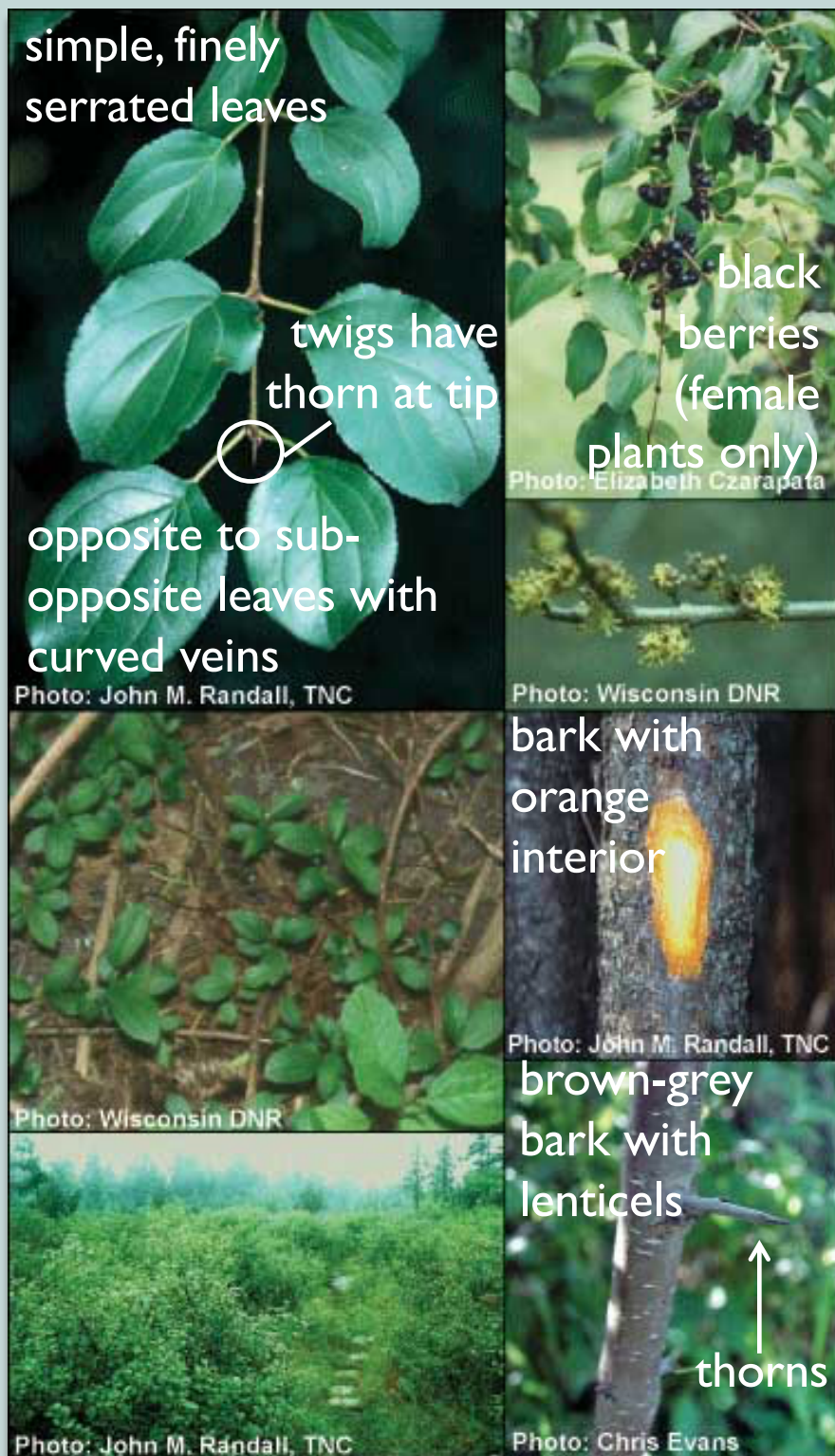


COMMON BUCKTHORN (*Rhamnus cathartica*)

Key Features

Habit: Small tree to shrub, grows up to 7.5 meters tall



Native Alternatives

Alderleaf buckthorn (*Rhamnus alnifolia*)

Choke cherry (*Prunus virginiana*)

Downy serviceberry (*Amelanchier arborea*)

American highbush cranberry (*Viburnum trilobum*)

Learn more about
this species here -->



Negative Impacts

- **Changes the nitrogen availability** in the soil, disadvantaging native species
- Tolerant of shade, drought, and moisture—**forest understory invader**
- **Leafs out early and stays green longer** into autumn than natives
- Fruits spread by birds and mammals



Invasive buckthorn before, during and after use of the Buckthorn Baggie.

Photo credit: Buckthorn Baggie

Removal Methods

Pulling/Digging: Pull out including the root or dig up in looser soils. Root wrench can be borrowed from KISMA

Cutting and Stump Smothering: Cut stump 6 in. above ground, cover stump and surrounding soil with Buckthorn Baggies or double thick plastic, and cinch tightly with zip tie. Leave for one year and monitor for re-sprouts, which can be cut.

Herbicide: Can be used for larger infestations/trees where roots cannot be removed or stump smothering cannot be accomplished, since buckthorn is a prolific stump sprouter. Note: If using herbicides, please see DNR best practices listed online.



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GLOSSY BUCKTHORN (*Frangula alnus*)

Key Features

Habit: Small tree, multiple stems, may grow up to 6 meters tall

simple, smooth margin, alternate leaves with veins curved toward tip

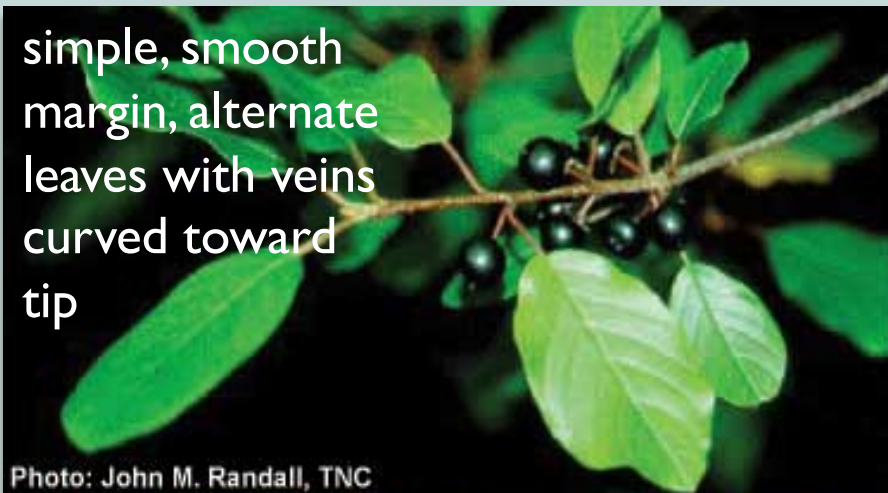


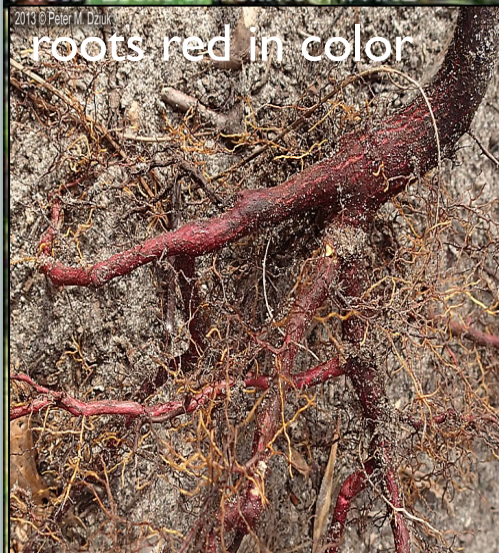
Photo: John M. Randall, TNC

immature drupes with leaf underside, ripen to black in late summer



Photo: Leslie J. Mehrhoff, IPANE

roots red in color



Brown-green stems with white specks (lenticels)

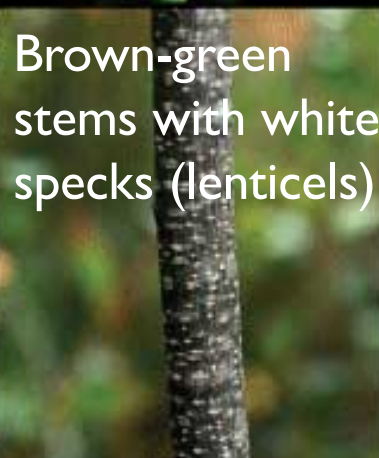


Photo: John M. Randall, TNC

clusters of 2-6 flowers, 4 petals each



Photo: Leslie J. Mehrhoff, IPANE

green-yellow in color

Negative Impacts

- Outcompetes native plants, **reducing resources** in many habitats—wetland and forest understory invader
- **Leafs out before** many natives and **leaves stay green longer** into the fall
- Fruits spread by birds and mammals



Photo credit: Sigrid Resh

Glossy buckthorn branch with immature berries

Removal Methods

Pulling/Digging: Pull out including the root or dig up in looser soils. Root wrench can be borrowed from KISMA

Cutting and Stump Smothering: Cut stump 6 in. above ground, cover stump and surrounding soil with Buckthorn Baggies or double thick plastic, and cinch tightly with zip tie. Leave for one year and monitor for re-sprouts that can be cut.

Herbicide: Can be used for larger infestations/trees where roots cannot be removed or stump smothering cannot be accomplished, since buckthorn is a prolific stump sprouter. Note: If using herbicides, please see DNR best practices listed online.

Source:

<https://mnfi.anr.msu.edu/invasivespecies/GlossyBuckthornBCP.pdf>

This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)

Native Alternatives

Choke cherry (*Prunus virginiana*)

Black chokeberry (*Aronia melanocarpa*)

Downy serviceberry (*Amelanchier Arborea*)

American highbush cranberry (*Viburnum trilobum*)

Learn more about this species here -->



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JAPANESE BARBERRY (*Berberis thunbergii*)

Key Features

Habit: 0.5-1 meter tall spiny shrub



Negative Impacts

- Helps spread **Lyme disease** by sheltering small mammals that host deer ticks
- Outcompetes native plants, creating a **monoculture** in the forest understory
- Drought and shade tolerant, avoided by deer
- **Raises soil pH**, reduces leaf litter, **alters nitrogen levels** and earthworm presence



Barberry infestation in understory of Tolkien Trails

Native Alternatives

Fragrant sumac (*Rhus aromatica*)
Black chokeberry (*Aronia melanocarpa*)
Ninebark (*Physocarpus opulifolius*)
American highbush cranberry
(*Viburnum trilobum*)

Learn more about
this species here →



Removal Methods

Pulling/Digging: Can be pulled out by the root or dug up. Wear thick gloves for protection from spines.

Cutting/Herbicide: Cutting will not completely remove barberry; however, combined with digging or herbicide treatments it can be effective.

Note: If using herbicides, please see DNR best practices listed online.

JAPANESE KNOTWEED (*Fallopia japonica*)

Key Features

Habit: non-woody herb, up to 3 meters tall

simple, alternate leaves with sharp point and flat base

Photo: Bradley Kriekhaus, USDA

shiny fruit with three wings

Photo: Jill M. Swearingen, NPS

small, light green flowers in summer

Photo: Britt Slattery, USFWS

Photo: JMandy Tu, TNC

bamboo-like hollow stalk

Photo: Barry A. Rice, TNC

Photo: Mandy Tu, TNC

Native Alternatives

Spikenard (*Aralia racemosa*)

Red-osier dogwood (*Cornus sericea*)

Thimbleberry (*Rubus parviflorus*)

Learn more about this species here -->



Negative Impacts

- Creates **dense monocultures** along riparian zones and disturbed areas
- Can **increase erosion** along streambanks
- Outcompetes native species, **lowering** compositional **diversity**



Photo credit: Sigrid Resh

Smothering with repeated cutting of Japanese knotweed

Removal Methods

Cutting/Digging: Generally is not recommended unless frequently (2-3 week) recut with plant parts removed, as entire plant may regenerate from plant fragments.

Smothering with Repeated Cutting:

Smother with old carpet or thick tarps.

Regrowth must be recut every 2-3 weeks through growing season. Plant material must be dried in sun away from contact with soil.

Herbicide: Herbicide treatments are possible since knotweed spreads aggressively. Note: If using herbicides, please see DNR best practices listed online.



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Source: <https://mnfi.anr.msu.edu/invasive-species/JapaneseKnotweedBCP.pdf>

This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)

GIANT KNOTWEED (*Fallopia sachalinensis*)

Key Features

Habit: non-woody herb, up to 4 meters tall

simple, alternate,
large, heart-shaped
leaves



Photo: Wisconsin DNR



Photo: Tom Heutte, USDA FS



bamboo-like
hollow stalk



small, light green
flowers in summer
Photo: Wisconsin DNR



Photo: Wisconsin DNR

Native Alternatives

Spikenard (*Aralia racemosa*)

Red-osier dogwood (*Cornus sericea*)

Thimbleberry (*Rubus parviflorus*)

Learn more about
this species here -->



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Negative Impacts

- Creates **dense monocultures** along riparian zones and disturbed areas
- Can **increase erosion** along streambanks
- Outcompetes native species, **lowering** compositional **diversity**



Photo credit: Sigrid Resh

Smothering with repeated cutting of giant knotweed

Removal Methods

Cutting/Digging: Generally is not recommended unless frequently (2-3 week) recut with plant parts removed, as entire plant may regenerate from plant fragments.

Smothering with Repeated Cutting: Smother with old carpet or thick tarps. Regrowth must be recut every 2-3 weeks through growing season. Plant material must be dried in sun away from contact with soil.

Herbicide: Herbicide treatments can be used. Note: If using herbicides, please see DNR best practices listed online.

GARLIC MUSTARD (*Alliaria petiolata*)

Key Features

Habit: Herbaceous, up to 1 meter tall



Negative Impacts

- **Allelopathic:** alters fungal communities that native species rely on
- **Outcompetes** native herbaceous species, impacting foragers
- Potentially **toxic to some insects:** eggs laid on leaves fail to hatch

Look Alikes



Left leaf: First year garlic mustard leaf, deep veins, smells like garlic; Right leaf: Invasive creeping Charlie, rounded leaf margin, smells like mint



Native violet leaf with shallow teeth and pointed tip

Native Alternatives

- Wild geranium (*Geranium maculatum*)
- Great white trillium (*Trillium grandiflorum*)
- Canada Anemone (*Anemone canadensis*)

Removal Methods

Pulling/Root Slicing: Recommended for smaller patches. Pull prior in early summer before seeds are dispersed. Root slicing must sever the taproot 1-2" below surface.

Herbicide: Herbicide treatments can be used for large patches. Note: If using herbicides, please see DNR best practices listed online.

Learn more about this species here -->



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Source: <https://mnfi.anr.msu.edu/invasive-species/GarlicMustardBCP.pdf>
This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)

PURPLE LOOSESTRIFE (*Lythrum salicaria*)

Key Features

Habit: Herbaceous, up to 2 meters tall



Negative Impacts

- Drastically **alters wetland communities**, disturbing fisheries, and migratory nesting habitat
- Intrudes into drier landscapes, causing economic **damage to farmland**



Galerucella biocontrol beetles eating purple loosestrife at the Nara wetland boardwalks

Native Alternatives

Swamp milkweed (*Asclepias incarnata*)
Marsh Blazing Star (*Liatris spicata*)
Blue Vervain (*Verbena hastata*)
Joe Pye weed (*Eutrochium purpureum*)

Removal Methods

Biological Control: Recommended for this species. *Galerucella sp.* can successfully remove >90% biomass from a loosestrife community.

Pulling/Digging: Recommended for small infestations before seed production. Taproot must be removed.

Learn more about
this species here -->



WILD PARSNIP (*Pastinaca sativa*)

Key Features

Habit: Herbaceous, up to 1.5 meter tall



small yellow flowers with 5 petals



hairy and grooved stems



flowers arranged in umbel



alternate leaves



seeds viable 4 years

Negative Impacts

- **Plant contains phototoxic chemicals**, causing skin **rashes, burns, and blisters** when exposed to sunlight
- Moves into disturbed habitats, along edges and or in disturbed patches
- **Spreads rapidly** and can **severely modify** open dry, moist, and wet-moist habitats



Photo credit:Vermont Invasives

Roadside covered in dense patch of wild parsnip

Native Alternatives

Cow parsnip (*Heracleum lanatum*)

Golden alexanders (*Zizia aurea*)

Sweet smooth ox-eye (*Heliopsis helianthoides*)

Learn more about this species here -->



Removal Methods

Pulling/Cutting: Pull up roots or cut below the soil surface before seed set. If flowering has begun, cut stem with flowers, and remove flower and seed heads from site. Be sure to wear protective clothing to reduce risk of skin reaction.

Chemical: Foliar herbicide treatment is effective on basal rosettes. Note: If using herbicides, please see DNR best practices listed online.

Sources:

<https://www.misin.msu.edu/facts/detail/?project=misin&id=40&cname=Wild+parsnip>
<https://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/wildparsnip.html>

This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)

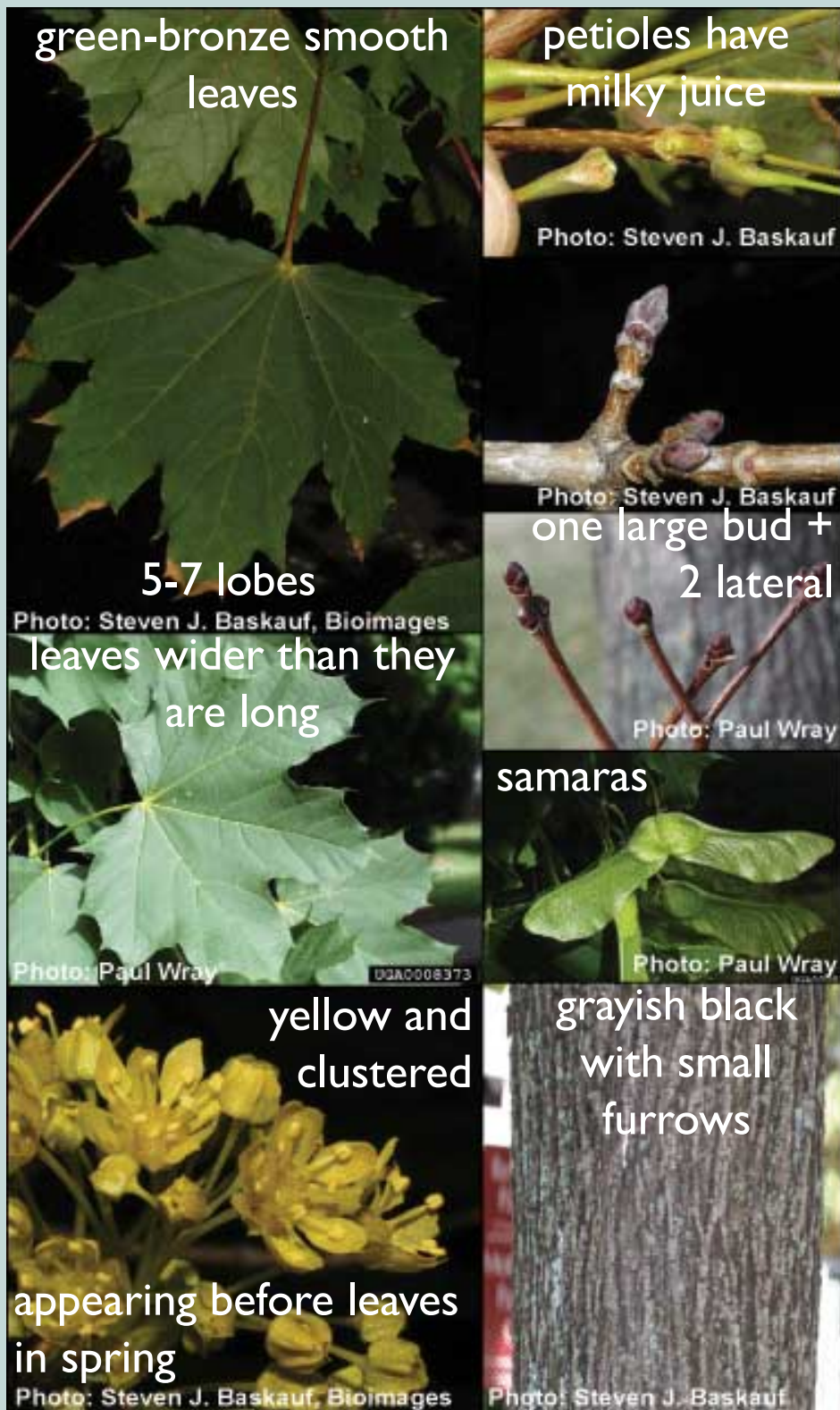


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NORWAY MAPLE (*Acer plantanoides*)

Key Features

Habit: tree, reaching 12-18 meters in height and 30-60 cm in diameter



Native Alternatives

Sugar maple (*Acer saccharum*)

Basswood (*Tilia americana*)

Learn more about this species here -->



Sources:

<https://www.misin.msu.edu/facts/detail/?project=misin&id=3&cname=Norway+maple>

<https://www.mortonarb.org/trees-plants/tree-plant-descriptions/norway-maple-not-recommended>

This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)

Negative Impacts

- Creates **dense shade** and monopolizes soil moisture
- **Regenerates prolifically** under its own canopy, reducing overall plant diversity
- Rapid spread due to **heavy seed production**
- Host to unsightly **tar spot**, a fungus (*Rhytisma* sp.), which is also non-native, causing early leaf drop



Photo credit: Bill Ostrofsky, Maine Forest Service

Late stage tar leaf spot on Norway maple

Removal Methods

Pulling/Cutting: Hand pull seedlings in the spring while soil is moist. Cutting and girdling are effective when herbicide is applied to cut-stump.

Herbicide: Basal bark treatment is effective for trees less than 10 cm in diameter. Herbicide must be applied to cut-stump or regrowth will occur. Note: If using herbicides, please see DNR best practices listed online.



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EUROPEAN SWAMP THISTLE (*Cirsium palustre*)

Key Features

Habit: Herbaceous biennial, 0.5-1.5 meters in height



Native Alternatives

- Native Marsh Thistle (*Cirsium muticum*)
- Swamp milkweed (*Asclepias incarnata*)
- Joe Pye weed (*Eutrochium purpureum*)

Learn more about this species here -->



Negative Impacts

- Found along roadsides, old fields, in wetlands, forest edges, beach and dune areas
- Aggressively colonizes natural areas, **decreasing biodiversity**
- Compromise the ecological integrity** of an area



KISMA Weed Crew pulling invasive thistle at Gratiot Lake Conservancy beaver pond in the Keweenaw

Removal Methods

- Pulling/Cutting:** Annually hand pull or dig rosettes. Repeated pulling of 2nd year plants (before seeding) will eventually deplete seed source and diminish populations. If thistle has flowered, clip and bag flower heads for disposal.
- Herbicide:** Foliar spray when plants are 6-10” tall, during bud to flower phase, or apply directly to rosettes. Note: If using herbicides, please see DNR best practices listed online.

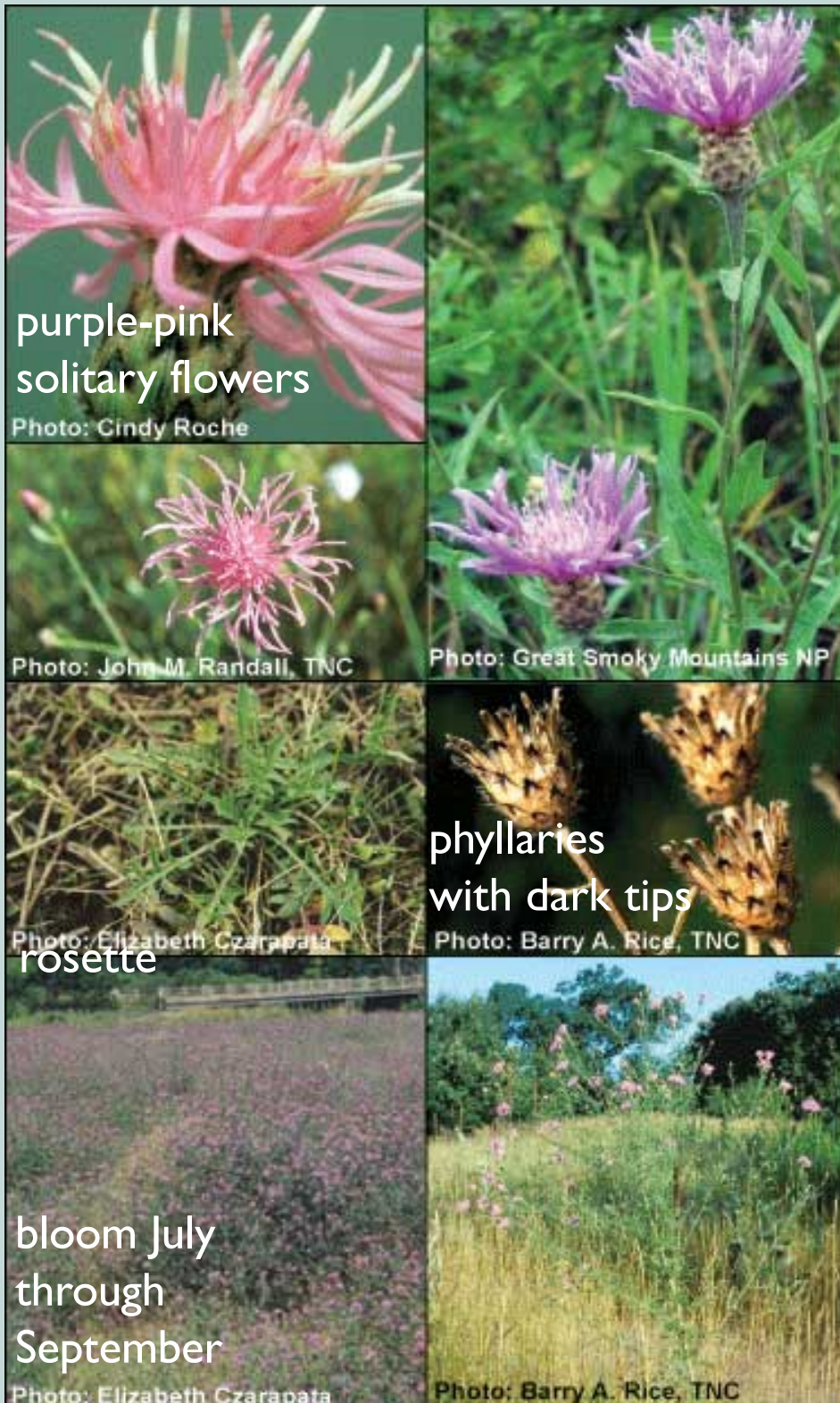
Sources:
<https://dnr.wi.gov/topic/Invasives/fact/EuropeanMarshThistle.html>
<https://www.misin.msu.edu/facts/detail/?project=misin&id=39&cname=European+swamp+thistle>
This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)



SPOTTED KNAPWEED (*Centaurea stoebe*)

Key Features

Habit: Herbaceous biennial or perennial reaching 0.6-1.2 meters



Native Alternatives

Blue giant hyssop (*Agastache foeniculum*)
Aromatic aster (*symphyotrichum oblongifolium*)
Canada tick trefoil (*Desmodium canadense*)

Learn more about
this species here -->



Negative Impacts

- Spotted knapweed is **poisonous** to other plants (allelopathic)
- Ubiquitous but worthy of controlling on dunes, beaches, and areas with native diversity
- Has become a serious problem in **pastures and rangeland** of the western states



Students display large taproot pulled at Huron Creek

Removal Methods

Digging/Mowing: Digging is only effective when taproot is removed. A combination of digging and using a root wrench is effective in uprooting plant. Mow before plant goes to seed.

Biological Control: Seedhead weevils, root-boring weevils, and seedhead flies are commonly used

Sources:

<https://www.misin.msu.edu/facts/detail/?project=misin&id=35&cname=Spotted+knapweed>

<https://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/spottedknapweed.html>

This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)



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EURASIAN WATERMILFOIL (*Myriophyllum spicatum*)

Key Features

Habit: Submergent aquatic perennial, 1-3 meters in length



Native Alternatives

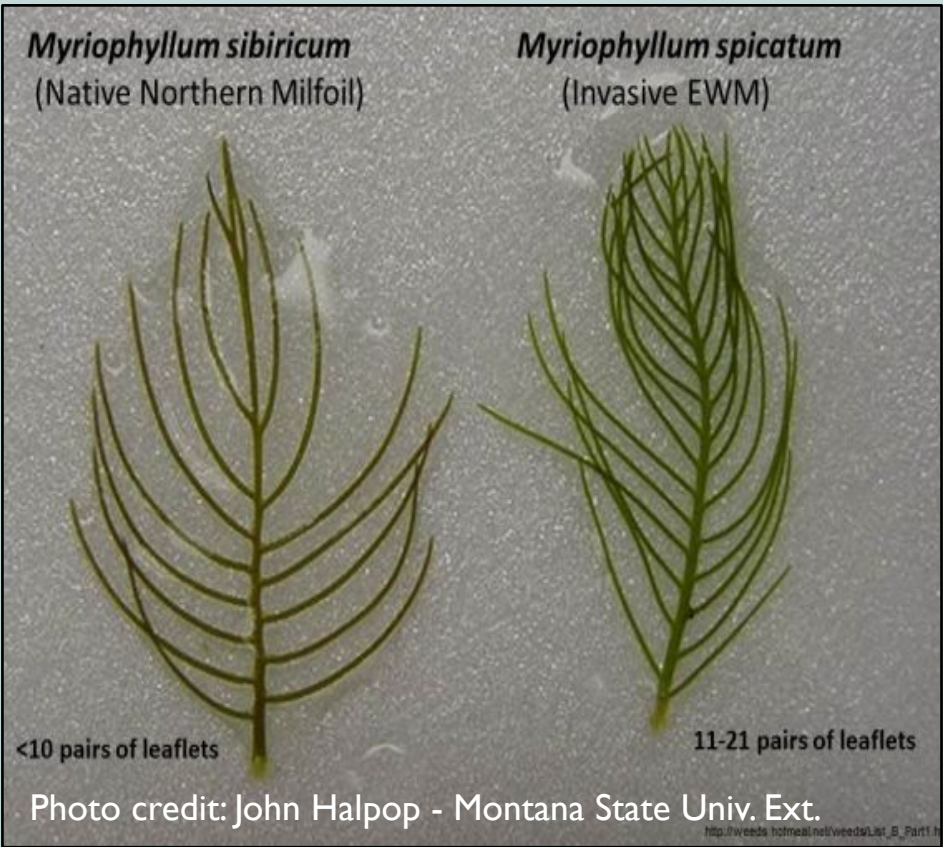
Northern Watermilfoil (*Myriophyllum exalbescens*)
Coontail (*Ceratophyllum demersum*)

Learn more about this species here -->



Negative Impacts

- Dense mats at the water's surface **inhibit water recreationists**
- **Outcompetes native aquatic plants**, potentially **lowering diversity**
- Provides **unsuitable shelter, food, and nesting habitat** for native animals



Comparison of Northern and Eurasian Milfoils

Removal Methods

Cutting/Pulling: Mechanical control can be done by cutting or pulling the plant by hand, or with equipment such as rakes or cutting blades. Permit required, contact DNR Specialist for more information.

Herbicide: Permit required for herbicide application to Eurasian Watermilfoil. If using herbicides, please see DNR best practices listed online.

Sources:
<https://www.dnr.state.mn.us/invasives/aquaticplants/milfoil/index.html>
<https://www.misin.msu.edu/facts/detail/?project=misin&id=44&cname=Eurasian+watermilfoil>
This project was funded by the Michigan Invasive Species Grant Program (www.michigan.gov/invasives)