



A BOATER'S REFERENCE GUIDE TO AQUATIC INVASIVE SPECIES IN THE GREAT LAKES

DEVELOPED IN
COORDINATION WITH
THE GREAT LAKES
AIS LANDING BLITZ

MAY, 2022



Prepared by:
Great Lakes AIS Landing Blitz
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Acknowledgements:

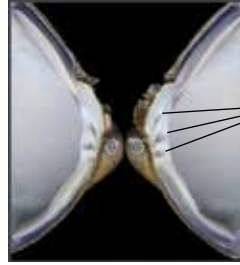
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USGS



Cardinal teeth

Dr. Harry G. Lee, Jacksonville, FL



USGS

Asian Clam

(*Corbicula fluminea*)

Size: Up to 5 cm long (2 inches)

Characteristics:

- Small freshwater clam, rounded triangular shape
- Shells are typically greenish-yellow or brown with thick concentric rings
- Inside of shell is smooth and polished with a light purple tinge
- Three cardinal teeth in each valve (native unionid mussels have none)

New Zealand Mudsnail

(*Potamopyrgus antipodarum*)

Size: 0.5-0.8 cm long (0.2-0.3 inches)

Characteristics:

- Small, slender freshwater snail
- Slender cone-shaped snail with a raised ridge on the body whorls
- Colour is variable, ranging from light to dark brown
- Operculum (thin, plate like cover on the shell opening) is ear-shaped



USGS



D.L. Gustafson

Bill Tate



Quagga Mussel (*Dreissena bugensis*)

Size: Adults are 2-3 cm long (0.75-1.25 inches); larvae (known as veligers) are barely visible to naked eye

Characteristics:

- Small freshwater mussel, sometimes with a striped pattern on shells
- Mussels are pale coloured, from cream to white, and may have darker stripes, bars, or rings
- Rounded triangular shell without a flat surface on hinge area
- Left and right shell sides are asymmetrical

Similar Species: Zebra mussel – has the “D” shaped shell with one flat side.

Ellen Marsden, UVM



Zebra Mussel (*Dreissena polymorpha*)

Size: Adults are 2-4 cm long (0.75-1.5 inches); larvae barely visible to the naked eye

Characteristics:

- Small, freshwater mussel with a striped pattern on shells
- Shells are zigzagged or striped but number of stripes varies; colour patterns can be from light to dark
- “D” shaped shell: flat on hinge side
- Usually attached to objects, surfaces, or other zebra mussels using silky threads (known as byssal threads) excreted near hinge

Similar Species: Quagga mussel – does not have the “D” shaped shell with one flat side.



U.S. Geological Survey Archives, U.S. Geological Survey, www.forestryimages.org

USGS

Banded Mysterysnail

(*Viviparus georgianus*)

Size: Up to 3.5 cm long (1.4 inches)

Characteristics:

- Large freshwater snail with dark spiral bands
- Spherical, inflated shell with 4-5 whorls; whorls separated by deep indents
- Yellow to greenish brown with 3-4 dark reddish-brown spiral bands
- Operculum (thin, plate-like cover on the shell opening) is ear-shaped with concentric growth lines



USGS

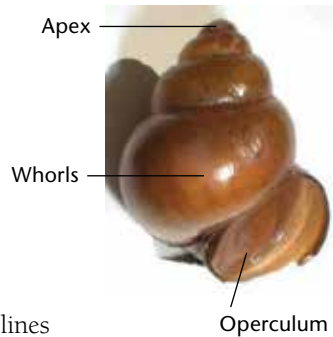
Chinese Mysterysnail

(*Cipangopaludina chinensis*)

Size: Up to 6.5 cm long (2.5 inches)

Characteristics:

- Large freshwater snail
- Spherical, inflated shell with up to 7 whorls; whorls separated by deep indents
- Brownish to olive-green
- Operculum is oblong with concentric growth lines



USGS

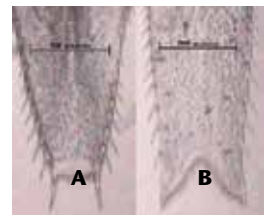
Bloody-Red Shrimp

(*Hemimysis anomala*)

Size: Generally less than 1.2 cm (0.5 inches)

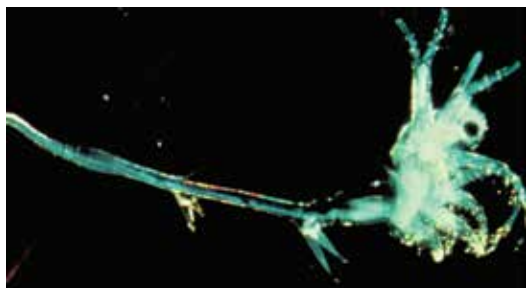
Characteristics:

- Telson or 'tail' has flat end with two prominent terminal spines (photo A), unlike telson of native *Mysis diluviana* which is forked (photo B)
- Spends daylight hours hiding in rocky crevices, but occasionally swarms near the surface
- The shrimp are most often seen during the day in shaded waters as reddish swarms of small animals.



NOAA, Great Lakes Environmental Research Laboratory

US EPA



Jeff Gunderson, Minnesota Sea Grant

Spiny Waterflea

(*Bythotrephes longimanus*)

Size: 1 cm long (0.4 inches); about 60% is tail length

Characteristics:

- Tiny aquatic crustacean, just visible to the naked eye; often collects in jelly-like clumps on fishing lines, cables, and commercial fishing nets
- Clear body with orange, blue, or green colouring
- Long, barbed tail filament; 1-4 pairs of barbs; straight needle-like tip
- Head has a single, large, dark eye



Michigan Sea Grant Program



Tim Mithue, LCRI

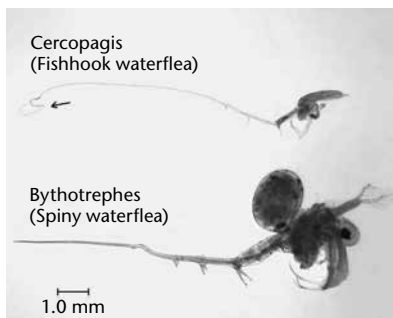
Fishhook Waterflea

(*Cercopagis pengoi*)

Size: Less than 0.5 inches at maturity (12 mm)

Characteristics:

- Long barbed tail filament which makes up 80% of total body length
- Tail can have between 1-4 pairs of barbs running down it
- Four pairs of legs, the first being the longest
- Often collect on fishing lines and downrigger cables
- Unique loop at the end of the tail



NOAA, Great Lakes Environmental Research Laboratory

Both photos: Karen Hahnel, MEDEP



Curly-Leaved Pondweed

(*Potamogeton crispus*)

Size: up to 2 m long (6 feet)

Characteristics:

- A submerged, rooted, aquatic perennial plant
- Oblong leaves, 4-10 cm long (1.5-4 inches) and 0.5-1 cm wide (0.2-0.4 inches), with a midvein, wavy edges, and finely-toothed margins; arranged along the stem in alternating pattern; reddish-green coloured
- Flattened, branching stems
- Flowers are tiny and extend above the water in small spikes; blooms in May and June
- Spreads from rhizomes and turions (vegetative overwintering buds) in late fall and early winter, giving it a competitive advantage over native plants

Eurasian Water-Milfoil

(*Myriophyllum spicatum*)

Size: 50-70 cm long (20-28 inches)

Characteristics:

- A submerged, rooted, aquatic perennial plant
- Feather-like leaves, with a mid-vein and 12-20 paired leaflets (native water-milfoil has 11 or fewer leaflet pairs); arranged along the stem in whorls of 4-5
- Stem is a leafy shoot, branching repeatedly, especially at the water's surface; shoots have reddish brown tips
- Flowers are small and red; extend above the water on 5-20 cm terminal spikes (2-8 inches); bloom in July and August
- Spreads primarily by fragmentation; can spread by seeds as well



VTDEC



Variable-leaved Watermilfoil

(*Myriophyllum heterophyllum*)

Characteristics:

- Rooted, submersed and emergent perennial aquatic plant
- Leaves finely divided, resembling a feather; arranged in whorls of 4 to 6 around the stem
- Emergent leaves are long and slender with serrated margins
- Flowers grow from the base of the emergent leaves and form an erect spike
- Spreads through fragmentation, roots, winter buds, and seeds
- Looks like a bottle brush



European Frog-Bit

(*Hydrocharis morsus-ranae*)

Size: leaves are 1-6 cm wide
(0.4-2.4 inches)

Characteristics:

- Free-floating, perennial aquatic plant; forms a rosette on the water's surface
- Rounded, heart-shaped, floating leaves 1-6 cm wide (0.4-2.4 inches), with a petiole (leaf stem)
- Small, white flowers with three petals open just above the water's surface
- Well-developed root system, up to 50 cm long (20 inches), which tangles around other plants to form dense mats
- Spreads by turions or by offsets that detach and form new plants



Ann Bove, VTDEC

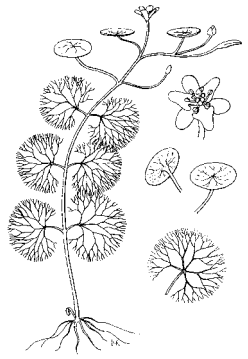
Fanwort

(*Cabomba caroliniana*)

Size: 2-9 m long (6-30 feet)

Characteristics:

- Rooted, submerged, perennial aquatic plant
- Leaves are finely divided, fan-like, and about 6 cm wide (2.5 inches); petioles up to 1.5 cm long (0.6 inches). The native lookalike, water marigold (*Megalodonta beckii*) has leaves without a petiole; arranged oppositely along the stem
- Inconspicuous, oblong-shaped, floating leaves
- Stems are tubular, long, and multi-branched
- Single white or yellow flowers, 0.6-1.5 cm wide (0.2-0.6 inches); on a long stem, usually emergent
- Spreads primarily by stem fragments or rhizomes



Photos: NHDES

Water Chestnut

(*Trapa natans*)

Size: Rosette up to 30 cm wide (12 inches)

Characteristics:

- Annual aquatic plant that can be rooted or free-floating; appearing as a rosette up on the water's surface
- Surface leaves are waxy and triangular, 2-5 cm wide (0.8-2 inches), with toothed edges, located at the end of petioles up to 15 cm long (6 inches); additional submerged leaves are feather-like
- Petioles have swollen sections that help the plant float
- Small, white flowers with four petals; bloom from July until first frost
- Spreads by fragmentation and by its nut-like fruit that has four sharp, barbed points



VTDEC



Hydrilla

(*Hydrilla verticillata*)

Size: up to 7.5 m long (up to 25 feet).

Characteristics:

- This plant is an emergent perennial
- Stems are rooted, erect, either branched or unbranched
- Leaves are green, attached to the stem and arranged in whorls of 3 to 8. Visibly saw-toothed edges, and sometimes have prickles on the underside
- Flowers are small, with petals 2 to 4 mm wide (0.1 to 0.2 inches), and are white to reddish or white to light-green with red stripes. When open, they float on the surface of the water

Brazilian Elodea

(*Egeria densa*)

Size: 3-5 metres (10 to 16 feet)

Characteristics:

- Grows to the surface of the water
- Thin upright stems, 1 to 3 mm (0.4 to 1.2 inches) in diameter
- Leaves are 1 to 3 cm long (0.2 inches), up to 5 mm broad, and found in whorls of 4 to 8
- Bright-green leaves and stem with short internodes (stem length between sets of leaves)
- Small, emergent flowers with three white petals



Vic Ramey, University of Florida



Paul Skawinski, Aquatic
Plants of the Upper Midwest

Parrot's Feather (*Myriophyllum aquaticum*)

Characteristics:

- Submersed, rooted perennial
- Emergent grey-green, stiff leaves, arranged in whorls of 4-6
- Submersed leaves are limp and feather-like, divided into 24-36 thread-like leaflets, often appear to be decaying
- Flowers white to pinkish
- Stems are brownish and rarely branch; can grow to 2.1 m (7 feet) and protrude up to 20 cm (8 inches) above the water surface
- Forms thick mats at the surface of the water
- Spreads from stem fragmentation

Didymo (“Rock Snot”) (*Didymosphenia geminata*)

Characteristics:

- Microscopic, single-celled algae (diatom) that produces visible, thick stalk material
- Tan, light brown or brown clumps or ropy strands
- Feels rough, cottony or fibrous is *not* slimy to the touch
- Can form thick solid mats 2.5 to 10 cm (1-4 inches) on rocks or stream bottoms, or may appear clumpy or feathery
- Dried stalk material on shore may look like dried cardboard or toilet tissue



Ann Bove, VT DEC



Didymosphenia geminata cell,
400x magnification,
Leslie Matthews, VT DEC

Amy Smagula, NH DES

Yellow Floating Heart

(*Nymphoides peltata*)

Size: leaves are 3-10 cm wide (1-4 inches)

Characteristics:

- Rooted, perennial, aquatic plant
- Heart-shaped, almost circular, floating leaves 3-10 cm wide (1-4 inches)
- Bright yellow flowers, about 2-4 cm wide (0.8-1.6 inches), with five ruffled petals; 2-5 flowers from each leaf stalk; blooms from June to October
- Reproduces by seed and vegetatively by broken stems



David Cappaert, Michigan State University, Bugwood.org



Mark Malchoff, Lake Champlain Sea Grant

Starry Stonewort

(*Nitellopsis obtusa*)

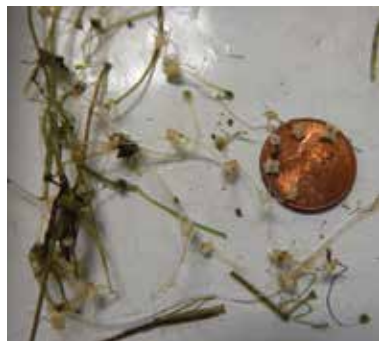
Size: Up to 83 cm (33 inches)

Characteristics:

- A bright green submerged annual macroalga
- Grows in tall and dense colonies and can form mats on the surface of the water
- Dense collections of vegetation can resemble underwater hills or mounds and are often called “pillows”
- Thin branchlets (branch-like structures) vary in length and are arranged in whorls (radiating out from a single point) around the stem
- Small white, star-shaped structures called bulbils, 3-6 mm (0.1-0.2 inches), are produced at the nodes
- Anchored by clear filaments called rhizoids
- Spreads by bulbils and fragments



Marcus Roosen



Minnesota Department of Natural Resources



David Copplestone, NDMNRF

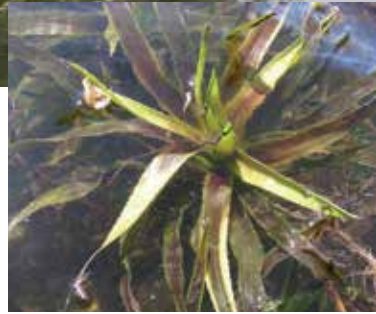
Water Soldier

(*Stratiotes aloides*)

Size: leaves up to 40 cm long (16 inches)

Characteristics:

- Perennial, aquatic plant, submerged during the winter and early spring, but becomes buoyant and rises to the water's surface, becoming emergent during the summer
- Leaves are sword-shaped, bright green, with sharp spines on the margins; form rosettes
- Flowers are white with three petals; however, flowering plants are rare in Ontario
- Similar to the runners of household spider plants; water soldier can also spread via turions



Eric Snyder, NDMNRF

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