First Detector Game-Indoors (20-30 minutes)

Students play a game, similar to Heads-Up, Seven-Up, to model and experience the positive impacts first detectors and Early Detection Rapid Response (EDRR) have on combatting the spread of invasive species. There are four different rounds, each representing a different invasive species scenario. At the beginning of each round, students must make a hypothesis of how they expect that round will turn out. At the end of each round, students will briefly discuss if their hypothesis was supported and what factors affected the outcome.

Supplies

- Timer
- First Detector Game Datasheet (1 per class or 1 per student)
- Writing utensil(s)

Roles

At the start of each round, assign students to be Native Species, Invasive Species, or First Detectors and explain what each role can do.

- **Native Species:** These students sit at their desks with their heads down and thumbs up. If a Native Species has his/her thumb pressed down, he/she needs to slowly and softly count out loud to 10. If the round ends **or** a First Detector comes by and taps the student's shoulder before the student has finished counting to 10, the student can put his/her thumb back up. Students should count even in rounds without First Detectors; they may be saved by the time for that round running out.
    - *All Native Species with their thumbs still up at the end of the round represent the plants and animals that were lucky enough to escape the Invasive Species.*
- **Invasive Species:** These students walk around the classroom gently pushing down the thumbs of as many Native Species players as possible. Every thumb they keep down is another plant or animal they outcompeted, mimicking the spread of invasive species in the wild.
- **First Detectors:** First Detectors need to counteract the Invasive Species. They do this by tapping the shoulders of any Native Species who has a thumb pushed down by an Invasive Species. Once they tap someone's shoulder, that player can put his/her thumb back up. This represents how real-life first detectors counteract the negative impacts and spread of invasive species.

Assigning Roles

For Round 1, ask for volunteers to be Invasive Species. The remaining students stay at their desks with their heads down and their thumbs up.

To select your Invasive Species volunteers for the next round, allow students to guess who pushed down their thumbs. If the student guesses correctly, he/she becomes the Invasive Species for the next round. If they guess incorrectly, they sit down (or put their hand down). Go student-by-student until you have enough new Invasive Species players for the next round. Those who did not get a chance to guess may get a chance in later rounds.

For the final round, select a few volunteers to be First Detectors. They circulate the room at the same time as the Invasive Species, gently tapping the shoulders of any Native Species with a thumb pushed down. Everything else remains the same.

Procedure

Explain to your students that this game is a way for them to model how different variables impact the effect of invasive species on native species. A model is a way for us to answer questions about things that would be

difficult to observe naturally. For example, it would take too long for us to observe the impacts of invasive species on native species in real time. A model allows us to predict how the scenario would play out in a much faster fashion. Models are made up of different variables, which are factors that you can measure and change. Scientists change variables to see if and how that changes the outcome of their models. In this game, we will change one variable each round. Ask your students why we only change one variable each time (A: you only want to change one variable each time you run a model, otherwise you won't be able to determine which variable caused your outcome). At the beginning of each round, explain the scenario to your students and have them hypothesize the outcome of that round.

At the beginning of each round, explain the scenario to your students and have them hypothesize the outcome of that round. Record the round parameters (time, number of Invasive Species, number of Native Species, etc.) and the class hypothesis on the provided datasheet.

Time the round. When the time is up, everyone at the end of the round with their thumbs down stands up (or raises their hands). Count and record the number of students still sitting on the datasheet. These students represent the native species lucky enough to escape the spread of the invasive species. Compare the results of each round to Round 1 to see how the different variables change the impacts of the Invasive Species.

The datasheet is set up for students to calculate the percentage of Native Species remaining at the end of each round. Since you will be changing the number of Native Species you start with between rounds, comparing the percentage of Native Species remaining at the end of each round is more accurate than comparing the number of remaining Native Species. If there is no time to do this calculation, you can compare the remaining number of Native Species at the end of each round for a rough comparison. If your students need help calculating percentage, you can write out this equation for them:

$$\textbf{Percentage } (\%) \textbf{ of Native Species Remaining at End of the Round} = \frac{\textbf{Number of Native Species at the End of the Round}}{\textbf{Number of Native Species at the Start of the Round}} \times 100$$

Notes

- Invasive Species must remember whose thumbs they pushed down because their classmates will be guessing who tagged them at the end of the round.
- Invasive Species must walk, not run.
- You may want to stage your Invasive Species at different parts of the room at the beginning of the round so that the Native Species in the front of the room aren't always tagged.
- If you find the Invasive Species are managing to push down everyone's thumbs each round, you can adjust the following parameters:
    - *Assign fewer Invasive Species*
    - *Reduce the time for each round (reduce each round by the same quantity of time to keep them comparable)*
    - *Spread the Native Species around the classroom so it takes the Invasive Species longer to walk to all of them*

Round 1: Long Exposure to Invasive Species, No First Detector

Round 1 illustrates the baseline impacts on invasive species on native species when there is no intervention.

- Hypothesize: What do you predict will happen to the Native Species when the Invasive Species go undetected and no one acts to stop them?

  Expected outcome: If nobody takes action to stop the Invasive Species, then most, if not all, of the Native Species will be impacted by Invasive Species.

- Assign roles
  - Invasive Species: 2-3 students
  - First Detectors: 0 students
  - Native Species: Remaining students
- Time this round for **30 seconds**
- Count and record the number of remaining Native Species players.
- Review:
  - *Was your hypothesis supported?*
  - *What are some things that could have slowed down the spread of the Invasive Species? (Ex: Removed/reduced the number of Invasive Species; Given them less time to spread; Introduced some competition)*

Round 2: Short Exposure to Invasive Species, No First Detector

Round 2 illustrates how reducing the amount of time invasive species have to spread changes their impact on native species. We can reduce the amount of time an invasive species has to spread by detecting them early and rapidly responding to an invasive species report.

- Hypothesize: What do you predict will happen to the Native Species when the amount of time the Invasive Species have to spread is decreased?

  Expected outcome: If the Invasive Species have less time to spread, then fewer Native Species will be affected by the Invasive Species.

- Assign roles
  - Invasive Species: 2-3 students (same number as Round 1, for accurate comparison)
  - First Detectors: 0 students
  - Native Species: Remaining students
- Time this round for **15 seconds**
- Count and record the number of remaining Native Species players.
- Review:
  - *Was your hypothesis supported?*
  - *Compared to Round 1, how did having less time change the impact of the Invasive Species?*

Round 3: More Invasive Species, No First Detector

Round 3 illustrates how having a larger number of invasive species impacts native species. For example, when invasive species go undetected and have a chance to breed, their numbers quickly increase as do their negative impacts on native species!

- Hypothesize: What do you predict will happen to the Native Species when there are more Invasive Species to start with?

  Expected outcome: If there are more Invasive Species to start with, then most, if not all, of the Native

Species will be affected by the Invasive Species.

- Assign roles
    - Invasive Species: 4-6 students (double whatever you had in Round 1, for accurate comparison)
    - First Detectors: 0 students
    - Native Species: Remaining students
- Time this round for **30 seconds**
- Count and record the number of remaining Native Species players.
- Review:
    - *Was your hypothesis supported?*
    - *Compared to Round 1, how did starting with more Invasive Species impact the Native Species?*
    - *If Round 1 and Round 3 both ended with no remaining Native Species, did this outcome occur more quickly in one of the rounds?*

Round 4: First Detector!

Round 4 illustrates how adding first detectors impacts the effects of invasive species on native species. By reporting invasive species early, we can counteract their negative impacts.

- Hypothesize: What do you predict will happen to the number of Native Species if there are First Detectors counteracting the Invasive Species?

  Expected outcome: If there are First Detectors working against the Invasive Species, then few, if any, of the Native Species will be turned into Invasive Species.

- Assign roles
    - Invasive Species: 2-3 (same number as Round 1, for accurate comparison)
    - First Detectors: 2
    - Native Species: Remaining students
- Time this round for **30 seconds**
- Count and record the number of remaining Native Species players.
- Review:
    - *Was your hypothesis supported?*
    - *Compared to Round 1, how did adding First Detectors change the impact of the Invasive Species?*
    - *In which round were the Invasive Species most successful (i.e. when did we see the greatest increase in Invasive species)?*
    - *In which round were the Invasive Species least successful (i.e. when did we see the lowest decrease in native species)?*
    - *Do you think First Detectors make a difference on the impact of invasive species in real life? (YES!)*
    - *If we were to play this game again, what models would you want to run to learn more about the real-life relationship between native species, invasive species, and first detectors (e.g. what questions would you like to answer)? What variables in our model would we need to change or add to test your question?*

Optional extension: Have students track the data collected during each round and then practice graphing the results for work with collecting and organizing data.

Stewardship game 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