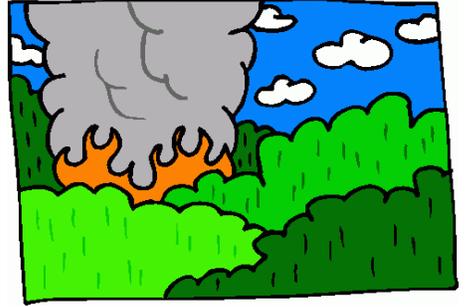

Fire Scars



Objectives

1. Students will describe the historic role of fire in the forests of the Klamath-Siskiyou Mountains.
2. Students will identify fire scars and growth rings on a tree cookie.
3. Students will write a story or a timeline describing the significant events in the life of a fire-scarred tree.

Materials

- 5 Fire-scarred tree cookies
- Fire-scarred tree photo (laminated)
- “Fire Scars: The Story of a Ponderosa Pine” article (photocopied for each student)
- “Fire Scars Timeline” (copied for each student)
- Fire-Scarred Tree Facts (copied for each student)
- Fire Scar on Tree photo (in binder)

“Fire Scars: The Story of a Ponderosa Pine” by Pepper Trail is used with permission. The story was originally published in *Mountains and Rivers* in 2001, and republished in *Jefferson Monthly* in 2012.

Background Information

Fire is a natural and essential element of forests in the Klamath-Siskiyou Mountains. Low- and moderate-intensity fires used to burn regularly throughout the region, but the US Forest Service's policy of fire suppression has altered that pattern. Since the beginning of the 20th Century, the Forest Service has put out as many fires as possible, as fast as possible. While this policy protects lives, property and timber sales, it threatens the health of the forest.

Fire Benefits the Forest:

- Fires create a patchwork mosaic pattern of burned and unburned areas in the forest. Because different species occupy each area, this leads to a high level of biodiversity in the forest, and a variety of habitats.
- Fire releases nutrients into the soil.

Appropriate Grade Level: 6th-12th

Time Required: 3 Hours (Each section can be presented as a 1-hour lesson.)

Curriculum Benchmarks: Science: 6.2L.2, H.2L.2, H.3S.1, H.3S.2, H.3S.3. Reading for Literacy in Science and Technical Subjects CCSS, and Writing for Literacy in History/Social Studies, Science and Technical Subjects: CCSS 6.RST.2, 6.RST.6, 6.WHST.2, 7.RST.2, 7.RST.6, 7.WHST.2, 7.WHST.4, 8.RST.2, 8.RST.6, 8.WHST.2, 8.WHST.4, 9-10.RST.2, 9-10.WHST.2, 9-10.WHST.4, 9-10.WHST.9, 11-12.RST.2, 11-12.RST.5, 11-12.WHST.2, 11-12.WHST.4.



- Low- and moderate-intensity fires thin out underbrush and accumulated dead material on the forest floor. This eliminates a lot of fire fuel, preventing high-intensity fires that can cause destruction to a forest and property in the forest.
- Infrequent high-intensity, stand-replacing fires are also a natural part of the forest ecosystem. High-intensity fires reset the nutrients, plant communities and structure of the forest.
- Many plants and animals are adapted to deal with, and even thrive from the effects of fire.

Ponderosa Pine Adaptations to Fire:

Ponderosa pines are adapted to survive low- and moderate-intensity fire in the following ways:

- Bark is thick and fire-resistant.
- Puzzle shape in bark dissipates heat by harboring cool air in the cracks.
- Needles are fire-resistant.
- Deep roots are protected from fire and draw resources from deep in the soil.
- Crowns (tree tops) grow high above the ground, protected from most fires.
- Wide-open crowns inhibit the spread of fire.

Reading Tree Cookies:

- One year of growth is represented by a set of one dark and one light ring. To estimate the age of the tree, count *either* the dark or light rings.
- As you get to the center of the tree, the rings become less distinct and counting the tree rings becomes more difficult. At this point, you must estimate the number of tree rings in the center of the cookie.
- One way to estimate the age of a tree is to measure the number of rings inside one inch, and then multiply that number by the radius of the tree in inches.
- Narrow rings are caused by years of slow growth. Most common causes of slow growth are drought or competition from neighboring plants. Competition becomes more intense as the forest becomes more and more crowded.
- Wide rings are caused by years of fast growth when resources were plentiful.
- Trees can be damaged and scarred by fire, disease or trauma (e.g. getting hit by another tree, animals scratching the tree, humans removing part of the tree, etc.) If the damage does not kill the tree, the tree will heal the wound by adding new growth over the scar. This repairing growth is often slow (the tree rings are narrow) and it curves over the scar.

Activity

Section 1: “Fire Scars” Story

1) Hand out the story “**Fire Scars: the Story of a Ponderosa Pine**” by Pepper Trail to each student. Before the students read the story, examine the drawing of the tree cookie located in the upper left-hand corner on the first page of the story. As a class or individually, have the students answer the following questions:

Fire Scars



- Estimate the age of the tree by counting *either* the light or the dark rings.
Answer: about 50 years old
- Count the number of fire scars from medium-intensity fires. These are the wider, black rings.
Answer: 4 or 5. See teacher copy of story
- Identify the fire scar from the high-intensity fire.
Answer: see teacher copy of story
- Locate the layers of new growth that were “healing” the scar by growing over it.
Answer: see teacher copy of story

2) Show the class the **Fire Scar on Tree** photo to give them a visual image of a fire scar.

3) As a class or individually, have the students read “Fire Scars.” This reading could be assigned as homework. If you feel the students need additional support to understand the story, provide them with the “**Fire Scars**” **Timeline**.

4) Discuss the article. Ask the students the following questions:

- What were the important events in this tree's life?
Answer: Refer to the “Fire Scars” Timeline.
- How did fire differ before and after 1897?
Answer: Before 1897, fire was frequent but usually burned at low- or moderate-intensity. Fire left scars on the tree, but did not threaten its life. After 1897, smaller fires were regularly suppressed, which caused the forest to become overcrowded. This caused larger, hotter fires to burn infrequently. These larger fires threatened and eventually killed the tree.
- Why did people start putting out fires?
Answer: Fire threatens property and timber sales, and people are afraid of fire. This is a complex issue, so encourage creative responses.

Section 2: Fire-Scarred Tree Cookie

5) Divide the class into groups and allow them to examine the **fire-scarred tree cookies**. Ask them to find the large fire scar on the tree cookie, and identify the growth rings. Point out to the students where the tree started to heal the scar by adding growth over the scar.

6) Using their observations of the fire-scarred tree cookie, discuss the following questions as a class:

Fire Scars



- If the tree was cut down in 2012, when did the tree sprout?
Answer: About 1900 (about 110 years old)
- When did the tree experience the fire that left the large scar?
Answer: 1973 (Approximate answers within 5 to 10 years are acceptable).
- Why didn't the tree burn completely in the fire?
Answer: The fire was a moderate-intensity fire, which means it was not hot enough to burn the entire tree. Ponderosa pine trees have thick bark that can protect them from low- and moderate-intensity fires.
- Why are the tree rings narrower before the fire?
Answer: Years of limited resources (low rainfall, competition with neighboring trees, etc.) meant the tree grew slowly.
- Why are the tree rings thicker after the fire?
Answer: The fire released nutrients back into the soil, fertilizing the tree. The fire may have cleared some area around the tree, giving it more access to sunlight, water and space. All these things stimulated growth of the tree for several years.
- How will cutting down this tree harm or benefit the ecosystem?
Answer: Cutting the tree could harm the ecosystem because animals may lose a home and source of food, the tree will no longer produce oxygen, and the impact of the tree-fall could have harmed animals or plants. Cutting the tree down may benefit the ecosystem by freeing-up resources for neighboring plants. Also, thinning out the forests could reduce the risk of high-intensity fires. Cutting this tree down provided jobs for people in the community, and it can now provide learning opportunities for students.

Assessment: create a fire scar story

Display or give each student a copy of **Fire-Scarred Tree Facts**. (This handout is designed to be copied and then cut in half.) Using their own observations of the **fire-scarred tree cookies**, insight gained from the whole-class discussion, and the information from the fact sheet, ask the students to write their own story about the life of the fire-scarred tree.

Assessment Alternative

Instead of writing a story, create a timeline of events in the life of the ponderosa pine.



"Fire Scars" Story Timeline

- 1723: Tree sprouts
1732: First fire scar
1737: Porcupine eats the growing tip, causing the tree to grow crooked
1747: Fire scar from fire set by Native Americans
1754: Another fire scar
1755: A white fir sprouts nearby
1769: White fir burns hot and fire leaves a large scar
1770: Lots of growth
1784: Fire scar
1794: Fire scar
1800: Fire scar
1813: Fire scar
1816: Wounded by young grizzly bear
1829: Fire scar
1833: Fire scar
1841: Fire scar
1852: Gold prospectors visit forest
1854: Native Americans leave forest
1855: Cattle enter forest
1862: Fire scar
1866: Sheep enter forest
1870: Fire scar from fire set by miners
1883: Fire scar
1888: Loggers cut sugar pines in forest
1896: Intense fires leave large scar
1897: Regular fires stop burning in the forest
Note: Around this date, the U.S. Forest Service was formed and the agency began putting out as many fires as possible, as fast as possible.
1931: Cattle trample forest and invasive species introduced
1954: Forest becomes over-crowded, nearby fire put out by smoke-jumpers
Note: Around this date, the U.S. Forest Service started using aircraft to fight fire.
1975: Government timber sale, tree spared because of crooked trunks (makes poor lumber)
Note: Around this date, timber sales constituted a huge portion of the regional economy.
1976: New plants sprout in the forest.
1986: Part of the tree dies from drought and competition in over-crowded forest, fire catches the tree but is put out before it kills the tree
2001: Large fire kills tree



Fire-Scarred Tree Facts

- This tree was cut down in 2012 as part of a forest restoration project in the Ashland Creek watershed, near Ashland, Oregon.
- The tree was cut down because the forest had grown overcrowded and this tree was growing too close to other ponderosa pines. The tree was removed in order to allow another nearby tree to gain more access to sunlight, water, and space. Access to these additional resources will hopefully enable the other tree to grow to maturity.
- The lightly colored, oval spots on the tree cookies may have been caused by damage from pine beetles.
- The fire that scarred the tree burned in 1973.

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