Hey Elliott - are we lost?

From Desert Floor to Mountain Summit Central Oregon is Truly Unique

In the fall of 1853, one of Oregon’s famous “lost” wagon trains, the Elliott Cutoff Party, was struggling desperately to reach Middle Fork Pass south of Diamond Peak. For months they toiled across high desert plains and through formidable wilderness. Their goal was to reach the Willamette Valley before the first snow. Their journey brought them to the edge of what is now called the Deschutes National Forest. They were exhausted, thirsty, covered with dirt and in the wrong place.

The wagon train labored for days across the parched high desert between Malheur Lake and Bend. Today there is still no surface water except for the occasional stock or irrigation pond. Sagebrush, rabbit brush and juniper trees survive in the thin volcanic soil. Newberry Volcano and Pine Mountain rise out of a grey-green desert sea. Little rain falls but small, hearty wildflowers still flourish.

Golden eagles, hawks and bald eagles soar above. Sage grouse strut flamboyant mating dances. Horned larks rustle among the shrubs, coyotes scavange for a meal and lean rabbits browse in fits and starts. In winter mule deer and elk forage for food. To the south antelope graze on dry Fort Rock Lake Basin bunch grasses.

Waterless days in that trackless waste must have seemed bitterly endless to the Elliott Party. No amount of cajoling would have convinced our pioneers that the empty high desert would one day be a haven for leisurely pleasures...

forest meadows. Blue birds, nuthatches and chickadees sing in the trees. Osprey make breathtaking dives into streams and lakes. Nature’s bounty lured humans in the past and keeps them here today.

No amount of cajoling would have convinced our pioneers that the empty high desert would one day be a haven for leisurely pleasures...

In the past 153 years Elijah Elliott’s wilderness has changed greatly. The stately, open groves of ponderosa pine, handiwork of frequent fires, are mostly gone. Forests of lodgepole pine are more widespread but the volcanic soil still supports manzanita, bitter brush and a medley of wildflowers. Life flourishes because, unlike the high desert, water is plentiful. The Deschutes River and its tributaries shelter fish in shadows along brushy stream banks. Mule deer and elk graze in summer.
Welcome to the Deschutes

To a Sand County Almanac, Aldo Leopold wrote, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

We on the Deschutes National Forest value the beauty and diversity of the resources we manage and welcome you to enjoy this special place.

A wide variety of recreational opportunities, diverse landscapes, breathtaking scenery, and abundant wildlife awaits you. Take advantage of Forest Service offices and visitor centers for current information about places to see, what to do, and how to get there.

Enjoy your stay in central Oregon. We look forward to caring for the land and serving you during your stay in the Deschutes National Forest.

Thanks for joining us.

Nice Doggy, Let Go of the Ranger, Sweetheart

My dog thinks his name is Zephyr-L-Love-You and hiking without at least one of my five "best friends" wouldn't be fun, for me. We forest rangers see more and more people hiking, mountain biking, horseback riding, camping, boating, skiing, even snowmobiling and riding ATVs in the Forest with canine family members. We also see more close encounters between dogs and people.

"He's never done that before... she's always been so good with kids. I meant to bring his tags but he's never run away..." Doggone it, this could be you and your dog! As you hike, be a partner in preserving the Forest by respecting it and respecting other users of the Forest.

Plants Grow by the Inch and Die by the Foot

Plantlife and soils are fragile. Here where trails exist, stay on them, and do not cut across curves or switchbacks.

Natural Landscaping

Collecting of wild plants is allowed on some parts of this National Forest. Call your local Forest Service office for an explanation of which plants can be collected where.

Protecting the Past for the Future

Cultural materials within the Monument and National Forest such as rock art and arrowheads, are protected by law. Increasing vandalism and theft are taking a priceless toll. The Archaeological Resources Protection Act provides for stiff fines and/or jail terms for anyone who knowingly damages or removes these links to our heritage. Help protect them by looking but not collecting. Report any suspicious activity to a ranger.

Fire is a real danger in the high desert and mountain wilderness areas

Camp stoves are recommended to minimize fire danger and environmental damage. Watch for special fire restriction alerts - especially during late-summer.

Don't Get Burned By Collecting the Wrong Volcanic Rock

Our visitors often ask where they can collect a sample of the local rocks. That depends a great deal on where you are and what you want. No rocks (artifacts, plants or animals) can be removed from the Newberry National Volcanic Monument. Outside the Monument, on public lands not designated as protected, small amounts of rocks can usually be collected without a permit. The allowable amounts vary according to what is being taken. Contact the Forest Service requires a special permit. Please ask at a local Forest Service, Bureau of Land Management or State Parks office before removing anything.

WELCOME!

Basic Safety

When venturing out for the day, know your physical limitations. Always carry plenty of water... and drink it! Wear sturdy footwear; the terrain here can be rugged and unforgiving. Do not hike alone. Tell someone your trip plans (destination and estimated return). Use maps. If your vehicle breaks down, stay with it. It is much easier to find a vehicle than a wandering person. Should you find yourself in trouble, do not panic. If you have followed basic precautions, help will soon be on the way.

Deschutes County Emergency - DIAL 911

More important numbers to know on page 16

Weather Safety

Central Oregon's weather can change drastically in a short period of time. Be aware whether you're hiking, boating, backpacking or just sightseeing. The summer temperatures can reach as high as 100 in the daytime and may dip into the 30's at night. In June it can snow in July! Be prepared!

Car Clouting (in 15 seconds or less)

Trailheads, parks and monuments have become increasingly popular sites for car clouting, vandalism and thefts from vehicles. An experienced car clown can break into a vehicle in less than 15 seconds and take everything of value in sight. Car clouters prefer to prowl parking lots and campgrounds. If you are hiking or camping take all of your valuables with you or keep them hidden in your trunk. Notify authorities immediately if you see suspicious characters or if you are a victim of car clouting or any other crime.

Volcanic Vistas

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Contributors: Larry Pratt, Ben Roux, Harry Moogerah and thanks to all the Forest Service specialists who contributed.

Paid for by: Northwest Interpretive Association (NIVA). Educating for the future: linking people, nature and history through interpretation. NIVA is a non-profit organization that operates educational sales areas. Money received through sales and donations helps support education, interpretation and research on the Deschutes National Forest. Visit our sales areas at Forest Service offices and visitor centers.
**Scenic Byways (Originating from Bend)**

- **Cascade Lakes Tour**
  - **Distance:** 87-100 Miles
  - **Directions:** From Bend take Highway 97 south to Sunriver exit 15 miles. Proceed on Highway 40 west 20 miles (Or Highway 42 southwest, 24 miles) to the Cascade Lakes Highway 46 (turn north). This Highway will bring you the 50 miles back to Bend.

- **McKenzie-Santiam Tour**
  - **Distance:** 130+ Miles
  - **Directions:** From Bend take Highway 20 west 21 miles to Sisters, on the west side of Sisters take Highway 242 (closed in winter months) 55 miles to Highway 126, from here head northeast to merge with Highway 20 and return to Sisters and Bend.

- **Points of Interest**
  - **Points of Interest (in order of appearance):** Drake Park (Bend), The High Desert Museum, Lava Lake, Benham Falls, Lava River Cave, Lava East Forest, Sunriver Nature Center, Pringle Falls, Deschutes River, Fall River (near Bend), Wickiup Reservoir, South Twin Lake, Crater Prairie Reserve, Owyhee Observation Point, Little Cultus Lake, Cultus Lake, Little Lava Lake, Lava Lake, Hosmer Lake, Elk Lake, Devils Lake, Sparks lake, Ray Atkeson Interpretive Trail, Todd Lake, Dutchman Flat, Mt. Bachelor, Swampy Lakes. From ponderosa pine to high alpine forests, lava fields, interesting geology, cinder cones, panoramic views, hiking, camping, lakes, fishing, bird and wildlife viewing.

- **Two Wild & Scenic Guys:**
  - The Deschutes and Metolius Rivers

**Deschutes River**
- Source: Cascade Range near Mt. Bachelor.
- The Deschutes begins as an outflow from Little Lava Lake, flows into Crane Prairie and Wickiup Reservoirs, tumbles through the high desert ending at the confluence with the Columbia about 15 miles east of The Dalles.
- **Wildlife:** Deer, elk, eagles, osprey, hawks, heron, waterfowl, mink, otter, beaver, bear.
- **Flora:** Wildflowers in central Oregon bloom along rivers first. Like most of the Deschutes, the area is a favorite stretch for anglers and boaters. The banks of the Deschutes are beautiful and in danger of being trampled by love. Much effort is going into repairing damage caused by use of users. Someone you know is probably volunteering their time to help. You can help a LOT by respecting restoration projects, staying on designated trails and leaving no trace of your visit.
- **Fun:** Whitewater rafting - outfitter guides offer 1, 2 or 3 day trips. Canoeing - Wickiup Reservoir to Benham Falls, with a portage around Pringle Falls, is a favorite stretch. And kayaking, fishing, mountain biking, hiking, horseback riding, and boating are all favorite pastimes. Rentals are available for most of the activities listed - check the local phone book.

**Metolius River**
- **Source:** The Metolius literally "burns" out of the ground along the base of Black Butte near Sisters, Oregon. It picks up volume from a series of springs, runs north and
- "Metolius Horn" and quickly ends its cold, clear journey in Lake Billy Chinook about 30 miles from the source.
- **Wildlife:** See Deschutes above.
- **Fish:** Yes. The river is about 50 feet wide, 50 degrees F and drops about 35 feet per mile. The steady flow and constant chilly temperature makes it unique among Oregon rivers and prime habitat for the rare Bull trout. Water quality is exceptional. Native species - Chinook and Sockeye salmon, Rainbow and Bull trout, Mountain Whitefish. Introduced species - Brown and Brook trout, Kokanee salmon.

**Who Will Be Visitor No. 2 Million?**

Not exactly a question that has been plaguing mankind but we're excited about it! Sometimes this August or early September the 2 millionth visitor to Lava Lands Visitor Center will come through the door. Our modest, friendly facility at the base of Lava Butte turns 21 years-old this year (hence, they grew up so fast don't they). We hope to host visitors from all walks of life and from around the world for decades or until the next eruption.

In honor of the 2,000,000th visitor the Deschutes National Forest is preparing a special award to be given along with a Northwest Interpretive Association bookstore gift certificate. Who knows? Maybe you'll be the lucky visitor! Stop in and see.

**Recreational Opportunities**

**Summer**
- **1. Hiking/backpacking**
- **2. Mt. biking**
- **3. Fishing**
- **4. Rafting/ kayaking**
- **5. Camping**
- **6. Horse Camping/Packing**
- **7. Sailing/windsurfing**
- **8. Canoeing**
- **9. Bird and wildlife watching**
- **10. Mt. Bachelor summit**

**Mountain Biking, Yes!**

The Deschutes National Forest offers many, many opportunities to experience the popular sport of mountain biking. With over 40 designated trails, beginner or expert can enjoy the forest's beautiful scenery and the challenge of seeing it on a bike. Check with a local bicycle shop for more information and maps of the mountain biking trails.

- **Favorite Trails:**
  - 1. Peter Skene Ogden Trail - uphill only. 8.9 miles.
  - 2. Waldo Lake Loop - 22 miles.
  - 3. Phil's Trail - 10 mile bike-only loop.
  - 4. Swamphy Lakes/Swede Ridge Trail - 4 or 9 mile loop.
  - 5. Sisters Mountain Bike Trail - 6 or 17 mile loop.

- **Rules of the Trail:**
  - 1. Ride on open, designated trails only.
  - 2. Ride in CONTROL.
  - 3. Always yield the trail to hikers only.
  - 4. Leave no trace - stay on the trail, and pack out all litter.
  - 5. Always wear a helmet
  - 6. Know your limits - plan accordingly.

**Fish in the Deschutes National Forest**

"Okey dokey, there are over 100 "fishable" lakes on this forest here. You have your large, windswind bodies of water like  
Crane Prairie Reservoir and Lake Billy Chinook, or your small, what you might call, more intimate-like lakes in the three Sisters Wilderness. Plus, those two federally-designated, Wild and Scenic major rivers, the  
Deschutes and Metolius, which offer anglers, your rushing-water-like thrill of river fishing."

**Species in High Cascades lakes - brook and rainbow trout; also lake trout, Atlantic salmon, and kokanee found in some lakes.**

- **Popular lakes -** Crane Prairie, Davis, Oddie, Lava, Crescent, Wickiup, Suttle, Paulina, East, and Lake Billy Chinook. Season opens late spring. Higher elevation lakes may be blocked by snow until late July. Observe posted speed limits, electric motors only on Hosmer Lake, catch-and-release only for Atlantic salmon in Hosmer and for wild trout in the Metolius River.

A valid Oregon fishing license is required for all persons 14 years of age or older. Refer to the Oregon sports fishing regulations booklet for more information and details on fishing opportunities. The Oregon Department of Fish and Wildlife, in cooperation with the Forest Service, stocks many of the lakes and oversees their management.
What's Buggin' Ya

An interview with Forest Pathologist Helen Maffei, Ph.D.

What happened on the Santiam Pass (Highway 20, over the Cascades) and what tools will the Forest Service use to restore the forest's health? Can't they fix it?

HM: A spruce budworm epidemic weakened and killed thousands of trees in the Pass area well beyond the highway corridor. No one argues that it's natural to have some trees decaying in the forest. That's where we get soil, homes for animals and lots more. But this forest is too crowded. Like thinning carrots in a garden it makes sense to thin crowded forests. The trees we leave grow bigger, healthier, and are more resistant to bugs and disease. Mechanical thinning is the main tool the Forest Service will use.

One year we see giant moths everywhere in Bend the next year giant worms on the ponderosa pines? Are we being invaded?

HM: These are pandora moths and their larvae. The larvae eat the new growth on ponderosa pines one year then pupate and emerge as moths the next. They have no mouth parts so they can't eat. The moths sole purpose is to breed - so they basically have sex, lay eggs and die. Pandora moth outbreaks usually happen in about 30 year cycles - the larvae usually die of a virus - all at once. We think that we've seen the last of them for awhile. There weren't many larvae out this year.

What bug is killing the lodgepole pines in Newberry Crater and other places?

HM: The mountain pine beetle. The beetle bores into the tree and feeds on the tender layer under the bark. This layer carries the nutrients and water that feed the tree. Once the layer is eaten all the way around the tree's trunk the tree dies. Thinning helps confine the beetles who locate food on the basis of dark and light patterns and a smell that they recognize. When the trees are spaced too widely apart the beetles flying around may not see or smell any food - they use up their energy reserves and die.

What bug made the orange looking big stripe up in the trees along Century Drive west of Mt Bachelor? The stripe or whatever it is - is at almost the same exact height on all the trees.

HM: A common insect called the snow plow. The snow on the last few miles of Century Drive just past Mt. Bachelor usually doesn't melt by the time the summer season begins and has to be plowed out. The plow blows some of the snow and ice up onto the trees "burning" the needles.

Ponderosa pine forests evolved with fire. Frequent, low-intensity fires swept through the underbrush every 10 to 50 years burning off the shrubs and underwoody, leaving open park-like stands of old growth ponderosa pine. Ponderosa pines have very thick bark, which flakes or pops off in puzzle-like pieces if the bark catches fire.

A century of fire suppression has allowed millions of shrubs and young trees to become established in these pine forests. Prescribed fire is a safe way to mimic natural fire conditions in the forest and restore the balance to many forest communities. Prescribed fire means fires ignited by people (forest managers) under controlled climatic conditions. Temperature, humidity, wind speed and other factors are all carefully considered before beginning a prescribed burn as well as total area, how hot the fire will burn and likely results of the burn five or ten years later.

Forest Service and other scientists doing research in this field have discovered that prescribed fires can have beneficial effects on plants, wildlife, and biological diversity. Prescribed fire is one tool that will be used, carefully, to help restore forests to natural health.

After All, It's Your Forest

(Continued from page 1)

- trees die. Fire suppression, overcrowding of vegetation, past harvest methods that selected out Douglas fir and white pine, and drought have collaborated to create the "healthy-looking today - dying tomorrow" situation.

Managing a healthy forest goes far beyond thinning and harvesting trees, taking action requires a diverse restoration program and includes planting, thinning, caring for the soil, tending to young seedlings and saplings and using prescribed fire to remove excess fuel and protect the Forest from catastrophic wildfire. This process happens in stages and takes years to fully implement.

The Deschutes program of work for 1996 and beyond, will focus on restoration and enhancement to help bring this forest back into balance. In my view, doing nothing is not an option. The goal is to restore the Deschutes National Forest to excellent health. The Forest will look very different in the future because forests are like people - THEY CHANGE.

PROBLEMS: Git-lak-chop-ke Fire Drought • Overcrowding Insect & Disease

OPTIONS: Salvage Dead • Replant Leave It Alone

PROBLEMS: Fire Suppression Drought • Overcrowding Insect & Disease

OPTIONS: Salvage Dead • Replant Thin From Below • Leave It Alone

UNHEALTHY
Cindy Says:
Our Soils Are Unique

We talked about high desert/high alpine ecology with Cindy O'Neil, botanist and Natural Resources Team Leader for the Bend/Ft. Rock Ranger District.

Q. What makes this region and the Deschutes National Forest unique?
A. The soils of the high desert/high alpine zones are unique from a national perspective. These are young volcanic soils that support a diversity of plants. Most importantly, much of the forest is free from non-native or exotic plants. This means that the Deschutes National Forest is like a last preserve for some of these species. For instance, the pumice grape fern found on Newberry Volcano grows only in pumice deposits.

But, the high desert/high alpine region faces a major challenge today: how do we maintain the quality and diversity of this environment and accommodate increased recreational use. The region's soils do not regenerate plants rapidly, especially along stream banks. If we can get people to understand the delicate balance of this ecology we can stabilize conditions and preserve this special place.

Pine Mountain:
Island In A Sagebrush Sea

What makes Pine Mountain unique is the rapid transition between vegetation zones on the peak's steep slopes. Located about 30 miles east of Bend on Hwy 20, this isolated mountain is an outstanding example of the transition from desert scrub to montane forest. Large areas of the Deschutes National Forest are classified as montane. In these areas ponderosa pines grow in open stands intermixed with lodgepole pine. Wildlife and a variety of plants flourish in this environment.

The summit of the mountain is also home to the University of Oregon's astronomical research observatory, the Pine Mountain Observatory (see Facilities page 16, for summer hours).

Some Doctors Still Make Housecalls

Public and private sector scientists and specialists study, interpret and diagnose changes in forests caused by disease and other factors.

Q. Why are so many pines dying?
A. The main reason is that humans have aggressively prevented forest fires for the last 100 years. During the late 1800's and early 1900's, people were often tragically affected by wildfire. To them the loss of life, property and what they saw as the destruction of millions of acres of forest, made it seem natural to support a policy of wildlife prevention. For eons cleansing fires burned through central Oregon forests every few years, killing small trees and brush; creating dark, park-like forests of huge old growth ponderosa pines in most areas.

Taking fire out of the forests is like never cleaning your home again. Different species begin to grow and debris piles up. Without fire, different tree and plant species crowd into thousands of acres where they were not present before. A fire-maintained forest might have had 10 to 30 large trees per acre - that same forest today can have over 1000 trees per acre. Too many trees competing for space, light, water and food. Overcrowding stresses trees making them fast-food for bugs and disease-causing organisms. Also, drought has hurt forests badly in recent years. The forest is maxed out, the last straw is over the camel and the ship is sinking - fast.

Q. Why can't we go back to letting fires burn without fighting them?
A. Letting the fires just burn now would be like saying: successful operation - but the patient is dead. Tons of woody debris on the forest floor plus dead trees plus "ladder fuels" growing up into the forest canopy add up to hazardous fire conditions. During a hot, dry central Oregon summer, a small uncontrolled fire could quickly turn into a major conflagration (that means a big, destructive fire). Everything could be destroyed - dead trees, green trees - wildlife and their habitat, water quality, scenic beauty, and future site productivity. A major concern is potential for increased loss of life. The bigger fires get, the more unpredictable and dangerous they become. As fire intensities have increased in the last few years, so has the fatality rate for wildland fire fighters. Large, severe fires do not respect human boundaries.

Learn more about Forest Health at the High Desert Museum Changing Forest Exhibit or contact the Deschutes National Forest Supervisor's Office at the base of Pilot Butte (off Hwy 20).
Phone: (541) 388-2715.
GEOLOGY

How does a lava cave form?

Lava caves, or lava tubes, form only in fluid basalt flows. Within a flow, a narrow channel forms followed by a thick crust over the top of the lava floor. Travelling unseen, the lava flows through this lava tube to feed the advancing front. When the supply of lava ceases, it drains out of the tube leaving a cave for us to enter.

To see an example of a lava tube, visit Lava River Cave, the longest lava tube in Oregon. The cave is located one mile south of Lava Lands Visitor Center on Hwy. 97, and is open from Memorial day thru October.

Why is Newberry Volcano so far away from the Cascades?

Newberry is not part of the Cascade Mountain Range. It lies at the juncture of three major fault zones in central Oregon. While there is a magma chamber far below the volcano's caldera, the molten rock may not be produced by the melting oceanic plate. Geologists do not fully understand where the magma comes from, but temperatures in excess of 500 degrees Fahrenheit 3000 feet below the caldera floor indicate that the volcano is far from dead.

Glossary (or, huh?)

fault zone: zones of sheared and broken rock in the earth's crust

Did You Know...

The Butte (elevation 5000') is 500 feet higher than the visitor center. Did You Know...

The lava flows from Lava Butte dammed the Deschutes River in 1960 and 7,000 years ago when highly gas-charged magmas erupted along a zone of weakness. Cinders and ash were thrown high into the air as the first magma reached the surface, much like opening a bottle of soda pop after shaking it. These cinders accumulated in a crater, which was shaped by the prevailing southwest winds. As the eruption proceeded the wind carried more cinder to the northeast side of the cone, forming a crater 180 feet deep from the highest side. The Butte (elevation 5000') is 500 feet higher than the visitor center. After the highly gas-charged lava foam was expelled, liquid lava broke through the thinner south side of the cone, spreading over 5 miles to the north and west. Numerous overlapping flows contributed over 9 square miles of lava before the eruption ceased.

The Formation of Lava Butte

Lava Butte formed 7,000 years ago when highly gas-charged magmas erupted along a zone of weakness. Cinders and ash were thrown high into the air as the first magma reached the surface, much like opening a bottle of soda pop after shaking it. These cinders accumulated in a crater, which was shaped by the prevailing southwest winds. As the eruption proceeded the wind carried more cinder to the northeast side of the cone, forming a crater 180 feet deep from the highest side. The Butte (elevation 5000') is 500 feet higher than the visitor center. After the highly gas-charged lava foam was expelled, liquid lava broke through the thinner south side of the cone, spreading over 5 miles to the north and west. Numerous overlapping flows contributed over 9 square miles of lava before the eruption ceased.

On the Rocks with Larry & Bob...

Larry Cleveland and Bob Jenson are geologists with the Deschutes National Forest. In addition to active studies on geo-technical problems, they take the time here to answer the most common geologic questions asked by forest visitors.

Q. Will there be another major eruption in central Oregon? A. There will certainly be future volcanic eruptions in central Oregon, due to the continued movement of the tectonic plates. The question now becomes, "Where and how soon can we expect it?" The three most likely spots are:

- The McKenzie lava fields.
- The Obsidian Flow erupted only 1300 years ago in the center of Newberry Crater.
- Geothermal exploration has shown a temperature of 500 degrees Fahrenheit at 3000 feet below the surface of the caldera, indicating hot rocks and possible magma waiting to erupt within the next few centuries.

Q. When will the next earthquake occur in Bend? A. The most recent earthquake occurred on October 6, 1995, just northeast of town, but registered a mere 2.0 on the Richter scale. Most people are concerned with a larger scale earthquake, or the "Big One." The region around Bend has historically experienced a large quake once every ten to thirty thousand years. Because it is expected that the terrain often dictates what type of a volcanic ecosystem can survive and flourish because landforms, like mountains and valleys, help create soil and weather patterns. Understanding the landforms and soils can lead to better management of biological resources, like trees. One question the Forest Geologist is trying to answer is what effect compacting soil has on tree growth. Most of the Deschutes is blanketeted with a layer of Mazama ash one inch to ten feet thick. This ash layer is of great interest because it can be artificially compacted to an almost impenetrable layer. Such dense soil can significantly reduce the growth rate of trees because less water and nutrients can get into the soil and microorganisms that must be present in soil for trees and other plants to grow can't penetrate into it and the normal space between soil particles is reduced or eliminated so the soil can't hold water.

Q. Will there be enough groundwater to support the growing central Oregon Communities? A. Like any natural resource, the ground water supply of this area is limited. Much of the snow and rain that falls in the Cascades drains into the porous volcanic rock, flows eastward underground, and emerges at springs along the Deschutes, Crooked, Metolius and other rivers. The ground water supply depends upon the yearly snowmass, but also upon the wise management of our water resources. It is probable that the water supply will support current growth rates for several years, but the supply is not unlimited! The U.S. Geological Survey is currently studying the ground water supply of central Oregon.
List of locations of geologic features to see on the Forest, listed by district. See page 15.

Crescent
Davis Lake Lava Flow: Located along the south end of the Cascade Lakes Highway, this lava flow erupted 5500 years ago. Maumee ash: Road cuts along Hwy 58 clearly show the blanket of ash and pumice that covered the forest, from the eruption which formed Crater Lake 7,700 years ago. Odell Lake U-shaped valley: Along Highway 58, this U-shaped valley was formed in the last Ice Age, about 25,000 years ago.

Walker Mt.: This fault-scarp mountain is part of a major fault zone that runs to the north-east, towards Newberry Volcano.

Why are the Cascades all lined up in a row in the middle of the state?
The Cascades owe their existence and location to plate tectonics. The surface of the earth is made up of several large sections of crust, called plates, that are sliding around on the surface of the earth. Two such plates have collided off the coast of Oregon. The North American plate and the Juan de Fuca plate, an oceanic plate. The oceanic plate is getting pushed down and under the continental plate, in a subduction zone. When the plate gets about 70 miles deep, the temperature and pressure are so intense that the plate actually melts. This molten rock called magma then finds its way to the surface through cracks in the crust, and collects in magma chambers just under the surface. These chambers then feed the eruptions that formed the Cascades.

Geothermal Update:
Geothermal energy continues to be a "hot" topic on the Deschutes National Forest. Scientists have been exploring the area around Newberry Volcano for years in hopes that the heat and water deep below the earth's surface could be harnessed to produce energy for the northwest. In 1995, Calenergy Company, Inc. drilled several deep test holes on the flanks of Newberry Volcano just west of Newberry National Volcanic Monument. More exploration drilling is planned for this year. If the results are favorable, a geothermal-powered electrical power plant could be up and running by 1998, producing 33 megawatts of power for the Pacific Northwest. Thirty-three megawatts of power is enough energy to supply a city the size of Bend. The Bonneville Power Administration and the Eugene Water & Electric Board would purchase the power generated from Calenergy. While geothermal power is used in many places in the United States and in other countries, this geothermal power plant would be the first of its kind in Oregon.

Candy and Flowers Won't Work
How to Date A Rock
Radioactive slime from outer space got you down? Chew up, Lord (Pb) will shield you from slime and Superman from Kryptonite's deadly rays. Picture a glowing rock radiating heat, invisible particles that go zinging through the air, melting flesh, metal or whatever. That's radioactivity, in the movies. It can be very harmful if you absorb too much like Superman or it can be a useful tool to determine the age of a rock or once living object. Both contain radioactive elements.

Atoms that spilt out pieces of themselves (spontaneously decay) are radioactive. An atom is the smallest piece of an element that can exist. Elements - Hydrogen (H), Gold, (Au), Uranium (U), Carbon (C), Argon (Ar), Potassium (K) and about 103 others are the building blocks of all substances - like chocolate and coffee are the building blocks of a good day. The same element can have different weights (isotopes) and unlike us - if isotopes don't like their weight they lose it. Atoms have the ultimate quick weight loss - they decay and ta dah - they are a new, different element, slimmer, trimmer and ready to decay again (until they are just right or stable).

Don't panic, we're organic - people and all living things are carbon-based lifeforms. When we breathe we take in carbon as carbon dioxide (CO2). Stable carbon is C-12 and radioactive carbon is C-14. There is a known amount of each in the atmosphere. When an organism dies carbon is not taken in, C-14 decays and we can measure how much is left and find out how old the remains are. Rocks must be dated using different elements because rocks (except the carbonates like limestone) don't contain much carbon. The element Potassium (K) is often found in volcanic rocks and a radioactive isotope of Potassium decays into the element Argon (Potassium/Argon dating). Argon can decay into another isotope of itself (argon/argon dating). These isotopes decay very, very slowly and can be measured to find out the ages of very, very, very old rocks. Like billions of years old.

If you want to know more about this ask a ranger, a teacher or look at the library - and get ready for another wonderful adventure in chemistry. Chemistry is what links everything together - if two people have the right chemistry it could be love - if two minerals have the right chemistry - it could be a rock! And that's another story!

These Are the Days of Our (half) Lives
The tragic decay of one life into another. Elements of the story will be all too familiar and you will see reflections of your own life flowing in the text. Half-life is the time needed for half of a specific amount of the radioactive isotope (same element, different weight) to disintegrate, decay. We know what the half-lives are for most radioactive isotopes and if we don't the - half-life is either too short (seconds or less maybe) or too long to be useful. Two examples of commonly used isotopes:

Element Half-life Used for Dating
Carbon-14 5668 years Carbon-12 and radioactive carbon is C-14.
Potassium-40 1.3 billion years Remains of once living things, remains of once living things, objects found with or near the remains, geologically young events.

Potassium-40 is used in carbon-14 to date organic remains - like a tree burned and burned by a lava flow - to determine the age of the lava flow is called absolute dating.

Using carbon-14 to date organic remains - like a tree burned and burned by a lava flow - to determine the age of the lava flow is called absolute dating.

Both methods can be used to zero in on a date and reduce the margin of error. Most dates are represented as Age in years ± a margin of error, in years, like 3000 ± 100 years. The margin of error will indicate how reliable the date is given several factors.
1997

Deschutes National Forest
Interpretive Program Schedules

Lava Lands

Hours:
9:30 am to 4:00 pm daily
July 4 through Labor Day
June 9 through Sept 3, 1997

Summer Programs Begin July 2

- Daily: 11:00 am
  Trail of the Molten Lands Guided Walk
- 1:30 pm
  Naturalist Talk on the Palace
- 2:00 pm
  Flintknapping, Birds of Central Oregon, or Geology
- 3:00 pm
  Trail of the Whipping Pines Guided Walk

Saturday Evenings, June 28 through August 21, Lava Butte Amphitheater:
- June 28 & 29: 6:45 pm
  Evening Ecology and Star Gazing Party
- August 8 & 21: 3:30 pm
  Evening Ecology and Star Gazing Party

HERITAGE RESOURCES

First Oregonians
With Forest Archaeologist Paul Clyessens

Who first settled on the forest fringe and high deserts of central Oregon?

PC: There were many tribes and bands of American Indians who roamed, occupied and utilized this landscape for at least the last 13,000 years. Early settlers from the Willamette Valley and others who traveled the Oregon Trail and its alternates arrived after the 1850s. Was American Indian life a "primitive" existence at that time?

PC: Not really. Hunter/gatherers, for instance, were not at "primitives," if that term is used to mean inferior, impoverished or somehow not equal to their "civilized" neighbors. Superficially, the lives of prehistoric humans may look simpler than ours but the business of survival was a matter of life and death. Just surviving took focused planning - thriving - now that took an economy. American Indians in this area

Huckleberries, Fin...
...or sculpin (fish) in desert lakes, ducks and geese, rabbits, deer, elk, and antelope. Indian rice grass, tree seed pods, water lily seeds, bisscht and bitter root, berries, fruits shrubs (huckleberries), trees (choke-cherry, juniper, etc.), were foods that prehistoric people ate. We know this because elders and traditionalists from local tribes still revere these foods incorporating them into their life and rituals and from archaeological excavations which often uncover fire hearths and living floors.

Money Rocks in Central Oregon

Research shows that obidian from flows on Newberry was traded in the immediate area AND made it's way up into Puget Sound and British Columbia by 4,000 years ago, probably via trade centers along the Columbia River.

Reedy to Wear

Prehistoric people relied on available plant fibers and animal skins for winter and summer wardrobes. Some examples: sage brush twigs, tanned deer hide for jackets and breeches, woven tule reeds or grasses for skirts and ceremonial hats, natural pigments and dyes like iron oxide (red ochre), chalk and charcoal for adornment and "paint." Paints and inks made from shells, stones, bone and wood.

On the Cutting Edge: Archaeology

Research on the Deschutes National Forest

You can help this summer or winter when you're out enjoying your public lands think about how past Indian cultures adapted to the landscape and stay tuned to this article for details.

The Central Oregon Heritage Service (COHG), a partnership of Forest Service, BLM and Deschutes County archaeologists and historic preservation specialists, is currently developing a research design to guide archaeological work in central Oregon. A goal is to increase their ability to interpret prehistoric life-ways and determine what types of "adaptive" strategies were used by American Indian cultures in central Oregon.

All site locations have been recorded digitally into a Geographic Information System (GIS). According to John Zancanella, archaeologist for BLM's Prineville District..."now data from thousands of sites can be easily looked at. This will greatly enhance COHG's ability to manage and study archaeological sites and involve the research community."

A research design will be tested this field season here on Forest Service and BLM lands. "Budgets and timelines will be tighter," states Paul Clyessens..."we will shift focus to the whole region, pool resources, prioritize work and then disperse, climate research accordingly."

"The Archaeological Society of Central Oregon (ASCO), is a major partner in COHG efforts, especially for involving citizens in ongoing research, management and education efforts," says Dick Googins, ASCO President.

Membership is open to anyone interested in archaeology. For more information write ASCO c/o The Central Oregon Environmental Center, 16 NW Kansas, Bend, OR 97701.

Sea Grasses

Raven

PC: Yes and if we view the history of humankind simply as an "evolution" from hunter/gatherer to agriculturist to civilized we fail to truly understand what is important about the range of variation in human societies: Our extraordinary ability to adapt to the available environment. All hunter/gatherers employed adaptations. Adaptations are techniques for using and harnessing the forces and bounty of nature.

How did early Indian populations adapt to the environment in central Oregon?

PC: Indian populations in central Oregon migrated to the shores of newly formed lakes in Fort Rock/Christmas Valley after the last Ice Age. Shallow lakes supported a rich variety of aquatic and terrestrial plant and animal resources. Permanent village - camps could be established along the shore. The skill and knowledge to acquire food and raw materials for housing, clothing, tools, toys and religious practices was passed from generation to generation. Most raw materials were available nearby so they maintained a relatively stable, sedentary existence.

The post-glacial climate continued to warm - did the lakes eventually dry up?

PC: Yep. When Mt. Mazama erupted 7,700 ya, creating Crater Lake, the climate was warmer and drier than it is now. Climatic change forced new adaptations, villages could no longer be maintained. What were once large lakes had become deserts. Indian bands dispersed and "seasonal rounds", moving residential camps to locations where resources could be collected. Population probably declined as the carrying capacity of the land diminished.

The eruption of Mt. Mazama had catastrophic consequences. Forests, streams and meadows were buried under tons of pumice and ash and central Oregon appears to have been abandoned by Native American First Oregonians... continued on page 14
Bat Facts

Bat colonies

Many bat species rear their young in maternity colonies. Pregnant females of many bat species migrate into one cave or building during the spring and summer. Disturbance of a nursery colony may kill all of the young for a year. If you see a cluster of bats, leave the area immediately. If you want to observe bats, watch a pond or river at dusk. Their acrobatics as they pursue insects are impressive. If you know where a group of bats is during the day, watch the entry from a distance of at least 50 feet during the evening. You may see them as they exit from the day's roost.

Bat "Bennies"

Wherever bats are found, they are critical elements in nature's web of life.

One little brown bat can eat 400 mosquitoes in one hour.

The 20 Mexican free-tailed bats from Bracken Cave, Texas, eat 250 tons of insects nightly.

Tequila is produced from agave plants whose production drops to 1/1,000th of normal without bat pollinators.

Important agricultural plants — bananas, mangos, cashews, dates, and figs — rely on bats for pollination and seed dispersal.

Bats hanging in caves support entire ecosystems of unique organisms, including bacteria useful in deterringeworms, improving deterrents, and producing gasoline and antibiotics.

Bat Facts

Bats are the only mammals that can fly.

Bats comprise nearly a quarter of all mammal species.

Mother Mexican free-tailed bats find and nurse their own young, even in huge colonies where millions of babies cluster at up to 500 per sq. ft.

The Chinese white bat is a symbol of good luck and happiness.

Left alone, bats pose little threat to humans.

Of the 43 bat species living in the United States and Canada, nearly 10 are endangered or are candidates for such status.

The smallest bat, the bumblebee bat, is only a Kitti's hog-nosed bat found in Thailand, is the size of a jelly bean and weighs 2 grams.

Flying foxes, the largest bats, weigh up to 3 or 4 pounds with a wing span of up to 6 ft.

Approaching Wildlife

(Make yourself approachable)

Do enjoy watching the local wild animals. They may actually enjoy watching you too. Are you a group of wild animals don't but if you are observing right you'll have a fun and safe experience and so will the wildlife. Sit still, like a rock, and observe the natural behavior of wildlife. If you are still, the birds you may see fly closer, seeing that you are not a threat. Deer may approach you out of curiosity, you may spot an elusive ptarmigan.

The first rule... avoid disturbing the animals. If a hawk appears upset at you, you are probably too close to it and may be affecting the survival of its eggs or young. Curiosity may draw you to a bird nest, but beware of the consequences to the inhabitants of the nest. Eggs that are late uncovered cool quickly, killing the embryo. Frantic parents may attract a predator (owens, jays) which eat eggs and nestlings.

The second rule... don't touch the animals. An apparently "abandoned" mother deer fawn is simply hiding, waiting for its mom to return and take it home.

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**Newberry National Volcanic Monument**

**What To Do In The Monument**

- **One hour:** Lava Lands Visitor Center
- **Half a day:** Shuteye to Lava Butte, Benham Falls, Lava River Cave
- **Full day:** Lava Cast Forest, Newberry Crater, Paulina Falls, Paulina Peak

- **Big Obsidian Flow**
  - Explore the lakes and trails.

More information on the Monument is available from these offices:
- **Deschutes National Forest** 1645 Hwy. 20 East Bend, OR 97701 (541) 388-2715
- **Bend/Fort Rock Ranger District** 1230 NE 3rd, Suite A-262 Bend, OR 97701 (541) 388-5644
- **Lava Lands Visitor Center** 58201 S. Hwy. 97 Bend, OR 97707 (541) 393-2423 (May-Oct.)

**Campgrounds**
- Campsites for over-night drinking water, toilets, picnic tables and campfire rings.

<table>
<thead>
<tr>
<th>NAME</th>
<th># of sites</th>
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<tbody>
<tr>
<td>A. Cinder Hill</td>
<td>110</td>
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<tr>
<td>B. Hot Springs</td>
<td>52</td>
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<tr>
<td>C. East Lake</td>
<td>29</td>
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<tr>
<td>D. Little Crater</td>
<td>50</td>
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<tr>
<td>E. Paulina Lake</td>
<td>69</td>
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<tr>
<td>F. Newberry Group Camp</td>
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<tr>
<td>G. McGyver Crossing</td>
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<td>H. Pratie</td>
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<tr>
<td>I. Odyssey Group Camp</td>
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<td>J. Chief Paulina Horse Camp</td>
<td>1.4</td>
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<tr>
<td>K. North Cove</td>
<td>6</td>
</tr>
<tr>
<td>L. Warm Springs</td>
<td>5</td>
</tr>
</tbody>
</table>

- By reservation only

- Paulina Lake Resort (open year-round) and East Lake Resort (open seasonally) offer cabins, supplies and shower facilities to the public.

**Weather**
- Due to heavy snowfall, the road into Newberry Crater is not accessible by car during the winter months, usually from November to May. The road is plowed up to the ten-mile snow-park, allowing access for the last three miles to the crater on skis or by snowmobile. Please call ahead to check on current road conditions during winter months. At lower elevations the Monument generally remains open through the winter.

**Points of Interest**

1. **Paulina Peak**
   - Located four miles by road or trail from Paulina Visitor Center, it is the highest point within the Monument (7,986 ft). The 360° view includes the Cascade Range from California to Washington; the Basin and Range region of eastern Oregon; and a clear view of the caldera lakes and surrounding volcanic landscape. This road not suited to trailers or motor homes.

2. **Big Obsidian Flow**
   - The result of the most recent eruption of Newberry Volcano and the younger (1,300 years old) geologic feature in central Oregon. Over 170 million cubic yards of obsidian and pumice erupted from a vent about a mile south of the trailhead. Native Americans used the glass for trade and to create tools. A one-mile loop trail and seven interpretive sign guides visitors across a corner of the flow.

3. **Paulina and East Lakes.**
   - The caldera may have originally held one large lake, much like Crater Lake, but deposits of pumice and lava divided the crater into two separate bodies of water about 6,200 years ago. Paulina Lake is one of the deepest lakes in Oregon (250 ft); East Lake is somewhat shallower (180 ft). Clear and nutrient rich, both lakes support a large population of trout and salmon, stocked by the Oregon Department of Fish and Wildlife. The lakes offer excellent fishing from late spring through fall.

4. **Paulina Falls**
   - Located just a quarter of a mile west of Paulina Lake Lodge. This dramatic 80 ft. waterfall spills over volcanic cliffs into a canyon and is a short walk from the parking lot. Paulina Creek is the only outlet for Paulina Lake and has qualified for federal designation as a Wild and Scenic River.

5. **Lava Cast Forest**
   - Approximately 7,000 years old. Lava from vents on Newberry Volcano flowed through a mature ponderosa pine forest. The molten lava enveloped the trees and quickly cooled around them leaving a mold. The pines eventually burned to charcoal or ash, leaving a mold. A one-mile self-guided interpretive trail winds across the lava flow slowly being claimed again by young ponderosa pines.

6. **Lava River Cave**
   - Located one mile south of Lava Lands Visitor Center on Hwy. 97. The one mile cave is the longest lava tube in Oregon. Lava tube forms when a river of molten lava creates a channel and the sides eventually crust over to create the roof. The tube kept the flowing lava hot enough to drain out of the channel, leaving the tube hollow. The cave is constant 74°F (23°C), so wear warm clothing and carry at least two light sources (only propane lanterns or flashlights please). Lanterns are available to rent and there is an entrance fee from mid-May to mid-October.

7. **Lava Lands Visitor Center**
   - 13 miles south of Bend on Hwy. 97. The center features displays on central Oregon geology, archeology and wildlife. On-site naturalists are available to answer questions and often lead guided walks and talks throughout the summer season. Two short self-guided interpretive trails leave from the patio of the center and explore the volcanic landscape and nearby forest. A shuttle bus leaves for Lava Butte summit on the 12 hour from the visitor center mid-May to Labor Day. A small fee is charged.

8. **The Deschutes River**
   - The northwest border of the Monument, it is a federally designated Wild and Scenic River. The Deschutes offers some of the best flyfishing, white water rafting and kayaking in Oregon. River trails run intermittently from Sunriver to Bend, with beautiful views for the hiker, biker or equestrian of Benham, Dillon and Lava Island Falls. Wildlife watching opportunities include beaver, otter, deer, elk, coyote, mink, martins, eagles and other birds.

**Geothermal Resources**
- In 1981 the U.S. Geological Survey drilled a test well in the center of Newberry caldera and found temperatures as high as 308°F. This indicated a potential geothermal resource area below the caldera. As of June 1996, CalEnery Co. has been drilling several deep test wells on the west flank of the volcano, outside of the Monument. If the drilling discovers a commercially viable resource, a plant will be built to draw hot ground water into steam turbines, generating an expected 33 megawatts of электrical power.

**Wildlife Observation**
- The caldera is designated wildlife refuge. Common mammals include deer, elk, badger, pine marten, and black bear. The lakes are home to osprey, ducks, geese, and tundra swans. A pair of bald eagles nest along the shore of East Lake. The 4000' elevation change within the Monument provides an extensive network of vegetation zones, including ponderosa pine, lodgepole pine, mixed conifer, mountain hemlock and white pine. All old growth stands of pines and firs are protected within the Monument.

See Map Page 13
Hey Elliott...

(Continued from page 1)

Imagine how Elijah Elliott would have reacted if told the forest-clad wilderness he was cracking through would one day be a Mecca for fishing, hiking, hunting, picnicking, canoing, rafting, cycling and bird photography. After weeks of boiling wagons over fallen trees and forcing the winding Deschutes River time after time - he'd have sneered at such an insane thought and turned back to driving his wagon out of sight into another dust-choked sunset.

After passing south of Diamond Peak the rough wagon track finally turned and headed west up to Middle Fork Pass. The land changed again. White fir and hemlocks replaced ponderosa and the terrain became a puzzle of lakes, meadows and dense forests. The high forests and the breathtaking, in summer craggy Cascade summits reflect in blue-green lakes. Paintbrush, larkspur and shooting stars decorate the shores. Lakes are filled with fish, the golden mantled ground squirrel thrives and deer browse along the shore.

A ragged band of pioneers could scarcely have imagined that people would crowd onto snow-covered Cascades slopes to ski and enjoy other winter sports. As the Elliott Party regretfully discovered - snow can come early and life is possible only for the hardy, hardy and leafless. By now they were desperately stranded on the Cascade Divide.

The high alpine country of the Deschutes National Forest is stunningly beautiful. Spiky peaks of extinct and dormant volcanoes tower thousands of feet above the surrounding highlands. Snow fields and glaciers feed clear mountain lakes. Only a handful of Elliott Party members actually teetered into the haunting, barren High Cascades and that was by accident.

When the road that Elijah Elliott had expected to find "at the foot of the mountains" was not there, three parties of scouts went out to find the road and look for help. A party crossed the Cascade divide between two of the Sisters and in his journal a member claimed, "Surely no part of the mountains can be more rugged than we passed over." High alpine country is concentrated near the Cascade summits. Miscellaneous plants cling to the rocky, wind whipped slopes. Natural conditions and solitude are the most prized resources up here and are legally protected by Wilderness designation.

Standing on the high desert plains east of Bend, Elijah Elliott knew he was headed in the right direction, the wagon train was not so much lost as off course. They were only 50 miles away from his target, a distance we routinely cross in less than an hour by car. Thankfully, most of the pioneering settlers survived their ordeal, rescued by good samaritans from the town of Warm Springs.

With a bit of planning, we can explore and enjoy in a day what took the Elliott Party weeks to walk across. Our forest has changed a lot since Elijah Elliott crossed central Oregon. Paved highways and gravel roads have transformed the wilderness of 1853 into the scenic byways of today.

What remains to be seen is what direction we are headed in now.

First Oregonians...

(Continued from page 17)

populations for about 2000 years. A cooler and wetter climate appears by 4,500 years ago (ya). The pattern of occupation seems to have re-established by 5,000 ya. Long-term residential camps were re-established, adjacent to much smaller lakes which had returned to the deserts.

What was happening in Oregon after the Mauna eruption?

PC: Populations to our north, along the Columbia River and its major tributaries, like the Deschutes and John Day Rivers, began to establish villages adjacent to river mouths and canyons. These were primarily winter villages. During the spring, summer and fall, various groups within the village would head out to other areas known to contain rich resources of plants, fish, fish and game. This adaptive strategy differs from the model relying on a mobile residence system since all surplus goods not consumed on site, were brought back to the winter village for storage and distribution. This kind of strategy, is known as "logistical mobility."

We're talking about the deserts and lakes, but what about the forests?

PC: During the entire Holocene, the forests of central Oregon provided resources from which people made their living. The forests or "uplands" were never occupied by permanent villages, but during all periods discussed above they were used seasonally by groups practicing whatever adaptive strategies their environment dictated.

So, "If you don't like the weather in Oregon, wait 30 seconds." is true - over time too.

PC: Yes, climates are changing. There are yearly variations and cycles that operate over decades, centuries and millennia. About 1,000 to 2,000 ya the climate changed again. Droughts turned lake shores into desert dwellers. This time the effect was not just local - in the greater American Southwest - the Anasazi or "Ancient Ones" abandoned their pueblo and cliff-

High Desert Learning Center

Perfect partners

Go Visit - Their first exhibit The Changing Forest is at The High Desert Museum. The exhibit takes you on a fascinating tour through the history of central Oregon's forest communities and demonstrates how climate, fire, insects and human management have shaped the high desert ecosystem we live in.

The Center of the focus is on unique high desert ecosystem. Three major geographic regions - the Great Basin, Cascade Mountain Range and Columbia River Basin overlap in central Oregon. This means that wherever you find yourself in the high desert, the local landscape and inhabitants may be a curious mixture of all three regions. We can say truthfully that our landscape is full of surprises waiting to be discovered and enjoyed.

Easy To See and Do - The Center sponsors Elderhostel and other field trips, school outreach programs and offers programs for everyone burning to learn about their national forests.

C'mon - Let us know how you liked The Changing Forest Exhibit and how you think the Learning Center could make the exhibit better and what future topics or programs you'd like your Learning Center to offer - visiting lecturers, fantastic field trips, publications...what?

For more information: 541-383-5634 or 541-382-4754.

Want To Know More?

You can purchase these books at the Northwest Interpretive Association (NWIA) Bookstore at LaPrairie's Visitor Center. The visitor center stocks many other interesting titles, from books on bats and caves, to trails, volcanoes, videos, maps, and much more. They are also available by mail with a small shipping/handling fee. Call 541-592-2421.

Northwest Interpretive Association

Northwest Interpretive Association is a non-profit organization that operates educational sales areas. Profits help support education, interpretation and research on the Deschutes National Forest. Other sales locations are at Paulina Visitor Center, Elk Lake Guard Station, LaPrairie's Visitor Center, Deschutes National Forest Supervisor's Office, Bend/Mantle Rock Ranger District Office, Crescent Ranger District Office and Sisters Ranger District Office.

Recreation

100 Bikes in the Central Oregon Cascades; Sullivan, W. $14.95
Exploring Oregon's Wild Aareas; Sullivan, W. $14.95
Fishing Central Oregon; Wing, R. $11.95
Mountain Biking Central Oregon, Map with text; Rapp, S. $4.95

Forest Ecology

Words of the West; Whitten, T. $24.95
Trees to Know in Oregon; Jensen, E. $4.00
Cascades Olympic History; Matthews, D. $22.50
Kids - Ancient Forests Discovering Nature; Anderson, M. $4.95

Geology of Oregon

Geology of Oregon; Ort, Orr and Baldwin $26.95
Roadside Guide to the Geology of Newberry Volcano; Jensen $12.95
Fire Mountains of the West; Harris, S. $16.00
Kids - Discovering Volcanoes; Field, N. $4.95

Heritage Resources

Indian Rock Art of the Columbia Plateau; Keyser, D. $17.50
Coyote Was Going There; Indian Rock Art of the Columbia Plateau; Keyser, D. $17.50

High desert wildlife viewing Guide; Yosvitch, J. $8.95
Field Guide to Birds of North America; Nat. Geo. Society. $21.00
Seasons of the Coyote; Harrison, P. $24.95
Kids - Animal Friends of the Northwest; Hubbard, E. $2.50


...AND FURTHERMORE...
TONS of 'em! Get Outta Here!

They're out! One surprising "product" of this national forest is mushrooms! Between 100 and 150 TONS of matsutake mushrooms have been harvested annually on this forest for years. The name is Japanese, matsu meaning pine, and tons of matsutake mushrooms have been harvested this year! Between 100 and 150 TONS of matsutake mushrooms have been harvested annually on this forest for years. The name is Japanese, matsu meaning pine, and mounted in a plastic bag, secure it tightly, and dispose.
Tell the Chief

If you enjoyed reading Volcanic Vistas, visiting Lava Lands Visitor Center, had a good time on the Hosmer Lake Canoe Tour and liked archaeological wonders of the Forest please not so positive experience you had on this or that visit. Our support helps keep us open and operating. Please keep visiting, open or not, registered or not. You are one of the best things we have.