

# Japanese Knotweed

*(Fallopia japonica)*

Best Management Practices in Ontario

# 2016 Best Management Practices Webinars

- Building Partnerships to deal with Invasive *Phragmites australis* – a “Grass Roots Perspective”
- *Phragmites* Management in Municipal Drains in the City of Kingsville
- Invasive *Phragmites*: Best Management Practices
- Clean Equipment Protocol: Inspecting and Cleaning Equipment for the Purposes of Invasive Species Prevention
- Grow Me Instead: Beautiful, Non-Invasive Plants for Your Garden
- Wild Parsnip: Best Management Practices
- Aquatic Invasive Plant Watch List for Ontario
- **Japanese Knotweed: Best Management Practices**

**\*\*\*New addition\*\*\*** Community Engagement in an Urban Greenspace: Stewardship Successes & Struggles in Invasive Species Management presented by Kirushanth Gnanachandran, The Riverwood Conservancy **May 4, 2016**

# Ontario Invasive Plant Council (OIPC)

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The OIPC was formed in 2007 to provide a coordinated provincial response to the growing threat of invasive plants.

The OIPC includes representatives from:

- All levels of government
- Non-government organizations
- Academia
- First Nations
- Industry



# Japanese Knotweed – Best Management Practices In Ontario

## Goal of this Webinar

To provide land managers with the tools for accurate identification and effective control of Japanese knotweed.

## Topics Covered

- Background
- Distribution
- Identification and Lookalikes
- Habitat and Impacts
- Best Management Practices and Control Measures
- Resources and Reporting Tools

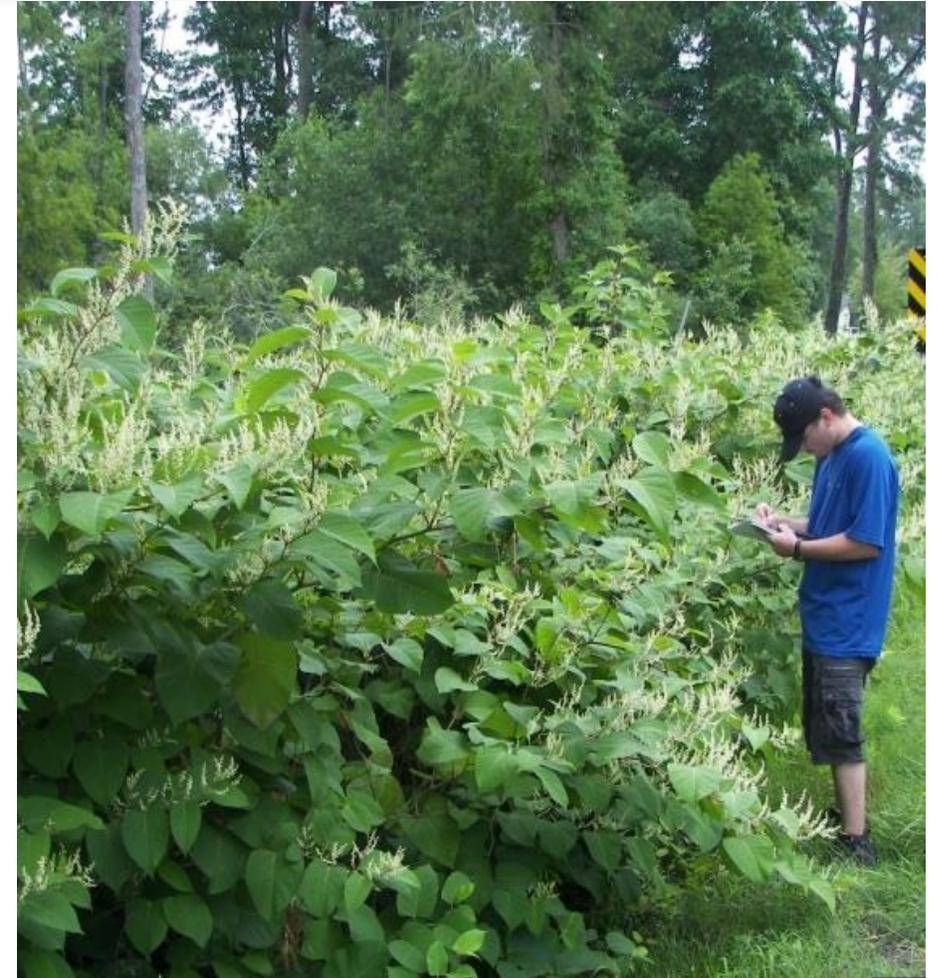


Photo by: Randy Westbrooks

# Background

- AKA: Mexican bamboo, fleeceflower, Japanese polygonum or huzhang
- Scientific names: *Fallopia japonica*, *Polygonum cuspidatum*, *Reynoutria japonica*
- Perennial, herbaceous plant in buckwheat (Polygonaceae) family
- Native to (but relatively uncommon in) eastern Asia (Japan, Korea, China and Taiwan)
- One of the first species to grow after eruptions or disturbance on volcanic slopes



Photo by: Wasyl Bakowski

- Introduced to North America as horticultural plant in late 19th century
- Widely planted as ornamental, for erosion control, forage for livestock
- Regarded as one of the world's top 100 worst invasive species by the Global Invasive Species Database

# Distribution

## Ontario

First recorded in Ontario in 1901 in Niagara Falls. Found throughout southern Ontario and as far north as White River and Thunder Bay.

## Nationally

Found primarily in Ontario, Quebec, and the Atlantic Provinces with isolated populations in Winnipeg, Manitoba and British Columbia.

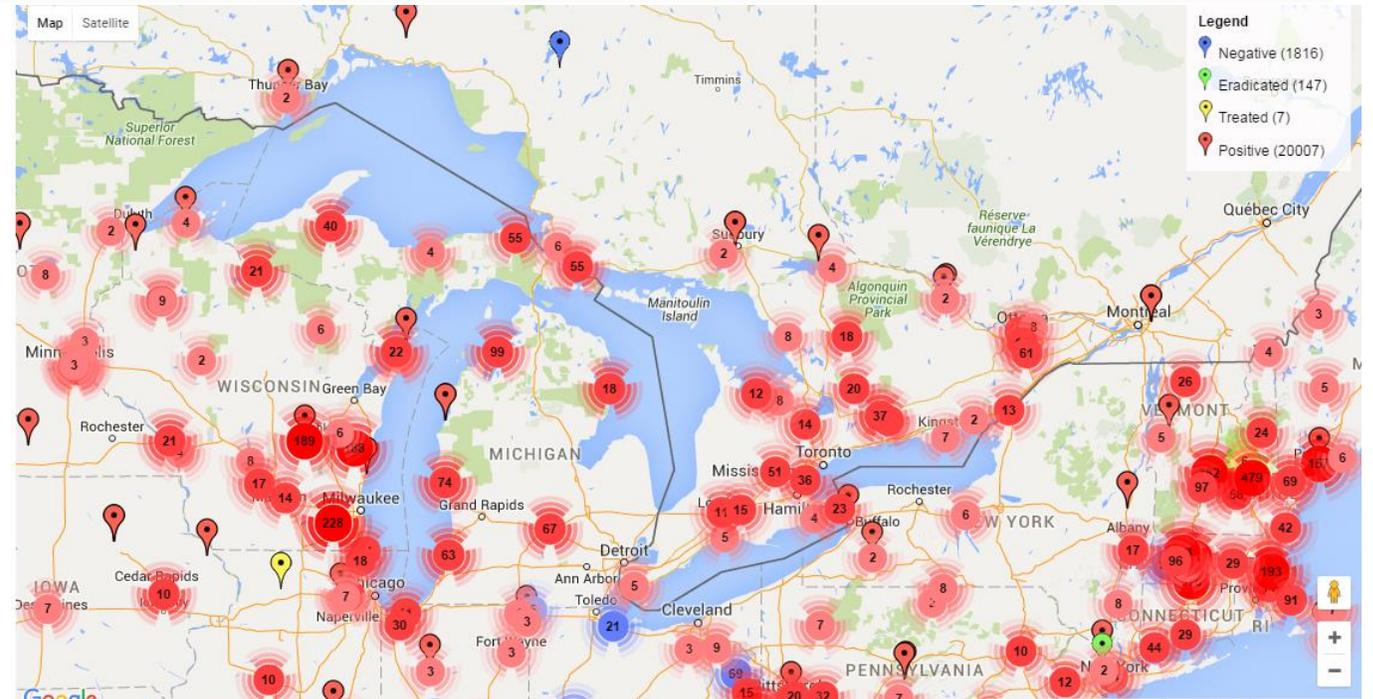


Image by: EDDMapS Ontario (April 11 2016)

## Internationally

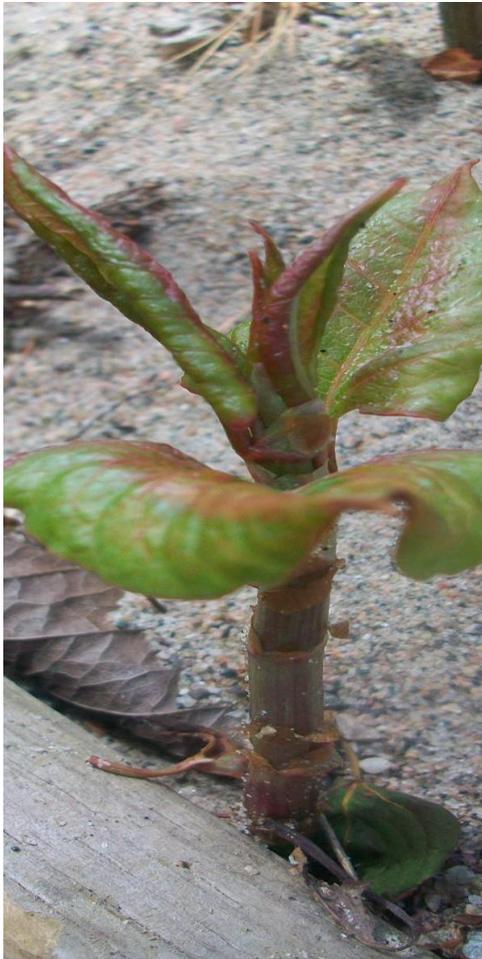
- Widespread in the north-eastern United States
- Also considered an invasive species in Europe, Australia and New Zealand

# Japanese Knotweed Identification



Photo by: Doug Thain

# Stems



- Hollow, smooth, jointed stems
- Up to 2.5 cm in diameter
- Purple-green with reddish-brown nodes surrounded by papery sheath (stipule)
- Stems die back each fall and dead stalks remain standing over winter
- New stems emerge in spring (late March-early April), resembling asparagus spears; red-purplish
- Can grow 8 cm / day
- Grows in large, bamboo-like clumps, reaching 1-3 m height



Photos by: Doug Thain and Rod Krick

# Leaves

- Leaves are oval to triangular with a pointed tip and flat a base on a long petiole
- Alternate on stem in a distinctive zig-zag pattern
- 10-17 cm long, 7-10 cm wide



Photos by: Francine MacDonald and Hayley Anderson

# Flowers and Fruit

## Flowers

- Small, white-green flowers in sprays along stem
- Bloom from late July - October
- Produced in branching panicles (clusters)
- Panicles usually longer than the closest leaves (key ID feature)



Photos by: Sam Brinker and Jill Swearingen

## Fruit

- Seeds are winged, triangular, shiny and very small



Japanese knotweed is dioecious and much of the Japanese knotweed in Ontario is thought to be a male-sterile clone; when pollination occurs, it is unknown if seeds are viable in Ontario.

# Rhizomes

- Quickly develops large, underground root systems (rhizomes)
- Make up 2/3 of plant mass
- Can extend >3 m deep and 14-18 m from parent plant
- Spreads outward at 50 cm/year in optimal conditions
- Even 1 cm pieces of stem or rhizome can produce new plants within 6 days if submerged in water



**Pieces of the stem or rhizome can produce new plants, as seen in this photo of improperly disposed soil with knotweed fragments.**

Photo by: BC Ministry of Forests, Lands and Natural Resource Operations

# Lookalikes: Giant Knotweed (*Fallopia sachalinensis*)

- Invasive (native to northern Japan)
- Found in southern Ontario (mostly south-east) and Niagara Region
- Introduced as an ornamental
- Up to double the size of Japanese knotweed, 2-4 m in height
- Hollow, light green stems
- Alternate, heart-shaped or “elephant ear” leaves with long thin hairs on underside
- Leaves 15-40 cm long, 10-28 cm wide
- Greenish-white flowers in clusters which are shorter than nearest leaves



Photo by: Wasył Bakowsky

# Lookalikes: Bohemian Knotweed (*Fallopia x bohemica*)



Photo by: Robert Videki, Doronimcum Ktf.,  
Bugwood.org

- Hybrid species of Japanese and giant knotweed
- In Ontario, first reported in Georgetown (garden)
- Maybe more invasive / aggressive than parent plants (takes on superior aspects of both)
- Stems reddish-brown, hollow
- 2-3 m in height
- Alternate, spade to heart-shaped leaves with long-tapered leaf tips
- Short, broad hairs on the underside of the leaf (key ID feature)
- Leaves 25 cm long, 20 cm wide
- Greenish-white flowers in clusters on mid-size stalks; bloom July to September

# Lookalikes: Himalayan Knotweed (*Persicaria wallichii*)

- Native to Himalayan Region of South Asia
- No known populations in Ontario, but invasive in British Columbia, Nova Scotia and Newfoundland
- Red stems and leaf stalks
- 2 m in height
- Alternate, long, thin leaves up to 20 cm long and 10 cm wide
- Similar leaves to Himalayan balsam (may be confused with that plant), but NOT serrated
- Pink to white flower clusters
- Bloom July-September



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# Japanese Knotweed

## Habitat and Impacts



Photo by: Freyja Whitten

# Habitat



- Grows most vigorously in full sunlight, but also in deep shade
- Prefers moist soils in riparian areas and wetlands, but also runoff from roofs etc.
- Also found in disturbed areas along roadsides, rail-beds, old homesteads, forest edges
- Salt tolerant
- Can survive extreme climates and contaminated soils
- Can escape from gardens

Photo by: British Columbia Ministry of Forests, Lands and Natural Resource Operations

# Impacts on Biodiversity

- Can severely degrade quality of wetland and riparian habitats
- Dense thickets can reduce sunlight penetration by >90%
- Native species groundcover can be completely eliminated within knotweed stands
- Do not support the same number of native amphibian, reptile, bird or mammal populations (e.g. native green frog, *Rana clamitans*)
- Has allelopathic properties



Photos by: Ken Towle, Wikimedia Commons

# Impacts on Infrastructure and Recreation

## Recreation

- Can block / hinder access to water for recreational activities (boating, angling, swimming)
- Impedes traffic along hiking / biking trails



## Infrastructure

- Able to grow through concrete or asphalt
- Knotweed root systems do not hold soil as well – soil banks can become unstable and prone to erosion and flooding
- Considered controlled waste in UK
- Prohibited in Michigan (cannot sell/purchase, transport, mow, etc.)

Photo by: BC Ministry of Forests, Lands and Natural Resource Operations

# Impacts on Infrastructure



Photo by: BBC One

# Japanese Knotweed Best Management Practices



Photo by: Sam Brinker

# Integrated Pest Management (IPM): Definition

**Integrated Pest Management (IPM):** Preventing or reducing damage caused by pests by using all best available information, and a variety of ecologically and economically sustainable approaches and control methods.

An IPM approach to Japanese knotweed control will depend on:

- Life cycle & biology of the plant
- Time of year
- Location of plants – presence of other sensitive species (i.e. species at risk)
- Size of infestation
- Skill level

Successful eradication may require several years and a variety of tools & approaches.

A management plan will ideally involve replanting of native plants to prevent soil erosion and help outcompete future invasions of invasive plants.

# Best Management Practices Cont'd

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## Monitoring:

- Begin scouting as soon as spring growth starts (March-April)
- Understand infestation size (early action can significantly reduce the cost of control)

## Identify order of control efforts:

- Satellite populations first
- Concentrate on high-priority areas (ex. most productive, sensitive part of a woodlot, favourite natural area)
- Begin upstream to avoid spreading further

## Restoration:

- Re-plant cleared areas immediately with a cover crop, native trees or shrubs to prevent other invasives from invading
- Cover with leaves or mulch to prevent other invasive plants from germinating in the disturbed soil

# Best Management Practices Cont'd

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## Repeat:

- Many Japanese knotweed stands have required 5-10 years of active control to achieve eradication
- Consider dedicating a certain time each year to control; consider a joint effort with neighbouring landowners / land managers.

## Disposal

- Be extremely CAREFUL not to spread the plant
- 1 cm piece of rhizome can start a new infestation

# Control Measures – Manual/Mechanical

## Mowing/Cutting

- Continual cutting with a brush mower at least once per month will eventually weaken rhizomes – start cutting when full grown (June)
- Best used in tandem with another control method (e.g. chemical control)
- Very labour intensive
- MUST properly dispose of all plant material

## Digging

- Digging young plants (complete with all rhizomes) can eradicate new or early infestations
- Will quickly re-sprout if all pieces of plant or root are not removed



Photo by: Hayley Anderson

# Control Measures – Manual/Mechanical

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## Excavation

- For large populations
- Full scale excavation with heavy machinery has proven to be a method of quick eradication in the U.K.
- Create deep pits (>5 m deep) lined with root barriers
- Excavate all infested soil up to 2 m deep and bury in pits
- VERY extensive, labour intensive and expensive
- As a last resort, if the Japanese knotweed cannot be buried on site, it is removed and brought to designated solid treatment areas at landfills.

# Control Measures – Manual/Mechanical

## Tarping

- “Cooks” the soil and everything under the tarp
- Cut stems, remove old canes, then cover with a dark coloured tarp or heavy material, loosely enough to allow some growth under the tarps as knotweed stems could break through the tarp; ensure tarp is placed further out than the infestation
- Left in place for up to 3 growing seasons
- Monitor for rips or tears (or shoots growing through or beside the tarp), and re-planted with native species once removed
- Limited success – should combine with herbicide



Photos by: Hayley Anderson

# Control Measures – Cultural

## Grazing

- Young shoots are edible for livestock and horses
- Will not eradicate infestation but can suppress growth and prevent spread
- Grazing stops when plants become woody-textured (around July) and the plants will continue to grow



Photo by: Francine MacDonald

# Control Measures – Biological

**Biological control:** The use of an herbivore, predator, pathogen or other natural enemy to reduce established populations of invasive species.

- Two strains of psyllid *Aphalara itadori* evaluated for control of invasive knotweeds (*Fallopia japonica*, *Fallopia sachalinensis* and *Fallopia × bohemica*)
- Approved for release by CFIA as of 2015
- Not yet available
- Research into establishment, overwintering, release procedures is ongoing
- Leafspot fungus safety testing ongoing



Photo by: John P. Bailey

# Control Measures – Chemical

Registration Number	Registrant Name	Product Name	Registration Status
<a href="#">24359</a>	FMC CORPORATION*	<a href="#">GLYFOS SOLUBLE CONCENTRATE HERBICIDE</a>	REGISTERED
<a href="#">26828</a>	CHEMINOVA CANADA, INC.*	<a href="#">CHEMINOVA GLYPHOSATE SOLUBLE CONCENTRATE HERBICIDE</a>	REGISTERED
<a href="#">26846</a>	INTERPROVINCIAL COOPERATIVE LIMITED	<a href="#">GLYPHOSATE HERBICIDE - AGRICULTURAL &amp; INDUSTRIAL</a>	REGISTERED
<a href="#">27287</a>	FMC CORPORATION*	<a href="#">GLYFOS AU SOLUBLE CONCENTRATE HERBICIDE</a>	REGISTERED
<a href="#">28322</a>	ALBAUGH INC.*	<a href="#">CLEAROUT 41 PLUS HERBICIDE SOLUTION</a>	REGISTERED
<a href="#">28623</a>	LOVELAND PRODUCTS CANADA INC.*	<a href="#">SHARPSHOOTER PLUS HERBICIDE</a>	REGISTERED
<a href="#">28631</a>	LOVELAND PRODUCTS CANADA INC.*	<a href="#">SHARPSHOOTER HERBICIDE</a>	REGISTERED
<a href="#">28924</a>	FMC CORPORATION*	<a href="#">GLYFOS SOLUBLE CONCENTRATE HERBICIDE II</a>	REGISTERED
<a href="#">28925</a>	FMC CORPORATION*	<a href="#">CHEMINOVA GLYPHOSATE (TM) II</a>	REGISTERED
<a href="#">29124</a>	NUFARM AGRICULTURE INC.*	<a href="#">CREDIT 45 HERBICIDE</a>	REGISTERED
<a href="#">29125</a>	NUFARM AGRICULTURE INC.*	<a href="#">NUFARM CREDIT 360 LIQUID HERBICIDE</a>	REGISTERED
<a href="#">29290</a>	NEWAGCO INC.*	<a href="#">MPOWER GLYPHOSATE</a>	REGISTERED
<a href="#">29363</a>	FMC CORPORATION*	<a href="#">GLYFOS BIO HERBICIDE</a>	REGISTERED
<a href="#">29364</a>	FMC CORPORATION*	<a href="#">GLYFOS BIO 450 HERBICIDE</a>	REGISTERED
<a href="#">29470</a>	NUFARM AGRICULTURE INC.*	<a href="#">NUGLO HERBICIDE</a>	REGISTERED
<a href="#">29479</a>	NUFARM AGRICULTURE INC.*	<a href="#">POLARIS</a>	REGISTERED
<a href="#">29480</a>	NUFARM AGRICULTURE INC.*	<a href="#">NUFARM GLYPHOSATE 360 HERBICIDE</a>	REGISTERED
<a href="#">29629</a>	LOVELAND PRODUCTS CANADA INC.*	<a href="#">VITERRA GLYPHOSATE</a>	REGISTERED
<a href="#">29745</a>	DOW AGROSCIENCES CANADA INC.*	<a href="#">GF2050 HERBICIDE</a>	REGISTERED
<a href="#">29995</a>	AGRI STAR CANADA ULC.*	<a href="#">CRUSH'R PLUS</a>	REGISTERED
<a href="#">30062</a>	DOW AGROSCIENCES CANADA INC.*	<a href="#">RECLAIM II A HERBICIDE (A COMPONENT OF RECLAIM II HERBICIDE)</a>	REGISTERED

This is an excerpt only. See <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php> to search labels.

Search for:  
 Japanese *cuspidatum*  
 Japanese knotweed  
 Knotweed (Japanese)  
*Polygonum cuspidatum*  
 Fleeceflower

# Control Measures – Chemical

All regulations including the Ontario Pesticides Act and Ontario Regulation 63/09 must be followed!!

- For established populations, chemical control is more effective when combined with mechanical control (cutting prior to herbicide application)
- Repeated cutting and allowing plant to grow to full height between cuttings will weaken roots to make them more susceptible to systemic herbicides such as glyphosate
- Foliar, wick, stem injections or wiper applications can be used (read the herbicide label!)



Photo by: Freyja Whitten

# Control Measures – Chemical



Photo by: Candice Petherick

## Stem Injections

- Best late summer or early autumn (when canes are 1/2 inch or more in width)
- Inject between 1<sup>st</sup> and 2<sup>nd</sup> nodes up from the bottom (some suggest between 3<sup>rd</sup> and 4<sup>th</sup>)

## Spray

- Spray isolated or new populations in late May
- Followed by another application in early summer
- Re-treatment may be needed for missed plants and re-sprouts

# Control Measures – Disposal



Photo by: Francine MacDonald

## Do not compost Japanese knotweed!!!

1. Place all plant parts in black plastic bags.
2. Seal the bags tightly and leave them to “cook” in direct sunlight for at least 1 week before disposing of them.
3. The best disposal for Japanese knotweed plant pieces after drying is to burn them or send them to the landfill.

# Permitting and Other Requirements

Permits and other requirements may be necessary for your control project, depending on the work involved and the location!

It is your responsibility to ensure that your project follows all relevant laws including municipal by-laws, and provincial / federal legislation.

**Some key items to consider with chemical control:**

- In Ontario herbicide storage, disposal, use, transport and sale are regulated under the *Pesticides Act* and Regulation 63/09
- There are exceptions under the *Pesticides Act* which may allow chemical control of invasive plants on your property (e.g. natural resources, forestry, agriculture)
- If you think you fall under any of the exceptions, contact the MOE or the MNRF to ensure your project meets the requirements of the exception or to obtain a letter of opinion for applying class 9 pesticides (natural resources exception)
- Pesticide application must be done by a licenced exterminator or you must hold the appropriate certificate

# Restoration and Monitoring

## Restoration During Control

**Mulching:** Reduces light availability after knotweed control, allowing shade-tolerant native species to germinate.

**Seeding:** Seeding with an annual cover crop or native plant species immediately after control activities will help to establish native species.

## Restoration After Control

**Soil Rehabilitation:** Replenishing the mycorrhizae in the soil after control will reduce allelopathic effects and restore soil conditions.

**Planting:** If there are invasive plants nearby, planting larger (i.e. potted) native species stock will give them an advantage over any invasive seedlings that germinate after control measures are completed

## Monitoring

Monitoring should be repeated throughout the growing season to catch re-sprouts.



Photo by: Ohio State Weed Lab Archive, Bugwood.org

# Preventing the Spread

## ✓ Report it!

If you think you see Japanese knotweed, take a picture, record the location and contact the Invading Species Hotline to report it. 1-800-563-7711 or visit [www.invadingspecies.com](http://www.invadingspecies.com).

## ✓ Watch for it!

Monitor hedges, property lines, fence lines and trails. Early detection of invasive plants can increase the success of control and removal efforts.

## ✓ Stay on trails!

Avoid travelling off-trail (dogs and ATVs, too!) and in areas known to have Japanese knotweed or other invasive species.

## ✓ Stop the spread!

Inspect, clean and remove mud, seeds and plant parts from clothing, pets (horses), vehicles (including bicycles), and equipment such as mowers and tools. Clean vehicles and equipment in an area where plant seeds or parts aren't likely to spread.

## ✓ Keep it natural!

Try to avoid disturbing soil and never remove native plants from natural areas. This leaves the soil bare and vulnerable to invasive species.

## ✓ Use native species!

Try to use local native species in your garden. Never use Japanese knotweed in your garden or hedgerows. Encourage your local garden centre to sell non-invasive or native plants.

# Help Track the Spread of Japanese Knotweed

You can help track the spread of Japanese knotweed in a couple of ways:

You can call the Invading Species Hotline:  
**1-800-563-7711**

Or report sightings online to Ontario's new mapping system (requires a photo & location)

[www.eddmaps.org/ontario](http://www.eddmaps.org/ontario)



# We Gratefully Acknowledge the Contributions of:

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**Chris Gosselin**, *Regional Municipality of Waterloo*

# For More Information

[www.ontarioinvasiveplants.ca](http://www.ontarioinvasiveplants.ca)

[www.ontario.ca/biodiversity](http://www.ontario.ca/biodiversity)

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