



**Controlling Invasive Plants:
Developing Strategies for Community Success**



Douglas Johnson
David Bloniarz
Clayton Edwards



www.unri.org

Invasive Plants in Massachusetts

Species Reviewed (Phases I and II): Listed by Category

Species	Common name	Category
<i>Acer platanoides</i>	Norway maple	Invasive
<i>Acer pseudoplatanus</i>	Sycamore maple	Invasive
<i>Aegopodium podagraria</i>	Bishop's goutweed, bishop's weed, goutweed	Invasive
<i>Ailanthus altissima</i>	Tree of heaven	Invasive
<i>Alliaria petiolata</i>	Garlic mustard	Invasive
<i>Berberis thunbergii</i>	Japanese barberry	Invasive
<i>Cabomba caroliniana</i>	Carolina fanwort; fanwort	Invasive
<i>Celastrus orbiculatus</i>	Oriental bittersweet; Asian or Asiatic bittersweet	Invasive
<i>Cynanchum louiseae</i>	Black swallow-wort; Louise's swallow-wort	Invasive
<i>Elaeagnus umbellata</i>	Autumn olive	Invasive
<i>Euonymus alatus</i>	Winged euonymus, burning bush	Invasive
<i>Euphorbia esula</i>	Leafy spurge; wolf's milk	Invasive
<i>Frangula alnus</i>	European buckthorn, glossy buckthorn	Invasive
<i>Glaucium flavum</i>	Sea or horned poppy, yellow hornpoppy	Invasive
<i>Hesperis matronalis</i>	Dame's rocket	Invasive
<i>Iris pseudacorus</i>	Yellow iris	Invasive
<i>Lepidium latifolium</i>	Broad-leaved pepperweed, tall pepperweed	Invasive
<i>Lonicera japonica</i>	Japanese honeysuckle	Invasive
<i>Lonicera morrowii</i>	Morrow's honeysuckle	Invasive
<i>Lonicera x bella</i> [morrowii x tatarica]	Bell's honeysuckle	Invasive
<i>Lysimachia nummularia</i>	Creeping jenny, moneywort	Invasive
<i>Lythrum salicaria</i>	Purple loosestrife	Invasive
<i>Myriophyllum heterophyllum</i>	Variable water-milfoil; two-leaved water-milfoil	Invasive
<i>Myriophyllum spicatum</i>	Eurasian or European water-milfoil; spike water-milfoil	Invasive
<i>Phalaris arundinacea</i>	Reed canary-grass	Invasive
<i>Phragmites australis</i>	Common reed	Invasive
<i>Polygonum cuspidatum</i>	Japanese knotweed; Japanese or Mexican bamboo	Invasive
<i>Potamogeton crispus</i>	Crisped pondweed, curly pondweed	Invasive
<i>Ranunculus ficaria</i>	Lesser celandine; fig buttercup	Invasive
<i>Rhamnus cathartica</i>	Common buckthorn	Invasive
<i>Robinia pseudoacacia</i>	Black locust	Invasive
<i>Rosa multiflora</i>	Multiflora rose	Invasive
<i>Trapa natans</i>	Water-chestnut	Invasive
<i>Anemopsis brevipedunculata</i>	Porcelain-berry; Amur peppervine	Likely invasive
<i>Anthriscus sylvestris</i>	Wild chervil	Likely invasive
<i>Berberis vulgaris</i>	Common barberry; European barberry	Likely Invasive
<i>Cardamine impatiens</i>	Bushy rock-cress; narrowleaf bittercress	Likely Invasive
<i>Centaurea biebersteinii</i>	Spotted knapweed	Likely Invasive
<i>Cynanchum rossicum</i>	European swallow-wort, pale swallow-wort	Likely Invasive
<i>Egeria densa</i>	Brazilian water weed; Brazilian elodea	Likely Invasive
<i>Epiobium hirsutum</i>	Hairy willow herb; Codlins and cream	Likely Invasive

Final Report: "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts"
Massachusetts Invasive Plant Advisory Group, February 28, 2005

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<i>Euphorbia cyparissias</i>	Cypress spurge	Likely Invasive
<i>Festuca filiformis</i>	Hair fescue; fineleaf sheep fescue	Likely Invasive
<i>Glyceria maxima</i>	Tall mannagrass; reed mannagrass	Likely Invasive
<i>Heracleum mantegazzianum</i>	Giant hogweed	Likely Invasive
<i>Humulus japonicus</i>	Japanese hops	Likely Invasive
<i>Hydrilla verticillata</i>	Hydrilla; water-thyme; Florida elodea	Likely Invasive
<i>Ligustrum obtusifolium</i>	Border privet	Likely Invasive
<i>Lonicera tatarica</i>	Tatarian honeysuckle	Likely Invasive
<i>Microstegium vimineum</i>	Japanese stilt grass, Nepalese browntop	Likely Invasive
<i>Miscanthus sacchariflorus</i>	Plume grass; Amur silvergrass	Likely Invasive
<i>Myosotis scorpioides</i>	Forget-me-not	Likely Invasive
<i>Myriophyllum aquaticum</i>	Parrot-feather; water-feather; Brazilian water-milfoil	Likely Invasive
<i>Najas minor</i>	Brittle water-nymph, lesser naiad	Likely Invasive
<i>Nymphaoides peltata</i>	Yellow floating heart	Likely Invasive
<i>Phellodendron amurense</i>	Amur cork-tree	Likely Invasive
<i>Pueraria montana</i>	Kudzu; Japanese arrowroot	Likely Invasive
<i>Ranunculus repens</i>	Creeping buttercup	Likely Invasive
<i>Rorippa amphibia</i>	Water yellowcress; great yellowcress	Likely Invasive
<i>Rubus phoenicolasius</i>	Wineberry; Japanese wineberry; wine raspberry	Likely Invasive
<i>Senecio jacobaea</i>	Tansy ragwort; stinking Willie	Likely Invasive
<i>Tussilago farfara</i>	Coltsfoot	Likely Invasive
<i>Arthraxon hispidus</i>	Hairy joint grass; jointhead; small carpetgrass	Potentially Invasive
<i>Carex kobomugi</i>	Japanese sedge, Asiatic sand sedge	Potentially Invasive
<i>Lonicera maackii</i>	Amur honeysuckle	Potentially Invasive
<i>Polygonum perfoliatum</i>	Mile-a-minute vine or weed; Asiatic tearthumb	Potentially Invasive
<i>Actinidia arguta</i>	Hardy kiwi; tara vine	Do not list at this time
<i>Akebia quinata</i>	Five-leaved Akebia; chocolate vine	Do not list at this time
<i>Catalpa speciosa</i>	Northern catalpa	Do not list at this time
<i>Cytisus scoparius</i>	Scotch broom; English broom	Do not list at this time
<i>Elaeagnus angustifolia</i>	Russian olive	Do not list at this time
<i>Festuca ovina</i>	Sheep fescue	Do not list at this time
<i>Ligustrum ovalifolium</i>	California privet	Do not list at this time
<i>Ligustrum sinense</i>	Chinese privet	Do not list at this time
<i>Ligustrum vulgare L.</i>	European privet	Do not list at this time
<i>Lonicera xylosteum</i>	Dwarf honeysuckle	Do not list at this time
<i>Miscanthus sinensis</i>	Eulalia; Chinese silvergrass	Do not list at this time
<i>Morus alba</i>	White mulberry	Do not list at this time
<i>Polygonum sachalinense</i>	Giant knotweed	Do not list at this time
<i>Populus alba</i>	White poplar	Do not list at this time
<i>Rorippa nasturphylla</i>	Watercress; onerow yellowcress	Do not list at this time
<i>Rorippa nasturtium-aquaticum</i>	Watercress	Do not list at this time
<i>Rosa rugosa</i>	Japanese rose; rugosa rose	Do not list at this time
<i>Sedum telephium ssp. telephium</i>	Live-forever; orpine; witch's moneybags	Do not list at this time
<i>Verbascum thapsus</i>	Common mullein; flannel mullein; velvet plant	Do not list at this time

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Prohibited Plant List - MA

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS



Department of Agricultural Resources
251 Causeway Street, Suite 500, Boston, MA 02114
617-626-1700 fax: 617-626-1850 www.mass.gov/agr

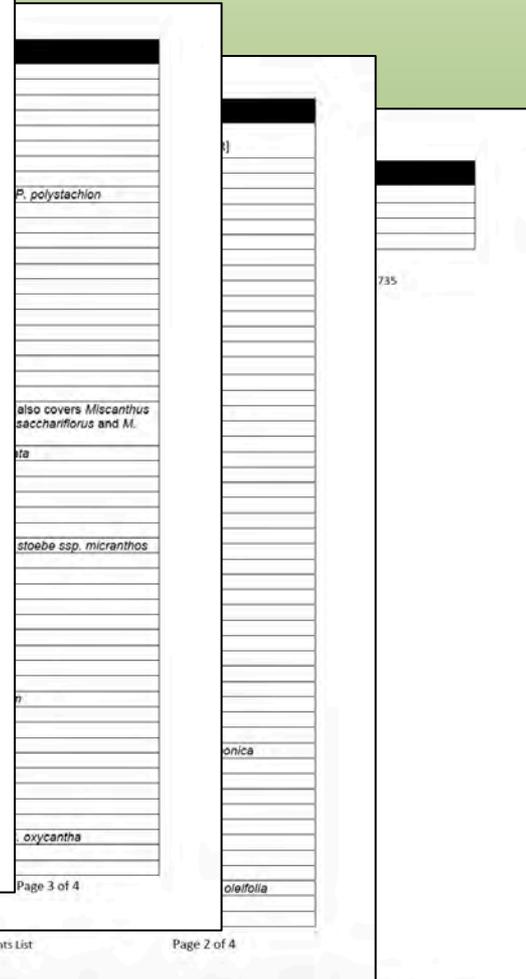


The Massachusetts Prohibited Plant List

Following is a list of plants for which importation and propagation is currently prohibited within the state of Massachusetts.

The original list of prohibited plants went into effect January 1, 2006. Certain species were subject to a phase-out period that expired on January 1, 2009. Three new species were added in February 2017. As of this date, the sale, trade, purchase, distribution and related activities for the species below, including all cultivars, varieties and hybrids, are not allowed:

Common Name	Scientific Name
aeginetia	<i>Aeginetia</i> spp.
African boxthorn	<i>Lycium ferrocissimum</i>
African couch grass	<i>Digitaria abyssinica</i> ; <i>D. scalarum</i>
African feathergrass	<i>Pennisetum macrourum</i>
alectra	<i>Alectra</i> spp.
alfombrilla	<i>Drymaria arenarioides</i>
ambulia	<i>Limnophila sessiliflora</i>
Amur cork-tree	<i>Phellodendron amurense</i>
Amur honeysuckle	<i>Lonicera maackii</i>
anchored water hyacinth	<i>Eichhornia azurea</i>
animalled oat	<i>Avena sterilis</i>
Andean screwbean	<i>Prosopis strombulifera</i>
arrowhead	<i>Sagittaria sagittifolia</i>
Asian sprangletop	<i>Leptochloa chinensis</i>
autumn olive	<i>Elaeagnus umbellata</i>
Bell's honeysuckle	<i>Lonicera x bella</i> (<i>L. morrowii</i> x <i>L. tatarica</i>)
Benghal dayflower	<i>Commelina benghalensis</i>
Bishop's weed, goutweed	<i>Aegopodium podagraria</i>
black locust	<i>Robinia pseudoacacia</i>
black swallow-wort, Louise's swallow-wort	<i>Cynanchum louiseae</i>
border privet	<i>Ligustrum obtusifolium</i>
borreria	<i>Spermacoce alata</i>
Brazilian satinail	<i>Imperata brasiliensis</i>
anacharis, Brazilian waterweed, Brazilian elodea	<i>Egeria densa</i> ; <i>Elodea densa</i> ; <i>Anacharis densa</i>
brittle water-nymph, lesser naiad	<i>Najas minor</i>
broad-leaved pepperweed, tall pepperweed	<i>Lepidium latifolium</i>
broomrape	<i>Orobanche</i> spp.
brownbeard rice, red rice	<i>Oryza rufipogon</i>
burning bush, winged euonymus	<i>Euonymus alatus</i>
bushy rock-cress, narrowleaf bittercress	<i>Cardamine impatiens</i>
Cape tulip	<i>Homena</i> spp.; <i>Morea</i> spp.
Carolina Fanwort, fanwort	<i>Cabomba caroliniana</i>
catclaw mimosa	<i>Mimosa pigra</i>
cattail grass, yellow foxtail	<i>Setaria pallidifusca</i> ; <i>S. pumila</i>
caulerpa	<i>Caulerpa taxifolia</i>



Prohibited Plant List - MA

Common Name	Scientific Name
Chinese waterspinach [PERMIT REQUIRED – contact MDAR]	<i>Ipomoea aquatica</i> [PERMIT REQUIRED – contact MDAR]
coat buttons	<i>Tridax procumbens</i>
coltsfoot	<i>Tussilago farfara</i>
common barberry; European barberry	<i>Berberis vulgaris</i>
common buckthorn	<i>Rhamnus cathartica</i>
common crupina	<i>Crupina vulgaris</i>
common reed	<i>Phragmites australis</i>
creeping buttercup	<i>Ranunculus repens</i>
creeping Jenny; moneywort	<i>Lysimachia nummularia</i>
crisped pondweed; curly pondweed	<i>Potamogeton crispus</i>
crofton weed	<i>Ageratina adenophora</i>
Cypress spurge	<i>Euphorbia cyparissias</i>
Dames Rocket	<i>Hesperis matronalis</i>
devil's thorn	<i>Emex spinosa</i>
dodder	<i>Cuscuta spp.</i>
duck-lettuce	<i>Ottelia alismoides</i>
Eurasian or European water-milfoil; Spike water-milfoil	<i>Myriophyllum spicatum</i>
European buckthorn; glossy buckthorn	<i>Frangula alnus; Rhamnus frangula</i>
exotic bur-reed	<i>Sparganium erectum</i>
flowering rush	<i>Butomus umbellatus</i>
forget-me-not	<i>Myosotis scorpioides</i>
garlic mustard	<i>Alliaria petiolata</i>
giant false sensitive plant; false sensitive plant	<i>Mimosa diplotricha; M. invisa</i>
giant hogweed	<i>Heracleum mantegazzianum</i>
giant salvinia; eared watermoss	<i>Salvinia auriculata</i>
giant salvinia; kariba-weed	<i>Salvinia molesta</i>
giant salvinia	<i>Salvinia biloba</i>
giant salvinia	<i>Salvinia herzogii</i>
goatsrue	<i>Galega officinalis</i>
gray willow; rusty willow	<i>Salix cinerea</i>
hair fescue; fineleaf sheep fescue	<i>Festuca filiformis</i>
hairy joint grass; jointhead; small carpetgrass	<i>Arthraxon hispidus</i>
hairy willow-herb; Codlins and Cream	<i>Epilobium hirsutum</i>
horned poppy; sea poppy; yellow hornpoppy	<i>Glaucium flavum</i>
hydrilla; water-thyme; Florida elodea	<i>Hydrilla verticillata</i>
Itchgrass	<i>Rottboellia cochinchinensis</i>
Japanese Barberry	<i>Berberis thunbergii</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese hops	<i>Humulus japonicus</i>
Japanese knotweed	<i>Polygonum cuspidatum; Fallopija japonica</i>
Japanese sedge; Asian sand sedge	<i>Carex Kobomugi</i>
Japanese stiltgrass; Nepalese browntop	<i>Microstegium vimineum</i>
jointed prickly pear	<i>Opuntia aurantiaca</i>
klawe	<i>Prosopis pallida</i>
kikuyugrass	<i>Pennisetum clandestinum</i>
Kodo-millet	<i>Paspalum scrobiculatum</i>
kudzu; Japanese arrowroot	<i>Pueraria montana</i>
Kyasuma grass	<i>Pennisetum pedicellatum</i>
large gray willow	<i>Salix atrocinerea; Salix cinerea ssp. oleifolia</i>
leafy Spurge; Wolf's Milk	<i>Euphorbia esula</i>
lesser celandine; fig buttercup	<i>Ranunculus ficaria</i>

Japanese Knotweed



Japanese Knotweed

- Fallopia japonica
- Polygonum cuspidatum
- Japanese knotweed
- Fleecflower
- Mexican bamboo
- Huzhang



Aggressive Invasive



New York City
NYC Parks Department



CT River Walkway/Bikeway



CT River Walkway/Bikeway

Spreads along riparian ways



Mill River, Willamsburg, MA
Baystate Forestry

Japanese Knotweed

Daily Mail

“Couple say they have endured ‘five years of hell’ after getting ‘imprisoned’ in their council house by hyper-aggressive Japanese knotweed infestation”

The New York Times

*“Though sometimes found on the menus of very tony restaurants, *Polygonum cuspidatum* is less like a rarefied salad green than a ticking time bomb.”*

 **National
Park Service**

“If the plant kingdom could anoint an overlord super-villain, you’d be hard-pressed to find a more suitable candidate than Japanese knotweed.”



THE SUNDAY TIMES



**THE
PLANT
THAT
ATE
BRITAIN**

THE SUNDAY TIMES *magazine* JULY 13 2014

**MATT RUDD ON THE UNSTOPPABLE
RISE OF JAPANESE KNOTWEED**

bon appétit



USDA Plants Database

Polygonum cuspidatum Siebold & Zucc.
Japanese knotweed

Show All



General Information

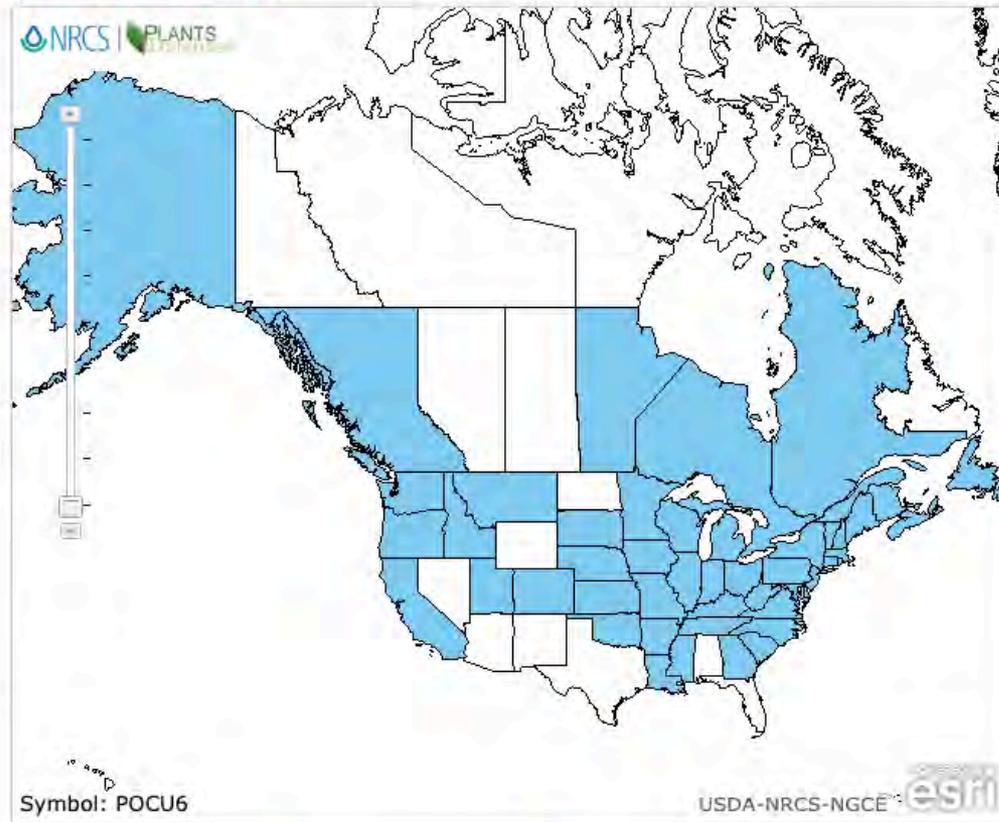
Symbol:	POCU6
Group:	Dicot
Family:	Polygonaceae
Duration:	Perennial
Growth Habit:	Forb/herb Subshrub
Native Status:	AK I CAN I L48 I SPM I

Data Source and Documentation

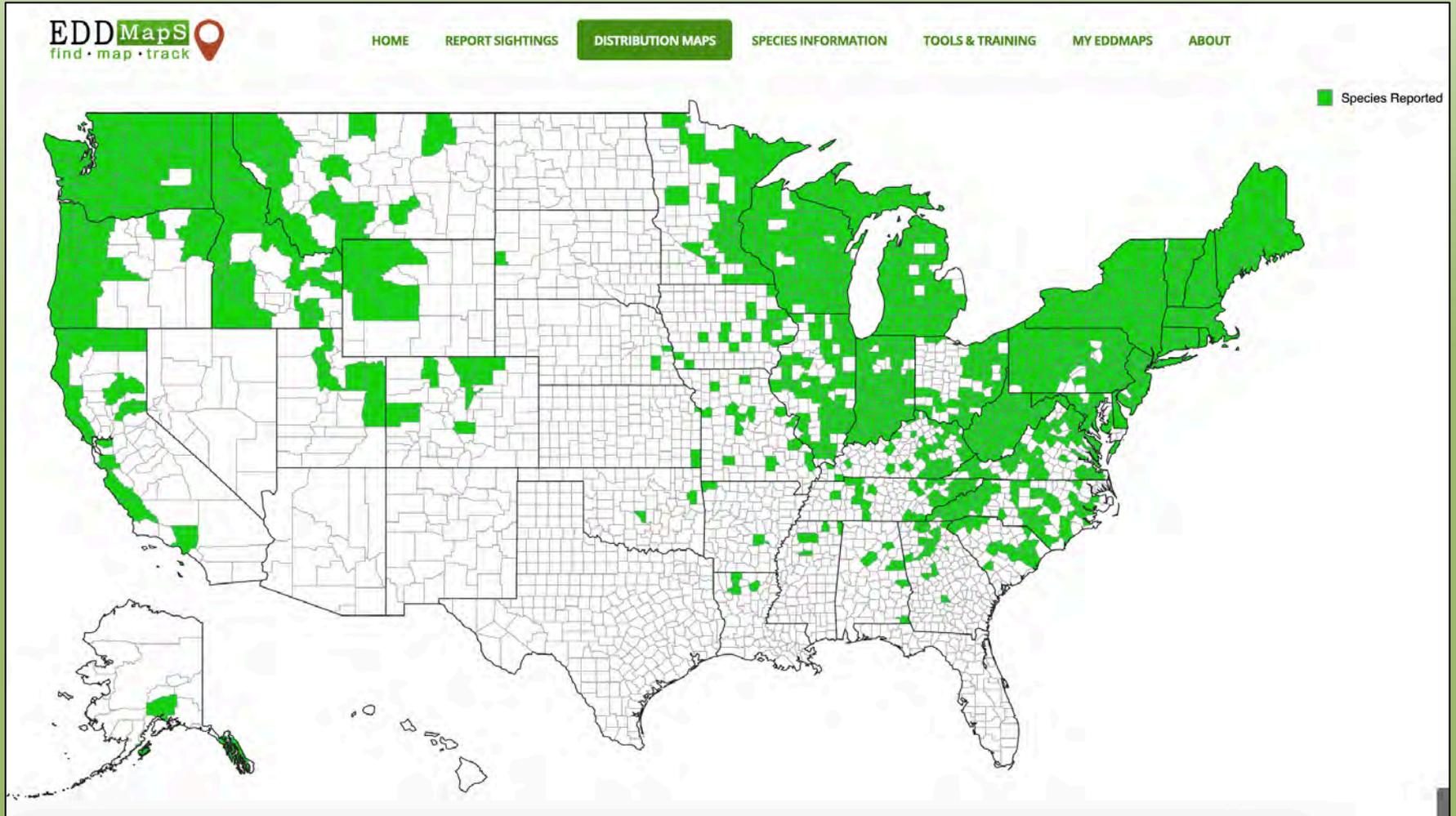


United States
Department of
Agriculture

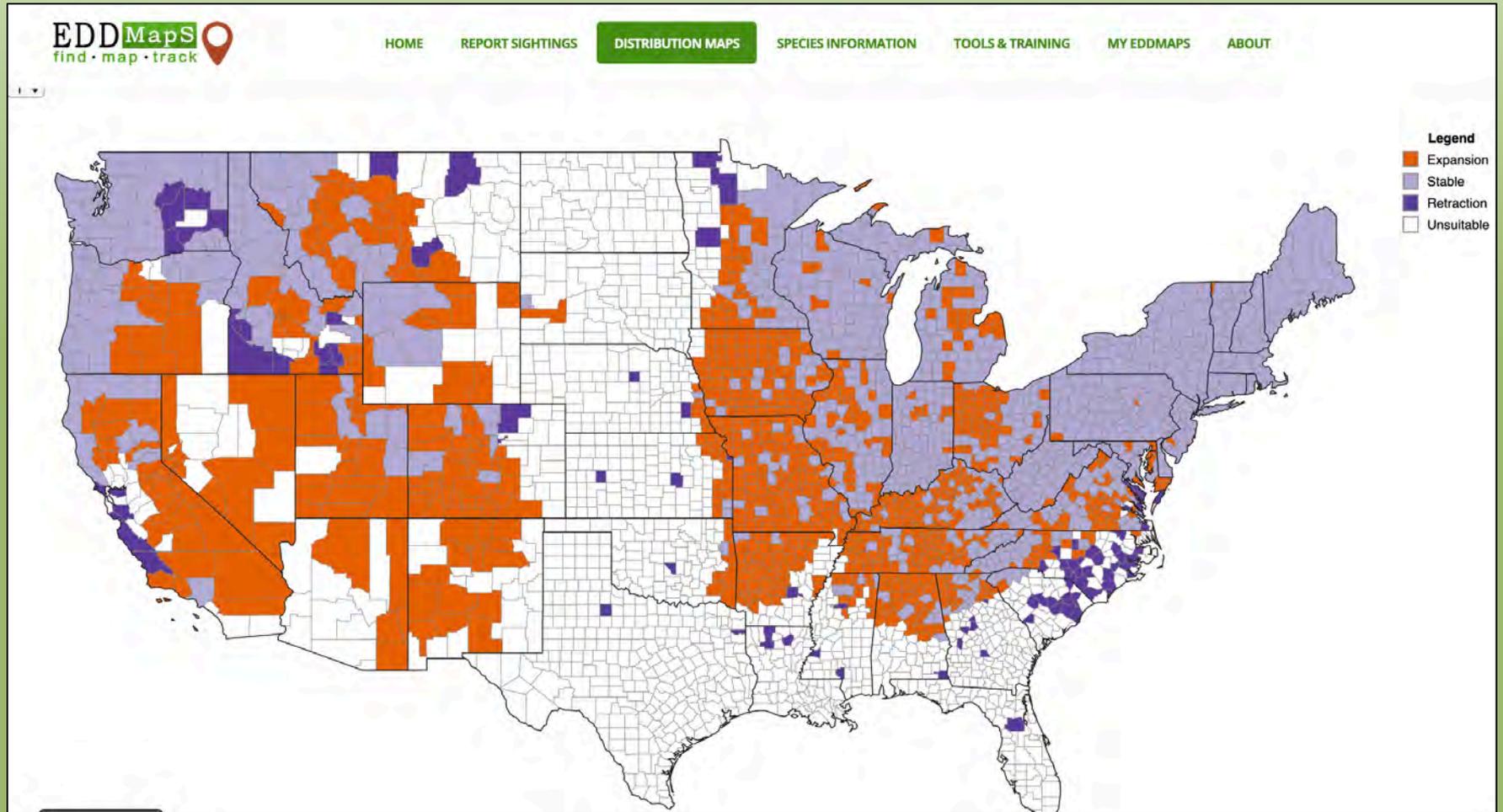
About our new maps



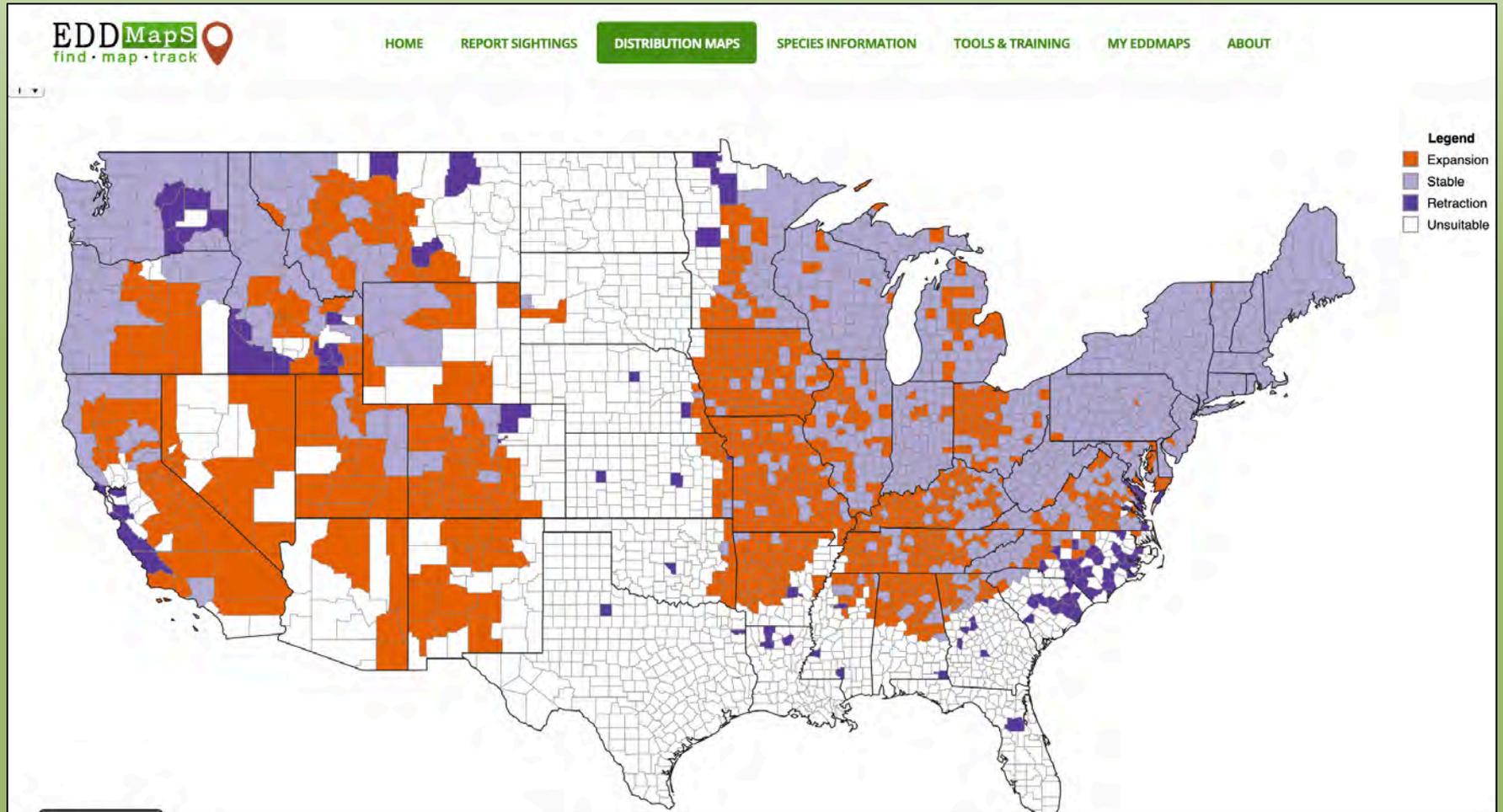
EddMAPS – Report & Database



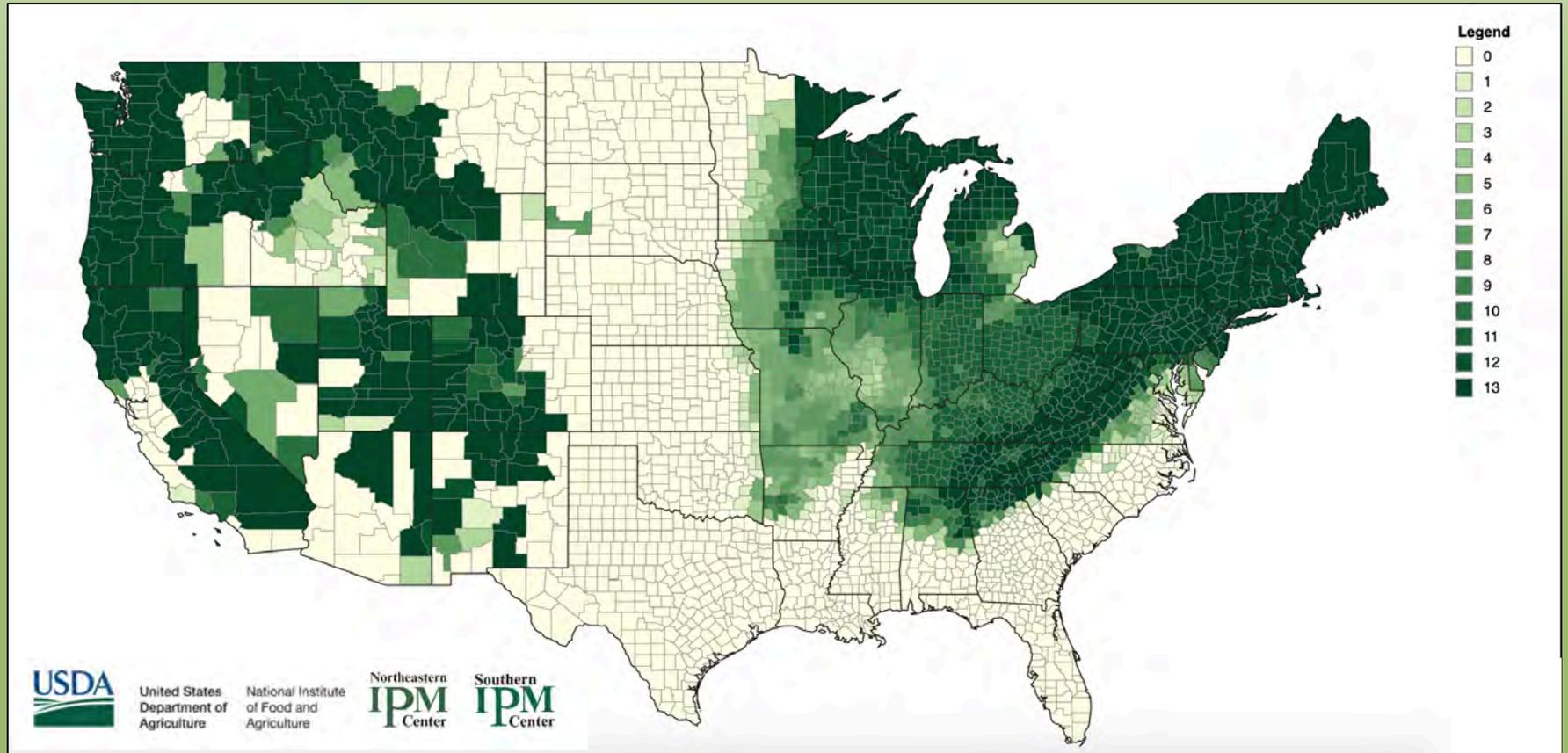
Future Projections



Future Projections



Future Projections



Future Projections

Invasive species are expected to shift their ranges to track preferred environments as climate changes. This map indicates the agreement of future climate models predicting county-level presence for the selected species by 2040 - 2060 based on currently available evidence. Higher numbers indicate higher agreement among models that the county will be suitable for the chosen species by 2040 - 2060.

This map was funded by the Northeastern IPM Center through Grant #2014-70006-22484 and supported by Southern IPM Center through Grant #2018-70006-28884 from the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management, Regional Coordination Program



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

Northeastern
IPM
Center

Southern
IPM
Center

US Stats (2019)



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STATES REPORTING OCCURANCE
OF JAPANESE KNOTWEED



2.3 Billion

ACRES OF LAND IN U.S.



5,785,208

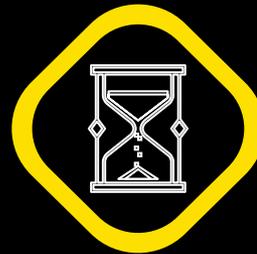
REPORTED ACRES OF
JAPANESE KNOTWEED

Projected Expansion



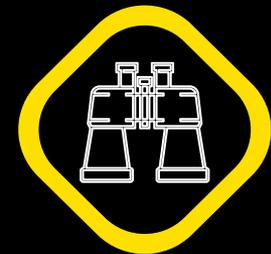
5,785,208

REPORTED ACRES OF
JAPANESE KNOTWEED
(2019)



14%

PROJECTED GROWTH BY
PERCENT (2040)



6,595,137

PROJECTED ACRES OF
JAPANESE KNOTWEED
(2040)



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

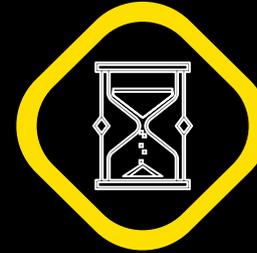


Control Estimates



\$2,600

**COST OF TREATMENT
PER ACRE
(FOLIAR SPRAY (2020))**



\$17,147,356,200

**PROJECTED COST OF
CONTROL (2020) IN U.S.**

EddMAPS – Report & Database

The screenshot displays the EDDMapS dashboard interface. At the top, a navigation bar includes links for HOME, REPORT SIGHTINGS, DISTRIBUTION MAPS, SPECIES INFORMATION, TOOLS & TRAINING, MY EDDMAPS (highlighted), and ABOUT. The user's name, David Bloniarz, is visible in the top right corner.

The main content area is titled "EDDMapS Dashboard" and features a sidebar menu on the left with options: Dashboard, Profile, Reports, Bulk Uploads, Downloads, My Species List, Projects, Alerts, Admin Tools, EDDMapS Pro Tools, and My Surveys.

The dashboard includes a filter section at the top with the following settings:
From: 03/03/2017 to 03/03/2020
State/Province: Massach...
County: All
Bulk Data: [button]
Exclu... [dropdown]

The central part of the dashboard is divided into two main sections. On the left, a map titled "Maps" shows "Maps showing recent reports" for the state of Massachusetts, with different regions highlighted in various colors (red, orange, yellow, blue). A legend and search icons are located at the bottom of the map area.

On the right, there are four summary cards with icons and data:
1. Total records: 1,709 (green icon)
2. Avg. records per day: 2 (red icon), with a note: Maximum: 51 (4/17/2017)
3. Total subjects: 207 (teal icon)
4. Total reporters: 72 (black icon)

The EDDMapS logo and tagline "Early Detection & Distribution Mapping System" are located in the bottom right corner.

Plan Ahead...

Japanese knotweed

Polygonum cuspidatum / *Faloplia japonica*

Fact Sheet

NH Department of Agriculture, Markets & Food, Division of Plant Industry, 29 Hazen Dr, Concord, NH 03301
(603) 271-3488

Common Name: Japanese knotweed

Latin Name: *Polygonum cuspidatum* / *Faloplia japonica*

New Hampshire Invasive Species Status: Prohibited (Agr 3800)

Native to: Japan



Description: Perennial reaching 10' in height and width. Bohemian Knotweed (*Polygonum x bohemicum*) is similar. **Stems:** Greenish, hollow and jointed, similar to bamboo. **Leaves:** Alternate, broadly ovate, 3-7" long. **Flowers:** Small, whitish, forming panicles, August-September. **Seeds:** Calyx, brown, triangular. **Habitat:** Found in woodland sites, open spaces, ditches, roadsides, riverbanks. Prefers moist, well-drained soils. **Spread:** Stem & root fragments, and by seed. **Comments:** Aggressive, spreads quickly along surface waters and in right-of-ways. **Controls:** Do not mow, cut stems at base then smother by covering area with heavy-duty fabric/plastic, herbicides also recommended.

General Considerations

Japanese knotweed is a tall upright perennial with a large rhizomatous rooting system and hollow stems. The stems can reach heights of up to 10' (3 m) tall, with some records indicating they can grow to 15' (3.9 m) tall. The stems are glaucous and hollow with nodes/joints, similar to bamboo shoots. The older shoots tend to get woody near the base as they age. Leaves are alternate and broadly ovate with a flat truncate base. Flowers emerge in late summer as small white to off-white racemes/panicles. Pollination is by insects, primarily by bees. The three-winged seeds (Calyx) were often thought to be sterile; however, a basic germination test showed that 95% of seeds collected from various populations spread.

A Guide to INVASIVE PLANTS in Massachusetts



\$5.00

PennState
College of Agricultural Sciences

Wildland Weed Management
plantscience.psu.edu/wildland

QuickSheet
Invasive Plant Species
Management 1

Japanese knotweed (*Faloplia japonica*)

Description

- Refer to the DCNR [Invasive Plants](#) webpage, and the [knotweed fact sheet](#) which describes Japanese knotweed and giant knotweed (*Fallopia sachalinensis*).
- Herbaceous, rhizomatous, perennial dicot.
- The true identity of knotweed can be obscure – there is Japanese, giant, and a hybrid.
- Grows in tall (8 to 10-plus feet), dense stands that exclude almost all other vegetation.
- Native to East Asia, imported as an ornamental in the late-1800's.
- Grows almost anywhere, from acidic spoil in full sun to fertile, partly-shaded alluvial soils along rivers and streams.

Management Keys

The primary objective in controlling Japanese knotweed is eliminating the underground rhizome system. Rhizomes are creeping underground stems that give rise to new stems and roots. As long as you are willing to invest the effort and follow a few key timing guidelines, it can be successfully suppressed.

Be Persistent

There are two phases of invasive species management – control and maintenance. The control phase for knotweed takes two seasons, and would ideally include two herbicide applications the first season and a rigorous follow-up treatment the second year.

After your control efforts have nearly eliminated the knotweed, you need to periodically monitor the sites and treat any new growth to prevent re-infestation.

Target the Rhizomes – Timing is Key

To control knotweed, you have to injure the rhizomes. This is most effectively done with systemic herbicides applied later in the growing season (Figure 1). This is when the foliage is sending sugars produced through photosynthesis to the roots and rhizomes. Systemic herbicides move in the same direction through the plant as the sugars.

Applications made too early in the season or too soon after cutting do not translocate to the rhizomes, and only injure the shoots.

June Cutting Can Help

Cutting alone is not an effective suppression approach. However, cutting prior to an herbicide application can be very helpful. If you cut in June, and wait eight weeks after cutting to treat, you will find that the knotweed regrowth is much shorter than when it was cut. Typically, knotweed regrows 2- to 5-ft tall. This cutting also reduces rhizome growth as the plant has to expend its energy to regrow a canopy instead of expanding its network of rhizomes.

When knotweed is growing near water, cutting is useful because it is easier to treat the shorter regrowth without getting spray solution into the water.

If the knotweed is not near water, you have to decide if cutting the knotweed is a good use of your finite time and effort. Treating intact knotweed lowering over your head is a lot like work, but cutting may be even more work. As long as you are able to effectively spray all the foliage in a patch, cutting is not critical.

Wait after Cutting to Treat

Wait eight weeks after cutting before applying herbicide. If you apply too soon after cutting, the plant is still directing its energy to new leaf growth and the herbicide will not be translocated to the rhizomes.

Recommended Herbicides

We recommend the herbicide glyphosate, a non-selective herbicide available as aquatic-labeled products for use in or near water. The glyphosate products typically available on the PA state contract include 'Rodeo', 'Aquanaul', or 'Glyphomate 41'.

Glyphosate has several advantages:

- It is effective
- It has low toxicity to non-target organisms
- It is available in aquatic-labeled formulations
- It has no soil activity
- It is relatively inexpensive.

The herbicide imazapyr (e.g. 'Potaris', 'Habitat') is also effective against knotweed, but has considerable soil activity and can injure nearby trees through root



This work was supported by the Pennsylvania Department of Conservation and Natural Resources, Bureau of State Parks (PA DOW).
Do not drink, eat, or absorb. Pesticide label not for sale. 2008 reviewed by A. J. Sauer, 2015 July 2018. The University of Pennsylvania has the right to use the logo and the name of the state of Pennsylvania. The contents of this document are the property of the University of Pennsylvania. The University of Pennsylvania is not responsible for the effectiveness of any product or service. The University of Pennsylvania is not responsible for the effectiveness of any product or service.

Science, Study and Community Action



How to Control Japanese Knotweed

(and other invasive plants)

Douglas Johnson, M.D.

Volunteer

Certified NYS Pesticide Applicator

Certified MA Pesticide Applicator

www.noknotweed.org

Outline

- Why Knotweed?
- Types of Knotweed
- RIIPP (Regional Inlet Invasive Plant Program)
 - Treatments – Ineffective; Effective
- Regulatory Restrictions/Permission forms
- RIIPP Results
- Japanese Knotweed in Springfield, MA
 - The Problem
 - Efforts Underway – ReGreen Springfield
 - CPA (Community Preservation Act) funding
 - Efforts planned

West River Vermont



Fifth & Sixth Lake Canoe Carry



A river system originally
flowing through the Fifth
Middle Branch of the Moose River
Branch of the Moose River
system. The river then flows past the
Inlet, northwest to Caribou, then to
Lake Umbagog Bay or Lake Umbagog.

It is 2.5 billion gallons of water
each year flowing through the lake
system. The lake is a natural
reservoir with an average depth
of 10 feet. It is a natural
reservoir with an average depth
of 10 feet. It is a natural
reservoir with an average depth
of 10 feet.

Thousands of years before the arrival
of the Europeans, the Five Abenaki
had a well established network
of travel routes in the northeast.
Some of these routes were land
trails, but wherever possible
water transport was preferred.
This was particularly so in
the area now called the
"Northern Forest".

Northern Forest Canoe Trail

Large Pond

*This Carry is part of the Northern Forest
Canoe Trail. A 740 Mile Waterway
Through New York, Vermont,
New Hampshire & Maine.
This Carry is maintained by
The Town of Inlet
Central Adirondack Trail Blazers
& N.Y.S. DEC Region 5*

**Registration
If You Carry It In
Carry It Out**



2007: Blue Mt Lake
New York
Durant Rd

Giant Knotweed





2008: George Spak (6'5")

5th Lake Canoe Carry

Bohemian Knotweed (L) JK (R)

Ineffective Treatments

- Digging up plant is ineffective, and can cause spread
 - Root fragments as small as 1 gram can start new plants
 - Can send out roots up to 20 feet away and 10 feet deep
- Cutting stems
 - Can slow plant growth
 - But makes treatment with herbicides ineffective that year, and leads to more canes the next year, making treatment more difficult the next year
 - Need have stems totally dry out before disposing

Ineffective Treatments

- Cut stem – then herbicide into stem
 - Leads to deformed plants the following year
- Foliar spray of large canes
 - Leads to deformed plants the following year, which are difficult to eradicate (likely due to not healthy enough to get subsequent herbicide to root system)
- Foliar spray of small canes with 2% glyphosate
- Herbicide treatments prior to plant starting to flower or near first hard frost

**Sprayed not injected-
2010 deformed plants
sprayed 2009 not injected**





2008: Giant Knotweed in Inlet, NY
Treated unsuccessfully 2007 spray

Effective Treatment

- Herbicide treatments after knotweed has started to flower and prior to hard frost (when taking nutrients to root system) to a plant that has not been cut down
- Inject 2 ml of concentrated (40-52%) glyphosate to each cane, and foliar spray of 5% glyphosate with surfactant to canes too small to inject
 - In 2016, New York adopted 2cc's for stem injection with less than labeled rate (of 5 cc)
- Do not cut down knotweed for several weeks after treatment so the herbicide will get to root system



Injecting Knotweed Jerry Charbonneau



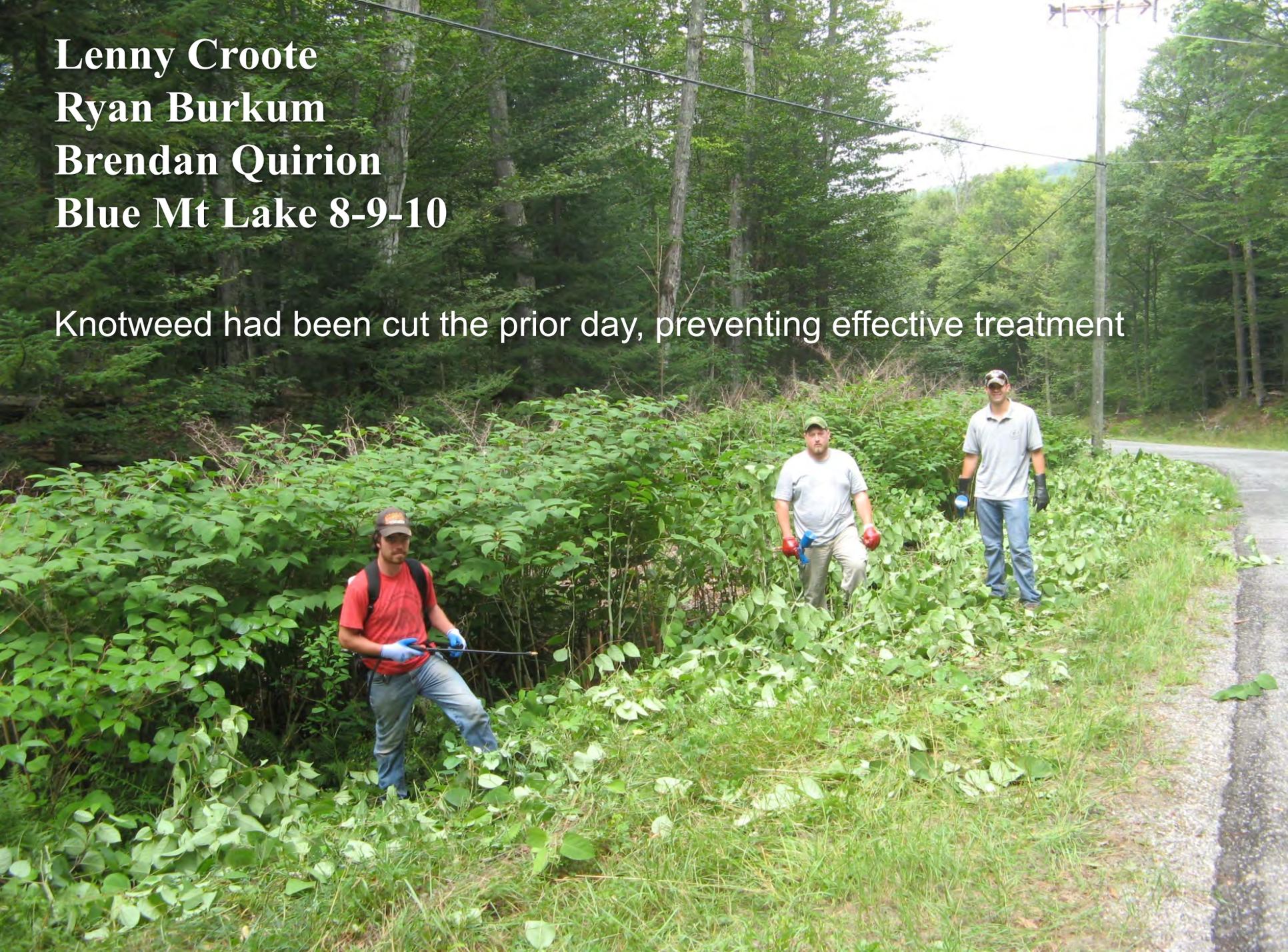
2008: Adirondack Museum



2009: Adirondack Museum

Lenny Croote
Ryan Burkum
Brendan Quirion
Blue Mt Lake 8-9-10

Knotweed had been cut the prior day, preventing effective treatment



Results – Glyphosate injection & foliar spray of canes too small to inject

- The year after treatment
 - about 90 to 95% of plants show no growth
- For sites treated two years
 - only a few tiny plants
- For sites treated three to five years
 - some with no plants, some with few tiny plants

Results - for sites where large canes were sprayed, not injected

- The year after treatment
 - Many deformed plants
- For sites treated two to five years
 - Continued small deformed plants, becoming more deformed
- If not treat the deformed plants for about three years, healthy plants will return

Deformed plants

- The optimal treatment of deformed plants uncertain
 - It may be better to let them grow for a few years, then treat when more healthy (when they should take herbicide to root system)

Regulatory Restrictions

- In MA, only certified pesticide applicators can apply pesticide on property other than their own.
- In NY, only commercial pesticide applicators or their apprentices, or pesticide technicians can apply pesticide on property other than their own.
- Some states (PA, MD, VA) allow volunteers to apply pesticide under the supervision of pesticide applicators.

Permission Forms

- Need property owner permission to use pesticides on private property
- Need town/county/state permission to use pesticides on those properties

RIIPP Collaboration

- Volunteers (invasive plant coordinators)
 - identify sites, obtain property owner permission, show applicator sites, help with fund-raising
- Town of Inlet
 - receive tax-deductible donations, collect permission forms, order pesticides/equipment, contract with applicators, have employees as applicators
- County
 - grants, data base, employees as applicators

RIIPP Results

- 2008 and 2009
 - Treated over 60 properties injecting tens of thousands of canes, and spraying tens of thousand of small plants
 - Areas included Blue Mountain Lake, Indian Lake, Inlet, Eagle Bay, Town of Webb
- 2010
 - Treated many more sites in the same towns, particularly in Blue Mountain Lake and Indian Lake, with Ryan Burkum an applicator

RIIPP Results

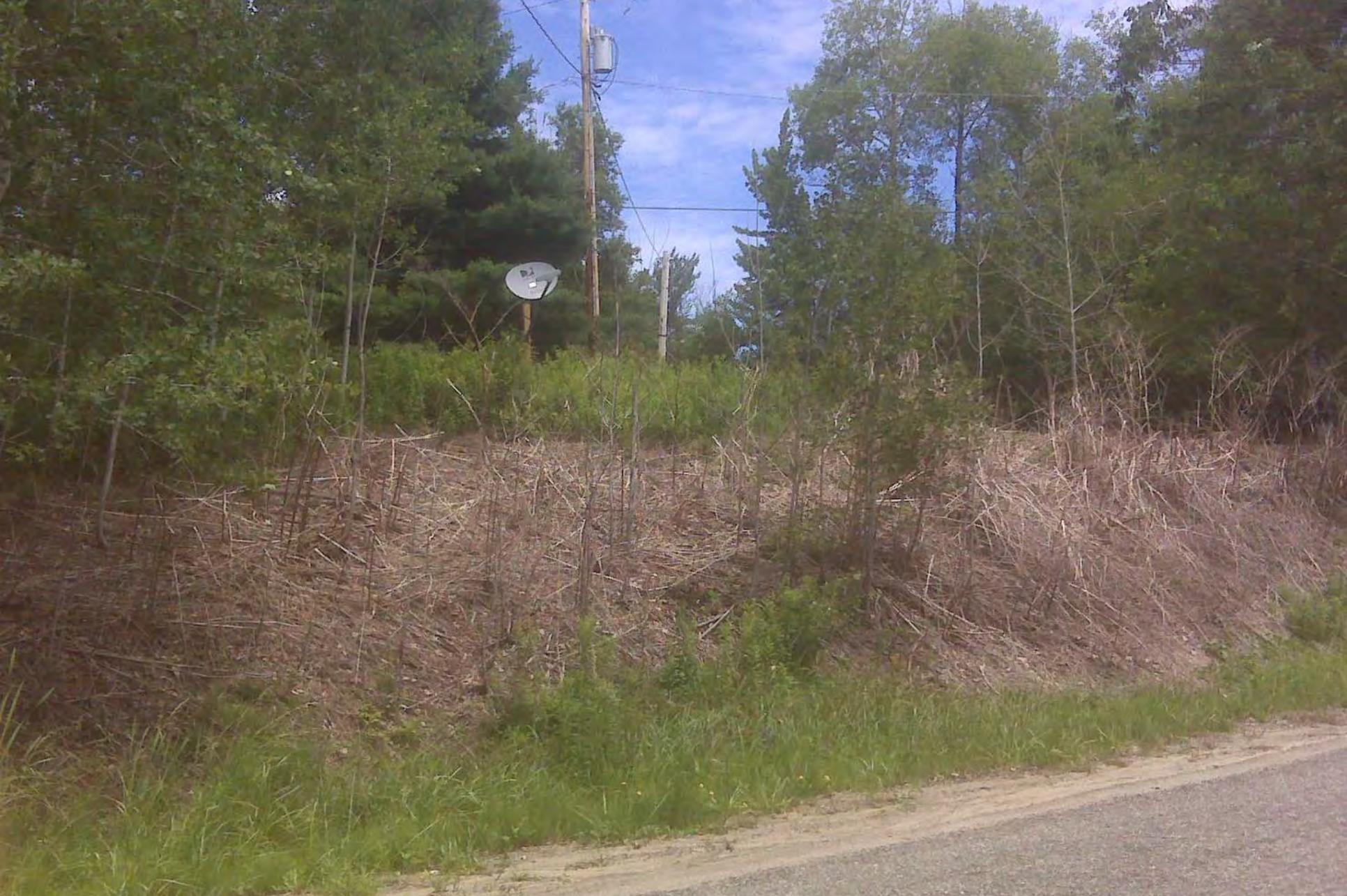
- 2011
 - Treated about 75,000 canes in over 150 sites
 - New towns/areas included Lake Piseco, Lake Placid, Long Lake, North Creek, North River, Speculator, Wells
- 2012
 - Treated about 51,000 knotweed canes in over 160 sites
 - New towns/areas included Lake Garnet, Saranac Lake, Tupper Lake
- 2013-2019
 - Treated hundreds of sites each year throughout the Adirondacks
 - budget about \$20,000-\$25,000 each year to pay applicators

2012





2008: Blue Mt Lake Durant Rd



2010: Injected 09 Blue Mt Lake Durant Rd



2008: back yard BML Durant Rd



**2010: Injected 2009 & 2008
back yard BML: Durant Rd**

2008 Gift Shop Rt 28





2009: 1 year later

RIIPP - Four Steps to Success

- 1. Educate**
- 2. Locate**
- 3. Certificate (permissions)**
- 4. Eradicate (glyphosate)**





Japanese knotweed: A threat to Springfield's parks and open space

Forest Park, Springfield, MA

9-30-12



8-10-13



6-7-15



9-27-17



9-27-17



Path in Forest Park 10-1-2017



Connecticut River Walkway/Bikeway Knotweed Study 2020

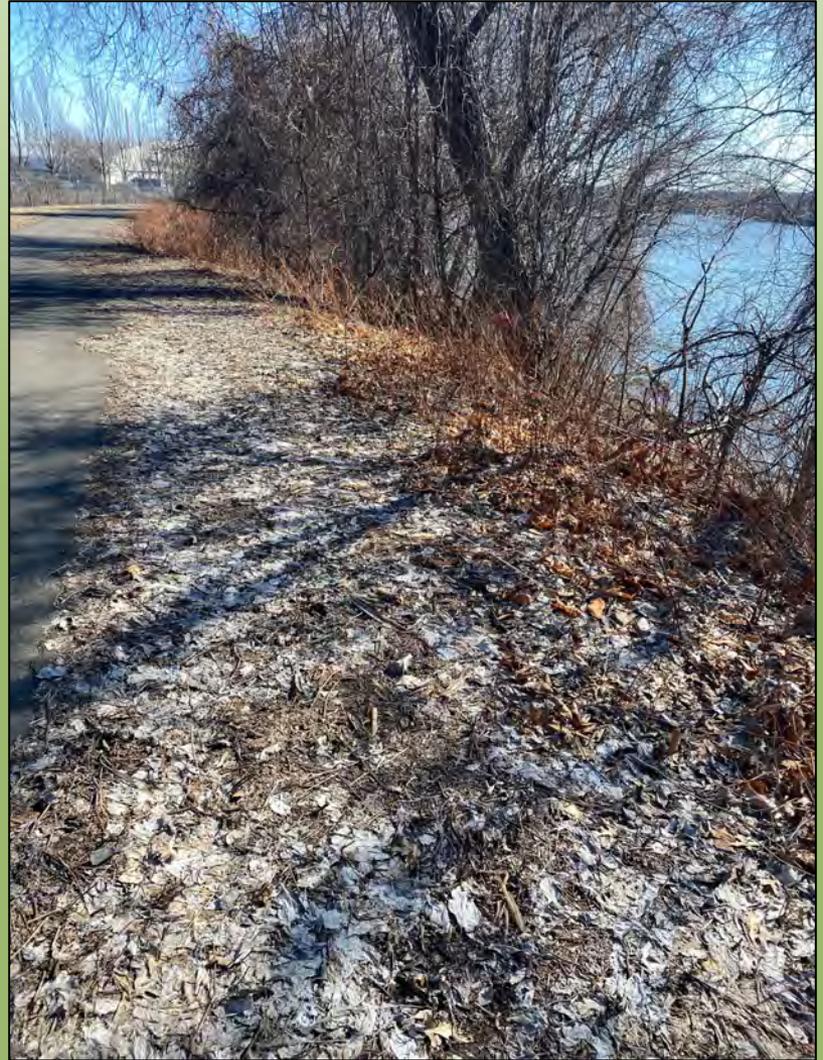




CT River Walkway/Bikeway



CT River Walkway/Bikeway





CT River Walkway/Bikeway

Springfield Stats (2019)



21,180

ACRES OF LAND IN
SPRINGFIELD



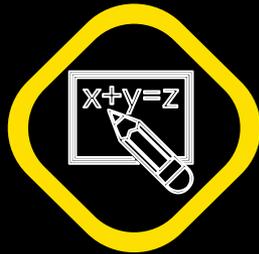
62

ACRES OF REPORTED
KNOTWEED (2019) IN
SPRINGFIELD



8

AVERAGE NUMBER OF STEMS OF
JAPANESE KNOTED PER SQ. FT.



348,480

NUMBER OF STEMS OF
PER ACRE IN SPRINGFIELD



21,605,760

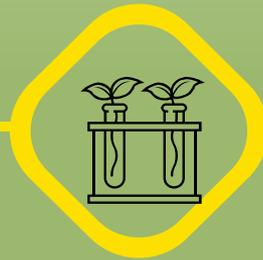
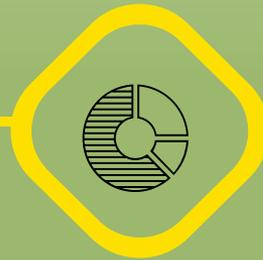
NUMBER OF STEMS OF
JAPANESE KNOTED IN SPRINGFIELD

Knotweed Control Study

MOWING

STEM INJECTION

PLASTIC W/MULCH



SPRAYING

CARDBOARD W/MULCH

Connecticut River Bike-Walkway Japanese Knotweed Control Study - 2020



Test Plot #001



Test Plot #002



Test Plot #003



Test Plot #004



Test Plot #005



Test Plot #006



NORTH

STUDY AREA TREATMENTS

These plots will be used to study the effectiveness of several control methods for the Japanese Knotweed growing along the Connecticut River Walk-Bikeway.

The following testing protocols will be used during the Spring 2020:

- Spray Treatment
- Stem Injection - New plot every 2 weeks
- Mowing (bi-weekly)
- Plastic Tarps (when plant is at 3" height)
- Cardboard Cover (when plant is at 3" height)



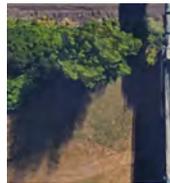
ReGreenSpringfield



CT River Walkway/Bikeway



Test Plot #001



Test Plot #002



Test Plot #003

CT River Walkway/Bikeway



NAISMITH
BASKETBALL HALL
OF FAME



Test Plot #004



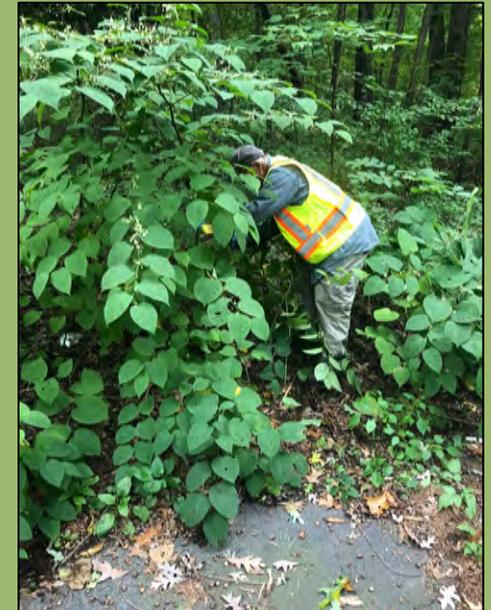
Test Plot #005



Test Plot #006

STUDY AREA TREATMENTS

- Spray Treatment (New segment every 2 weeks)
- Stem Injection (New segment every 2 weeks)
- Mowing (bi-weekly)
- Plastic Tarps with mulch cover (when plant is at 3" height)
- Cardboard Sheeting with mulch cover (when plant is at 3" height)



SPRAY TREATMENTS (New segment bi-weekly)

- Start mid-April
- Rodeo (glyphosate) plus added surfactant
- Less expensive than Roundup Pro
- 1 gallon of water with 2.25 ounces of Rodeo herbicide concentrate
- 96 oz. concentrate needed per acre
- Spray the plants at .75-1.0m tall
- Repeat on any re-growth once they reach .75m again.



MOWING (bi-weekly)

- Start mid-April
- Requires bi-weekly cutting
- Goal is to remove or starve the root system
- Must be carried out until frost
- May require more than one season



PLASTIC TARPING

- Install in mid-April or when plant is 3" height
- Extend at least 6' beyond outside stems
- Requires full contact of tarp edges with ground
- May require spot treatment
- May require one full season of application



CARDBOARD AND MULCH

- Install in mid-April or when plant is 3" height
- Cover with 2 layers of cardboard
- 3" wood chip mulch over cardboard
- Extend at least 6' beyond outside stems
- May require spot treatment with foliar spray or cutting
- May require one full season of application



STEM INJECTION (2-protocols)

- 7ml of 100% Rodeo (glyphosate) per stem
- Each stem of a given clump is injected with mechanical syringe
- Follow-up application may be required in the following season



FOLIAR SPRAY

Per application



62

ACRES



21,605,760

STEMS



\$2,600

COST PER ACRE (2019)



\$161,200

TOTAL COST

STEM INJECTION

Per application



62
ACRES



21,605,760
STEMS



10
AVG. SECONDS PER STEM



216,057,600
TOTAL SECONDS



3,600,960
TOTAL MINUTES



60,016
TOTAL HOURS



30.008
TOTAL STAFF YEARS

A Friendly Notice about Invasive Plants

It appears your property may contain Japanese Knotweed



Invasive plants are aggressive non-native species that reproduce rapidly, outcompete native species, and can negatively impact agriculture, industry, recreation, forestry, human health, and the environment. Invasive plants may be introduced unintentionally, as hitchhikers on clothing, gear, or equipment, or unknowingly, often for ornamental purposes.

This notice is part of the early detection, response, and monitoring plan for

ReGreen Springfield

whose mission includes protecting Springfield from the negative impacts of invasive species.

For more information contact
ReGreen Springfield

One Federal Street Springfield MA 01105
413-537-3748 www.regreenspringfield.org

JAPANESE KNOTWEED (*Fallopia japonica*)

Origin: Asia

THE PROBLEM: Japanese knotweed is considered one of the worst invasives in the eastern U.S. It invades forest edges, stream banks, and open or disturbed areas such as roadways and yards. Its early spring emergence and dense growth enable it to take over large areas and displace native species. Its thick root systems can extend horizontally for 60 feet or more, damaging buildings, flood defenses, and roadway infrastructure.

HOW TO IDENTIFY: Japanese knotweed has hollow, red and green stems and large, alternate, oval-shaped leaves. A cascade of white flowers blooms in August, and dormant reddish stems are visible in winter. Dense bushes may reach heights of more than 10 feet.

WHAT YOU CAN DO: Knotweed is very difficult to control. Mowing is not advised as it can contribute to its spread. A stem injection or foliar spray treatment with herbicide is recommended. Always read and follow label instructions to ensure safe and appropriate use of any herbicide. Repeated controls are often necessary. Do not compost, as plants can survive, spread, and decompose slowly.

Observer name: _____

Phone #: _____

Email: _____

Date species was observed: _____

Comments: _____

Thank you for your help in the fight against invasive species!

AGREEMENT TO COMPLETE INVASIVE PLANT SPECIES CONTROL ON PRIVATE PROPERTY IN MASSACHUSETTS AND INDEMNITY AGREEMENT:

_____, with a mailing address

_____,
phone _____; email _____ is the owner or agent (hereinafter referred to as the "Owner") of property located in Hampden County, Massachusetts, which property has a street address of _____ (hereinafter referred to as the "Property"), and the following approximate Global Positioning System coordinates: _____.

Owner, in consideration of receiving assistance from Regreen Springfield, Inc., a 501(c)3 not for profit organization, located in Springfield, MA, in controlling invasive species on the Property, hereby agrees as follows:

Owner agrees to the physical, chemical or biological removal of invasive species from the Property by Regreen Springfield, Inc. (including employees, contractors, volunteers), and releases from liability and agrees to hold harmless Regreen Springfield, Inc. (including employees, contractors and volunteers) from and against any and all claims arising from these invasive species control activities on the Property, whether such activities involve the physical removal of invasive species from the Property, the use of chemical or biologic control activities, or any other activity that the Owner and Regreen Springfield, Inc. mutually choose to employ on the Property.

Owner recognizes that there may be risks associated with all forms of invasive species control activities, and acknowledges that Regreen Springfield, Inc. has made no representations, express or implied, about any such risks.

Invasive plant control measures using herbicides to treat Japanese knotweed (*Polygonum cuspidatum*) will include applications of glyphosate: Accord or Rodeo concentrate (EPA Reg. No. 62719-324), Accord XRT II (EPA 62719-556) by Massachusetts Certified Pesticide Applicators under Regreen Springfield, Inc.'s direction.

Owner agrees to the collection of invasive species distribution and management data on the Property by ReGreen (including employees, contractors, apprentices or volunteers). ReGreen may use or disclose data for research, education, or similar purposes.

The term of this agreement will be one year from the date of Owner's signature. This agreement will renew automatically on an annual basis unless otherwise terminated by ReGreen or the Owner. Each year, the Owner or Owner's authorized agent may request the specific date or dates of invasive species management to be provided and, if so requested, ReGreen or its agents must inform of the specific dates and include that date or dates in this agreement. There will be no charge to the owner, with costs covered by donations from owners and others, grants, and the town/county. There is no guarantee that the control work will be performed. Included with this contract is a list of the pesticides to be applied and any label warnings that are pertinent to the protection of humans, animals or the environment. ReGreen or the Owner may terminate this agreement at any time by written notice (email notice is allowed).

Executed on this ____ day of _____, _____.

Property owner or owner's agent signature: _____

Regreen Springfield, Inc. Authorized Signature and Title

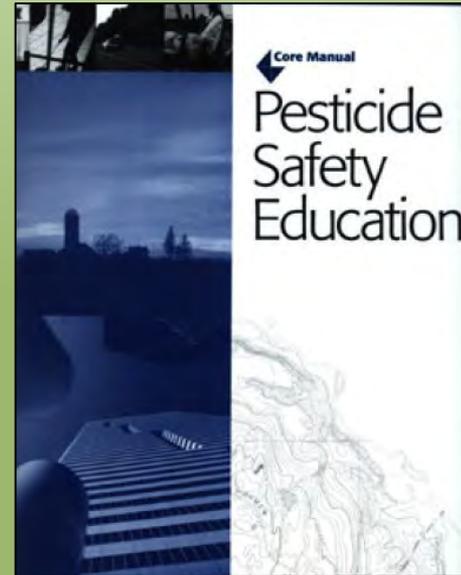
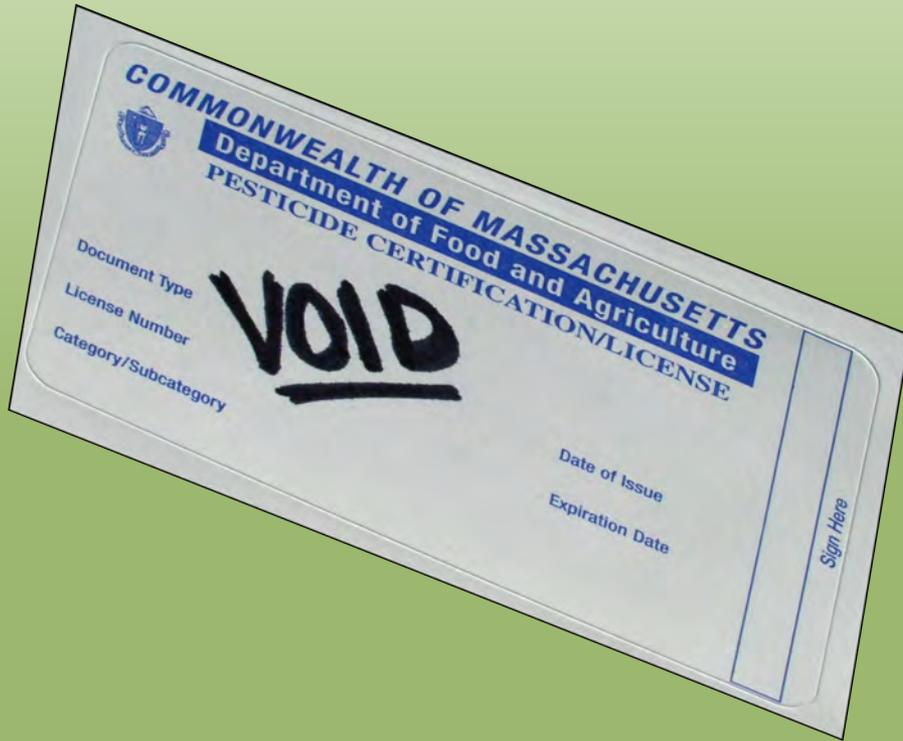
Please send donations payable to ReGreen Springfield and mail to address above with your name, address, email, and phone.

Private Property
Permission Agreement

Massachusetts Pesticide Licensing

- What license do you need to control invasive plants in your community?
- Process for obtaining licensing
- Reporting requirements

LICENSURE



LICENSURE

- Use of a pesticide for hire on someone else's property must be done by an appropriately licensed and insured individual

DEFINITION OF 'USE'

333 CMR 10.02

- Application
- Storage/Disposal
- Transporting
- Mixing/Loading