



AQUATIC INVASIVE SPECIES

WHAT IS AN AQUATIC INVASIVE SPECIES?

Activity adapted from Project WET's "Invaders!"

SKILL LEVEL

6th-8th

KEY TERMS

Aquatic Invasive Species

Native Species

Non-Native Species

Biodiversity

Threatened

Extinction

Competition

EDUCATION STANDARDS

SD Science: MS-LS2-1

SD Science: MS-LS2-4

SD Mathematics: 7.RP

TIME NEEDED

45-50 Minutes

MATERIAL LIST

- » Laminated fish cards
- » Plastic cups
- » Plastic knives
- » Plastic spoons
- » Plastic forks
- » Large binder clips
- » Red pom-poms
- » Black pom-poms
- » White pom-poms
- » 3'x4' piece of felt
- » Bingo chips
- » Timers



EXPECTED LEARNER OUTCOMES

- » **OBJECTIVE 1:** Students will understand the natural balance of an ecosystem and identify the food web of a pond or stream.
- » **OBJECTIVE 2:** Students will identify the resources needed for a species' survival.
- » **OBJECTIVE 3:** Students will understand how invasive species can disrupt the balance of an ecosystem.

BACKGROUND

The National Invasive Species Council defines invasive species as "an alien (or non-native) species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health." Aquatic invasive species includes plants and animals, and they cause significant disruptions to native ecosystems. Aquatic invasive species can outcompete **native species**, which impacts the biodiversity of the ecosystem, the local food chain and predator/prey relationships, and many other ecosystem processes.

Aquatic Invasive Species (AIS) includes both aquatic flora and aquatic fauna.

- Invasive aquatic flora are introduced plants that have adapted to living in, on, or next to water, and that can grow either submerged or partially submerged in water.
- Invasive aquatic fauna require a watery habitat, but do not necessarily have to live entirely in water

VOCABULARY

Aquatic Invasive Species

Freshwater or marine organism that has spread or been introduced beyond its native range and is either causing harm or has the potential to cause harm.

Native Species

Presence is the result of only “natural” processes; that is to say, not by human agency.

Non-native Species

Species that has been introduced by human action, either accidentally or deliberately, outside of its natural range.

Biodiversity

The variety of animals, plants, fungi, and microorganisms that make up our natural world.

Threatened

A plant or animal species generally perceived as likely, in the near future, to become endangered within all or much of its range.

Extinction

Termination of a kind of organism or of a group of kinds, usually a species.

Competition

The direct or indirect interaction of organisms that leads to a change in fitness when the organisms share the same resource.

BACKGROUND (Continued)

Why are invasive species an issue? There are a number of problems invasive species can potentially cause.

- **Prey on native species or compete with native species.**
- **Cause economic harm.**
- **Damage property and endanger people.** Invasive species can damage property and equipment, such as aquatic weeds tangling in boat motors. Trailing plant matter on boat propellers also pose a drowning hazard for swimmers.
- **Ruin habitat.** Invasive species can completely change a habitat for native species. Zebra and quagga mussels, for example, are notorious for adhering to any structures left in the water, especially pipes and boats. They’ll even grow on and smother native shellfish! When invasive species take over a habitat, it can make recreation more difficult due to sharp shells on the beach (ie Zebra Mussels) or over vegetation gumming up motors (ie Eurasian watermilfoil or Curly Leaf). When invasive species take over, they can outcompete our native species and decrease the biodiversity and health of a habitat. They also decrease aesthetic values.

Invasive species are a leading cause of **biodiversity** loss, second only to habitat loss!

While all species compete to survive, invasive species have specific traits that give them an advantage over native species. Some characteristics that they may have help invasive species are that they lack natural predators, occur in many areas, spread quickly, grow quickly, breed early, have many offspring, have a broad diet, and can often tolerate many different types of habitats . These characteristics can help these species outcompete native species for habitat. An invasive species doesn’t have to have all of these traits to successfully invade new areas.

In South Dakota, there are several aquatic invasive species that natural resource managers are monitoring and working to determine their potential impacts. These species include zebra mussels, quagga mussels, Silver Carp, Bighead Carp, Rusty Crayfish, curly pondweed, Didymo and Eurasian Watermilfoil. Other invasive species known in South Dakota are European Rudd and Western Mosquitofish.

ACTIVITY PREPARATION

Refer back to Lesson 1 and the stream or pond ecology that the students completed. What types of organisms did the students identify? Were there any that they could identify as non-native or invasive?

Using the species found in the stream or pond ecology study, and removing any known invasive species, have the students draw a native food chain . Encourage them to be as creative as possible in their web, and see how many intricate relationships they can create.

Adaptation: if you have the space or would like the students to be more mobile, you can do a living web instead. Please see Appendix A for additional resources.

Animals need many resources to be able to survive. We can simplify the resources needed into four main categories: food, water, shelter, and space. Some species, require much more of a certain resource than others. For example, a mountain lion needs much more space per individual than a prairie dog.

Today, students will be able to participate in an activity that allows them to chart the population of a fish species over time. In doing this, students can begin to recognize the resources needed and may even be able to identify the limiting factor for their species.

REFLECTION

Post-activity discussion questions:

1. Were you able to compete with the other native species for resources necessary to your survival and reproduction?
2. Were you able to compete with the invasive species for resources necessary to your survival and reproduction? Why? What made the carp so successful?
3. What could be the consequences of organisms entering an ecosystem that have a competitive advantage over the native species?

EXTENDED LEARNING

Distribute a native species and invasive species to groups of students and have them research these species food and resource needs. Have students spend some time comparing and contrasting these needs.

Ask students: Which they think is the better competitor—invasive or native?

ACTIVITY PREPARATION (Continued)

Break the students into groups of five. If the numbers do not work out well, smaller groups can be used, however the supplies will need to be modified. Students will be assigned one of four native fishes or an invasive fish. Each native fish will need to gather enough food to survive each round using their particular mouth style. However, after approximately 3 rounds, an invasive species will be introduced.

Equipment per five-person group:

- 5 cups
- 2 plastic knives
- 1 plastic spoon
- 3 plastic forks
- 1 large binder clip
- 10 red pom-poms
- 12 black pom-poms
- 10 white pom-poms
- 3'x4' piece of felt
- 25 bingo chips
- 1 timer

In this activity, there are four native species. Each native species must gather enough food to survive using the tools they have in only one hand. The perch will have one plastic spoon, the bass has two knives, the bluegill has one fork, and the walleye has two forks. There will also be an invasive carp, which can use the binder clip to gather pom-poms.

Each native fish starts off with three lives, which are represented by the bingo chips. At the end of each round, the fish each need 5 pom-poms to survive. If they collect more than the 5 necessary pom-poms, they can gain a chip for each 3 additional pom-poms. This represents having enough resources to both survive (5 pom-poms) and perhaps reproduce (at least 3 additional pom-poms). For example, if the walleye collects 7 pom-poms in the allotted time, they do not lose a chip but they do not gain one which would indicate reproduction. However, if the bass collects 10 pom-poms, they would gain an additional bingo chip after that round indicating they had gathered enough resources to reproduce. If any fish loses all three bingo chips, they become extinct and can participate in future rounds as a carp using a binder clip.

It's important to recognize that in addition to different mouth parts, the species eat different things. Each native fish has a particular set of eating habits identified below:

- Perch eats only white pom-poms
- Walleye eats only white and red pom-poms
- Blue gill eats only black pom-poms
- Bass eats black and red pom-poms
- Carp eats anything

Have the students in each group of five randomly distribute their pom-poms on the felt. Each native fish has 30 seconds per round to collect their food using just one hand and their assigned tools. Have the students play approximately three rounds with only the native species competing for food, and then introduce the carp. Have the students compete with the carp for a couple rounds, and see what happens to their populations.

Adaptation for small groups: reduce the number of native species if groups are < 5.

NATIVE SOUTH DAKOTA SPECIES



BLUEGILL



YELLOW PERCH



LARGEMOUTH BASS



WALLEYE

INVASIVE SPECIES



BIGHEAD CARP