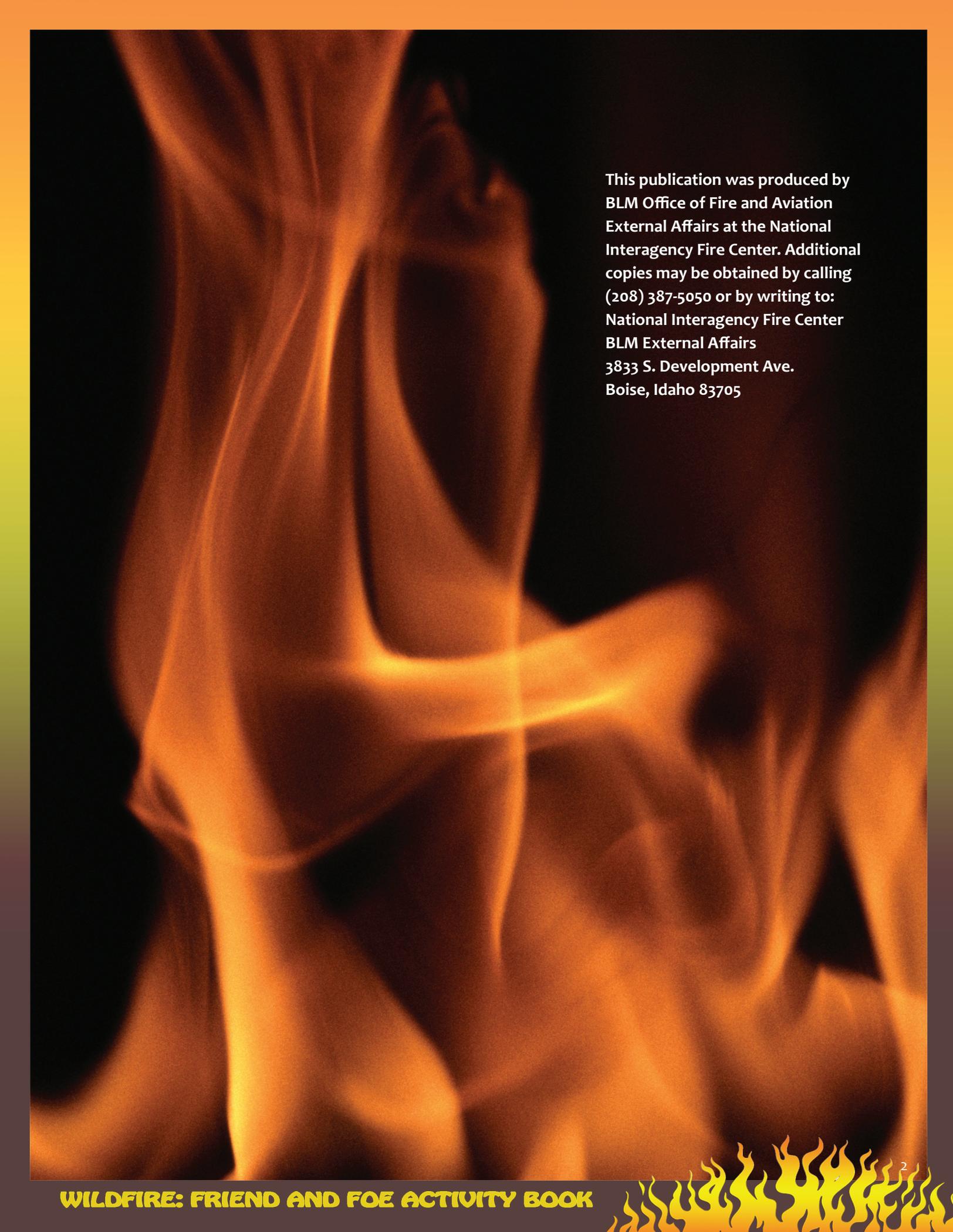


WILDFIRE: FRIEND AND FOE

Activity Book





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BLM Office of Fire and Aviation
External Affairs at the National
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(208) 387-5050 or by writing to:
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BLM External Affairs
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Boise, Idaho 83705



Wildfire: Friend and Foe Booklet

The *Wildfire: Friend and Foe* booklet focuses on many aspects of wildfire. Wildfires occur year round throughout the United States, which makes it important to understand fire's purpose and place in nature. This book will educate you on what wildfires are, the benefits of wildfire to nature, and how they are managed. You will learn about plant and animal adaptations, prescribed fire, and many other interesting topics related to wildfires.



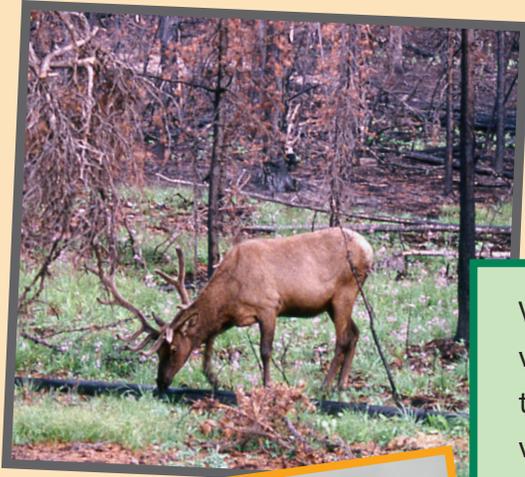
Bureau of Land Management

The Bureau of Land Management (BLM) is a federal land management agency that cares for more than 245 million acres of land. Many wildfires occur on BLM lands each year. BLM fire managers are responsible for managing these fires. Managing fires means that firefighters will monitor and put out wildfires and also light prescribed burns to ensure the landscape stays healthy and people and communities stay safe.

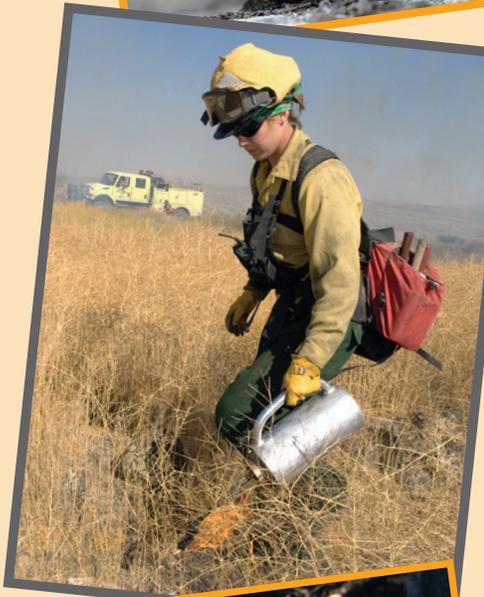
About the Booklet Activities

This booklet was developed targeting 4th-6th graders; however, there are a lot of activities that older and younger children will enjoy as well. When you complete each activity, check it against the answers on pages 30 and 31. Enjoy learning about wildfires!

Fire Is Friend and Foe



When someone says the word “fire,” most people think of a burning building with flames coming out the windows. These fires are called structure fires. This booklet focuses on wildfires. They can be started by lightning or by careless people. Wildfires occur in forests and grasslands.



Like structure fires, wildfires are dangerous. They can destroy homes and leave behind blackened trees and barren ground. But wildfires can also benefit nature. Some plants and animals need or use wildfire to help them survive. Wildfires clean the land of dead fuel and allow new plant growth.



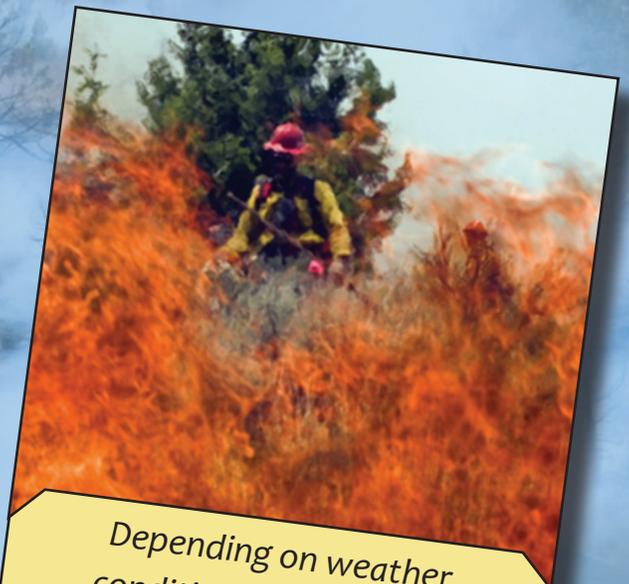
Throughout this booklet, you will learn about all of these things and more!



Wildfire Facts



About 200 new wildfires start every day in the USA.



Depending on weather conditions, wildfires can happen any time of the year.

Smokey Bear has been the symbol of fire safety for more than 65 years.



Between 70,000 and 80,000 new wildfires start each year. People cause most of them by accident or carelessness.



Many fires are started by lightning, but firefighters put them out before they become very big.



Every state has wildfires at some point throughout the year.

Wildfire Definitions

Directions: Fill in the letters above each blank space, using the code box for reference. When you're done, you will have the words to the definitions of many wildfire terms.



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

A. _____ is anything that can burn.
 6 21 5 12

B. _____ are lit by firefighters and carefully used to benefit animals and plants.
 16 18 5 19 3 18 9 2 5 4 6 9 18 5 19

C. _____ is an unplanned fire started by humans or lightning.
 23 9 12 4 6 9 18 5

D. _____ is a type of fire that burns homes or buildings.
 19 20 18 21 3 20 21 18 5 6 9 18 5

E. _____ is plants, animals, and non-living things in a certain area.
 5 3 15 19 25 19 20 5 13

F. _____ is the study of how fire affects plants and animals.
 6 9 18 5 5 3 15 12 15 7 25

G. _____ means to form or make again.
 18 5 7 5 14 5 18 1 20 5

H. _____ is an area created around a home that is less likely to burn during a wildfire.
 4 5 6 5 14 19 9 2 12 5 19 16 1 3 5

I. _____ is a wildfire that burns the plants on top of the ground, fallen branches, and shrubs on the surface.
 19 21 18 6 1 3 5 6 9 18 5

J. _____ is a wildfire that burns from top to top of trees or shrubs.
 3 18 15 23 14 6 9 18 5

K. _____ is a change in an animal or plant over time that helps it be better suited for survival.
 1 4 1 16 20 1 20 9 15 14

L. _____ is what firefighters dig around a wildfire to stop it from spreading.
 6 9 18 5 12 9 14 5



What is Fire and the Fire Triangle?

So what is fire? Anyone can tell you what it's like. It's hot. It burns things. The flames are usually yellow, red, and orange. Think for a second... what does fire sound like? What does fire smell like? What does fire feel like?

Fire is a chemical reaction. Three ingredients are needed for a fire to exist:

1. **Fuel** is anything that will burn.
2. **Heat** is needed to get the fire going.
3. **Oxygen** is in the air all around us.

These three ingredients – fuel, heat and oxygen – are called the “Fire Triangle.” When fuel, heat and oxygen combine, a fire can start.



Directions: List some examples of fuel sources or things that can burn under the Fuel category. Here are a few to get you started: trees, wood, and pinecones. Now add some Heat sources under the heat category. Fireworks, campfires and debris burning should be included. List as many as you can under both categories.

FUEL	HEAT
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Wildland Firefighters Managing Fire

For many years, firefighters have suppressed, or put out, fires. Wildland firefighters became very good at putting out fires soon after the first smoke was sighted. It was understood that all fires were bad.

Little did they know, putting out fires so quickly was actually harmful to the health of forests and rangelands. When wildfire was not allowed to play its natural cleansing and healing role, the fuels built up. When a fire starts in an area with all this built up fuel, it burns very hot, is harder to put out, and can severely damage an ecosystem.

Fire managers and researchers now know that fires keep nature from being overgrown. Fire could not be removed from the landscape without harming the landscape in the long run. Gradually it became clear that fire was essential and needed for healthy land.

When firefighters do put fires out, they have many different ways to do it, called tactics. Each tactic removes one or more legs of the fire triangle — fuel, heat or oxygen. We all know that blowing on a lit candle will put it out. This is an example of removing the heat source.

Directions: Look at each example and write down what leg of the triangle the firefighter is removing (heat, fuel, or oxygen).



Firefighters use water from their fire truck to spray the burned area.



Firefighter uses a shovel to throw dirt on the fire and smother it.



Firefighters light a fire inside the fireline to burn up the grass, shrubs, and trees in the path of a wildfire.



Firefighters dig a dirt line around a slow moving fire.



Fire's Role in Nature

Fire is an essential, natural process. It has shaped our wildlands for a long time, and it is important for the survival of many plants and animals. Fire improves the health of ecosystems by cleaning up branches and debris on the ground, providing nutrients for new plants to grow, and getting rid of weeds and harmful insects. After the fire, new plants grow quickly and provide food for animals.

Ecosystem health depends on how often fires occur. Many areas need fire to burn regularly to maintain a natural balance. Plants and animals that live in areas where fires occur develop ways to live with fire called adaptations. For example, some trees need fire to open their cones and spread their seeds. Other trees have very thick bark that protects them from the heat of a fire. Most animals are able to escape a wildfire by running, burrowing, or flying away.





NO FIRE

Dense overgrown forests



**NATURAL OR
PRESCRIBED FIRE**



**Healthy forests for
regrowth and wildlife**



**"When you try to change any single thing, you find it
hitched to everything else in the universe." John Muir**

Types of Wildfire

There are two basic types of wildfires. Surface fires burn the plants on the ground, fallen branches, shrubs and materials on the surface. These fires stay low to the ground. Surface fires clean up the ground and help new plants to grow. Crown fires burn the fuels on the ground, but also move up the trees and spread from one crown, or treetop, to the next. They have very large flames and move quickly through the forest or rangeland.



Directions: Using the information about surface and crown fires, draw fire on the landscape for each of the pictures shown. Below is an example of how to draw flames.

How to Draw Flames

1. Start with a shape



2. Add details



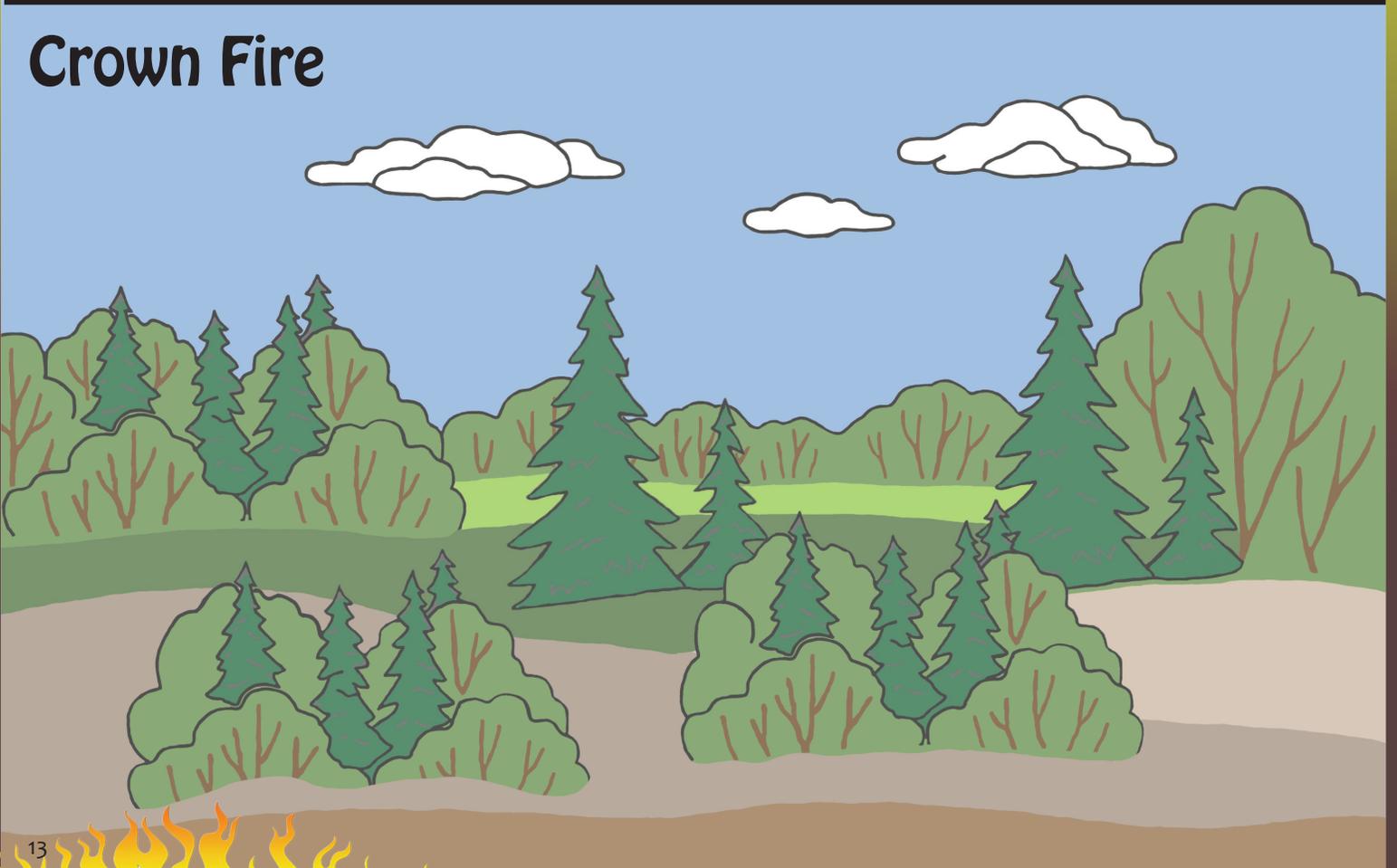
3. Finish and color



Surface Fire



Crown Fire





Plants Adapt to Fire



Directions:

Fill in the blanks with the appropriate words from the word bank. Each word will be used once. You may need to research some of these a bit!

temperatures	lodgepole pine	strengthened	nutrients
country	survive	floods	protect
reproduce	helpful	seeds	

In order for plants or animals to _____, they must adapt to changing temperatures and natural disasters such as _____ or fire. To survive a wildfire, most plants have adaptive traits to allow them to _____ or regenerate after the fire. Many plants have adaptations that _____ them as a species against the effects of wildfire and some are even _____ by it.

Nearly every ecosystem in the _____ has some kind of fire-adapted plant. For example, fire kills some large plants and prepares the soil for seeding by making _____ more available for plants to grow. Another example of plants needing fire would be the _____

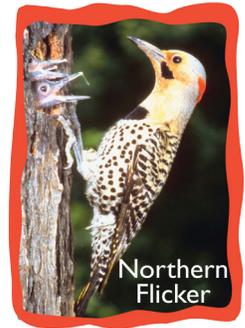
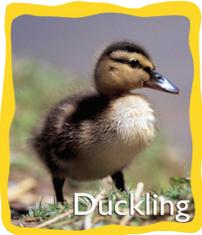
tree. They need fire to open their cones and release new _____. These types of cones are called serotinous and are held closed by a sap that is sensitive to and opens in high _____ generated by the wildfire. So you see? Fire can be very _____ to plants!



Animals Adapt Too

Look at the pictures of animals on this page. What would each of them do if a fire was coming near them? What options do each of them have for surviving the wildfire? Fly? Run?

Directions: Write each animal in the category that describes how they would escape from a wildfire. Keep in mind, some may have more than one way to adapt.



Fly

Run

Burrow

Lives in or escapes to water

Prescribed Fire

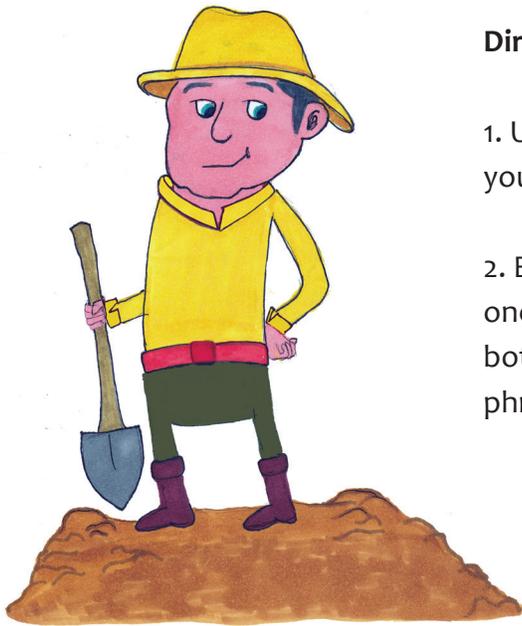
Firefighters have been putting out wildfires for more than 100 years. Since we know now that nature needs fire, sometimes fire managers will light a fire, with careful planning, in a specific area to reduce the fuels. These kinds of fires are called either prescribed fires or controlled burns. They mean the same thing.

Prescribed fires are called this because they must meet a certain “prescription” in order for firefighters to light them. Careful plans are made to only burn these areas on certain days, with certain temperatures, very little wind and lots of firefighters and equipment on hand to keep the fire under control. They are planned and managed to burn more safely and slowly than wildfires. Firefighters use prescribed fires for goals such as burning harmful plants or improving the habitat that animals live in. Sometimes they light prescribed fires where the fuels are very thick, to create better living habitat for both plants and animals. Managing fire in this manner helps prepare the forest and rangelands so when a wildfire occurs, the fire will be less destructive.

Look at the picture below. The firefighter is using a driptorch to light the prescribed fire. A driptorch is a can with a handle that holds a gas mixture. It has a stem with a wick coming out the top that can be lit.



Wildfire vs. Prescribed Fire



Directions:

1. Use the information on the previous page and what you've learned so far to complete the activity.
2. Each of the terms or phrases listed below fall under one of three categories: wildfire, prescribed fire, or both. Use the diagram shown to write the words or phrases where they belong.

Human-caused

Least costly

Firefighters are present

Animals benefit

Planned

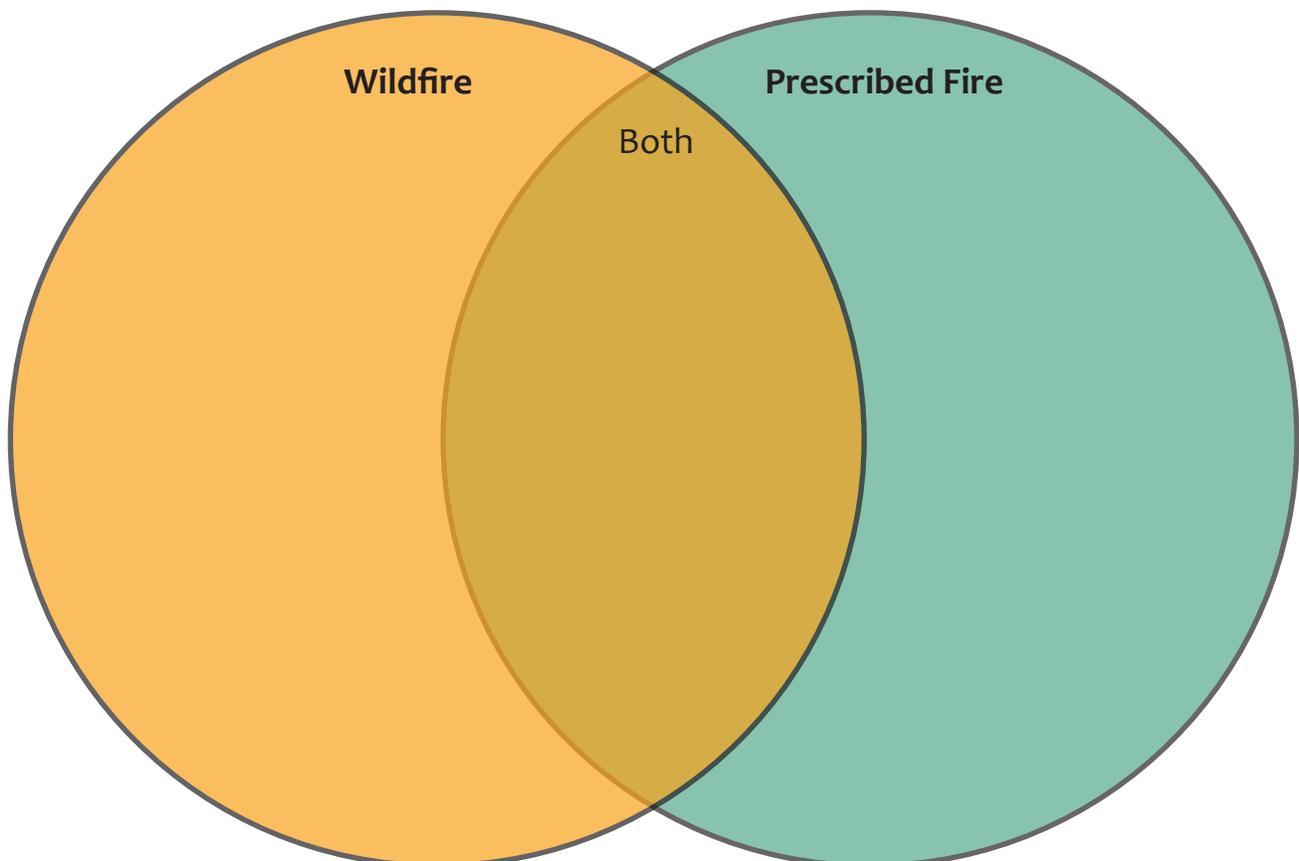
Starts by lightning

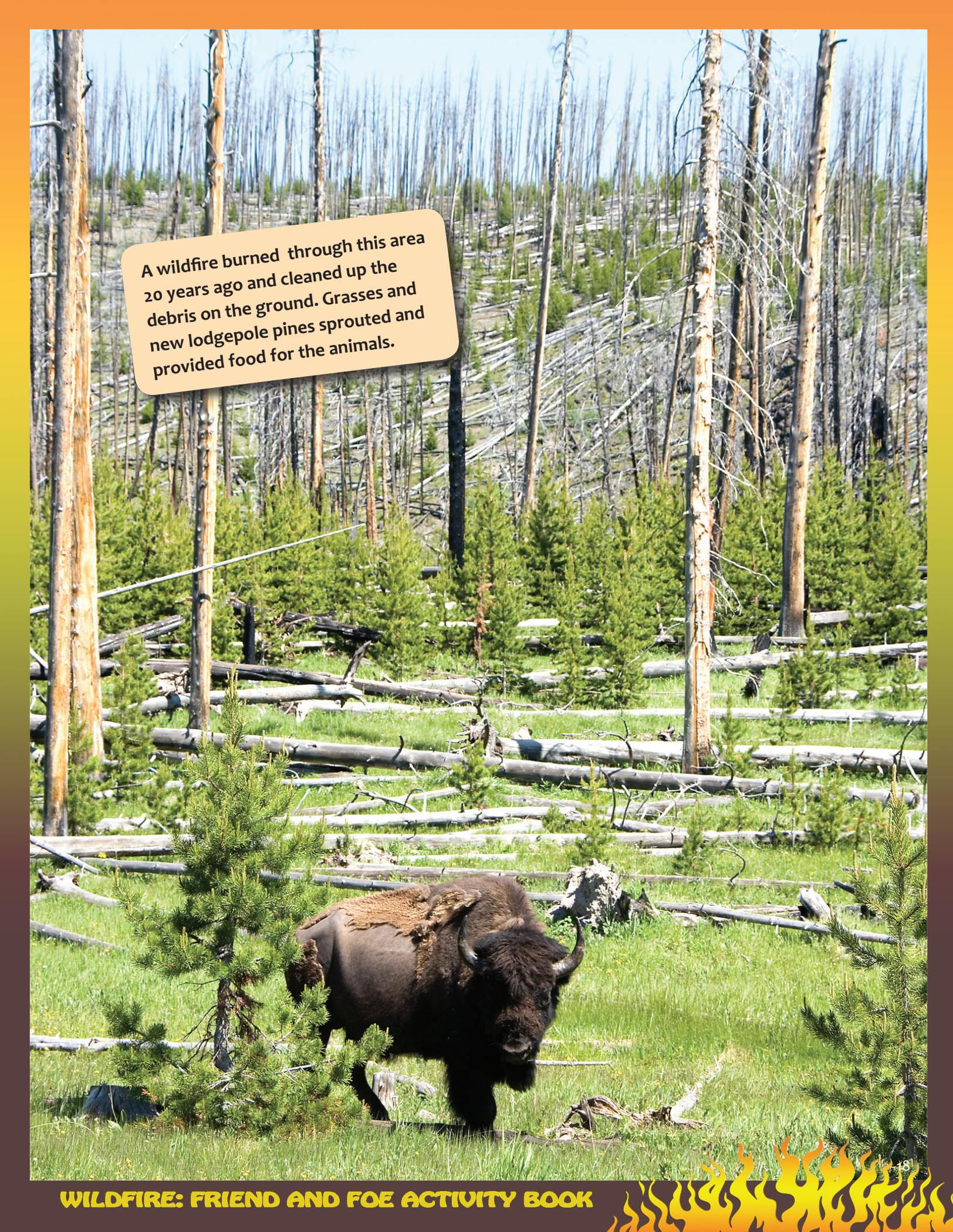
Unplanned

Plants benefit

Accidental

Safest to manage





A wildfire burned through this area 20 years ago and cleaned up the debris on the ground. Grasses and new lodgepole pines sprouted and provided food for the animals.

Nature Needs Fire

Directions: Look at the pictures on page 21. Below are some descriptions of those pictures. Cut each of these out and paste them with the picture that best matches the description.

A. Many years later, the landscape is looking healthier and more “cleaned up.”

B. Firefighters carefully use fire to burn dead grasses, branches and smaller trees.

C. This is a thick, overgrown forest that hasn't burned in many years.

D. Right after the fire, you can see that some smaller trees have died and some green grasses are beginning to grow back.

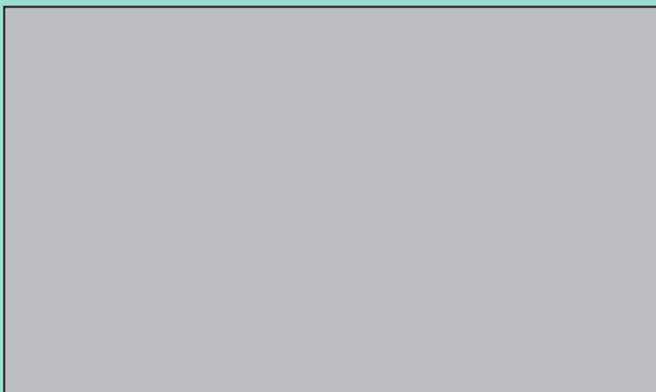
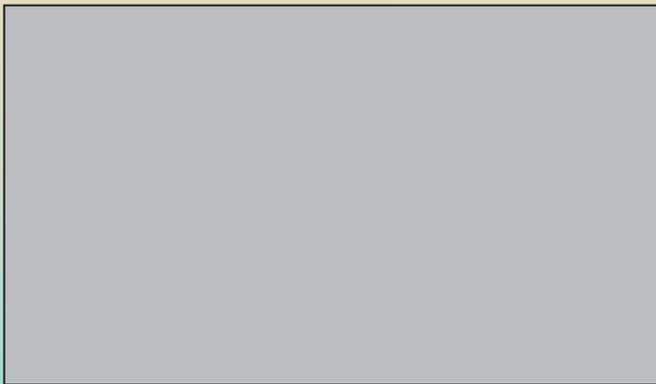
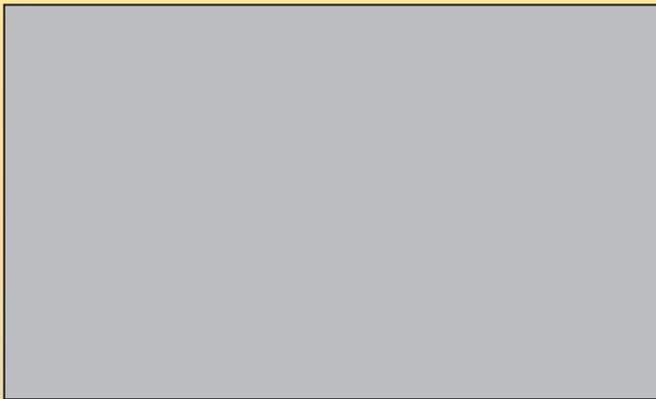


Cut and paste



Nature Needs Fire (continued)

See previous page for activity instructions.



Firefighting Protective Gear and Tools



A **helmet** protects a firefighter's head from falling trees, rolling rocks or other dangers.

Firefighting shirts are made of fire-resistant material.



Radios are used like walkie-talkies to stay in contact with people working on the wildfire.

A **backpack** stores food, drinking water and other daily essentials for each firefighter.

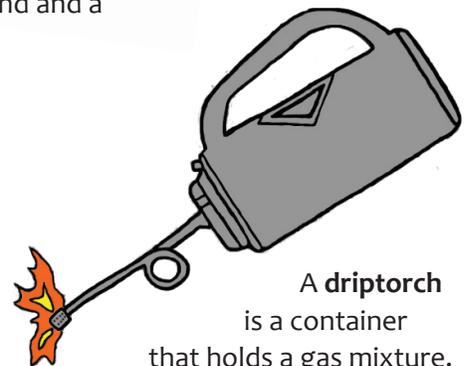


Gloves protect the hands from burns, blisters or falls.



The **pulaski** is a firefighting tool with an axe on one end and a hoe on the other.

Firefighting pants are also made of fire-resistant material.



A **driptorch** is a container that holds a gas mixture. When the gas is lit, firefighters use it to light prescribed fires.



A firefighter's **boots** are very sturdy and made of leather to provide ankle support and protect the feet.



Firefighters use a **shovel** to dig fireline and throw dirt on flames.

Find the Firefighting Gear and Tools

Directions: Circle the protective gear and tools you learned about in the puzzle below.

- | | |
|-------------|---------|
| Backpack | Helmet |
| Boots | Pulaski |
| Driptorch | Radios |
| Firefighter | Shirt |
| Gloves | Shovel |

C F S E Z L E S X I O E S N K L N X J T
F F O P Z E D A T B S C K Q C J G X M B
O W I F I V S P I F H C B W A C Q Y A N
W V D R Y O V E O X K L E C P A I M K Q
R A A U K H U E V Z F P E Q K L O Z I T
U E R S E S I T Y O J N O X C P S K T J
K K T I R G T H E U L H G M A J S E E U
N Q R H W W A I R O X G F Q B A X M M S
P W J D G D R I P T O R C H L M I C L V
W X D P G I B O O T S Y W U G B O D E I
I G U K K O F P C Z X L P Z J A Q D H Y
E O L C A Q T E Y L J M Y Y W Q D V G P
Z C V R O L B N R N F Z D V E W T L X B
J K Y E C Z B O F I H L S C A Q J O K K
Q N P X G S C E H S F Y N Y E E R J O G
T J A T X C L Z Z O H A K O S K C D K D
P U E D D U P T T S O I V B S F B W Z Q
S M L H N X B G R K R F R M K Y Z R M V
G P V Q L F R M B K G N Z T V T Y F R S
X Z T Q T R A U Q O F E D H N A L Y Z H

Pros and Cons of Wildfires: A Summary

So far, you've learned a lot about wildfires. Our next activity will look at the "pros" and "cons" of wildfires. Pros means the advantages or positive results. Cons are the disadvantages or negative results.

Directions: Use the table below to list the pros and cons of wildfires. Feel free to add in your own ideas of why you think wildfires can be positive or negative. When you're listing ideas, remember to think about how wildfires affect humans, plants and animals. If you need to research further, go to: http://www.ecopals.com/wild_fire.html and read each section. Click the red arrow to go to the next section of the web page. Add the information you learn to your table.

Pros of Forest Fires	Cons of Forest Fires



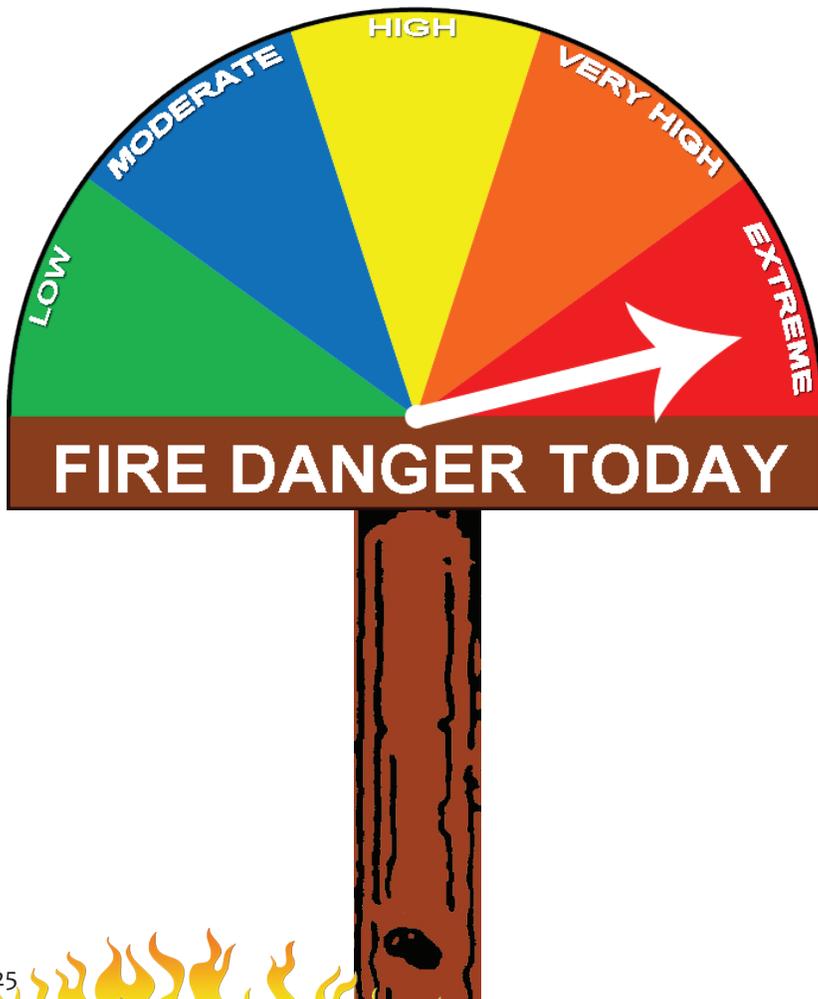
http://www.ecopals.com/wild_fire.html

The screenshot shows a website interface with a navigation menu on the left containing: Home, WILD FIRES, SUN SAFETY, RIDDLES & JOKES, and THE LIVING JOURNAL. The main content area features a 'YOUR SCORE' box, a 'Print Version' button, and a 'NEXT' button circled in green. Below these are links for 'Forest Fires', 'The Role of Fire in Nature', and 'Fire Fighting Methods | Related Websites'. The main text reads: 'It's Too Darn Hot! You already know how dangerous fire can be. You hear from parents, teachers, and fire fighters to stay away from matches and to be careful around stoves and other kinds of fires. If you've been out camping or hiking on a nature trail, you have probably seen signs that warn you to prevent forest fires.' There is also an illustration of a dog's head.

Smokey Bear has Five Rules of Wildfire Prevention:

Directions: Unscramble the red word to complete each sentence.

- 1) Only you can prevent _____ (ilerwdfis).
- 2) Always be _____ (rflcaeu) with fire.
- 3) Never play with _____ (sehcamt) or lighters.
- 4) Always watch your _____ (mpirfaec).
- 5) Make sure your campfire is _____ (ycloeelmt) out before leaving it.



Career Profile

Lisa Kemper

Prescribed Fire/Fuels Technician

Why did you want to become a firefighter?

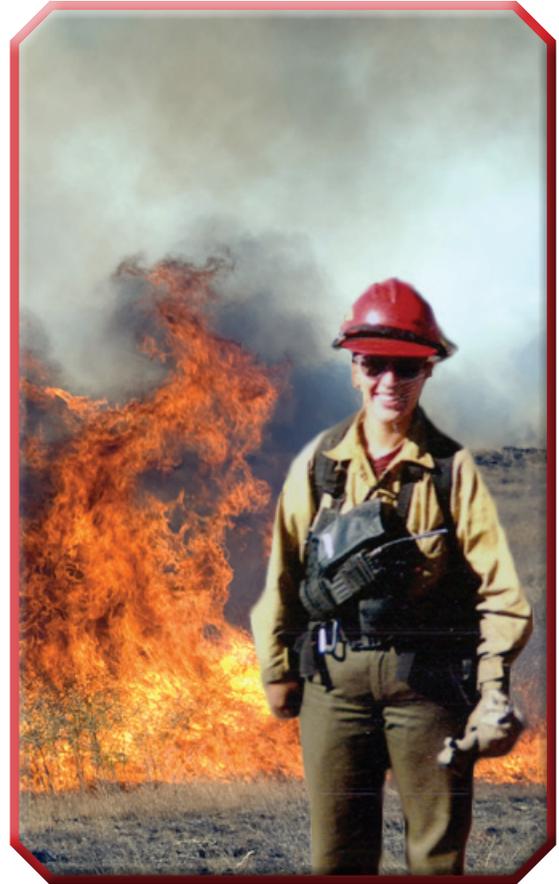
I have always loved the outdoors and some of my family were firefighters. Because I loved being outside, I tried it and after the first season on an engine crew, I was absolutely hooked and knew I wanted to do this for a career.

What does a typical day in the life of a firefighter look like?

Staying in good shape is very important for firefighting. We start the day by exercising and reviewing current fire activity nearby and across the country. Usually we will work on projects close by until a fire call comes through our dispatch center. We then respond as quickly and safely as possible, put on our safety equipment and get to work!

How did you get into firefighting?

I was inspired by a *high school forestry teacher*. He told me I could fight fires in the summer to help pay for college, so that's exactly what I did!



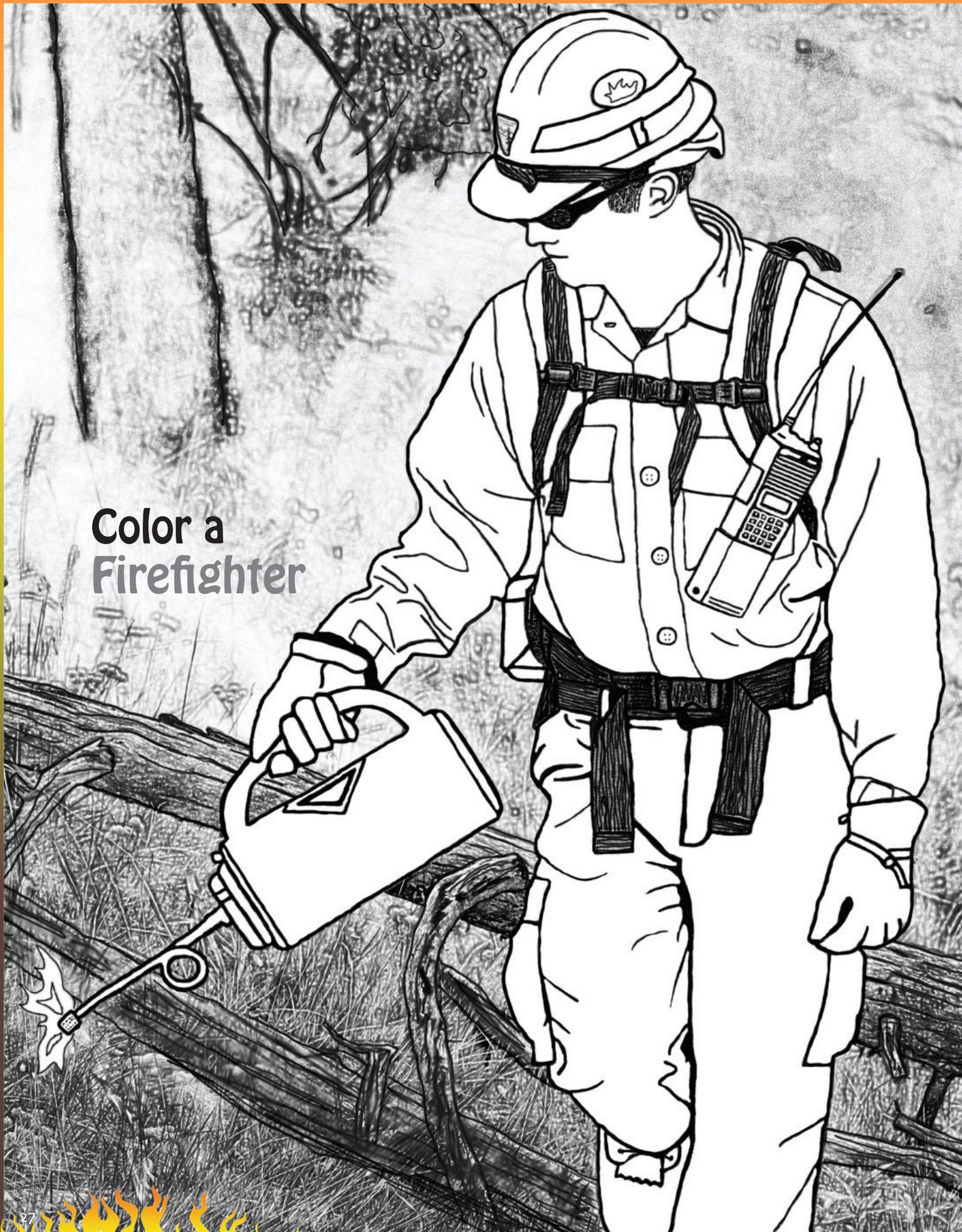
What's the best part about firefighting?

The best part is doing something different every day. Not many people can say that their office is outside and they don't have to look at four walls and a roof all day long. I'm really lucky!

Where have your firefighting travels taken you?

I fought fires in thirty states as a result of my job as a firefighter. I even got to go to Disneyland after putting out a fire in California!

**Color a
Firefighter**



Glossary

benefit	a positive advantage
crown fire	wildfire that burns from top to top of trees or shrubs
fire behavior	how a fire reacts in different weather, fuels and landscapes
foe	a bad thing
landscape	a certain large area of land
pulaski	a firefighting tool with an axe on one end and a hoe on the other
regenerate	to form again or reproduce
serotinous	a type of pinecone that needs heat to release its seeds
surface fire	wildfire that burns just the top of the surface of the earth and anything downward such as roots



Ready for More?

Learn more about wildfires,
safety tips, and related activities!



Visit the NIFC website at <http://www.nifc.gov> for information about current wildfires, firefighting aircraft, fire shelters, radios, firefighter training and wildfire policies.



Watch videos about wildfire and firefighting on the National Interagency Fire Center's (NIFC) YouTube channel at <http://www.youtube.com/BLMNIFC>.



Visit NIFC's Picasa site for hundreds of wildfire photos. Go to the NIFC home page at www.nifc.gov and click on the Picasa icon.



Visit Smokey Bear Online Wildfire Science to learn about fire's natural role in nature. <http://www.smokeybear.com>



The National Weather Service Fire Weather website offers information about how wildfires are affected by weather at <http://www.srh.noaa.gov/ridge2/fire/>.



The Predictive Services Outlooks website offers current information about where wildfires could happen throughout the United States at <http://www.predictiveservices.nifc.gov/outlooks/outlooks.htm>.

Answer Key

Wildfire Definitions (page 6)

- A. Fuel
- B. Prescribed Fires
- C. Wildfire
- D. Structure Fire
- E. Ecosystem
- F. Fire Ecology
- G. Regenerate
- H. Defensible Space
- I. Surface Fire
- J. Crown Fire
- K. Adaptation
- L. Fireline

What is Fire and the Fire Triangle? (page 7)

Answers will vary.

FUEL

- Grass
- Shed
- Wood
- Leaves
- Homes
- Woodpiles
- Shrubs
- Vehicles
- Brush
- Trees
- Pinecones

HEAT

- Campfires
- Debris Burning
- Fireworks
- Lighters
- Cigars
- Candles
- Sparks
- Powerlines
- Lightning
- Matches
- Cigarettes

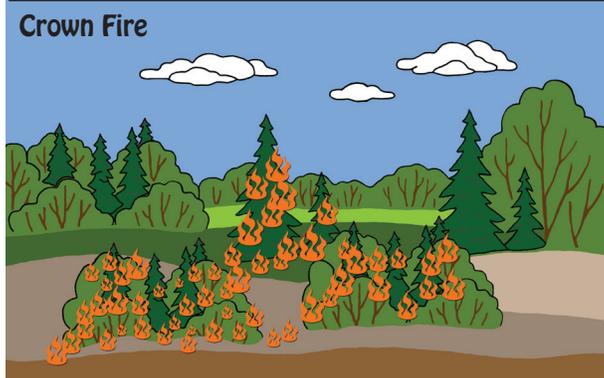
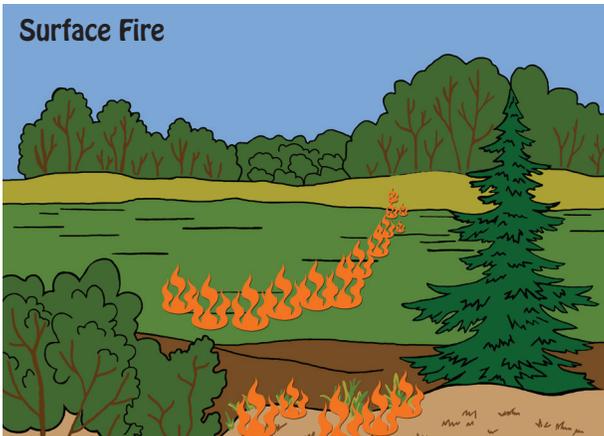
Wildland Firefighters Managing Wildfires (page 8)

- A. Heat
- B. Oxygen
- C. Fuel
- D. Fuel

Fire's Role in Nature (page 10)

Answers will vary, but should include discussion about how fuel would buildup if wildfires do not burn regularly in an ecosystem.

Types of Wildfires (page 12) Answers will vary.



Plants Adapt to Fire (page 14)

In order for plants or animals to **survive**, they must adapt to changing temperatures and natural disasters such as **floods** or fire. To survive a wildfire, most plants have adaptive traits to allow them to **reproduce** or regenerate after the fire. Many plants have adaptations that **protect** them as a species against the effects of wildfire and some are even **strengthened** by it.

Nearly every ecosystem in the **country** has some kind of fire-adapted plant. For example, fire kills some large plants and prepares the soil for seeding by making **nutrients** more available for plants to grow. Another example of plants needing fire would be the **lodgepole pine** tree. They need fire to open their cones and release new **seeds**. These types of cones are called serotinous and are held closed by a sap that is sensitive to and opens in high **temperatures** generated by the wildfire. So you see? Fire can be very **helpful** to plants!

Animals Adapt Too (page 15)

Fly

- Chipmunk
- Goose
- Northern Flicker
- Burrowing Owl

Burrow

- Badger
- Ground Squirrel
- Toad
- Newt
- Burrowing Owl
- Black Ant

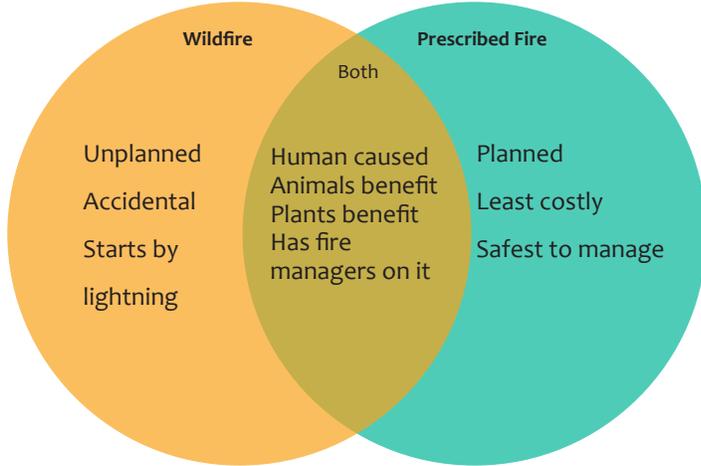
Run

- Badger
- Grizzly Bear
- Chipmunk
- Antelope
- Mule Deer
- Salamander

Lives In Or

- Escape To
- Water
- Duckling
- Turtle
- Rainbow Trout

Wildfire vs. Prescribed Fire (page 17)



Wildland Firefighters Managing Wildfires (page 19 and 21)

1. C
2. B
3. D
4. A

Firefighting Protective Gear and Tools (page 22)

C F S E Z L E S X I O E S N K L N X J T
 F F O P Z E D A T B S C K Q C J G X M B
 O W I F I V S P I F H C B W A C Q Y A N
 W V D R Y O V E O X K L E C P A I M K Q
 P A A U K H U E V Z F P E Q K L O Z I T
 U E R S E S I T Y O J N O X C P S K T J
 K K T I R G T H E U L H G M A J S E E U
 N Q R H W W A I R O X G F Q B A X M M S
 P W J D G D R I P T O R C H L M I C L V
 W X D P G I B O O T S Y W U G B O D E I
 I G U K K O F P C Z X L F Z J A Q D H Y
 E O L C A Q T E Y L J M Y Y W Q D V G P
 Z C V R O L B N F N F Z D V E W T L X B
 J K Y E C Z B O F I H L S C A Q J O K K
 Q N P X G S C E H S F Y N Y E E R J O G
 T J A T X C L Z Z O H A K O S K C D K D
 P U E D D U P T T S O I V B S F B W Z Q
 S M L H N X B G R K R F R M K Y Z R M V
 G P V Q L F R M B K G N Z T V T Y F R S
 X Z T Q T R A U Q O F E D H N A L Y Z H

Pros and Cons of Wildfires (page 24)

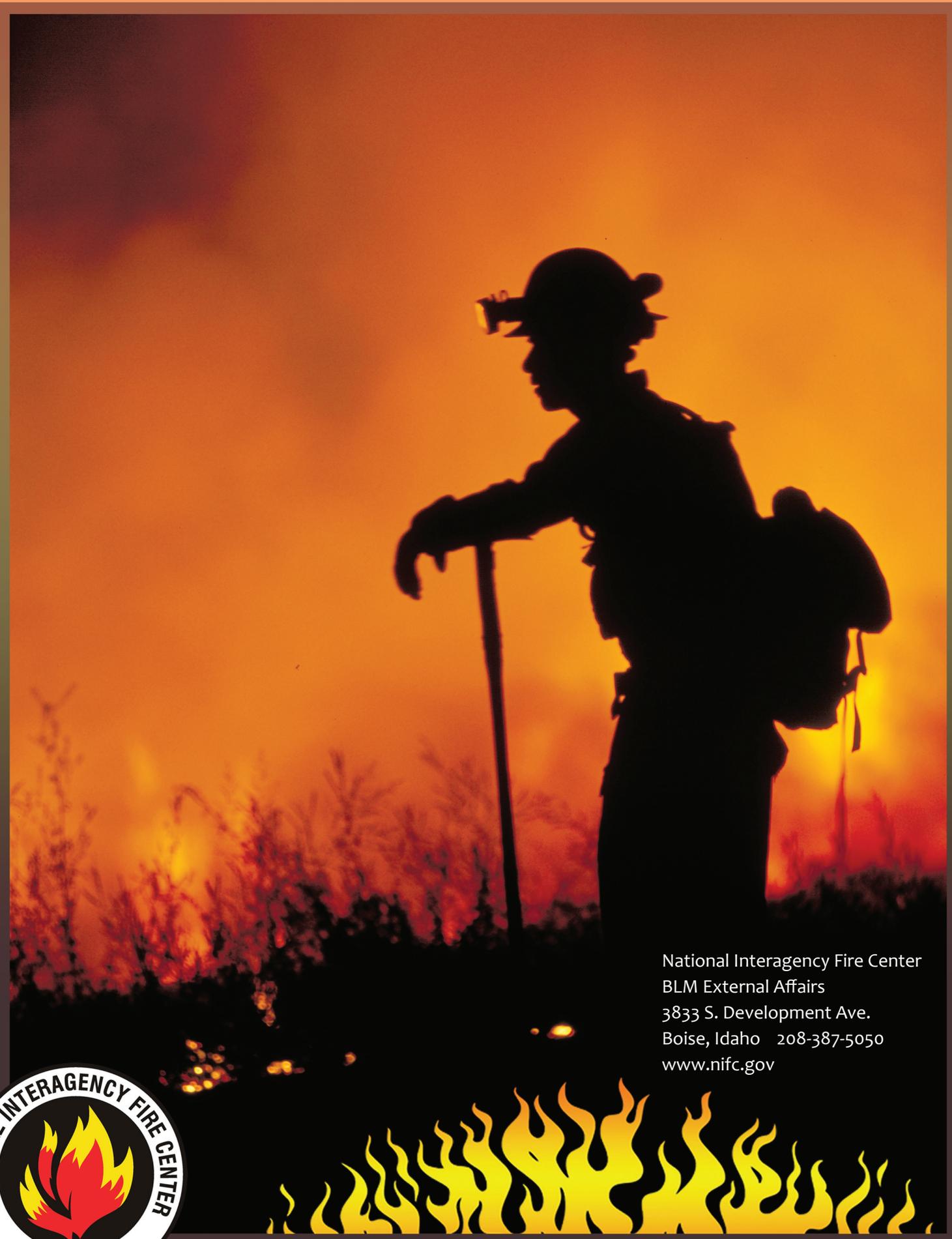
Pros of Forest Fires (positive things)	Cons of Forest Fires (negative things)
Some trees need fire to release seeds	Destroys habitat
Clears dead trees, gets rid of disease	Sterilizes the soil
Provides opportunity for healthy plant life	People lose homes
Thin the canopy, allows more sunlight for streams which in turn makes more food for fish	Animals, trees and plants may die
Allows new growth for plants	

Answers will vary.

Smokey Bear Five Rules of Fire Prevention (page 25)

- 1) Wildfires
- 2) Careful
- 3) Matches
- 4) Campfire
- 5) Completely





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