



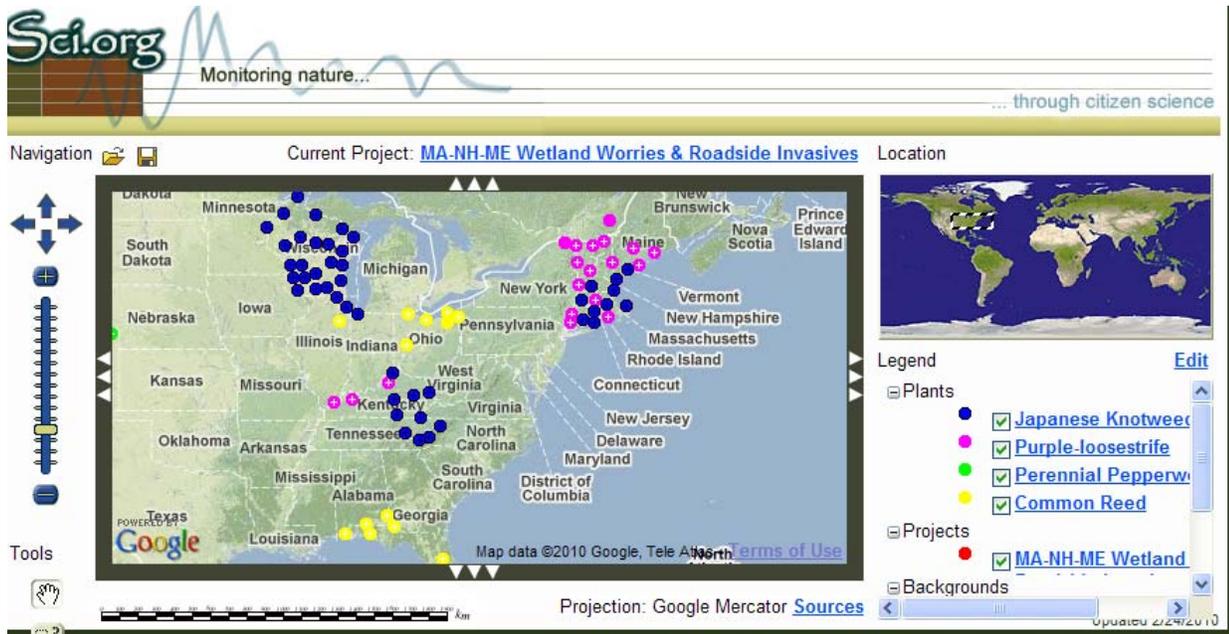
Legend

- Plants
  - Japanese Knotweed
  - Purple-loosestrife
  - Perennial Pepperweed
  - Common Reed
- Projects
  - MA-NH-ME Wetland
- Backgrounds

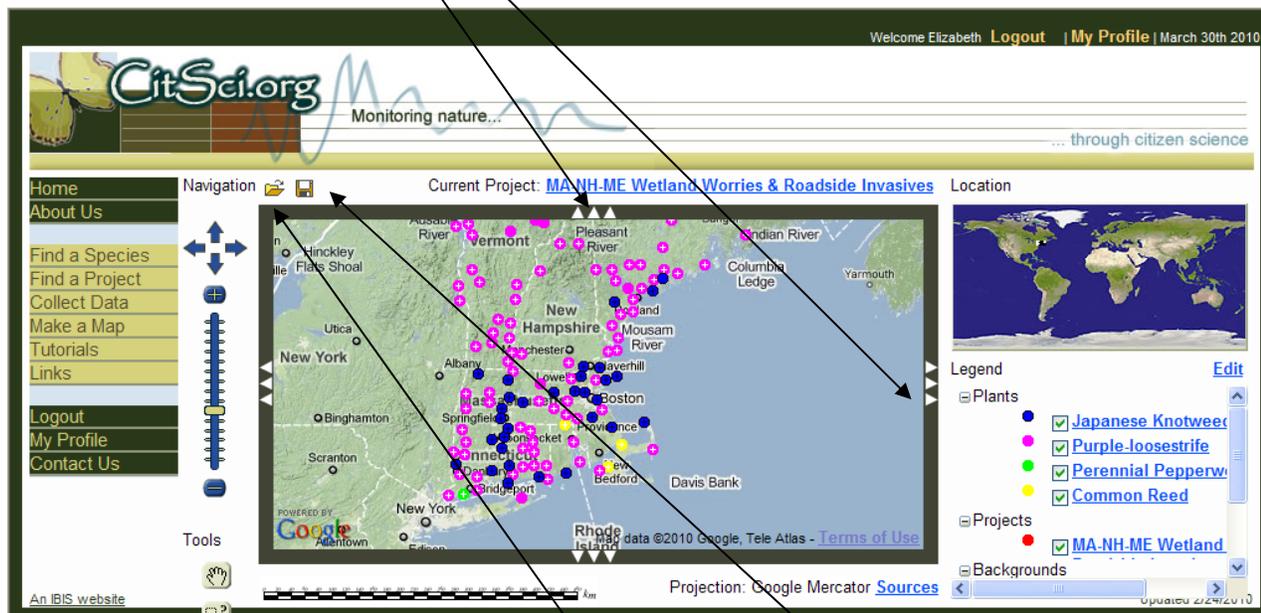
Projection: Google Mercator [Sources](#)

- You will probably want to edit your map to improve the key. For example: Change the "Purple Loosestrife" color code to a color closer to purple (fuschia). Change the Common Reed color code to yellow. Change perennial pepperweed to green. Make these changes by double clicking on the circle in the key. The spots on the map with + signs inside are points represent multiple points. They will show more points if you zoom in on them.

Edited Map Zoomed out:



Edited map with color changes, zoomed in closer. You can navigate with the triangles by clicking on them.



Here's a really important step. SAVE YOUR MAP!!!

- SAVE YOUR MAP! Preserve all your work, by clicking on the disk icon. Give your map a name and click on Submit.
- To retrieve your map in the future, click on the file icon and click on the map you want to retrieve.