SCIENCE

Cultural Burning

ESSENTIAL UNDERSTANDINGS

- **Since time immemorial**
- **Lifeways**

LEARNING OUTCOMES

Students will be able to:

- **Define cultural burning**
- **Explain the purpose of cultural burning and ways that cultural burning supports the health of an ecosystem**

ESSENTIAL QUESTIONS

- **What is cultural burning?**
- **How does cultural burning benefit the forest?**
- **Why is cultural burning important to Native American communities?**

LOGISTICS

- **Where does the activity take place?**
  Classroom, as well as a large open area, either indoor or outdoor, for activity 2.
- **How are the students organized?**
  ☒ Whole class ☐ Teams: 2 – 4
  ☒ Pairs ☒ Individually

TIME REQUIRED

Two and a half hours

Overview

In today's world of increasingly frequent catastrophic wildfires, it can be hard to think of wildfire as beneficial. However, Indigenous people have used controlled burning for thousands of years to reduce the risk of catastrophic fire, enhance access to food and plant materials, and sustain healthy and resilient ecosystems. Such practices are referred to as "cultural burning" due to their importance in many Native American cultures.

This lesson will introduce students to the role of cultural burning in traditional Indigenous land management practices and to actions the Confederated Tribes of Siletz Indians, and many other Tribes across North America, are taking to revive and expand this important practice on Tribal, state, and federal lands. Students will explore the topic of cultural burning through a classroom game, discussion, and data interpretation activity.

Background for teachers

Fire, in the form of managed or controlled burns, plays a major role in Indigenous land management practices and has for millennia. Through careful experimentation, Native people have learned over time how to use low-intensity fires to safely create

places that can sustain the food and materials they need to survive. Native American people from all over Western Oregon have developed an understanding of which times of year are best for controlled burning, where to light fires, and how much area to burn. They have learned from experience and observation how important species of plants and animals will react to fire and how fire impacts the greater landscape and ecosystem.

Historically, Indigenous people used controlled burning to preserve the prairies and meadows where deer and elk liked to graze and to generate more open and less crowded forests that made hunting easier. The use of fire was so important for hunting that when controlled burns were outlawed by state and federal land managers, Native hunters often complained about the difficult hunting conditions due to the new land management system of fire suppression.

Controlled burns also helped create ideal conditions for harvesting basketry materials and plants. For example, the best hazel sticks for baskets are the straight new growth that comes up after a patch has had a controlled burn. Many plant foods also rely on fire to be at their healthiest and most productive. Burned oak groves produce acorns with fewer insect infestations, while tarweed (a nutritious seed) is covered with a sticky pitch that must be burned off to be collected. Native people used controlled burning to create a healthy set of ecosystems capable of sustaining the foods, medicines, and materials they needed to survive.

STANDARDS

Oregon science standards

2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitats.

- **Connections to Nature of Science -** Scientific knowledge is based on empirical evidence: Scientists look for patterns and order when making observations about the world.
- **W.2.8 -** Recall information from experiences or gather information from provided sources to answer a question. (2-LS4-1)
- **2.MD.D.10 -** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems.

K-2_ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Oregon English language arts standards

W.2.8 - Recall information from experiences or gather information from provided sources to answer a question. (2-LS4-1)

The benefits of controlled burning extended far beyond Native American communities. Over thousands of years, Indigenous peoples in Western Oregon created a set of ecosystems that relied on frequent managed burns, fostering a web of relationships between animals, plants, and people dependent on fire. The list of interconnected relationships was endless: butterflies that relied on certain flowers flourishing in carefully maintained meadows, animals that sought nutritious food at managed oak groves, plants that relied on fire to release and spread seeds, and even salmon that benefited from the cooled water temperatures caused by burns that were timed to coincide with the fish runs. Fire was a crucial element of ecology throughout Western Oregon and much of the rest of the Pacific Northwest.

As Tribal people lost control and ownership of the land, their ability to set beneficial fires was also taken away. Private landowners and government officials managing the checkerboard of private, state, and federal forests saw fire as a threat, especially to the timber industry. Federal and state governments ultimately outlawed controlled burns and assigned wildland fire crews to suppress all naturally started fires. More than a century of fire suppression by state and federal authorities has disrupted the carefully crafted relationships developed by Indigenous peoples, creating overgrown, crowded, brushy forests that are much more vulnerable to the large destructive forest fires that plague much of the West today.

MATERIALS

- Cultural Burning_Slide Deck
- (1) Red bandana, rope, tape, or necklace
- (4) Green bandanas, rope, tape, or necklace
- (25) Blue bandanas, rope, tape, or necklace

VOCABULARY

Benefits – A positive (good) result from doing something.

Cultural burns – A special type of controlled burn designed to encourage ecosystems that Native people rely on for social, spiritual, and physical health.

Collaborate – To work together.

Dependent – Something that relies on someone or something else.

Fire suppression – Trying to prevent all fires from starting or spreading.

Increase – To become or make greater in size, amount, intensity, or degree.

Rejuvenate – To restore to a condition characteristic of a younger, healthier landscape.

Prescribed fire/controlled burn – All-inclusive terms for managed and controlled fires lit by people on purpose to create a benefit.

After nearly a century of trying to control and eliminate all fires, some people in federal and state government and natural conservation fields are realizing that Native peoples have generational knowledge and experience that is important in creating healthy forests that are not as prone to huge, catastrophic fires. Through co-management agreements and partnerships, Tribes are involved in the planning process for creating healthier forests and landscapes. The Confederated Tribes of Siletz Indians participates in some of these efforts on lands in Western Oregon that the Tribe helps to manage, and some Siletz Tribal members are doing the research and outreach needed to bring fire back to the land in a safe and healthy way.

References

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Clarke, C. (2016, October 21). Here's how Native knowledge could help save salmon. *Tending the Wild* (series). KCET. **https://www.kcet.org/shows/tending-the-wild/heres-how-native-knowledge-could-help-save-salmon**

David, A. T., Asarian, J. E., & Lake, F. K. (2017). *Can summer wildfire smoke reduce peak water temperatures in the Salmon River, potentially benefiting cold-water fishes? A preliminary analysis.* Prepared for the Klamath Tribal Water Quality Consortium by Riverbend

ADAPTIONS FOR DISTANCE LEARNING

With limited focus time, what is the most valuable student information?

It is important for students to understand that the use of cultural burning has many benefits for the land, animals, and people as well as helping to prevent severe wildfires.

What are the core Tribally focused concepts?

Cultural burning is an effective land management system, and Tribes can help create healthy ecosystems in which all animals and people thrive.

What needs to be synchronous/asynchronous?

Activity 1 can be asynchronous, while activities 2 and 3 should be synchronous

Sciences with assistance from the U.S. Fish and Wildlife Service Arcata Office and the U.S. Forest Service Pacific Southwest Research Station. **https://klamathwaterquality.com/documents/DavidAsarianLake_SmokeTempsSalmon_20170922_final.pdf**

First Nations Emergency Services Society of British Columbia. *Revitalizing cultural burning: Integrating Indigenous cultural values into wildfire management and climate change adaption planning* (Infographic). **https://www.fness.bc.ca/downloads/shackan-infographic-for-web.pdf**

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Lelande, J. M., & Pullen, R. (1999). Burning for the 'fine and beautiful open country': Native uses of fire in Southwest Oregon. In R. Boyd (Ed.). *Indians, fire, and the land in the Pacific Northwest* (pp. 255–276). Oregon State University Press.

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Considerations for teachers

Assessment

Students will engage in a substantial amount of discussion with partners and the whole class. The teacher should actively monitor student discussion for correct understanding and should intervene when there are misconceptions or biases.

Practices

- *Classroom discussion* – Large group, whole class discussion allows students to express their thoughts and hear the thoughts of others. For the instructor, this practice is a good way to take the pulse of the group and see what general themes emerge. For students, large group discussion can be a way to express themselves or to hear differing perspectives.
- *Small group activities/discussions* – Small group activities allow students to share and analyze ideas with one, two, or three other people. This practice can be good for students who do not want to share their ideas with the whole class and/or who may be afraid of others' reactions. The teacher should monitor small group discussions to determine the degree to which students understand the concepts.

Learning targets

- I can define cultural burning.
- I can explain the purpose of cultural burning.

Appendix

Material included in the electronic folder that support this lesson is:

- Cultural Burning_Slide Deck

Activity 1

What is cultural burning?

Time: 45 minutes

Say:

Lately, fire has been on many people's minds. Every summer, it seems like huge forest fires are becoming more and more frequent throughout Oregon and other parts of the West. Forest fires today are scary. They burn close to homes, make it difficult to breathe, and destroy valuable habitats for animals, plants, and fish. The warmer, dryer climate is playing a big role in fueling all these new fires. But the way people live and interact with the forest also has a big impact on the health of the trees, the types of plants that grow, and how easily a huge scary fire can start.

Ask:

Do you remember anything about the forest fires we have had in the past few years? Have you ever wondered why the fires are so big?

Say:

Thanks for sharing! The types of forest fires we are experiencing in recent years are actually related to the ways people interact with the forest. Before settlers moved into Oregon and forced Native American people away from the land 160 years or so ago, Native people actually used fire as a tool to help protect forests from those big destructive fires. Native people lit small fires that burned up brush on the ground and kept the forest clear and open—less likely to turn into huge forest fires. Let's think about why this might be.

Activity 1 *(Continued)*

Ask:

Why do you think small-scale fires each year would help protect forests?

> **Key point:** Low-scale fires prevent fuel, such as brush and fallen trees, from building up, while still leaving mature trees unharmed. Managed fires are done by experienced adults who know how to conduct low-scale fires in a way that keeps everyone safe. Remember: Fire without adults is dangerous!

Say:

Great ideas! We talked about how small fires can actually protect the forest from big scary fires. Native people have always known this, but the people in the government who took over control of forests from Native people didn't believe them. They thought that it was best to suppress—or keep down—fires. They passed laws that made it illegal for Native people (or anyone else) to light fires. It seems a little strange, but by suppressing the low-intensity fires that Native people used to manage the land, non-Native officials actually helped create the conditions for the big destructive fires that we see today. Stopping small fires causes brush and fallen trees to build up in the forest, and that is fuel that causes fires to turn into huge destructive forest fires that can burn whole areas to the ground.

Ask:

Why do you think federal and state land managers didn't listen to Native people about the importance of fire?

> **Key point:** State and federal land managers thought they were more knowledgeable than Native people and more technologically advanced; these land managers were primarily interested in the monetary value of lumber and did not prioritize overall ecosystem health.

Activity 1 *(Continued)*

Say:

Thank you for sharing! When Native people stopped being able to burn, it was harmful to the forest. This means it was also harmful to the people, whose way of life was connected to the forest. Native people relied on fire to create the types of food and materials they needed to survive and carry on their way of life. When the government made it illegal to light fires, it became more difficult to hunt and fish, more difficult to gather foods like acorns, and harder to collect materials for baskets. People also call controlled fires "cultural burns" because they are an important part of Native culture.

Say:

Fire is so important that today many Tribes are working to revitalize cultural burning. They are working with federal land managers and teaching them how important it is to use fire in a safe and useful way. Today, we are going to learn more about the importance of fire to the Confederated Tribes of Siletz Indians.

Step 1

Ask students to match the terms with the pictures on slide 2 of the PowerPoint.

Say:

First, let's play a little game to help remember what we've talked about so far. Let's look at these pictures and see if we can match these terms to the images. I would like you to first take a silent moment to yourself and think about which term matches which picture. Then, we will share with our think-pair-share partners, or shoulder partners, about which term matches which image. I am going to read the terms out loud. As I read them, think about which image matches each term.

Activity 1 *(Continued)*

Say:
First term: "wildfire." Now, think silently about which image is showing a wildfire. Second term: "fire suppression." Think silently about which image is showing fire suppression. Third term: "cultural fire." Think silently about which image or images show cultural fire.

Say:
Now, share with your shoulder partner which term matches which image and explain why you think so. When you and your partner have come to an agreement, find another pair to share your answers and reasoning with. If you have different answers, explain your reasoning and talk it out. After sharing, find another partner pair you haven't shared with yet. Repeat this process until you have talked with three partner pairs.

Allow partners a few minutes to discuss their answers with each other. Once all partner pairs have agreed which term matches each image, allow all partner pairs to find another partner pair to share their responses. Walk around the room, check for understanding, help facilitate the discussion about their thought process, and answer questions without giving any answers. After a few minutes, bring students' attention back to a whole group discussion and have students take their seats.

Say:
Now I'm going to read each term again. When I call on your pair, please tell me which image matches the term and explain your reasoning.

Call on a pair to share their answer, and then ask for any pairs who would like to further discuss the first pair's choice and respectfully agree or disagree. Continue this for each of the terms, allowing for the whole class to discuss each term and its appropriate matching image.

Activity 1 *(Continued)*

Step 2

Say:

Now that we have a pretty good idea of how fire is used for different purposes, we are going to think about how cultural fire was used by the Confederated Tribes of Siletz Indians to benefit the land, people, plants, and animals.

Show the video "Good Fire, Cultural Fire: A Discussion of Indigenous Fire Science" (**https://youtu.be/dq3objj3w5w**). While students are watching the video, have them think about all the ways the Confederated Tribes of Siletz Indians used fire. After the video, have students tell their partners all the ways they saw fire used, and if they can explain why fire is good for the land, people, animals, and plants. After sharing with their partner, call on students to share out in a whole class discussion about how fire was used.

Say:

In the video, we learned that all living things are fire dependent, or that they need fire for the benefits it provides. Healthy fire—good fire, cultural fire—is a specific type of fire used during specific times of the year and in specific places. On the screen there are two questions. I would like you to first think silently about your responses, then share and discuss with your partner.

Ask students the following questions, displayed on slide 3:

- How did the peoples of the Confederated Tribes of Siletz Indians use fire to maintain their environment?
- What is the consequence of not using cultural burning practices?

For each question, ask students to think silently about their response and then think-pair-share with their partner. After all partners have had a chance to share their responses with each other, conduct a whole class discussion.

Activity 1 *(Continued)*

Say:

First question: How did the peoples of the Confederated Tribes of Siletz Indians use fire to maintain their environment?

> **Possible answers:** Fire is "how we relate to the landscape;" use of fire by people has shaped the ecosystem; importance for basket materials; treating the plant with heat helps to keep it healthy by killing insects, thickening the bark; having ash on the ground helps the soil; importance in ceremonies and dance houses; importance for producing medicines; importance for producing healthy foods.

Follow up with student responses as a whole class and share some possible answers that have not been shared.

Say:

Second question: What is the consequence of not using cultural burning practices? Again, please think silently about your response and then share your response with your shoulder partner.

> **Possible answers:** Severe, out-of-control wildfires; severe fires that kill plants and trees; doesn't allow important plants to grow their healthiest, such as plants used for food or basket materials; affects the vegetation that wildlife eat; potentially destroys or damages homes.

Again, follow up with student responses as a whole class and share some possible answers that have not been shared.

Activity 2

Wildfire tag

Time: 45 minutes

Say:

OK, let's play a game. This game is called wildfire tag. I'm going to choose someone to be the fire, and their job will be to run and tag as many trees as they can, making them a part of the fire. The person tagged will join hands with the person who tagged them, and we will see the wildfire grow. But I'm also going to choose four students to be firefighters who will be trying to save trees from wildfire. When a tree is saved, they will join hands with the firefighter, creating a line of saved trees—or what is called a firebreak. When the are no more trees to burn, the wildfire will be contained and will burn out. When the fire is stopped, all the trees standing will represent how new trees grow. This will help us see how fires burn trees, how trees can be protected from fire, and how trees grow back.

Directions for wildfire tag

This game is played in three rounds and is designed to help students grasp the way that prescribed fire can help make forests more resilient to destructive fires.[1]

Round 1

1. Select five students from the class and pull them aside. Assign one of them to be the wildfire and put a red necklace on that student.
2. Assign the other four to be wildland firefighters and put green necklaces on them. Give each firefighter five blue fire-protection necklaces.
3. Have the rest of the class scatter to different parts of the play area and stand still; they are trees in the forest. Have them spread out their arms like branches.

[1] This game has been adapted from Table Rock curriculum: **https://www.blm.gov/or/resources/recreation/tablerock/files/Fire_Tag.pdf**

Activity 2 *(Continued)*

4. Ask the wildfire student to stand in the middle of the playing area and have the firefighters stand around them. The game starts when the teacher yells, "FIRE!"
5. The wildfire student grabs the hand of a tree student, and the tree then becomes part of the wildfire. Now the two of them run together, holding hands, to grab another tree, causing the fire to build and spread.
6. Firefighters try to protect the trees by putting blue fire-protection necklaces around the trees' necks. Firefighters can only protect trees that haven't been caught by the wildfire. When a tree receives a necklace, it must join hands with other protected trees to make a "fire line" (a natural or human-made line of protection that the fire cannot cross).
7. When the fire runs out of fuel (tree students), it burns out. At this point, the wildfire students should drop their hands and stand in place. These students now represent new trees that have sprouted in the burned soil. In time, these young trees will eventually become a new forest.

Round 2

Ask students to switch roles.

Say:

Now we are going to change the game a little bit to try and represent the way that controlled burns can help protect forests." Bring out five extra fire-protection necklaces. This time, the firefighters are able to pick five trees to protect before the fire begins. This is a cultural burn area, an area that has been protected with a fire set by people that has burned off the brush and small trees that help fire spread.

Follow the instructions above to play the game again. Then ask students to compare how quickly and where the fire spread when some parts of the forest started out with fire protection necklaces.

Activity 2 *(Continued)*

Round 3 (optional)

This time, lay a string or ribbon across the middle of the play area. This represents a natural fire line, such as a river or a road. Explain that the fire group cannot cross the line until they reach a certain size (suggest 5 or more). Again, let the firefighters do a cultural burn to protect five trees of their choice, after considering how the natural fire line might help them.

Follow the instructions above to play the game again. Then ask students to compare how quickly and where the fire spread when natural and human barriers work together.

Say:

Great work everyone! We played this game to think about the way fire spreads and how cultural burning helps protect forests. Let's think together about what you noticed while playing the game.

Discussion questions

- How did the cultural burning provide protection for the trees in round two?
- How did the firefighters decide where to put the extra necklaces representing the prescribed burn?

Activity 3

Native scientists

Time: 45 minutes

Overview

This activity highlights how Tribes are using their cultural knowledge to interact with scientists and other non-Native land managers. In this activity, students will analyze data collected by Tribal researchers to understand the benefits of controlled burning for basket makers.

Say:

Tribal people have lived in Oregon since time immemorial—a very long time! And they have been passing down knowledge about cultural burns within their families and communities. That means the older people teach the younger people.

Ask:

Lots of people learn skills and information from their families or community. Think about your own life: What lessons or abilities have you learned from your family or community?

Say:

Thank you for sharing! We learn lots of information at school but we also learn a lot about how to live in our homes and community around us. In recent years, Tribal people have also started studying cultural fire using scientific tools. Studying cultural fire scientifically helps to convince the government to take the knowledge of Native people seriously and give Tribal people a bigger role in managing the land.

Ask:

What is the job of a scientist? How might a scientist study fire?

Activity 3 *(Continued)*

Say:

Thanks for sharing your thoughts! Scientists collect data—or information—when they want to find an answer to a question. They collect data by observing and recording information about the world around them. I want to share a study that Yurok and Karuk scientists did in Northern California to measure how controlled burns affect the ability of weavers to gather basket materials. Native people have always known that cultural burns help make the best hazel sticks to weave with by stopping the plant from getting too bushy and having too many crooked limbs. These Native scientists went to three different types of areas: gathering places that hadn't been burned, gathering places that burned in an uncontrolled forest fire, and gathering places that were culturally burned. Then they counted the number of good sticks for weaving that people were able to find at each place.

Ask:

Let's make a hypothesis and guess what happened. Which spot do you think had the most sticks that weavers could collect in three hours? Why do you think that?

Say:

Thanks for sharing your guesses (or hypotheses)! I'm going to share some data from the actual study and we're going to see if we were right …

*In 200 minutes of gathering, weavers collected only 50 sticks from the unburned area, 200 sticks from an area burned by an uncontrolled fire, but **350 sticks (!)** from areas with controlled burns.*

NOTE: The entire study is available online: **https://fireecology.springeropen.com/articles/10.1186/s42408-021-00092-6.**

Say:

Sometimes data can be easier to read if we put it in a graph—a picture that shows numbers. Let's do that with these numbers. We'll have three bars to represent the three different types of places.

Work with students to collaboratively construct a simple graph on a classroom writing surface. Prompt students to help label each part of the graph, making the y-axis represent the number of sticks that each weaver found after three hours and the x-axis represent the

Activity 3 *(Continued)*

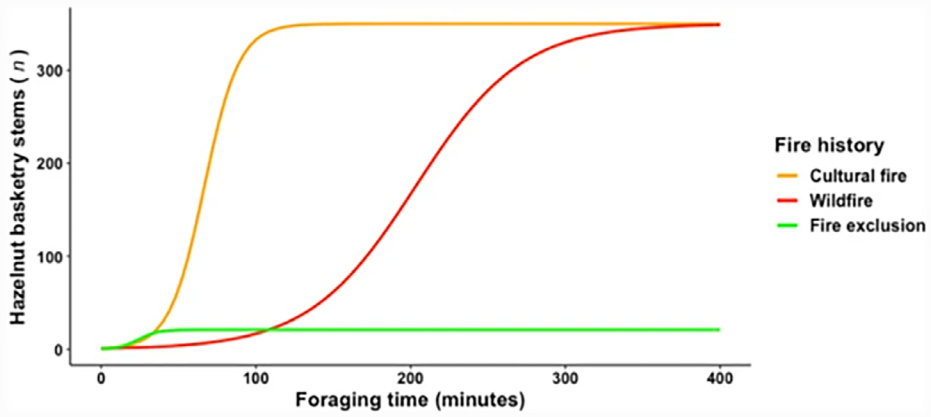
three kinds of burn areas. Ask students if the information is easier to understand in graph form. If so, why?

Next, show slide 4.

Say:

The study that this data is from is actually a little more complicated. It measures both the time spent gathering and the number of sticks found. This is more complicated math that kids typically learn in older grades, but I want to show it so you can see a more complex way of showing information. The yellow line shows us what happens in areas where cultural fire is used. You can see that weavers can find lots of good sticks really quickly. The red line shows us what happens after a wildfire that severely burns all plants and trees. Although it takes a longer time to regrow due to the bad burns, weavers can eventually gather the same number of hazel sticks in these areas—it just takes longer. And the green line shows us that when we suppress fires, there is hardly any growth for the basketry sticks. No matter how long weavers search, they never find as many usable sticks as in the other areas.

Fig. 9



Fire history and hazelnut basketry stem gathering rates modeled as logistic functions in Karuk and Yurok territory, northwestern California, USA, from 2015 to 2019. Foraging time includes travel and gathering time for stem harvesters. Gathering rates are based on average rates observed in 22

Activity 3 *(Continued)*

Give student time to examine the graph, then lead a discussion about how the bar graph the class developed fits into the story told by the more complex graph.

Say:

Thank you for working so hard! We learned that Native scientists sometimes use scientific tools to show non-Native scientists how important the knowledge in their community is. You used graphs to show how important cultural fires are to making sure that there are enough weaving materials for Native people who want to make baskets.

Activity 4

Reflection/closure

Time: 15 minutes

Overview

Sum up the lesson by having students share the benefits of cultural burns.

Say:

Now that we have examined all the different ways fire can be beneficial to the land, plants, animals, and people by using cultural burning techniques, I would like you to each share one benefit of cultural fires.

Students can share with their shoulder partner, or each student can share one benefit with the whole class.