

THE LAKE SUPERIOR
**AQUATIC
INVASIVE
SPECIES
GUIDE**





Prepared by:
Ontario Federation of Anglers and Hunters
March 2014

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Lake Superior Watershed



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Map courtesy Environment Canada

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THE LAKE SUPERIOR AQUATIC INVASIVE SPECIES GUIDE

Introduction

Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health. They thrive in the absence of their native predators and have the potential to drastically alter habitat, rendering it inhospitable for native species. Aquatic invasive species (AIS) reach our waters through a variety of means, sometimes intentionally. Some were introduced for specific purposes, such as controlling aquatic plants, while others were planted as ornamentals, such as garden plants which then escaped. A few were released by aquarists while some “unwanted” live study specimens were released by teachers and students. However, most species were unintentionally introduced through ballast water from ships, when dumping bait buckets, or by moving watercraft and gear between waterbodies. The Lake Superior Aquatic Invasive Species Complete Prevention Plan lists the actions needed to prevent new species from entering the lake (http://epa.gov/glnpo/lakesuperior/LakeSuperior_AIS_Sept2010DRAFT.pdf).

Lake Superior has extraordinary aquatic life, supported by cool coastlines, pristine islands, diverse coastal wetlands, extensive sandy beaches, and the coldest and deepest waters in the Great Lakes. It is the world’s largest freshwater lake by area. Lake Superior has a relatively simple food web, which means it is especially vulnerable to damage from invasive species.

Of all the Great Lakes, Lake Superior is the least invaded and we want to keep it that way. This guide illustrates invasive species already established or a threat to becoming established; however, it is not an exhaustive list. According to the University of Minnesota Sea Grant Program, 98 non-native fishes, plants, invertebrates, and diseases have become established in the big lake (http://seagrant.umn.edu/ais/superior_nonnatives). Impacts of many non-native species are unknown until they cause noticeable effects. In terms of new species that could spread into Lake Superior, there are eighteen profiled in this guide. The actions that you can take (pages 3 and 4) will help stop the introduction of species profiled and threats like chinese mitten crab, red swamp crayfish, faucet snail, redear sunfish, hydrilla and many more.

The Lake Superior Aquatic Invasive Species Guide is designed for recreational users of the lake, people who spend their time boating, fishing, and exploring this beautiful waterbody. Descriptions and photos provided will help you identify these invaders and report sightings. Knowing the distribution of invasive

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species and detecting any new arrivals is critical for managing and protecting the lake – do your part to help protect Lake Superior!

How to Use the Guide

This AIS guide is divided into two sections: Fishes and Invertebrates, and Aquatic Plants. Fish and plant anatomical keys are located at the front of each section. For each AIS, the common and scientific names are provided at the top of the page. A description with the key features used to identify the species is provided, along with photographs showing specimens or features of the species. This guide also provides information on the habitat, known distribution within Lake Superior and the Great Lakes, and the environmental and human impacts of the invading species.

AIS listed in this guide are either ESTABLISHED in Lake Superior, meaning they have already reached the lake and are reproducing within its waters; or are a THREAT to Lake Superior, meaning they have not yet spread there. The status of each species in the guide is shown at the top of the page. It is important to report both established and threat species because knowing current ranges helps with lake management of AIS. Importantly, if you suspect you have found a threat species, report it immediately as early detection is critical to protecting Lake Superior from colonization by new AIS!

To report sightings:

- Record the date and exact location using an address, landmark, and/or GPS coordinates;
- Wrap plant fragment or scrape of suspicious material in a wet paper towel or place fish in a sealed plastic bag and refrigerate; place molluscs and invertebrates in rubbing (isopropyl) alcohol if possible or a sealed plastic bag and refrigerate;
- Take pictures! Show the full specimen as well as up close shots of key features (refer to guide);
- REPORT IT!

Invading Species Hotline: 1-800-563-7711

www.eddmaps.org/ontario

For additional information, please contact:

**Ontario Ministry of
Natural Resources**
Northwest Regional Office
Thunder Bay
(807) 475-1261

**University of Minnesota
Sea Grant Program**
Duluth, Minnesota
(218) 726-8712
seagr@d.umn.edu

Help Prevent the Spread of Aquatic Invasive Species!

Aquatic invasive species – plants, fishes, crustaceans, molluscs, amphibians, diseases, or pathogens – can spread from bilge water, bait buckets, and livewells and can adhere to boats, trailers, motors, paddles, waders, footwear, and fishing tackle. Some species can survive for several days or weeks out of water. Small plant fragments, fish eggs, or microscopic organisms may hitch a ride unbeknownst to you.



Outdoor recreationists:

What you can do:

- Inspect** and clean off any visible aquatic plants, animals, and mud from all equipment before leaving water access;
- Drain** motor, bilge, livewell, and other water containing devices before leaving water access;
- Dispose** of unwanted bait, worms, and fish parts in the trash. When keeping live bait, drain bait container and replace with spring or dechlorinated tap water;
- Spray/rinse** recreational equipment with high pressure hot water to clean off mud and kill aquatic invasive species when possible;
- Flush** motor according to owner's manual; AND/OR
- Dry** everything for five days or more OR wipe with a towel before reuse;
- Never dump** live fishes, bait or other organisms from one water body into another.

Home Aquarists, Water Gardeners, Teachers and Students:

What you can do:

Alternatives to release:

- Contact a retailer for proper handling or for possible returns;
- Give or trade with another aquarist, pond owner or water gardener;
- Donate to a local aquarium society, school or aquatic business;
- Contact a veterinarian or pet retailer for humane disposal guidance.

What about those plants?

- Build water gardens away from other waters;
- Inspect plant orders and remove seeds, other plant fragments, snails and fishes;
- Seal aquatic plants in plastic bags and dispose in the trash;
- Avoid compost disposal because many seeds can withstand drying and freezing;
- Never collect plants or fishes from the wild (in many jurisdictions this practice is illegal).

Invasive Species in the Lake Superior Watershed

Established

Fishes

Alewife
Eurasian Ruffe
Fourspine Stickleback
Freshwater Drum
Rainbow Smelt
Round Goby
Sea Lamprey
Threespine Stickleback
Tubenose Goby
White Perch
Common Carp

Invertebrates

Asian Clam
New Zealand Mudsnail
Quagga Mussel
Rusty Crayfish
Spiny Waterflea
Zebra Mussel

Threat

Fishes

Bighead Carp
Black Carp
Grass Carp
Silver Carp
European Rudd
Northern Snakehead
Tench

Invertebrates

Banded Mysterysnail
Chinese Mysterysnail
Bloody Red Shrimp
Fishhook Waterflea



Sea Lamprey

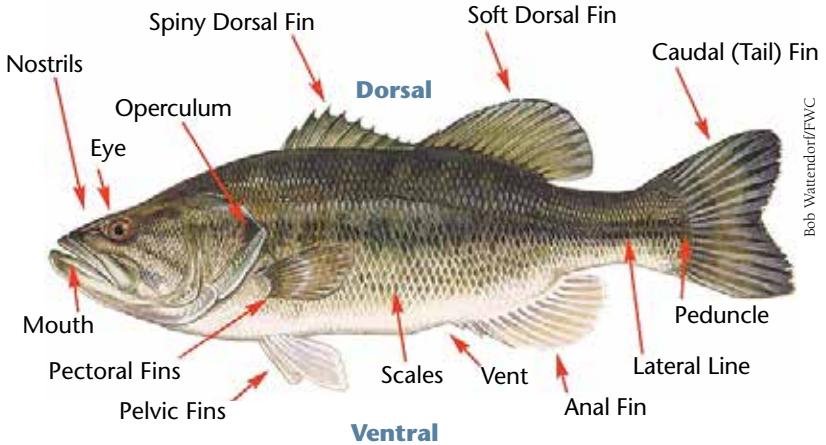
C. Krueger, GLFC



GUIDE TO
AQUATIC INVASIVE
FISHES AND
INVERTEBRATES



Generalized Fish Anatomy



Definitions

Dorsal: Relating to the upper side or 'back' of a fish.

Lateral: Along or out to the sides of the fish. A 'lateral line' runs along the side of the body from head to tail.

Ventral: Referring to the bottom or underside of a fish.



Shawn Good, VT Department of Fish and Wildlife, Bugwood.org

Alewife

(*Alosa pseudoharengus*)

Size: 13-15 cm long (5-6 inches)



Duane Raver, US Fish and Wildlife Service, Bugwood.org

Characteristics:

- Silvery scales with a blue/green luster on dorsal portion
- Prominent black spot behind gill cover
- Lower jaw extends beyond upper jaw
- Belly has a serrated edge where scales from each side meet and overlap
- No lateral line on body
- Deeply forked tail

Similar Species: Blueback Herring

Habitat: Deep, open waters of lakes for most of the year; moves inshore to spawn in spring and early summer.

Distribution: Throughout Lake Superior.

Impacts: Competes with native fish for zooplankton; increases algae abundance. Preys on eggs, and young of other fishes. Alewife have thiaminase that destroys thiamine (vitamin B1). Predators of Alewife can become thiamine deficient, which causes impaired biological functions and early mortality.



Gary Cholwek, USGS

Eurasian Ruffe

(*Gymnocephalus cernuus*)

Size: 10-15 cm long
(4-6 inches)

Characteristics:

- Greenish brown on back; dark patches on light brown sides; whitish yellow belly
- One long dorsal fin, distinctly notched between front spiny and rear soft sections
- Dark spots on dorsal fin and tail
- Mouth turns down
- Slimy when handled

Similar Species: Yellow Perch, Walleye, Sauger, Trout-perch, Logperch

Habitat: Highly adaptable, exploits a wide range of depths and conditions; near shore areas of lakes and stream mouths with aquatic vegetation.

Distribution: Thunder Bay and Kaministiquia River in Ontario. Throughout U.S. embayments and lower reaches of tributaries of Lake Superior.

Impacts: Reaches high densities quickly which may cause competition for food sources (zooplankton, fishes) and impact recruitment through egg predation.



Mark Gautreau, Canadian Rivers Institute, University of New Brunswick

Fourspine Stickleback

(*Apeltes quadracus*)

Size: 3-7 cm long (1.25-2.75 inches)

Characteristics:

- Olive green to brown back; darkly mottled sides, silver white belly
- Small, narrow bodied fish
- Scaleless body with no bony plates
- First two dorsal spines longer than second two dorsal spines
- Wide gap between third and fourth spine

Similar Species: Brook Stickleback, Threespine Stickleback

Habitat: Shallow, brackish estuaries; less frequently found in freshwater streams and lakes; heavily vegetated shallow water.

Distribution: Thunder Bay to Black Bay.

Impacts: Competes with native fishes for invertebrate prey; declines in native stickleback populations have been observed.



Freshwater Drum

(*Aplodinotus grunniens*)

Size: Up to 89 cm long (35 inches)



John Lyons, Wisconsin Department of Natural Resources

Characteristics:

- Anal fin has two spines, the second is greatly enlarged
- Two dorsal fins are connected; long second dorsal fin, with 24-32 rays
- Roughly square or rectangular tail
- Silvery to bronze body with no stripes
- First ray of pelvic fin is elongated into a filament

Similar Species: White Perch

Habitat: Bottoms of shallow, quiet water in lakes and streams. Able to tolerate murky conditions.

Distribution: Duluth-Superior Harbor and Upper St. Mary's River.

Impacts: Competes with native fishes for invertebrate prey (insect larvae, crayfish, clams, snails) and small fishes.



Rainbow Smelt

(*Osmerus mordax*)

Size: 18-22 cm long (7-9 inches)



Characteristics:

- Long, slim body type
- Bodies are olive green dorsally, with purple, pink and blue iridescence ventrally and a silvery belly
- Large teeth on both jaws, roof of the mouth, and tongue
- Large mouth, protruding lower jaw, upper jaw extends laterally to middle of eye or beyond
- Single dorsal fin in the middle of the back, and a small fleshy (adipose) fin near the tail
- Scales are small and easily detached

Similar Species: Whitefish, Cisco, and fish in the minnow family

Habitat: In the spring, large schools move from lakes into streams and along shorelines to spawn.

Distribution: Throughout Lake Superior.

Impacts: Competes with forage fishes for zooplankton and fishes, which disrupts the food web. Declines in Yellow Perch, Walleye, Lake Herring, Whitefish and Lake Trout populations have been observed. Rainbow Smelt have thiaminase that destroys thiamine (vitamin B1). Predators of Rainbow Smelt can become thiamine deficient, which causes impaired biological functions and early mortality.



D. Jude, CLGAS, Univ. of Mich., 1998.

Round Goby

(*Neogobius melanostomus*)

Size: 6-18 cm long (2.5-7 inches)

Characteristics:

- Typically gray with brown or black spots on back and sides; cream to white belly; young gobies lack spots
- Cylindrical body shape
- Front dorsal fin has a large black spot
- Pelvic fins are fused together to form one round suction-cup disk
- Distinct nostrils with short tubes that do not reach the upper lip

Similar Species: Native sculpins,
Tubenose Goby

Habitat: Prefers riprap cobble and rock bottoms; shallow to deep water in lakes and slow-moving rivers.

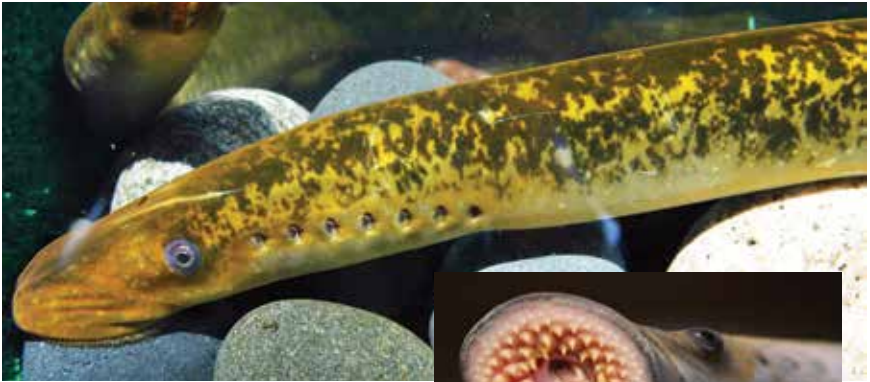
Distribution: Thunder Bay Harbour, and eastward from Duluth-Superior Harbor along southshore; one record from Marquette.

Impacts: Aggressive. Drive out bottom-dwelling fishes into poor habitat. Compete for food with other bottom fishes; egg predation impacts game fish recruitment.



J. Ellen Marsden

Round Goby (top) and native sculpin (bottom). Note: “fused” pelvic fins appearing as one disc-shaped fin on the ventral side of Round Goby.



C. Kraeger, GLFC

Sea Lamprey

(Petromyzon marinus)

Size: 30-76 cm long (12-30 inches)

Characteristics:

- Greyish blue to dark brown body; large adults are marbled; darker back with lighter belly
- Long, cylindrical, flexible body shape
- Two separate dorsal fins; no other fins
- Large, round, jawless mouth is a sucking disk filled with hard, hooked, sharp teeth



Ted Lawrence

Marc Gaden, Great Lakes Fishery Commission or M. Gaden GLFC

Similar Species: American Eel, American Brook, Chestnut, Northern Brook, and Silver Lamprey

Habitat: Immature lamprey live in the silty bottoms of rivers and streams; adults live in the deep waters of lakes and connecting waterways.

Distribution: Throughout Lake Superior.

Impacts: Parasitic feeder that uses its mouth to attach itself to fish and feed on their blood and bodily fluids, often killing the host fish. They have decimated native Lake Trout, Whitefish, and Walleye populations, causing alterations to the food webs of the Great Lakes. The Great Lakes Fishery Commission oversees a Sea Lamprey control program that has reduced populations by 90% through lampricides, barriers, and trapping.



John Lyons, Wisconsin DNR

Threespine Stickleback

(*Gasterosteus aculeatus*)

Size: 3.5-7.5 cm long (1.5-3 inches)

Characteristics:

- Green to brown back; some darker marking; silvery belly
- Small, narrow bodied fish
- Scaleless body with bony plates
- Two to four (usually three) dorsal spines
- First two are substantially larger than the third (and fourth, if present)

Similar Species: Brook Stickleback, Fourspine Stickleback

Habitat: Shallow, weedy areas and deep water; rivers, streams, lakes, and ponds.

Distribution: Throughout Lake Superior.

Impacts: Competes with native fishes for invertebrate prey; declines in native stickleback populations in Lake Superior have been observed.



University of Michigan Museum of Zoology



David J. Jude

Tubenose Goby

(*Proterorhinus semilunaris*)

Size: 6-11 cm long (2.5-4.5 inches)

Characteristics:

- Black lines on first dorsal fin; no black spot on dorsal fin
- Dark bars or blotches over lighter brown or tan colour on back and sides; cream to white belly
- Cylindrical body shape
- Pelvic fins are fused together to form one round suction-cup disk
- Distinct nostrils with long tubes that extend over the upper lip

Similar Species: Native sculpins, Round Goby

Habitat: Shallow areas with aquatic vegetation; lakes and river mouths.

Distribution: Thunder Bay and Duluth-Superior Harbours.

Impacts: Impacts not well documented. May reach high density; may compete for food and prey on other bottom fishes; may impact other fish which spawn in vegetated areas.



Douglas Facey

White Perch

(*Morone americana*)

Size: 15-25 cm long (6-10 inches)

Characteristics:

- Grayish green to dark green-brown on back; paler sides; silvery white on belly
- Body is deepest just ahead of dorsal fin
- Anal fin has three spines; second and third spines are the same length
- When the spiny dorsal fin is pulled upright, the soft dorsal fin will also become erect
- 11-12 rays on second dorsal fin

Similar Species: White Bass

Habitat: Thrives in shallower, warm waters of lakes and bays; exploits both shallow and deep waters.

Distribution: Throughout the Great Lakes, including Lake Superior; Thames, St. Clair and Detroit Rivers.

Impacts: Competes with native game and forage fish for zooplankton, insect larvae, and fishes; egg predation may limit Walleye recruitment.



Maynard F. Reece, Iowa Department of Natural Resources

Common Carp

(*Cyprinus carpio*)

Size: 30-75 cm long (12-30 inches)

Characteristics:

- Bronze to golden yellow body; white or yellow belly
- Large, deep bodied shape, with large scales
- Single serrated spine on long dorsal fin with more than 16 soft rays
- Two barbels on each side of the mouth

Similar Species: Goldfish, Grass Carp

Habitat: Warm lakes and slow-moving rivers rich in organic matter.

Distribution: Throughout Lake Superior, in warmer waters.

Impacts: Disrupts bottom sediments when foraging; may compete for food and impact recruitment through egg predation.

NOTE: The Common Carp has been established in the Great Lakes since the mid-1800s and reporting of this species is not required. This description has been included to help you identify the potential invading species of Asian carp described on the following two pages.

Asian Carps

Asian carps were brought from Asia to North America in the 1960s and 70s. Since then they have migrated north through U.S. waterways towards the Great lakes. Asian carps prefer cool to moderate water temperatures, like those found near the shores of the Great Lakes. The term “Asian carps” includes four species: Bighead, Silver, Grass and Black Carp. If Asian carps become established in the Great Lakes, they could potentially eat the food supply that our native fish depend on and crowd them out of their habitat. Black Carp feed exclusively on molluscs and so pose a considerable threat to native snails and mussels in the Great Lakes watershed, a high proportion of which are already at risk. Bighead Carp and Silver Carp are the species that have spread the most aggressively and can be considered one of the greatest threats to the Great Lakes. Silver Carp are a hazard for boaters: the vibration of boat propellers can make them jump up to three metres out of the water.

Similar Species: Common Carp* (see pg 18), Goldfish, Rudd, suckers, Golden Shiner, Fallfish (*Note: *Barbels – whiskerlike tactile organs near the mouth – can help differentiate Asian carps from Common Carp.*)

Habitat: Prefer large rivers and embayment but can live in ponds and lakes; often near the surface; Black Carp can be found in deeper water than the other Asian carps.

Potential Distribution: Throughout the Great Lakes, connecting channels and associated tributaries to the first barriers.

Impacts: Not yet established in Ontario waters or Great Lakes waters; established in watersheds of the USA, including Mississippi, Missouri, and Ohio watersheds, and the Red River watershed.

Bighead Carp (*Hypophthalmichthys nobilis*)

Size: Up to 120 cm long
(47 inches)



David Riecks, University of Illinois, IN Sea Grant

Characteristics:

- Dark gray back; fades to off-white on sides and belly; irregular dark blotches
- Large, deep bodied, laterally compressed fish; up to 45 kg (100 lb)
- Short dorsal fin, stiff but not serrated; dorsal spine followed by 8 soft rays
- Smooth keel (raised line running along the belly) only between pelvic and anal fins
- Large mouth with a lower jaw that extends past upper jaw; no barbels
- Eyes forward, sit below mouth, and project downward; scaleless head

Black Carp

(*Mylopharyngodon piceus*)

Size: Up to 150 cm long (60 inches)

Characteristics:

- Dark brown to black on back and sides; some white on belly; dark-edged scales give a cross-hatched effect
- Cylindrical, slightly compressed body ; no keel (raised line running along the belly)
- Short, soft and pointed dorsal fin with 8-10 rays; all fins are dark
- Small to moderately sized mouth; slightly downturned; no barbels
- Eyes sit even with the mouth



Rob Cosgriff, Illinois Natural History Survey, Bugwood.org

Grass Carp

(*Ctenopharyngodon idella*)

Size: Up to 100 cm long (40 inches)

Characteristics:

- Olive brown back; blending to white from sides to belly; dark-edged scales give a cross-hatched effect
- Moderately compressed, more slender body than Bighead and Silver carps
- Short, soft, and pointed dorsal fin with 8-10 rays
- Moderately sized mouth; slightly downturned; no barbels
- Eyes sit even with the mouth



Department of Fisheries & Wildlife Sciences, Virginia Tech

Silver Carp

(*Hypophthalmichthys molitrix*)

Size: Up to 90 cm long (35 inches)

Characteristics:

- Olive to greyish black back; silvery sides; fading to white belly
- Large, deep-bodied, laterally compressed fish; up to 40 kg (90 lb)
- Short dorsal fin, stiff but not serrated
- Smooth keel (raised line running along the sides of the body) from the base of gills to anal fin
- Large mouth with a lower jaw that extends past upper jaw; no barbels
- Eyes forward, sit below the mouth, and project downward; scaleless head



David Reeces, University of Illinois, IN Sea Grant



NYSDEC, Bureau of Habitat

European Rudd

(*Scardinius erythrophthalmus*)

Size: 10-35 cm long (4-14 inches)

Characteristics:

- Brown-green back; silver, gold, or rosy sides; silvery white belly
- Large, deep-bodied minnow
- Dorsal fin is set far back on the body, beginning behind the start of the pelvic fin
- Pectoral, pelvic, and anal fins are a vivid red or orange colour
- Mouth is small and upturned
- Eyes are red or have a red spot dorsally

Similar Species: Golden Shiner, Redfin Shiner, Goldfish, Bigmouth Buffalo

Habitat: Variety of habitats: slow-moving streams, rivers, and vegetated areas of lakes and ponds.

Distribution: Not yet found in Lake Superior watershed; scattered occurrences in the St. Lawrence River, Lake Ontario, and Lake Erie.

Impacts: May compete with native fishes for invertebrate prey; may alter nursery sites by feeding on vegetation.



Photos: U.S. Geological Survey Archive, U.S. Geological Survey; Bugwood.org



Northern Snakehead

(*Channa argus*)

Size: Up to 84 cm long (33 inches)

Characteristics:

- Sharp teeth; like Northern Pike
- Narrow, torpedo-shaped body with long single dorsal fin
- Pelvic fins closer to head compared to Bowfin
- Anal fin extends from middle of body almost to the tail
- Light brown with dark brown patches covering the body
- Capable of breathing out of water (in moist environments) for up to three days while searching for other bodies of water

Similar Species: Bowfin, Burbot

Habitat: Shallow, vegetated waters.

Distribution: Not yet found in Lake Superior watershed; established populations in states of Pennsylvania and New York..

Impacts: Compete with native game and forage fish for zooplankton, fish and fish larvae, frogs and toads, invertebrates, insects, small reptiles and even small birds and mammals.



Steffen Zeinert



Mark Malchoff, Lake Champlain Sea Grant

Tench

(*Tinca tinca*)

Size: 20-64 cm long (8-25 inches)

Characteristics:

- Dark olive to golden tan back; white to bronze belly
- Bright red-orange eye
- Deep-bodied, flat fish
- Fins are dark and rounded, without spines
- Single barbel on each side of mouth

Similar Species: Common Carp, Goldfish, Lake Chubsucker

Habitat: Lakes or slow-moving rivers with muddy bottoms and aquatic vegetation.

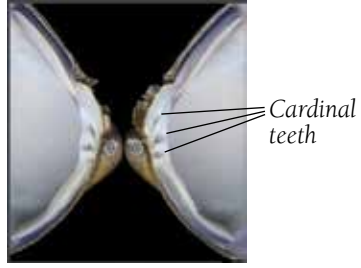
Distribution: Not yet found in Lake Superior watershed; found in Richelieu River, Quebec.

Impacts: May compete with native bottom feeders for prey; by feeding heavily on snails that graze on algae, tench may contribute to algal blooms.



Ellen Marsden, UVM

USGS



Dr. Harry G. Lee, Jacksonville, FL



USGS

Asian Clam

(*Corbicula fluminea*)

Size: Up to 5 cm long (2 inches)

Characteristics:

- Small freshwater clam, rounded triangle in 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 (see photo) in each valve (native unionid mussels have none)

Habitat: Lakes, rivers, and ponds; prefers flowing water with mixed mud-sand substrate.

Distribution: Warm water discharge in the Duluth-Superior Harbor.

Impacts: Rapid reproduction and high densities cause millions of dollars in damage to industrial water intake pipes. Filters large amounts of plankton from the water, which increases water clarity and alters the growth pattern of algae and aquatic plants. Outcompetes native mollusks for habitat and food.



D.L. Gustafson



USGS

New Zealand Mudsnail

(*Potamopyrgus antipodarum*)

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

Characteristics:

- Small, slender freshwater snail
- Cone-shaped, with slender, pointed whorl
- Colour is variable, ranging from light to dark brown
- Operculum (thin, plate like cover on the shell opening) is ear-shaped

Habitat: Lakes, rivers, and estuaries with silty sand substrates; does not tolerate freezing temperatures.

Distribution: Thunder Bay Harbour; St. Louis River.

Impacts: Reproduces and spreads rapidly, up to 300,000 individuals per square metre; can dominate an area and alter the food web of a waterbody; may compete with native invertebrates for resources.



Ellen Marsden, UVM

Quagga Mussel

(*Dreissena bugensis*)



Bill Tate

Size: Adults are 2-3 cm long (0.75-1.25 inches); larvae 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, with a curved mid-line

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

Habitat: Lakes, reservoirs, ponds, and quarries; slow-moving rivers; can occur in both shallow, warm waters and deeper, cool waters; overlaps with and extends below depths preferred by zebra mussels.

Distribution: Duluth-Superior Harbor.

Impacts: Form dense colonies that attach to all available substrates, including rocks, plants, boats, and docks. Quagga mussels filter large amounts of plankton from the water, which increases water clarity and alters the growth pattern of algae and aquatic plants. Native mussels are impacted through food competition and by smothering from attached quagga mussels. Linked to e-botulism and wildlife die-offs. Quagga mussels are able to colonize at deeper depths than zebra mussels and are increasing the scope of impacts on these waters.



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Rusty Crayfish

(*Orconectes rusticus*)

Size: Up to 15 cm long (6 inches)



University of Minnesota Sea Grant Program

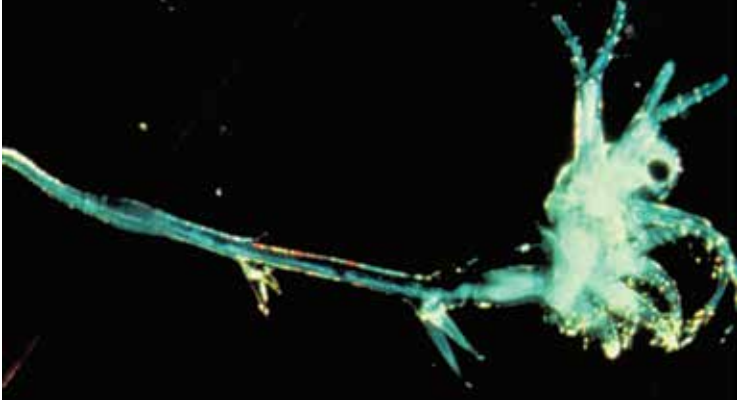
Characteristics:

- Covered by a hard exoskeleton (outer covering); 5 pairs of legs attached to the body, front pair end in large claws
- Variable body colour with dark reddish spot on both sides of the body
- Strong, smooth claws are larger than most crayfish species; brownish olive or reddish brown colour, with black bands on claw tips

Habitat: Very hardy; can live in both fast and slow-moving waters; prefers clay, silt, or gravel bottoms with rocks, logs, and debris for cover.

Distribution: Duluth-Superior Harbor; Pigeon River; Thunder Bay Harbour and many nearby inland lakes and rivers.

Impacts: Competes with native crayfish for food and habitat, very aggressive; feeds on invertebrates, vegetation, and native fish eggs. Clear-cuts aquatic vegetation taking away habitat for fish. Loss of vegetation can result in enhanced shoreline erosion. Hybridizes with native crayfish.



US EPA

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 (see photo)
- 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

Habitat: Prefers large, deep, clear lakes, but is also found in more productive lakes; migrates to the deeper waters during the day and up to the surface at night.

Distribution: Throughout Lake Superior, St. Louis River, Nipigon River, and a few inland lakes in the watershed.

Impacts: Preys on native zooplankton, which reduces food for small fishes and young of sport fishes; fouls fishing equipment.



Jeff Gunderson, Minnesota Sea Grant



Michigan Sea Grant Program, Ontario Federation of Anglers and Hunters



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

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 excreted near hinge



USGS

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

Habitat: Lakes, rivers, reservoirs, ponds, and quarries; requires slow-moving water for the veligers to attach to plant and substrate surfaces.

Distribution: Thunder Bay and Duluth-Superior Harbours; Sault Ste. Marie Locks.

Impacts: Form dense colonies that attach to all available substrates, including rocks, plants, boats, and docks. Zebra mussels filter large amounts of plankton from the water, which increases water clarity and alters the growth pattern of algae and aquatic plants. Native mussels are impacted through food competition and by smothering from attached zebra mussels. Linked to e-botulism and wildlife die-offs.

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 malleata*)

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 (thin, plate like cover on the shell opening) is oblong with concentric growth lines



USGS

Habitat: Slow-moving freshwater rivers, streams, and lakes with soft, muddy or silty bottoms; banded mysterysnail often found in proximity to flowing water, and river mouths.

Distribution: Inland waters within the Lake Superior watershed.

Impacts: Competes with native snails; may also decrease available phosphorus in near shores that can impact algae and fish communities. Both mysterysnails are intermediate hosts for parasitic worms and can transmit trematodes that kill waterfowl. They both often litter shorelines and clog water intake screens. Banded mysterysnail also prey on fish embryos.



NOAA, Great Lakes Environmental Research Laboratory

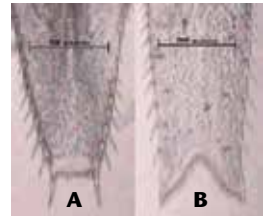
Bloody Red Shrimp

(*Hemimysis anomala*)

Size: 0.6-1.2 cm long (0.25-0.5 inches)

Characteristics:

- Small invertebrate, just visible to the naked eye; may be seen forming reddish swarms
- Soft covering on head and body; 8 pairs of legs
- May have bright red to orange-red colour but can also be pale or translucent
- Tail-end is flat with two prominent terminal spines (see photo); the native *M. diluviana* has a forked end



A
Hemimysis anomala

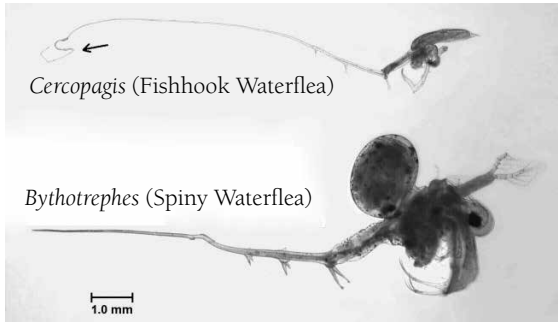
B
Mysis diluviana

NOAA, Great Lakes Environmental Research Laboratory

Habitat: Slow-moving fresh waterbodies; generally over hard bottom substrates (rock), occasionally over soft bottom substrates (silt).

Distribution: Not yet found in Lake Superior watershed. Present in Lake Michigan, Lake Huron, Lake Erie, Lake Ontario.

Impacts: Preys on phytoplankton and zooplankton, a key source of food for native zooplankton and plankton-eating fishes.



NOAA, Great Lakes Environmental Research Laboratory

Fishhook Waterflea

(*Cercopagis pengoi*)

Size: 1 cm long (0.4 inches); about 80% is tail length

Characteristics:

- Tiny aquatic crustacean, just visible to the naked eye; may collect in cotton-like clumps on fishing lines, downrigger cables, and commercial fishing nets
- Transparent body
- Long, barbed tail filament; 1-3 pairs of barbs; unique loop or hook at the tip
- Head has a single, large, dark eye

Habitat: Prefers the warmer surface water of deep, open waterbodies.

Distribution: Not yet found in Lake Superior watershed. Present in Lake Ontario and the St. Lawrence River, Lake Erie, and Lake Michigan.

Impacts: Preys on native zooplankton, which reduces food for small fishes and young of sport fishes; fouls fishing equipment.



Ontario Federation of Anglers and Hunters



GUIDE TO AQUATIC INVASIVE PLANTS



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Invasive Plants in the Lake Superior Watershed

Established

- Curlyleaf Pondweed
- Eurasian Watermilfoil
- European Common Reed
- Exotic Burreed
- Himalayan Balsam
- Narrowleaf Cattail
- Purple Loosestrife
- Watercress
- Yellow Iris

Threat

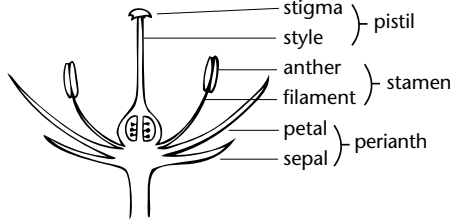
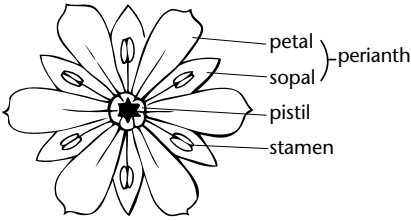
- European Frogbit
- European Water Chestnut
- Fanwort
- Flowering Rush
- Water Lettuce
- Water Soldier
- Yellow Floating Heart



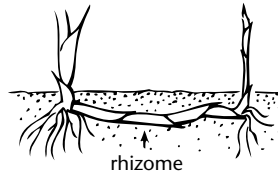
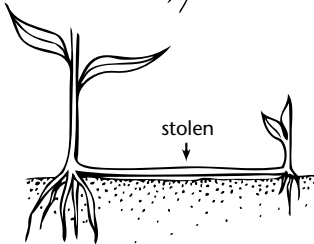
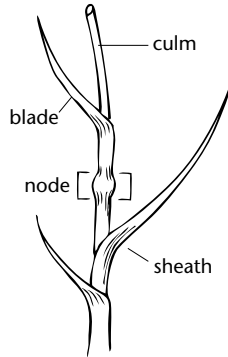
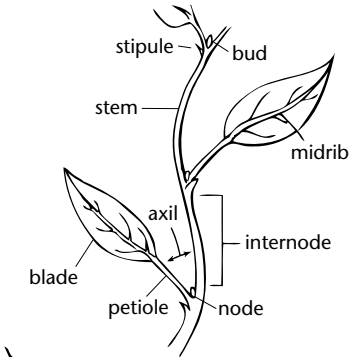
Purple Loosestrife

Plant Parts

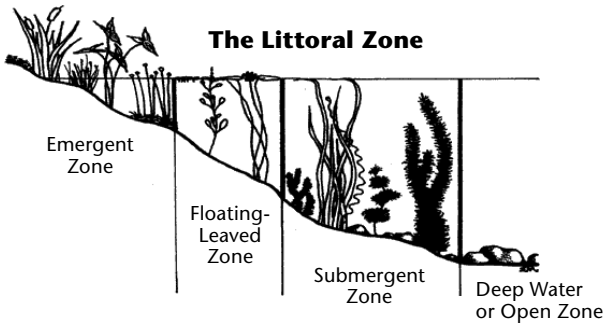
Flower Parts



Stems

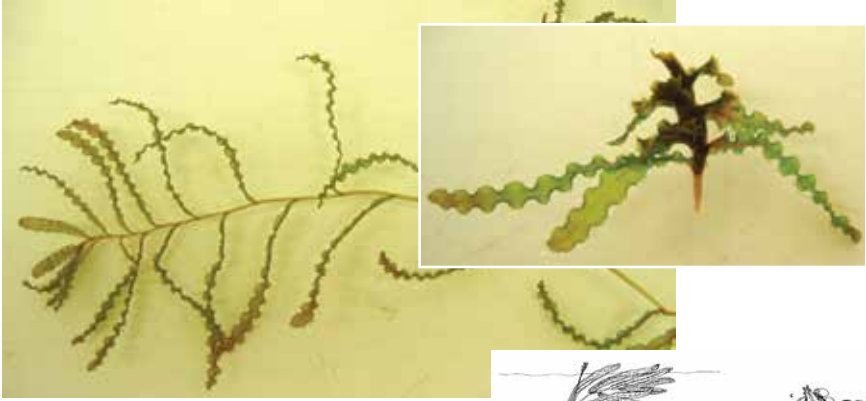


The Littoral Zone



Plant Parts drawings are the copyright property of the University of Florida Center for Aquatic and Invasive Plants (Gainesville). Used with permission. Plant Communities illustration by Sheila Murray.

Both photos: Karen Hänel, MEDEP

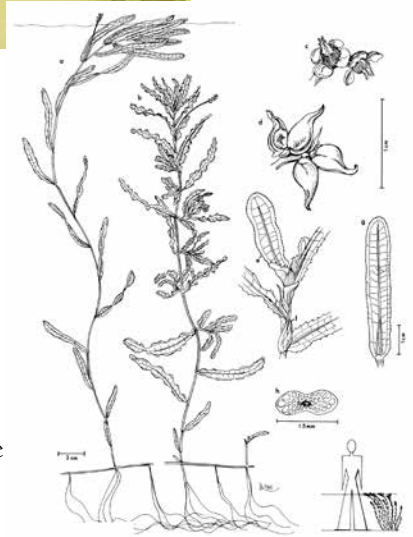


Curlyleaf Pondweed

(*Potamogeton crispus*)

Characteristics:

- A submerged (underwater), rooted, aquatic perennial plant; up to 2 m long (6 feet)
- Leaves oblong, 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 alternate; 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



Habitat: Freshwater lakes, rivers, streams, ponds, ditches, and canals.

Distribution: Duluth-Superior Harbor, Knife River Marina, MN, and Washburn Harbor, WI.

Impacts: Forms large, dense stands; outcompetes native plants; impedes boating, fishing and swimming; plant decay can deplete oxygen levels leading to fish kills.



Eurasian Watermilfoil

(*Myriophyllum spicatum*)

Characteristics:

- A submerged (underwater), rooted, aquatic perennial plant; 50-70 cm long (20-28 inches)
- Feather-like leaves, with a mid-vein and 12-20 paired leaflets (native watermilfoil has 11 or fewer leaflet pairs); arranged along the stem in whorls of 3 to 6
- 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 spikes (2-8 inches); bloom in July and August
- Spreads primarily by rooting of plant fragments; can spread by seeds as well



Habitat: Generally in 1-3 m (3-10 feet) deep water of lakes, ponds, and slow-moving streams, but can occur at depths up to 10 m (32 feet).

Distribution: Saint Louis River, and Chequamegon Bay, WI.

Impacts: Forms large, dense stands; outcompetes native plants; impedes boating, fishing and swimming; hybridizes with native milfoils that can create more vigorous or aggressive forms.



Ann Murray, University of Florida

European Common Reed

(*Phragmites australis* subsp. *australis*)

Characteristics:

- Extremely tall, erect, emergent (above water) perennial grass; 1-4 m tall (3-13 feet)
- Long, sharp, bluish-green leaves with a pointed tip; 15-40 cm long (6-16 inches) and 2-4 cm wide (0.8-1.6 inches)
- Stem is hollow and 0.5-1.5 cm thick (0.2-0.6 inches)
- Feathery, plume-like flower heads with individual clusters of small purple-brown flowers that change to tan or grey at the end of the season
- Spreads mainly by fragmentation and elongation of rhizomes (underground stems); establishment of new populations may occur from seed



Habitat: Marshes, floodplains, river and stream margins, lake edges, wet ditches and fields. Deep roots also enable growth in relatively dry areas.

Distribution: Scattered occurrences in Lake Superior watershed.

Impacts: Forms large, dense stands; outcompetes native plants; reduces wetland plant and animal species diversity.

Meg Modley,
Lake Champlain Basin Program



Illustration: *Sparganium erectum*, public domain; from wikicommons.jpg

Exotic Burreed

(*Sparganium erectum*)

Characteristics:

- Emergent (above water), perennial plant, 50-150 cm tall (20-60 inches)
- Leaves are smooth, erect, 1-1.5 cm wide (0.4-0.6 inches)
- Globe-like flowers are produced on a branching spike; flowers June to August
- Flowers at tip of spike are male; flowers further down are female
- Fruits are small, dry, and spongy; contain 1-2 seeds

Habitat: Shallow margins of lakes, rivers, streams, ditches, canals; silty mud substrate.

Distribution: Scattered occurrences in Lake Superior watershed.

Impacts: Forms dense stands; outcompetes native plants; reduces wetland plant and animal species diversity.



Francine MacDonald



Jan Samanek, State Phytosanitary Administration, Bugwood.org

Himalayan Balsam

(*Impatiens glandulifera*)

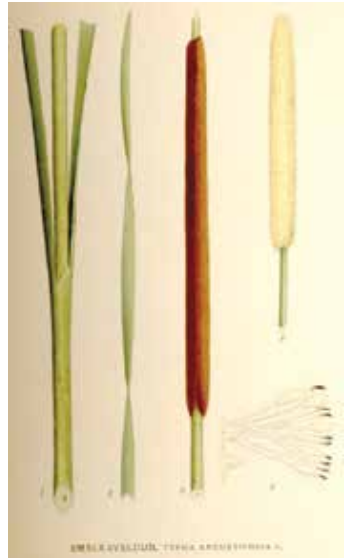
Characteristics:

- An annual, erect plant of shorelines, wetlands, and damp areas; 1-3 m tall (3-10 feet)
- Leaves are lance-shaped with round bases and pointed tips, 6-15 cm long (2.5-6 inches) and widest in the middle with sharply toothed edges; arranged along the stem in opposite or whorls of three
- Stems are hollow and smooth with purple to reddish colour
- Flowers have 5 pink, white or purple petals, resembling small hats, with 5-10 flowers on each stem; similar to the native Jewelweed (*Impatiens capensis*), which has yellow-orange flowers
- Spreads by seed; mature seed capsules explode when touched, launching seeds up to 5 m away (16 feet)

Habitat: Requires moist soils, often in riparian and lakeshore areas; thrives in disturbed areas.

Distribution: Scattered occurrences in Lake Superior watershed.

Impacts: Forms dense stands that prevent native plants from establishing and reduces biodiversity; nectar produced draws pollinators away from native species; shallow root system leads to erosion issues along riverbanks.



Public Domain, from http://commons.wikimedia.org/wiki/File:Typha_angustifolia_nf.jpg

Narrowleaf Cattail

(*Typha angustifolia*)

Characteristics:

- Emergent (above water), perennial plant; up to 3 m (10 feet)
- Leaves are slightly convex on the back; 0.5-1.2 cm wide (0.2-0.5 inches)
- Flowering stalk is light green, stiff, round in cross-section
- Male and female parts of the flower spike are usually greater than 3 cm (1.2 inches) apart, along the same stalk
- Seeds are soft, downy clustered in “cattail” shape
- Plants spread underground by rhizomes

Habitat: Wetlands, streams, riverbanks, ditches, lakeshores.

Distribution: Scattered occurrences in Lake Superior watershed.

Impacts: Forms dense stands; outcompetes native plants; reduces wetland plant and animal species diversity. Hybridizes with broad-leaved cattail.



Carol Treadwell

Purple Loosestrife

(*Lythrum salicaria*)

Characteristics:

- Erect, emergent (above water) perennial plant; 0.45-2 m tall (1.5-6 feet)
- Leaves are lance-shaped; 3-10 cm long (1.2-4 inches); arranged along the stem in opposite or whorls of three
- Stem is square or angular; may have small hairs
- Pink-purple flowers blossom in spikes 10-40 cm long (4-16 inches) from July to September
- Spreads primarily by seeds, can re-sprout from broken roots; multiple stems can grow from one root

Habitat: Marshes, floodplains, river and stream margins, lake edges, wet ditches and fields.

Distribution: Throughout Lake Superior watershed.

Impacts: Forms dense stands over very large areas, threatening wetland habitat and communities, potentially reducing or displacing native species of plants, birds and invertebrates. In 1992, the Canadian and American governments approved the release of two European leaf-eating beetle species, which are natural enemies of Purple Loosestrife and feed exclusively on the plant. This biological control of Purple Loosestrife can reduce populations by up to 90 per cent and allow native plants to re-establish.

All photos: Dan Tenaglia, MissouriPlants.com



Watercress

(*Nasturtium officinale*)

Characteristics:

- Emergent (above water) or floating hollow stems, rooting freely at the nodes; 10-38 cm tall (4-15 inches)
- Leaves are alternate, and 5-10 cm long (2-4 inches), 2-4 cm wide (0.75-1.5 inches), branching in groups of 3 to 9
- Leaflets are oval to lance-shaped with irregular edging, typically rounded at both ends, the terminal leaflet slightly larger than the rest and may be nearly round
- Small, white flowers with 4 rounded petals; April through September
- Elongating flower stalks at the ends of many branching stems, with blooming flowers clustered at the tip
- Fruit is a slender pod, 1-3 cm long (0.5-1.25 inches). Seeds are oval, reddish brown, arranged in 2 rows

Habitat: Lakes, ponds, rivers, streams, springs.

Distribution: Scattered inland occurrences on U.S. side of Lake Superior watershed.

Impacts: Forms dense stands; outcompetes native plants; reduces wetland plant and animal species diversity.



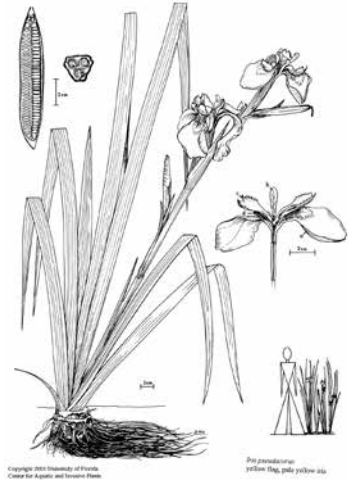
Photos: Dawn Sucee,
OFAH

Yellow Iris

(*Iris pseudacorus*)

Characteristics:

- Erect, emergent (above water), perennial plant; 70-150 cm tall (25-60 inches)
- Leaves linear, sword-shaped, 40-100 cm long (16-40 inches) and 2-3 cm wide (0.8-1.2 inches); all leaves originate from underground rhizomes
- Flowers are showy, bright yellow, and have 3 spread out sepals with brown markings
- Spreads by rhizome fragments, fruit, and/or seed



Habitat: Marshes, floodplains, river and stream margins, lake edges, wet ditches and fields.

Distribution: Not yet found in Lake Superior watershed.

Impacts: Forms dense stands; may outcompete native plants and convert habitat from a wetland to a drier environment; poisonous to animals and humans if ingested; human skin contact can cause dermatitis.

Ann Bove, VTDEC



Mark Matlochhoff, Lake Champlain Sea Grant

European Frogbit

(*Hydrocharis morsus-ranae*)

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 surface
- Well-developed root system, up to 50 cm long (20 inches), which tangles around other plants to form dense mats
- Resembles American frogbit (*Limnobium spongia*); native species has a convex layer of spongy, gelatinous, red tinged tissue beneath the leaf
- Spreads by turions (vegetative overwintering buds) or by offsets that detach and form new plants



Habitat: Areas with limited wave action and slow-moving water; sheltered inlets, ponds, rivers, and ditches.

Distribution: Not yet found in Lake Superior watershed. Throughout the St. Lawrence River to Lake Ontario; occurrences along Lakes Erie and St. Clair; the Kawartha Lakes, the Rideau and Ottawa Rivers systems, and some other inland waterbodies; spreading northward throughout the southern margin of the Canadian Shield.

Impacts: Forms large, dense floating mats; outcompetes native plants; impedes water flow, boating, fishing and swimming.



VTDEC



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European Water Chestnut

(*Trapa natans*)

Characteristics:

- Annual aquatic plant that can be rooted or free-floating; appearing as a rosette up to 30 cm wide (12 inches) 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 (leaf stems) up to 15 cm long (6 inches); additional submerged (underwater) 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 nut-like fruit that has four sharp, barbed points; plant fragments



VTDEC

Habitat: Lakes, rivers, streams, ponds with soft substrate and nutrient-rich waters; in water 2-4 m (6-13 feet) deep.

Distribution: Not yet found in Lake Superior watershed. Established in Ontario, in a bay connected to the Ottawa River in Voyageur Provincial Park; also found in southwestern Québec along Rivière du Sud.

Impacts: Forms large, dense floating mats; outcompetes native plants; impedes boating, fishing and swimming.

Copyright 2003 University of Florida
Center for Aquatic and Invasive Plants*Trapa natans*
water chestnut



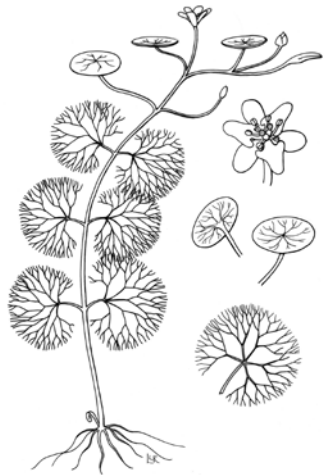
Photos: NHDES

Fanwort

(*Cabomba caroliniana*)

Characteristics:

- Rooted, submerged (underwater), perennial aquatic plant; 2-9 m long (6-30 feet)
- Leaves are finely divided, fan-like, and about 6 cm wide (2.5 inches); petioles (leaf stem) up to 1.5 cm long (0.6 inches). Native 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 flowers, white or yellow coloured, 0.6-1.5 cm wide (0.2-0.6 inches); on a long stem, usually emergent (above water)
- Spreads primarily by stem fragments or rhizomes



Habitat: Rooted in silty substrate of stagnant to slow-moving waters in streams, small rivers, ponds, lakes, and ditches; usually in water less than 3 m deep (10 feet), but up to 5 m (16 feet).

Distribution: Not yet found in Lake Superior watershed. In Ontario, the Crowe River watershed north of Peterborough is the only known occurrence.

Impacts: Extremely persistent. Forms dense stands; outcompetes native plants; impedes water flow, boating, fishing and swimming. Can significantly reduce water storage capacity and taint drinking water supplies.



Ann Bove, VTDEC



Les Merhoff, University of CT

Flowering Rush

(*Butomus umbellatus*)

Characteristics:

- Erect, emergent (above water), perennial plant, which can also be submerged (underwater) or have leaves floating on the water's surface; up to 2.7 m tall (9 feet)
- Leaves all originate from underground rhizomes; linear shape 0.5-1.0 cm wide (0.2-0.4 inches); leaf tips are usually spiraling
- Green stems are triangular in cross section
- Flowers grow in umbrella-shaped clusters; each flower has three pinkish-white petals
- Spreads by seeds or vegetatively by root fragments



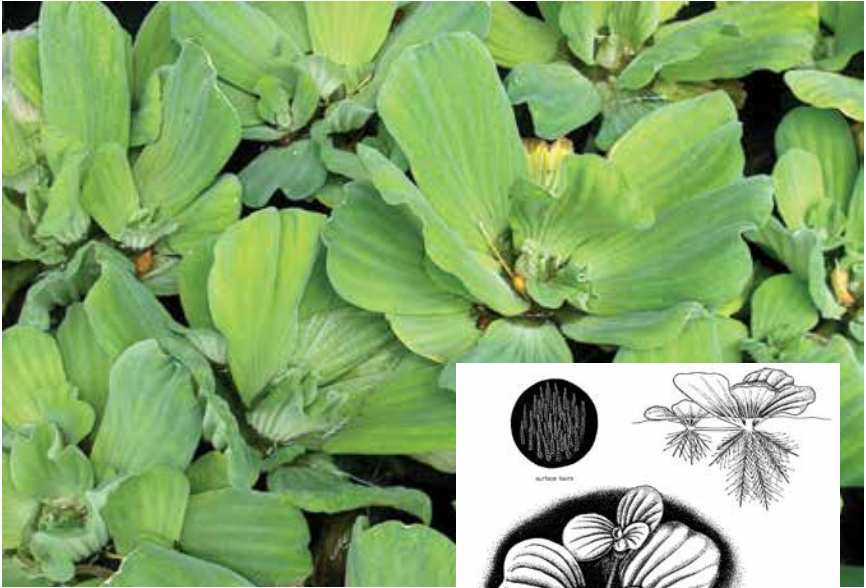
Habitat: Shallow water up to 2 m (6.5 feet) deep in lakes, rivers, marshes, ponds, and wet ditches.

Distribution: One occurrence in Whitefish Lake near Thunder Bay. Throughout Lakes Erie, St. Clair and Ontario; western St. Lawrence River and the Severn River.

Impacts: Displaces native riparian vegetation; impedes boating, fishing and swimming.



Nick Proulx, MNDNR



Water Lettuce

(*Pistia stratiotes*)

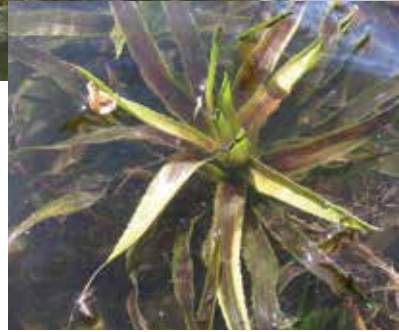
Characteristics:

- Free-floating perennial or annual aquatic plant; forms rosettes at the water's surface
- Leaves are floating or nearly erect; spongy, light green with short white hairs; rounded above and narrow at the base with prominent nearly parallel ridges, 2-20 cm long (1-8 inches)
- Small flowers, white to pale green on a small stalk from the rosette
- Roots are submerged and numerous, hanging beneath rosette of leaves, up to 50 cm long (20 inches)
- Spreads by seed or plant fragments

Habitat: Slow-moving streams, rivers, lakes, ponds, canals, and wet ditches.

Distribution: Not yet found in Lake Superior watershed. Found in ponds connected to the Rideau Canal near Ottawa, and Welland River in Niagara Region, Ontario; Erie Canal in New York and Lake Erie in Ohio.

Impacts: Forms large, dense floating mats; clogs irrigation and flood control canals; impedes boating, fishing and swimming; potentially alters oxygen levels.



Stratiotes aloides Eric Snyder, OMNR

Water Soldier

(*Stratiotes aloides*)

Characteristics:

- Perennial, aquatic plant, submerged (underwater) during the winter and early spring, but becomes buoyant and rises to the water's surface and becomes emergent (above water) during the summer
- Leaves are up to 40 cm long (16 inches), sword-shaped, bright green, with sharp spines on the margins; forms rosettes
- Flowers are white with three petals; however, plants growing in Ontario have not been found with flowers
- Looks very similar to an aloe vera plant, or the top of a pineapple plant
- Spreads by offsets produced by mature plants; offsets are smaller versions of the mature plant

Habitat: Prefers quiet waters, slow-moving rivers, lakes, ponds, and canals; in water up to 5 m deep.

Distribution: Not yet found in Lake Superior watershed. Only population in North America is in the Trent-Severn Waterway, near the hamlet of Trent River, Ontario.

Impacts: Forms large, dense stands; outcompetes native plants; impedes boating, fishing and swimming; inhibits phytoplankton growth; potentially alters surrounding water chemistry.



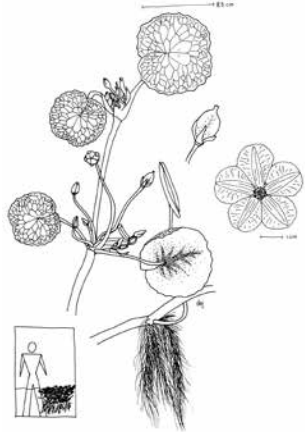
Mark Matchoff, Lake Champlain Sea Grant

Yellow Floating Heart

(*Nymphoides peltata*)

Characteristics:

- Rooted, perennial, aquatic plant; leaves floating on the water's surface
- 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 fringed petals; 2-5 flowers from each leaf stalk; blooms from June to October
- Reproduces by seed and vegetatively by broken stems



Habitat: Prefers quiet waters, slow-moving rivers, lakes, ponds, and canals; grows on damp mud and in water up to 4 m deep (13 feet).

Distribution: Not yet found in Lake Superior watershed. Scattered occurrences in Lake Erie and southern Ontario.

Impacts: Forms large, dense floating mats; outcompetes native plants; impedes water flow, boating, fishing and swimming.



Ann Bove, VTDEC



Theodore Webster, USDA Agricultural Research Service

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Himalayan Balsam, *Impatiens glandulifera* 40

Hydrocharis morsus-ranae, **European Frogbit** 45

Hypophthalmichthys molitrix, **Silver Carp** 20

Hypophthalmichthys nobilis, **Bighead Carp** 19

Impatiens glandulifera, **Himalayan Balsam** 40

Iris pseudacorus, **Yellow Iris** 44

Lythrum salicaria, **Purple Loosestrife** 42

Morone americana, **White Perch** 17

Mylopharyngodon piceus, **Black Carp**. 20

Myriophyllum spicatum, **Eurasian Watermilfoil** 37

Narrowleaf Cattail, *Typha angustifolia* 41

Nasturtium officinale, **Watercress** 43

Neogobius melanostomus, **Round Goby** 13

New Zealand Mudsail, *Potamopyrgus antipodarum* 25

Northern Snakehead, *Channa argus*. 22

Nymphaoides peltata, **Yellow Floating Heart** 51

Orconectes rusticus, **Rusty Crayfish** 27

Osmerus mordax, **Rainbow Smelt** 12



Petromyzon marinus, **Sea Lamprey** 14

Phragmites australis subsp. *australis*, **European Common Reed** 38

Pistia stratiotes, **Water Lettuce** 49

Potamogeton crispus, **Curlyleaf Pondweed** 36

Potamopyrgus antipodarum, **New Zealand Mudsnaill** 25

Proterorhinus semilunaris, **Tube-nose Goby** 16

Purple Loosestrife, *Lythrum salicaria* 42

Quagga Mussel, *Dreissena bugensis* 26

Rainbow Smelt, *Osmerus mordax* 12

Round Goby, *Neogobius melanostomus* 13

Rusty Crayfish, *Orconectes rusticus* 27

Scardinius erythrophthalmus, **European Rudd** 21

Sea Lamprey, *Petromyzon marinus* 14

Silver Carp, *Hypophthalmichthys molitrix* 20

Spartanium erectum, **Exotic Burreed** 39

Spiny Waterflea, *Bythotrephes longimanus* 28

Stratiotes aloides, **Water Soldier** 50

Tench, *Tinca tinca* 23

Threespine Stickleback, *Gasterosteus aculeatus* 15

Tinca tinca, **Tench** 23

Trapa natans, **European Water Chestnut** 46

Tube-nose Goby, *Proterorhinus semilunaris* 16

Typha angustifolia, **Narrowleaf Cattail** 41

Viviparus georgianus, **Banded Mysterysnail** 30

Watercress, *Nasturtium officinale* 43

Water Lettuce, *Pistia stratiotes* 49

Water Soldier, *Stratiotes aloides* 50

White Perch, *Morone americana* 17

Yellow Floating Heart, *Nymphoides peltata* 51

Yellow Iris, *Iris pseudacorus* 44

Zebra Mussel, *Dreissena polymorpha* 29

