



Don't Stop for Hitchhikers!

Trip at a Glance

Students role-play the part of lake inhabitants and the aquatic exotics who displace the native species. Props are used to help demonstrate how aquatic exotic species enter a lake or river system, the negative effect they have on the native species, and things people can do to stop the spread of exotic species.

Destination

Students will be able to

- ✿ Identify exotic species and ways they are transported.
- ✿ Learn about several exotics that affect water habitat.
- ✿ Identify the negative or positive effects of exotic species on native animals.
- ✿ Know how these exotics are transported and ways people can help to stop further spread.

Adventure Levels

Grades 4–8

This activity can be adapted for younger students.

Areas of Interest

Science and Social Studies

Locale

Gymnasium, outdoor setting, or classroom

Length of Stay

Approximately 45 minutes

Invader Background Check

Today there are several aquatic exotic species that pose a severe threat to all of the lakes and river systems of many states. These exotic species by definition are nonnative, "severe worldwide agents of habitat alteration and degradation." Natural boundaries are in place that limit the spread of these species, but human actions in the form of recreation and sports have allowed the exotics to diffuse to other lakes and rivers. There are, however, simple actions that we can do to stop the proliferation of these harmful species.*



As stated in the suggested script to read to students, "Exotic species are invading lakes and rivers by hitching a ride with you, and there's no stopping them, unless you do something about it."

* Adapted from *A Field Guide to Aquatic Plants and Animals*, a pamphlet from the Minnesota Department of Natural Resources.

Foreign Language

Ballast water
Eurasian watermilfoil
Exotic species
Purple loosestrife

Round goby
Ruffe
Sea lamprey
Zebra mussel

Amenities Provided

Role-Playing Activity Script and Directions immediately following this activity

Things to Pack

Picture/drawing of several aquatic exotics—ruffe, zebra mussel, round goby, purple loosestrife, sea lamprey, Eurasian watermilfoil
Bait bucket (available at bait stores)
Bucket
Seed package
Two 6-foot lengths of rope
Toy boat/trailer (or picture)
Paper fish
Twelve paper plates, six marked with "X" on both sides



Itinerary

1. Begin the program with the students forming a circle in a large open space, and tell them that the circle represents a lake. Explain that they will hear the story of the mighty walleye (or select a different fish) that lives in a big lake. Explain the definition of an aquatic exotic species.
2. Tell them that you need volunteers to play the parts of the lake inhabitants. The first volunteer is given a picture or drawing of the fish and taken to the "middle of the lake." Explain that he or she is the biggest walleye in the lake.
3. Drop the paper plates on the ground around the inside of the circle, telling the group that this is the favorite food (the plain plates) and the favorite sleeping spots (plates with an "X") of the walleye.
4. Now the story begins. Explain that the walleye swims and eats all over the lake. Have the volunteer walleye "swim" up to one of the paper plates and pretend to eat or sleep.
5. Next, introduce one of the exotic species by first showing the students the picture and explaining how to identify it and the harmful effects it has on the habitat. The introduction of the exotic aquatics can be in any order, but the sea lamprey should be last. See the activity script for information about each exotic species, which props to use with each, and what to tell students about the meaning of each prop. The exotic species include Eurasian watermilfoil, purple loosestrife, zebra mussel, ruffe, round goby, and sea lamprey.
6. Explain how the exotic is spread. Demonstrate this by using the appropriate prop. Give the picture to a group of students (about four or five students depending on the number of students present), and tell them that they are now the exotic species and must remember how it is spread.
7. Next, have the group move one or two steps closer to the center of the circle to represent the loss of habitat for the walleye. After the students move in, say, "But the walleye doesn't care, it has other places to sleep or eat."

8. Each time a new species is introduced and the volunteers take a step forward, the prior groups must take a step forward as well, ultimately covering up all the paper plates and surrounding the walleye. Have students think about how the habitat for the native animals is reduced to the point of being a threat for the native species' survival each time a new exotic species is added. Have students notice that the amount of living space is being reduced and is getting smaller.
9. The final exotic introduced should be the sea lamprey. Set the rope pieces down parallel to each other about three feet apart, "entering" the edge of the lake. Introduce the ropes as a canal that was built to connect the lake to a river. Have a volunteer swim through the "canal" and simulate the attack of the sea lamprey. The student can simply touch the walleye on the arm or wrap his or her arms around the walleye.
10. At this point the demonstration and role-playing are finished. Students can resume their seats in the classroom or sit down at their current location for a follow-up and review. Ask each group to remind the class how its exotic species is spread. Explain what is being done by the government to stop the spread of exotics. This information is found at the end of the role-playing script.
11. If desired, ask questions on the material covered in this lesson, to be answered either orally or in written form. This can be used as an evaluation tool. You could also have students match species with its mode of transport.

Travel Tips

- ✿ The best place to conduct the lesson is in an area large enough for the entire class to spread out in a large circle (e.g., a classroom, gymnasium, or outdoor setting).
- ✿ The number of volunteers for each exotic species can vary depending on the number of students. The best outcome would be for all students to be involved as one of the species. Any species of fish can be used in place of the walleye.
- ✿ This activity involves various scientific fields including biology, wildlife management, and botany.
- ✿ This activity can be adapted for younger students by editing the script accordingly.

Debriefing

Students can be evaluated on the discussion following the demonstration or on items listed in step 11.

Extending the Visit

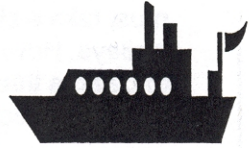
- ✿ Have the students create a "Public Service Announcement" in the form of posters, signs, audio tapes, or videos informing other classes on ways to stop the spread of exotic species.
- ✿ Visit a local lake, pond, or boat access and look for signs of exotic species. At the boat landing, see if there are warning signs about one of the exotics. If there are none, ask the water resource manager or fisheries biologist at the Department of Natural Resources (DNR) to post some signs.
- ✿ Visit a lake known to contain exotic species and monitor the growth in population or the spread in infested areas.
- ✿ Have the students identify other exotic species.

Places to Go

Fact Sheets and Publications

Fact sheets on aquatic exotics can be obtained from state Sea Grant programs.

For your closest program, visit the National Sea Grant College Program Web site and click on state program: <http://www.nsgo.seagrant.org>



Minnesota Department of Natural Resources. *A Field Guide to Aquatic Exotic Plants and Animals*. 1995. View at Minnesota Department of Natural Resources Web site:

<http://www.dnr.state.mn.us> or the Minnesota Sea Grant Web site: <http://www.seagrant.umn.edu>

Travel Agent

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Role-Playing Activity Script and Directions

This is a compilation of information about various exotic species, directions for conducting the activity "Don't Stop for Hitchhikers!" and suggestions for what to say and do during the activity. Note that ***bold italics*** are used for all sections that are ***the exact words teachers could use*** during this activity. All information pertaining to exotics that is indented below has come from the Minnesota Department of Natural Resources pamphlet, *A Field Guide to Aquatic Exotic Plants and Animals*.

Have students form a large circle. Say:

This large circle represents a lake, and you will hear the story of the mighty walleye (or select a different fish) that lives in a big lake. We are going to do an activity called "Don't Stop for Hitchhikers!" Exotic species are invading lakes and rivers by hitching a ride with you, and there's no stopping them, unless you do something about it. You will all play the part of inhabitants of this lake and learn about exotic species.

Explain the definition of an aquatic exotic species.

Exotic species—organisms introduced into habitats where they are not native—are severe worldwide agents of habitat alteration and degradation. A major cause of biological diversity loss throughout the world, they are considered "biological pollutants." They compete for food and habitat of native species. Most species introductions are through the work of humans. Some introductions, such as carp and purple loosestrife, are intentional and do unexpected damage, but many exotic introductions are accidental. Some exotic introductions are ecologically harmless and some are beneficial, but other exotic introductions are harmful to recreation and ecosystems. They have even caused the extinction of native species—especially those of confined habitats such as island and aquatic ecosystems.

Ask for volunteers to play the parts of the lake inhabitants:

I will need volunteers to play the inhabitants of this lake.

Give the first volunteer a picture or drawing of the fish, and take him or her to the "middle of the lake." Say:

You are the biggest walleye in the lake.

Drop the paper plates on the ground around the inside of the circle, and say:

This is the favorite food (the plain plates) and the favorite sleeping spots (plates with an "X") of the walleye. The walleye swims and eats all over the lake.

Have the volunteer walleye "swim" up to one of the paper plates and pretend to eat or sleep.

Show a picture of the zebra mussel and explain how to identify it, the harmful effects it has on the habitat, and how the exotic is spread. (The introduction of the exotic aquatics can be in any order, but the sea lamprey should be last. For ease of use, this script suggests an order and starts with the zebra mussel.) Read or summarize information below:

Zebra mussels are small, fingernail-sized mussel native to Asia, which may produce as many as 1 million eggs per year. They were discovered in Lake St. Clair near Detroit in 1988. Zebra mussels have now spread to parts of all the Great Lakes and the Mississippi River and are showing up in inland lakes. Zebra mussels clog water systems and irrigation pipes. They have severely reduced and eliminated native mussel species. Microscopic larvae may be carried in livewells or bilge water. Adults can attach to boats that sit in the water. Adult life size: 1/4 to 1 inch.

Prevention: *Drain water from livewells in the same lake or river; do not dump in any other body of water. Since zebra mussels can attach to any hard surface, clean your boat and trailer before moving to a new lake.*

Use the **boat** to represent how they are transported.

Give the picture to a group of students (about four or five students depending on the number of students present) and tell them:

You are now the exotic species and must remember how it is spread.

Have the group move one or two steps closer to the center of the circle to represent the loss of habitat for the walleye. After the students move in, say:

But the walleye doesn't care, it has other places to sleep or eat.

Introduce the next species. An explanation of ballast water appears with round goby information.

Round goby is a bottom-dwelling fish, native to Eastern Europe, which entered the eastern Great Lakes in ballast water.

Ballast water: Ships take on ballast water for stability during travel. This water is pumped out when the ships pick up their loads in Great Lakes ports. Because the ships make the crossing so much faster now and harbors are often less polluted, more exotic species are likely to survive the journey and thrive in the new waters.

Negative effects of the **round goby**: dominate fisheries quickly, reach densities of over 100 per square yard, no effective predators, can spawn several times per year, grow to about 10 inches, are aggressive, and compete with native bottom-dwellers like sculpins and log perch. They are expected to be harmful to Great Lakes and inland fisheries. Adult life size: 10 inches.

Prevention: *Drain water from livewells in same lake or river; do not dump in any other body of water.*

Use the **bucket filled with water** to represent ballast water.

Each time a new species is introduced and the volunteers take a step forward, the prior groups must take a step forward as well, ultimately covering up all the paper plates and surrounding the walleye.

Have students think about how the habitat for the native animals is reduced to the point of being a threat for the native species' survival each time a new exotic species is added. Have students notice that the lake is getting smaller. Say:

Do you notice that the living space is getting reduced and is getting smaller? Think about how the habitat for the walleye is being threatened.

Eurasian watermilfoil was accidentally introduced to North America from Europe, spread westward into inland lakes primarily by boats and also by waterbirds, and reached midwestern states between the 1950s and 1980s. It can form thick underwater stands of tangled stems and vast mats of vegetation at the water's surface. In shallow areas the plant can interfere with water recreation such as boating, fishing, and swimming. The plants floating canopy can also crowd out native water plants. A key factor in the plant's success is its ability to reproduce through stem fragmentation and runners. A single

segment of stem and leaves can take root and form a new colony. Fragments clinging to boats and trailers can spread the plant to other lakes. Milfoil may become entangled in boat propellers or may attach to keels and rudders of sailboats. Stems can become lodged among any watercraft apparatus or sports equipment that moves through the water, especially boat trailers.

Prevention: *Clear and clean off all weeds from boats and trailers.*

Use the **boat** to explain how milfoil gets tangled in the trailer and boat prop.

Ruffe (ruf) was introduced to Duluth harbor, probably in tanker ballast water, around 1985, and is spreading to other rivers and bays around Lake Superior. The ruffe's ability to displace other species in newly invaded areas is due to (1) its high reproductive rate, (2) its feeding efficiency across a wide range of environmental conditions, and (3) characteristics that may discourage would-be predators such as walleye and pike. Ruffe could be accidentally transported in livewells, bilge water, bait buckets, and ballast water. Adult life size: 3 to 5 inches.

Prevention: *Empty livewells, bilge water, and bait buckets on the ground before entering a different lake or river.*

Use the **bait bucket** to demonstrate how ruffe may be spread.

Purple loosestrife is a wetland plant from Europe and Asia that was introduced into the East Coast of North America in the 1800s. First spreading along roads, canals, and drainage ditches, then later distributed as an ornamental plant, this exotic plant is in 40 states and all Canadian border provinces. Purple loosestrife invades marshes and lakeshore, replacing cattails and other wetland plants. The plant can form dense, impenetrable stands that are unsuitable as cover, food, or nesting sites for a wide range of native wetland animals, including ducks, geese, rails, muskrats, frogs, toads, and turtles. Many rare and endangered wetland plants and animals are also at risk. A major reason for purple loosestrife's expansion is a lack of effective predators in North America. Seeds escape from gardens and nurseries into wetlands, lakes, and rivers. Once in aquatic systems, moving water and wetland animals easily spread loosestrife seeds. Adult height: 2 to 7 feet.

Prevention: *If you see them in a wetland area, don't pick them and take them somewhere else. Don't buy loosestrife plants from nurseries; avoid wild seed mixtures that contain purple loosestrife seeds.*

Use the **seed packet** to show how careless gardeners help spread purple loosestrife.

The final exotic introduced should be the sea lamprey.

Sea lamprey is an eel-like fish with a circular suctioning mouth with sharp rasping teeth on its inner surface* native to the coastal regions of the Atlantic Ocean. They entered the Great Lakes through the Welland Canal about 1921. They contributed greatly to the decline of whitefish and lake trout in the Great Lakes. Negative effects of the sea lamprey: One adult can consume 40 pounds of fish. Adult life size: 12 inches.

Prevention: *Chemical controls, called lampricides, are being used by water resource managers.*

Set the **rope pieces** down parallel to each other about three feet apart, "entering" the edge of the lake. Introduce the ropes as a canal that was built to connect the lake to a river.

*Stein, Jess, ed. 1980. *The Random House Dictionary Concise Edition*. Random House. New York.

Have a volunteer swim through the "canal" and simulate the attack of the sea lamprey. The student can simply touch the walleye on the arm or wrap his or her arms around the walleye.

Students can resume their seats in the classroom or sit at their current location for a follow-up and review. Ask each group to remind the class how its exotic is spread (optional). Questions to consider:

What is being done by the government to stop the spread of exotics?

The National Invasive Species Act of 1996 reauthorized the U.S. Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. The Act provides an institutional framework that promotes and coordinates research, develops and applies prevention and control technologies, establishes national priorities, educates and informs citizens, and coordinates public programs.*

U.S. ballast water regulations mandated under the Act help limit introductions through transoceanic shipping.*

Possession of exotic species is illegal in most states.

What are some other exotic species?

Spiny water flea, rusty crayfish, white perch, flowering rush, curly-leaf pondweed, alewife, and mosquito fish.

Adapted with permission from the Minnesota Department of Natural Resources.

*Great Lakes Panel on Aquatic Nuisance Species. 1988. *Biological Invasions*. Great Lakes Commission.