TEACHER LESSON PLAN

Stewardship Tag Game

Grade	Length	Subjects/strands	Topics
4th–12th grade	30–45 minutes	Ecology, invasive species management	Stewardship, prevention, invasion pathways, propagule pressure

INTRODUCTION

Through playing a fun and action-full tag game, we will explore how exposure time, the number of invasive species, and the role of early detection can impact or protect the population of native species.

The amount of time an invasive species is present can have an effect on the environment it enters. A longer period of time equals to a higher impact compared to a shorter period of time. In addition, the number of invasive species can have an effect on the area it is introduced to. A higher population of invasive species can equal a higher impact on the environment compared to a smaller population of invasive species.

Through Early Detection Rapid Response (EDRR), we can learn to identify and report invasive species. EDRR can work if citizens are knowledgeable enough to identify and report invasive species. This tag activity is best delivered in conjunction with another activity that introduces the concept of invasive species beforehand.

LEARNING OBJECTIVES

Students will:

- Observe how quickly an invasive species can replace native species
- Understand how the concepts of predation and competition relate to growth and spread of invasive species
- Discover the value of an Early Detection Rapid Response (EDRR) system

BACKGROUND

EDRR is a strategy for addressing the spread of invasive species that focuses on identifying small populations of invasive species early and controlling them before they become abundant. Eradication can become impossible without huge economic or environmental costs. EDRR relies on public education and action where people need to know what species to look for and identify, and how to report them if found. EDRR systems are facilitated by a reporting hotline, either by phone or online. In Oregon you can report invasive species by calling 1-866-INVADER or by going to the website oregoninvasiveshotline.org. In California go to: https://www.wildlife.ca.gov/Conservation/Invasives/Report or call 1-800-491-1899. In Washington go to: http://www.invasivespecies.wa.gov/

When a report is made, teams of professionals can take action to plan and implement a response, thus removing or isolating the invasive species before the spread is abundant and the species becomes too widespread for eradication.

The biggest challenge to effective EDRR is the large amount of land and water we need to survey. Professionals and natural-area managers cannot monitor or survey all the possible places where an invasive species could invade. If more people were knowledgeable as to what invasive species to look or and how to report them, we could have more success in detecting new infestations early and preventing them before the damage is done.

MATERIALS NEEDED

- Strips of blue cloth or other marker (to indicate Native Species)
- Strips of yellow cloth or other marker (to indicate Responder)
- A large, flat playing field (or a classroom)
- Cones or markers for boundaries of the playing field
- Timer
- Table and pen

Stewardship Tag Game

VOCABULARY

Invasive Species, Native Species, Early Detection and Rapid Response (EDRR), population dynamics, propagule pressure, exposure time, eradication.

PREPARATION

It is useful for the teacher and students to gain familiarity with invasive species topics before teaching this lesson. To provide the appropriate background before starting this lesson, we recommend you complete the Introductory PowerPoint, followed by the "Design an Ultimate Invader" or "Invasive Species Loteria" activities. These activities are available on MenaceToTheWest.org. Before the lesson, students should be asked questions about their understanding of the EDRR system and the factors that would affect the success or failure of an invasive species in an ecosystem. In addition, teachers should review with students all the steps of the game (described below).

PROCEDURE

Explain to students how the game will work and ask them to hypothesize and compare/contrast how the outcome might be different after each round. Write their hypothesis on the board, if possible. There will be four rounds total (see chart below). This activity functions as a tag-based game.

Roles:

At the beginning of each round, students are assigned a role. Each role has a different set of parameters.

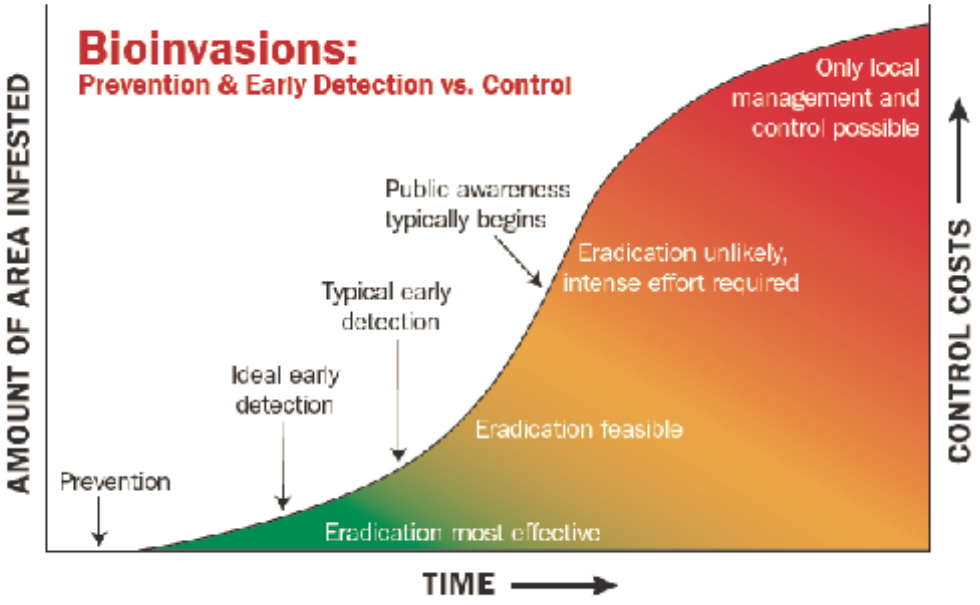
Native Species – The person playing the Native species needs to run away from the Invasive species, and if he/she is tagged he/she will become an Invasive species. If he/she is tagged, he/she has to stand still (freeze) for 10 seconds. If the Responder touches him/her within the 10 seconds (he/she slowly counts out loud to the number 10), then he/she goes back to being a Native species. If he/she is not "freed" by a Responder within that time period, then he/she removes his/her blue flag and permanently remains an Invasive species.

Invasive Species – The Invasive species will try to tag players who are Native species.

Responder – The Responder's role is to help Native species by detecting, reporting, and removing Invasive species. In the game, the responder does this by un-tagging players who have been tagged by Invaders. The Responder(s) will wear the yellow cloth and will try to tag Native species that have been tagged and are counting to the number 10.

Timekeeper – The teacher can keep track of time, and record data on the chart after each round.

*Students are not allowed to block each other



This curve illustrates the increase in costs, changes in public awareness, and changes in management approaches as an invasive species is introduced and its population increases through time. Note that the most cost-effective strategy is to prevent the establishment of new invaders by taking actions to detect and report their introduction and prevent their spread. This figure was adapted by Oregon Sea Grant from one originally created by East Multnomah Soil and Water Conservation District.

Round 1 – Long Exposure to Invasives

- Assigning of roles
  - # of Responders: 0
  - # of Invasive Species: 2–3
  - # of Native Species: total remaining students
- Procedure
  - Time for 45 seconds
- Wrap-up
  - Ask about the length of time needed for the Invasive species to overcome the Native species.
  - Ask students what could be done to inhibit the spread of the Invasive species.
  - Expected outcome: Due to the long exposure time, all Native species are impacted by Invasive species.

Round 2 – Short Exposure to Invasives

- Assigning roles
  - # of Responders: 0
  - # of Invasive Species: 2–3 (must be the same number of Invasives as Round 1)
  - # of Native Species: total remaining students
- Procedure
  - Time for 15 seconds
  - Have students hypothesize: the impact of a shorter amount of time compared to Round 1.
- Wrap-up
  - Take a count of remaining Native species.
  - Ask about the amount of time needed for the Invasive species to overcome the Native species.
  - Expected outcome is that there will be more Native Species remaining compared to the first round, because the amount of time allowed for Invasive species to spread is shorter.
  - Ask students to hypothesize how the next round will change when doubling the number of Invasive species.

Round 3 – Higher Propagule Pressure (double the number of Invasives)

- Assigning roles
  - # of Responders: 0
  - # of Invasive Species: 4–6 (doubled from Round 2)
  - # of Native Species: total remaining students
- Procedure
  - Time for 15 seconds (same time as Round 2)
  - Have students hypothesize or guess the impact of doubling the number of Invasive species.
- Wrap-up
  - Ask students if their hypothesis was correct.
  - Ask students to hypothesize how the next round will change when adding a Responder.

Round 4 – Responder to the Rescue

- Assigning roles
  - # of Invasive Species: 2–3 (Same number as Rounds 1 and 2)
  - # of Responders: 2
  - # of Native Species: total remaining students
- Procedure
  - Time for 15 seconds
- Wrap-up
  - Take a count of remaining Native species
  - Ask students to compare the four rounds and explain the impact that the introduction of Responders had on the spread of the invasive species.
  - Expected Outcome: There should be a higher number of Native species present due to the Responder role.
  - Explain to students how to become a real-life Responder by learning how to identify invasive species and knowing how to report them properly.
  - Tell students that in Oregon you can report invasive species by calling 1-866-INVADER or by going to the website Oregoninvasiveshotline.org
  - In California go to: https://www.wildlife.ca.gov/Conservation/Invasives/Report or call 1-800-491-1899.
  - In Washington go to http://www.invasivespecies.wa.gov/

CONCLUSION AND EVALUATION

Discussion/Debrief questions:
Once the game is played, the main ideas should be revisited.

- What were the Invasive species doing? How would that actually happen in real life?

  The Invasive species were reducing the biodiversity of the Native species through competition, predation, or by removing/changing the habitat. The ecosystem went from predominantly native to entirely invasive organisms.

- Why was it so easy to convert Native species to Invasive species in the first round?

  Because there was nothing to stop the invasive species: When we start taking notice and become proactive against the Invasive species, we can have a dramatic effect on stopping or slowing the spread.

- How is the amount of time an Invasive species has to invade related to the impact it has on the environment?

  The longer the species is present, the greater impact it has.

- What impact did the Responder have?

  The Responder reduced the impact of the Invasive species by reporting and controlling it.

  - Why was it more difficult to overcome Native plants?
  - What would change if there were more Responders?

  There was a difference in the effectiveness of the Invasive species when Responders were added. If there were more responders, Invasive species would have a more difficult time becoming established.

- How important is it that we get more people to become Responders in real life?
  - How could you become a Responder in real life?
  - How can we get more Responders in real life?

  Very important. Invasive species damage our ecosystem, our economy, and even human health. If there were more Responders in real life, Invasive species wouldn't be so effective at negatively impacting our environment. To become a responder in real life, you can research what are the high-priority species for early detection in your area, then learn how to identify and report that species. (See the next page for more resources on how to become a Responder).

QUIZ QUESTIONS

1 (TRUE/**FALSE**) It is not necessary to report Invasive species that you find.

2 An invasive species is called "invasive" because it:

A. Helps the ecosystem
B. Takes over and inhibits the growth of native species
C. Provides a service for humans
D. Is easy to remove once successfully established

3 (TRUE/**FALSE**) Even a small population of an invasive species is impossible to remove from an ecosystem.

4 (**TRUE**/FALSE) When a population of invasive species gets too large, then it is nearly impossible to permanently control or remove.

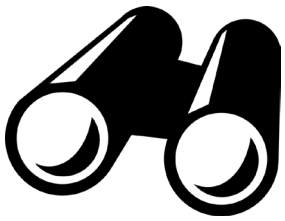
5 (**TRUE**/FALSE) Responders can have a huge impact on keeping invasive species out of our ecosystem.

6 Reporting invasive species is just one way people can take action to stop the spread of new invaders. What actions below can also help stop the spread?

A. Clean your shoes, pets, and equipment to make sure you are not spreading invasive species.
B. Never release live plants or animals into the wild.
C. Never move live plants or animals from one place to another.
D. Tell friends, classmates, and family about the problem of invasive species and what they can do.
E. All of the above.

Evaluation can also be accomplished by challenging students to find an invasive organism around their home, school, or neighborhood and report it.

Become a Responder!



You can become a Responder and reduce the impact of invasive species by learning what species to report in your area. Many experts in your state or local government and nonprofit organizations can help. For example, you can contact your State Fish and Wildlife or Agriculture department, your local Soil and Water Conservation District, or your Watershed Council.

The next step is to report! **How to Report Invasive Species:**

- In Oregon: Call 1-866-INVADER or by going to the website Oregoninvasiveshotline.org
- In California go to: https://www.wildlife.ca.gov/Conservation/Invasives/Report or call 1-800-491-1899.
- In Washington go to http://www.invasivespecies.wa.gov/

RESOURCES

Oregon Invasive Species Council website on EDRR

http://www.oregoninvasivespeciescouncil.org/news/2016/6/4/early-detection-rapid-response

Safeguarding America's Lands and Waters from Invasive Species

A National Framework for Early Detection and Rapid Response.
https://www.doi.gov/sites/doi.gov/files/National%20EDRR%20Framework.pdf

California Invasive Plant Council

Information on EDRR, including education and outreach resources:
http://www.cal-ipc.org/ip/edrr/

Least Wanted Aquatic Invaders for the Elkhorn Slough and Monterey Bay Area

http://www.elkhornslough.org/research/PDF/aquaticinvaders.pdf

USDA National Agriculture Library Resources on Early Detection and Rapid Response for Aquatic Invasive Species

https://www.invasivespeciesinfo.gov/aquatics/detection.shtml

Aquatic Invaders: Menace to the West Curriculum

Contains introductory material on aquatic invasive species as well as lesson plans and activities on the introduction, spread, and impact of AIS, all aligned to STEM Standards.
www.menacetothewest.org

Washington Sea Grant Crab Team

A volunteer-based early detection and monitoring program to improve our understanding of native salt marsh and pocket estuary organisms, and how they could be affected by green crabs.
https://wsg.washington.edu/community-outreach/environmental-threats/invasive-green-crab-volunteer-monitoring/

Did you use this lesson?

Please let us know by going to MenaceToTheWest.org and clicking the "Give Feedback" button.

Stewardship Tag Game

Table 1. Reproduce this chart on a large sheet of paper, an overhead projector, or a chalkboard, and fill it out as a class as you go through this activity.

	ROUND 1	ROUND 2	ROUND 3	ROUND 4
TIME	45 SECONDS	15 SECONDS	15 SECONDS	15 SECONDS
Total # of Invasive Species at start				
# of Responders				
# of Total Native Species at start				
# of Native Species remaining at end				
Percent (%) of Native Species remaining at end				