



Invasive Plant  
Management Training  
Invasive Species Centre



# Common Reed *Phragmites sp.*

## Identification



Mitt Watershed Council

Invasive	Native
Rough, dull stem	Smooth shiny stem
Blue-green leaf	Yellow-green leaf
Leaf sheaths remain attached, difficult to remove	Leaf sheaths easily removed in fall
Base stem tan coloured in spring/summer	Base stem red coloured in spring/summer
High density	Low density



Caleb Slemmons, National Ecological Observatory Network, Bugwood.org



Rob Routledge, Sault College, Bugwood.org



# Common Reed *Phragmites sp.*

## Impacts



Travis McMahon, MIA Consulting, Bugwood.org

Economic	Social	Ecological
<ul style="list-style-type: none"><li>• High maintenance costs on roadways and private property</li><li>• Fire hazard</li><li>• Reduced visibility</li></ul>	<ul style="list-style-type: none"><li>• Impedes access to natural areas</li><li>• Cut stocks can post health risk</li></ul>	<ul style="list-style-type: none"><li>• Serious losses to plant and animal diversity</li><li>• Affect all reptiles that are considered SAR</li></ul>



# Common Reed *Phragmites sp.*

## Management

### *Dry-Land Management*

- Herbicide
  - Active ingredients: Glyphosate or Imazapyr
  - *\*Refer to legislation for requirements on applying herbicide to your project*
- Selective cutting and spading
  - Manually cutting stalks below the soil surface- may be required more than once in a growing season

### *Wet Land Management*

- Flooding
  - During spring to summer
  - Location- areas to control water levels or flood prone areas
- Selective cutting and spading in water
  - Cut close to substrate with a minimum of 30cm water depth
  - Handheld tools or amphibious cutting vehicles

### *Additional Control*

- Cultural control
- Mulching (does not impact root system)
- Prescribed burning (combined with other management techniques)
- Excavating
- Cutting seed heads



Caleb Slemmons, National Ecological Observatory Network, Bugwood.org



# Periwinkle

*Vinca minor*

## Identification

Common ID features:

Flowers	Leaves	Growth form
<ul style="list-style-type: none"><li>• 20-30 mm wide</li><li>• Flowers are purple to white in colouration</li><li>• 5 petals per flower</li><li>• Visible in late spring to early summer</li><li>• White star-shaped silhouette sometimes present in center of flower</li></ul>	<ul style="list-style-type: none"><li>• Oblong to ovate shaped leaves</li><li>• Oppositely arranged</li><li>• Dark glossy green in colour</li><li>• Short petiole (leaf stem)</li><li>• Exude a milky juice when crushed/ broken</li><li>• Faint white veins present</li></ul>	<ul style="list-style-type: none"><li>• Vine-like growth</li><li>• Trailing stems grow close to the ground</li><li>• Vines can reach up to 15 cm long</li></ul>



Deena C, Bugwood.org

5467988



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UGA0581072

Jill Swearingen, USDI National Park Service, Bugwood.org



# Periwinkle

*Vinca minor*

## Impacts

### Social

- Is readily available at local nurseries

### Ecological

- Can aggressively out-compete native ground-layer species
- Shallow, trailing roots allow it to escape ornamental gardens and spread to natural forested areas
- Grows as a dense ground cover that prevents native tree seedlings from becoming established



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# Periwinkle

*Vinca minor*

## Management

### *Manual Removal*

- Cutting plants during active growing season (spring)
  - Digging out plants by hand
  - Removal of all plant and roots
- \*can be used as a species for volunteer community pulling events



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# Giant hogweed

## *Heracleum mantegazzianum*

## Identification

Common ID features:

### Flowers

- Flowers appear in early to mid-June
- Clustered in white umbel-shaped heads
- Can measure up to 1 m in diameter
- Each compound umbel can have 50-150 rays (separate stems) which can lead to a single plant producing well over 50,000 flowers

### Growth form

- Under ideal growing conditions, can reach heights up to 5 meters
- Heights of 3 - 4.5 meters are most common



Terry English, USDA APHIS PPQ, Bugwood.org



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Rob Routledge, Sault College, Bugwood.org



# Giant hogweed

## *Heracleum mantegazzianum*

Common ID features:

Leaves	Stem
<ul style="list-style-type: none"><li>• Prominently spiked with a pronounced jagged appearance</li><li>• Mature plant leaves are divided into three equal parts which are then divided into a further 3 parts (ternate)</li><li>• Smaller plants may just be deeply lobed</li><li>• Leaves can grow up to 1 m wide.</li><li>• Leaf tips come to a sharp point</li></ul>	<ul style="list-style-type: none"><li>• Can range from 10-15 cm in diameter</li><li>• Covered in coarse sharp hairs/prickles</li><li>• Bright green and often speckled with red/purple blotches</li><li>• Stems can be entirely purple</li></ul>

## Identification Continued



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

# Giant hogweed

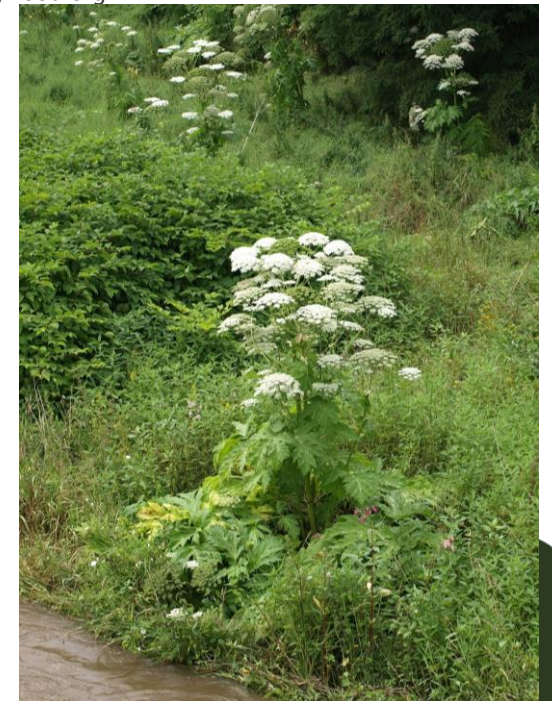
*Heracleum mantegazzianum*

## Impacts

Economic	Social	Ecological
<ul style="list-style-type: none"><li>• Growth in agricultural fields may impact crop yields</li></ul>	<ul style="list-style-type: none"><li>• Contains phototoxic sap which can cause second degree burns with skin contact when exposed to UV light</li><li>• Can also cause temporary blindness sap is in contact with eyes and exposed to sunlight</li><li>• May discourage outdoor recreation in areas it is present</li><li>• Pets are often the ones going blind as they walk through stand</li></ul>	<ul style="list-style-type: none"><li>• Shades out native plants</li><li>• Rapid growth can out compete native plants</li><li>• Forms dense stands in riparian areas resulting in increased erosion in stream banks, threatening salmon spawning sites</li></ul>



USDA APHIS PPQ - Oxford, North Carolina , USDA APHIS PPQ, Bugwood.org



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# Giant hogweed

*Heracleum mantegazzianum*

## Management

**\*Proper PPE must be worn when working with this plant**

The best time to remove the plant is in late April or early May.

### *Mechanical Control*

- Handpulling/digging
- Mowing
- Tilling
- Flower removal

### *Chemical Control*

- Systematic herbicide

### Disposal

- **DO NOT BURN**
- **DO NOT COMPOST**
- Dispose of plant material in construction grade black (labeled) or clear garbage bags & leave in sunlight to dry out (1 week)



Terry English, USDA APHIS PPQ, Bugwood.org



Thomas B. Denholm, New Jersey Department of Agriculture



# Himalayan balsam

*Impatiens glandulifera*

## Identification

Leaves	Stem	Growth form
<ul style="list-style-type: none"><li>• 6-15 cm long and are widest in the middle</li><li>• Oblong/egg-shaped with finely serrated margins</li><li>• Arranged in whorls (usually in threes)</li><li>• Purple mid-vein</li></ul>	<ul style="list-style-type: none"><li>• Stems can be easily snapped or broken</li><li>• Hollow &amp; square shaped</li><li>• Green in colour, with tinges of purple and red throughout</li></ul>	<ul style="list-style-type: none"><li>• Shallow thin roots</li><li>• Can reach heights exceeding 2 m</li></ul>



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# Himalayan balsam

*Impatiens glandulifera*

## Identification continued

Common ID features:

Flowers	Seed pods/ capsules
<ul style="list-style-type: none"><li>• Light to dark pink</li><li>• Helmet-shaped</li><li>• Drooping appearance</li><li>• 5 irregular petals per flower</li><li>• Up to 5-10 flowers on each stem.</li></ul>	<ul style="list-style-type: none"><li>• Seed pods are light green when young</li><li>• 3-5 cm long, up to 1.5 cm wide</li><li>• Contain up to 16 seeds per pod</li><li>• Seed pods break open and curl when touched dispersing seeds within</li><li>• Seeds disperse up to 5 m away from parent plant</li></ul>



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Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Himalayan balsam  
*Impatiens glandulifera*

## Impacts



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Economic	Social	Ecological
<ul style="list-style-type: none"><li>• Can be costly to remove large amounts of material</li></ul>	<ul style="list-style-type: none"><li>• Can completely take over an area, including walking trails</li><li>• Spread commonly by people through improper dumping and yard clippings</li></ul>	<ul style="list-style-type: none"><li>• Replaces native plants along riparian areas</li><li>• Shallow root system increases erosion, impacting water quality</li><li>• Produces a lot of nectar, pulls pollinators from other native species</li></ul>



# Himalayan balsam *Impatiens glandulifera*

## Management

### *Mechanical Control*

- Hand pulling plants before seed sets (flowered)
- Removing entire plant from shallow root when soil is soft
- Dispose plants in sealed black garbage bags, in direct sunlight for 1-3 weeks
- Larger stands may be mowed with repeated maintenance - essential to get below first node to ensure no regrowth

\*herbicide may be used per permit approval (consideration on herbicide treatment around riparian areas)



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# Japanese knotweed

*Fallopia japonica*

## Identification

Common ID features:

Stems	Growth form
<ul style="list-style-type: none"><li>• Height 1-3 m</li><li>• Hollow &amp; bamboo-like in appearance</li></ul>	<ul style="list-style-type: none"><li>• New stems appear red to purplish</li><li>• Turning green with purple specks as they mature</li><li>• Grows rapidly in large bamboo-like clumps</li></ul>



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



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Emma Erlen, University of New Hampshire, Bugwood.org

5596609



# Japanese knotweed

*Fallopia japonica*

## Identification Continued

Common ID features:

### Leaves

- Alternate 10-17 cm long, 1-10 cm wide
- Oval to heart shaped with a flat base with pointed tip

### Flowers

- Flowers are greenish-white
- Flowers cluster upright along the stem
- Flower clusters are longer than closest leaves
- Fruits are small and winged which helps wind dispersal



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Jan Samanek, Phytosanitary Administration, Bugwood.org



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# Japanese knotweed

*Fallopia japonica*

## Impacts



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Economic	Social	Ecological
<ul style="list-style-type: none"><li>• Very expensive to control</li><li>• Can break through concrete, damaging infrastructure, costing homeowners and reducing property values</li></ul>	<ul style="list-style-type: none"><li>• Can take over an area, including public parks/trails</li></ul>	<ul style="list-style-type: none"><li>• Outcompetes native species</li><li>• Reproduces via rhizomes (only 1 cm fragment needed)</li><li>• 2/3 of its biomass is underground</li><li>• Degrades wildlife habitats</li></ul>



# Japanese knotweed

*Fallopia japonica*

## Management

### *Mechanical Control*

#### **Mowing or cutting**

- Stems once a month throughout growing season
- Combination with other control methods

#### **Tarping plants**

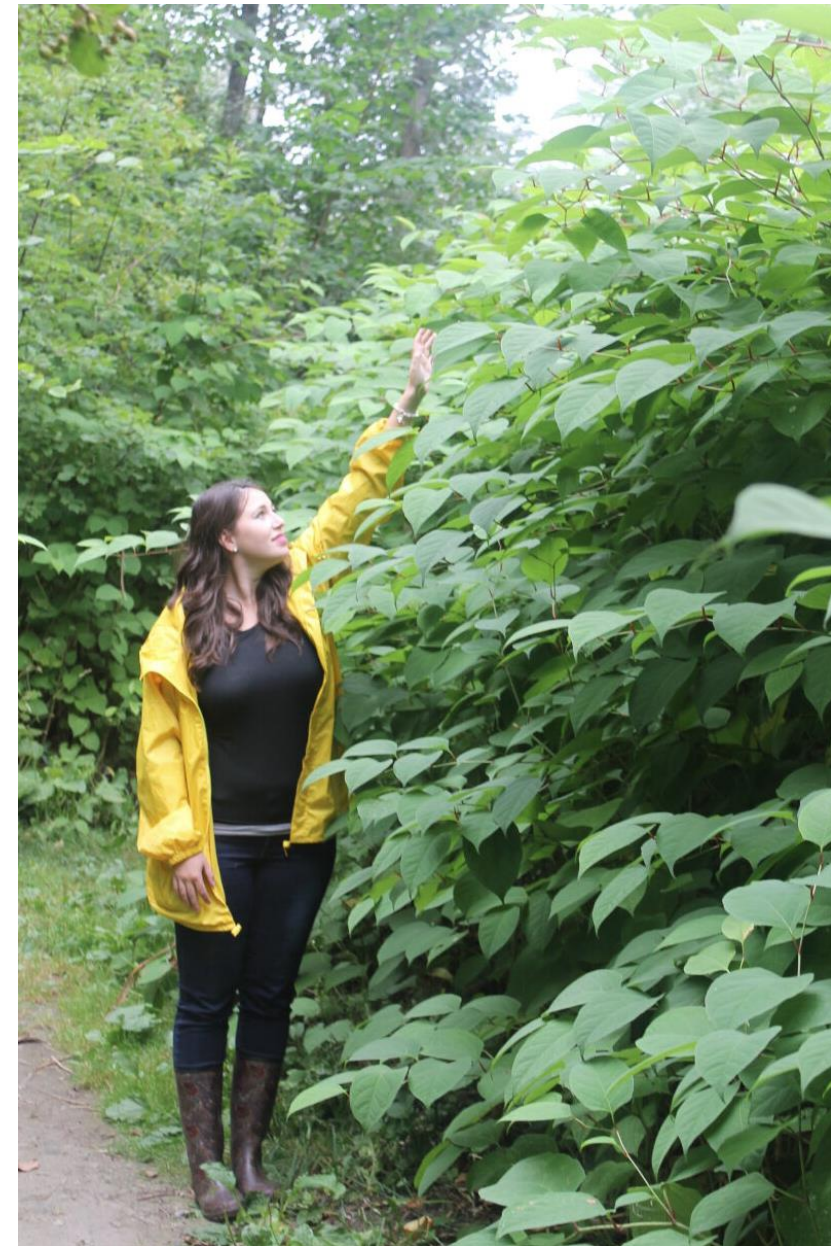
- Late spring and continue through season
- Covering population with dark material to block sunlight, “cooks” the root system
- Re-plant when area is cleared to prevent resprouting

### *Chemical Control*

#### **Herbicide**

- Following label directions
- Needs multiple application

BMP is being updated based on emerging research.



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# Common buckthorn

## *Rhamnus cathartica*

## Identification

### Common ID features:

Berries	Leaves	Flowers
<ul style="list-style-type: none"><li>• Black fruits are produced on the female trees and are found in dense clusters in the leaf axils (where the leaf attaches to the stem)</li><li>• Appear in July and August</li><li>• Each fruit contains 3-4 seeds and has deep narrow grooves on the back.</li><li>• Fruits remain well into winter</li></ul>	<ul style="list-style-type: none"><li>• Dark green &amp; smooth to the touch</li><li>• Oppositely to sub oppositely arranged</li><li>• 3-5 strongly curved veins arching toward the tip of the leaf</li><li>• Finely serrated leaf margins</li></ul>	<ul style="list-style-type: none"><li>• Pale green/ yellow</li><li>• Four-petals per flower</li><li>• 6 mm across and appear in early June on short threadlike stalks.</li></ul>



Paul Wray, Iowa State University, Bugwood.org



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# Common buckthorn

## *Rhamnus cathartica*

## Identification Continued

Growth	Bark
<ul style="list-style-type: none"><li>• Ranges in size from a shrub to small tree</li><li>• Can reach heights of up to 6 - 7 meters tall</li><li>• Older specimens can have trunks up to 25 cm in diameter</li></ul>	<ul style="list-style-type: none"><li>• The cambium layer (directly under the bark) is bright orange.</li><li>• Bark is dark greyish brown in colouration with distinct small lenticels (small circular or elongated scars) scattered throughout the trunk and branches.</li><li>• Younger bark will appear smoother and shinier, while older bark develops a roughened texture as it matures.</li></ul>



Richard Webb, Bugwood.org



Chris Evans, University of Illinois, Bugwood.org



# Common buckthorn

*Rhamnus cathartica*

## Impacts

Economic	Social	Ecological
<ul style="list-style-type: none"><li>• Outcompeting forest regeneration</li><li>• Creates even-aged stands</li></ul>	<ul style="list-style-type: none"><li>• Encroaching on established trails</li><li>• Reducing aesthetic value by reducing wildflowers</li><li>• Openings left by the loss of ash trees are being taken over by buckthorn</li><li>• Hazardous due to terminal thorns</li></ul>	<ul style="list-style-type: none"><li>• Berries are purgative</li><li>• Outcompetes forest regeneration and vegetation</li><li>• Allelopathic</li><li>• Spreads quickly</li></ul>



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# Common buckthorn

## *Rhamnus cathartica*

## Management

### *Mechanical Control*

#### **Hand pulling**

- When soil is soft (fall/ early winter)
- Removing entire root (re-sprouting occurs)
- Weed wrench tool for plants up to 5cm in diameter

#### **Cutting**

- Causes sprouting (other management required)
- Cut stump without herbicide, place bag to cover over stumps

#### **Girdling**

Larger plants that cannot be pulled

- Girdle down to the Cambrian layer
- Band should be 3 inches wide

\*girdling will cause resprouting

Disposal at municipal compost, pile branches before they dry and ensure no seeds are present

\*ensure there are no seed present if disposing at compost

### *Chemical Control*

#### **Herbicide application**

- Following label instructions
- Cut stump method late to early spring



Chris Evans, University of Illinois, Bugwood.org



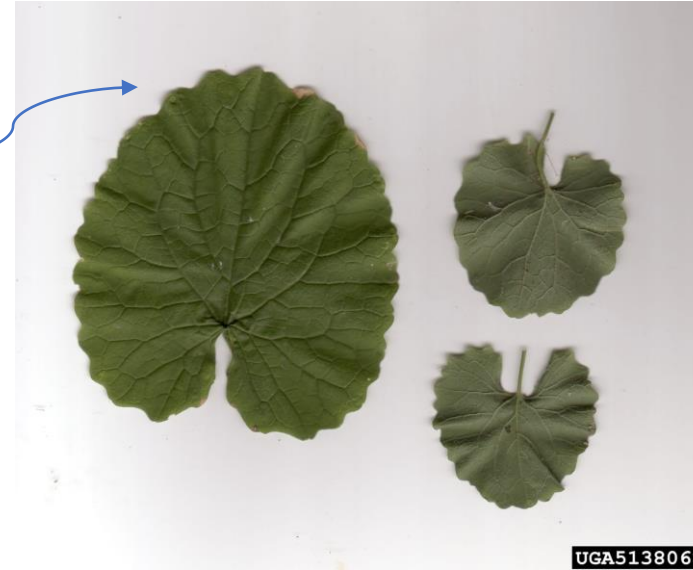
# Garlic mustard

*Alliara petiolata*

## Identification

Growth	Flowers	Leaves
<ul style="list-style-type: none"><li>• “S” shaped taproot</li></ul>	<ul style="list-style-type: none"><li>• 4 white petals, 2<sup>nd</sup> yr flowering stalk</li><li>• Flowers in early May</li></ul>	<ul style="list-style-type: none"><li>• 3-4 leaves per rosette</li><li>• Dark green kidney shape</li><li>• Scalloped margins, deep veins</li><li>• Appear alternate on stem 2<sup>nd</sup> year growth</li><li>• Smells like garlic when crushed</li></ul>

First Year Leaf



Lynn Sosnoskie, University of Georgia, Bugwood.org



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Second Year Leaf (seed Producing plant)

David Cappaert, Bugwood.org



# Garlic mustard

*Alliara petiolata*

## Impacts

### Economic

- Long-term management plans are required to control populations
- Stands can double in size every four years

### Ecological

- Outcompetes and inhibits the growth of native species, including species at risk like American ginseng
- Allelopathic
- Thrives in wide variety of conditions, including forest understory
- Not a valuable food source for animals



Steven Katovich, Bugwood.org





# Garlic mustard

*Alliara petiolate*

## Management

### *Manual Removal*

- Hand pulling
  - Plants can be hand pulled- remove the whole “S” shaped taproot
  - Focus your control efforts on the second year (seed-producing) plants, removing these prevents further seed dispersal
  - Start with outlying populations and work your way in, this will prevent edge expansion

\*Remove before seeds drop: mid-May to early June

\*Do not compost, place in construction grade garbage bags sealed tightly, and place in direct sunlight for 1 week.

\*Ideal plant for a community invasive species pull



Connie Gray, GA-EPPC, Bugwood.org

# Oriental bittersweet

*Celastrus orbiculatus*

## Identification

### Growth

- Young stem looks bright green and grows to have red-brown bark
- Leaves are round with toothed edge
- Alternates leave along stem
- Yellow fruit appear in late summer and splits with red center on the fall

### Bark

- Bark has cracked fish netted texture
- Smooth stems climb by winding around host plants



Chris Evans, University of Illinois, Bugwood.org



UGA5125079

Chris Evans, University of Illinois, Bugwood.org



5560290

Chris Evans, University of Illinois, Bugwood.org



UGA5269040

Chris Evans, University of Illinois, Bugwood.org



# Oriental bittersweet

*Celastrus orbiculatus*

## Impacts

### Ecological

- Grows rapidly and shades out native vegetation
- Weaken mature trees with weight of woody vines
- Displaces native plants by stealing space, light, water and other crucial resources
- Girdles trees which can “cut” off flow of water and nutrients

### Social

- Trees that are covered with Oriental bittersweet are susceptible to damage in ice, snow and windstorms, due to the added weight, creating a hazard to human health



David L. Clement, University of Maryland,  
Bugwood.org



# Oriental bittersweet

## *Celastrus orbiculatus*

## Management

### *Mechanical Control*

**Cutting** – consistent cutting or mowing vines if done often throughout the growing season, may eventually deplete the plant's energy reserves.

**Hand pulling** - Manage seedlings and small populations by hand pulling or digging. Monitor sites where it has been observed and removed for possible regrowth.

- Be cautious when moving soil in areas where Oriental bittersweet is present. Root fragments can resprout and become a new plant.



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org





# Multiflora rose

## *Rosa multiflora*

## Identification

Leaves	Flowers	Fruit
<ul style="list-style-type: none"><li>• Alternate; pinnately compound</li><li>• 5-11 leaflets with serrated edges</li><li>• Green and smooth on surface, paler with short hairs on underside</li></ul>	<ul style="list-style-type: none"><li>• Clusters of white/pink flowers</li><li>• Blooms May-June</li></ul>	<ul style="list-style-type: none"><li>• Oval, bright red and fleshy</li><li>• &lt;6mm diameter</li><li>• Fruits Aug-winter</li></ul>



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Rob Routledge, Sault College, Bugwood.org



UGA1380238

Chris Evans, University of Illinois, Bugwood.org



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Chris Evans, University of Illinois, Bugwood.org



5449917

Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



# Multiflora rose

*Rosa multiflora*

## Impacts



Richard Gardner, Bugwood.org



John M. Randall, The Nature Conservancy, Bugwood.org

### Economic

- Thickets can invade agricultural fields
- Reduce grazing areas
- Degrade forage quality

### Social

- Can invade and restrict recreational areas with thickets

### Ecological

- Grows rapidly once established
- Invades native plant communities
- Thickets shade out native species for light and nutrients



# Multiflora rose

## *Rosa multiflora*

# Management

### *Mechanical Control*

#### **Hand pulling**

- Seedlings
- Digging out the root

#### **Hand cutting**

- Pruning back thickets to allow other plants to grow (continued maintenance)
- Early spring or summer followed by another cut in the fall

#### **Mulching**

- Before leaf-out (winter/early spring)

### *Chemical (not during bird nesting season)*

- Foliar – when leaves are fully opened (July- mid Sept)
- Cut Stump/Stem - during dormant season, cut stem as close to the ground as possible
- Basal bark- dry conditions, apply all around stem

Disposal in municipal compost

\* Proper PPE must be worn when working with this plant



Nancy Dagley, USDI National Park Service, Bugwood.org

[Best Management Practice-](#)  
[Ontario Invasive Plant Council](#)



# Yellow iris

*Iris pseudacorus*

## Identification

Flowers	Leaves	Seed pods
<ul style="list-style-type: none"><li>• Irregular yellow flowers</li><li>• 3 large drooping sepals with purple veins &amp; brown spots at the base</li><li>• 3 smaller erect petals</li><li>• 2-3 flowers per stalk</li><li>• Flowers May-July</li></ul>	<ul style="list-style-type: none"><li>• Blue-green in colour</li><li>• Sword-shaped &amp; flattened in a "V" as they emerge</li><li>• Emerge from base of plant</li><li>• Pink rhizomes</li></ul>	<ul style="list-style-type: none"><li>• Glossy green, oblong capsules</li><li>• Seeds are "puck" shaped</li></ul>



Nancy Loewenstein, Auburn University, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



John Ruter, University of Georgia, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Yellow iris  
*Iris pseudacorus*

Impacts



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Economic	Social	Ecological
<ul style="list-style-type: none"><li>• Mats may clog irrigation systems and storm management ponds</li><li>• Decreases recreational areas in areas of infestation</li></ul>	<ul style="list-style-type: none"><li>• Toxic to humans and animals if ingested</li><li>• Plant sap can cause skin irritation</li></ul>	<ul style="list-style-type: none"><li>• Forms dense mats to shade out native vegetation</li></ul>



# Yellow iris

*Iris pseudacorus*

## Management

### *Mechanical Control*

#### **Hand pulling & digging**

- April-June
- Several times throughout growing season
- Wear gloves pulling entire rhizome
- Use sharp spade & remove entire rhizome

#### **Selective cutting in water**

- April-June
- Remove leaves and cut stem below waterline, submerge all stems in 10cm of water

#### **Remove seed pods**

- Wear gloves & use clippers to sever seed pods
- Dispose in garbage bags

#### **Benthic barriers**

- Once a year to be placed over several growing seasons
- Cut plant down to base
- Place heavy PVC barrier (dig trench & push liner into sediment)

Disposal should be removed from site & placed into garbage bags in the sun for 2-3 weeks



*Leslie J. Mehrhoff, University of Connecticut, Bugwood.org*