



Keep All Our Lakes Great!

Ontario's Invading Species Awareness Program

Invasive species are one of the greatest threats to Ontario's biodiversity and the health of our lakes, forests, and wetlands. In 1992, the Ontario Federation of Anglers and Hunters (OFAH), in partnership with the Ontario Ministry of Natural Resources and Forestry, established the Invading Species Awareness Program to address the critical threat that invasive species pose to Ontario's biodiversity.

Since 1992, we have worked cooperatively to prevent the introduction of invasive species through multiple pathways, including recreational watercraft, use of live bait, and the aquarium, water garden, live food fish, and horticulture industries.

These efforts have resulted in the following success:

- Engagement of hundreds of community groups and like-minded agencies in invasive species outreach, monitoring, and stewardship activities annually;
- Distribution of hundreds of thousands of invasive species educational materials annually;
- Training of over 200 technical professionals in invasive species identification and reporting
- Participation in hundreds of provincial and regionally based events and workshops annually;
- Hiring of over 20 summer staff annually for the Invading Species Hit Squad to deliver on the ground, community-based invasive species education, awareness, and monitoring initiatives;
- Monitoring of hundreds of water bodies annually by volunteers engaged in Invading Species Watch
- Installation of invasive species awareness billboards across the province
- Early detection of new species invasions through citizen reports to the Invading Species Hotline and Invasives Tracking System within North America, the Great Lakes, and Ontario's inland waters;
- Development of educational materials for invasive species preventions for targeted pathways;

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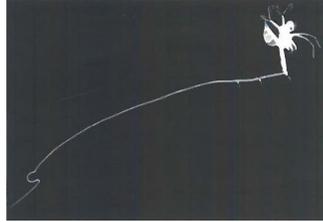
Fishhook Water Flea

Fishhook water flea (*Cercopagis pengoi*) is a member of a large group of organisms called crustaceans, which include species like crayfish and shrimp. Fishhook water flea originated from the Caspian Sea in Eastern Europe and was discovered in Lake Ontario in August 1998. Its most probable route of introduction to the Great Lakes was via the ballast water of ocean crossing ships

The species is a very small organism that is only about 1 cm in length. It has a long spiny tail that makes up almost 80 percent of its body length. Using a microscope, it can be identified by

the unique loop at the end of its tail, as well as a pointed brood pouch that may contain eggs (see diagram). To the casual observer, these characteristics are unlikely to be seen.

Fishhook water flea has a unique reproductive cycle that enables it to become established in a new lake with only one individual.



Without mating, a female can produce eggs that develop into identical female offspring. However, in response to an environmental cue (cold weather, declining food sources), some of these eggs can hatch into males. The males mate with the females to produce "resting eggs", which are later released and fall to the lake bottom where they survive the cold winter and hatch into juvenile females in late spring or early summer. Resting eggs can remain dormant for long periods of time and thus can be easily transported in mud and on fishing equipment to new water bodies.

What does it eat?

Tiny aquatic animals called zooplankton are food for the fishhook water flea. However, zooplankton is also an important food source for native invertebrates and fish, especially young fish.

What are the Impacts?

Fishhook water flea may potentially reduce the abundance and diversity of native zooplankton species and affect local fishes. Large populations of fishhook water flea may consume large amounts of zooplankton which is the same source of food needed by young and small fish. These fish are not likely able to use fishhook

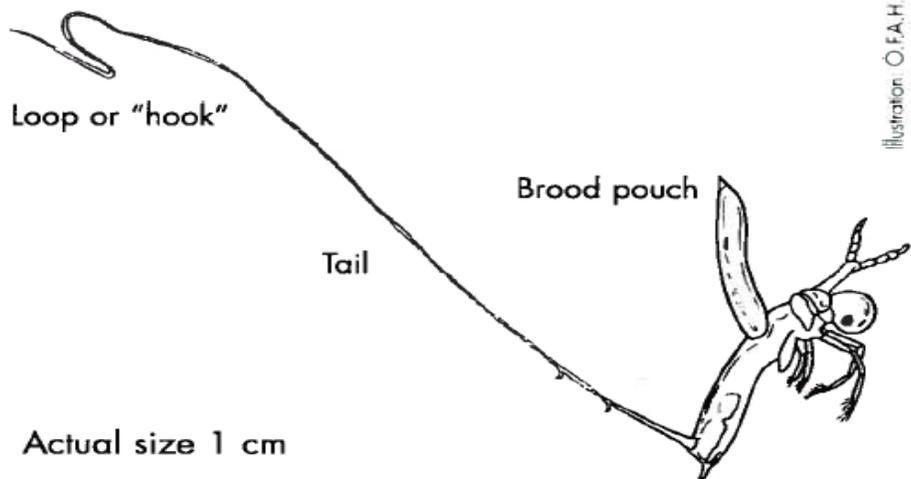
water flea as a food item because of its long spiny tail.

In Lake Ontario, fishhook water flea has had negative impacts on recreational angling, commercial fishing and charter fishing operations. Anglers are most likely to encounter the species on fishing lines as the flea's long spiny tail can become

entangled in them, causing the first line guide of fishing rods to clog with hundreds of fleas: anglers have reported having to cut their lines because they are unable to reel them in. The mass of fleas looks and feels like wet cotton batten, and contains tiny black dots that are the single eyes of each flea. These organisms also foul fishing nets used in the commercial fishing industry.

Where is it found?

Fishhook water flea has been reported in Lake Ontario Lake Erie, Lake Michigan and several inland lakes in New York State.



Round Goby

Round goby (*Neogobius melanostomus*) is a small, invasive bottom-dwelling fish that has already had significant impacts on the Great Lakes fishery and threatens to invade Ontario's inland waters. Round goby is native to Eastern Europe but has been



introduced to North America where it was first reported in the St. Clair River, Ontario in 1990. The species is believed to have been introduced after being transported in the ballast water of ocean crossing ships.

Round goby can live up to five years and reach lengths of up to 25 cm (10 inches). The fish is mottled brown in colour (a spawning male is black) and looks like our native sculpins. However, unlike most other fish that have two separate pelvic fins, round goby has a single pelvic fin forming a suction disc underneath the body. Round gobies can

spawn multiple times in a season. Females can lay thousands of eggs per year. The males guard the nests, which are made under stones, logs, in cavities, or artificial substrata. Eggs develop over approximately 15 days depending on water temperature. In some places, densities of round goby have reached up to 100 fish per square meter.

What are the Impacts?

Round goby has caused the decline of native fish such as mottled sculpin and logperch by competing with these species for food and habitat. Its interference with the spawning of mottled sculpin has potential impacts to yellow perch, which is an important predator of sculpins in some areas. Round goby also severely affects other fish such as bass, lake trout and sturgeon by eating their eggs and young.

The potential for round goby to contribute to food web bioaccumulation of toxins is also a serious concern for fish and other animals in higher trophic levels. Research

is beginning to examine possible contaminant burdens that might build up through zebra mussels, round gobies, piscivorous fish, and animals that consume these fish, including humans.

It is suspected that botulism Type E poisoning of fish and fish-eating birds in the Great Lakes is also spread in a similar way. The toxin may be initially contracted by round goby from infected zebra mussel, and then transferred to piscivorous fish

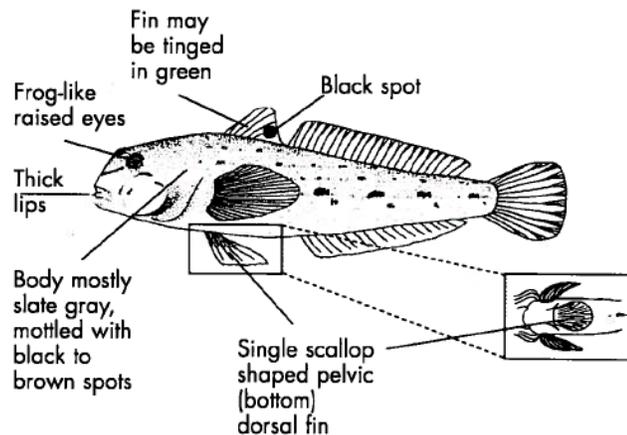
and birds that eat round goby. Recreational activity such as angling is impacted, as well. In areas where round goby densities are high, they are a nuisance to angling because of their aggressive habit of stealing bait.

Due to serious impacts caused by the introduction of round goby and the potential for people to introduce them to new areas, regulations have been passed to make it illegal to possess this fish alive.

Currently, round goby is the fastest spreading fish in Ontario. The species is now established in all five Great Lakes and in Lake St. Clair. It has been found in Michigan's inland waters and recently in inland Ontario, at Trent Severn Waterway (Village of Hastings) and Pefferlaw River (near Lake Simcoe).

This fish prefers to inhabit rocky and sandy bottoms but is not limited to these habitats. It occupies a broad range of depths but is most abundant near shore.

Where is it found?



What does it eat?

The diet of round goby consists largely of small benthic organisms like crustaceans and molluscs, as well as insects. Larger round goby feed on zebra mussels (but unfortunately do not control them) and on the eggs and young of important recreational and commercial fish

Rudd

Rudd (*Scardinius erythrophthalmus*) is a European member of the minnow family that has been introduced to many parts of North America.

Rudd found in Ontario waters probably came from the United States where the species is

commonly used as a baitfish. Bait bucket dumping is believed to be the primary way in which rudd has spread. It is illegal to import baitfish into Ontario.

Rudd is a large, deep bodied minnow that can grow to a

length of 35 cm (14 inches) and weight of approximately 1.8 kg (2.5-3 pounds). It is very similar in appearance to our native golden shiner, but rudd has blood-red fins (golden shiner's are yellow) and a fully scaled belly. See diagram for further details.

Female rudd can lay between 100,000 to over 200,000 eggs per year. The eggs are usually laid close to shore in shallow waters with submerged vegetation and temperatures between 14°-20°C. The eggs hatch in 7-14 days depending on water temperature.



What are the Impacts?

The impacts of rudd on native species are not yet fully known. Rudd may compete with native fish for food and habitat resources. Its large appetite for aquatic vegetation can potentially degrade the spawning and nursery habitats of native fish like Northern pike, muskellunge and yellow perch. Since rudd can hybridize with native golden shiner, there is a potential for the

unique genetics of native golden shiner to be lost.

Invading Species Hotline

1-800-563-7711

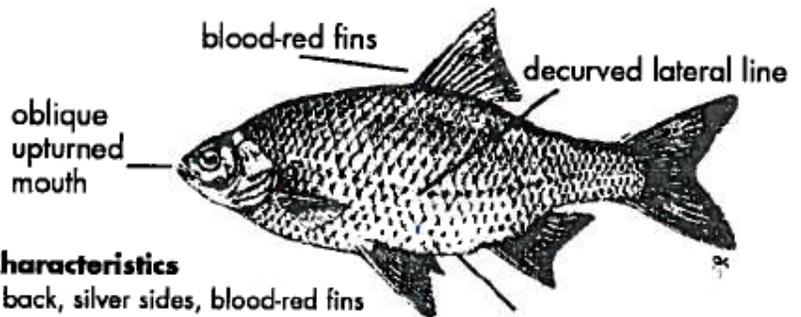
Where is it found?

In Ontario, rudd was first found in the St. Lawrence River in 1990. It was found at several locations in the river during the 1990s, and in 1997 it was discovered in western Lake Ontario and eastern Lake Erie. In 2005, the

What does it eat?

Adult rudd feed mainly on aquatic vegetation and insects. In lab experiments, they consumed up to 40% of their body weight per day.

When they are young, rudd feed on algae, zooplankton, small invertebrates, and occasionally small fish.



General Characteristics

- dark grey back, silver sides, blood-red fins (golden shiner fins are yellow)
- up to 35cm (14") long
- similar to golden shiner

midventral keel with scales (golden shiner keel without scales)

Rusty Crayfish

Rusty crayfish (*Orconedes rusticus*) is a member of a large group of organisms called crustaceans. It is one of approximately 350 crayfish species found in North American waters. Rusty crayfish is native to the Ohio River system of Ohio, Kentucky and Indiana, but has been introduced to many northern lakes and streams where it is a cause for concern. Rusty crayfish may have been introduced through bait bucket dumping or released from an aquarium, though there is no way of knowing for certain.

This species has a brown body and claws with dark black bands near the tips (see

diagram). There are prominent rusty patches (which may not always be present) on either side of the carapace as though it was picked up by a person with rusty paint on their forefinger and thumb. Rusty crayfish grows to an average length of 10 cm (3.9 inches), not including the claws.



Its claws are more robust and larger than other native species in Ontario.

Rusty crayfish can live three to four years. The number of eggs a female lays ranges from 50 to 575 eggs, which hatch in three to six weeks depending on water temperature. Fertilized eggs and newly hatched young are carried on the underside of a female's abdomen for protection. As a result, it is possible for a single crayfish to start a new population once introduced to a water body.

What are the Impacts?

Rusty crayfish can eat twice as much as native crayfish. By consuming larger quantities of benthic invertebrates, rusty crayfish competes with young game fish

and forage fish for food. This could impact the recreational and commercial fishery. Also, rusty crayfish consumption of vegetation reduces the abundance and species diversity of aquatic plants. Many invertebrates and fish rely on these plants for habitat. Fish populations might be further impacted by rusty crayfish feeding on the eggs and young of native fish.

Rusty crayfish can displace native crayfish and contribute to their local extinction. The native species are forced by rusty crayfish out of their daytime hiding sites, so they are more vulnerable to predation by birds and fish. Mating between native *Orconedes propinquus* and rusty crayfish has resulted in hybrid crayfish. This hybridization may hasten the local loss of *O. propinquus* species.



What does it eat?

The species is omnivorous, eating aquatic plants, benthic invertebrates (e.g. worms, snails, leeches, and aquatic insects found at the bottom of a water body), decaying plants and animals, fish eggs, and small fish.

Young crayfish especially feed heavily on benthic invertebrates like mayflies, stoneflies, midges, and side-swimmers.

Where is it found?

The first Ontario reports of this species were from the Kawartha Lakes in the early 1960s. Rusty crayfish has since become established in several areas of southern and northwestern Ontario. It is found in Lake of the Woods, Quetico Provincial Park, Lake Superior, and tributaries near Thunder Bay. It is also found in the North Channel along the north shore of Manitoulin Island, the Ottawa River drainage basin, the upper Mississippi drainage

system, in Lanark and Frontenac counties, the Trent-Severn waterway, as far north as Balsam Lake, areas in Haliburton, and Berford Lake on the Bruce Peninsula. Rusty crayfish have also been found

in streams in the Toronto area as well as in the upper Grand River watershed near Grand Valley and upper Speed River watershed near Guelph. On the US side of the Great lakes, rusty crayfish have been found near Duluth Minnesota on Lake Superior.

Rusty crayfish inhabits lakes, rivers, ponds, and streams which have water in them all year-round. The species prefers rock, log and debris cover, as well as bottoms of clay, silt and gravel. It is most active from spring to fall when temperatures are above 8°C.

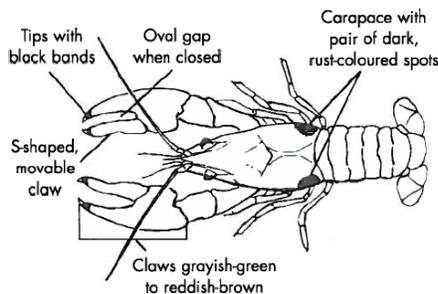


Illustration Great Lakes Sea Grant Network and U.S. Fish and Wildlife Service

The Ontario Federation of Anglers and Hunters (O.F.A.H.) and the Ontario Ministry of Natural Resources (OMNR) have set up a toll-free Invading Species Hotline 1-800-563-7711 and website www.invadingspecies.com for you to obtain information on and report sightings of rusty crayfish and other invading species.

- ⇒ **Report sightings.** If you find an invasive species in a new area, freeze it or preserve it in rubbing alcohol, then call the Invading Species Hotline or contact your local OMNR Office to report your finding and confirm your specimen.
- ⇒ **Get involved.** Participate in one of our many community based monitoring programs to detect and prevent the spread of invading species.
- ⇒ **Find out more.** Contact the Invading Species Hotline 1-800-563-7711 or visit www.invadingspecies.com



Boaters and Anglers - you can help!

It is extremely important to prevent the further spread of rusty crayfish. To protect your lake and prevent the spread of invading species, please take the following precautions before leaving a water body and entering another:

- ◇ Never use rudd, round goby or rusty crayfish as bait!
- ◇ Do not release live bait! Empty your bait bucket on dry land, or freeze or salt the bait for later use. It is illegal to release live baitfish from one water body into another.
- ◇ Inspect your boat, trailer and equipment - remove all plants, animals and mud, and dispose of them on dry land or in the garbage.
- ◇ Drain water from motor, live well, bilge and transom wells while on land.
- ◇ Remove organisms you can't see on your boat, trailer and equipment by:
 - ◇ Rinsing them with hot water (>40°C); or
 - ◇ Spraying with high pressure water (250 p.s.i.); or
 - ◇ Drying them in the sun for at least five days; and
 - ◇ Submerge hard-to-clean fishing equipment and nets in hot water (40°C) for ten minutes.