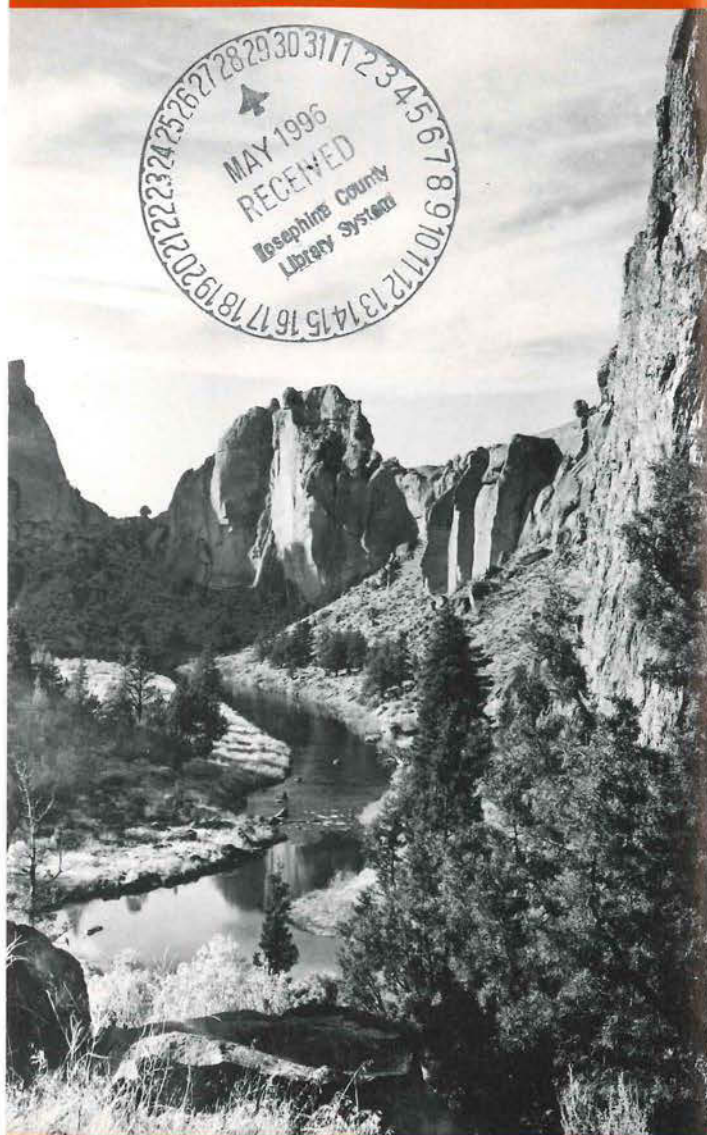


GEOLOGIC TREASURES

Fossils



Oregon's Heritage Brochure 4



Finding fossils in Oregon is not so much a question of where to look for them as where not to look. Fossils are rare in the High Lava Plains and High Cascades, but even there, some of the lakes are famous for their fossils. Many of the sedimentary rocks in eastern Oregon contain fossil leaves or bones. Leaf fossils are especially abundant in the rocks at the far side of the athletic field at Wheeler High School in the town of Fossil. Although it is rare to find a complete animal fossil, a search of river beds may turn up chips or even teeth. In western Oregon, the sedimentary rocks that are primarily marine in origin often contain fossil clams and snails. An occasional shark's tooth or crab can also be found. Marine fossils are also abundant near the town of Vernonia and along the central to south-central Oregon coast.

Collecting is permitted within the highway right-of-way, unless excavation is destructive to the roadcut, and on private land with the owner's approval. Collecting is prohibited or a collecting permit is necessary to collect fossils on state and federal lands and in parks. Collecting is prohibited in the John Day Fossil Beds National Monument.



Above: Fossil ammonite, east-central Oregon.
Photo: David G. Taylor

Places to see fossils:

John Day Fossil Beds National Monument

Contains a 40-million-year record of plant and animal life in the John Day Basin in central Oregon near the towns of Dayville, Fossil, and Mitchell. The Cant Ranch Visitor Center at Sheep Rock on Highway 19 includes museum exhibits of fossils. Open every day 8:30-5. For general information, contact John Day Fossil Beds National Monument, 420 West Main St., John Day, OR 97845, phone (503) 575-0721.

Oregon Museum of Science and Industry

1945 SE Water Ave., Portland, OR 97214. Open Thurs. & Fri. 9:30-9; Sat. through Wed. 9:30-7 (summer hours); 9:30-5 (rest of year), phone (503) 797-4000.

Condon Museum, University of Oregon

Pacific Hall, Eugene, OR 97403. Open only by appointment, phone (503) 346-4577.

Douglas County Museum of History and Natural History

off I-5 at exit 123 at Roseburg (PO Box 1550, Roseburg, OR 97470). Open Tues.-Sat. 10-4, Sun. noon-4, closed Mon., phone (503) 440-4507.

Horner Museum

Oregon State University, Gill Coliseum, Corvallis, OR 97331. Open June-Aug., Mon.-Fri. 10-5, Sun. 2-5. Rest of year, Tues.-Fri. 10-5, Sat. 12-4, Sun. 2-5, phone (503) 737-2951.

High Desert Museum

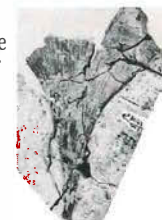
59800 S. Hwy. 97, Bend, OR 97702. Open 9-5 every day except Thanksgiving, Christmas and New Year's Day, phone (503) 382-4754.

Rock Shops

Throughout the state.

Opening Soon - Northwest Museum of Natural History

SW 6th and Hall, downtown Portland, expected opening date 1994. The new museum will include exhibits with natural historical themes of local, regional, and global interest. For information, contact Dr. David Taylor, PO Box 1493, Portland, OR 97207, phone (503) 725-3374.



Fossil leaves from the Clarno Nut Beds.
Photos: Steven R. Manchester

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Geologic Sightseeing

The Oregon landscape has been shaped by plate tectonics and millions of years of volcanic activity. Visitors will find many opportunities to examine the scenic geology and see and collect samples of minerals, rocks, and fossils.

Oregon can be divided into the following geologic provinces, each with outstanding geologic scenery:

Coast Range Province

The heavily vegetated, elongated Coast Range province has a varied geologic history. Its basement was formed by a volcanic island chain that collided with North America about 50 million years ago. The ancient volcanoes form many of the scenic headlands along the coast, and the sediments that have accumulated around them contain marine fossils that help unravel the area's complicated geologic story.

Ecola State Park, Haystack Rock at Cannon Beach, and Neahkahnie Mountain,

located on Highway 101 on the northern Oregon coast: Spectacular views of volcanic headlands, sea stacks, and an enormous landslide at Ecola.

State Parks of Cape Arago, Sunset Bay, and Shore Acres,

near Coos Bay on the southern Oregon coast, along Highway 101: Marine terraces and dipping sedimentary rocks, some with concretions and others with coal seams.



The Klamath Mountains Province

This province consists of four north-south-trending belts of metamorphic and igneous rocks that formed in an oceanic setting and subsequently collided with the North American continent about 150 million years ago. Complexly folded and faulted rocks are bounded by belts of sparsely vegetated bands of serpentinite. Oregon Caves National Monument lies within an enormous fault-bounded block of marble. The historic gold-rush town of Jacksonville remains today as evidence of the area's colorful gold-mining history.

Oregon Caves National Monument,

located in the Siskiyou Mountains of southwest Oregon, 20 miles east of Cave Junction on Highway 46: Carved in a marble block in the Applegate Group of Late Triassic age, the cave features a 75-minute tour of pillars, stalactites, and stalagmites. For information, contact Oregon Caves National Monument, PO Box 128, Cave Junction, OR 97523, phone (503) 592-3400.

South Sister, one of the Three Sisters volcanoes in the central Cascade Range.



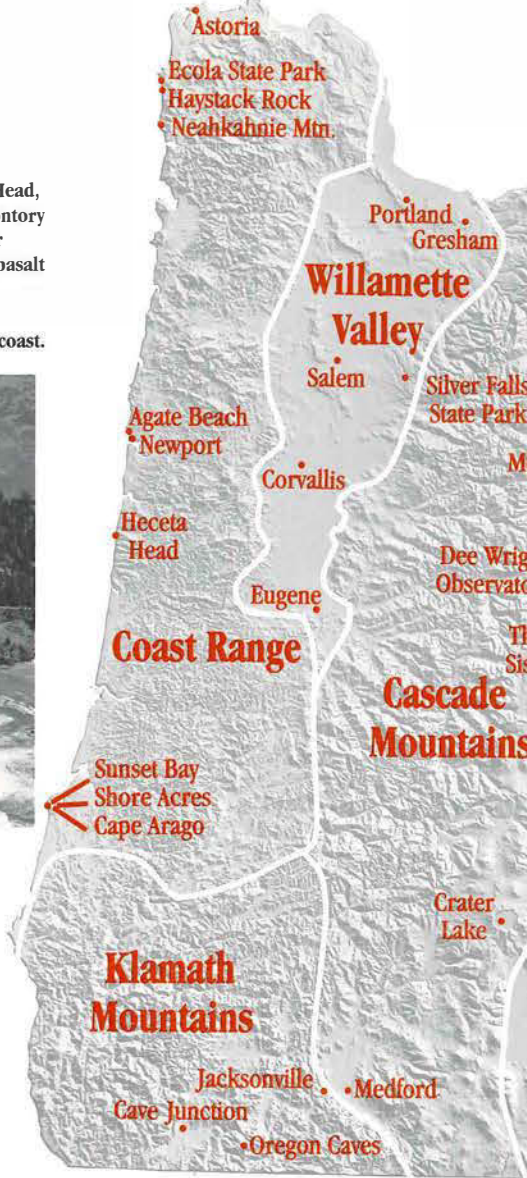
Willamette Valley Province

The Willamette Valley province forms a catch basin between the Coast Range and the Cascades. The sediments collected in it record multiple Ice Age floods that originated in Montana, poured through the Cascades (via the Columbia River), and backed up here in the valley before eventually draining to the Pacific Ocean.

Silver Falls State Park,

located on Highway 214 east of Salem: A 7-mile hiking trail takes you near or behind 10 waterfalls which cascade over steep cliffs of Columbia River basalt that flowed into this area as molten lava 14-16 million years ago. At North Falls, chimney-like holes in the overhanging rock are tree molds formed when hot lava flowed around and over standing trees.

Heceta Head, a promontory of upper Eocene basalt on the central Oregon coast.

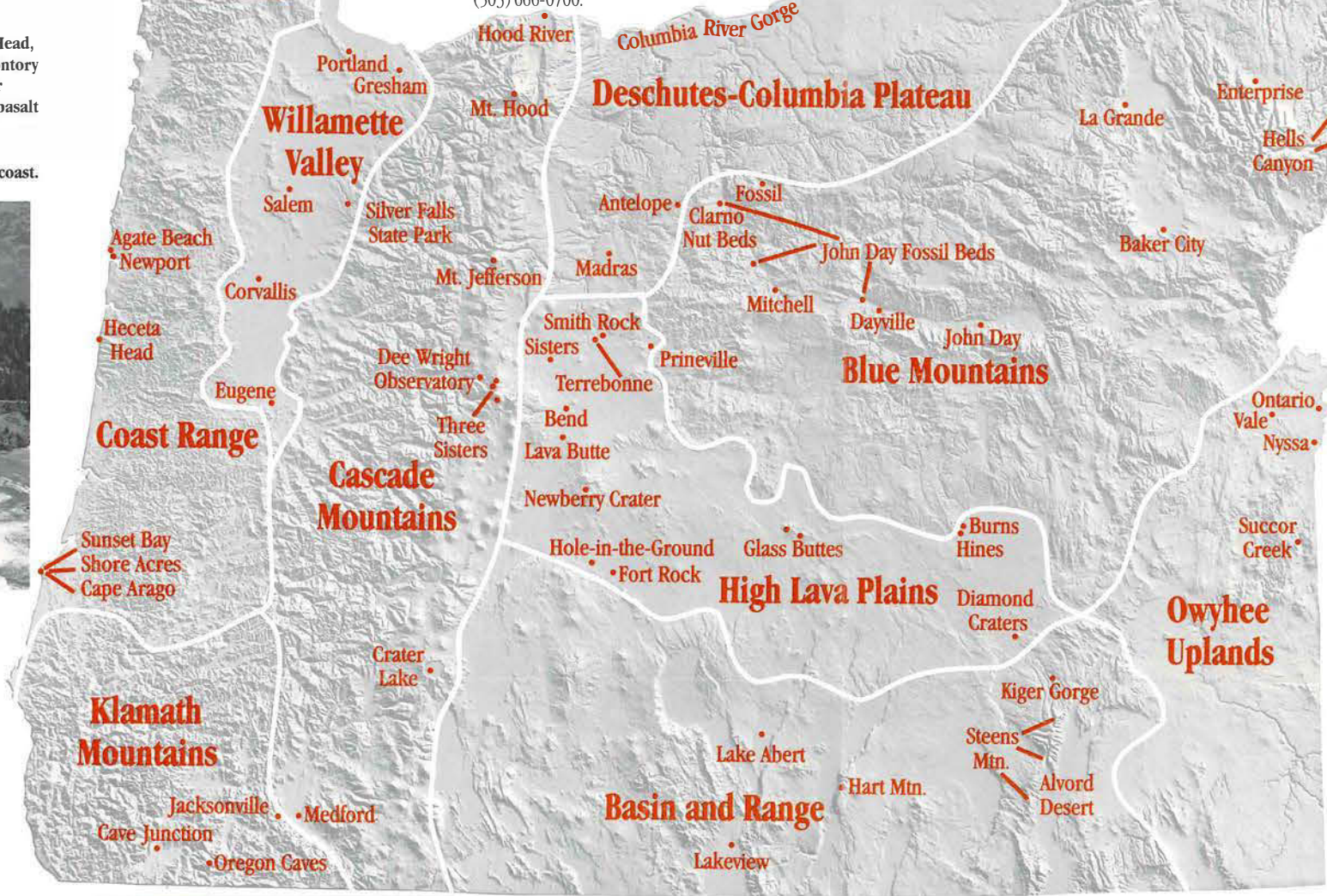


Cascade Mountains Province

The Cascade province is actually made up of two volcanic regions, the older, broader, and deeply eroded Western Cascades and the dominating, snow-capped peaks of the younger, more easterly volcanoes of the High Cascades, such as Mount Hood, Mount Jefferson, and the Three Sisters (North, Middle, and South Sister). Another High Cascade peak, Mount Mazama, was destroyed about 6,800 years ago by a catastrophic eruption that left a deep caldera later filled by what is now Crater Lake.

Mount Hood Loop,

located on the northern boundary of Oregon: One of the world's most scenic highway loops, through a gorge cut by the Columbia River along Interstate I-84, along the fault- and volcano-bounded Hood River Valley (Highway 35), and up the flanks of Mount Hood (Highways 35 and 26). For information, contact Columbia River Gorge National Scenic Area, 902 Wasco Ave., Suite 200, Hood River, OR 97031, phone (503) 386-2333; or Mount Hood National Forest, 2955 NW Division St., Gresham, OR 97030, phone (503) 666-0700.



McKenzie Pass Highway,

crossing the Cascades along Highways 242 and 126 between Sisters and Eugene: A view of volcanoes, lava flows, cinder cones, and the Dee Wright Volcano Observatory.

Crater Lake National Park,

located in southwest Oregon, with year-round access on the south via Highway 62: World-famous, 1,900-foot-deep Crater Lake lies in the caldera of what is left of once 12,000-foot-high Mount Mazama, which was destroyed by a catastrophic eruption about 6,800 years ago. For information, contact Superintendent, Crater Lake National Park, Box 7, Crater Lake, OR 97604, phone (503) 594-2211.

Deschutes-Columbia Plateau Province

Between 14 and 16 million years ago, "fissure" volcanic eruptions in eastern Washington, eastern Oregon, and western Idaho produced enormous volumes of inolten Columbia River basalt that flowed likewater west into the Deschutes-Columbia Plateau province in eastern Washington and northeastern Oregon, with some lava continuing to flow as far west as the Pacific Ocean via the ancestral Columbia River valley. As the basalt cooled and congealed, it formed the columnar cliffs that dominate the landscape today. Erosion by the Columbia River has exposed a particularly spectacular sequence of these rocks in the Columbia River Gorge on Oregon's northern boundary.



In the midst of an extensive wilderness area, ancient volcanic rocks are exposed in the steep walls of Hells Canyon.

The High Lava Plains Province

This area has some of the most recent faulting and youngest volcanic activity in Oregon. Well-preserved in a high desert climate, volcanic features stand out above the plains.

Lava Butte, Newberry Crater, Fort Rock, and Hole-in-the-Ground,

in central Oregon, along Highways 97 and 31 south of Bend: A collection of relatively recent volcanic features including volcanoes, cinder cones, buried forests, obsidian flows, lava tubes, and a large explosion crater. For information, contact Deschutes National Forest, 1645 Highway 20E, Bend, OR 97701, phone (503) 388-2715; Lava Lands Visitor Center, 58201 S. Highway 97, Bend, OR 97707, phone (503) 593-2421; Newberry National Volcanic Monument, Fort Rock Ranger District, Suite A 262, Bend, OR 97701, phone (503) 388-5664.

The Blue Mountains Province

This area is made up of separate "exotic terranes," areas that were prefabricated elsewhere and scooped up by North America as it moved west toward the Pacific. Fossils found in this province reveal their foreign origins. Placer and lode gold mines were active here in the past, and towns such as John Day and Baker City, together with the Sumpter gold dredge, are vivid reminders of the Blue Mountains gold mining heritage.

Hells Canyon,

along the northeastern boundary of Oregon: Deeper than the Grand Canyon, Hells Canyon was formed when the Snake River cut through a chain of volcanic islands that had been smashed against the westward-moving North American continent millions of years ago. For information contact Wallowa Whitman National Forest, Hells Canyon National Recreation Area, 88401 Highway 82, Enterprise, OR 97828, phone (503) 426-4978.

John Day Country,

John Day Fossil Beds National Monument, Sheep Rock overlook, and Picture Gorge in central Oregon on Highway 26 west from John Day and north on Highway 19: A drive through historic gold mining country, lava flows, colorful volcanic ash and ash-flow deposits, and fossil-rich volcanic sediments.



Hole-in-the-Ground resembles a meteor crater but actually was formed by a gigantic explosion caused by lava welling up from the depths until it encountered ground water not far below the surface. The ensuing blast created this crater, which is nearly a mile in diameter and over 500 feet deep.

The Basin and Range and Owyhee Uplands Provinces

Both lie in a region that has been stretched, or extended, almost 100 percent from its original width in the last 10 million years. Evidences of this extension are massive fault block mountains

such as Steens and Hart Mountains, with intervening basins containing such features as the Alvord Desert and Lake Abert. Intense volcanic and hot-spring activity over millions of years has produced fine-grained gold deposits and jasperoids that are prized by rock hounds.

Steens Mountain,

located 60 miles south of Burns in southeastern Oregon: In summer, you can drive to the top of this 9,670-foot-high fault block mountain to look over the Alvord Desert more than 5,000 feet below. Other unusual geologic features in the area include Diamond Craters, which has an extraordinary collection of volcanic features, and glaciated Kiger Gorge on Steens Mountain. For more information contact the Burns BLM, HC 74-12533 Highway 20 West, Hines, OR 97738, phone (503) 573-5241.



The Alvord Desert with Steens Mountain in the background is a place of silent beauty.

Photo: Ellen Morris Bishop.

Rocks and Gold



**Obsidian flow
at Newberry Crater.**

Photo: Ellen Morris Bishop.

Cover Photo: Smith Rock State Park, located in central Oregon on Highway 97 near Terrebonne. The steep cliffs of this volcanic tuff cone formed when rising magma encountered ground water and exploded as fine ash. This area is famous for its superb rock climbing.

Cover photo and those otherwise not credited: Oregon Dept. of Transportation

Publications related to the geology and other natural history features of Oregon, topographic maps, a 1:500,000-scale full-color geologic map of Oregon (\$11.50 for map plus \$3 for mailing), and a soft cover book, *Geology of Oregon*, by Orr, Orr, and Baldwin (\$25 for book plus \$3 for mailing) are available from:

The Nature of Oregon Information Center

Suite 177, 800 NE Oregon Street #5
Portland, OR 97232
Phone (503) 731-4444

Located near the Convention Center and Lloyd Center in Portland, the Center is open 10-5, Monday through Friday. Call or write the Nature of Oregon Information Center for free publication lists from the Oregon Depts. of Geology and Mineral Industries, Agriculture, Water Resources, and Economic Development. The U.S. Dept. of Interior Bureau of Land Management also provides information and sells its publications at its Public Room, 1300 NE 44th Avenue, PO Box 2965, Portland, OR 97208, phone (503) 280-7001.

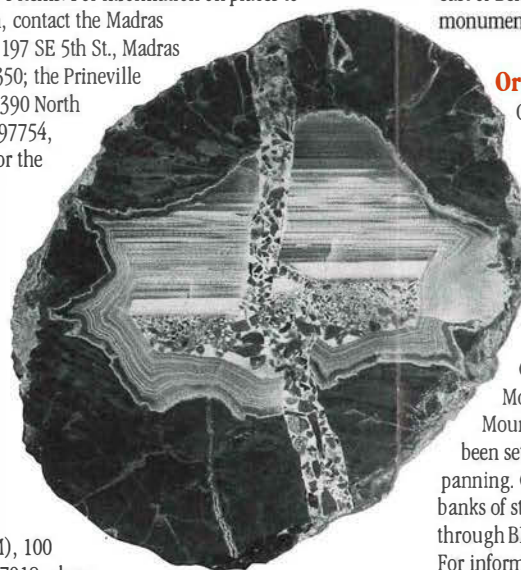
This brochure was published by the Oregon Department of Geology and Mineral Industries, Ste. 965, 800 NE Oregon St. #28, Portland, OR 97232, with funding from the U.S. Department of the Interior Bureau of Land Management, PO Box 2965, Portland, OR 97208.



Oregon. Things Look Different Here

Thunderegg

Oregon's state rock can be collected at fee and free sites in central and southeastern Oregon. Unimpressive on the outside, these spherical rocks contain colorful silicic material and, when sliced and polished, make beautiful collector's items. For information on places to collect in central Oregon, contact the Madras Chamber of Commerce, 197 SE 5th St., Madras OR 97741, phone 475-2350; the Prineville Chamber of Commerce, 390 North Fairview, Prineville, OR 97754, phone (503) 447-6304; or the following fee sites: Richardson's Recreational Ranch, Gateway Route, Box 440, Madras, OR 97741, phone (503) 475-2680 or 475-2839; or Hay Creek Ranch, Ashwood Star Route, Madras, OR 97741, phone (503) 475-7237. In southeastern Oregon, contact the Bureau of Land Management (BLM), 100 Oregon Street, Vale OR 97918, phone (503) 473-3144; or Emil Wohlcke, chairman, Thunderegg Days (held for five days around the first Wed. in June), 707 Emison Ave., Nyssa, OR 97913, phone (503) 372-3715.



**Thunderegg,
central Oregon.**
Photo: John E. Allen.

Agates and Jasper

These semiprecious gemstones can be collected at many sites along the Oregon coast, including Agate Beach at Newport, in some of the streams draining the Western Cascades, near the town of Antelope and around Prineville in central Oregon, near Hart Mountain and Lakeview in south-central Oregon, and at Succor Creek in southeastern Oregon.

Obsidian

This volcanic glass can be collected in central Oregon at Glass Buttes on Highway 20 between Bend and Burns. An enormous flow of obsidian can also be seen at Newberry Crater, south and east of Bend, but no collecting is permitted in this national monument.

Oregon Sunstone

Oregon's state gemstone is a feldspar crystal that weathers out of certain lava flows in south-central Oregon. It may be collected on BLM land near Lakeview. Collecting on mining claims is prohibited. For information, contact BLM, 1000 South Ninth, PO Box 151, Lakeview, OR 97630, phone (503) 947-2177.

Gold

Gold has been mined for many years in the Blue Mountains, the Western Cascades, and the Klamath Mountains. Most areas have been staked, but some have been set aside as fee or free sites for recreational gold panning. Gold panning is also usually permitted on nearly all banks of streams and rivers running through state lands and through BLM and USDA Forest Service campgrounds in Oregon. For information about gold panning in specific areas in the Western Cascades, contact BLM, 1717 Fabry Road SE, Salem, OR 97306, phone (503) 375-5646. For the Klamath Mountains, contact the Medford District Office, BLM, 3040 Biddle Road, Medford, OR 97504, phone (503) 770-2200; or the Applegate Ranger District of the USDA Forest Service, 6941 Upper Applegate Road, Jacksonville, OR 97530, phone (503) 899-1812. For the Blue Mountains, contact the Wallowa Whitman National Forest, PO Box 907, or BLM, PO Box 987, both at 1550 Dewey Ave., Baker City, OR 97814, phone (503) 523-6391. The US Bank in Baker City, eastern Oregon, has a fabulous collection of gold nuggets that were found in eastern Oregon. The display is in the bank lobby and may be seen during normal bank hours.

**The thunderegg is Oregon's state rock.
The sunstone is the state's gemstone.**