

# INVASIVE FISH SPECIES

## A QUICK REFERENCE GUIDE

THIRD EDITION, 2024



## ACKNOWLEDGEMENTS

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## INTRODUCTION

Invasive species are plants, animals, and micro-organisms that, when introduced outside of their natural environment, outcompete 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 fishes, by contrast, are a concern because they have a displacement capacity, meaning they outcompete our native fishes for space, food, and other resources.

## HOW DO INVASIVE FISHES ARRIVE AND SPREAD?

Invasive fishes can be introduced and spread in a variety of ways including ballast water, movement of bait, the aquarium and water garden trades, live fish trade, 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 FISH SPECIES REGULATED AS PROHIBITED UNDER THE INVASIVE SPECIES ACT, 2015 AS OF JANUARY 1ST, 2024

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

**Bighead Carp** *(Hypophthalmichthys nobilis) page 12*
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*(Gambusia holbrooki & G. affinis) page 22*
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**Stone Moroko** *(Pseudorasbora parva)*
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**Wels Catfish** *(Silurus glanis)*
**Zander** *(Sander lucioperca)*
**Red Shiner** *(Cyprinella lutrensis) page 36*
**Ide (Orfe)** (*Leuciscus idus*)

Under the Federal Fisheries Act, it is illegal to possess, transport, or release the following invasive fishes unless they are dead: Round Goby, Tubenose Goby, Ruffe, and Rudd

## WHAT CAN I DO ABOUT INVASIVE FISHES?

- Learn to identify invasive fish species that are a threat to Ontario and how to prevent the spread of these unwanted species.
- Never buy or keep live invasive fishes. If you have any information about the illegal importation, distribution, or sale of invasive fishes, 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 live fish into Ontario lakes, rivers, or streams. Return or donate unwanted aquarium fish to a pet store or local school.
- Clean, Drain, and Dry your boat, trailer, and equipment. Remove all plants, animals, and algae, and dispose of them on dry land or in the garbage. For more information on boater regulations in Ontario, visit: www.invadingspecies.com/invasive-species-act/
- If you see an invasive fish in the wild, please report it through one or more of the below methods.

## HOW TO REPORT INVASIVE SPECIES

- Call: 1-800-563-7711
- Email: isap@ofah.org
- Create a profile: on EDDMapS.org and submit your reports digitally.

## TEMPLATE FOR REPORTING A SIGHTING

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

**What?**

What species do you suspect you have encountered? Are there native lookalikes that you may not have considered?

**Picture?**

In order to confirm reports, a picture is required. However, with some high-priority species, it is best to always report!

To photograph an invasive fish:

- Photograph the entire fish on its side with something for scale.
- Accurately capture the shape of the dorsal (back) fin.
- Photograph the mouth of the fish.
- Take a photo of the underside of the fish.

**When and where?**

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

**Specimen?**

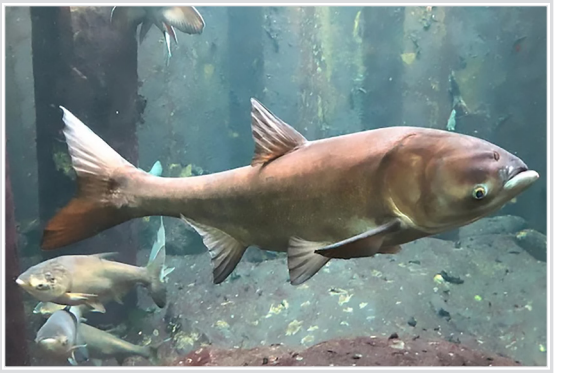
Do you have the fish in hand?
If so, call the Invading Species Hotline at 1-800-563-7711 and ISAP staff will direct you on your next steps.

*Species Profiles*

# BIGHEAD CARP

*Hypophthalmichthys nobilis*

XENOCYPRIDIDAE



## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Native to China and far eastern Russia, it was introduced to the US in the 1960s and 70s for water quality management in fish culture ponds.
- Flooding resulted in its escape into the Mississippi River Basin.

## DESCRIPTION

- Deep-bodied fish with a large toothless mouth and very large head that is about one-third of its total length.
- Eyes are located forward and low on its head, well below the axis of the body.
- Colouration is dark grey above and cream-coloured below with dark grey to black irregular blotches on the back and sides.
- Can measure up to 1.5 m (about 60 inches) and weigh up to 41 kg (about 90 lbs).

## HABITAT

- Spawning occurs in moderate to large rivers and lakes with areas of slow current and depths of more than two metres.
- Extremely adaptable and can thrive in many freshwater environments.

## IMPACTS

- Filters large amounts of plankton out of the water column to a greater degree than native fishes.
- May cause a large decrease in native forage fishes.
- May result in a decrease of sportfish species that feed on forage fishes.

## LOOKALIKE SPECIES

- Gizzard Shad, Mooneye, Alewife (introduced).

# BLACK CARP

*Mylopharyngodon piceus*

XENOCYPRIDIDAE

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Large rivers and lakes in eastern Asia from southern Russia to southern China and Vietnam.
- Introduced to the US in the 1960s and 70s for water quality management in fish culture ponds.
- Flooding resulted in its escape into the Mississippi River Basin.

## DESCRIPTION

- Appears elongated and laterally compressed.
- Large scales with appearance of crosshatching, terminal mouth with pharyngeal teeth.
- Colour is anywhere from a brown to black with a lighter underbelly and its fins are a darker colour (appear lighter near the base).
- Can measure up to 1.8 m (about 71 inches) and 35 kg (about 77 lbs).

## HABITAT

- Prefers habitats in the lower reaches of rivers and lakes with spawning occurring in areas of high turbulence.

## IMPACTS

- Predates primarily on molluscs and may impact many species at risk if introduced to the Great Lakes.
- Competes with native fishes for food and habitat.

## LOOKALIKE SPECIES

- Fallfish, Creek Chub, Common Carp (introduced).

# GRASS CARP

*Ctenopharyngodon idella*

XENOCYPRIDIDAE

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Large rivers and lakes in eastern Asia from southern Russia to northern Vietnam.
- Introduced to the US in the 1960s and 70s for vegetation management in fish culture ponds.
- Flooding resulted in its escape into the Mississippi River Basin.

## DESCRIPTION

- Lacks barbels on their mouth and have a narrow dorsal fin.
- Their eyes appear small and are centred on the side of the head, in line with its axis.
- Large, crosshatched scales and lacks serrated fin rays.
- The colouration varies from an olive-brown at the top to a brassy/silver-white towards the sides and belly.
- Can measure up to 1.5 m (about 60 inches) and 45 kg (almost 100 lbs).

## HABITAT

- Prefers large, slow-moving waterbodies and will spawn in large rivers with a moderate current.

## IMPACTS

- Alter habitat through feeding of aquatic vegetation; may cause water to become more turbid by uprooting plants and disturbing sediment.
- Compete with native fishes for food and habitat.

## LOOKALIKE SPECIES

- Creek Chub, Common Carp (introduced), Fallfish, Buffalo spp.

# SILVER CARP

*Hypophthalmichthys molitrix*

XENOCYPRIDIDAE

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Large rivers, canals, and lakes in eastern Asia from southern Russia and North Korea to southern China.
- Introduced to the US in the 1960s and 70s for water quality management in fish culture ponds.
- Flooding resulted in its escape into the Mississippi River Basin.

## DESCRIPTION

- Deep-bodied with a moderately large, broad head.
- Toothless with an upturned lower jaw and eyes located below the axis of the body.
- Silver in colour with a grey head and dorsal surface.
- The belly is white with a keel that extends from the anal fin to the throat.
- Can measure up to 1 m (about 40 inches) and weighs up to 27 kg (about 60 lbs).

## HABITAT

- Prefers stagnant waters of rivers, canals, and lakes.

## IMPACTS

- Filters large amounts of plankton out of the water column to a greater degree than native fishes.
- May cause a large decrease in native forage fishes.
- May result in a decrease of sportfish species that feed on forage fishes.

## LOOKALIKE SPECIES

- Gizzard Shad, Mooneye, Alewife (introduced).

# PRUSSIAN CARP

*Carassius gibelio*

CYPRINIDAE / CARP FAMILY

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Waterbodies with poor water quality from Siberia and central Europe.
- First detected in Alberta in 2006 where it is thought to have been mistakenly released as a Goldfish.
- Currently found throughout Alberta and Saskatchewan river systems.

## DESCRIPTION

- Deep-bodied, robust fish.
- Long dorsal (back) fin relative to their overall length and have a deeply forked caudal fin.
- Can measure up to 45 cm (about 18 inches) and weigh up to three kg (approx. 6.6lbs).
- Similar in appearance to Goldfish, but Prussian Carp are more silvery-brown. However, to truly tell the difference, genetic testing must be used.

## HABITAT

- Prefers lakes, rivers, and reservoirs, provided there is submerged vegetation or regular flooding.
- Can tolerate poor water conditions.

## IMPACTS

- Can significantly reduce invertebrate populations and may outcompete native fishes for habitat and food.
- Have been associated with a decrease in habitat quality and aquatic biodiversity.

## LOOKALIKE SPECIES

- Goldfish (invasive), Common Carp (introduced), Rudd (invasive).

# EASTERN & WESTERN MOSQUITOFISH

*Gambusia holbrooki & G. affinis*

POECILIIDAE / LIVEBEARER FAMILY

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Native to north and central America within the Mississippi River basin and the Atlantic and Gulf Slope drainages.
- Introduced worldwide in the early 1900s as control for mosquitoes.
- Established in several states bordering the Great Lakes.

## DESCRIPTION

- Small fish with distinct smoky black teardrop below the eye.
- Dull grey colouration with a large abdomen, rounded dorsal and caudal fins, and an upturned mouth.
- Grow to a maximum length of 6.5 cm (2.5 inches).

## HABITAT

- Prefers slow moving freshwater streams but can persist during periods of high salinity.

## IMPACTS

- Aggressive and can negatively impact native fishes and invertebrate populations through predation and competition.
- By displacing native insectivores, Mosquitofishes can facilitate mosquito population growth.
- Mosquitofishes are carriers of the necrosis hematopoietic virus (EHNV) that can be fatal to Rainbow Trout (introduced).

## LOOKALIKE SPECIES

- Native minnows, especially shiner species.

# EURASIAN RUFFE

*Gymnocephalus cernua*

PERCIDAE / PERCH FAMILY

## ORIGIN

- Native to northern Europe and Asia.
- It was likely transported to North America in the ballast water of vessels arriving from Europe in the mid 1980s.

## DESCRIPTION

- Perch-like body <20 cm (8 inches) long with glassy eyes and a down-turned mouth.
- Olive-brown on the back and turns to a pale colour on its sides.
- The two dorsal fins are joined; first fin has 11-16 sharp spines with rows of dark spots between them, and the second dorsal fin has soft, flexible rays.
- Sharp spines on their anal fin and gill covers with no scales on its head.

## HABITAT

- Highly adaptable and able to thrive in a wide range of environmental conditions including water with low or high nutrients, and a wide range of depths and temperatures.
- Capable of spawning in a wide variety of conditions and habitats.

## IMPACTS

- Competes with native sportfishes for food and habitat.
- Can become the most dominant fish in localized areas.

## LOOKALIKE SPECIES

- Juvenile Walleye, Sauger, Yellow Perch.

# GOLDFISH

*Carassius auratus*

CYPRINIDAE / CARP FAMILY

## ORIGIN

- Native to eastern Asia, brought over to North America for the pet trade.

## DESCRIPTION

- Elongated bodies which average 12 to 20 cm (5 to 8 inches) long but can grow to 40 cm (16 inches) in a larger ecosystem.
- Colour can vary from the typical orange to an olive green or creamy white, however wild populations are typically olive to grey.
- Large head and eyes. Dorsal fins are long with a single stout spine with serrated trailing edge.
- Short anal fin with a single stout serrated spine, deeply forked tail and a small mouth without barbels.

## HABITAT

- Quiet vegetated ponds, streams, and pools, which are often in populated urban or suburban areas.
- Established populations have been reported along the north shores of Lake Erie and the west end of Lake Ontario.

## IMPACTS

- Compete with and predate on native fish species.
- Feeding patterns affect the growth of aquatic plants.
- Potential to produce large populations and carry diseases that harm native fish species.

## LOOKALIKE SPECIES

- Common Carp & Koi (introduced), Prussian Carp (invasive).

# NORTHERN SNAKEHEAD

*Channa argus*

CHANNIDAE / SNAKEHEAD FAMILY

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Native to China and was introduced by consumers after purchasing for the live-food trade or as released pets.
- First North American discovery in the wild was in Maryland, US in 2002.

## DESCRIPTION

- Narrow, torpedo-shaped body.
- Colour is dark brown to tan with irregular blotches.
- Long single dorsal fin and long single anal fin.
- Head has large scales which gives it a "snakehead" appearance and their jaws are canine-like.

## HABITAT

- Lives in ponds, lakes, rivers, and streams.
- Ability to live in areas with very little oxygen due in part by a lung like organ that allows them to inhale oxygen by gulping air at the surface.

## IMPACTS

- Competes and predates on native fish species due to its aggressive feeding behaviour.
- Highly adaptable and is likely to thrive in Ontario's waters, if introduced.

## LOOKALIKE SPECIES

- Burbot, Bowfin.

# ROUND GOBY

*Neogobius melanostomus*

GOBIIDAE / GOBY FAMILY

## ORIGIN

- Native to eastern Europe; introduced to North America through ballast water and was first discovered in 1990 in the St. Clair River.

## DESCRIPTION

- Measures from 6 to 16 cm (2 to 6 inches) long with a cylindrical body and a rounded to blunt snout.
- Mottled grey and brown.
- Single suction cup-shaped pelvic fin, bulging eyes, and a black spot on the rear of their front dorsal fin.
- Male Round Gobies turn to jet black during the spawning season (April to September).

## HABITAT

- Found near shore, can tolerate a wide range of conditions, however prefers rock, cobble, and rip rap or sandy areas.

## IMPACTS

- Reduces populations of sportfish by eating their eggs and young, and by competing for food sources.
- Linked to botulism type - E, which can impact fish-eating birds.

## LOOKALIKE SPECIES

- Slimy and Mottled Sculpins, Tubenose Goby (invasive).

ILLEGAL TO POSSESS, TRANSPORT, OR RELEASE UNLESS DEAD

# TUBENOSE GOBY

*Proterorhinus semilunaris*

GOBIIDAE / GOBY FAMILY

## ORIGIN

- Native to eastern Europe; introduced to the Great Lakes via ballast water and was first detected in the St. Clair River in 1990.

## DESCRIPTION

- Small, bottom-dwelling invasive fish that grows up to 10 cm (about 4 inches) in length.
- Mottled brown body with no black spot on its dorsal fin, unlike the Round Goby.
- Characterized by a fused scallop-shaped pelvic fin.
- Small nostril tubes that extend over the upper lip.

## HABITAT

- Prefers waters near the shores of lakes and rivers, where they can hide among aquatic plants.

## IMPACTS

- Competes with bottom-dwelling fishes for food.
- May also eat and compete for food with other species that spawn in nearshore areas.

## LOOKALIKE SPECIES

- Slimy and Mottled Sculpins, Round Goby (invasive).

ILLEGAL TO POSSESS, TRANSPORT, OR RELEASE UNLESS DEAD

# RUDD

*Scardinius erythrophthalmus*

LEUCISCIDAE / MINNOW FAMILY

## ORIGIN

- Native to western Europe to the Caspian and Aral Sea basins. Brought over to the US for use in the bait trade.

## DESCRIPTION

- Large, deep-bodied; on average 10 to 25 cm (4 to 10 inches) long.
- Protruding lower jaw and are a gold bronze in colour with a white belly.
- Can also be dark to light olive in colour.
- They usually have reddish-coloured fins.

## HABITAT

- Still, shallow weed lines in lakes, slow moving rivers, and ponds.
- Seldom move into open water.

## IMPACTS

- May impact genetic diversity due to their ability to hybridize with the native Golden Shiner.
- Will compete with native sportsfishes for food and habitat.
- Eating habits can degrade spawning and nursery habitat for native fishes.

## LOOKALIKE SPECIES

- Golden Shiner, Goldfish (invasive), Red Shiner (invasive), Prussian Carp (invasive).

# RED SHINER

*Cyprinella lutrensis*

CYPRINIDAE / CARP FAMILY

## ORIGIN (NOT CURRENTLY KNOWN IN ONTARIO)

- Native to central and western Mississippi River basin.
- Popular in the aquarium trade and as bait fish, also known as Rainbow Dace.
- Found in 15 states outside their native distribution throughout the continental US.

## DESCRIPTION

- Deep-bodied minnow that is laterally compressed and has a terminal mouth with a rounded snout.
- Lateral line curved downward.
- Grow to a maximum length of 9 cm (3.5 inches).

## HABITAT

- Can be found in almost any aquatic habitat.
- Can thrive in poor water conditions and habitats, such as irrigation ditches and canals.

## IMPACTS

- Can threaten native fish populations by outcompeting native species for food and habitat.
- Prey on native fishes and invertebrate eggs and larvae.
- Can spread diseases and pathogens and hybridize with native minnow species.

## LOOKALIKE SPECIES

Rudd (invasive), Golden Shiner.

# TENCH

*Tinca tinca*

TINCIDAE / TENCH FAMILY

## ORIGIN

- Native to Europe and western Asia. Introduced in the US for food and as a potential sportfish.
- It was brought to a Québec fish farm in 1986 and escaped into the Richelieu River, a tributary of the St. Lawrence River.

## DESCRIPTION

- Dark olive to pale golden tan above with a white to bronze belly and a bright reddish-orange eye.
- Usually 20 to 25 cm (8 to 10 inches) in length with a deep, but thin body.
- Terminal mouth and has a single barbel hanging from each side of the mouth.
- Fins are dark and rounded with no spines.
- Scales are small and embedded in thick skin.

## HABITAT

- Prefers lakes and slow moving waterways with abundant vegetation and muddy bottoms.
- Can sustain life in waters with very low levels of oxygen.

## IMPACTS

- Competes with native species for food.
- Aggressive feeding stirs up sediments leading to cloudy water.

## LOOKALIKE SPECIES

- Common Carp (introduced).

# GLOSSARY OF FISH TERMS

**Anal fin**
the fin on the median ventral line behind the anus.

**Barbel**
whisker-like projection close to the mouth, like those seen on catfish.

**Caudal fin**
pertaining to the tail.

**Dorsal fin**
a fin on the back, usually central in position supported by rays of spines.

**Juvenile**
a younger, not fully developed fish early in its life-cycle.

**Keel**
the flat undersurface of a fish usually found between the pelvic fin and anal fin, but sometimes extends the full length of the fish.

**Lateral line**
series of pore-like openings, extending from the head to the tail on either side of a fish, that detects movement in the water and other fish.

**Pectoral fins**
the most anterior/uppermost of the paired fins, usually dorsal to the pelvic fins.

**Pelvic fins**
ventral, paired fins either side of the ventral midline, may be below the pectoral fin, between the pectoral and the anal fin, forward of the pectoral fin, between the pectoral and the anal fin, forward of the pectoral fin, modified into a suction cup, or absent entirely.

**Pharyngeal teeth**
teeth composed of hard, moveable plates located in the throat of certain fish and used for crushing or grinding food.

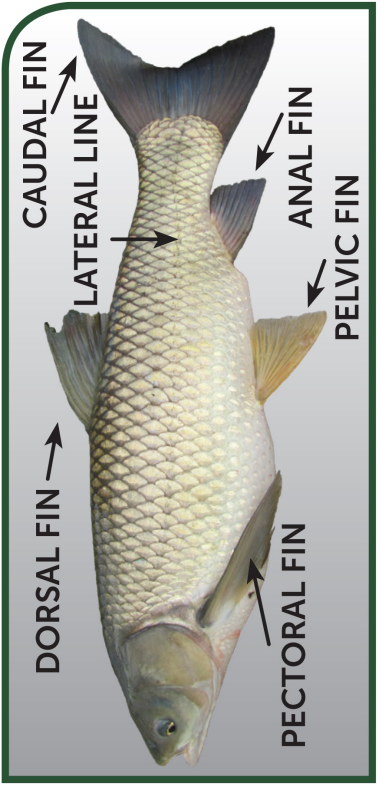
**Prohibited**
forbidden by law.

**Rays**
the articulated or jointed rod that supports the membrane of a fin.

**Spine**
a sharp, rigid animal process like a porcupine quill.

## FISH ANATOMY

Photo Credit: Jeff Hill, University of Florida
-IFAS Tropical Aquaculture Laboratory



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# PHOTO CREDITS

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**Black Carp**
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Ryan Hagerty, USFWS.

**Grass Carp**
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John Lyons, Department of Natural Resources

**Goldfish**
John Lyons, Department of Natural Resources

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# NOTES

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