

The Future Forest?

Objective:

Students assess tree regeneration on a 1/1000th acre plot of forest floor and make predictions about the future makeup of the forest.

Standards of Learning:

Science 6.1, LS.1, LS.5, LS.11, BIO.1, BIO.7, BIO.8, BIO.9 (Also some math)

Materials:

- Yarn pieces (yellow) – 23 feet, 4.9 in. long
- Data sheets, clipboards, pencils
- Rulers
- ID books

Background:

Forests go through a natural process of succession, in which plant communities change in predictable ways over time. Some trees, such as shortleaf pine and black locust, are considered early successional species. They need full sunlight to grow, they tend to grow fast, and they usually don't live as long as the species that follow them. Many hardwoods are later successional species. These are more tolerant of shade, usually slower growing, and relatively long-lived. The progression from an abandoned field to a pine forest to a mature hardwood forest can take well over 100 years. Through those years, the wildlife living in the forest will gradually change with each forest stage.

Succession is set back to an earlier stage when trees are harvested, or when they die due to fire, insect attack, or storms. This situation can be good for certain types of trees, wildlife, and other plants. Foresters and biologists are interested in how a forest will look in the future. Managing the forest allows them to manipulate succession to meet certain goals. Management may be done to ensure that certain species make up the future forest. For example, if we want oaks to dominate the forest because of their value as wildlife food, we may have to remove other species that would outcompete the young oaks. As another example, if we want to grow pines for lumber or paper pulp, we would need to harvest the trees periodically. This would, in effect, reset succession, so that new pines can grow in the full sunlight they need. In the absence of management, a forest will still change over time, but change may happen more slowly.

In addition to the species present, forest managers need to think about the density of trees. An optimum density allows trees to use the available resources (light, water, nutrients) to grow their best. If a stand is too dense, trees are crowded and competing with each other. If a stand has a very low density, it may be producing fewer trees than we would like. Foresters often talk about density in terms of a stand being understocked, fully stocked, or overstocked. Stocking rates depend on management objectives, so a “good” rate cannot be generalized across all forest types. And, even if a stand is well stocked with mature trees, regeneration (growth of young trees) can make the future stocking rate quite different.

In this activity, students will examine the types and numbers of mature and young trees in one part of the State Forest. They will also predict what that part of the forest might look like in the future, if nature takes its course and no forest management takes place.

In the Forest:

While walking the trail, stop at a point and give each group of 4 students a piece of yarn from the envelope, a clipboard with data sheet, a ruler, and a tree ID book. To select a plot center, someone from each group should walk 15 steps (have each walker go in a different direction) and stop, marking the plot center. Other group members then place the yarn in a circle on the ground around the plot center. (This length of yarn will make a 1/1000 acre plot.) The plot may include trees of many sizes, or none at all.

Groups will inventory all trees in their plot, by species. Remember that young tree seedlings can be very tiny, with just a few leaves. Students should use the tree ID book to identify species and to make sure they are looking at trees, not shrubs. (Shrubs should not be included in this inventory.) Groups should count the number of seedlings and saplings (< 5 inches in trunk diameter) and mature trees (> 5 inches in trunk diameter) of each species that fall within their plot. Students can use the ruler to check diameter if they are unsure which category a tree falls into. Trees on the plot border should be counted if they are at least halfway inside the plot.

If there is time, have each group sample a second plot. To avoid overlap with others' plots, groups should continue 15 steps in the same direction they traveled originally, to find the center of their new plot.

Optional: If you have extra time, continue walking along the trail and stop to sample plots in another area of the forest.

Back in the Classroom:

Convert the groups' plot data to seedlings/saplings and mature trees per acre. (*Note: If groups sampled at two different sites, do the calculations for each site separately. This is important because stands of trees may have different characteristics that can't be averaged across the whole forest.)

To calculate trees per acre: For each species, first tally the total seedlings/saplings counted by all groups. Divide this total by the total number of plots sampled to get a plot average for that species. Then multiply this plot average by 1,000 to get the average number of seedlings/saplings of that species per acre. Repeat these steps for each species of seedlings/saplings and mature trees.

Questions for Discussion:

- What species were most common as mature trees in the plots?
 - What species were most common as seedlings or saplings?
 - Did you expect the mature and young trees to be the same species? Were they? If not, what are some possible reasons for the difference?
 - Did we find more mature trees or seedlings/saplings per acre? Is this what you expected? Why or why not?
 - Do you think there is enough regeneration (growth of young trees) to produce a healthy forest in the future? Why or why not?
 - If the seedlings and saplings eventually replace the mature trees, will the makeup of the forest change or stay the same? Explain your answer.
 - What factors will influence whether the young trees grow into mature, healthy trees?
 - Do you think it would be better to manage this forest for certain species, or let nature take its course? What are the advantages and disadvantages of each strategy?
- (- Optional: If you sampled at 2 sites, what were the differences between the sites?)

Data Sheet - "The Future Forest?"

SITE 1

Plot 1

Tree Species	Number of seedlings & saplings (<5 in. diam.)	Number of mature trees (>5 in. diam.)

Plot 2

Tree Species	Number of seedlings & saplings (<5 in. diam.)	Number of mature trees (>5 in. diam.)

SITE 2 (Optional)

Plot 1

Tree Species	Number of seedlings & saplings (<5 in. diam.)	Number of mature trees (>5 in. diam.)

Plot 2

Tree Species	Number of seedlings & saplings (<5 in. diam.)	Number of mature trees (>5 in. diam.)