



Fire at Lava Beds National Monument

Overview

Students will learn about fire ecology and western juniper management at Lava Beds

California Science Standards

Grade 3: 3.b.c.d.-L.S.

Grade 4: 3.b.-L.S.

Grade 7: 7.c.-I&E

Oregon Science Standards

Grade 4: 2L.1

Grade 5: 2L.2

Grade 6: 2L.2, 4D.1

High School: 2L.2

National Standards

Content Standard A:

Scientific Inquiry

Content Standard C:

Life Science

Materials Included

* Student Journal

Material Needed

Activity Time

Preparation: 20 min.

Activity Time: 1 hour,
30 min.

Best Season

Spring/Summer

Vocabulary

* Habitat

* Fire suppression

* Prescribed fire

* Mechanical thinning

Grade Level: 3rd-8th (O.S.S 4th-6th, & 12th) (C.S.S: 3rd, 4th, & 7th)

Learner Objectives

Students will:

- Learn about fire ecology
- Learn about fire as a management tool at Lava Beds
- Conduct a site visit at the north end of park

Background Information

Wildfire is a natural disturbance process that in many ecosystems is needed for maintaining healthy plant communities. Regularly occurring fires help to maintain a healthy mix of plant species, age classes, and structural variability within fire adapted ecosystems. Wildfires also help to recycle nutrients back into soils and allows sunlight to reach growing seedlings, thus maintaining the health of the overall habitat.

Wildfire is an important disturbance for the ecosystems of the Basin and Range Region. Basin and Range sagebrush steppe habitats were maintained and enhanced by fires that burned every 10-50 years in many areas. Sagebrush vegetation has adapted to survive, reproduce, and establish following wildfire. Enhanced flowering, sprouting from underground tissues, and prolific seed production are fire related adaptations of the native grasses, herbs and shrubs associated with sagebrush steppe plant communities.

After European settlement in the Basin and Range Region near the turn of the 20th century wildfires were actively suppressed. This has resulted in plant species composition and structural conditions that are different than what historically characterized the region's sagebrush steppe habitats. Fire suppression has led to the encroachment of western juniper and invasive cheatgrass into sagebrush steppe habitats. Although juniper is native to the Basin and Range, fire suppression has caused this species to drastically increase its range within the region. When fires are suppressed, plant material builds up causing future fires to burn with too much heat, and the benefits of the fire are lost.

Historically, wildfires regularly burned in the area that now makes up the Lava Beds National Monument. As a result of fire suppression Junipers have pushed north into the Monument's sagebrush steppe habitats, out

Lesson Plan

competing big sagebrush for space and resources. As a result, wildlife such as the pronghorn and Sage Grouse, that require open grassland and sagebrush steppe habitats, no longer seen occur at Lava Beds National Monument.

Lava Beds National Monument land managers are using fire, along with mechanical thinning, as a management and restoration tool. Thinning is used to remove western junipers from areas where they did not historically occur. Prescribed fire, fire that is intentionally started by land managers, is also used to reduce junipers. These controlled burns restore grassland and sagebrush steppe habitats to their historical conditions by reintroducing the natural disturbance regime of this area. As of August 2008, Lava Beds National Monument land managers have burned or mechanically thinned nearly 600 acres at the northern end of the monument.

Land managers and science organizations are also monitoring the effects of wildfire, prescribed fire, and juniper thinning on the ecosystem in the Monument. By researching the effects of fire, land managers better understand how to use fire as a tool to help restore native habitat conditions and native animals, such as the Sage Grouse, to Lava Beds National Monument. Researchers found that junipers at Merrill Cave were killed by spring prescribed fires and that understory vegetation positively responded. A study conducted by the Klamath Bird Observatory found Rock Wrens and Brewer's Blackbirds, species that prefer open and disturbed areas, in greater numbers in burned areas than in adjacent unburned sites.

Getting Ready!

1. Read the background information.
2. Make copies of the *Student Journal: Fire at Lava Beds National Monument*.

Discuss!

1. Ask the students how they feel when they hear the word fire. Do they view it as helpful or harmful and why?
2. Ask students if they know what is needed for a fire to occur. Share with students the fire triangle: Oxygen+Fuel+Heat=Fire.
3. Brainstorm with the class natural and manmade causes of fire. (You may receive answers like lighting or campfires that have not been properly put out.)
4. Ask the students if they think fires can be beneficial to an ecosystem.

Lava Beds National Monument Sites To Visit

North End of Monument - Wildfires

1. Gillems Camp
2. Canby Cross
3. Captain Jack's Stronghold
4. Devils Homestead Flow
5. Black Crater Road

South End of Monument - Prescribed Fires

1. Caldwell Trail Parking Lot
2. Bunchgrass Trail
3. Crescent Butte
4. Hippo Butte



Photo by Dave Larson, NPS

Sagebrush Steppe

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5. Share with students background information on fire as a natural, helpful process for maintaining natural landscape conditions. Discuss how low intensity fires can be beneficial to sagebrush steppe communities, while high intensity fires do not contribute to ecosystem health.
6. Ask students to brainstorm what would cause a high intensity fire. (*The build up of plant material provides fuel for fires, the more time between fires the more material builds up and the hotter the fire.*)
7. Discuss the historical role of fire at Lava Beds.
8. Discuss the current management strategy for managing western juniper and restoring grassland and sagebrush habitat at Lava Beds.

Investigate!

1. Tell students that they will be going outside to conduct an experiment on wildfires!
2. Divide students into four groups that will model four different wildfire scenarios.
3. **Safety Tip** - This activity should be done outside on a blacktop or concrete surface free of debris
4. Group 1 will represent a pristine sagebrush steppe. Group 2 will represent a sagebrush steppe habitat with mild western juniper encroachment; Group 3 will represent a sagebrush steppe habitat with moderate juniper encroachment; and Group 4 will represent an area where western juniper and cheatgrass has displaced the sagebrush.
5. Each group should get a roasting pan, modeling clay, matches, some shredded newspaper, and water.
6. Matches will represent western juniper and the shredded newspaper represents the sagebrush and native grasses.
7. Have students press the clay into a thin layer in the roasting pans.
Group 1: Will have 3 matches and shredded newspaper. (Have students arrange the shredded newspaper into small clumps to represent big sagebrush.)
Group 2: Will have 10 matches and shredded newspaper.
Group 3: Will have 20 matches and shredded newspaper.
Group 4: Will have 40 matches and very little newspaper.
Have all groups arrange matches and newspaper randomly on the clay surface.
8. Have students watch and record observations while the teacher starts a wildfire by dropping a match into the pan.
Students should record how much of the habitat burned, how long it took for the fire to go out and the intensity of the fire in



Photo by Dave Larson, NPS

Western juniper encroaching onto sagebrush steppe.

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the Student Journal.

10. Afterwards, discuss with the class which pan created the most rapid fire and why. Think of the fire triangle in this discussion.

Go Outside!

1. Pick a burned and unburned location at Lava Beds where students can walk around and observe juniper woodland and sagebrush steppe to make an habitat comparison and contrast.
2. Pass out copies of the *Student Journal: Fire at Lava Beds National Monument*
3. Have the students walk around both the burned and unburned habitat locations and make observations of any and all western juniper trees, sagebrush, other vegetation, and wildlife and record, them on their student journal.
4. When they have finished comparing/contrasting the two habitats, gather the students together and go over their findings.
5. Visit areas of the park that have experienced fire in different years to see the natural succession process.
6. Plan to revisit these locations in subsequent years as more prescribed fire has been implemented. You should be able to monitor changes in juniper numbers over the years as well as other vegetation and wildlife changes.

Follow-up!

1. Ask students 2-3 questions to re-cap the lesson (see right panel).

Suggested Questions

Why is fire an important aspect of Lava Beds?

What is the purpose of prescribed fire?

What are two ways western juniper is being managed at Lava Beds?



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