Forest Health

In the Forest Health activity, we observe overstory tree health and identify invasive species pressure in our FERN plot. Like human communities, forest ecosystem health is impacted by many factors. Observing tree health and invasive species abundance gives us a small window into the bigger picture of health in our FERN plot and in the forest ecosystem as a whole.

Before you Start:

Take a few minutes to walk around your FERN plot. Work with your classmates to find the boundaries of the 1/10 acre plot and the embedded 1/50 acre and 1/1000 acre plots. Find and walk your transect lines.

What do you notice about the forest around you?

What do you wonder?

Use your field notebook to record your thoughts. Make note of the date, the weather, and any other information you think might impact how you move through the activity today. One important key to data management is keeping good notes on what is going on around you while you're collecting your data. These factors impact how you do your work, and can give you helpful clues down the road if you notice that something might have gone wrong.

What You'll Need

- compass
- data sheets
- field notebook
- Forest Trees of Maine book
- Maine Invasive Plants Field Guide
- measuring tape
- measuring pole
- pencil

Invasive Species are species that have been introduced to a new ecosystem and, because of favorable ecosystem conditions, outcompete species native to that ecosystem. This competative edge allows invasive species to spread, occupying more and more space, and threatening the health of the forest ecosystem. Here we focus on plant species, though animal species can meet the characteristics of "invasive" as well.
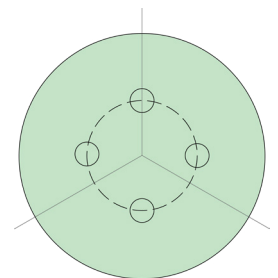
Monitoring **Tree Health** also provides insight into the health of the forest. While one sick tree may not teach us much about the forest, many sick trees begin to tell a bigger story.

This activity happens in the 1/10 acre FERN plot

This activity challenges you to think about what makes a healthy forest and what contributes to forest stress. Here, we specifically look at the abundance of invasive species and monitor overstory tree health to gain insight into forest health.

Forest health may be a new topic for you, but health is something we think about a lot. *What is an indicator that a person is healthy? What is an indicator that a person is unwell?* In both forest ecosystems and human communities, when we see patterns across many individuals we can begin to draw inferences about a larger group. *What might indicate that a human community is healthy? What might indicate that a human community is unwell?*

Tree Health Procedure:

For this activity, groups of students should be assigned groups of overstory trees to collect data on. This can be achieved by dividing the FERN plot into quadrants based on the cardinal directions, or by giving each group of students a range of tree IDs to collect data on.

1. Find your first overstory tree and record the tree ID number on your data sheet.

2. Identify the tree's species using past data and your Forest Trees of Maine book.

3. Scan your tree carefully from the base of its **bole** to the top of its **crown**. The chart below outlines observations that may be signs of damage or disease. If you make any of these observations on your tree, mark the finding on your data sheet in the appropriate section. Otherwise, classify the tree as healthy. In the Damage % column, estimate how much of the crown or bole is impacted by the damage or disease you noted.
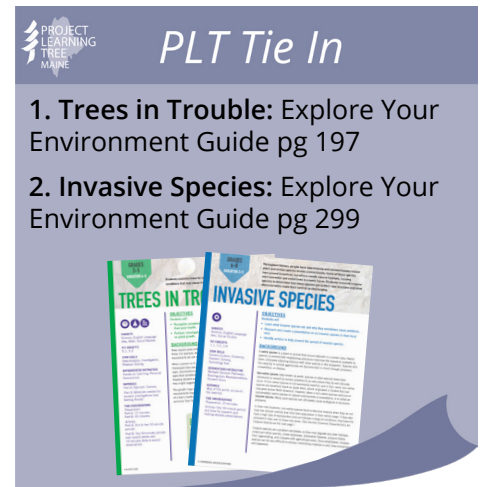
Crown	Bole
Branches	Trunk
broken branches	damaged bark
branches without leaves	missing bark sections
Foliage	Roots
miscolored leaves	extreme lean
oddly shaped leaves	miscoloration at base
leaves with holes in them	mushrooms at base

Note: some of these observations (like miscolored leaves, or branches without leaves) are normal presentations for healthy hardwoods in the autumn and winter. Check in with your FERN forestry expert if you're unsure if an observation indicates damage or disease.

4. Make an educated guess about the cause of the damage or disease on your data sheet. Your FERN forestry expert can give you some insight into how to think this question through.

Invasive Species Procedure:

*This activity challenges students to identify **invasive plants** in the FERN plot. Before beginning the procedure, spend some time in the classroom building familiarity with the Maine Invasive Plants Field Guide and identifying features of common **invasive plants** in Maine. Consider: why do we document **invasive plants**? What can we learn from this data over time? Your FERN forestry expert is an excellent resource for this activity, both in the classroom and in the field.*

5. Stand at plot center and face north *Note: figure out which way north is by using a compass or the marking on your plot center post.*

6. Systematically survey your FERN plot for **invasive plants** by carefully looking all around as you walk in a pizza slice pattern: from plot center walk to the northern boundary of your plot, take 10 or 12 steps clockwise along the outside edge, then return to plot center. Turn, and walk to the eastern boundary of your plot. Continue this pattern until you have covered the entire FERN plot. If you find an **invasive plant**, continue to step 7.

7. Use the Maine Invasive Plants Guide to double check that you are looking at an **invasive plant**. Once you are confident, return to plot center.

8. Using a compass, determine the directional degree from north of the **invasive plant**. *Note: directional degree from north is a measurement of direction. From plot center, you can use your compass to determine how far clockwise from north you need to turn to face your invasive plant. Your FERN forestry expert can show you how.*

Walk pizza slice shapes in each cardinal direction to systematically survey your FERN plot for invasive plants.

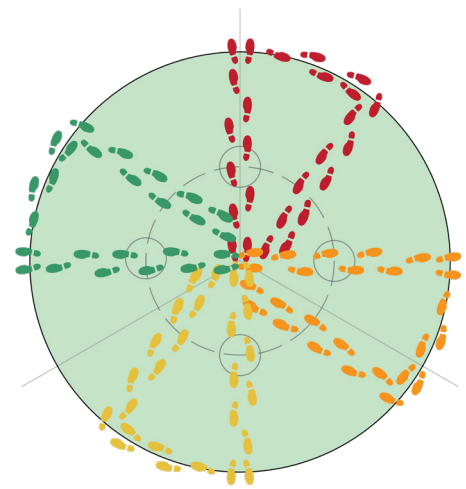9. Use the measuring tape to determine the distance from plot center to the **invasive plant**.

10. Use the measuring tape or measuring pole to determine the **height class** of the **invasive plant**. **Height class** options for this activity are: under 2-feet, 2-feet to 4.5 feet, over 4.5 feet, and climbing vine.

11. Using the measureing tape (and your math skills), estimate the area occupied by the **invasive plant**.

12. Return to your systematic walk until you find another **invasive plant**.

13. Return to your classroom and check the accuracy of your data. If the plot has been measured before, compare the measurements you just took with the previous measurements. Make sure you can explain all changes, or make a not if you are unsure.

14. Once the data is verified, share your findings with Maine TREE and the FERN network.

Definitions:

Bole: The bole is the trunk of the tree. It includes everything from the ground to the lowest branches with leaves or needles.

Crown: The crown is the top of the tree. It starts at the lowest branch with leaves or needles and continues until the very top of the tree.

Height class: Height classes are categories used to lump plant size measurements into groups of similarly sized plants instead of recording the exact measurements for every plant. By lumping similarly sized plants together, we can more quickly notice patterns of similarity and difference.

Invasive plant: Invasive plants are outsiders to an ecosystem that outcompete insiders or native species. Because of their competative edge, invasive plants can quickly take over an area. Plants can only be invasive when they are in an ecosystem they did not evolve to live in.

FERN FOREST ECOLOGY RESEARCH NETWORK