

LESSON #5:

FIRE BEHAVIOR — FIREFIGHTERS, FUEL LOADS, PRESCRIBED BURNS

GRADES:
3-5

TIME REQUIREMENT:
40-60 minutes or longer

STANDARDS:
Science Standards for Alaska and NGSS:
3-LS4-3, 3-LS4-4, 3-ESS3-1,
3-5-ETS1-2, 5-ESS2-1, 5-ESS3-1

Alaska Content and Performance Standards:
Geography: A-2, A-4, A-5, A-6, B-8, C-1, C-2, C-3, E-5, E-6, F-2, F-3

Alaska Cultural Standards:
A-4, E-2

OVERVIEW:

Small groups work to control fire for specific habitats and conditions.

MATERIALS NEEDED

- Forest fire grid: fabric gameboard with number and letter columns
- Tree/fire tokens
- Water/dead wood tiles
- Firefighter tokens
- Yellow "protected" discs

LEARNING OBJECTIVES

The student will:

1. Model prescribed burns and controlled forest fires
2. Play the role of wildlife managers by practicing decision-making skills and designing solutions for managing wildfire and habitat
3. Demonstrate understanding of the role of rivers and manmade fire breaks in wildfire management
4. Explain that different animals thrive in different habitats and that wildfire creates new habitat for some creatures

ASSESSMENT

Students can:

1. Model a prescribed burn and controlled forest fires by accurately advancing the model fire in all five scenarios A-E.
2. Use decision-making skills relevant to managing wildfire and habitat by placing model fire fighters and fire breaks in four scenarios B-E.
3. Identify the two points that fire can jump the river in scenario A and developing feasible solutions in scenarios C and E.
4. Identify animals that thrive better in a post fire habitat than in a mature forest and describe how a forest fire can improve/increase habitat for those creatures.

ACTIVITY STEPS

1. Open a discussion with the students about the importance of different kinds of landscapes for different plants and animals. Introduce the idea of wildlife management

“We’re taking a look at how fire can help make different types of habitats for animals. You are going to be the wildlife managers for a section of land. You want to be sure that there is good habitat for all kinds of animals. Right now the land is covered by a thick forest of trees. As a wildlife manager, you will use fire to help make different kinds of habitat.

What are some animals in Alaska that need different habitats? What are some of those habitats? *Solicit different student ideas.*

2. Have the students set up their own boards and prepare to follow through the five scenarios below.

A. Prescribed Burn

“You have been asked to set up a prescribed burn on a small section of the forest. A prescribed burn is a fire that is intentionally set and then carefully watched. Prescribed burns allow wildlife managers to create habitat for different kinds of animals. What happens if you start a fire in H1?

Students should set up their boards following the patterns below. There is a large version of the template in the material at the end of this lesson. Help the students realize that the fire will jump the river at I2 to J3 (step 3); H5 to F6 and C5 to D6 (step 7); and J8 to I9 (step 9).

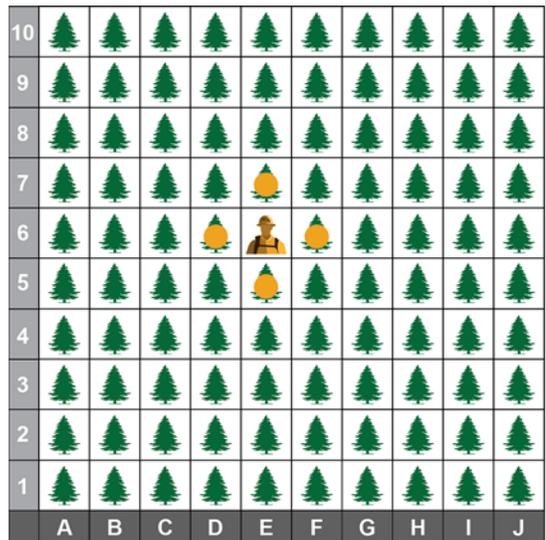
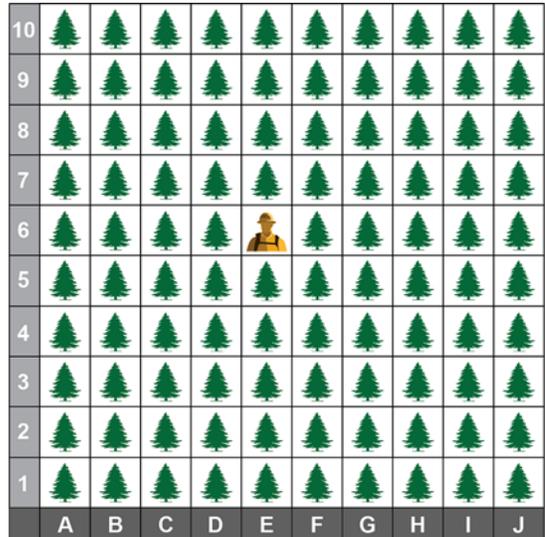
10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
	A	B	C	D	E	F	G	H	I	J

B. Firefighters

“You realize that you need firefighters to help you manage the burn. When you put a firefighter on a square with a tree, that square will not burn. A firefighter can also protect up to four other squares, but those squares must touch the square they are standing on, either directly or diagonally. Place a yellow chip on top of a square to show that it is protected. If there is a wood, tree, house or water marker in the square, put the chip on top of or under the token.

How many firefighters will you need to safely burn all the area South of the river? Where do you put them?

Solicit student answers; two firefighters at J3 and D6 will stop the burn. If the students put firefighters below (South of) the river, not all the trees in that section will burn.



C. Fire Break

“Your test burn is successful and new growth is coming into the area. Moose are eating the new shoots and birds are eating the bugs that come to pollinate the flowers of the new growth. You are asked to manage a new piece of land, one that does not have a river. However, you do have access to a bulldozer that can plow a strip of land down to rocks and soil. This is a type of fire break. You have been asked to conduct a prescribed burn that is big enough to cover 10 squares, but ONLY 10 squares. Where will you cut the fire break?”

Facilitate student discussion about possible options. One option is to block out row 2, 9, or column B, or I.

D. Lots of Dead Wood

“As a forest matures the trees grow taller and shade the space beneath them. Fewer young plants and flowers can get enough light and nutrients to grow. How do you think this would affect the animals we talked about earlier?”

Guide the students in reasoning that the mature forest would no longer be good habitat for those creatures so they would be likely to move to better habitat.

“Place dead wood tokens a on squares D5, D6, D7, E6, E7, and F7. Place trees on all the remaining squares. This is a different part of the forest, one which hasn’t been allowed to burn for a long time. As a result, there is a lot of dead wood on the

ground, which acts as extra fuel for a fire, making the area very flammable.

A fire in these areas spreads farther in the four directions surrounding it. The gray squares have lots of dead wood in them-- they have too much fuel. When a fire burns in a forest with this much dead material, firefighters have to be extra careful.

“You are asked to burn this space with too much fuel, but only the squares with dead wood. How many firefighters do you need to keep it safe? Where will you put them?”

Facilitate student discussion about possible options. It will probably require at least four firefighters.

10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
	A	B	C	D	E	F	G	H	I	J

E. Wind and Weather

“Fire fighters often have to think about the weather where they are going to fight a fire. What are some types of weather than

affect forest fires? What is the difference between a rainy *day* and a rainy *climate*? What kinds of climates are more likely to have fires?"

"One condition that can be especially important in forest fires is wind. Going back to the fire triangle in Lesson 2, how might wind affect fires? We're going to experiment with wind on our forest boards. Fill your boards with trees."

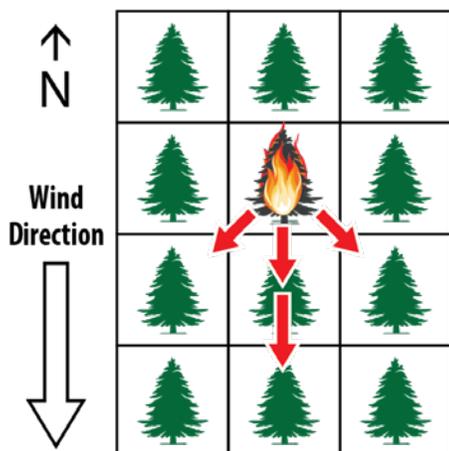
"The burning rule for wind is two squares in the direction that the wind is *coming from*, one square to each side, and no squares against the wind burn. For example, if there is a strong wind coming in from the North (the top of the board), and a tree is burning, two squares to the South, one square each to the Southeast and Southwest catch fire, and no squares to the North catch fire."

Have the students start fires at the top row of the board (be sure to have at least one group start from each corner) and compare the effects and progress of the fire as it starts from different positions.

Afterwards, have the students discuss their theories about wind and fire.

CLOSING DISCUSSION

Forest fires are one way to manage wildlife habitat. What are some potential positive or negative consequences of using fire?



EXTENSION

Larger Areas

“Cover squares B8-H8, B7-H7, B6-H6, B5-H5, G4, H4, G3, and H3 with square dead wood tokens (see illustration below). Place trees on all the remaining squares. This is a section of forest with a large amount of dead wood. In the forest below, a tree has caught fire at C2. We want to keep the fire from spreading to the part of the forest that has lots of dead trees and fuel.

*How would you do this with firefighters?
How would you do it with a bulldozer
(making a fire break)?*

10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
	A	B	C	D	E	F	G	H	I	J

icons courtesy dcim-studio, freepik.com, pch.vector, pngwave, and GI Design Services, UAF



This material is based upon work supported by the National Science Foundation under award #OIA-1757348 and by the State of Alaska. UA is an AA/E/O employer and educational institution and prohibits illegal discrimination against any individual: www.alaska.edu/nondiscrimination.

TEMPLATE FOR PRESCRIBED BURN SCENARIOS

10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
	A	B	C	D	E	F	G	H	I	J

This page intentionally left blank.