HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

Curly-leaf Pondweed
(*Potamogeton crispus*)

SEARCH LOCATIONS
- In water **3-10 feet deep**
- Fragments along shoreline

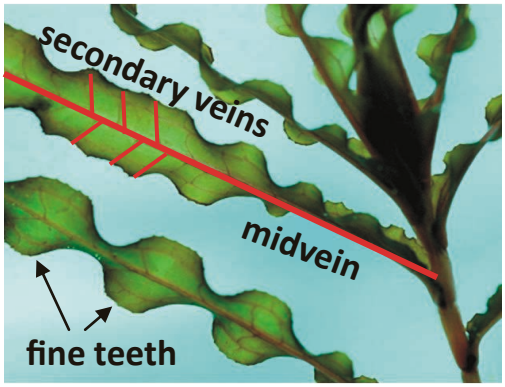
SEARCH TIME
- **Ice-off through August**

SEARCH IMAGE
- Submerged **"lasagna"** leaves

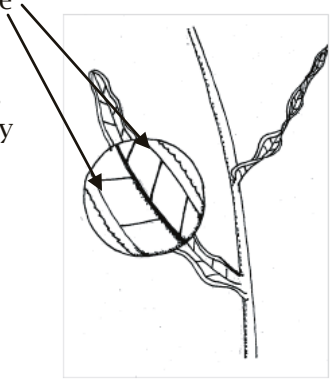
IDENTIFICATION CHECKLIST

✓ 1) Leaf edges have **fine teeth**

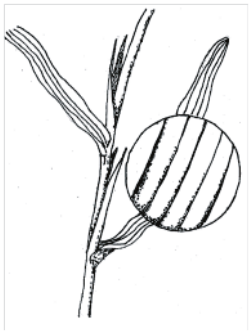
✓ 2) Leaves have **secondary veins branching** from the midvein

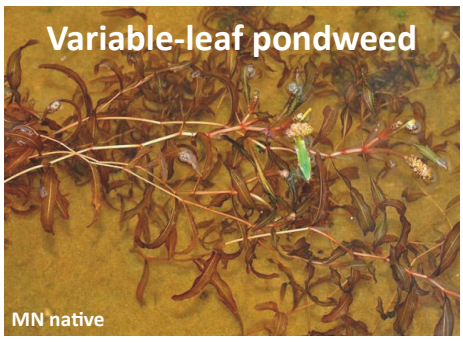


OTHER HELPFUL HINTS
- A single **leaf vein runs parallel** to the leaf edge
- Leaf tips are **blunt** (not pointed)
- Branching stems may/not form **mats** just below water surface (flowers may extend above water)

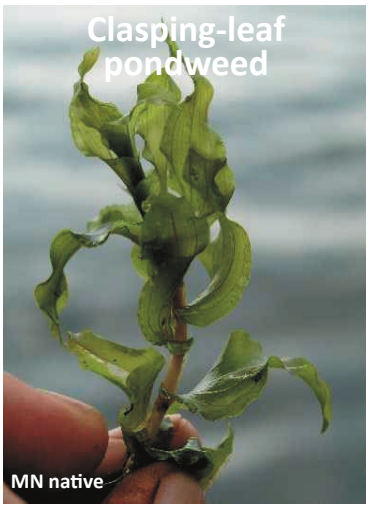


LOOK-ALIKES with "lasagna" leaves





These native look-alikes have **parallel** (not branching) **leaf veins**



INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Curly-leaf Pondweed (*Potamogeton crispus*)

MINNESOTA STATUS: *Prohibited invasive species*

It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce curly-leaf pondweed except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE OF CURLY-LEAF PONDWEED

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

- "Turions" (dormant buds; see images below) form on the plants, sink and lie dormant on the lake bottom during the hottest part of summer; they germinate in the fall and live under the ice during winter
- Stem segments can root and grow into new plant (stems break from waves, boat propellers, harvesting)
- Underground stems (rhizomes) spread outward from original plant to form new plants
- No germination of seeds has been observed

VECTORS OF SPREAD

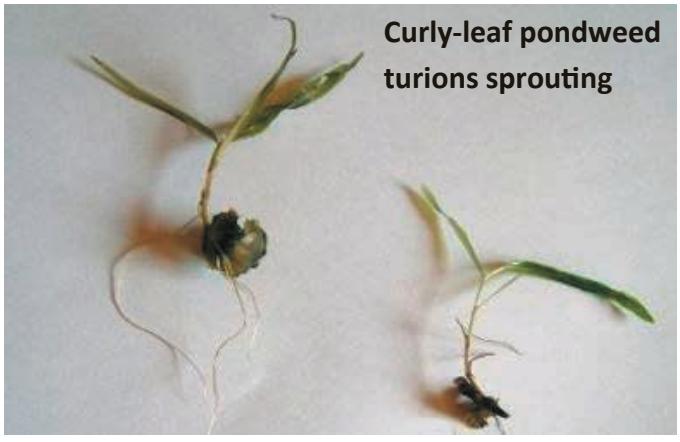
- Plants or stem fragments in/on boats, motors, live wells, bilges, boat trailers, other equipment

RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf

Curly-leaf pondweed with turion



Curly-leaf pondweed turions sprouting

HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

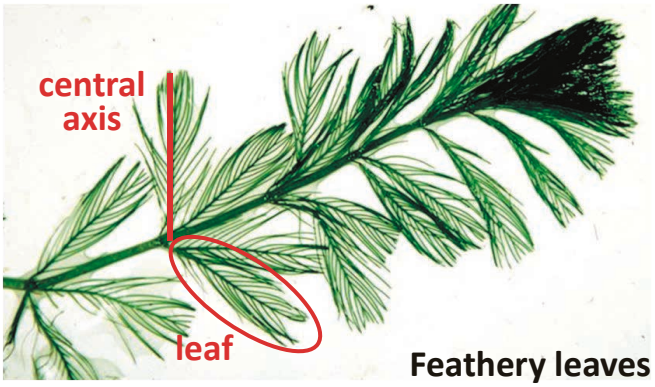
Eurasian Watermilfoil
(*Myriophyllum spicatum*)

SEARCH LOCATIONS
- In **3-12 feet of water** in lake or bay with soft sediment
- Fragments along shoreline

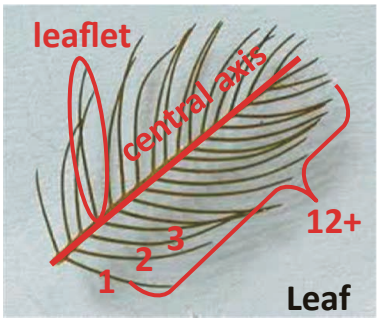
SEARCH TIME
- **May through September**

SEARCH IMAGE
- Submerged **feathery leaves**

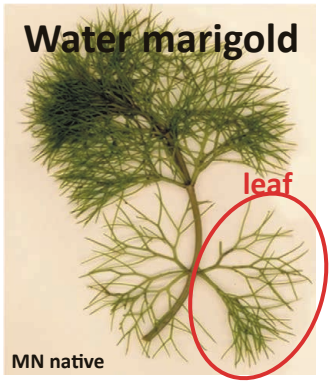
IDENTIFICATION CHECKLIST
- ✓ 1) Leaf has a **central axis**
- ✓ 2) Leaflet **does not branch**
- ✓ 3) **12 or more leaflet pairs** on leaf (hint: *count the leaflets on one side of the axis*)



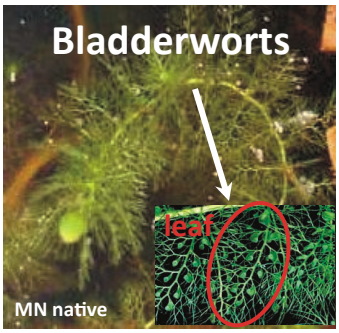
OTHER HELPFUL NOTES
- Leaves **hang limp** when out of water
- Leaflets at the ends of the leaves tend to form a **blunt tip**—rather than tapered
- Plants may have a **reddish hue**
- Branching stems may/not form **mats** just below water surface (flowers may extend above water)



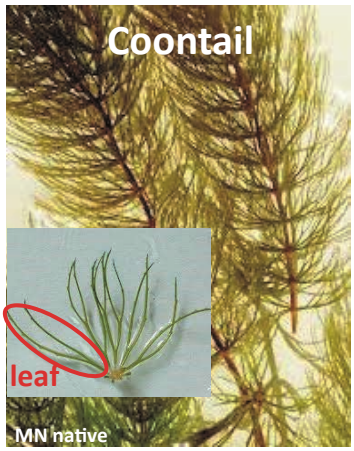
LOOK-ALIKES with submerged feathery leaves



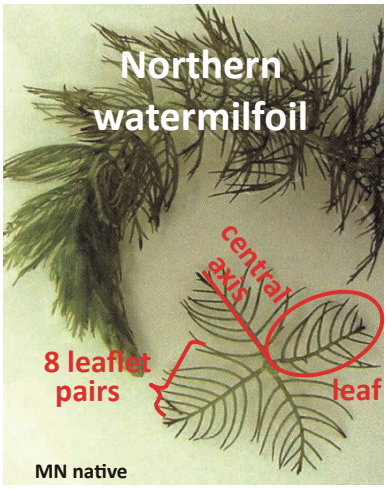
- Leaflets branch
- Leaf with no central axis



- Leaflets branch
- Leaf with no central axis
- Leaves with small sacs



- Forked leaf
- Leaf with no central axis



- Leaf with central axis
- Less than 12 leaflet pairs

INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Eurasian Watermilfoil (*Myriophyllum spicatum*)

MINNESOTA STATUS: *Prohibited invasive species*

It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce Eurasian watermilfoil except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE OF EURASIAN WATERMILFOIL

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

- Stem segments can root and grow into new plant (stems break from waves, boat propellers, harvesting)
- Underground stems (rhizomes) spread outward from original plant
- Seeds have poor germination

VECTORS OF SPREAD

- Plants or stem fragments in/on boats, motors, live wells, bilges, boat trailers, other equipment

RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf

BIOCONTROL FOR EURASIAN WATERMILFOIL

HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

Faucet Snail
(*Bithynia tentaculata*)

MN DNR

SEARCH LOCATIONS
- On **substrate** year round (river and lake bottoms on/under rock, sand, clay or mud)
- On **aquatic plants** during the warmer months
- On **docks** and other objects placed in the water
- Shorelines in water **up to 5 meter depth**

SEARCH TIME
- Snails may be found **year round**

SEARCH IMAGE
- **Spiral-shell** snail
- **Up to 0.5 inches** long

IDENTIFICATION CHECKLIST

✓ 1) **Corkscrew-like** — spiral tapers to a point


Amy Benson, USGS

MN Sea Grant

MN NATIVE LOOK-ALIKES with **tiny, spiral snail** shells

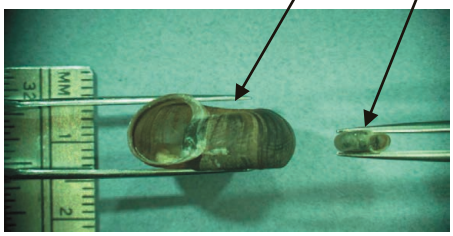
Fossaria snails
~ 1/2 inch

- Very similar to faucet snails—consult a professional to distinguish from faucet snails


Andrew Hicks et al.

Planar snails

- Spiral is **in a single plain**—does not taper to a point



INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Faucet Snail

(*Bithynia tentaculata*)

MINNESOTA STATUS: *Prohibited invasive species*

It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce faucet snails except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE OF ANY SMALL SNAIL THAT FITS THE FAUCET SNAIL DESCRIPTION

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

- Female snails lay their eggs on rocks, wood and shells
- Egg-laying occurs from May to July when water temperature is 20ºC or higher—fecundity may reach up to 347 eggs and is greatest for the 2nd year class.
- Eggs hatch in three weeks to three months, depending on water temperature—growth usually does not occur from September to May.
- Lifespan varies regionally and can be anywhere from 17 – 39 months

PATHWAYS OF SPREAD

- Snails can spread by attaching to aquatic plants, boats, anchors, decoy anchors, other recreational gear and equipment placed in the water.
- Some movement by waterbirds may also spread this invasive to new waters.

OTHER INFORMATION

- Faucet snails can close their shells allowing them to survive out of water for days.
- Eradicating infestations is nearly impossible.
- They host three intestinal flukes that can kill scaup, coots, and other waterfowl that consume them.

RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf

Since it is difficult to distinguish the native snails from the non-native, invasive Faucet snail, ***please report every occurrence of tiny, corkscrew-like snails.***

HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

Flowering Rush
(*Butomus umbellatus*)

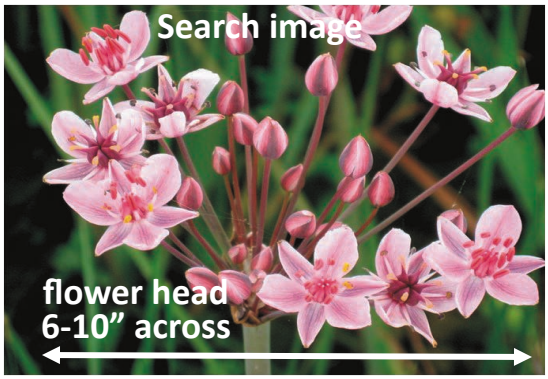
SEARCH LOCATIONS
- River, lake and stream edges
- **Emerging from water** up to 4 feet deep

SEARCH TIME
- **July through August** (flowering)

SEARCH IMAGE
- **Pink-white flower** head, **6-10 inches** in diameter
- **3-6 feet** tall

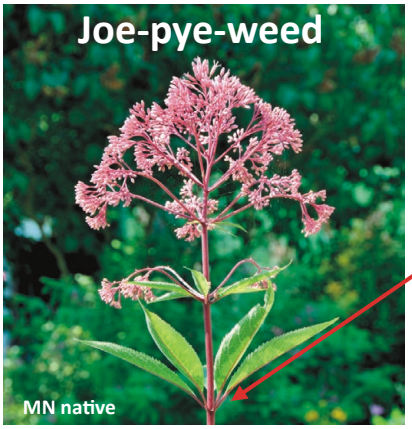
IDENTIFICATION CHECKLIST

✓ 1) **No leaves** on flower stalks



LOOK-ALIKES with **tall, large, pink-white flower** heads found along lake, river and stream edges

Marsh milkweed **has leaves on flower stalk**



Joe-pye-weed **has leaves on flower stalk**

INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Flowering Rush (*Butomus umbellatus*)

MINNESOTA STATUS: *Prohibited invasive species*

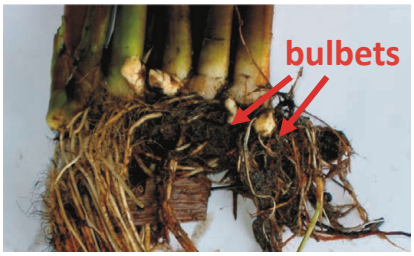
It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce flowering rush except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE OF FLOWERING RUSH

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

- "Bulbets" form at the base of the leaves (see image at right) and can root to form a new plant
- Underground stems (rhizomes) spread slowly outward from original plant
- Seeds are often not viable in Midwest



VECTORS OF SPREAD

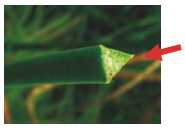
- Water currents, ice action and muskrats can spread bulbets (and seeds)

RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

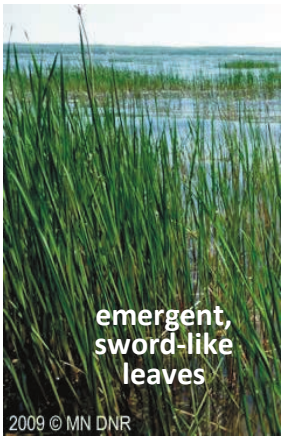
MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf

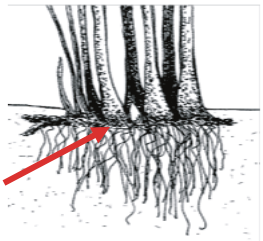
IDENTIFICATION OF FLOWERING RUSH WHEN *NOT FLOWERING*:



SEARCH IMAGE

- emergent, **sword-like leaves**
- leaves are **triangular** in cross-section and may flatten and spiral at the tip

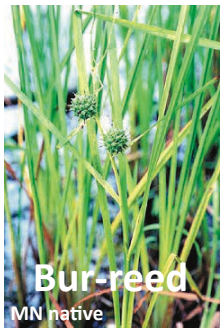


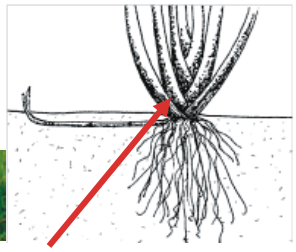


IDENTIFICATION CHECKLIST

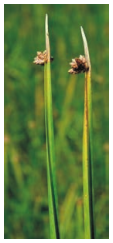
✓ 1) leaves **attach parallel**
2) and **adjacent** to each other at the base of the plant

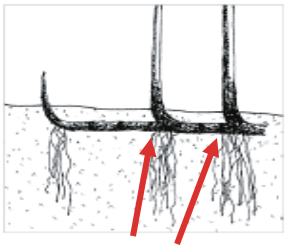
NATIVE LOOK-A-LIKES with sword-like leaves (stems) that are triangular in cross-section





- Fan-shaped attachment





- Stems attach **parallel**, but **distant to each other**

HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

Purple Loosestrife
(*Lythrum salicaria*)

SEARCH LOCATIONS
- Ditches and **wetlands**; river, lake and stream edges; gardens
- Full sun to partial shade

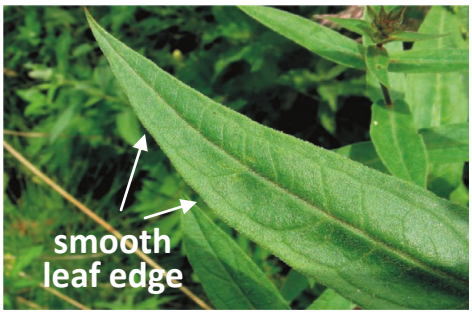
SEARCH TIME
- **Mid-July through early September** (flowering)

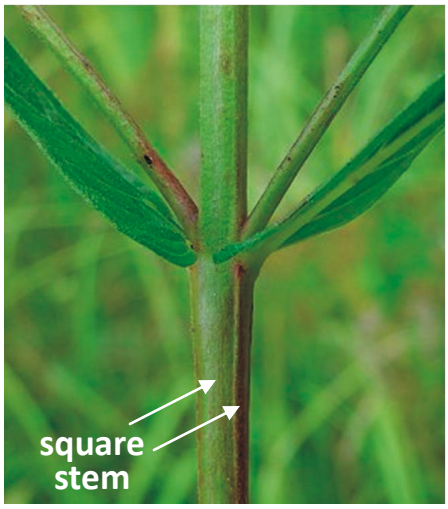
SEARCH IMAGE
- **Magenta flower spike** at top of stem
- **4-7 feet** tall

IDENTIFICATION CHECKLIST
✓ 1) **Square stem** (seldom 5- or 6-sided)

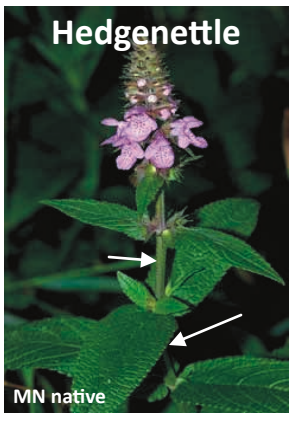
✓ 2) **Smooth leaf edge** (not serrated/toothed)

OTHER HELPFUL NOTES
- A single vein runs parallel to the leaf edge





MN NATIVE LOOK-ALIKES with magenta flower spikes that grow in wet areas



Hedgenettle has a **square stem** and **toothed leaf edge**

These three look-alikes have **round stems** and **smooth leaf edges**

INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Purple Loosestrife (*Lythrum salicaria*)

MINNESOTA STATUS: *Prohibited invasive species*

It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce purple loosestrife except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE OF PURPLE LOOSESTRIFE

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

Up to 300,000 seeds per spike are produced each year (survival rate is 60-70%; seeds are viable for up to 20 years and up to 20 months submerged in water)

- Underground stems (rhizomes) spread rapidly outward from original plant to form dense stands

PATHWAYS OF SPREAD

- Most seeds fall near parent
- Water currents, animals, boats and other recreational equipment and humans can transport the tiny seeds long distances

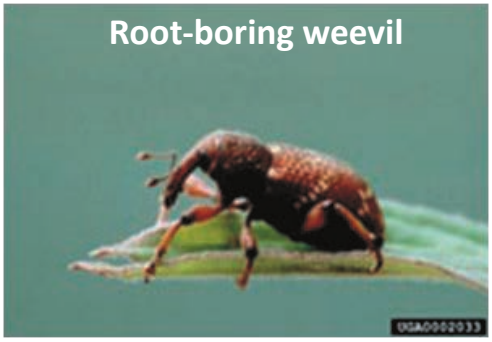
RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf

PURLPLE LOOSESTRIFE BIOCONTROLS


Leaf-feeding weevil


Root-boring weevil


Flower-feeding weevil

HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

Spiny waterflea (*Bythotrephes longimanus*) and Fishhook waterflea (*Cercopagis pengoi*)


Emily DeBolt

SEARCH LOCATIONS

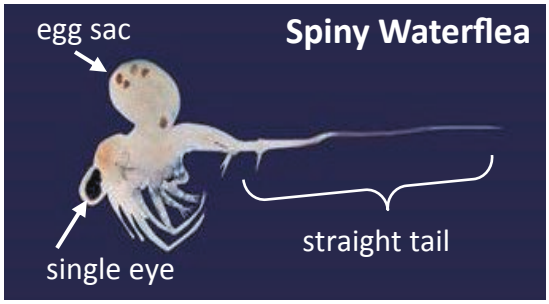
- Daytime: in **deep or dark water**
- Nighttime: **near surface**

SEARCH TIME

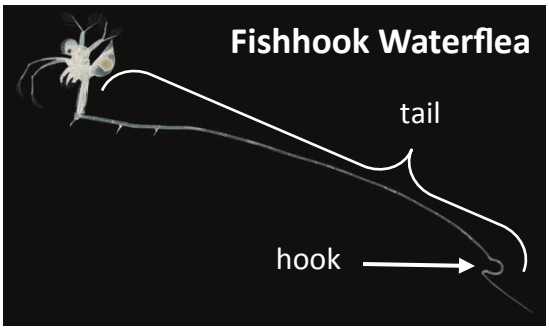
- **May through October**

SEARCH IMAGE

- **Gelatinous mass** on fishing line, downrigger cable or anchor rope
- (Dark spots are single eyes of water fleas and/or eggs in sac)



Bill O'Neil



www.iisgcp.or

IDENTIFICATION CHECKLIST

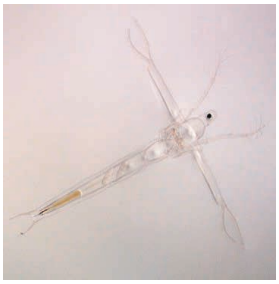
✓ 1) **5-15 mm** in length (difficult to determine without magnification)

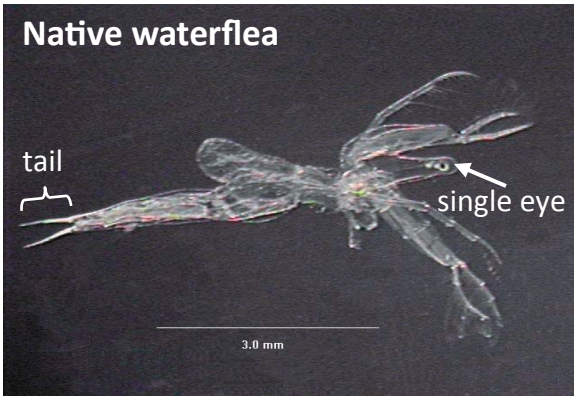
✓ 2) **Slender** tail is **longer than the body**

✓ 3) The barbed tail is **straight** (Spiny waterflea) or with a **distinct kink** or hook (Fishhook waterflea)

MN NATIVE LOOK-ALIKES occurring as a **gelatinous mass** on fishing line etc.

- **Up to 6 mm** in length
- Tail is **less than one body length**
- Tail is **forked**


UNH Center for Freshwater Biology



Zooplankton Project. http://www.cnas.missouristate.edu/zooplankton/default.htm

INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Spiny waterflea (*Bythotrephes longimanus*) and Fishhook waterflea (*Cercopagis pengoi*)

MINNESOTA STATUS: *Prohibited invasive species*

It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce spiny waterflea or fishhook waterflea except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE THAT FITS THE SPINY OR FISHHOOK WATERFLEA DESCRIPTION

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

- Waterfleas can reproduce asexually as well as sexually.
- Unfertilized eggs are carried in a brood pouch, and fertilized eggs are cast in the fall, hatching the following spring (Evans 1988).

PATHWAYS OF SPREAD

- Waterfleas can spread by attaching to fishing lines, downriggers, anchor ropes, and fishing nets.
- While female waterfleas die out of water, under certain conditions they produce eggs that resist drying and freezing, and can establish a new infestation.
- They also can be unintentionally transported in bilge water, bait buckets, or livewells.

RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf

Since it is difficult to distinguish the native Leptodora from the non-native, invasive waterfleas, ***please report every occurrence of a gelatinous mass found on fishing lines, anchor ropes, and/or downrigger cables.***

HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH

Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena rostriformis bugensis*)

U.S. Fish and Wildlife Service

SEARCH LOCATIONS

- In **4 feet or greater** of water on **hard surfaces** (zebra & quagga) and **soft surfaces** (quagga)
- Current-year mussels may also be in shallower water

SEARCH TIME

- **Adult mussels** may be found **year round**
- **Current-year mussels** become visible to the naked eye in **August**

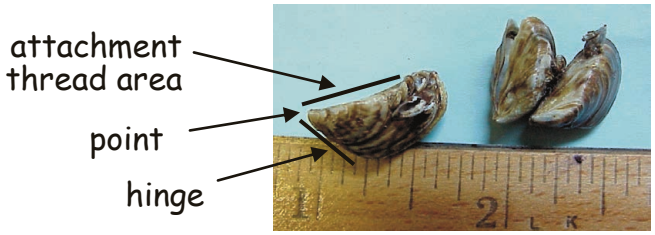
SEARCH IMAGE

- **Small**— up to 1.5 inches long
- **Clam-like**—two shells joined at a hinge

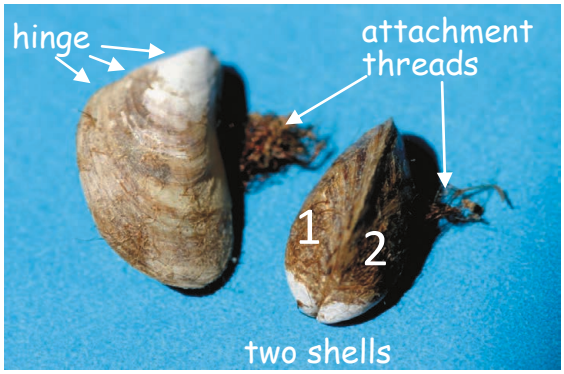
IDENTIFICATION CHECKLIST

✓ 1) **Threads** attach mussel to objects

✓ 2) Thread and hinge areas of shell are straight/flat, tapering to a **distinct point**



Jim Mason



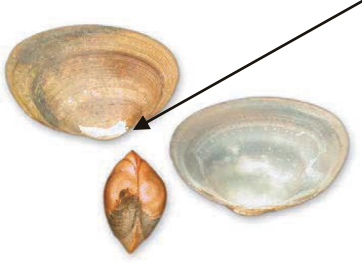
Robert Korth

MN NATIVE LOOK-ALIKES with **small, clam-like** shells

Fingernail clams

~ 1/2 inch

- **No** attachment threads
- Hinge area **rounded**



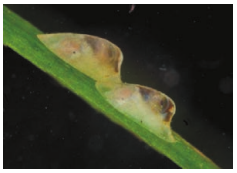
Andrew Hicks et al.

Peter Walker

Limpet snail

~3/8 inch

www.fwgna.o



- **Single shell**
- **No** attachment threads

INFORMATION ON HUBBARD COUNTY AQUATIC INVASIVE SPECIES WATCH:

Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena rostriformis bugensis*)

MINNESOTA STATUS: *Prohibited invasive species*

It is unlawful (a misdemeanor) to possess, import, purchase, transport, or introduce zebra mussels or quagga mussels except under a permit for disposal, control, research, or education.

IF YOU FIND A NEW OCCURANCE OF ZEBRA OR QUAGGA MUSSELS

1) Record its location (GPS coordinates, labeled dot on map or landmark)
2) Record the date
3) Document the plant (electronic images that include items on the "checklist")
4) Provide this information to the local MN DNR Aquatic Invasive Species Specialist. Name and contact information can be found at: **http://www.dnr.state.mn.us/invasives/ais/contacts.html**

METHOD(S) OF REPRODUCTION

- Female zebra mussels can produce 100,000- 500,000 eggs per year.
- These develop into microscopic, free-living larvae (called veligers) that begin to form shells.
- After two-three weeks, the microscopic veligers start to settle and attach to any firm surface using "byssal threads". (MN DNR)

PATHWAYS OF SPREAD

- Mussels attach to boats, nets, docks, swim platforms, boat lifts, and can be moved on any of these objects.
- They also can attach to aquatic plants, making it critical to remove all aquatic vegetation before leaving a lake.
- Microscopic larvae may be carried in water contained in bait buckets, bilges or any other water moved from an infested lake or river.

RESOURCES

Center for Invasive Species and Ecosystem Health: http://www.invasive.org

MN Dept. of Natural Resources: http://www.dnr.state.mn.us/invasives/index_aquatic.html *and* http://files.dnr.state.mn.us/aboutdnr/reports/legislative/2012_invasive_species_annual_report_final.pdf