

Volcanic Vistas



Guide to Newberry National Volcanic Monument



View to the northeast across Newberry National Volcanic Monument from Paulina Peak on Newberry Volcano. Community concern for the preservation of the area led to the establishment of the Monument in 1990. The Deschutes National Forest manages the Monument to preserve and protect the area's unique geologic and ecological resources. The exceptional scenic and recreational opportunities cover 50,000 acres.

Photo: Mary Williams

What Can I See In...

2 Hours:

*Lava Lands Visitor Center and Lava Butte**

*Due to limited parking atop Lava Butte, 30 minute parking passes are issued on a first come, first served basis. Vehicles longer than 22 ft. prohibited.

Half-Day:

Above sites plus explore *Lava River Cave***

**Allow about 2 hours for round trip through entire cave. Gate closes at 4pm.

Full Day:

Above sites plus *Lava Cast Forest****

***Access site via gravel road, 9 miles one way. Pick up brochure at Lava Lands or download from Deschutes National Forest website.

2-3 Days:

See ALL of Newberry National Volcanic Monument!

Visit all of the above sites plus the following sites within the

Newberry Caldera:

Paulina Visitor Center

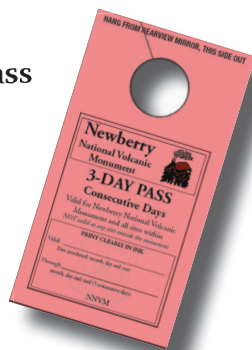
Big Obsidian Flow

Paulina Falls

Paulina and East Lakes

Drive to the top of *Paulina Peak* (7,984 ft.) for one of the best views in Oregon!

Buy a 3-Day Monument Pass for \$10!



Useful Contacts

EMERGENCY	911
Newberry National Volcanic Monument www.fs.usda.gov/goto/centraloregon/nnvm Lava Lands Visitor Center	541-593-2421
Deschutes National Forest www.fs.usda.gov/centraloregon Bend Fort Rock Ranger District	541-383-5300 541-383-4000
Discover Your Northwest www.discovernw.org/deschutes	877-874-6775
Deschutes County Sheriff (Non-emergency and Animal Control): http://sheriff.deschutes.org	541-693-6911
Oregon Department of Fish & Wildlife www.dfw.state.or.us/	800-720-6339
ODOT Road Conditions www.tripcheck.com/	511 (toll free in Oregon) 1-800-977-ODOT (toll free in Oregon) 1-503-588-2941 (outside Oregon)
National Weather Service www.weather.gov/	Enter Bend or La Pine, Oregon
Crater Lake N.P. Information	541-594-3000

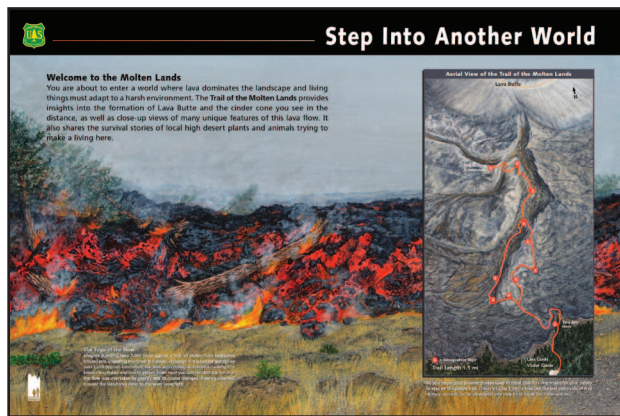
Newberry National Volcanic Monument
Information HOTLINE 541-383-5700



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What's New on the Monument?



The first of eleven new interpretive panels on the Trail of the Molten Land.



Detail of Newberry Caldera from the new 3-D topographic model of the Monument.

THE TRAIL OF THE MOLTEN LAND provides insights into the formation of the cinder cone, Lava Butte, and close up views of its basaltic a'a lava flow. A newly completed (June 2012) section of the trail provides barrier-free access. New full color interpretive panels along both the old and new trail sections help visitors imagine what the conditions would have been like just over 7,000 years ago during Lava Butte's two-phase eruption. In addition to addressing these exciting geologic events, some panels share the current story of how life is adapting to this harsh environment, introducing the visitor to the plant and animal life that lives on the lava.

THE LARGEST VOLCANO IN THE CASCADES volcanic arc is a little hard to get your head around. Fortunately, the rangers at Lava Lands Visitor Center have a new interpretive tool to help visitors do just that. This fall, the Deschutes National Forest contracted the services of Rauda Scale Models, Inc. to build a model that illustrates the over 50,000 acres of the Newberry National Volcanic Monument in exquisite detail. The 5' x 9' scale model resides in the visitor center bookstore where rangers will be available to further orient visitors to the geologic wonders awaiting them on Newberry National Volcanic Monument.

NEWBERRY QUICK FACTS

VOLCANO TYPE: shield-shaped composite

AREA: 1,200 square miles—about the size of Rhode Island

NEARBY TOWNS: Bend, Sunriver, LaPine, and Redmond

POPULATION ON OR NEAR NEWBERRY LAVAS: about 200,000

CALDERA AREA: 17 square miles

ELEVATION: 7,984 feet above sea level—Paulina Peak summit

HEIGHT ABOVE BEND: About 4,000 feet

LAST ERUPTION: about 1,300 years ago—Big Obsidian Flow

OLDEST LAVAS: about 400,000 years

NUMBER OF VOLCANIC CONES AND VENTS: more than 400

ESTIMATED TOTAL VOLUME: 120 cubic miles (mi³) (for example, South Sister is 5 mi³ and Mt. St. Helens is 6 mi³)

VOLUME OF LAVA BUTTE CONE AND FLOW: Less than 1 mi³

SOURCE: USGS FACT SHEET 2011-3145

GREENER GOALS FOR THE GREENER GOOD

Deschutes National Forest is a leader in innovative ways to reduce fossil fuel usage within all aspects of operations; from hybrid vehicles to 100% off-the-grid facilities the Deschutes National Forest is leading by example. The U.S. government challenged all federal agencies to reduce fuel consumption in facilities by 65% by year 2015 with the Energy Independence and Security Act of 2007. Newberry National Volcanic Monument contributes to the success of the Deschutes National Forest by greening operations one step at a time. In 2012, the Monument is improving its **solar power** system at Lava River Cave (LRC), piloting the use of **rechargeable lanterns** at LRC, using **bicycles** for staff travel between Lava Lands and LRC, installing **bike racks** at both sites, printing the Vista with 80% **recycled paper** and **soy ink**, and using **E-85 fuel** in one of our newer vehicles.



RECREATION PASSES ARE REQUIRED at designated day use sites on the Deschutes National Forest including sites within Newberry National Volcanic Monument.

Recreation Passes accepted include : National Forest Recreation Day Pass (\$5), Annual Northwest Forest Pass (\$30), Interagency Annual Pass (\$80), Interagency Senior Pass (\$10), Interagency Access Pass (FREE with documentation), the NEW Interagency Military Pass and the 3-day Monument Pass*(\$10). *The 3-day Newberry National Volcanic Monument Pass is only sold at Monument Welcome Stations (see below) and is good **only for sites within the Monument**.

Passes are available at Newberry National Volcanic Monument Welcome Stations (Lava Lands Visitor Center, Lava River Cave, Paulina Visitor Center and Newberry Welcome Station), Forest Service offices throughout Washington and Oregon and online at <http://www.fs.usda.gov/detail/centraloregon/passes-permits/recreation>

Benefits: 95% of the revenue from Recreation Passes stays in the local area for facility maintenance, interpretive services, and ecosystem protection. These passes are your opportunity to care for our public lands and pass on your natural legacy. Thank You!



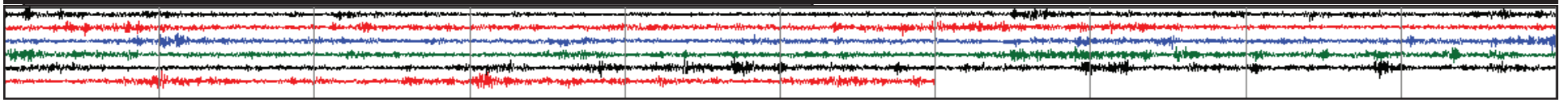
Discover Your Northwest

Deschutes National Forest and Discover Your Northwest (DYNW). DYNW is a nonprofit organization dedicated to promoting the discovery of northwest public lands, enriching the experience of visitors, and building community stewardship of these special places today and for generations to come. Proceeds from DYNW retail operations are used to fund conservation education programs, publications, exhibits, guest speakers, events and other services designed to enhance your appreciation of the area.

Become a member today and receive a 15% discount at DYNW locations on public lands throughout the Northwest.

For more information: www.discovernw.org 206-220-4140 Discover Your Northwest 164 Jackson Street Seattle, WA 98104

Volcanic Vital Signs



U.S. Geological Survey (USGS)/Cascades Volcano Observatory (CVO) scientists and volunteers installed eight new real-time seismic and deformation (GPS) volcano monitoring stations around Newberry Volcano, in August 2011. By November 2011, scientists had linked all sites into a telemetry system that sends real-time field data to the USGS-CVO in Vancouver and the University of Washington Pacific Northwest Seismic Network (PNSN) in Seattle.

Monitoring stations feature a seismometer buried in the ground and a GPS receiver. Seismometers are so sensitive that they can detect elk (or people) walking nearby, and the GPS instruments can detect ground movement of just a few millimeters. With several months of careful study of background seismicity and deformation levels, the new Newberry Volcano monitoring network is now fully operational.

Newberry is a quiet volcano. In the first six months of operation, only one small earthquake has occurred in the caldera, but it would not have been detected without the new network. The instruments have recorded the fracturing of ice in lakes several miles distant. A 2004 USGS assessment of monitoring networks at 13 major Cascade volcanic centers, found Newberry to be one of the volcanoes “most in need” of additional monitoring. Two factors contribute to

Newberry’s status as hazardous—its relatively recent eruptive activity (the 1300 year old Big Obsidian Flow), and its proximity to human population centers. Until last summer, only one seismic station existed on Newberry Volcano. USGS considered a lone seismic station inadequate for providing timely warning of a volcano’s reawakening.

At volcanoes such as Newberry, earthquakes and slow movement can be symptoms of subsurface movements of magma, gas, and fluids. Often, volcanic reawakening can begin subtly, with many earthquakes of a magnitude less than 1.0, and with ground deformation measured in tiny fractions of an inch. Additional monitoring stations will provide baseline data that improves scientists’ ability to detect and interpret which movements are normal for the area, and which might indicate volcanic unrest. The idea is similar to your doctor having a baseline record of your vital signs, so that when one of those signs changes your doctor can interpret that change in your system and respond appropriately.

If you encounter a monitoring station during your hikes around Newberry, please do not disturb. You can check Newberry’s vital signs yourself at the following website of the Pacific Northwest Seismic Network: <http://old.pnsn.org/WEBICORDER/PNSN/welcome.html> where real time data from the new monitoring stations is displayed.



USGS Cascade Volcano Observatory staff setting up seismic/GPS station on Newberry Volcano in 2011. If you encounter a monitoring station during your hikes around Newberry, please do not disturb.
Photo: Seth Moran, USGS/CVO

“Newberry Volcano - Central Oregon’s Sleeping Giant”

Learn more about Newberry Volcano’s history with USGS’s newly published Fact Sheet 2011- 3145:



<http://pubs.usgs.gov/fs/2011/3145/fs2011-3145.pdf>

Geothermal Power from Newberry Volcano - Is it possible?

AltaRock Energy & Davenport Power think so...

NEWBERRY VOLCANO has had a long history of geothermal energy prospecting dating back to the 1970s. In the 1980’s, a USGS research drill found hot steam (509F) 3,057 feet below the surface near the center of Newberry’s caldera. The establishment of the Monument ended drilling inside the caldera. Subsequent drilling outside the Monument boundary encountered only hot dry rock.

WHY GEOTHERMAL EXPLORATION AT NEWBERRY VOLCANO? Newberry is an active volcano with lots of available relatively shallow heat. It is the largest volcano in the Cascade Range and has built itself a broad shield shape through repeated eruptions over the last 400,000 years. Only 75,000 years ago, Newberry’s summit collapsed forming a caldera from a major eruption which volcanic ash has been found as far as San Francisco, California. Its last eruption was an explosive obsidian flow centered in the Newberry caldera a mere 1,300 years ago.

ALTAROCK ENERGY & DAVENPORT POWER are teaming up to see if Newberry’s geothermal energy can be harnessed to produce power from its hot dry rock. AltaRock hopes its application of a new technology called Enhanced Geothermal Systems (EGS) will be able to create a reservoir of tiny cracks filled with hot water that can be used to generate geothermal power. Geothermal energy provides clean renewable base load

power and represents an unlimited resource that can dynamically change our energy future. The Obama administration’s fiscal year 2013 budget requests a 71% increase to geothermal and EGS funding.

WHAT MAKES NEWBERRY VOLCANO SUCH AN IDEAL SPOT TO TEST THIS NEW TECHNOLOGY? 1) a recently drilled production well on Newberry’s west flank, outside the Monument boundary, already in place extending 10,060 feet below the surface; 2) very impermeable dry rock below 6,500 feet; 3) temperatures over 600°F at the bottom of the well bore; 4) Newberry is an active volcano which has had historically very low seismicity.

HOW WILL THEY DO IT? See a brief description of the EGS Demonstration process at right. See AltaRock Energy’s website (address below) for a full description of the process.

IF THIS EGS DEMONSTRATION WORKS and shows that geothermal power can be produced from Newberry Volcano as a commercially economical energy source, then Davenport Power may realize its dream of producing 100 MW of electricity which could provide power to 100,000 homes. And Newberry Volcano...well, it just may become the first in the Cascade Range to produce geothermal power.

For more information on the latest Newberry geothermal project:

AltaRock Energy - Newberry EGS Demonstration: www.altarockenergy.com/projects

Davenport Power - Newberry Geothermal: www.newberrygeothermal.com/

AltaRock’s EGS Demonstration

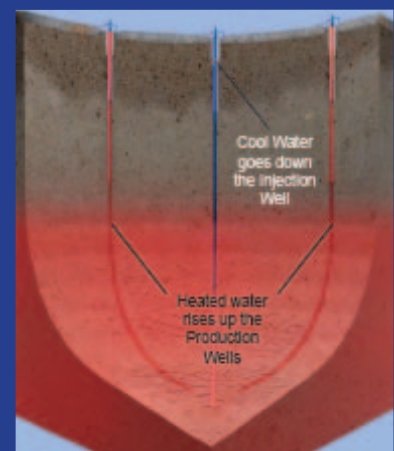
Create a reservoir of tiny cracks by pumping clean cold groundwater down an existing production well in a process called “hydroshearing.”

Inject a diverter down the well bore to temporarily block water flow to the newly open fractures so that a total of three fracture zones can be opened deeper in the well bore.

The hydroshearing process creates very small earthquakes which will be mapped reveal the size, location, and orientation of the fracture network.

Lastly, water will be pumped down the injection wells, flow through the fracture network absorbing heat, and then be pumped out of the production well creating hot water and steam.

No actual electricity will be generated through this demonstration project.



Injection Well Stimulation

Source: www.altarockenergy.com/projects

Newberry Caldera

Paulina Visitor Center (PVC)

OPEN 9:30am - 4:30pm

Weekends June 9/10, 16/17
Thursday - Monday beginning June 21 - September 30

Offering recreation pass sales, maps, information, bookstore and a 24/7 Self-Service Fee Station.

Ranger Talk schedule available at the center.

Sleep On a Volcano!

Camping in Newberry Caldera is managed by HooDoo Recreation. Some sites are available by reservation, some on a first come, first serve basis. Find out about camping options by contacting HooDoo Recreation directly at:

HooDoo Recreation
www.hoodoo.com
Reservations: (877) 444-6777
Information: (541) 338-7869



Lodging in Newberry Caldera is offered by the following businesses:

East Lake Resort
www.eastlakeresort.com
541-536-2230

Paulina Lake Lodge
www.paulinalakelodge.com
541-536-2240

Please Note:
No Camping
or Campfires
Outside of
Developed Sites
in Newberry
National Volcanic
Monument

Recreation Sites Where Day Use Fees are Charged

Some form of Recreation Pass must be displayed in your vehicle in order to park in the following Newberry Caldera Day Use Sites:

- ALL Trailheads
- Cinder Hill Boating Sites
- East Lake Boating Site
- Hot Springs Boating Site
- Little Crater Boating Site
- Little Crater Picnic Site
- Big Obsidian Flow Interpretive Site
- Paulina Falls Picnic Site
- Paulina Peak Viewpoint
- Paulina Boating/Picnic Site

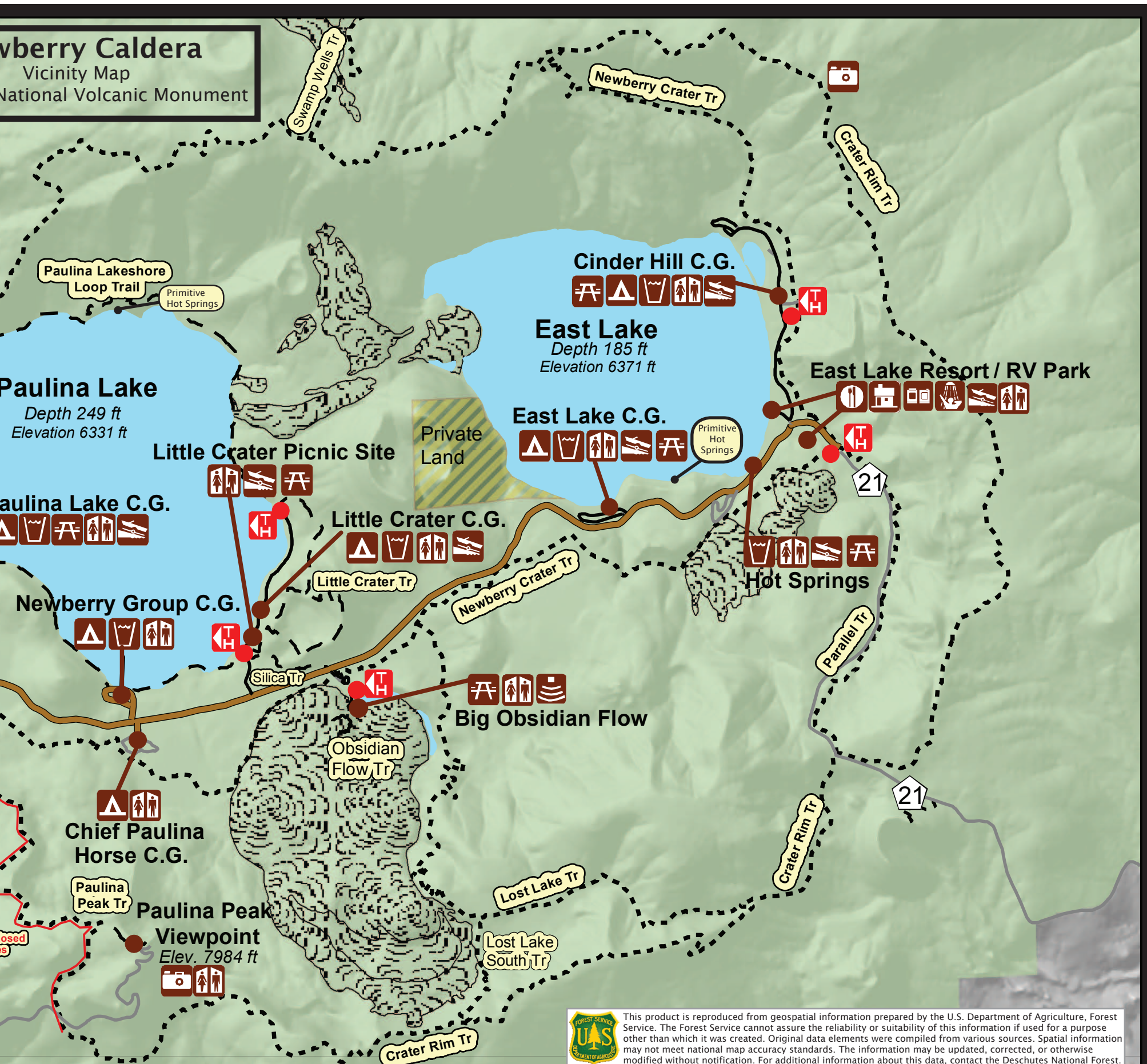


Day Use Passes may be purchased 24/7 at the Self-Service Fee Station in front of the PVC. Other types of Recreation Passes may be purchased at the Newberry Welcome Station and the PVC when those sites are open.



Newberry Caldera Trails	Miles One Way	Elev Change	Use	Difficulty
Crater Rim Trail #57	21	6330-7600 feet	hike,bike,horse	difficult
Obsidian Flow Trail # 58.1	0.5	6330-6850 feet	hike only	easy
Little Crater Trail # 53	1.5	6330-6850 feet	hike only	moderate
Little Crater Tie	0.6	6330-6600 feet	hike only	moderate
Lost Lake Trail #58.2/58.4	3.9 + 0.6	7100-7440 feet	hike, bike, horse	difficult
Newberry Crater Trail #3958	9.2	6350-7300 feet	hike, bike, horse	moderate





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Newberry National Volcanic Monument	Major Paved Road	Camping Area	Boat Ramp	Restaurant	RV Dump Site
Hiking only Trail	Minor Paved Road	Picnic Area	Water	Cabin Rental	Amphitheater
Trail	Dirt/Gravel Road	Visitor Center	Restrooms	Showers	Trailhead
Trail w/ Restrictions	Contours 200ft.	Viewpoint	Fee Station	Laundry	Lava Flow

Newberry Caldera Trails	Miles One Way	Elev Change	Use	Difficulty
Parallel Trail #58.3	2	6450-7000 feet	hike, bike, horse	moderate
Paulina Falls Trail #57	0.5	6120-6280 feet	hike only	easy
Paulina Lakeshore Loop #55	7.5	6330-6560 feet	hike only	moderate
Paulina Peak Trail #57	0.25	7800-7980 feet	hike only	moderate
Peter Skene Ogden Trail # 56	8.6	4300-6350 feet	hike, horse, bike	moderate
Silica Trail # 58.5	0.5	6350-6365 feet	hike only	moderate

LAVA LANDS VISITOR CENTER

OPEN 9:00am to 5:00pm

Weekends in May

Memorial Day Weekend May 26 - 28

Thursday-Monday May 31- June 30

Daily July 1 - September 3

Thursday-Monday September 6 - 30



Lava Butte, as viewed from its lava flow on Trail of the Molten Lands at Lava Lands Visitor Center.

THINGS TO DO AT LAVA LANDS

LEARN about volcanoes in the Lawrence A. Chitwood Exhibit Hall and orient yourself with the 3-D topographic model of Newberry National Volcanic Monument.

DRIVE to the top of Lava Butte, paved road 1 3/4 miles one way. Parking is limited to 10 vehicles (< 22' long), so please ask for a 30 minute time pass from the Ranger as you arrive. Lava Butte passes are issued on a first come, first served basis and on busy days there may be a wait.

WALK the Lava Butte Rim Trail, unpaved 1/4 mile loop with a panoramic view of Newberry National Volcanic Monument and surrounding area. Please respect the pavement barriers placed there for your safety as we work to repair the surface at the top of Lava Butte.

WALK the Trail of the Molten Land, paved 1 mile loop. NEW full color interpretive signs provide for a self-guided

tour. NEW ADA compliant trail section provides barrier-free travel. Older trail sections have grades that may be challenging without assistance.

WALK the Trail of Whispering Pines, paved 1/3 mile loop. Follow the edge of the Lava Butte flow as it winds through the shady whispering pines.

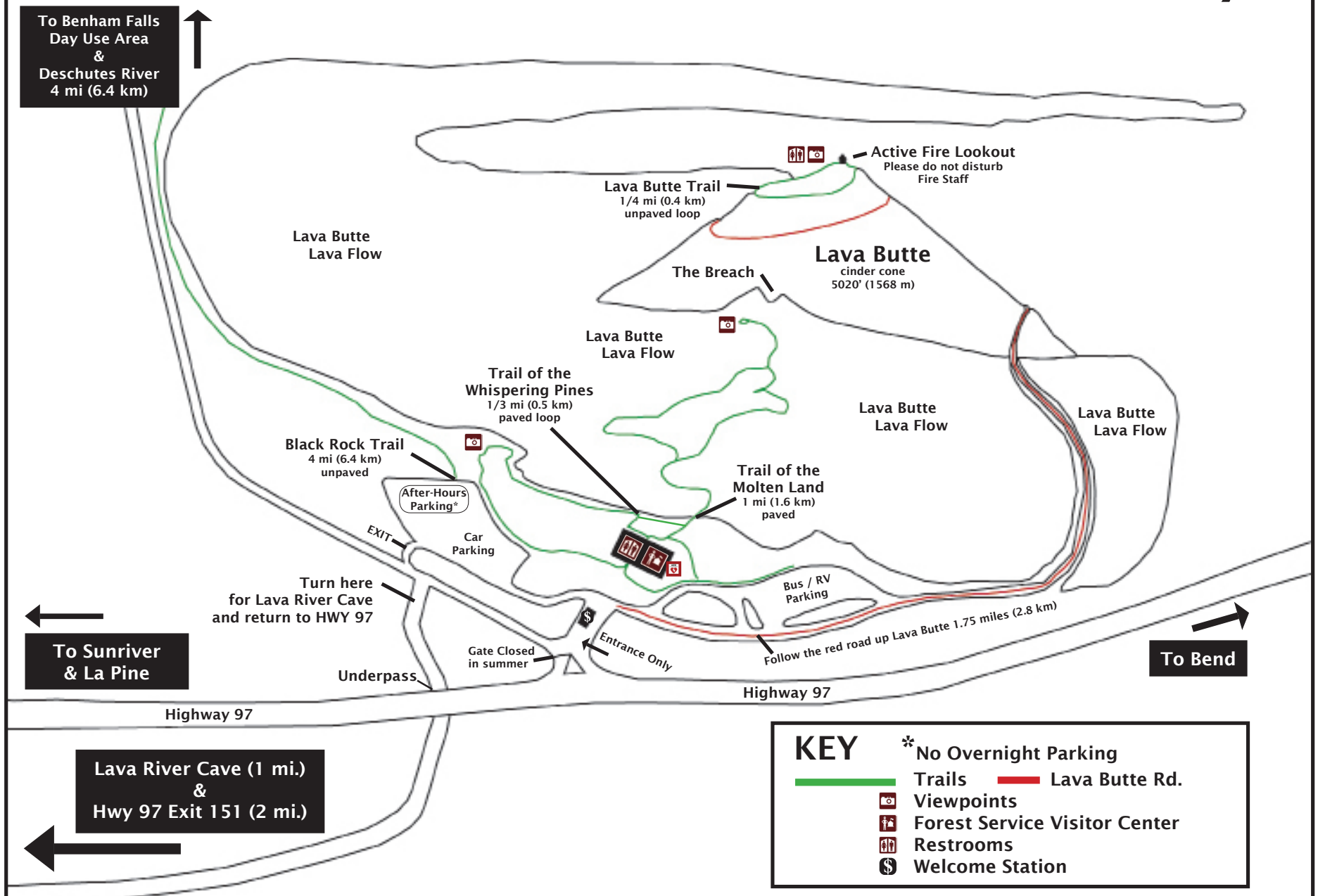
SHOP in the Discover Your Northwest bookstore for books, maps and gifts.

CHECK at the visitor center front desk for Film and Ranger Program Schedule.



LEASHED PETS are ok outside on a leash. Please cleanup after your pet.

Lava Lands Visitor Center & Vicinity



LAVA RIVER CAVE

OPEN 9:00am to 5:00pm* (*Gates close at 4:00pm)

Memorial Day Weekend	May 26 - 28
Thursday-Monday	May 31- June 30
Daily	July 1 - September 3
Thursday-Monday	September 6 - 30



Cave Conservation Tour participants descending into Lava River Cave.

HELP KEEP LAVA RIVER CAVE BATS HEALTHY by visiting the Bat Conservation Station upon arrival at Lava River Cave and completing a short survey before you enter the cave. See article below for more information on White-nose Syndrome.

PETS: Only certified service dogs are allowed in the Cave provided a container is carried in to remove waste. Please either leave your pet at home or have a member of your party stay on top with your pet. There is not enough shade in the parking lot to leave your pet in your vehicle safely.

CAVE CONSERVATION TOURS: 3:00pm (Daily)
Guided tour focusing on cave geology, ecology and stewardship

CAVE RESTRICTION: The back of the Cave from the crawl space forward is now CLOSED to visitors to further prevent the spread of spores that cause White-Nose Syndrome. Do not go beyond the closure indicators.

VISITATION GUIDELINES:

- ***Wear warm clothing:** Cave temperature averages around 40 degrees Farenheit.
- ***Wear closed-toed shoes.** Cave access requires walking on stairs and uneven surfaces.
- ***Watch your head and consider not using child carrier backpacks.** Cave headroom is variable.
- ***Please use the restroom before entering the Cave.** The Cave is about one mile long, one way and there are no bathrooms down there.
- ***Carry at least 3 light sources with you** (only propane lanterns or flashlights please). There is no lighting in the Cave. Propane lanterns are available for rent at the site. Lantern rental \$5.00.

Protecting Bats at Lava River Cave

Bats and White-Nose Syndrome

White-nose syndrome (WNS) is responsible for the death of over 5,000,000 hibernating bats in the eastern and midwestern U.S. since 2006. In some bat winter roosts (hibernacula), 90 to 100 percent of the bats are dying. This new disease is caused by a cold-loving fungus that thrives in caves and mines. Named for the white powder around the nose, the fungus can also appear on the ears, wings, and forearms or may not be visible at all. The fungus appears to cause bats to frequently wake up during winter hibernation using up fat reserves and water needed for winter survival. The fungus primarily spreads from bat-to-bat contact but may also be spread by humans on clothing or equipment used in caves or mines.

There is no known health risk to humans from WNS. However, the impacts to humans from the loss of bats may be great. Bats play a crucial role in the health of our ecosystem by consuming over half their body weight each night in insects including pest species. Nationally, scientists estimate annual economic losses of \$3 to \$53 billion dollars due to an increase in insect pests as a result of the high mortality of bats from WNS and wind powered turbines.

For more information on white-nose syndrome, bats, and cave conservation visit these websites:

Deschutes National Forest <http://www.fs.fed.us/r6/centraloregon/wns>
U.S. Fish and Wildlife Service <http://www.fws.gov/WhiteNoseSyndrome/>
National Speleological Society <http://www.caves.org>
Bat Conservation International <http://www.batcon.org/home/default.asp>



Little brown myotis close-up of nose with fungus in New York. Photo courtesy Ryan von Linden, New York Dept. of Environmental Conservation (DEC) , 2008

The Deschutes National Forest

has over 350 caves. Many caves and mines on public lands in the midwest and eastern U.S. have been closed to visitors since 2008 to reduce the potential for spread of the spores and WNS. Please help us keep caves open in the West and protect bats by not wearing clothing, boots, or any gear in Lava River Cave that has been used in a cave or mine outside Oregon or Washington.

If you plan to visit another cave on or off the Forest, after visiting Lava River Cave, please clean your boots, clothing and gear before going into that cave.

Help keep Lava River Cave bats healthy by...

...not wearing clothing, boots, or use any gear (headlamp, camera, fanny pack, etc.) in Lava River Cave that have been used in a cave or mine outside Oregon or Washington.

...wear warm clothes, sturdy boots, and needed safety items but limit other gear in the cave.

...visiting the Bat Conservation Station at Lava River Cave and complete the short survey.

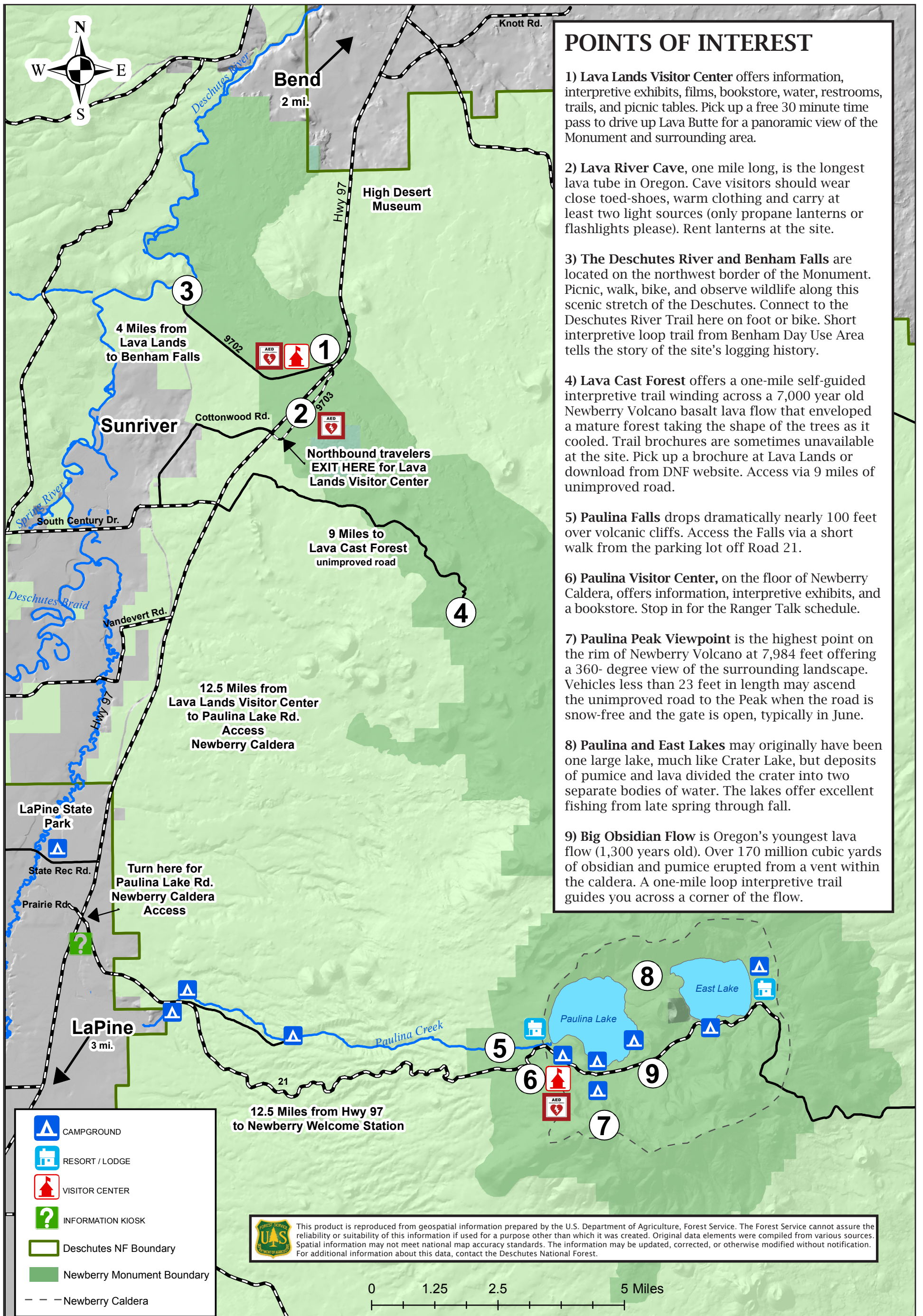
....Do Not continue past the closure into the crawl space at the end of the Cave.

...disinfecting your clothing, boots, and gear worn in Lava River Cave before going in another cave on or off the Forest. Disinfecting guidelines on DNF website. See link on this page.



Healthy long-eared bat.
Photo: Diane Probasco, USFS

Newberry National Volcanic Monument



Newberry National Volcanic Monument INFORMATION HOTLINE 541-383-5700

