

Lesson 3: Great Lakes Most Unwanted

Activity: Students work in small groups to organize invasive species cards, featuring facts and photos. Each group presents a different invasive species in a poster or fact sheet to the class.

Grade level: 4-8

Subjects: Science, social studies

Setting: Classroom

Duration: 2 hours

Key terms: Ballast water, Invasive, Non-native

Objectives

After participating in this activity, students will be able to:

- Name and visually recognize the primary aquatic **invasive** species of the Great Lakes
- Understand and analyze the negative impacts that invasive species have on the Great Lakes ecosystem
- Explain the ways in which non-native species are introduced into the Great Lakes

Summary

Many non-native species live in the Great Lakes, and some of them have become invasive. These species have established populations, multiplied rapidly, and caused profound and lasting impacts on the Great Lakes ecosystem. Others (such as Asian carp) have caused serious ecological problems in other parts of the country and threaten to enter the Great Lakes. Students will learn about some of the impacts of invasive species and how people can help prevent the spread of these unwanted species.

Background

Many non-native species have been introduced into the Great Lakes since the early 1800s, either accidentally or intentionally. Nonindigenous or **non-native** species are plants and animals living outside of the area where they evolved. A fraction of these species (about 10%) are considered invasive. Aquatic invasive species are non-native plants, animals and microscopic organisms that have a profound negative impact on an aquatic ecosystem or human activity.

Free from natural predators, invasive species reproduce rapidly in their new homes and compete with native species for food and habitat. They disrupt the aquatic food web by reducing food for native species or by preying directly upon native species. Invasive species are often called “biological pollutants.” They’re costly to manage and have led to a severe loss of biodiversity throughout the world.



In the Great Lakes, zebra mussels and sea lamprey are among the invasive species that have permanently altered the ecosystem, contributed to declines in native species, and impacted sport and commercial fishing. Invasive plants, such as purple loosestrife and Eurasian watermilfoil, have established themselves in many wetlands and inland lakes, respectively, resulting in a loss of native plants and the wildlife that depend upon them.

Many invasive species in the Great Lakes were transported from foreign ports in the ballast water of ocean going freighters. Ships often take on **ballast water** for better balance, stability, and safety. Today, the United States and Canada require that most ships entering the Great Lakes exchange their ballast water while still at sea to reduce transport and introduction of new species. Other species like sea lamprey entered the Great Lakes on their own when shipping canals were modernized. Still other introductions are the result of accidental releases.

How You Can Help

Prevent the transport of aquatic invasive species. Before leaving a body of water:

- Remove mud, plants, fish and animals from fishing gear, boats, motors, and trailers.
- Eliminate water from all equipment, including swimming floats, boat hulls, and bait buckets.
- Clean and dry anything that came in contact with the water—even boots, clothing, and pets.
- Do not release or put plants, fish or animals into a body of water unless they came out of it. Dispose of unused fishing bait in the trash.
- See: Protect Your Waters Website, www.protectyourwaters.net

Materials and Preparation

For each group of 3-4 students:

- Set of 16 *Aquatic Invasive Species Game Cards*. Each set has 8 photo cards (featuring invader photo and introduction) and 8 characteristics cards (featuring species characteristics and impacts).
- White and colored card stock
- Tape
- Copy photo cards onto white card stock. Copy characteristics cards onto colored card stock.
- Assemble all cards by cutting, folding in half, and taping to make 2-sided cards.
- Answer sheet

NOTE: Set of 16 *Aquatic Invasive Species Game Cards*, see cards at the end of this lesson (supplemental materials).

Procedure

1. Introduce the topic of invasive species to the class. Explain key points made in the background section and define difficult vocabulary words, such as non-native, invasive, ballast water, etc.

2. Have the students work in groups of three to four people, each with a complete set of 16 shuffled cards—8 photo cards and 8 characteristics cards.
3. Beginning with the photo cards, match each invader to its corresponding characteristics and impacts.
4. When group members agree that they have matched the cards to the best of their ability, they may review their answers on the answer sheets.
5. Each group selects an invader to present to the class, and constructs a poster about the invader or develops a fact sheet. Be sure to include the impact of the invader on the ecosystem. Brainstorm ways to prevent new species from entering the Great Lakes.
6. After all the groups have presented and discussed their species, review with students the importance of human behavior in preventing the introduction and spread of invasive species, which have many negative impacts on the Great Lakes ecosystem.

Adaptations

- Draw an invasive species, paying special attention to distinguishing characteristics.
- Create a humorous cartoon depicting some of the impacts of invasive species. (Example: purple loosestrife choking other plants, etc.)
- Learn about ways to prevent the introduction of new invasive species and slow the spread of existing populations using the Great Lakes Most Unwanted (poster series).

Source

Adapted for the Great Lakes Education Program with permission from “What do scientists know about invader species of the Great Lakes?” in Earth Systems—Educational Activities for Great Lakes Schools: Life in the Great Lakes. Modified by Anne Williamson and Mike Klepinger.

Assessment & Standards

See separate document: FLOW_Assessment_GLCE.pdf

FLOW Feedback

Please take 10 minutes to provide us with your feedback.

Go to: <http://www.miseagrant.umich.edu/flow/flow-feedback.html>

Supplemental Materials, Unit 1

Lesson 3 - Great Lakes Most Unwanted Documents:

- Set of 16 Aquatic Invasive Species Game Cards
- Additional details and photos about aquatic invasive species, see: www.miseagrant.umich.edu/ais
- Aquatic Invasive Species Poster Series, *Great Lakes Most Unwanted*, see: www.miseagrant.umich.edu/store

INVASIVE SPECIES ANSWER SHEET

Unit 1, Lesson 3

SEA LAMPREY

Sea lampreys come from an ancient family of jawless fishes that look like eels. Native to the Atlantic Ocean, they entered the St. Lawrence River and eventually the Great Lakes when the Welland Canal was modernized around 1920. Today sea lampreys are found in all the Great Lakes and many tributaries, with the largest population in northern Lake Huron.

Characteristics

- Eel-like fish that attach to other fish and feed on body fluids.
- Adults grow 12 to 20 inches long.
- Round, suction disk mouth is filled with sharp teeth.

Impacts

- Can kill 40 pounds of fish during its life.
- Often kills large, predator fish, causing populations of smaller fish to grow too large.

EURASIAN RUFFE

This fish is native to Europe and Asia. It was first discovered in Minnesota's St. Louis River, the main tributary to western Lake Superior, in 1986. It arrived in the ballast water of an ocean-going vessel.

Characteristics

- Small, aggressive fish with sharp spines on top and bottom fins.
- Grows rapidly and loves to eat.
- Can tolerate a range of water conditions.

Impacts

- Makes up an estimated 80 percent of the fish caught in the St. Louis River.
- Has spread to other areas in western Lake Superior, and Thunder Bay, Lake Huron.

- Reduces food and habitat for native fish, such as walleye and perch.

ROUND GOBY

This fish is originally from the Black and Caspian Seas. It hitched a ride to the Great Lakes in the ballast water of an ocean-going vessel. Round gobies were discovered in the St. Clair River around 1990. They've spread to all of the Great Lakes, with the greatest numbers in Lake Erie, Lake St. Clair, and southern Lake Michigan.

Characteristics

- Small, bottom-dwelling fish that resembles a large tadpole.
- Known to steal fishing bait and is often caught by anglers.
- Likes to live in rocky places and can survive in poor water quality.

Impacts

- Displaces native fish, eats their eggs and young, and takes over optimal habitat.
- Spawns multiple times per season. Population grows rapidly.
- Can become the most numerous fish in a given area.

SPINY WATER FLEA FISHHOOK WATER FLEA

These tiny creatures are distantly related to shrimp, lobster and crayfish. To see them clearly, you need a microscope. The spiny water flea was discovered in Lake Huron in 1984. The fishhook water flea was discovered in Lake Ontario in 1998.

Characteristics

- Microscopic zooplankton that have long, barbed or hooked tails.
- Tails often catch on fishing lines and downrigger cable.
- Clumps of these zooplankton look and feel like gelatin or cotton batting.

Impacts

These zooplankton:

- Eat small plankton, reducing food for native Great Lakes zooplankton.
- Compete with small and juvenile (baby) fish for plankton such as Daphnia.

- Not a good food source for native fish. Barbed tail spines are hard to digest.

- Clog nets and fishing line, creating problems for fishermen.

ZEBRA MUSSELS

These small, striped mussels are about the size of a fingernail. Zebra mussels are native to the Caspian and Aral Seas of Eastern Europe and Western Asia. They traveled to the Great Lakes in the ballast water of ships. Zebra mussels were discovered in Lake St. Clair in 1988

and have spread to all five Great Lakes and many inland lakes.

Characteristics

- Live in colonies that attach to submerged rocks, dock pilings, boat hulls and even native clams and mussels!
- Filter thousands of gallons of freshwater every day to capture their preferred food—plankton.

- Dead ones can wash up on shore, littering beaches with their sharp shells.

Impacts

- Filter (eat) large quantities of plankton, reducing food for many native species.
- Cause water to become clearer, which promotes excessive growth of aquatic plants.
- Grow in large clusters that clog water intake pipes, boat motors, and pumps, costing millions of dollars to control each year.

- Attach to native Great Lakes mussels and clams, often smothering them.

ASIAN CARP:

BIGHEAD AND SILVER CARP

These two fish were brought to North America in the early 1970s to remove algae from aquaculture ponds (by eating lots of plankton). They escaped from farms along the Mississippi River during a flood in the early 1990s. These big fish now live in the Mississippi and Illinois rivers, and scientists fear they will enter Lake Michigan.

Characteristics

These two fish:

- Grow up to 4 feet long. Weigh over 60 pounds.
- Jump more than 15 feet out of the water. Slam into fishing boats.

- Eat more than 40 percent of their body weight each day.

Impacts

- Eat enormous amounts of plankton—including phytoplankton and zooplankton.
- Could disrupt the Lake Michigan food web and cause problems for fisheries.
- Have been spotted less than 50 miles from Lake Michigan.

PURPLE LOOSESTRIFE

Early settlers brought purple loosestrife to North America from Europe. They liked the plant's eye-catching purple flowers. From its humble beginnings as a garden plant, purple loosestrife quickly invaded wetlands in nearly every U.S. state and Canadian province.

Characteristics

- Tall, flowering plant that can grow from 3 to 7 feet high.
- Often found on the edges of wetlands, roadside ditches and other moist areas.

- Perennial plant that regenerates from its roots every spring.

- Bright purple flowers bloom during midsummer.
- Spreads quickly. A mature plant can produce more than 2.5 million seeds each year.

Impacts

- Competes with native Great Lakes wetland plants and gradually replaces them.
- Not a good food source. When this plant takes over a wetland, ducks, fish, and frogs may leave or die.
- Dense stands of this plant block access to water.

EURASIAN WATERMILFOIL

Eurasian watermilfoil was first spotted in North America in the 1940s, and some say it was brought here intentionally. Others believe the plant was transported in the ballast water of ships from Northern Europe and Asia. Today, Eurasian watermilfoil thrives in nearly every U.S. state, including Michigan, and three Canadian provinces.

Characteristics

- Submerged aquatic plant. Forms thick mats on the water's surface.
- Gets tangled in boat propellers and interferes with swimming and fishing.
- Has feathery leaves, and small red flowers that bloom above water in early summer.

Impacts

- Inhabits inland lakes including some in the Great Lakes region.
- Forms tangled mats that interfere with boating, swimming, and fishing.
- Prevents sunlight from reaching native aquatic plants.
- Reproduces from fragments. Spreads easily by clinging to boats, trailers, and fishing gear.



photo: Dave Brenner

SEA LAMPREY

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photo: Dave Jude

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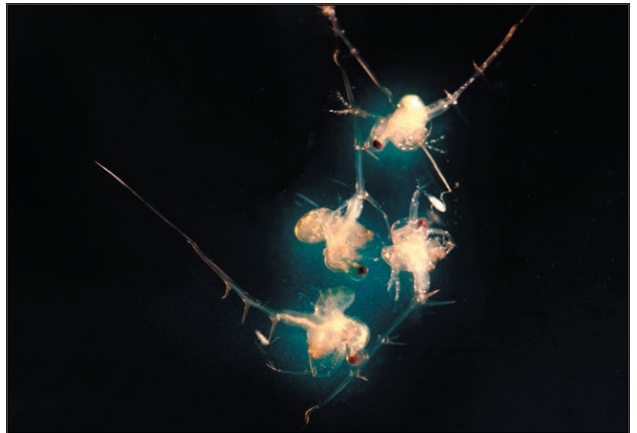


photo: Dave Brenner

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CUT

FOLD

CUT

FOLD



photo: Simon van Mechelen

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photo: David Riecks

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FOLD

CUT

FOLD

AQUATIC INVASIVE SPECIES CHARACTER CARDS

Unit 1, Lesson 3

Sea Lamprey

Eurasian Ruffe

MICHU-05-413

COPY MASTER

CHARACTERISTICS

- Eel-like fish that attach to other fish and feed on body fluids.
- Adults grow 12 to 20 inches long.
- Round, suction disk mouth is filled with sharp teeth.

IMPACTS

- Can kill 40 pounds of fish during its life.
- Often kills large, predator fish, causing populations of smaller fish to grow too large.
- Has contributed to declines in native lake trout and whitefish populations in the Great Lakes.

CHARACTERISTICS

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- Grows rapidly and loves to eat.
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IMPACTS

- Makes up an estimated 80 percent of the fish caught in the St. Louis River.
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- Likes to live in rocky places and can survive in poor water quality.

IMPACTS

- Displaces native fish, eats their eggs and young, and takes over optimal habitat.
- Spawns multiple times per season. Population grows rapidly.
- Can become the most numerous fish in a given area.

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Round Goby

FOLD

CUT

Spiny Water Flea

FOLD

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Unit 1, Lesson 3

Zebra Mussel

Asian Carp

www.miseagrant.umich.edu/flow



MICHU-05-413

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CHARACTERISTICS

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