



# INTO

# THE

Why should you care  
about Oregon's forests?

# FOREST



Oregon Forest  
Resources Institute

# WHY DOES THE FOREST MATTER?

Now there's a question for you. Why does it matter and why should you care?

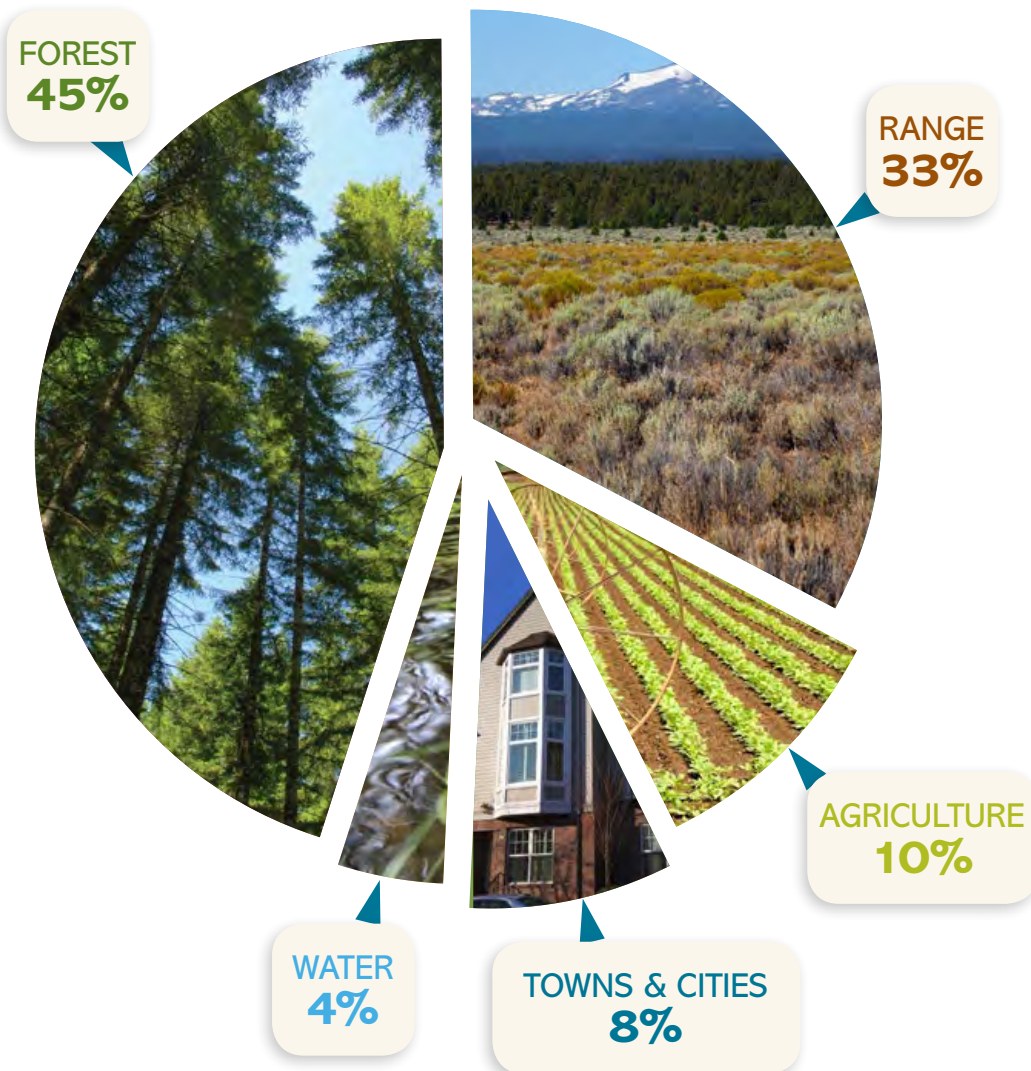
Well, almost a third of all land on Earth is forest. And almost half of Oregon is forest.

Hmm. Are you still saying, "So what?"

**OK, LET'S THINK ABOUT IT THIS WAY:** When is the last time you used something that came from the forest? Here are some hints: Have you taken a drink from the water fountain lately? What is this book made out of? Do you like sitting by a warm fire? What's holding up the roof of your home? Do you go camping? Are you breathing?

Check out the rest of this book. And then we'll ask you the question again at the end: Why should you care about Oregon's forests?

## OREGON'S LAND TYPES:





## What is a forest anyway?

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### FOREST:

A large area of land covered by trees – lots of trees, which often grow close together, forming a canopy. But it's more than that. A forest is an ecosystem. If you don't know what that means, don't worry. You'll learn about it later on in this book.

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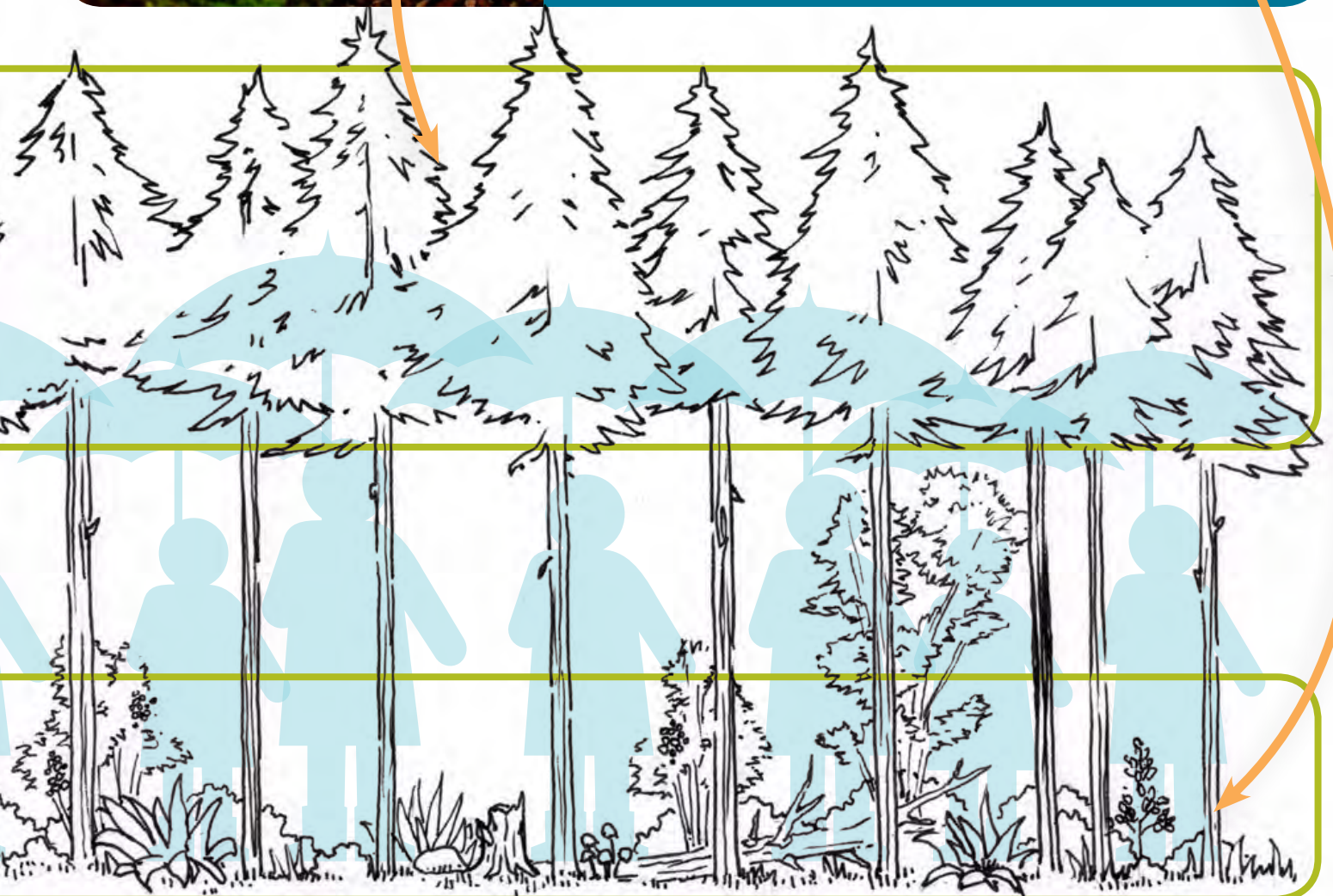
### CANOPY:

Imagine you're standing outside, holding an umbrella. You're a tree! Your body is like the trunk and the umbrella is like outstretched branches. Now imagine you're standing in a group with everybody else in your school. Everybody else has an umbrella, too. Now you're a forest, and the umbrellas form a "canopy" over the ground you all are standing on. When trees grow close together in a forest, the branches form a canopy like this. Although not quite as waterproof as an umbrella, the forest canopy does make it shady down below on the ground.

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### UNDERSTORY:

The layer of plants growing beneath the main canopy of the forest.



# THAT FOREST IS WORKING ITS TRUNK OFF

Let's say you're on your way somewhere, sitting in a car. You're staring out the window at the forest. And it looks like nothing is happening. But you know what?

The forest is seriously busy – all the time.

The forest is making oxygen...

that humans and other animals can breathe. It's taking carbon dioxide out of the atmosphere. It turns the carbon into wood and releases oxygen into the air. Get this: Every 60 seconds (the time it takes to watch two commercials on TV) the forests in Oregon grow about as much wood as it takes to build a typical size house.



The forest is making clean water.

When rain falls on the forest, most of it soaks into the soil. Tree roots suck up some of it, but most travels through the soil to become groundwater. This works like a natural filter, and produces the clean, fresh water that ends up being the drinking water in most towns and cities in Oregon. So chances are the water that comes out of the drinking fountains at your school was once rain or snow that fell on the forest.

During big storms when it's pouring rain, the forest soaks up tons of water. This slows down how fast the water runs down out of the hills and helps control flooding. And tree roots help hold soil in place.



striped skunk



red-tailed hawk



black bear



northern spotted owl



Pacific tree frog



garter snake



northern flying squirrel



deer mouse



pileated woodpecker

The forest is also home to thousands of different types of creatures.

So yes, it may look like nothing is happening, but actually the forest is working really hard, 24/7.

### What do you think?

Forests provide many vital things. Which of these do you think is most important? Why?

- Clean water
- Oxygen
- Turning carbon into wood
- Flood control
- Habitat for wildlife

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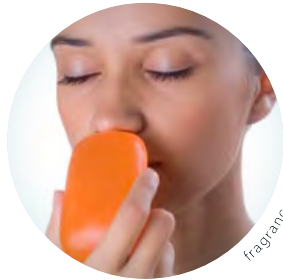


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**FILTER**

Humans have used the forest for centuries to help them survive. Prehistoric humans burned wood to stay warm and cook food. They hunted and gathered in the forest.



fragrance



paper



a woodchuck? No way.

More recently, but still thousands of years before recorded history, people used wood to build shelters, canoes and tools, and carve ceremonial and art objects. They made musical instruments, such as drums and flutes. For some, the forest was a spiritual or mystical place.



tencel



rayon



cinnamon from tree bark, though not an Oregon tree

# THINGS WE MAKE F

Come to think of it, we use the forest in many of the same ways today. We collect firewood. We make lumber and paper from trees. We fish and hunt. And we go hiking, mountain biking and snowboarding.



anything made of wood



toothpaste



plywood furniture

The nice thing about trees is that they are a renewable natural resource. They can be harvested like broccoli, and the land can be replanted to grow more trees. One difference between a tree and broccoli, of course, is that trees take a lot longer to grow. You can harvest broccoli after a few months. A Douglas-fir tree in Oregon will usually need to grow 40 years or more before it is ready to be harvested. Nobody wants to eat broccoli that old.



nope, not blueberry pie



cork



football helmet

In Oregon, forest managers plant **ABOUT 40 MILLION SEEDLINGS EVERY YEAR**, or about four trees for every one harvested. This will assure that Oregon will always have a growing forest.

## WORDS TO KNOW:

### natural resource

something that occurs in the world naturally that humans can use to make things they need or want; metal ore, minerals and oil are all natural resources.

### renewable resource

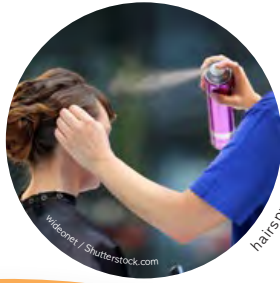
a natural resource that can be replenished over time; trees are natural resources, and they are renewable resources! So is sunlight.



aspirin: from the bark of willow



pencils



hairspray



musical instruments



maple syrup



heating fuel

# FROM TREES



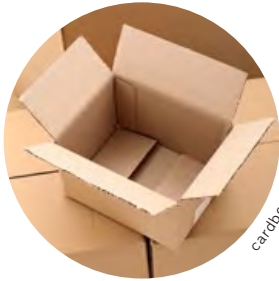
cellulose sponges



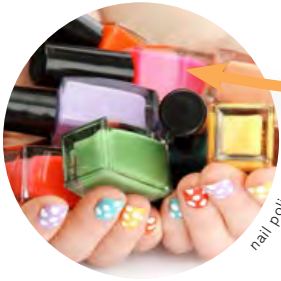
nope, not even George Washington's false teeth



chewing gum



cardboard



nail polish



cellophane

## Did you know?

Spruce and maple are two kinds of wood found in Oregon that are used in musical instruments, such as violins, cellos and guitars.

Oregon makes more lumber than any other state in the country.

About 20 schools, hospitals and other public buildings in Oregon are heated by high-tech systems that burn renewable wood pellets, chips or bricks.

"Waste" from lumber mills and logging – that is, bark, branches, woodchips and sawdust – can be burned and turned into electricity.

The substance taxol, which has been developed into drugs that fight cancer, originated from the bark of the Pacific yew tree, which you can find in western Oregon.

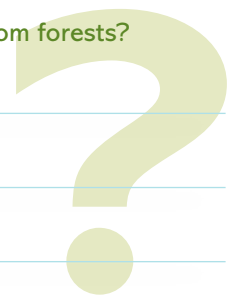
Oregon makes more plywood than any other state in the country.

Cellophane, football helmets, nail polish, hairspray, chewing gum and toothpaste – Say what?! Yes, all these things contain substances like cellulose, hemicellulose and lignin that are found in trees.

Take a look around the room

Can you list 12 things you see right now that come from forests?

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____



# OREGON'S FORESTS

The forests in Oregon are not the same all over the state. In fact, scientists can point out as many as 14 different forest types, depending on the kinds of trees that grow in them. The map shows a few. The kind of trees that grow in any forest depends on such things as the soil and climate.



## SPRUCE-HEMLOCK FORESTS

have, guess what? Spruce trees and hemlock trees! These kinds of trees like the damp, thin strip of land along the coast, where it tends to be especially wet and foggy.



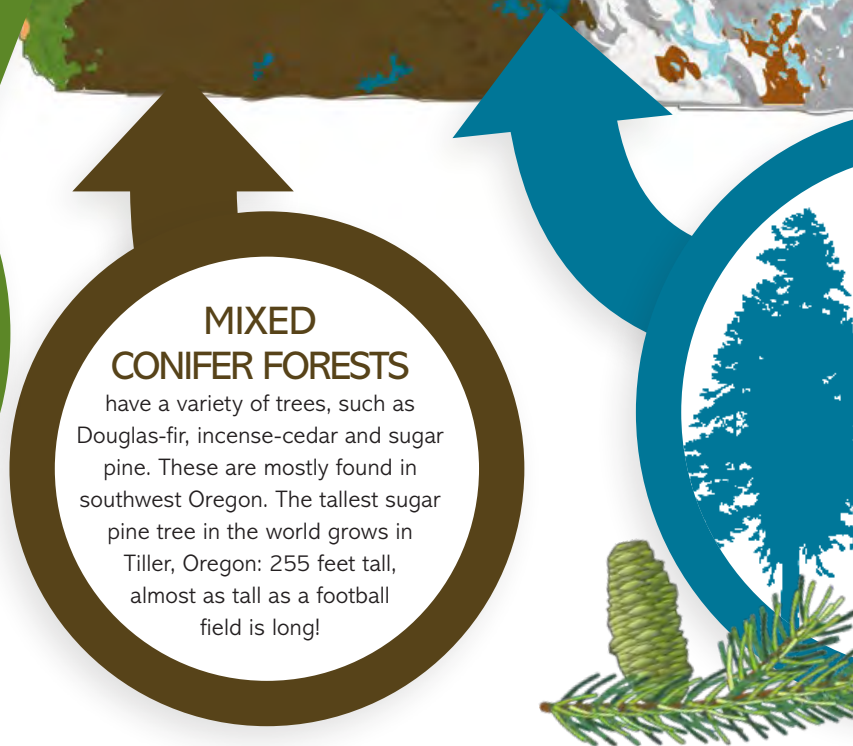
## DOUGLAS-FIR FORESTS

surround the Willamette Valley. Douglas-fir is Oregon's state tree. Its wood makes some of the best lumber for building structures such as homes, apartments and commercial buildings.

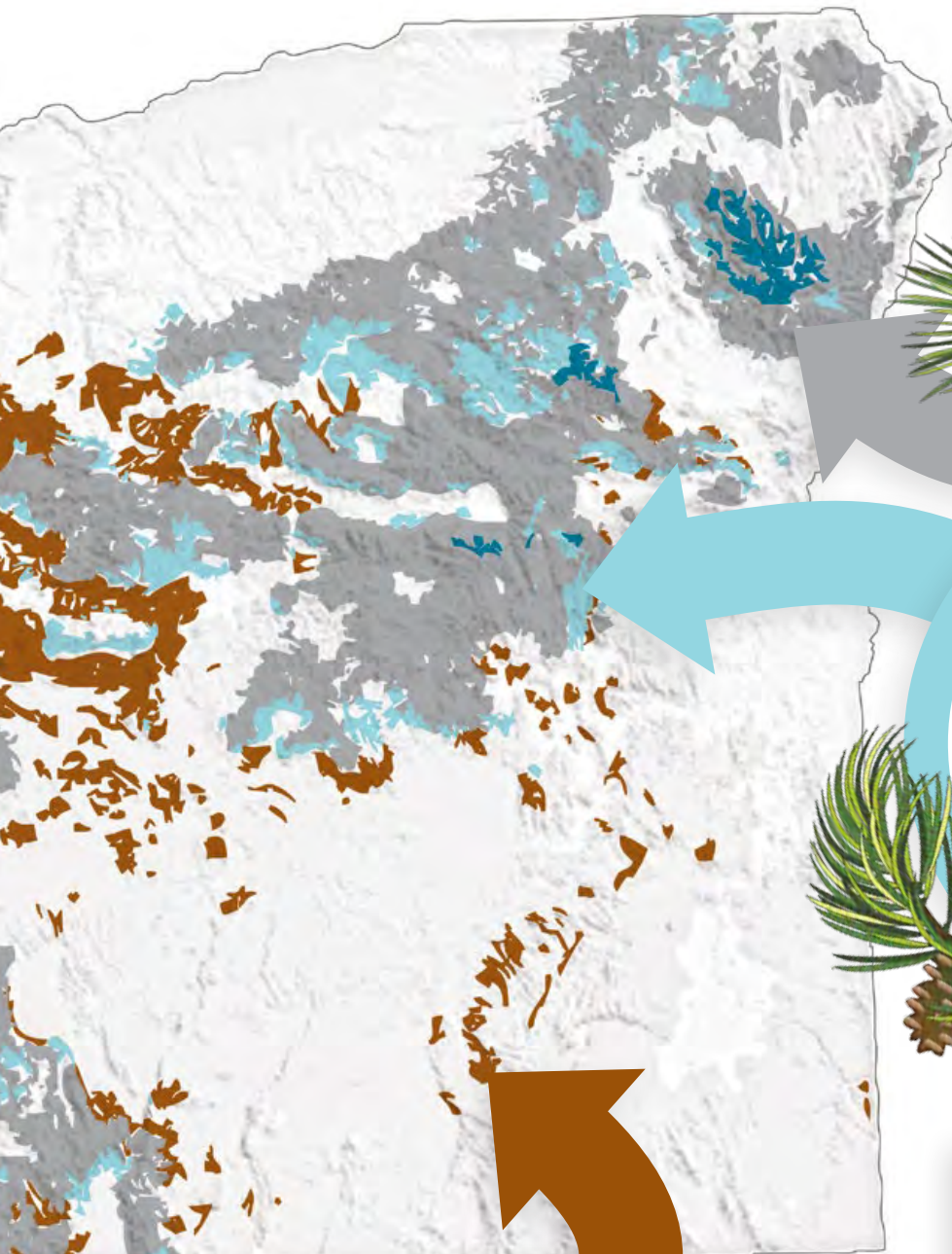


## MIXED CONIFER FORESTS

have a variety of trees, such as Douglas-fir, incense-cedar and sugar pine. These are mostly found in southwest Oregon. The tallest sugar pine tree in the world grows in Tiller, Oregon: 255 feet tall, almost as tall as a football field is long!









**PONDEROSA PINE FORESTS**  
cover big areas in eastern Oregon. They prefer dry summers and cold, snowy winters. Ponderosas have a thick, corky bark that is more fire resistant than the bark of other tree species, which helps them survive low-intensity fires.



**LODGEPOLE PINE FORESTS**  
are found in eastern and central Oregon. Lodgepoles are often the first trees to grow back after a fire. They are also more likely to be attacked by insects that can kill the trees.



**SUBALPINE FORESTS**  
are found higher up in the mountains, mostly above 4,500 feet elevation in the Cascade and Willowa ranges. There are lots of white fir and noble fir, which can deal with a lot of snow.



**JUNIPER WOODLANDS**  
are found in Oregon's high desert. There is a lot more juniper than there used to be. Wildfires used to keep junipers in check, but since we put out fires quickly these days, juniper has become more common.

**What happened?**

Juniper trees are much more common in eastern Oregon than they were 100 years ago. Why are there more junipers now than before?

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# THE ECOSYSTEM: EVERYTHING IS



“You can’t see the forest for the trees.”

Have you heard this saying? It means you’re looking so hard at little details that you don’t notice the big picture. Like, you’re so worried about a loose button on your shirt that you forget to notice you didn’t put on any pants. It’s a good saying, because if you’re looking at only the trees, you’ll miss [WHAT THE FOREST REALLY IS: AN ECOSYSTEM](#).

What is a forest ecosystem in Oregon? It’s trees, yes. Also air, worms, ferns, streams, sunlight, mushrooms, insects, moss, rain, bears, dead mice, dirt, deer, salamanders, rotting logs, bird poop, rocks, fish, fire, wind and even you, too, if you go there. It’s everything that’s there, whether **biotic** or **abiotic**.

## BUT HERE'S THE IMPORTANT THING:

An ecosystem is how all those things exist together in the same place, and how they all affect each other. Here are a few of the many, many ways that happens:

Soil makes a place for a mushroom to sprout when it rains ...



Insects and microbes eat deer poop, turning it into soil ...



More rain makes the ground muddy and then wind uproots the tree ...



The sun shines and a tree grows ...



The tree falls into a stream, making the water pool up and giving fish a nice place to hang out ...

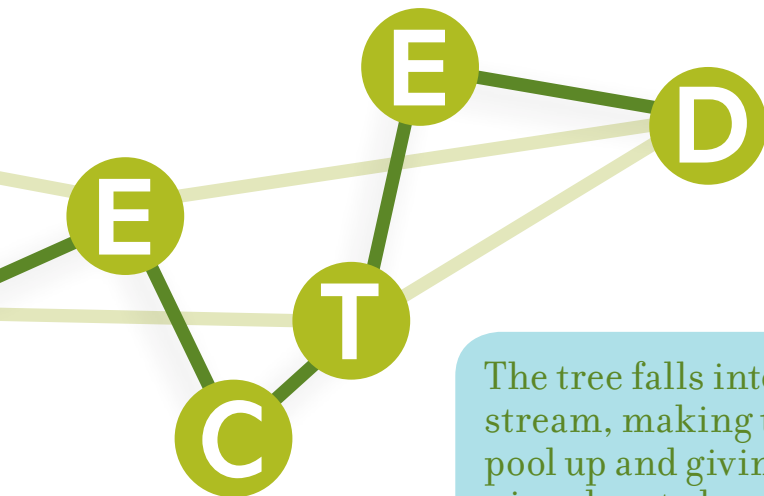


## IF YOU REMOVE SOMETHING FROM AN ECOSYSTEM, OTHER THINGS ARE AFFECTED.

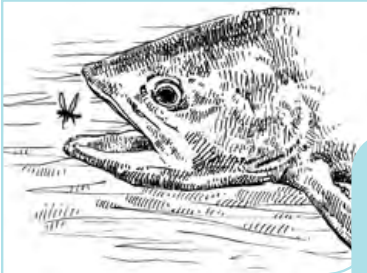
If you remove the tree from the stream you affect the fish. If it didn't rain, the mushroom might not sprout. If you got rid of all the insects and microbes, deer poop would pile up everywhere!

Ecosystems even include things that look destructive to us – like a raging forest fire or a volcano erupting. Remember in the previous section, we mentioned that there are more juniper trees than there used to be? What changed in the ecosystem to cause that?

In a forest, all kinds of things are changing and growing and dying all at the same time, and everything you see is connected to something else. This is an ecosystem.



A fish eats a bug ...



A mink eats a fish ...



It goes on and on ...

# PARTS OF AN ECOSYSTEM:

## biotic

Living or was once living. The biotic parts of an ecosystem are all the living things: plants, animals and microbes.

## abiotic

Not living and never was living. The abiotic parts of an ecosystem are all the things that are not living, from a stone to the wind to water.

## producer

A living thing in an ecosystem that makes its own food using the sun; in a forest ecosystem, the producers are trees and other plants.

## consumer

Any living thing that cannot make its own food, generally animals, which eat either plants or other animals.

## decomposer

Insects, fungi (like mushrooms) and microorganisms that eat dead organisms or the waste of living organisms. Decomposers cause things to rot, and whatever they're decomposing turns into soil.

## disturbance

A forceful event that brings great change to an ecosystem, often very quickly – a windstorm or a fire, for instance.



## What's in the forest?

Look at the illustration and find a few examples of each kind of ecosystem element. Write their names in the correct spaces.



Biotic: \_\_\_\_\_

Abiotic: \_\_\_\_\_

Producer: \_\_\_\_\_



Consumer: \_\_\_\_\_

\_\_\_\_\_

Decomposer: \_\_\_\_\_

\_\_\_\_\_

Disturbance: \_\_\_\_\_

\_\_\_\_\_

# ANSWERS (No cheating!)

Page 23: We all depend on forests for clear water, air and forest products, and for storing carbon.

Page 21: Our society relies on all three types of forestland management. Any answer is right as long as you provided solid reasoning for your opinion.

Page 18 (bottom): An increasing amount of carbon dioxide in the atmosphere may be contributing to global climate change. Trees take carbon from the atmosphere and store it in their trunks and branches.

Page 18 (top): Answers in order from top to bottom: 1 - sun, 2 - top right leaf, 3 - in air (on right), 5 - middle left leaf, 6 - in trunk, 4 - root

ACROSS  
3. forest  
4. biotic  
5. consumer  
6. canopy  
7. understory  
11. succession  
12. snag  
13. broadleaf

DOWN  
1. natural resource  
2. producer  
8. decomposer  
9. Douglas-fir  
10. conifers  
14. renewable  
15. abiotic

Page 15:  
Disturbance: lightning-caused wildfire, volcano eruption  
Decomposer: mushrooms, flies  
Consumer: owl, deer, fox, squirrel, snake  
Producer: trees, shrubs, grasses  
Abiotic: stream, water, rocks, soil, air, rain, lightning  
Biotic: owl, deer, fox, squirrel, snake, trees, shrubs, grasses, mushrooms

Page 12-13: Possible Answers  
In the past frequent, low-intensity wildfire would eliminate most juniper. But fire suppression activity in the past 100 years has allowed more juniper to grow than the land can support.

Page 5: All these things are important to life on Earth. Any answer is right, as long as you provided solid reasoning for your response.

Young forests contain seedlings, saplings, leafy shrubs and grasses, and usually provide lots of things animals like to eat. Animals you might find here include the striped skunk, deer mouse and black bear. (see page 5)

Middle-aged forests have taller trees growing close together. The forest canopy closes, which means you can walk around under the tree branches in the shade. This also allows for different plants on the ground. Animals that like this habitat include the garter snake, red-tailed hawk and Pacific tree frog. (see page 5)

YOUNG OPEN FORESTS

MIDDLE-AGED FORESTS

OLDER FORESTS

# FOREST LIFE CYCLE

Older forests have some very large trees, as well as smaller, younger trees. There is a dense overstory. The understory includes snags, down logs and shrubs. Animals likely to be found here include the pileated woodpecker, northern flying squirrel and northern spotted owl. (see page 5)

## FOREST ECOSYSTEMS ARE ALWAYS CHANGING.

A disturbance such as forest fire, a powerful windstorm or logging can clear out part of a forest. Planted seedlings, as well as naturally sprouted seedlings, will soon start to grow in the opening, and over time a new forest emerges. This change is called succession.

That's why, even without logging, there would be openings and new, young forests.

Some kinds of trees like these open, sunny places. Lodgepole pine, western larch and Douglas-fir, for example, are often the first trees to sprout in a clearing. As the forest gets older they may be joined or even replaced by other kinds of trees. Likewise, you find different kinds of animals living in forests of different ages.

## WORDS TO KNOW:

### succession

The replacement of one living community with another. For instance, a new, young forest replaces an older forest that was burned or harvested.

### snag

A dead tree that's still standing. Many kinds of animals live in snags, from insects to owls to raccoons.

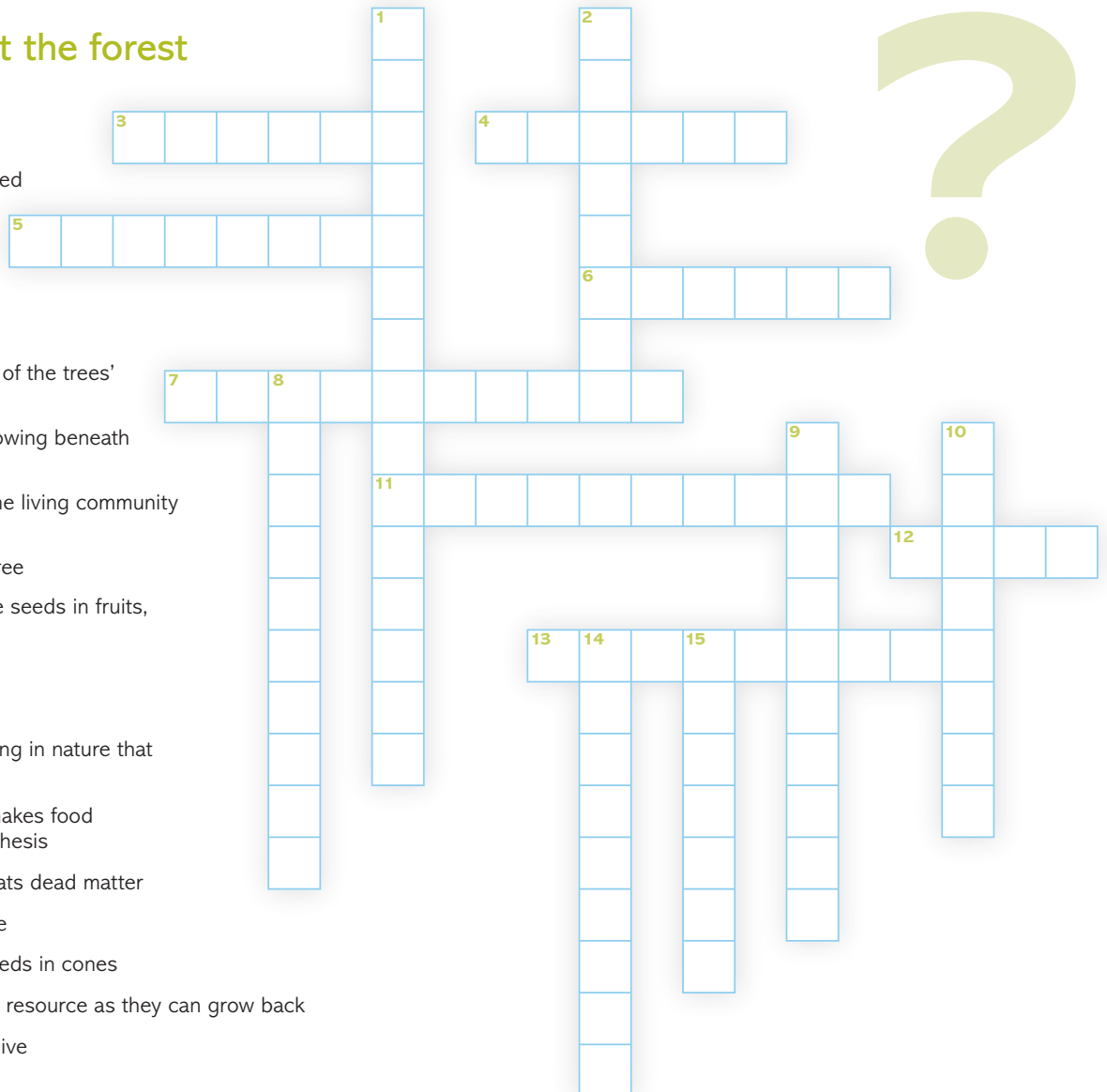
## Talking about the forest

### ACROSS

3. A large area covered with trees
4. Living or once living
5. Living thing that eats animals
6. Forest layer made of the trees' branches
7. Layer of plants growing beneath the forest canopy
11. Replacement of one living community with another
12. A standing dead tree
13. Trees that produce seeds in fruits, flowers or nuts

### DOWN

1. Something occurring in nature that people use
2. Living thing that makes food through photosynthesis
8. Living thing that eats dead matter
9. Oregon's state tree
10. Trees that have seeds in cones
14. Trees are a \_\_\_\_\_ resource as they can grow back
15. Not living; never alive



# WHAT DO TREES

All this talk about trees! What is a tree, anyway? You pretty much know one when you see one, although there's not one "official" scientific definition.

You could say: A tree is a woody plant that is usually at least 10 or 12 feet tall when it's mature – that's about as tall at two grownups stacked on top of each other. But trees are often a lot taller than that! Trees usually have a single main woody stem, which we call a trunk, and a canopy of leaves if the tree is a broadleaf or a canopy of needles if it's a conifer.

A few pages back we talked about how the many things in a forest interact as an ecosystem. Trees have many different roles in the ecosystem.

## WORDS TO KNOW:

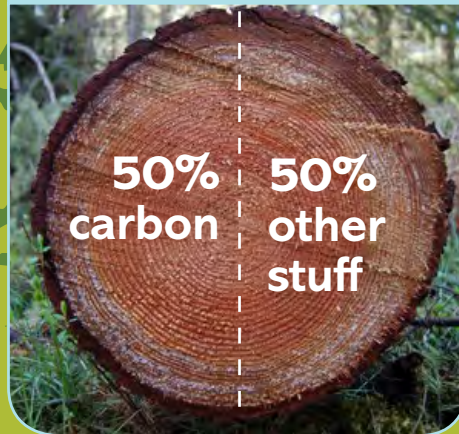
### **broadleaf**

Trees that have broad, flat leaves and produce seeds in fruits, flowers or nuts.

### **conifer**

Trees that have needle-like or scale-like leaves and produce seeds in cones.

Trees absorb carbon dioxide from the atmosphere and store the carbon as wood.



Tree trunks and branches provide habitat for animals.

Like a person drinking through a straw, roots suck water from the soil, controlling runoff.





# DO?

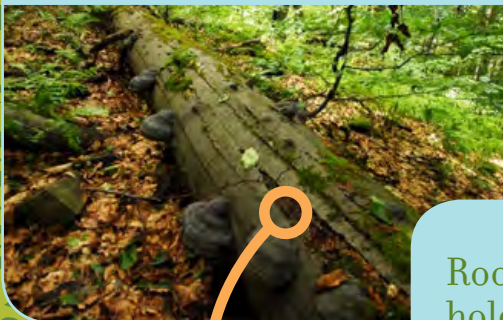


The canopy provides shade that keeps the ground and streams cool for fish and wildlife.

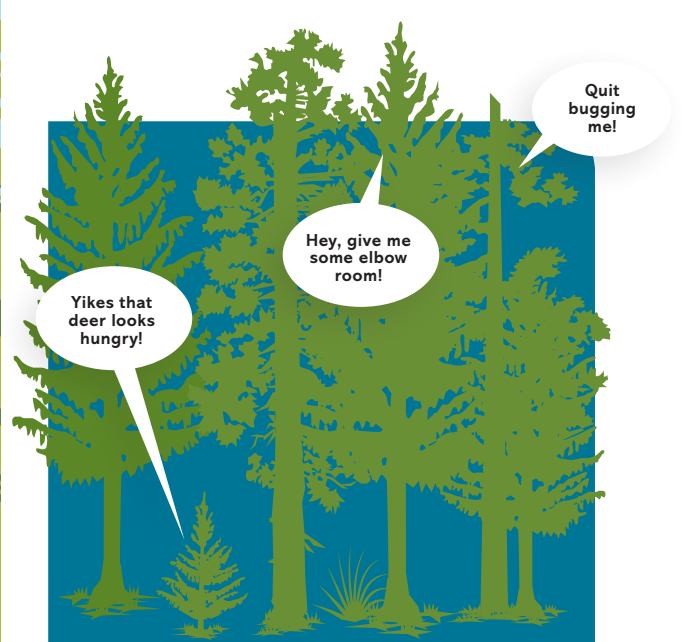
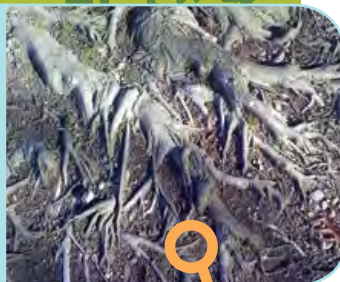


Leaves and needles release oxygen into the air, which animals and people breathe.

Fallen trees rot and decompose, giving their nutrients back to the soil.



Roots hold soil in place.



## It's tough being a tree

It's not easy getting to be a full-grown tree. Many tree seeds are eaten by animals like squirrels before they even sprout. Those that do sprout may be eaten by an animal such as a deer.

Once they get a little bigger, trees have to compete with each other. There is only so much water in the ground and only so many nutrients in the soil. As a new forest takes hold, trees compete for these things – and for sunlight, too. Trees that grow taller faster get more sunlight. Trees that don't get enough water, minerals and sunlight can become weak and more easily killed by insects, disease or fire. Some species of trees do well growing in the shade. Others like to be in the full sun.

As with animals and people, many trees survive all these difficulties to grow large and strong – but as time passes even they grow old and become weaker, and eventually they die.

# Photosynthesis

So how do trees grow and survive? They make their own food, using sunlight. It's called "photosynthesis." Basically, trees are like big solar panels. Here's how it works: The leaves or needles of a tree absorb carbon dioxide from the air. Meanwhile, the roots drink up water and minerals from the ground. Sunlight also hits the leaves or needles. Sunlight is energy. The tree uses that energy to combine the carbon dioxide, water and minerals from the soil to make sugars that the tree uses for food to grow.

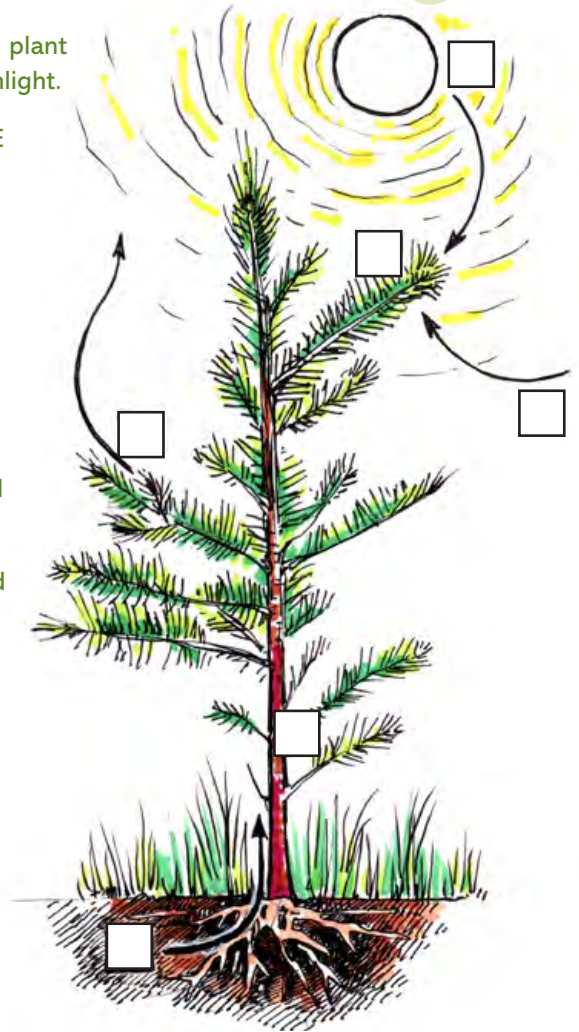
Oxygen is a byproduct of photosynthesis, which means it's left over. Plants use some, but most of it is released into the air. That's nice for us, because humans and animals need to breathe oxygen to survive. A lot of the oxygen we breathe comes from the Earth's forests.

You've heard of "global warming" or "climate change"? This may be occurring because there is an increasing amount of carbon dioxide in the atmosphere. **TREES HELP BY ABSORBING CARBON DIOXIDE AND STORING THE CARBON** in the wood, roots and leaves of the tree. One nice thing about wood is that when you cut down a tree and saw it into lumber, the carbon stays in the wood – at least until it burns or decays. A house or building made of wood can store tons of carbon for a long time.

## How do plants grow?

Plants make their own food through photosynthesis ("putting together with light"). In each box below, write the description number matching that step of the process.

1. SUNLIGHT provides the energy for photosynthesis.
2. CHLOROPHYLL in plant leaves absorb sunlight.
3. CARBON DIOXIDE from the air and
4. WATER from the soil combine in the leaves to make sugar.
5. OXYGEN is left over and released into the air.
6. CARBON is stored in the woody tissues of the plant.



## Benefits of the forest

How do Oregon's forests help reduce the effects of global climate change?

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# CHANGING THE ECOSYSTEM ON PURPOSE

We know that in a forest ecosystem changing just one thing can affect many other things, because everything is connected. And in fact, people often do things to affect the forest on purpose. This is called “forest management.” A person who has a job as a forest manager does things in the forest to achieve certain goals.

But a forest manager also wants to make sure that a stream and the fish that live in it are not harmed.

## THREE TYPES OF FORESTLAND MANAGEMENT IN OREGON:



## Not much waste

A log is brought out of the forest and turned into things people will buy. Hardly anything is wasted. At first a log might go to a mill, where it is sawn into boards or peeled to make veneer for plywood. Because logs are round and boards are square, you can imagine there is some left over. These leftover piles of woodchips and sawdust usually are sold to other mills. They are used to make paper or other products like particleboard. Some of the chips also get burned to make electricity or heat. Some end up under the swings on the playground – which make for a softer landing if you crash! Even the bark is made into mulch for gardens and landscaping. At the end of all this, practically none of the original log is left.



# ADVENTURES OF A FORESTER MANAGER

Grow wood here –  
and be careful of  
the stream, please!

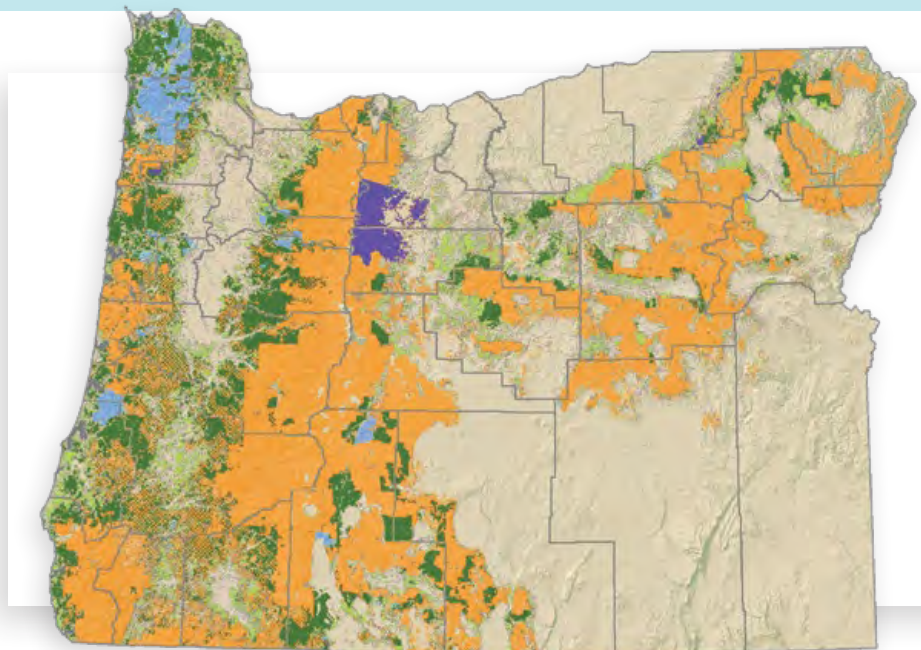


## WOOD PRODUCTION

Let's assume we want to get wood from the forest.

We need to make sure we don't cut down the forest faster than it can be replenished. And we want to make sure the forest can keep doing all the good things it does, like making clean water and giving animals a place to live. So we harvest some trees. But we also leave some trees alongside the stream to shade the water. The fish prefer that. And after the harvest, we replant the land with tree seedlings. The Oregon Forest Practices Act requires that streams be protected and trees be planted after logging.

The decisions a forest manager makes often depends on who owns the forest. **IN OREGON, THE UNITED STATES GOVERNMENT MANAGES 60 PERCENT OF THE FOREST**, including the national forests. The state of Oregon manages some forests too. Private companies and families own and manage forests. The public forests actually belong to all of us.



This old forest is looking pretty good

Good place for a mountain bike trail!



### RESERVE

Some forests are left to be mostly wild places, like wilderness areas, where parts of the forest can grow to be very old and provide habitat for those animals that like older forests. But because humans have changed the ecosystem in some ways – by working hard to put out forest fires, for instance – a forest manager may need to do some of the work that a forest fire would have done. In some pine forests in eastern Oregon, forest managers “thin” the woods by cutting down selected trees here and there to make the forests more like they would be if periodic, low-intensity fire was still part of the ecosystem. No logging at all is allowed in forests designated wilderness areas.

### MULTI-RESOURCE

Finally, some land is kept for other uses, like hiking and camping, protecting wildlife, clean water and some logging. You'll find trails and campgrounds and some timber harvests in certain areas.

## Who owns the forest?

- FEDERAL GOVERNMENT
- LARGE PRIVATE
- SMALL PRIVATE
- STATE & OTHER PUBLIC
- TRIBAL

## What do you think?

In your opinion, which is the most important type of forestland management: wood production, multi-resource or reserve? Why?

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# FOREST CAREERS



## What do forest scientists do?

Of every 30 workers in Oregon, one of them has a job related to forests – from **WILDLAND FIREFIGHTERS** to **LOGGERS** to **SCIENTISTS** to **FOREST MANAGERS** to **PAPER MILL WORKERS**. That’s a lot of people. About **60,000** of them.

In Oregon, many scientists are working to understand how things such as logging, roads and fire affect the forest ecosystem.

Here’s an example: In the 1960s, **SCIENTISTS DID A BIG EXPERIMENT TO LEARN HOW LOGGING AFFECTS STREAMS**. It was called the Alsea Paired Watershed Study, and it took 14 years! Scientists found three similar streams in a forest to compare. They counted fish, took the temperature of the water, and measured how much water and dirt was in each stream.

Then, the land around one stream was logged. The land around another stream was logged, but trees close to the streams were left untouched. Around the third stream, there was no logging.

The scientists collected data on what happened for the next few years, measuring all the same things. They found that it really helped the streams and fish to leave the trees next to the streams. This idea became part of a law called the Oregon Forest Practices Act.

Today, scientists are repeating the same kind of experiment to check how logging under today’s rules might affect streams.

# Decisions, decisions: How do you choose?

In this book, we've explored the good things forests do and the good things they provide. Many jobs would not exist if we didn't harvest trees for their wood. Nor would we have many of the wood and paper products we use every day.

Oregonians have abundant clean drinking water because of the forest. Fish and animals depend on the forest for places to live and food to survive.

Some of these things conflict with each other. That's why there are about 280 rules for working in the forest. **280 RULES!** Think about that next time your principal or teacher talks about rules at your school. But following these rules helps Oregon care for its forests.

People still sometimes argue about what's best. But that's all part of the debate that happens as Oregon's leaders try to find the right balance of all the good things that come from the forest. It's how we try to make sure that the natural resource known as the forest is sustainable.



## What can you do to help Oregon's forests?

**PREVENT WILDFIRE:** Lightning starts some fires, but humans start most fires by accident. Be super careful with fire near the woods. For instance, always put out campfires until they are cold to the touch.

**STAY ON MARKED TRAILS:** To disturb the forest as little as possible, it's best to stay on the trail if you are hiking, camping or riding a bike. Taking a "shortcut" can cause unnecessary erosion or kill sensitive plants.

**PICK UP LITTER:** Trash isn't just ugly. Some types of trash can hurt animals or fish. So pick it up and dispose of it properly.

**VOLUNTEER TO MAKE FORESTS BETTER:** Groups called watershed councils and land trusts work on projects to clean streams of trash or pull out invasive plants. They often need volunteers. Other groups plant trees and work on trails. Find something that's important to you and lend a hand.

### My pledge

What will you do to help our forests?

- Visit a forest.
- Leave no litter and stay on marked trails.
- Find and read a library book about Oregon's forests.
- Use paper and other forest products wisely.
- Do what I can to prevent wildfire.
- Volunteer to improve forest health.
- Learn about a job I could do in the forest

NAME \_\_\_\_\_

DATE \_\_\_\_\_

### What did you learn?

We started this book asking: Why should you care about the forest?  
Can you list some reasons now?

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## ABOUT OFRI


The Oregon Forest Resources Institute (OFRI) is a state agency whose mission is to advance public understanding of how forest stewardship meets the social, environmental and economic needs of both present and future generations. OFRI works closely with the scientific, academic and educational communities at Oregon State University, the Oregon Department of Forestry and other agencies to ensure its K-12 resources are accurate and objective.



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