Lesson 3: Be a First Detector

Students model species' interactions and use technology to collect invasive species data in their community.

Intended Audience
Middle School

Students Will Be Able To
- Form hypotheses about the interactions of organisms in varying environmental scenarios
- Explain the importance of first detectors in preventing the spread of invasive species
- Identify and report an invasive species in their community
- Utilize tools to collect data

Activities
- First Detector Game
- First Detector Survey
- Review activity:
  -Verbal or written review questions

Estimated Time
3 class periods

Standards Addressed

NGSS
- MS-ESS3-3
- MS-ESS3-4
- MS-LS1-4
- MS-LS1-5
- MS-LS2-1
- MS-LS2-2
- MS-LS2-4
- MS-LS2-5

Common Core
- WHST.6-8.1
- SL.6-8.1

Ed-Tech
- 2.2.1
- 2.2.2
- 2.3.1
- 2.3.2

Introduction

Prevention is the best strategy for invasive species management. If invasive species do sneak into an area, however, early detection and rapid response (EDRR) are key. The quicker we can address a problem, the less time it has to grow. Luckily, specialists know how to deal with invasive species, but they need the public's help in detecting them. Students will learn the importance of EDRR and practice detecting and reporting invasive species.

Materials

First Detector Game
- Strips of Blue Cloth or Other Distinguishing Markers
- Strips of Yellow Cloth or Other Distinguishing Markers
- Large, Flat Playing Field or Classroom
- Timer
- First Detector Game Datasheet (1 per class or 1 per student)
- First Detector Game-Outdoor Directions
- First Detector Game-Indoor Directions
- Writing Utensil
- Optional:
  -Cones or Markers for Boundaries of the Playing Field

First Detector Survey
- Reporting Device (cell phone, iPad, or tablet)
  Note: *If no reporting devices are available at your school, use a camera and upload reports using our online form*
- First Detector Survey Datasheet (at least 3 per group)
- Optional:
  -Invasive Species Pictures
  -Hard Surface to Write On
  -Magnifying Glass
  -Object for Scale (e.g. coins, ruler, anything with a defined size)
  -Example First Detector Survey Datasheet
  -"How to Report" Handout
  -"Quality Photo Tips" Handout
  -"How to Report" PowerPoint Presentation
  -Field Trip Template
  -"Oh Deer" Invasive Species Style

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Preparation

1) Read the **Teacher Notes** to familiarize yourself with invasive species. It is also ideal for students to have an understanding of what an invasive species is prior to this activity. You can use our PowerPoint presentation from **Lesson 1: What is an Invasive Species?**

TED-Ed also has two introductory videos for a brief alternative introduction or review:

"The Threat of Invasive Species": https://youtu.be/spTWwqVP_2s (4:45)

"Attack of the Killer Algae": https://youtu.be/Vd4rgN6MYtg (3:23)

2) Download the "WA Invasives" app: Apple or Android

3) Create an EDDMapS account: https://www.eddmaps.org/index.cfm?freg. Making a class account and having students submit their reports using one e-mail address is the simplest option. This will ensure that all the data is stored in one place. However, students may each make their own account if preferred.

4) Gather the materials necessary for the **First Detector Game**.

5) Gather the materials listed for the **First Detector Survey**. If your class completed **Lesson 2: Bioblitz!,** you can reuse materials from the research stations. Students can also review their notes and/or bring them along during the survey to help better identify invasive species.

6) Identify at least three invasive species in your survey area. This will ensure that your students will find something and help focus their search.

- **If you do not feel confident in identifying invasive species in your area**, see **Resources** for potential volunteers who can help you.
- **If you cannot find invasive species in your available survey area**, you can hide some of the specimen from the lesson plan toolkit or photos of invasive species in your survey area. Students still get to practice data collection and can still make a report using the "WA Invasives" app (Simply write "Test" in the notes of your report). Try to use species they would likely find in your area so they form useful search images and can still use their data for **Lesson 4: Map the Invasion.**

  This could also be a great discussion about why the schoolyard does not contain invasive species, showing that it is in fact possible to control invasive species. You may be able to invite your groundskeepers to discuss with students what they do to manage the area.

  This is also a **way to conduct the survey indoors** if the weather or your location preclude an outdoor survey.

7) **NOTE:** Each report is verified prior to being posting on EDDMapS. As such, there will be a lag between when you collect data and when the data will be available to download for **Lesson 4: Map the Invasion**. If you are on a tight schedule, you can contact the Washington Invasive Species Council (WISC). This will help them be on the alert for reports and hopefully expedite the process. E-mail WISC at: invasivespecies@rco.wa.gov.

8) This lesson is a great field trip activity. See **Resources** for a field trip template and game idea.

Procedure

Class 1
Introduction (5 minutes):

Define or re-define **invasive species** with the class. If you have completed either of the previous lessons, you can have students mention key points they remember. Tell students that today they will be learning about **early detection and rapid response (EDRR)**. EDRR is when we detect, or find, a problem early and quickly act to stop it before the problem can get bigger. For example, if you knocked over a glass of juice on the table, it is much easier to quickly clean up the juice on the table rather than waiting and letting it spread onto the carpet too. After **prevention** (stopping invasive species from entering an area in the first place), EDRR is the most effective way to stop the spread of invasive species.

For example, in Washington, we set up thousands of traps to detect invasive insect species. Have you ever seen bright red and orange triangles hanging up around your neighborhood? Those are insect traps. Biologists check these traps regularly to see if they have caught any invasive insects. If they find an invasive, specialists act quickly to remove the insects from the area before they can spread.

No matter how many traps we set up, however, some invasive pests manage to sneak into the state. Reports from the public are crucial for tracking invasive species and preventing outbreaks. From 1990-2016, the public (people like you and me) reported an estimated 36% of newly detected invasive species in Washington[1]. We call these people who make reports **first detectors**. One example of first detectors saving the day is the case of the Asian Longhorned Beetle. Asian Longhorned Beetles prey upon many trees, including maple trees, which, among other things, give us maple syrup. Thankfully, a first detector saw the strange insect, reported it, and we were able to stop the beetles before they could do a lot of damage. Next time you enjoy a stack of pancakes or waffles smothered in syrup, you may have a first detector to thank!

First Detector Game (20-30 minutes)

Select one of the **First Detector games** to help students model the positive impacts of first detectors and EDRR against the spread of invasive species. There are two options; choose whichever best fits the ability and personality of your class.

- The outdoor version is a Freeze-Tag style game that involves running around outside.
- The indoor version is a Heads-Up, Seven-Up style game that can accommodate any level of mobility.

Optional extension:

If you would like your students to practice with graphing, you can use the provided F**irst Detector Game Datasheet** to collect their hypotheses and data (either take one for the whole class or have each student fill out their own). The students can then graph their data to help them visualize how changing variables between rounds impacted the number of invasive species. (***Note:*** *Time for graphing is not included in the time estimated for this activity*).

Class 2
Introduction (5 minutes)

Tell your students that they are going to practice being First Detectors. They will survey their community (e.g., schoolyard, local park, block around the school, etc.) for invasive species. They will take down detailed data for the different invasive species they find and make a report to

1 Looney, C., T. Murray, E. LaGasa, W.E. Hellman, and S.C. Passoa. 2016. Shadow surveys: How non-target identifications and citizen outreach enhance exotic pest detection. American Entomologist, 62(4):247-254.

the Washington Invasive Species Council. These reports are received by invasive species professionals who check each report for accuracy. Your reports help these professionals get an idea of how far different invasive species have spread around the state and could help stop new invasive species outbreaks!

Identify the target species (15 minutes)

Introduce your students to the species they will be searching for using pictures or actual specimen (***Note:*** *If using actual plant specimen, throw them in the trash after your lesson and be cautious of any seeds*). Photos are nice either way because they provide you with a quick identification reference when you're out collecting data. Point out to the students the unique features of the species they are searching for and maybe a few interesting facts (fact sheet sources can be found on the **Resources** page).

Note: *This is a great day to invite an invasive species professional to your class to introduce the invasive species found in your area. See the* ***Resources*** *page for a list of organizations to contact to find a potential guest speaker.*

Practice Report (15-25 minutes)

Demonstrate to your students how to fill out their **First Detector Survey Datasheet** and how to make a good report. If they pay close attention, next class period they may get a chance to make their own reports using a reporting device.

Note: *Allowing students to use a reporting device is at the discretion of the teacher. You must decide if you think they are responsible enough to treat them properly. Set expectations accordingly (e.g., I will make reports vs. You will make reports).*

Indoor options:

1) Walk your students through an example **First Detector Survey Datasheet**. You can use the provided example datasheet or fill out an example for your specific location.

2a) Go through the **"How to Report" PowerPoint presentation** with students.

OR

2b) Project the screen of your reporting device using a projector or connect your reporting device to a projector using an HDMI cable. Go through the different steps to make a report (outlined in **"How to Report" handout** and **PowerPoint** slides).

Outside option:

1) Walk your students through an example datasheet. You can use the provided example datasheet or fill out an example for your specific location.

2) Lead class to an invasive species on your school ground. Go through steps to make a report using your reporting device (outlined in **"How to Report" handout** and **PowerPoint** slides). It is useful to locate an invasive species prior to taking the students out for this demonstration so you do not use up class time searching.

<u>Class 3</u>

Assign groups and gather data (30 minutes)

Break students into small groups (2-3 students).

Pose this data gathering task as a challenge. For example, "In class yesterday we talked about some invasive species commonly found in our community. There are at least three of those invasive species between the fence and the soccer goal. Which group can find all three first?"

Give each group three **First Detector Survey Datasheet** (or

more, depending on how many invasive species you would like them to find). They need to use the datasheets to describe where they found the invasive species and what characteristics the invasive species has. Explain that their notes need to be detailed enough that they can guide you back to the spot to make a digital report. Even though in the end you will make a digital report, remind them that many scientists keep a physical copy of their data in case the digital collection tool malfunctions. It is also another task to keep all the students actively engaged.

Reiterate the survey area boundaries and remind students to be aware of their surroundings (watch out for holes, standing water, thorny vines, etc.). Once a group finds all the invasive species you challenged them find and completely fills out their datasheets, they report back to the teacher. The students must then guide their teacher to the invasive species. The teacher uses their reporting device to make the report for the class (Note: if you have responsible students, you can choose to let your students make the report. You could pose this as the reward for being the first group to find all of the pre-identified invasive species AND filling out all the areas of their datasheet properly).

If your students and you are unsure about a report, that is OK. We would rather be safe than sorry. Have them make their best guess and then the experts will verify their report.

If you do not have a cell phone or other reporting device available, use a camera to take a photo of the different invasive species. While not necessary to make a report, it is nearly impossible to verify a sighting without a photo. Data and photos can be entered using our online reporting forms: https://invasivespecies.wa.gov/report.shtml. Online reports are verified and added to the EDDMapS database just like reports from our "WA Invasives" app.

Decontamination (5 minutes)

After their search, have students check their clothes for any hitchhiking seeds. Also stomp their shoes to dislodge any mud that may also be harboring seeds. Researchers have unwittingly spread many invasive species!

If possible, throw seeds away. Otherwise, leave them on-site; the invasive species is already present there. The goal is to not help it leave that area.

Note: *This can be done during class discussion if done outside.*

Review

Use the following questions to facilitate a group discussion or assign as a writing exercise (10-15 minutes).

1) Which invasive species did you discover during your survey?

2) Did you see any interactions between the invasive plant species and the other plants in the area? For example, in the areas you found invasive species, was there a variety of different plants, or mainly just the invasive plant?

3) Did you notice any difference in animal activity between the areas with invasive plants compared to those without invasive plants?
(If you didn't notice any animals in your area, hypothesize how their behavior might differ.)

4) How do you think the invasive species got to your survey site?

- Think of at least three potential pathways of spread (ways the invasive species are moved to new locations).
- For each pathway of spread you identify, come up with at least one way you could prevent more invasive species from arriving from that pathway.

Stewardship Tag Game-Outdoor adapted from Oregon Sea Grant's "Menace to the West" curriculum:
https://seagrant.oregonstate.edu/sites/seagrant.oregonstate.edu/files/invasive-species/toolkit/lp-t-stewardship-tag-game_0.pdf