

INVASIVE AQUATIC INVERTEBRATE SPECIES

A QUICK REFERENCE GUIDE

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INTRODUCTION

Invasive species are plants, animals, and micro-organisms that, when introduced outside of their natural environment, out-compete native species (Government of Canada, 2016). Invasive species can have harmful consequences for the natural environment, economy, and society, including human health. However, not all introduced species are invasive. Some, like the introduced Chinook salmon (*Oncorhynchus tshawytscha*), produce economic incentives for society, while also not posing a significant threat to native fish and their ecosystems.

Invasive invertebrates, by contrast, compete with our native species for resources, such as food and habitat, and can destroy native fish spawning habitats.

HOW DO INVASIVE INVERTEBRATES ARRIVE AND SPREAD?

Various species of invertebrates have invaded Ontario's waters through pathways including ballast water, recreational and commercial boating, aquarium and water garden trade, live food trade (fish), bait bucket release, unauthorized introductions, and canals and water diversions.

INVASIVE SPECIES ACT, 2015

The Ontario Invasive Species Act (ISA) came into force on November 3rd, 2016. The goal of the Invasive Species Act is to support the prevention, early detection, response to and eradication of invasive species in Ontario. Preventing invasive species from arriving and becoming established in Ontario is critical in the fight against this growing threat. Some key elements of the Invasive Species Act include:

- Giving Ontario the tools to regulate invasive species as either prohibited or restricted and banning activities such as buying, selling, possessing and transporting certain invasive species;
- Enabling response actions to address urgent threats; and
- Helping to promote compliance through modernized inspection and enforcement measures.

INVASIVE INVERTEBRATE SPECIES REGULATED AS PROHIBITED UNDER THE INVASIVE SPECIES ACT, 2015 AS OF JANUARY 1ST, 2018

In Ontario,
it's **illegal** to import, possess, deposit, release, transport, breed/grow, buy, sell, lease or trade these species:

Golden Mussel *(Limnoperna fortunei) page 12*

Killer Shrimp *(Dikerogammarus villosus) page 32*

Yabby *(Charex destructor) page 34*

Golden mussel (*Limnoperna fortune*)

WHAT CAN I DO?

- Learn to identify invasive aquatic invertebrate species that are a threat to Ontario and how to prevent the spread of these unwanted species.
- Never buy or keep invasive aquatic invertebrates. If you have any information about the illegal importation, distribution, or sale of invasive invertebrates, report it immediately to the Ministry of Natural Resources and Forestry TIPS line at **1-877-TIPS-MNR** (**847-7667**) toll-free any time.
- Don't release any aquatic invertebrates into Ontario lakes, rivers, or streams.
- Clean, Drain, and Dry your boat, trailer, and equipment—remove all plants, animals, and mud, and dispose of them on dry land or in the garbage.
- If you see an invasive aquatic invertebrate in the wild, please contact the toll-free Invading Species Hotline at 1-800-563-7711 or report a sighting online at EDDMapS.org/Ontario

HOW TO REPORT INVASIVE SPECIES

- **Call:** 1-800-563-7711
- **Email:** info@invadingspecies.com
- **Create a profile:** on EDDMapS.org/Ontario and submit your reports digitally.

When submitting a report through the Invading Species Hotline or online at EDDMapS.org/Ontario, it is best to have the following information on hand to submit a complete report:

What?

What species do you suspect you encountered? Are there native look-alikes that you may not have considered?

Picture?

In order to confirm reports, a picture is required. However, with some high-priority species (e.g. Prohibited Species), it is best to always report if you suspect you have encountered one!

When and where?

Be sure to note the date and geographical location where you encountered the invasive invertebrate (e.g. latitude and longitude).

Specimen?

Do you have the specimen on hand? If so, call **1-800-563-7711** and ISAP staff will direct you on your next steps.

Species Profiles

GOLDEN MUSSELS

Limnoperna fortunei

MYTILIDAE FAMILY

ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- The Golden Mussel is native to China and southeastern Asia.

DESCRIPTION

- Average length of 2-3 cm, but can potentially reach lengths of 4.5 cm.
- Left and right valves are slightly asymmetrical with a slightly curved mid-ventral line.
- Outside of shell is yellow-brown in colour and interior is white to purple.

HABITAT

- This species inhabits lakes, rivers, wetlands and bays with temperatures ranging from 8-35°C.

IMPACTS

- Attaches to available surfaces, forming dense colonies, also damage infrastructure by fouling water intakes and cooling systems.
- High filtration (feeding) rates, which may cause negative environmental impacts by changing ecological conditions.
- May compete for food and habitat and disrupt reproduction of native mussels.
- May cause injury because of their sharp shells.

LOOKALIKE SPECIES

- Zebra mussels (invasive) and Quagga mussels (invasive).

QUAGGA MUSSELS

Dreissena bugensis

DREISSENIDAE FAMILY

ORIGIN

- Quagga mussels are freshwater bivalves native to the Black Sea region of Eurasia.
- Believed to have been introduced in the late 1980's by ballast water from transoceanic ships carrying veligers (larvae), juveniles, or adult mussels.

DESCRIPTION

- Average 2 cm but can reach lengths of 3 cm.
- Their shells don't allow them to sit flat as they are round in shape.
- Dark concentric rings cover the shell and they are pale in colour near the hinge.

HABITAT

- Attach to surfaces (rocks, pillars, boats, motors, docks, etc.) in lakes, rivers, canals and ponds.

IMPACTS

- Filters large quantities of plankton from water, which can increase water clarity leading to increased plant growth, harmful alga blooms, and reduces availability of food resources for native species.
- Large colonies affect spawning areas, potentially impacting the survival of fish eggs.
- Affects recreational activities by cutting swimmers feet due to their sharp shell.

LOOKALIKE SPECIES

- Zebra mussels (invasive) and Golden mussels (invasive).

ZEBRA MUSSELS

Dreissena polymorpha

DREISSENIDAE FAMILY

ORIGIN

- Zebra mussels are freshwater bivalves native to the Black Sea region of Eurasia.
- Believed to have been introduced in the late 1980's by ballast water from transoceanic ships carrying veligers (larvae), juveniles, or adult mussels.

DESCRIPTION

- Average 2-2.5 cm but can reach up to 4 cm in length.
- Sit flat on its underside and is triangular in shape.
- They are black or brown with white to yellow zig zagged patterns but colour patterns can vary.

HABITAT

- Attach to surfaces (rocks, pillars, boats, motors, docks, etc.) in lakes, rivers, canals and ponds.

IMPACTS

- Filters large quantities of plankton from water which can increase water clarity leading to increased plant growth, harmful alga blooms, and reduces availability of food resources for native species.
- Large colonies affect spawning areas, potentially impacting the survival of fish eggs.
- Affects recreational activities by cutting swimmers feet due to their sharp shell.

LOOKALIKE SPECIES

- Quagga mussels (invasive) and Golden mussels (invasive).

BANDED MYSTERYSNAIL

Viviparus georgianus

VIVIPARIDAE FAMILY

ORIGIN

» Native to northeastern United States to Florida, Gulf of Mexico, Mississippi River to Illinois.

DESCRIPTION

» 3.5 cm or less, spherical with whorls separated by deep sutures.

» Yellow to greenish brown with 3-4 dark reddish brown spiral bands.

» Operculum is ear shaped with concentric growth lines.

HABITAT

» Commonly found in slow flowing streams as opposed to larger fast flowing waters.

» Thrive in disturbed watersheds including fresh to brackish waters with silt, sand, and mud substrates.

IMPACTS

» Reproduce and spread rapidly.

» May prey on fish eggs and reduce survival rates.

» Out-compete for food and habitat and affect the abundance of native snails.

» Can be carriers of parasites that can be transmitted to fish and other wildlife.

LOOKALIKE SPECIES

» Striped garden snail (Terrestrial; native)

CHANNELED APPLE SNAIL

Pomacea canaliculata

AMPULLARIIDAE FAMILY

ORIGIN

- Native to south America, central portion of the continent primarily Argentina (northern), Bolivia, Brazil, Paraguay, and Uruguay.

DESCRIPTION

- 4.5 – 7.5 cm.
- Spherical with 5-6 whorls.
- Brownish or greenish, but can vary from black to pale cream.
- Operculum is ear-shaped with concentric growth lines.

HABITAT

- Commonly found in slow flowing streams as opposed to larger fast flowing waters.
- Thrive in disturbed watersheds with silt, sand, and mud substrates.

IMPACTS

- Reproduce and spread rapidly.
- May prey on fish eggs and reduce survival rates.
- May out-compete for food and habitat and affect the abundance of native snails.
- Might act as a vector transferring bacteria and parasites.

LOOKALIKE SPECIES

- Chinese mysterysnail (invasive), Banded mysterysnail (invasive).

CHINESE MYSTERYSNAIL

Cipangopaludina chinensis

VIVIPARIDAE FAMILY

ORIGIN

- Native to eastern Asia.

DESCRIPTION

- 6.5 cm or less
- Spherical shoulder whorls separated by prominent sutures.
- Brownish to olive-green.
- Operculum is oblong with concentric growth lines.

HABITAT

- Commonly found in slow flowing streams as opposed to larger fast flowing waters.
- Thrive in disturbed watersheds with silt, sand and mud substrates.

IMPACTS

- Reproduce and spread rapidly.
- May prey on fish eggs and reduce survival rates.
- May out-compete for food and habitat and affect the abundance of native snails.
- Has been reported to clog water intake pipes.
- Can be a vector for parasites and diseases.

LOOKALIKE SPECIES

- Banded mysterysnail (invasive), Brown mysterynail.

NEW ZEALAND MUDSNAIL

Potamopyrgus antipodarum

HYDROBIIDAE FAMILY

ORIGIN

- Native to New Zealand and adjacent small islands; it is naturalized in Australia and Europe.

DESCRIPTION

- 8 mm or less.
- Cone-shaped and slender with pointed whorl.
- Variable, range from light to dark brown.
- Operculum is ear shaped with off-centre nucleus.

HABITAT

- Commonly found in slow flowing streams as opposed to larger fast flowing waters.
- Thrive in disturbed watersheds including fresh to brackish waters with silt, sand and, mud substrates.

IMPACTS

- Reproduce and spread rapidly.
- May prey on fish eggs and reduce survival rates.
- Out-compete for food and habitat and affect the abundance of native snails.

LOOKALIKE SPECIES

- Native snails *Marstonia decepta* and *pomatiopsis lapidaria*.

ASIAN CLAM

Corbicula fluminea

CYRENIDAE FAMILY

ORIGIN

- Native to southeast Asia, as well as Australia, Africa, Indonesia, and Turkey.

DESCRIPTION

- Shell is oval triangular and small; less than 25 mm, rarely exceeding 50 mm.
- Shell is light green and brown with elevated ridges.
- Serrated lateral teeth that can be seen with a hand lens.
- Muscular foot that allows for movement.

HABITAT

- Rivers, lakes, streams, canals, and reservoirs.
- Silt, sand, or gravel bottomed areas.
- Prefers moving water with high oxygen levels.
- No tolerance for polluted or near freezing water.

IMPACTS

- Ability to self-fertilize causes rapid reproduction with densities reaching 10,000 per square meter.
- May out-compete native species for habitat and food.
- May cause damage to intake pipes that are used in power and water industries.
- Potential to alter food chains and reduce biodiversity.

LOOKALIKE SPECIES

- Pea clam and Fingernail clam.

BLOODY RED SHRIMP

Hemimysis anomala

MYSIDAE FAMILY

ORIGIN

» Native to freshwater areas of the Black, Azov and Caspian seas in eastern Europe and western Asia.

DESCRIPTION

» Females up to 1.7 cm long, while males are up to 1 cm long.

» Bodies are translucent with bright red to reddish-orange colouring, especially around the head and tail. Colour varies depending on light and temperature.

» Eyes are large and black, extend from the body on short stalks.

» Tail is square with two spines at the end.

HABITAT

» They are most often seen during the day in shaded areas as reddish swarms of tiny animals.

» Cluster on rocky lake bottoms or protected areas near hard structures such as docks, piers, and boats.

IMPACTS

» Reduced food availability for young native fish by eating large quantities of zooplankton.

» Reduction of zooplankton could have detrimental effects on the normal food chain of native species.

» Dense swarms of bloody red shrimp could compete with native fish for food and resources.

» Potential to alter food chains and reduce biodiversity.

LOOKALIKE SPECIES

» Opossum shrimp.

KILLER SHRIMP

Dikerogammarus villosus

GAMMARIDAE FAMILY

ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Native to the Ponto-Caspian region of eastern Europe.

DESCRIPTION

- Relatively large freshwater invertebrate, reaching lengths up to 3 cm.
- Curled, semi-transparent and consist of a head, thorax and abdomen.
- Two pairs of antennae and may be striped or uniform in colour with relatively large jaws.
- The thorax has seven sections, each with a pair of walking legs.
- The abdomen is subdivided into three segments each with a pair of swimming limbs.
- At the end of the abdomen is a fanned tail.

HABITAT

- Prefers slow-moving waters of lakes, rivers, and canals.
- Able to colonize any type of hard-bottomed surface.

IMPACTS

- Aggressive predatory behaviour can displace native species and reduce biodiversity.
- Can also attack smaller fish preying upon certain life stages such as eggs, larvae, and juveniles, causing changes throughout the food web and could impact populations of native fish species.
- Also carry several parasites, which are harmful to other native crustaceans, fish, and birds.

COMMON YABBY

Cherax destructor

PARASTACIDAE FAMILY

ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Native to southern Australia.

DESCRIPTION

- Typically 10-20 cm in length.
- Four ridges that run from behind the eyes on top of the head to the back of the head segment.
- Rostrum (area between the eyes) is smooth.
- Colours can vary depending on water conditions, season, and location, but could include green-beige to almost black or blue grey with a dirty white to grey belly.
- Common Yabby bred for aquarium trade is often bright blue.

HABITAT

- Swamps, streams, reservoirs, and rivers.
- Can also survive for long periods in areas where a body of water has dried up by lying dormant in burrows in the mud.

IMPACTS

- Aggressive behaviour may push out native species for food and habitat, reducing biodiversity and changing species composition of ecosystems.
- Mature at a young age, reproduce rapidly to take over an area in a short amount of time.

LOOKALIKE SPECIES

- Rusty crayfish (invasive), Virile crayfish (*Orconectes virilis*).

MARBLED CRAYFISH A.K.A MARMORKREBS

Procambarus fallax f. virginalis

CAMBARIDAE FAMILY

ORIGIN

- There are no known indigenous populations. Arose recently during breeding of *P. fallax* in captivity.
- Discovered in natural ecosystems in Germany, Italy, the Netherlands, and Madagascar.
- Extremely unique due to the fact that only females exist and they reproduce via cloning.

DESCRIPTION

- Medium sized crayfish capable of reaching 13 cm, but is usually less than 10 cm.
- Distinct marbled colour pattern, especially on the latter parts of the carapace.

HABITAT

- Capable of living in a wide variety of habitats (e.g. rivers, lakes, swamps, drainage ditches, and fish ponds).

IMPACTS

- Possess the ability to degrade wetland habitat and fish populations (observed in its introduced range).
- Due to direct competition, this species may impact native crayfish populations.
- May act as a vector of spread for diseases to native crayfish.

LOOKALIKE SPECIES

- May resemble other native *Cambaridae* species of crayfish.

RUSTY CRAYFISH

Orconectes rusticus

CAMBARIDAE FAMILY

ORIGIN

- Native to the Ohio River Basin in the United Sates.

DESCRIPTION

- Large; adults can reach 7.5-13 cm from the rostrum to the tail.
- Rusty patches on each side of the shell.
- Greyish-green to reddish-brown claws, black bands near the tips.
- Claws have oval gap when closed.
- The rostrum is smooth, pinched and distinctly concave.

HABITAT

- Commonly found in lakes, rivers, ponds, and streams with clay, silt, and gravel bottoms that contain rocks, logs, or debris the crayfish can hide under.

IMPACTS

- Compete with native crayfish for food and resources, often causing the decline or disappearance of native species.
- Reduce spawning and nursery habitat for native fish by eating large quantities of aquatic vegetation.
- Females have the ability to carry fertilized eggs under their tail, allowing them to spread rapidly.

LOOKALIKE SPECIES

- Northern clearwater crayfish (*O. propinquus*), the native virile crayfish (*O. virilis*), and the introduced obscure crayfish (*O. obscurus*).

SPINY WATERFLEA

Bythotrephes longimanus

CERCOPAGIDAE FAMILY

ORIGIN

- Native to northern Europe; likely introduced in ballast water; first discovered in Lake Ontario in 1982.

DESCRIPTION

- Tiny (1-1.5 cm) and translucent.
- Long, sharply barbed tail-spine; dark eye is prominent.
- Large colonies form clumps (with black spots) that looks and feels like gelatin.

HABITAT

- Prefer large, deep, clear lakes, but can be found in shallower waters.

IMPACTS

- Reduce food supplies for small fish and young sportfish such as Bass, Walleye and Yellow Perch.
- Few animals can multiply into a large population.
- Easily spread between waterbodies via angling equipment, bait buckets, live wells, and bilge waters.
- Spiny waterflea introductions result in an average 30 to 40 percent decline in native population of zooplankton.
- Tail spines catch on fishing equipment, making it difficult to reel in lines, and clogging commercial nets and trawl lines.

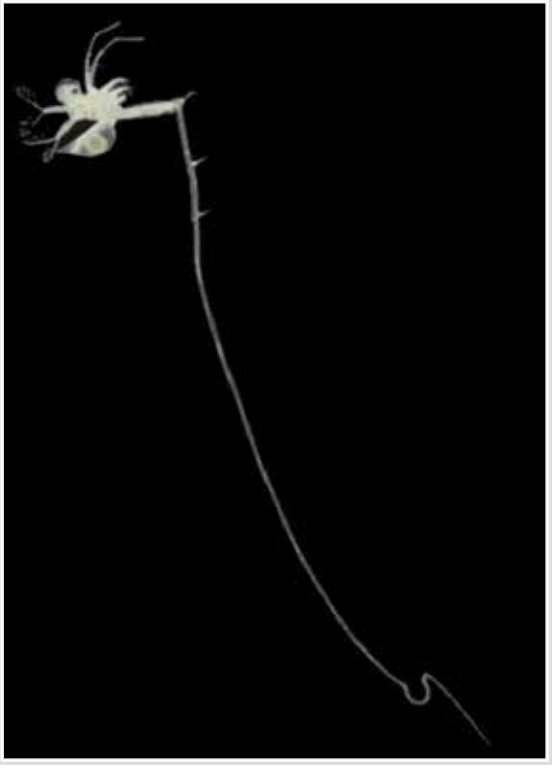
LOOKALIKE SPECIES

- Fishhook waterflea (invasive).

FISHHOOK WATERFLEA

Cercopagis pengoi

CERCOPAGIDAE FAMILY



ORIGIN

» Native to northern Europe; likely introduced in ballast water; first discovered in Lake Ontario in 1982.

DESCRIPTION

» Reaches lengths of 1 cm and translucent.

» Long tail-spine ending in a "hook"; dark eye is prominent.

» Large colonies form clumps (with black spots) that looks and feels like gelatin.

HABITAT

» Prefer large, deep, clear lakes, but can be found in shallower waters.

IMPACTS

» Reduce food supplies for small fish and young sportfish such as Bass, Walleye and Yellow Perch.

» Few animals can multiply into a large population.

» Easily spread between waterbodies via angling equipment, bait buckets, live wells and bilge waters.

» Tail spines catch on fishing equipment making it difficult to reel in lines, and they can clog commercial nets and trawl lines.

LOOKALIKE SPECIES

» Spiny waterflea (invasive).

GLOSSARY OF INVERTEBRATE TERMS

Ballast
Material (rocks or water) taken onboard ships to help maintain stability when the cargo hold is empty.

Bivalve
Second-most diverse group of mollusks, easily recognized by its two-halved shell, including mussels, oysters, and scallops.

Carapace
The part of the shell covering the head and thorax of a crab or crayfish.

Concentric
Describes the growth lines of a snail operculum that lie entirely within each other; not forming a spiral.

Crustacean
Group of mostly aquatic animals that have an exterior skeleton and antennae; some examples of crustaceans include shrimps, lobsters, crabs and waterfleas.

Operculum
(mollusks) covering or lid that closes the opening.

Rostrum
Anterior part of carapace between eyes.

Substrate
Surface or material on or from which an organism lives, grows or obtains its nourishment.

Thorax
The middle section of the body, between the head and the abdomen, bearing the legs.

Veliger
Microscopic, free-swimming larva of some mollusks, such as zebra and quagga mussels.

Whorl
One turn of a spiral shell.

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Zebra Mussels
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Banded Mysterysnail
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Channeled Apple Snail
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NOTES

NOTES


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