

## Lesson 5: Ruffe Musical Chairs

**Activity:** Students use role-play to mimic the behavior of an invasive, non-native fish called Eurasian ruffe (pronounced rough) to experience firsthand how and why the species has multiplied so rapidly in some Great Lakes harbors.

**Grade level:** 4-8

**Subjects:** Science, social studies

**Setting:** Classroom

**Duration:** 1 hour

**Key Terms:** Invasive, Nonindigenous, Predator

### Objectives

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

- Explain why fish populations in the Great Lakes change over time.
- List three reasons why non-native ruffe have significant advantages over some native Great Lakes fishes.
- Identify two things that they can do to minimize the spread of ruffe.

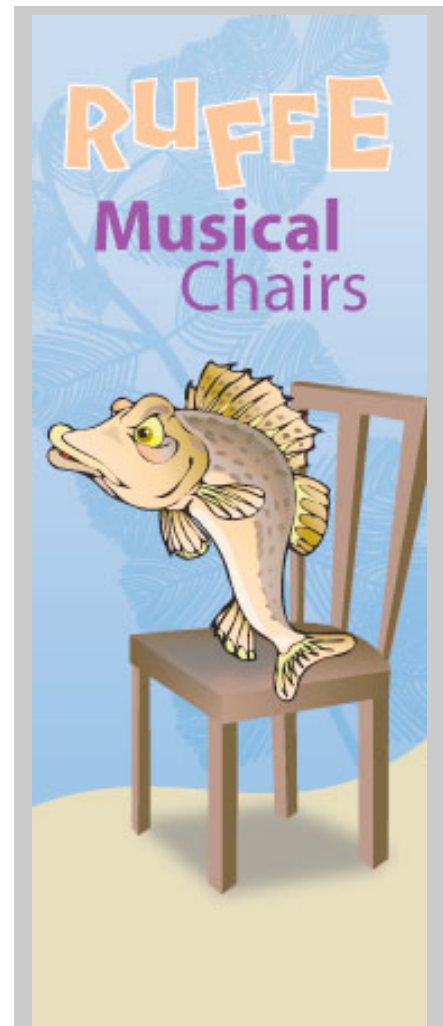
### Summary

All animals must meet basic needs for food, water, and habitat in order to survive. There are times, however, when some animals can't meet their needs. One reason may be due to competition for food and habitat caused by an invasive species. By learning about the aggressive ruffe, students begin to see how a single species can cause other fish species to decline, and create a dramatic change in the Great Lakes food web in a relatively short time.

### Background

Eurasian ruffe, small members of the perch family, are aggressive fish native to Europe and Asia. They were first discovered in the St. Louis River, the main tributary to western Lake Superior, in 1986. They arrived in the ballast water of an ocean-going vessel. In the absence of natural predators, ruffe populations multiplied rapidly.

Today, ruffe make up an estimated 80 percent of the fish caught in the St. Louis River. Since their arrival, ruffe have spread to other rivers and bays along the south shore of western Lake Superior and northward to Thunder Bay, Ontario. Ruffe also thrive in the waters near Alpena, Michigan on northern Lake Huron. Rapid growth of ruffe populations has reduced food and habitat for native fish with similar diets and feeding habits, including walleye, perch, and a number of small fish.



*Ruffe illustration by D. Brenner, graphic by T. Marsee*

*Once established, the ruffe population grows rapidly and takes over habitat. Ruffe reduce food for some native fish including walleye, yellow perch, and several small fish. Some species of native fish have declined in areas where ruffe have become numerous.*

Several factors allow ruffe to displace native species in newly invaded areas. First, ruffe grow rapidly and produce many offspring. Ruffe can reproduce in their first year, and an average female can produce 13,000 to 200,000 eggs per season. Second, ruffe can tolerate a range of environmental conditions, including murky water. Ruffe are primarily bottom feeders, and they prefer dark environments where they can hide from predators. Finally, even though ruffe are small (usually less than 5 inches), ruffe have few predators due to the spines on their fins.

## Materials and Preparation

- 10 chairs. Place chairs in two rows of five, back to back.
- Set of *Ruffe Musical Chairs Game Cards*. Print ruffe cards on card stock, and cut out individual cards.
- “Nautical” or “fish” music.
- CD player

**NOTE: *Ruffe Musical Chairs Game Cards*, see cards at the end of this lesson (supplemental materials).**

## Procedure

### Preliminary Discussion

- Introduce or revisit the basic needs of animals. Students need to understand that all animals must meet needs for food, water, and habitat in order to survive.
- Ask volunteers to describe times when they looked for something they wanted or needed and it wasn’t there, or when they went to do something but there wasn’t room for them to participate. After hearing a few of these stories, ask the students what it felt like. Ask them to imagine what it would be like to not meet a basic need like food, water or shelter.
- Ask students if they think that there are instances in nature when animals can’t meet their basic needs. When might this happen? Explain that students will experience this during the game they are about to play.

## Play the Game

The first half of the game demonstrates the competition for food and habitat.

1. Start with two rows of five chairs, placed back to back in an area clear of other furniture. Explain that the chairs represent the basic needs of native fish in the Great Lakes—meaning they represent food, water and shelter. Choose five students to represent native Great Lakes fish and play the game just like “Musical Chairs.” Because there are five students and ten chairs they will easily find seats.
2. Explain that since they were so easily able to meet their needs, they were also able to produce offspring. Add five more students and play again. All seats will now be full.
3. Add five more students (15 total), due to reproduction, and play again. This time, when the music stops, there will be plenty of competition to observe. Those students who can’t find seats get eliminated. Ask or explain what this represents. (When too many creatures are produced, those who can’t find food or meet other needs must leave the area to look elsewhere or die.)
4. Play a few more rounds with 15 students until all students have had a chance to play.

- Place Ruffe cards face down on three of the seats. Play the round with 15 students again, and have those who land on cards read and interpret them. Explain that ruffe are a new kind of fish accidentally introduced into the area by ocean-going ships. Ruffe are competing for the same needs as the local or native fish. If students have a card with "Sorry, you lost your seat," they are eliminated for that round as well as the students who couldn't find a seat.
- Pick up the ruffe cards, shuffle them with the others and put six down on different chairs. Play the round with 12 students instead of 15 (because with less food, water and habitat, there will be less reproduction and survival of young). Again, those cards with "Sorry, you lost your seat" are eliminated along with those who don't find chairs.
- Pick up the cards, shuffle, and put down eight cards. Play the round with eight students.
- Cover all the chairs with a card, shuffling between rounds, and play until no student (representing Great Lakes fish) survives the round.
- Also see the sidebar (below) to modify the game.

### **Discuss the Results**

- Ask students what it feels like to have the ruffe taking over their lake. Ask if they know of other species (plants or animals) that try to come in and take over where they don't belong. (Dandelions and other weeds are good examples.)
- Explain, or have the students explain, that non-native species like this can create real problems for the native species living in an area because they compete for basic needs.

### **Modify the Game**

The second half of the game demonstrates what happens when predators are also considered.

- Play the game again with 9 native fish, 2 predators (representing walleye and northern pike), and 2 ruffe.
- If the "predators" don't find seats when the music stops, they're allowed to eliminate other "fish," or take over chairs. (Predators prey upon smaller fish.)
- Play the game until the ruffe finds a seat. For every successful ruffe, add 2 more ruffe, and continue playing the game. (The ruffe population has established itself and is growing rapidly.) The predators are not allowed to eliminate ruffe, or take over their chairs, because they prefer feeding on native species. (Ruffe have spiny fins that are hard to digest.)
- Keep playing until the ruffe have taken over most or all of the seats.

### **Discuss the Results**

- Ask the students why ruffe were so successful in taking over the chairs. Explain that all these things are true for ruffe in the Great Lakes and they are expanding at a fast rate and into new areas.
- Ask the students if they know of any ways to prevent the spread of ruffe. Indicate the things mentioned in the background material if the students don't think of them. See: How You Can Help in Lesson 1.3 (in the right sidebar, under the graphic).

### **Source**

Adapted from Musical Mussels. From Fish Ways Project, MNR, Ontario, Canada.

## 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 5 - Ruffe Musical Chairs Documents:

- Ruffe Musical Chairs Game Cards
- Additional details and photos about aquatic invasive species, see: [www.miseagrant.umich.edu/ais](http://www.miseagrant.umich.edu/ais)
- Aquatic Invasive Species Poster Series, *Great Lakes Most Unwanted*, see: [www.miseagrant.umich.edu/store](http://www.miseagrant.umich.edu/store)

# RUFFE MUSICAL CHAIRS

Unit 1, Lesson 5

[www.miseagrant.umich.edu/flow](http://www.miseagrant.umich.edu/flow)



- **Ruffe are eating your food. You have to look somewhere else. Ruffe eat small aquatic insects and other organisms that live on the bottom.** Because there are so many ruffe, other fish with similar feeding habits (such as walleye and yellow perch) don't get enough food.

- **Ruffe are eating your offspring's food. Many of your young are starving.** Ruffe eat such a wide variety of foods and exist in such large numbers that they can create a "bottle-neck" for the young of native species by reducing food for that life stage, which results in fewer adults.

The following statements relate to the Ruffe Cards used in this activity.

## TEACHERS: READ THE FULL STATEMENTS TO STUDENTS BEFORE PLAYING RUFFE MUSICAL CHAIRS.

- **You can't eat ruffe because of their spiny fins. Go search for other prey.** Ruffe have spines on their dorsal fins as well as on their gill covering, making them hard for would-be predators to digest.
- **Ruffe produce so many offspring that they're taking over.** Ruffe grow very fast and reach reproductive age more quickly than native species. They also produce large amounts of eggs each time they spawn.
- **Ruffe can survive in murky water. But, you leave to search for better habitat.** Ruffe can thrive in a wide range of temperatures and habitat. Unlike some perch species, ruffe are more tolerant of murky conditions.
- **Ruffe haven't moved into your area yet. You are meeting your needs.** So far, ruffe appear to be concentrated in certain harbors and rivers. Resource managers want to prevent ruffe from spreading.
- **Ruffe haven't eaten all of your food. You are meeting your needs.** In some places, ruffe populations have not yet taken over. Native fish can still find food.

# RUFFE MUSICAL CHAIRS GAME CARDS

Unit 1, Lesson 5

[www.miseagrants.umich.edu/flow](http://www.miseagrants.umich.edu/flow)



**SORRY**  
YOU LOST YOUR SEAT

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YOU LOST YOUR SEAT

Ruffe are eating your food. You have to look somewhere else.

Ruffe are eating your offspring's food. Many of your young are starving.

You can't eat ruffe because of their spiny fins. Go search for other prey.

Ruffe produce so many offspring that they're taking over.

**SORRY**  
YOU LOST YOUR SEAT

**GREAT NEWS**  
YOU MAY TAKE A SEAT

**GREAT NEWS**  
YOU MAY TAKE A SEAT

**GREAT NEWS**  
YOU MAY TAKE A SEAT

Ruffe can survive in murky water. But you leave to search for better habitat.

Ruffe haven't spread to your area yet. You are meeting your needs.

Ruffe haven't eaten all of your food. You are meeting your needs.

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**SORRY**  
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**SORRY**  
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**SORRY**  
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