



Science Essential Standards:

- 3.L.2.3 (plants)
- 5.L.2.2 (ecosystems)

Time:

45-60 minutes

Audience:

3rd or 5th grade

Learning Objective:

- Summarize the stages in the life cycle of a tree, from seed to decomposition.
- Identify common trees of NC.

Materials:

- field guide
- containers
- Private Eyes or magnifying glasses

Vocabulary:

Decomposer, disperse, mature tree, photosynthesis, sapling, seed, snag, species, sprout

Preparation:

- ✓ Familiarize yourself with the area where you will be bringing students. Check the area for poison ivy and other potential safety concerns.
- ✓ Know how many students are in your group.
- ✓ Gather the materials needed for the lesson.
- ✓ If possible, scout out an area with fallen logs that students could investigate.

Background:

Like other living things, trees have a life cycle. The first stage in the tree life cycle is the **seed**. Seeds can come in a variety of forms and sizes. For example, an acorn is the seed of an oak tree and an apple seed from the fruit you eat can produce an apple tree. Wind, water, animals, and people are some of the ways that a seed can be **dispersed**, or move away from the parent tree. For example, if a bird eats a piece of fruit, the seeds will be excreted elsewhere from where the fruit was eaten. Some seeds have sticky outer coatings that cling to fur or even pant legs, as animals or humans move through the forest.

Once the seed has found favorable conditions to grow, it will sprout. The **sprout** is a very young plant that has broken through the soil. It will continue to grow if it has enough access to light to perform **photosynthesis**. This is the process by which plants use sunlight to create energy from carbon dioxide and water. Without enough sunlight, the sprout will no longer be able to grow larger into a **sapling**, or a small tree. At this stage, the sapling is not able to produce its own seeds.

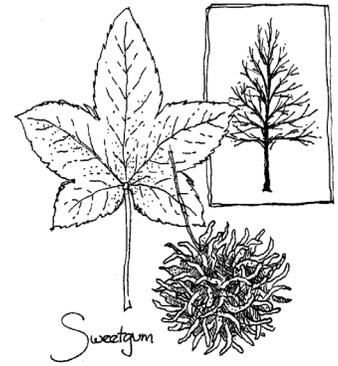
Once a tree has reached its mature state, it is now able to reproduce. **Mature trees** disperse their seeds to create new trees. Reaching maturity takes years. Oak trees are typically 15-50 years old before producing acorns. Different varieties of trees have different life spans. Oak trees can be 80 to 1,000 years old depending on the **species**, or type.

A tree that is no longer alive but still standing is called a **snag**. Different animals, insects, and fungi use the snag as a habitat. Most woodpecker species make nest cavities in snags. Snags, and the resulting stumps and fallen logs that they become, can be an entire ecosystem in unto themselves. Over time they will be broken down even more by **decomposers**. Decomposers are bacteria, fungi, and invertebrates that break down organic material which returns nutrients back to the soil, feeding the next generation of seeds.

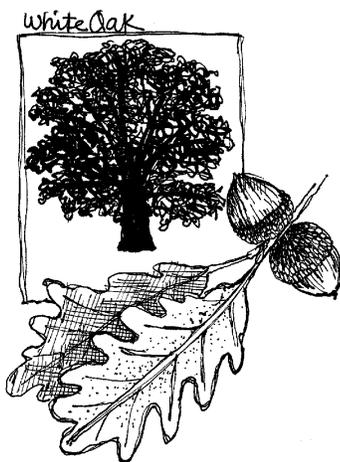
North Carolina has many common species of trees to identify. Deciduous trees that lose their leaves in the fall include sweet gum, sycamore, maples, white oaks, and red oaks. Conifers which produce cones include loblolly pine, Virginia pine, and eastern red cedar.

Instructions:

1. Greet the students and explain the learning objective of this activity. Explain to the students that they will be learning about the stages in the life cycle of a tree as well as about some common trees found in North Carolina. They will also be learning about trees as an ecosystem and as part of an ecosystem. *Ask what they already know about trees.*
2. Describe the stages of the life cycle:
 - a. **Seed:** the unit of reproduction that will form the tree. A mature tree has made the seed that contains all the material needed for a new tree.
 - b. **Sprout:** a young plant that has grown from the seed.
 - i. *Ask students what a seed needs to be able to sprout.* Explain that the seed needs water, soil, and carbon dioxide from air to be able to grow.
 - c. **Sapling:** a small, young tree. They have not yet reached the stage where they can produce their own seeds.
 - i. *Ask students how a sapling continues to grow.* Explain that the sapling needs water, carbon dioxide, nutrients from the soil, and sunlight.
 - ii. *Ask students if they know why trees need sunlight.* Explain that plants use sunlight for photosynthesis to make their own energy. Have them turn and talk to a partner about why a seed doesn't need sunlight to sprout.
 - d. **Mature tree:** a fully-grown tree that can produce seeds for reproduction.
 - e. **Snag:** a dead tree that is no longer alive and is beginning to fall apart.
 - f. **Rotting:** the stage where the tree remains are being broken down by **decomposers**. The rotting tree can serve as a habitat for many other organisms. Likely on the ground and known as a fallen log at this stage.
 - i. *Ask students if they can think of any animals that might live in a rotting tree.* Examples include birds, squirrels, and insects.



3. Walk through the forest to find evidence of all 6 stages of a tree life cycle. **Challenge** students to find seeds first and then look for each of the life cycle stages in order from there. Consider having the students work in smaller groups of 2 or 3.



- a. If students have nature journals or paper, have them draw the different stages in the life cycle that they see.
4. *Pause occasionally on the hike to ask students about the stages that they observe.*
 - a. For 3rd graders, discuss the environmental conditions that support these trees, i.e. soil and amount of rainfall.
 - b. For 4th graders, focus the discussion on what animals would live in the trees. *Ask about adaptations of these animals for this habitat.*
 - c. For 5th graders, ask about what kind of ecosystem are they in and how do they know.
 5. When you find an area with fallen logs, gather the group together.
 6. *Ask students what they might find under the logs.* Answers might include beetles, ants, termites, spiders, snails, snakes, and salamanders.
 7. Explain that fallen logs are their own small ecosystem of mostly **decomposers** which are **fungi, bacteria, and invertebrates** that return nutrients to the soil for other organisms to use. *Prompt students to define each type of decomposer.*

8. Explain that they will be looking for evidence of **decomposition and decomposers**. Explain that **decomposition** is the breaking down into smaller parts and simpler parts. Students will look for evidence of **fungi** and **invertebrates** (animals without a backbone) such as millipedes, ants, worms, slugs, roly-polies, or beetles.
9. **Model** how to carefully pick up animals and return them to their original home.
10. Explain that students will not be able to see bacteria, because it is so small.
11. **Model** how to gently roll over a log toward them, allowing creatures residing underneath the log to flee and students to view them more safely. For example, if a copperhead snake is resting under the log, by rolling the log toward you, the snake has an escape route and has no need to strike anyone.
12. Have the students **model** for you that they know how to safely roll over a log.
13. After 10-15 minutes of exploration, bring the group back together to discuss this activity. **Ask students to share what evidence of decomposition they saw**. Have students point out evidence on the logs when possible.
 - a. For **5th graders**, ask them to give an example of a food chain involving the fallen logs.
14. Continue the hike discussing the stages of the **tree life cycle** and **forest ecosystem**.
15. **Gather** students at the end of the hike within site of the forest and trees. **Ask students to explain the stages of the tree life cycle**. Ask them **why decomposers are an important part of the tree life cycle**.



Click beetle

Opportunities for Extended Learning

- Students can complete a **nature journaling prompt** about what they saw in the forest today. They can draw the different stages of the tree lifecycle or what the fallen log ecosystem that they observed.

Behavior & Materials Management Tips:

- ◆ Give students clear **boundaries** for where they can wander in the forest.

References & More Information:

Goodwin, M. (2019, August 14). Oak Tree Life Cycle Lesson and Memory Game. Retrieved from <https://thehomeschoolscientist.com/oak-tree-life-cycle-lesson/>

Texas A&M Forest Service. (n.d.). How Trees Grow. Retrieved from <http://texastreeid.tamu.edu/content/howTreesGrow/#lifecycle>

BETLES: Science and teaching for Field Instructors. (n.d.). The Case of the Disappearing log. Retrieved from <http://beetlesproject.org/resources/for-field-instructors/case-disappearing-log/>

Credits:

Illustrations by Cindie Brunner.

Photo of sourwood in bloom by Lauren Greene at Medoc Mountain State Park on July 24, 2019.

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