

Plop! The Invasion Begins!**Grade**

4th–12th grade

Length

45 minutes to an hour

Subjects/strands

Invasive species impact, prevention, and control; pathways of spread; predator-prey relationships; habitats.

Topics

Biology and ecology

IN A NUTSHELL

Students play a fun board game to learn about impacts and prevention of the invasive bullfrog.

LEARNING OBJECTIVES

Students learn and apply knowledge about the impact of invasive species introduction, dispersal, and management practices in local community ecosystems. Students will think critically about the potential consequences of invasive species introductions, dispersal, and management.

INTRODUCTION

During this lesson, students play a fun board game about the invasive bullfrog. In the game, each student has a pond, and the object of the game is to try to have the most native species in their pond by the end of this game. Event cards determine how many invasives and natives students have in their pond, while at the same time teaching students about the biology and impacts of bullfrogs. Use this lesson either to complement other lessons from this toolkit, or as a standalone lesson to learn about the impact of invasives species on an ecosystem.

BACKGROUND

The American bullfrog is the largest frog in the U.S., weighing up to one pound. It has been cultivated globally for its edible legs and has been introduced to many regions around the globe as an aquarium pet. The bullfrog is native to the eastern U.S., and invasive in much of the western U.S. and several other continents. It's often a dominant species in new ecosystems, due to a limited number of predators and its generalist eating habits. It will eat anything that fits in its mouth, even its own young! It is able to thrive in many habitats because its natural predators are absent. The bullfrog

can also be a carrier of the chytrid fungus that affects frogs and amphibians and is a contributor to many dwindling frog populations around the world. North American bullfrogs prefer warm, calm, shallow waters, such as a lake, pond, river, or bog. Bullfrogs take two years to mature to adults, so they prefer areas that have water year-round. Bullfrogs are becoming much more common in areas that have been changed by humans. Humans can help prevent the spread of bullfrogs by removing their egg masses, and by being careful not to spread bullfrogs from one place to another. Remember: Don't let it loose!

MATERIALS NEEDED

The following board game materials are available to download on the lessons page of MenaceToTheWest.org

- One Plop! Game Board
- One Deck of Invasion Cards
- One Deck of Prevention Cards
- Five pawns of five different colors
- One Score Sheet
- One die

VOCABULARY

Amphibian, chytrid fungus, dispersal, ecosystem, invasive species, prevention, ranavirus, watersheds.

PREPARATION

Download and print out board game materials. Students can help to cut out the cards and game board.

It is useful to gain some familiarity with invasive species topics before teaching this lesson. We suggest you review the Menace to the West introductory video or PowerPoint, or read the Introduction page and the bullfrog species guide available on MenaceToTheWest.org.

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PROCEDURE

- 1 Introduce the concept of an Invasive Species to the students. Ask them if they have ever seen a bullfrog before or eaten frog legs. Are they aware of any other invasive species in their environment?
- 2 Explain to students that they will be playing a game in which each player pretends he or she has a pond that he/she wants to keep free of invasive species. As students play the game, they will observe and experience many factors that affect whether or not a bullfrog can invade, have a negative impact, and be removed.
- 3 Pass out the PLOP rules handout and read it along with your students. The rules are also copied below for your convenience.
- 4 Students play until only one person has remaining native species in their pond, or you can simply allow them to play for the time you have available and the student with the most native species wins.
- 5 After the game, use the discussion questions at the end of this lesson plan to discuss what happened and what we learned about bullfrogs and how to prevent them.
- 3 Once you land on a space, follow the directions marked on the board.
- 4 If you land on “Draw an Invasion Card” or “Draw a Prevention Card,” draw the appropriate card and follow the instructions.
- 5 If you land on “Your bullfrogs had babies,” double the amount of bullfrogs in your pond.
- 6 When your turn has ended, recalculate the number of native species remaining in your pond. To calculate the native species, first subtract as many native species as there are bullfrogs. For example, If you have five bullfrogs in your pond at the end of your turn, you must subtract five native species. Then, subtract any native species based on the instructions on the board or on the Invasion or Prevention cards. Use the native species score sheet to help you keep track.
- 7 When a player loses all of his or her native species, he/she will be unable to continue and must wait till all other players are finished or when time is up.
- 8 The game is over when only one person remains with native species in his or her pond, or when the teacher decides the time is up.
- 9 The winner of the game is the player with the most native species at the end.

PLOP RULES

Setting the Stage:

Each player starts with 100 native species and one bullfrog in his or her pond. Players use the species tracking sheet to keep track of how many bullfrogs and how many native species are in their pond as the game goes along. Players lose native species from their pond when they are consumed by bullfrogs, contract one of the various diseases, or by chance from a Prevention/Invasion card.

Object of Game:

Maintain as many native species in your pond as possible.

How to Play:

- 1 Players begin by placing their pawns at the corner marked “PLOP!” The youngest player in the group goes first, and players take turns moving clockwise around the table.
- 2 Each player will roll his or her die at the beginning of each turn and will move his/her pawn from the corner marked “PLOP” (in the direction of the arrow) the number of spaces indicated by the die.

Conclusion and Evaluation Questions

- 1 **What is an invasive species?**
A nonindigenous species whose introduction and proliferation causes or is likely to cause economic or environmental harm or harm to human health.
- 2 **How were bullfrogs first introduced?**
Bullfrogs were introduced as a food source (frog legs) between 1900 and 1940.
- 3 **Where do bullfrogs come from?**
Natural range extends from the Atlantic Coast to as far west as Oklahoma and Kansas. It is not found on offshore islands near Cape Cod and is largely absent from Florida, Colorado, Nebraska, South Dakota, and Minnesota.
- 4 **What role do humans play in the introduction of invasive species?**
Humans can be a vector for the intentional or unintentional introduction of invasive species into new areas.

Humans can intentionally introduce species into an area by trying to benefit agriculture, support human recreational activities, or improve the looks of public recreation areas or private properties, or even use the introduced species as a food source. We can unintentionally introduce species into new areas by way of activities such as hiking, boating, international travel, and from ship ballast water.

5 Why is it important to detect small populations of invasive species early?

It's important to detect small populations of invasive species early because when a new invasive species infestation is detected, a plan can be created to contain and eradicate the species quickly, which can reduce environmental and economic impacts—and cost less and do less damage than implementing a long-term control program after the species is established.

6 During the course of the game, you may draw a card that makes you poison your pond to kill all your bullfrogs but also kills native species in the process. Do you feel this would be a good management decision? Why or why not?

This is debatable depending on the context of the situation during the game. If there are only two bullfrogs in your pond, it would be better not to poison your entire pond to kill two bullfrogs when you can use other eradication methods. But if you have a low amount of native species and a high amount of bullfrogs, it might be better to remove all the bullfrogs and then restock the pond with native species once the poison is out of the system.

7 Where were some of the sources of bullfrogs during the course of the game?

Bullfrogs having babies, bullfrogs transferring from neighbors' ponds, a class releasing a pet bullfrog, bullfrogs dispersing from other areas, a farmer releasing bullfrogs onto his farm for pest control, people releasing frogs into ponds to improve the look of the pond, bullfrog farm closing, someone misidentifying a bullfrog, and local kids releasing tadpoles that were bought off the Internet.

8 How do bullfrogs spread from one pond to another?

Bullfrogs can be dispersed by moving them manually from one place to another and by large amounts of rain

creating temporary water bodies that allow the bullfrogs to travel farther than they could otherwise.

9 Why did it help the bullfrogs when the pond had water year-round?

Bullfrogs take a few months to three years to fully form into adults. When they are tadpoles, they need to be living in water to be able to metamorphose into adults.

10 Why do we want to stop the spread of bullfrogs?

We want to prevent them from spreading into new ecosystems where they can have a devastating impact on the native fish, frogs, turtles, and other organisms.

EXTENSIONS AND COMMUNITY STEWARDSHIP

As a class, brainstorm reasons to protect habitats. (For future generations, for biodiversity, for healthy economy, to preserve fishing opportunities, etc.) Then, brainstorm things that a classroom can do to prevent the introduction of bullfrogs or other invasive species. Perhaps have them create a community event to help teach the community about the impact of invasive species, sponsor a cookout featuring invasive species on the menu, or help local natural areas by removing American bullfrogs with the help of local government agencies. See the bullfrog pages on MenaceToTheWest.org for more detailed instructions on how to remove bullfrog egg masses, and more ideas. You can also use the lesson plan Watershed Warriors to help guide the process of planning a community stewardship project.



Photo credit: Russ Ottens

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ADDITIONAL RESOURCES

The following resources can all be accessed and downloaded at MenaceToTheWest.org. Just go to “Species Guides” and scroll to “bullfrogs.”

Bullfrog Resource Guide

A detailed overview of bullfrog biology, ecology, identification, impacts, and solutions

Bullfrogs are (Literally) the Worst Pets

Bullfrogs make terrible pets

<https://www.youtube.com/watch?v=e2Hon-Ciqbs>

Habitattitude

Habitattitude is a site for aquarium hobbyists, backyard pond owners, water gardeners, and others who are concerned about aquatic resource conservation

<http://www.habitattitude.net/>

Internet Center for Wildlife Damage Management

This site provides research-based wildlife control and management information from the experts

<http://icwdm.org/>

Pet Pathway Toolkit, Pet Industry Joint Advisory Council

Information on helping governments, the pet industry, and their partners establish programs and policies to prevent the release of pets into an environment where they may become invasive

<http://www.pijac.org/PPTK>

Save the Frogs

A nonprofit organization dedicated to amphibian conservation

<http://www.savethefrogs.com/threats/index.html>

USDA National Agricultural Library

The United States Department of Agriculture has made a bullfrog species profile complete with links to fact sheets collected from other sources, such as the Oregon Department of Fish and Wildlife

<https://www.invasivespeciesinfo.gov/aquatics/bullfrog.shtml>

STANDARDS ADDRESSED

Common Core

Mathematics

- Abrast and Quantitative Reasoning MP.2
- Strategic mathematic tool use MP.5

Reading: Informational Text (RI) (Grade 5)

- Integration of Knowledge and Ideas 5.9

Science & Technical Subjects (RST) (Grades 6-12)

- Key Ideas and Details 6-8.1, 11-12.1
- Integration of Knowledge and Ideas 6-8.7, 11-12.7

Speaking and Listening (SL) (Grade 8)

- Comprehension and Collaboration 8.1

Writing (WHST) (Grades 6-12)

- Write informative/explanatory texts 6-8.2, 9-12.2
- Research to Build and Present Knowledge 6-8.9, 9-12.9

Next Generation Science Standards

Earth and Space Sciences (Grades 6-8)

- Earth and Human Activity MS-ESS3-3

Life Sciences (Grades 6-12)

- Biological Evolution: Unity and Diversity HS-LS4-3, HS-LS4-5
- Ecosystems: Interactions, Energy, and Dynamics MS-LS2-1, MS-LS2-2, MS-LS2-4, HS-LS2-2, HS-LS2-6
- From Molecules to Organisms: Structures and Processes MS-LS1-5

Did you use this lesson in your classroom?

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