After All, It's Your Forest

Forest Supervisor Sally Collins discusses the serious health problems affecting many of our National Forests.

Notice as you travel through the Deschutes that there are broad swaths of dead and dying trees, the result of widespread insect infestations and disease. Forests continually change - naturally or because of choices people make. The Deschutes National Forest is no exception.

Our Forest’s health is out of balance. A healthy forest is able to bounce back from a disturbance - an unhealthy forest needs help. I’d like to share some solutions which may be initiated by the Forest Service to bring the Deschutes back into a balanced, more healthy condition. We will use the best and most recent science available to manage the Forest as a sustainable, resilient ecosystem.

One major dilemma is that your favorite part of the Forest looks healthy and vigorous one year but is dying the next. How could this happen so quickly? Much of the Forest that looks good is really “at risk.” A relatively small change in say the amount of rainfall will mean having a hard time just making it to the next water hole.

Arriving near what is now the city of Bend, the Elliott Party expected to find a newly completed road to the southern Willamette Valley. But, Elijah Elliott, the wagon train leader, had mistaken the Three Sisters for Diamond Peak. The new “road” he had expected turned out to be little more than marks hacked into trees leading south through forested wilderness.

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.

Elliott... Continued on page 14.

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Welcome to the Deschutes National Forest

In 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 catering for the land and serving you during your stay in the Deschutes National Forest. Thanks for joining us.

Welcome to Deschutes National Forest • http://www.fs.fed.us/d6/d2/deschutes.html

Nice Doggy, Let Go of the Ranger, Sweetheart

My dog thinks his name is Zephyr-I 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 talking to us?

Accidents can happen, but most accidents are preventable. If you own the animal then you are responsible for its safety and the safety of others. Be careful with your dogs and take precautions to keep them and others safe. Prevention may take longer but it beats the alternative.

• In all developed recreation sites on National Forest lands, dogs must be on a hand-held leash no longer than 6 feet and under full physical control at all times. Please, this is for the protection of your dog and other users of the area.

• Trail Etiquette: On most trails, dogs are not required to be on leash but must be within 15 feet and under reliable physical or voice control at all times. This is to prevent dog fights and human injury, as well as protect wildlife from harassment. The stress of being chased by loose dogs can weaken wildlife making it harder for them to survive. Chasing wildlife is the most common cause of lost dogs. Remember, dogs are not always compatible with other animals, i.e. wildlife, hikers, bikers, skiers, etc.; respect their right to use the area safely.

• You and Your Dog need lots of WATER here! At these altitudes you and your dog will be losing water at a great rate. Dogs, like humans, become dehydrated.

• Winter means difficult conditions for some dogs and taking them skiing, snowshoeing, or snowmobiling is discouraged. Snow travel can exhaust an unfit dog. Snow packed between some dogs and taking them skiing, snowshoeing, or snowmobiling is discouraged. Snow travel can exhaust an unfit dog. Snow packed between pads can cause lameness and frostbite, crusted snow and ice can cut feet.

Don’t Get Burned

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.

Commercial fire restriction requirements vary - especially during late-summer.

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 curvies or switchbacks.

Natural Landscaping

Collection 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. As part of using the area, you can also be a part of the solution.

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

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 when on trails that traverse sharp rocky terrain. Summer temperatures can reach as high as 100 in the daytime and may dip into the 30's at night. It can snow in July! Be prepared!

Lightening: Carry a 4 foot square piece of polyethylene as an insulator, crouch down on it, knees and feet together. Crouching lessens your chances of becoming a lightning rod.

Get away from each other. Groups attract lightning.

Get away from metal Rocks don’t hold much water and your body does.

Get off your high horse. It may have metal shoes, bit and rigging in the saddle. If there’s time, unsaddle your animal and put him in the brush.

If your hair stands on end, take safety action immediately.

Swimming, boating, fishing... when you count to ten or less between lightning flash and thunder get out of the water. Stay under cover until the danger has passed. Be conservative. It only takes once!

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**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 to the Midwest back to Bend.
- **Points of Interest:** In order of appearance: Drake Park (Bend), The High Desert Museum, Usa Lands Via. (Bend), Mann Falls, Lake River Cave, Lava Falls, Sunriver Nature Center, Pringle Falls, Deschutes River, Fall River (fish hatchery). Wickiup Reservoir, South Twin Lake, Crater Lake National Park, Crater Lake Visitor Center, Crater Lake, Lava Butte, Lava Lake, McCloud River, Middle Oregon. It picks up volume from a series of springs, runs north around the base of Black Butte near Sisters, and then north around Benham Falls, the local phone book.

**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 Bend and Bend.
- **Points of Interest:** In order of appearance: Drake Park (downtown Bend), Tumalo State Park, Black Crater Trailhead, Dee Wright Observatory, Proxy Falls, McKenzie Bridge, McKenzie River National Trail, Sahalie Falls, Clear Lake, Shaver Crater, Hoodoo Ski Bowl, Big Lake, Blue Lake, Suttle Lake. From old growth ponderosa to Douglas fir, lava fields, geology, 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 outflow from Little Lake Lava, flows into Crane Prairie and Wickiup Reservoirs...tumbles through the high desert by the confluence with the Columbia about 15 miles east of The Dalles.
- **Wildlife:** Deer, elk, eagles, osprey, hawks, heron, water fowl, minnow, other beaver, bear.
- **Fish:** Coho and Kokanee salmon, Steelhead, Mountain Whitefish, Tui Chub, Rainbow, Bull, and Brown trout. The Deschutes can reach up to 12 inches in size.
- **Flora:** Wildflowers in central Oregon bloom along rivers first. Like many riparian (near water) zones the banks of the Deschutes are beautiful and in danger of being trampled by love. Much effort is going into repairing damage caused by years of use. 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 guide offers 1, 2 or 3 day trips. Canoeing - Wickiup to Bend with a portage around Pringle Falls, is a favorite. Like postcards from the last century, open, park-like stands of ponderosa pine shade the upper Deschutes National Forest here. You have your own personal tablita.

**Metolius River**
- **Source:** Deschutes Range near Mt. Bachelor. The Metolius begins as outflow from Little Lake Lava, flows into Crane Prairie and Wickiup Reservoirs...tumbles through the high desert by the confluence with the Columbia about 15 miles east of The Dalles. "Metolius Horn" and quickly ends its cool, 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 Brown trout, Mountain Whitefish. Introduced species - Brown and Brook trout, Kokanee salmon.
- **Flora:** Like postcards from the last century, open, park-like stands of ponderosa pine shade the upper Metolius - remnants of quiet forests that once stretched from mountainside to desert fringe. Wildflowers and other plant life seem to grow along the banks as if joy were fertilized. Rare beauty requires strong stewardship. Stay on designated trails, leave no trace of your visit and take only photos and memories home.

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

- **Winter**
  - **1. Alpine skiing**
  - **2. Cross-country skiing**
  - **3. Snowmobiling**
  - **4. Snowshoeing**
  - **5. Dog Sledding/skijoring**
  - **6. Winter camping**

- **Summer/Winter Safety Essentials**
  - Take these on every outing in the forest:
    - **Check List**
    - **1. Extra food and water.**
    - **2. Extra warm clothing.**
    - **3. Map and compass.**
    - **4. First aid kit.**
    - **5. Space blanket.**
    - **6. Inflatable pad.**
    - **7. Knife.**
    - **8. Flashlight/batteries.**
    - **9. Sunglasses/sunscreen.**

- **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 to 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.**

  **Check List**
  - **1. Extra food and water.**
  - **2. Extra warm clothing.**
  - **3. Map and compass.**
  - **4. First aid kit.**
  - **5. Rain gear.**
  - **6. Extra warm clothing.**
  - **7. Inflatable pad.**
  - **8. Flashlight/batteries.**
  - **9. Sunglasses/sunscreen.**

- **Fishing the Deschutes National Forest**
  - Okey dokey, there are over 100 "fishable" lakes on this forest here. You have your large, windspawed 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, these two are 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, Odell, Lava, Crescent, Wickiup, Suttle, Paulina, East, and Lake Billy Chinook. Season opens late spring. Higher elevation lakes may be blocked by snow until late 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.**

- **Check List**
  - **1. Extra food and water.**
  - **2. Extra warm clothing.**
  - **3. Map and compass.**
  - **4. First aid kit.**
  - **5. Rain gear.**
  - **6. Extra warm clothing.**
  - **7. Inflatable pad.**
  - **8. Flashlight/batteries.**
  - **9. Sunglasses/sunscreen.**

**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 will come through the door. Our modest, friendly facility at the base of Lava Lake turns 21 years-old this year (Sniff, - they grow up so fast don't they?) We hope to host visitors from all walks of life and from all 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.

**More What & Where on Pages 15 & 16**
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.

Another tool they plan to use is prescribed fire. To reduce the high fuel loads in other areas, crushing, piling, and removal of brush can be done.

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. 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 beetles bores into the tree and feeds on the tender layer under the bark. Once the layer is eaten all the way around the tree’s trunk the tree dies. Thinning helps confuse 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.

Prescribed Fire
Ponderosa pine forests evolved with fire. Frequent, low-intensity fires swept through the underbrush every 10 to 50 years burning off the shrubs and understory, 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, and removing excess fuel 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.
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 1800s and early 1900s, 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 wildfire 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 insects and disease. It is okay for 25% of the forest to be at risk, but not 50%.

The healthier the forest becomes, the more options there are for trees, wildlife, people and fire.

A healthy forest is a stable, resilient environment for all plant and animal species. Wildfire passes through and the forest retains its basic character.

Without fire, tree and plant species crowd out - compete ponderosa pine if fire is removed from the system. But these trees are much less resistant to drought, fire, insects and disease.

You don't see too much vegetation on the forest floor because frequent fire removes it. Small amounts of manzanita and snowbrush grow in openings.

The soils are healthy. Microorganisms are thriving and multiplying.

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 punice 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 quickly, 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 types 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. 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).

One problem is that 'at risk' forests look good to people. They look lush and diverse and there is lots of wildlife. But, high density vegetation leads to instability when resources are scarce.

Overcrowding stresses trees making them fast-food for insects and disease.

Fire and Drought

It has been a long, dry spell - 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.

选项：
- 火灾抑制
- 大水
- 自然的火灾

健康森林

- 稳定的健康
- 生物多样性
- 景观
- 水质
- 土地

危险

- 火灾抑制
- 大水
- 自然的火灾

康复

- 火灾抑制
- 大水
- 自然的火灾

健康

- 火灾抑制
- 大水
- 自然的火灾

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 punice 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 quickly, 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.
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 river. Travelling unseem, 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
graben: a sunken region of land with faults on both sides
pumice: volcanic glass so full of air bubbles that it floats in water
obvial: volcanic glass
magma: rock material melted by high temperatures and pressures within the earth's crust
Aa: blocky slow-moving lava flows, named for the exclamation people make when walking over flow hardened
pahoehoe:ropy, liquid lava which can form lava tubes
subduction zone: an underground region where an ocean plate is pushed/pulled under continental crust
convection current: what geologists believe drives the movement of the crustal plates
magma chamber: an area located several miles beneath surface
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 cinder cone, 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 flow was expelled, liquid lava broiled through the thinly covered south side of the cone, spreading over 5 miles to the north and west. Numerous overtopping flows contributed over 9 square miles of lava before the eruption ceased.

Did You Know...

Larry Chittwood and Bob Jensen 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 Deschutes National Forest

Shawn Dibble, the Deschutes National Forest's geologist, has studied these areas and can provide more detailed information. Please visit their websites or contact them directly for more information.

Tumalo fault zone: to the west of Bend could experience a major earthquake in the next 50,000 years, many dams in the area are being strengthened to withstand a possible big quake.

Q. Will there be enough groundwater to support the growing central Oregon Communities?
A. Like any natural resource, the groundwater 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 groundwater supply depends upon the yearly snowpack, 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. Mazama ash: Road cuts along Hwy 58 clearly show the blanket of ash and pumice that covers the forested slopes in a region which formed Crater Lake 7700 years ago. Odell Lake glacial 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 tectonic plates. 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 zone, called magma then finds its way to the surface through cracks in the plate actually melts. This molten zone. When the plate gets about 70 miles deep, the temperature and pressure are so intense that the plate actually melts. This molten zone, called magma then finds its way to the surface through cracks in the plate. The surface of the earth is made up of several large sections of crust, called tectonic plates. 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 zone, called magma then finds its way to the surface through cracks in the plate.

Crescent Mountain

Fault

Early High Cascades

Lake High Cascades

Late High Cascades

Fault

Geologic Features

CASCADE GRABEN

Ancient Volcanoes of Western Cascades

Cascades Fault

Fault

Crescent Mountain

Fault

Mt. Jefferson Elev. 10,480

Three Fingered Jack Elev. 7840

Mt. Washington Elev. 10,205

North-Sister Elev. 10,000

Middle-Sister Elev. 10,547

Black Butte Elev. 9,936

Mt. Hood Elev. 11,239

Bend/Fort Rock

Cascade Lakes Highway: This drive offers splendid views of the High Cascade peaks (stratovolcanoes), as well as access to several lava-dammed lakes.

Newberry National Volcanic Monument: The monument contains many excellent examples of volcanic features. See page 12 for map and more details.

Lava Lands Visitor Center/Lava Butte: The center provides interpretive displays, trails and naturalists to explain the geology of central Oregon. The Butte offers a nice panoramic view of the geology of the region.

Deschutes River Trail: The many falls on the river were created by lava flows which dammed the original river channel. The trail can be reached from the Cascade Lakes Highway or from Lava Lands Visitor Center.

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Boy Are We In Hot Water!

Geothermal Update:

Geothermal energy continues to be a "Hot" topic on the Deschutes National Forest. Scientists have been eying 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? Cheer up, Lead (Pb) will shield you from slime and Superman from Kryptonite's deadly rays. Picture a glowing rock radiating hot, invisible particles that go zinging through space, hitting air, melting flesh, metal or wood. 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 split out pieces of themselves (naturally 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, smaller, 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 blowing in the sands of time.

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

Carbon-14   5668 years

Potassium-40 1.3 billion years

Using carbon-14 to date organic remains - like a tree burned and killed 19,000 years ago, we find that it will take 5668 years for one-half of the unique carbon, C-14 in the tree to disintegrate. 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 blowing in the sands of time.

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Big Obsidian Flow
4:30 pm, Fridays, meet at visitor center

Roving Nature Walks
11:30 am, 2:00 pm, Wed, Thur, Sat, Sun
4:30 pm, Wed, Thur

Paulina Lake
12:30 pm, Sat, Sun

Big Obsidian Flow
10:30 am, Wed, Thur, Sat, Sun (1 hour)

Naturalist Walks

Hours:
Under the bats and stars!

July 9:00 pm Evening Ecology and Star Gazing Party
is free, appropriate for all ages and lasts about one and half hours. See you
idea to check at the Lava Lands Visitor Center or call 593-2421. The program
the evening's program. So, if you are planning on attending it's always a good

The sky, even over Lava Butte, can sometimes be fickle. Weather can affect
• America's most famous volcanoes erupt twice daily!
• A new walk every week!
• Hot springs, wildlife and fossils.
• See an 80 foot waterfall cascading over volcanic rock.
• See volcanic glass and the ancient art of tool making.
• Exploration hike, Lava Lake day use area.
• Hikes meet at Sparks Lake boat ramp
• Canoe discovery, meet at the boat ramp.
• Fire Prevention
• Smokey's Birthday Party: Mollie Jurgenson

July 27 Sat, 7:00 pm
Spring Campground Boat Launch Area
(Crescent Lake)
• Volcanic History: American Indian Rock Art, Ruth Killam
August 3 Sat, 1:30-2:30 pm
Willamette Pass Ski Lodge - Highway 58
• National Recreation Areas: Fire Prevention
August 11 Sat, 10:00 am
Trapper Creek Campground Entrance
(Most OR/Idaho)
• Trapper Creek Nature Walk, Upper Road, Marine Boating
August 17 Sat, 8:00 am
Spring Campground Day Use Area
(Crescent Lake)

Sisters Ranger District
July-September
Please call Sisters office for current schedule (541) 497-2211 to check at Camp
Sherman store

HELP WANTED
MAKE EP YOUR OWN JOB: Volunteers wanted with serious interest in
geology, archeology, wildlife, botany, history, etc. We will train. If you are
dedicated, Satisfaction guaranteed. Call Deschutes National Forest at 388-5664.

TOURS: Some tours needed to do! Sit in the morning, snow shoe in the
afternoon. Guide new friends around mountain lakes. Admire wildflowers and
birds, identify stars at night. Volunteers needed to help with winter and summer
national forest programs. Call 388-5664.
First Oregonians
With Forest Archaeologist Paul Claeyssens

Answers to questions about our predecessors who lived in the high deserts of central Oregon.

Who first settled on the forest fringes and high deserts of central Oregon, pioneers?

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 1850's.

Was American Indian life a "primitive" existence at that time?

PC: Not really. Hunter/gatherers, for instance, were not/are not " 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 constructed of stout pine support posts with skins or woven mat laid over smaller poles and likely used as summer base camps by prehistoric peoples from the Northern Great Basin to the southeast.

This (really, really) Old House

The oldest domestic structure, dated to at least 9,500 years before present, was discovered adjacent to Paulina Lake in Newberry Caldera. The house, likely a circular shelter or "wickiup," was excavated at the lake site in 1992. Wickiups were

On the Cutting Edge: Archaeology

Research on the Deschutes National Forest

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

The Central Oregon Heritage Group (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 examine 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 "...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 Claeyssens "...we will shift focus to the whole region, pool resources, prioritize work and then 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.

HERITAGE: Protecting the Past

Cultural materials within the Monument and National Forest such as rock art and arrowheads...are protected by law. Increasingly, vandalism and theft are taking a 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. As part owner of this forest, you can also be a part of the solution.

Plants, Animals and Artifacts

All plants, animals, rocks and artifacts, including wildflowers, dead wood and arrowheads...are fully protected by law. Their destruction or removal is prohibited. Help us preserve the forest's beauty and history for those who visit in years to come.

Huckleberries, Finch...

...or squilpin (fish) in desert lakes, ducks and geese, rabbits, deer, elk, and antelope. Indian rice grass, tarried seeds, water lily seeds, bittersweet root, berries, fruits shrubs (huckleberries), trees (choke-cherrys) and more, were foods that prehistoric people ate. We know this because elders and traditionalists from local tribes still retrieve 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 obsidian from the Newberry area 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.

Ready to Wear

Prehistoric people relied on available plant fibers and animal skins for winter and summer wardrobes. Some examples: sage bark woven into sandals, tanned deer hide for jackets and breeches, woven reed or grasses for skirts and conical hats, natural pigments and dyes like iron oxide (red ochre), chalk and charcoal for adornment and "make-up," necklaces of beads made from shells, stone, bone and wood.

HERITAGE RESOURCES
**Too Close For Comfort...**

National Forests are home to a large variety of wildlife. Since this is their home they forage for food where it is most convenient. Small and large animals frequently live in and near campgrounds. Browsing campites like they are the local 7-11.

American black bears (Ursus americanus) are occasional visitors to the campgrounds. It is your responsibility to store your food, leftovers and garbage out of their sight and smell. Bears can be very creative in the food pilfering arts and can do extensive property damage in their efforts to secure just the right snack. This can range from fruit trees being stripped of their fruit to breaking vehicle windows. Black bears are very dangerous and, almost as quickly as chipmunks, overcome their fear of people. Bears that have overcome their fear of humans are usually destroyed because of the risk of injury to people. Keep your pets and children away from them. Please do not contribute to the delinquency of a bear by feeding them or leaving food that attracts bears. Remember, this is their natural home, we are all just visitors.

Mountain Lion, Cougar, Puma, Felis concolor, not just another pusey cat...

Your chances of ever viewing a mountain lion in the wild are quite slim, however they do live in the Deschutes National Forest. The mountain lion was formerly present in practically all parts of the United States. Now it is confined almost entirely to the mountains of the West. These powerful cats (weighing in at 80 to 200 pounds) are not very smart and are easily frightened. They inhabit the mountains and have a preference for areas where there is a good supply of small game. They are solitary creatures and usually live alone. The only time they form social groups is when they are trying to secure a mate or a hunting territory. They are excellent hunters and will eat almost any animal they can overpower. They are very creative in the food pilfering arts and can be very destructive.

**Bat Facts**

Bat colonies Many bat species rear their young in maternity colonies. Pregnant females of many bat species congregate in one cave or building during the spring and summer. A group of female bats may occupy all of the young for a few weeks. 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 10 feet during the evening. You may see them as they exit from the day roost.

**Bat “Bennies”**

- Wherever bats are found there are critical elements in nature’s web of life.
- One little brown bat can catch 600 mosquitoes in one hour.
- The 20 million Mexican free-tailed bats from Bracken Cave, Texas, eat 250 tons of insects weekly.
- Tequila is produced from agave plants whose seed production drops to 1/3,000th of normal without bat pollinators.
- Important agricultural plants - bananas, mangos, cashews, dates, and figs - rely on bats for pollination and seed dispersal.
- Bat droppings in caves support entire ecosystems of unique organisms, including bacteria useful in detoxifying wastes, improving detergents, and producing gasohol 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 baby bats cluster at up to 500 sq. ft. per cubic foot.
- The Chinese view bats as symbols 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 40 percent are endangered or are candidates for such status.
- The smallest bat, the bumblebee bat or Kitti’s hog-nosed bat, found in Thailand, is the size of a jelly bean and weighs about 2 grams.
- Flying foxes, the largest bats, weigh up to 3 or 4 pounds with a wingspan of up to 6 ft.

**Approaching Wildlife**

(Make yourself approachable)

Do you watch the local wild animals? They actually enjoy watching you too. There are a lot of wild animal don’t but if you are observing right you’ll have a fun and safe experience and so will the wildlife. Just sit, like a rock, and observe the natural behavior of wildlife. If you are still, the birds may see you as a friend, seeing that you are not a threat. Deer may approach you out of curiosity, you may spot an elusive pika or...

The first rule... avoid disturbing the animals. If a hawk appears up on you, you are probably too close to its nest 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 next. Eggs that are left uncovered cool quickly, killing the embryo. Frantic parents may attract a predator (ravens, jays) which eat eggs and nestlings.

The second rule... don’t touch the animals! An apparently “abandoned” mule deer fawn is simply hiding, waiting for its mom to return and feed it. If you pick it up or cause it to run away, the mom may not escape and find you again. The third rule...don’t feed the animals. Wild animals that get used to being fed forget how to fend for themselves. Human food is bad for animals - if you don’t see it growing in the area, it’s not healthy for the animals and it could be bad for your health to feed them.

**Keeping Wilderness Natural:**

**Changing Images and Impressions**

The word wilderness means different things to people. You can probably think of a wilderness image that’s your favorite, Solitude and natural splendor are uniquely preserved in the five wilderness areas on the western boundary of Deschutes National Forest. These areas surround some of the major volcanic peaks of the High Cascade range. Protecting the characteristics that make wilderness exceptional is a challenge. The key to success lies in our images and impressions of what a wilderness is.

1. Leave it ALONE! is how some people would keep wilderness natural. Not that simple. The High Cascade wilderness receives thousands of visitors a year. Ignoring the physical impact thousands of people have on a natural environment is not an option. What most of us don’t realize is - the wilderness we see is not what a “natural” wilderness looks like.
2. Keep track of your observations. For decades we protected our wildlands by removing the elements that shaped them. Scenic, Lightning-caused fires have been suppressed. Fire creates cleatings that become meadows of grass and wildflowers attracting a greater

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History
Newberry National Volcanic Monument is located south of Bend, Oregon, off Hwy 97. Community concern for the preservation of the area led to the establishment of the Monument in 1990. The Deschutes National Forest currently manages the Monument to preserve and protect the area's unique geologic and ecological resources. The Monument's exceptional scenic and recreational opportunities cover over 50,000 acres.

Archeology
The Newberry area has been inhabited by Native Americans intermittently for the last 10,000 years. Archeologists hypothesize that early inhabitants used the Newberry area in much the same way we do today—fishing, hunting, and recreation. Obsidian from Newberry was traded up and down the Pacific Northwest and has been found as far away as British Columbia in Canada. It is unlawful to remove or damage any rock, plant or artifact found within the Monument.

Geology
Newberry Volcano is one of the largest shield-shaped volcanoes in the lower 48 states, covering over 500 sq. miles. The Monument is located along a group of faults known as the Northwest Rift zone. A current geophysical survey indicates that the volcano has erupted hundreds of times during the last half-million years. The most recent eruption was 1,300 years ago. Suggesting that the volcano is still active. The caldera of Newberry is commonly referred to as Newberry Crater, but it is truly a caldera like Crater Lake—much wider than it is deep. This feature formed after a series of collapses following big eruptive episodes and now contains two clear crystal lakes. The Monument also has many other fine examples of common volcanic features such as cinder cones, ash flows, lava tubes and flows, pumice and obsidian deposits.

Geothermal Resources
In 1981 the U.S. Geological Survey drilled a test well at the center of Newberry caldera and found temperatures of 509° F at a depth of 3658 ft. This indicated a potential geothermal resource was located below the caldera. As of June 1996, CalEnergy Co. has been drilling several deep test wells on the west flank 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 electrical power.

Recreation
TRAILS: Miles of hiking trails explore the Monument; most are open late spring through fall for hiking, horseback riding and mountain biking. The trails are also popular in winter with cross-country skiers and snowmobilers. 
• Paulina Rim Trail (21 miles)
• Paulina Lake Trail (7.0 miles)
• Peter Skene Ogden Trail (8.6 miles)

BOATING: Frequent steady winds make the lakes ideal spots for sailing and windsurfing. Motor boats are permitted on both lakes throughout the summertime. There is a 10 mph speed limit in force, and Oregon fishing licenses are required.

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

Points of Interest

1. Paulina Peak, located four miles by road or trail from Paulina Visitor Center, is the highest peak in the Monument (7895 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 is the result of the most recent eruption of Newberry Volcano, and the youngest (1,300 years) 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 several 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 6200 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 is located just a quarter of a mile west of Paulina Lake Lodge. A 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 surface outlet for Paulina Lake and has qualified for federal designation as a Wild and Scenic River.

5. Lava Butte is 7000 feet above sea level, located in the northwest border of the Monument. The peak is about 300 feet taller than Paulina Peak.

6. Lava River Cave is located one mile south of Lava Lake Visitor Center on Hwy 97. The one mile cave is the largest lava tube in Oregon. Lava tubes form when a river of molten lava creates a channel and the sides eventually crust over to create the roof. The cave offers an excellent opportunity to see lava tube formations. The cave is closed to the public except during certain educational programs. The cave entrance is at Paulina Lake Road, just south of Lava Lake Visitor Center.

7. Lava Beds National Monument is located on the northeast side of Bend, Oregon, off Hwy 97. The area is home to the Lava Beds National Monument and is designated a Wild and Scenic River.

8. The Deschutes River, northwest border of the Monument, is a federally designated Wild and Scenic River. The Deschutes offers some of the best flyfishing, whitewater rafting and kayaking in Oregon. A river trail runs intermittently from Sunriver to Bend, with beautiful views for the hiker, biker or equestrian of Bend, Dillon and Lava Island Falls. Wildfire watching opportunities include beaver, otter, deer, elk, osprey, mink, martins, eagles and other birds.

Campgrounds
Campsites A-D offer drinking water, toilets, picnic tables and campfire rings.

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.
High Desert Learning Center

Perfect partners

The High Desert Museum, Pacific Northwest Research Station, Bureau of Land Management and Deschutes, Oregon, Fremont and Winema National Forests

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 focus of the Center is on our 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 the 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 Lava Lands 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 541-591-2421.

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, Lava River Cave, Deschutes National Forest Supervisor's Office, Bend-Ft. Rock Ranger District Office, Crescent Ranger District Office and Sisters Ranger District Office.

Recreation

Weeds of the West; Whitson, T. $24.95 Trees to Know in Oregon; Jensen, E. $4.00 Cascade-Olympic Natural History; Mathews, D. $22.50 Kids - Ancient Forests Discovering Nature; Anderson, M. $4.95

Geology of Oregon
Geology of Oregon: Ott, 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 Volcanos: Field, N. $4.95

Heritage Resources
Indian Rock Art of the Columbia Plateau; Keyser, D. $17.50 Coyote Was Going There Indian Literature of the Oregon Country; Lowell, J. $17.95 Uncle Sam's Cabins; Joinlin, L. $16.95

Wildlife


Hey Elliot...

(Continued from page 9)

Imagine how Elijah Elliott would have reacted if told the forest-clad wilderness he was crashing through would one day be a Mecca for fishing, hiking, hunting, picnicking, canoeing, rafting, bicycling riding and that new fangled fog - photography. After weeks of hoisting wagons over fallen trees and fording 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 east 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 are 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 rugged 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 Elliot Party regretfully discovered - snow can come early and life is possible only for the baleful and brave. But now they were desperately stranded on the Cascade Divide.

The high alpine country of the Deschutes National Forest is stunningly beautiful. Spiked peaks of extinct and dormant volcanoes tower thousands of feet above surrounding highlands. Snow fields and glaciers feed clear mountain lakes. Only a handful of Elliot Party members actually walked 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 exclaimed, "Surely no part of the mountains can be more rugged than we passed over."

High alpine country is concentrated near the Cascade summits. Miraculously 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 shivering pioneers survived their ordeal, record by good samaritans from the town of Lowell.

With a bit of planning, we can explore and enjoy in a day what took the Elliot Party weeks to walk across. Our forest has changed a lot since Elliot 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 10)

If you don't like the weather here, wait 30 seconds. It is true - over and furthermore...

People in central Oregon - 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.

We've talked 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 here, wait 30 seconds." It is true - over and furthermore...

PC: Yes, climates are not stable. 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 shore inhabitants into desert dwellers. This time the effect was not just local - in the greater American Southwest - the Anasazi (or "Ancient Ones") abandoned their pueblos and cliff-dwellings and disappeared and experienced the archaeological record. Populations in central Oregon adjusted their adaptive strategies, or "life-ways" and began "rounding" take advantage again of seasonally available resources in different locations.

Archaeologists working in central Oregon, use these "adaptation" models to help interpret ancient sites, to try and understand the past life-ways of our American Indian predecessors. Removing or disturbing artifacts literally erases the past. Look at it and leave it lie. It's not just a good idea, it's the law.

Tracks Answers
from page 11
A. Cottontail Rabbit    B. Pika    C. Mouse    D. Targaryen    E. Deer    F. Skunk    G. Owl

..AND FURTHERMORE...
Japanese, and rainstorms of fall.

**Bold Text**

**ITALIC TEXT**

**For Trails Listed, Elevation is given for each Trail.**

**TOADS**

Spotted Toadflax (snapdragon family) - spreads by seed and by root buds, can grow up to 3 feet tall on long stalks, bright yellow flowers alternate with waxy, blue-green leaves.

**WEEDS**

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**Places of Interest**

**Trails of Central Oregon**

**Key Sites by District**

**Bend/Fort Rock**

- Mt. Bachelor
- Tumalo Falls
- Swallow Falls
- Lake Lava Volcano/Lava Butte
- Lava Cast Forest
- Lava River Cave
- Benham Falls
- Lava Prairie Rec. Area
- Dillon Falls
- Lava Island Falls
- Newberry Crater
- Big Obsidian Flow
- Paulina Lake
- East Lake
- Paulina Falls
- Prong Falls
- Fall River Ranch Hatchery
- Pilot Butte State Park
- Tumalo State Park
- Smith Rock State Park
- Fort Rock State Park
- Dry River Canyon
- Big Hole
- Hole in the Ground
- Pine Mountain

**CRESCENT**

- Big Marsh
- Trappert Creek Nature Trail
- Chestnut Crk. Trail
- Diamond Peak Viewpoint
- Cascade Crest

**SISTERS**

- Sisters State Park
- Mule Ear Headwaters
- Wizard Falls Fish Hatchery
- McKenzie Pass (Wayside)
- Suicide Lake

**Winter Recreation Opportunities**

**TRAIL NAME**

**Bend/Fort Rock**

- Charlton Lake
- Ochler Rim
- Coyote Loop
- Hoffman Island
- Lava Cast Nature
- Little Crater
- Lost Lake
- Mt. Bachelor
- Newberry Crater
- North Fork
- Obidian Flow
- Osprey Point
- Paulina Falls
- Paulina Hot Springs
- Paulina Peak
- Peter Sweeney Oasis
- Ray Alkison Loop
- Swamp Wells
- Swapp Lake
- Molten Lands
- Tumalo Mountain
- Whispering Pines

**LOCATION**

- 19 10' 5500-7100 Jun-Nov Diff. X X X X X
- 57 17.0 6300-7855 Apr-Dec Easy X X X X X X
- 62 6.6 4090-4350 Mar-Nov Mod X X X X X
- 59 1 5500-5600 May-Nov Easy X
- 18 0.3 4950-5000 May-Oct Easy X
- 60 0.9 5750-5850 May-Nov Easy X
- 53 1.5 5330-6850 Mod X
- 42.5 4.5 6450-7400 Jun-Nov Diff X Diff X X X
- 30 1.6 6200-9000 Jun-Nov Diff X
- 8.7 6 3350-7300 Jun-Nov Mod X X X X
- 24.2 3.5 4950-6100 Jun-Nov Mod X X
- 58 0.1 56 5420-6560 Jun-Nov Easy X
- 29 0.3 4450-5100 May-Nov Easy X
- 54 0.5 6250-6350 Apr-Oct Easy X
- 77 0.7 6300-6650 May-Nov Mod N X
- 51 0.5 6550-7352 Jun-Nov Diff X
- 56 9.5 4300-6250 May-Nov Mod X
- 4.3 2.5 5400-5450 Jun-Nov Easy X
- 20 20.6 4090-7400 May-Dec Mod X X X X
- 23 8.5 3260-6100 Jun-Nov Mod X
- 22 0.5 4500-4550 Apr-Dec Easy X
- 38 1.5 6200-7700 Jun-Nov Diff X
- 30 0.3 4500-5400 Apr-Dec Easy X
- 58 7.6 4900-7251 Jun-Oct Diff X
- 99 37.6 2900-6000 May-Dec Easy X
- 20 10 2890-2900 Apr-Nov Easy X
- 32 2.2 3560-4550 Apr-Nov Easy X
- 90 22 3100-4000 May-Nov Mod X
- 30 4 4800-5200 May-Oct Mod X
- 2000 13 5700-6644 Jun-Nov Diff X
- 2000 17 5700-6744 Jun-Nov Diff X
- 40 5.5 4850-5450 May-Nov Easy X
- 40 5.5 5200-6000 May-Nov Mod X
- 41-A 2.0 5500-7500 May-Nov Diff X
- 42 11.2 4800 May-Nov Mod X
- 43 7.5 5800-6000 May-Nov Easy X
- 44 13.1 4850-6200 May-Nov Mod X
- 44-A 3.7 4860-5600 May-Nov Easy X
- 44-B 0.8 5800 May-Nov Easy X
- 45 3.0 5400 May-Nov Easy X
- 46 3.6 5553 May-Nov Easy X
- 49 3.0 4941 May-Dec Diff X
- 50 4.2 5400 May-Dec Diff X
- 2000 3.5 5126-5700 Jun-Nov Easy X
- 2 473 2 May-Nov Easy X

**Trail Sites**

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**What are some of the most noxious weeds in Oregon?**

**Go Pull (more than one) Fast!**

**What is a noxious weed?**

Noxious weeds are aggressive non-native plants that invade, displace native plants and cause long-lasting problems. Noxious weeds increase fire hazards, replace valuable wildlife food, poison livestock and reduce the quality of recreational experiences. They take over, reduce plant diversity and threaten the health of the forest and the community.

**What t9 major noxious weeds occur in central Oregon?**

Spotted Knapweed (dandelion family) - purple flowers resemble those of thistles, seeds spread by rodents, livestock, in hay or commercial feed, or on vehicles, seeds can remain viable in the soil for up to eight years. Knapweed is found along roads, in vacant lots, your yard and is spreading throughout central Oregon.

**Dalmatian Toadflax (snapdragon family) - spreads by seed and by root buds, can grow up to 3 feet tall on long stalks, bright yellow flowers alternate with waxy, blue-green leaves.**

**WEEDS**

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**Where are any name**

**Bachelor Button - coneflower is a weed (Greek).** Western Water Hemlock (parsley family) found along streams and in wetlands, is considered one of the most poisonous plants in America. It is often mistaken for water-parsnip, an edible wild parsley.

**Babybreath is a weed (Europe).**

**Cheat Grass - (one of many non-native grasses) is the grass whose "seeds" get caught in your socks, in your pets ears, between your dogs paws...Europe.**

**Foglower is a weed toxic to livestock (Europe).**

**Rocky Mountain Iris (1-2 foot tall iris you often see along roads) is toxic to cattle.**

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**Animals transport weed parts in their fur and feces.**

**Becoming familiar with what local noxious weeds look like.** Pull weeds. If you find them without flowers or seeds, leave them after pulling; but if flowers or seeds are present, place weeds in a plastic bag, secure it tightly, and dispose.

**Report any weed sites you find to the Forest Service.**

To report a weed site on the Forest, or to volunteer to help pull weeds on the Forest, contact Charmaine Leavac (Bend/Ft. Rock Ranger District) at 549-7770. Carolyn Clove (Crescent Ranger District) at 433-3235, or Marci Paine (Sisters Ranger District) at 549-7771.

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Visiting Lava Lands Visitor Center, had a good
your comments
directly
pick up an official
comment card
at any Forest
Service office or ask a ranger for one and send
archaeological wonders of the Forest please

They can serve you better.

If you have a school or group that would like a tour
at Lava Lands, call (541) 593-2421 (May-Oct.) or 388-
5664 anytime. We also offer snowshoe naturalist tours
in the winter on Mt. Bachelor, call (541) 388-5664
(Oct.-May). You can also write to us at:

Environmental Ed. Coordinator
Lava Lands Visitor Center
Bend/St. Rock Ranger District
1230 NE 3rd St., Suite A262
Bend, OR 97701

Smiling, frowning, eating or just being huma - we love 'em all!

Merlo Station High, Beaver; Monmouth Middle School,
Monmouth; Morning Star Christian School, Bend,
Mt. Angel Middle School, Mt. Angel; New
Dimension Christian School, Medford; Oak Heights
Elementary, Sweet Home; Ontario High, Ontario;
Palisades Elementary, Lake Oswego; Redmond
Elementary, Redmond; Riddle Elementary, Riddle;
Rogers Juniper High, College Place WA; Saturday Academy;
Sisters Elementary, Sisters; Spencer Butte Middle School,
Portland; St. Mary's Academy, Portland; St. Francis
School, Bend; St. Mary's Academy, Medford; Star
Mountain Waldorf School, Bend; Thomas Academy, Kert
WA; White City Elementary, White City; Winchester
Elementary, Winchester and all the other schools that
visited but weren't registered and schools who visited
during times we weren't open. Please register,
your support helps keep us operating. And please keep
visiting, help or not, registered or not. You are one of
the best things we have.

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
learning about the geological, ecological, and
archaeological wonders of the Forest....please
pick up an official comment card at any Forest
Service office or ask a ranger for one and send
your comments directly to Washington D.C.
Your input can help keep places like Lava Lands
Visitor Center open and programs like the
High Lakes Discovery Walks - well, walking.

AND let the Chief know about any positive or
not so positive experience you had on this or
any National Forest. The Forest Service wants
how they served you well and how they
can serve you better.

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Please continue the cycle!

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