

Title

Eyes on Invasives

Overview

This lesson emphasizes the negative impacts non-native, invasive species have on an ecosystem. Students are shown a PowerPoint presentation outlining invasive species' movement patterns, species identification, and what makes individual species successful. Then students compete in a hands-on simulation in which 5 different types of freshwater fish compete for food resources. Student will discover that the competition from the non-native invasive species will cause native species populations to stagnate, decline, or become extinct. Afterwards, students will discuss the results and present their findings to the group.

Objectives

- Students will demonstrate that resources are limiting factors in an ecosystem
- Students will exemplify each organism's adaptations that allow it to obtain resources
- Students will understand the negative impacts of invasive organisms entering an ecosystem
- Students will recognize the interdependence of species in a freshwater ecosystem

Context (Background Information)

This game involves the Round goby, an invasive species in Lake Erie; however this game can be modified to be any invasive species depending on your region and natural inhabitants. It can also be utilized when teaching about life cycles, pollution (pollution would reduce vital nutrients), invasive species, and aquatic life.

NGSS

HS-LS2-6: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Key Terms

- Non-native invasive species – Exotic organisms that have been introduced to an area where they are not native, either purposefully or accidentally, and that have a negative impact where they are introduced.
- Generalist – A species whose members are able to thrive in a wide variety of habitats and consume a wide variety of foods.
- Specialist – A species with narrow habitat and food requirements
- Ecological Restoration – A process aimed at recreating, initiating, or accelerating the recovery of ecosystems that have been disturbed.

Materials

Per 5 person group:

5-cups

2-plastic knives

1-plastic spoon

3-plastic forks

10 red pom-poms

12 black pom-poms

10 white pom-poms

3x4 piece of felt

25 bingo chips

1 timer

Per 4 person group:

4-cups

2-plastic knives

1-plastic spoon

1-fork

8 red pom-poms

10 black pom-poms

8 white pom-poms

3x4 piece of felt

20 bingo chips

1 timer

Preparation/Class set-up

Communicate the eating habits and diet of the specific fish species.

There are four native species; one with a plastic spoon (perch), one with two knives (bass) in one hand, one with one fork (blue gill), one with two forks (walleye) in one hand. If this is too difficult for students, make changes as necessary.

Students use these different appendages to pick up the pom-poms. Only one pom-pom may be picked up at a time and placed into a cup in front of the student.

Eating habits:

- Perch eats only white
- Walleye eats only white and red
- Blue gill eats only black
- Bass eats black and red

Gobies eat anything (using peace fingers and thumb) and are introduced after a few rounds so students can see how stable their ecosystems are before and after the Goby.

Instructions

- Show and discuss “Invasive Species” PowerPoint.
- Leave the last slide up- a visual representation of the eating habits of each fish
- Randomly distribute the pom-poms onto the felt.
- Each of the four native fish will have 20 seconds per round to collect food using their assigned tools.
- The native fish will play 2 rounds before the invasive (Goby) arrives.
- Play will continue with the goby now competing for resources for 3-5 more rounds.
- It should be made clear to the gobies that it is in their benefit to eliminate native species. Their tactics could include selective feeding to knock out other species, e.g., eating only white, so the species that can only eat white cannot get enough to reproduce.

Scoring:

- Each fish starts off with zero bingo chips
- At the end of the round each fish needs 5 pom-poms to survive the round
- If fish does not collect 5 after a round, they lose a life (a bingo chip is taken away and given to the score person)
- If 11 pom-poms collected, fish “reproduces” and gets two bingo chips
- Once the fish is out of lives he becomes extinct and that player joins the Goby player, collecting pom-poms their two peace fingers and thumb.

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 Goby so successful?

3) What could be the consequences of organisms entering an ecosystem that have a competitive advantage over the native species?

Extensions

This can be applied to any ecosystem and can be used for pollution as it removes nutrients (eliminate some pom-poms after a few rounds) or as pollution as a poison (have one random color be a poison each round, this would require more pom-poms and a few more colors to make feeding more random).

Lesson Plan originally from The University of Toledo GK-12 Program and modified for Living Lands & Waters Student Workshops. Original lesson plan can be found here:

http://www.myips.org/cms/lib8/IN01906626/Centricity/Domain/8123/Invasive_Species_Game_Lesson.pdf