



Bureau of Land Management

Junior Explorer



Junior Naturalist

National Historic

OREGON TRAIL

INTERPRETIVE CENTER

Activity Book

Words to know:

Ecosystem: All of the living organisms in an area, such as plants, birds and insects, interacting with one another and their non-living environment, such as soil, water and climate.

Climate: The general, long-term weather pattern for a large area of the earth, including temperature, rain, and wind. For example, Central America has a warmer, more tropical climate than our climate in North America.

Cryptobiotic soils: Soil crusts, made up of soil bacteria, lichens and mosses.

Nocturnal: Being most active at night.

Diurnal: Being most active during the day.

Crepuscular: Being most active in the morning and in the evening.

Carnivore: An animal that eats mostly other animals.

Herbivore: An animal that eats mostly plants.

Omnivore: An animal that eats both animals and plants.

Geology: The scientific study of the origin, history, and structure of the earth (there are more geology words to know on page 13).

Tridentate: A leaf with three tooth-shaped points.

Threatened and endangered species: Animals or plants present in such small numbers that they could easily become extinct.

Field notes: Records of observations or interpretations made by scientists and naturalists of their work while out in the field. This includes written notes, photographs, drawings, videos or tape-recordings.

Would you like to be a Trail Master?



Hi! I'm Gus, the ground squirrel, and I'm going to be your nature guide today. Look for me throughout this book as I help you along with information and fun activities you can do to become a Trail Master. The vocabulary words on the page at left and on page 13 will help you understand the things we'll explore. If you have any questions, just ask one of those friendly Interpretive Center people. They like to answer questions.

And remember: take notes! All good adventurers make field notes so that they can remember and share all of the amazing things that they have seen.

How You Can Become a Trail Master:

1. Walk around the Flagstaff Hill trail loop, read the signs, and make field notes and drawings of the plants, rocks, and any wildlife you see (there's a Field Note Sketchpage for drawings and notes on page 15).
2. If you are 6-8 years old, complete 3 or more field notes or observations. If you are 9-12 years old, complete 5 or more field notes or observations.
3. To receive your Trail Master Certificate, take your completed Junior Naturalist Guide to one of the Interpretive Center workers, or mail it to the address on the back of this book, with your return address, so we can mail your Certificate to you.

Beginning Our Adventure

The National Historic Oregon Trail Interpretive Center is a special place. It was created in 1992 to provide an educational and interpretive examination of the Oregon Trail Experience. Historians, naturalists and scientists come to this site every year to study the Oregon Trail and local and natural history.

As a Trail Master at the Interpretive Center you can help by exploring our area's rich natural history, learning to read the signs of nature, and sharing your discoveries with your family and friends.

The ecosystem around the Interpretive Center is called a sagebrush steppe ecosystem. The name "sagebrush" comes from the sagebrush plant, which is the most abundant plant in this ecosystem. The word "steppe" is a Russian word meaning "treeless plain." The summers are very hot and dry here with almost no rain at all, while the winters are really cold with lots of snow. With such a harsh climate, how can anything survive out here? Let's find out!

Plants



A plant combines sunshine, carbon dioxide from the air, and nutrients from the soil to build its leaves and flowers. This process is called photosynthesis, and it's very important because as the plants take in carbon dioxide they give off oxygen (the air we breathe), and they become food for many different kinds of animals, including you!



Desert-Parsley *Lomatium erythrocarpum*

The sagebrush steppe has many plants uniquely adapted to survive in the dry environment, unusual geological formations and extreme weather changes from season to season.

Small size and tiny leaves are two adaptations that help steppe plants hold in water or resist cold weather.

The red-fruited desert-parsley is a tiny plant that, out of the entire world, only grows here in the Elkhorn Mountains of Baker County.

Sagebrush Mariposa *Calochortus macrocarpus*

The sagebrush mariposa is a more common species that, much like a butterfly, adds splashes of pink to the dusty-green steppe.

A member of the lily family, the mariposa flower has only three petals. A darker magenta band and many yellow hairs brighten its center. It has a single green leaf that withers before the plant flowers, helping the plant conserve energy in this harsh environment.

If you look carefully, you may see this lily in bloom along the paths here in mid to late July. This lovely flower has become more rare due to people picking it. So just look, and leave it for the next person to enjoy!





Sagebrush *Artemisia tridentata*

The most common steppe plant you'll find is the sagebrush. However, several other shrubs, such as gray horsebrush and green rabbitbrush, live here as well. Can you tell the difference?

Though many plants of the sagebrush steppe have small, narrow leaves, sagebrush leaves are unique because they are *tridentate* (they have three small 'teeth' at the tip of the leaf). Most other shrubs around the Interpretive Center have *entire margins* (leaves with smooth edges).

As you walk along the trails, examine the leaves of different shrubs you see and try to identify which ones are sagebrush.

In the space at right, sketch a sagebrush leaf you've found. If you want, you can also sketch a leaf from another plant to compare the two, and make notes.



Insects



Insects have three pairs of legs, a pair of antennae on top of their heads, and wear their skeletons on the outsides of their bodies. More than 1,000 different insect species live in the sagebrush steppe ecosystem. There are butterflies, grasshoppers, beetles, midges, flies, moths, and many species of ants. Ants in particular are a very important part of this ecosystem.

What's so special about ants?



Like people, ants are very social and live in large colonies, much as we live in cities. They also have to work hard to provide food for the colony just like your parents work to provide food for you.

Where would I find an ant colony?

Along the trails look for a cleared spot of ground with a small hole in the center surrounded by small pebbles. Below-ground lives a harvester ant colony that could contain millions of ants.

Why do ants walk in lines?

You might see ants going in and out of their hole in lines. What they're doing is following a scent trail made with pheromones, chemicals that the ants use to make a trail they can follow so they won't get lost.

Why are harvester ants so important?

They spread plant seeds, feeding on the seeds and carrying them into their tunnels where some will eventually sprout. Many birds, lizards, and spiders also eat ants as part of their diet.



Field Notes:

How many kinds of insects did you see?

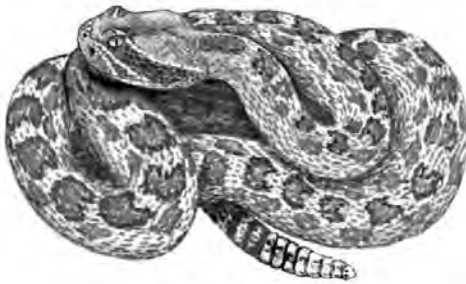
Where did you see them?

What were they doing?

Reptiles

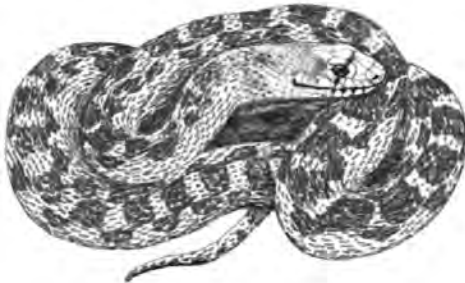


Most famous for being cold-blooded, reptiles cannot regulate their own body temperature and need to lie in the sun to warm up. They also have scales covering their skin, and most of them lay eggs. Lizards, snakes, turtles, crocodiles, and alligators are all reptiles. Here are some of the reptiles you might see in the sagebrush steppes.



Western Rattlesnake *Crotalis viridis*

Rattlesnakes are best known for the rattles they have on the tips of their tails that they use to warn other animals to leave them alone. Rattlesnakes have wide, triangular heads, slit-shaped pupils, and should be treated with extreme caution because they have a venomous bite. They are mostly crepuscular and nocturnal.



Gopher Snake *Pituophus melanoleucus*

Also called bullsnakes, these large, long, non-venomous snakes, are usually yellowish, with brown, black or sometimes reddish blotches. They often have a bad attitude. Though they are not rattlesnakes, when cornered they will often mimic one by flattening their heads and vibrating their rattle-less tails. If the vibrating tail strikes dried plants, it may sound like a rattlesnake.



Sagebrush Lizard *Sceloporus graciosus*

These small, brown-tan lizards blend in perfectly with their sagebrush environment. They typically have three light stripes running down their backs and can often be found sunning themselves on logs or rocks. They are mostly diurnal.

Field Notes:

How many kinds of reptiles did you see?

Where did you see them?

What were they doing?

Birds



Birds are covered with feathers instead of scales or hair, and have beaks instead of teeth. There are many different kinds of birds, including songbirds such as sparrows, birds of prey like hawks and eagles, and waterfowl such as ducks and geese.

Birds come in all colors, shapes, and sizes, and eat everything from algae to grass, grains, and even other animals. Like all animals, what a bird eats and how it looks can help you figure out where a bird is most likely to be found and also how to identify it.



Brewer's Sparrow *Spizella breweri*

These small, grayish birds have brown streaks and long notched tails. They are perfectly colored to blend into the sagebrush environment, and can go for a long time without water, getting all of the moisture they need from the seeds and bugs they eat.

Say's Phoebe *Sayornis saya*

Medium-sized flycatchers, these birds have rusty orange bellies with pale brown backs and black tails. You might see them darting from bush to bush, catching insects in mid-air.

American Kestrel *Falco sparverius*

The second smallest falcons in the world, these robin-sized raptors are our most common falcons. They are also one of the most colorful, being reddish brown with pale spotted or streaked bellies. Males have bright blue on their wings while females are reddish brown. These little falcons can dive at speeds between 60 and 70 mph!

Swainson's Hawk *Buteo swainsoni*

These medium-sized hawks have dark upperparts, stout bodies, and brown breasts. They often follow tractors or stay close to prairie fires to catch any fleeing insects, mice or rabbits.



Turkey Vulture *Cathartes aura*

Very large, dark brown-black birds with light edges on their underwings and bald red heads, turkey vultures feed on dead animals which they find with their excellent sense of smell. While soaring, they rarely flap their wings.



Golden Eagle *Aquila chrysaetos*

One of the largest birds of prey in North America, golden eagles are dark brown all over with a golden sheen on their heads. Young birds have white patches on their underwings and tail. Adults have been known to hunt full grown deer!



California Quail *Callipepla californica*

Not all birds are high-flyers! California quail, sage grouse, and partridges are all ground-dwelling birds that can only fly short distances. California quail are gray with heavily marked bellies, a dark mask, and a black feather plume curling down over their foreheads.



Gray Partridge *Francolinus francolinus*

These chunky, chicken-like gray birds from Eurasia were introduced by humans to North America. Males and females have brownish streaks on their sides, but only males have an orange face. You might hear them cackling.

Field Notes:

How many kinds of birds did you see?

Where did you see them?

What were they doing?

Mammals



Finally, my favorite group of animals! The key characteristics of mammals are that they have hair on their bodies at some point in their life and that they feed their babies with milk. Mammals are one of the most dominant animals on earth due to the fact that most of us are warm-blooded, giving us an exceptional ability to adapt to our environment. I'm a mammal and so are you!



Yellowbelly Marmot *Marmota flaviventris*

A larger version of ground squirrels, they have gray, heavy-set bodies with bushy brown tails and pale yellow bellies, perfect for blending in with the rocks they burrow under. Watch for them sunning on large rocks. They are herbivores.



Belding's Ground Squirrel *Citellus beldingi*

These small gray ground squirrels, with a brown streak running down their backs, are nature's nappers, sleeping for up to nine months out of the year. They often sit up very straight to watch for danger. Their local nickname is "whistle pup." These rodents are omnivores.



Mountain Cottontail *Sylvilagus nuttalli*

Medium-sized greyish-brown rabbits with pale bellies and cottony white puffs for tails, these cottontails have relatively short and rounded ears. Watch for them in brushy, rocky areas. They are herbivores, feeding on sagebrush, grasses and leafy plants.



Black-tail Jackrabbit *Lepus californicus*

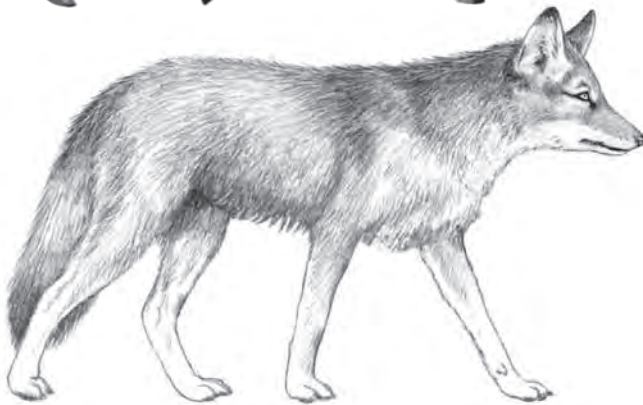
Large, silvery-tan in color with black on their tails and the tips of their huge long ears, these hares have very long hind legs and can run up to 36 miles per hour. They rarely need to drink water and actually get some of their water from eating their own droppings!



American Badger *Taxidea taxus*
Badgers have a heavy, flat yellowish-gray bodies, short legs, long front claws, black stripes on the face, and ears that lie close to the head. They are the strongest mammals for their size and also the fastest diggers. They can even dig through cement! These animals are mostly carnivorous, digging out and eating marmots, ground squirrels, and mice. Watch for the large holes they have dug.



Pronghorn *Antilocapra americana*
The fastest land animal in North America, deer-sized pronghorn are easily identified by their tan bodies, white rumps and collar patches, and dark horns with a single branch or “prong.” These antelopes are sometimes seen in herds. They eat sagebrush and can run at speeds of up to 40 miles per hour!



Coyote *Canis latrans*
You might have already seen these highly adaptive creatures in your neighborhood. The size and shape of a medium-sized dog, but with bushy tails, they are a combination of reddish and grayish-brown, with pale throats and bellies. They are omnivorous, will eat almost anything, and often play the trickster in Native American stories. Listen for their yodeling call.

Field Notes:

How many kinds of mammals did you see?

Where did you see them?

What were they doing?

Geology



This cross section shows the major geological features around the Interpretive Center. Which of these features can you actually see from Flagstaff Hill (where the Interpretive Center is). How do you think geologists figure out things they can't see on the surface? **Write some ideas in the space below.**

Elkhorn Range

The rock that makes up these mountains used to be part of an ancient sea floor and coastal plain.

Between 300 and 150 million years ago, they were fused onto the continent by the eastward movement of the sea floor as it was pulled down under North America (accreted), like the Wallowa Mountains.

Granite Batholiths

Molten rock rose up beneath Eastern Oregon after accretion stopped,

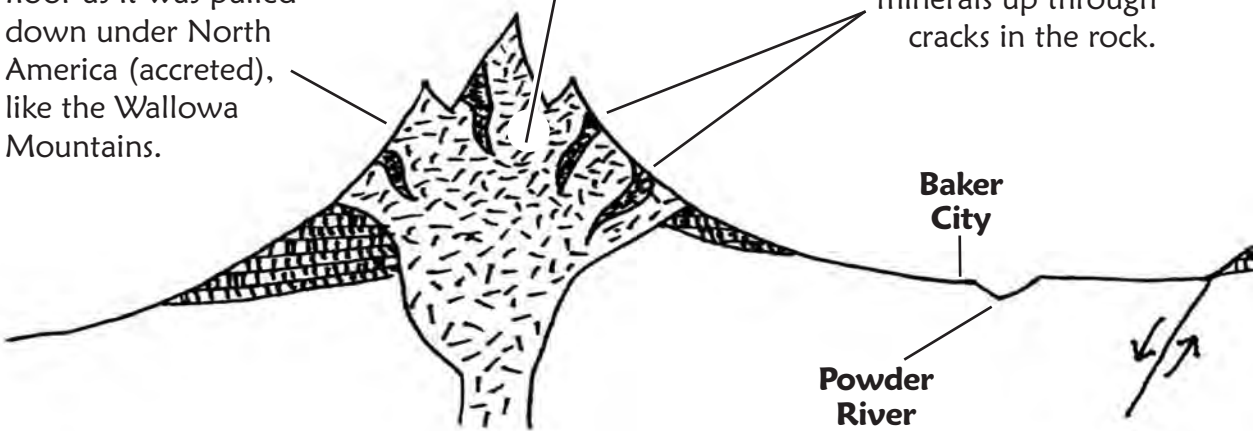
The batholiths pushed up the Elkhorns and Wallowas into the mountain ranges you see today.

The batholiths in the picture below are the dashed areas inside the mountain ranges.

Gold Veins

Veins of quartz, altered rock, gold and other minerals make Eastern Oregon a rich mining district.

These veins form when hot fluids and gases rise from deep in the Earth along with the batholiths, bringing melted rocks and minerals up through cracks in the rock.



Columbia River Flood Basalt

Between 17 and 10 million years ago, a tremendous volume of basaltic lava erupted from cracks in the Earth in eastern Oregon and western Idaho, covering about 63,000 square miles of Oregon, Washington, and Idaho with basalt.

The rock layers are thousands of feet deep in some places and flowed as far as the Pacific Ocean. Flagstaff Hill is a large bluff of flood basalt.

Wallowa Range

These mountains used to be volcanic islands in the ocean west of North America, about 300 million years ago when the shore of the Pacific Ocean was near Boise, Idaho.

As the ocean floor slid down underneath the continent, the islands were scraped off against the edge of the continent, in the process of continent-building called accretion.

Geology words to know

molten rock: rock heated up in the Earth's depths until it turns liquid, like melted chocolate.

batholith: molten rock which rises up from the hot depths of the Earth, then cools.

fault: a crack in the Earth's crust where the ground on each side is moving in different directions.

subduction: when two sections of earth meet and one is pushed under the other, down into the Earth's hot depths.

accretion: rocks and earth scraped off and piled up against the edge of the continent during subduction.

The Oregon Trail Interpretive Center at Panorama Point

Virtue Flat

Flagstaff Hill

Fault Trace The ground on either side of the crack at left is moving in the direction of the arrows. From Panorama Point you can see this extension fault (where the ground is being pulled apart) running along the base of Flagstaff Hill and north up the Powder River Valley. The valley floor is sinking and the sagebrushy hills are rising.

Leave No Trace



At home, you've probably learned all about recycling and conserving energy and water by doing things like turning off the lights when you leave the room and turning off the faucet when you're not using water, but did you know that there are certain guidelines you should follow on hikes too? It's all about keeping nature clean so that we'll all still be able to enjoy the great plants and animals you learned about for many, many more years!

Read the choices below, then draw a line from the activity on the left to the action you should take on the right. One has been done for you.

Hiking Guidelines

You find an animal den and nobody seems to be home.

You finish a candy bar while on a hike and have only the wrapper left.

You want to walk across an area where there are cryptobiotic soils.

A cute squirrel runs up to you and looks hungry.

You're on a hike and you have to go to the bathroom.

You want to make a campfire.

Pack out all your trash and throw it in a trash can when you get back.

Bring a fire pan and pack out your ashes.

Use a "Wag Bag" or dig a cat-hole 6-8 inches deep, 200 feet away from water. Carry out your toilet paper.

Stay on trails or walk in washes when possible.

Don't feed animals, no matter how hungry or cute they look.

Leave it for other people to see and/or take a picture to remember it. An animal might be coming back later.

Your Field Note Sketch Page



That was fun! I'm glad you came along with me today to explore our sagebrush steppe. I hope you learned a lot and will come back soon!

When the first naturalists came over the Oregon Trail, they had to do all their own drawings of the animals and plants they saw.

Below is some extra space to draw your own field sketches of the sagebrush steppe ecosystem. Draw two or more different plants that you saw today and three animals that you saw and/or learned about. Add notes, too, if you want.

The Oregon Department of Education has developed content standards for each grade level, focusing on what constitutes essential knowledge and skills in each content area.

This nature guide encompasses many of these standards, including:

- Making observations about the natural world,
- Recording observations with pictures, numbers, or written statements,
- Comparing and contrasting the characteristics of living and non-living things, and
- Comparing and contrasting the changes in the surface of the Earth that are due to slow and rapid processes.

Trail Master Certificate

This is to certify that

*has completed the
National Historic Oregon Trail Interpretive Center
Junior Naturalist Guide*

and is hereby designated a

Trail Master

*in good standing
with the*

Bureau of Land Management

Official signature

Date



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