

Eruptions at Mount Hood During the Past 30,000 Years



Mid-1800's

Small steam and ash explosions



About 200 years ago

Lava dome at Crater Rock; pyroclastic flows, lahars in south and west valleys, and minor tephra falls



About 1,500 years ago

Debris avalanche from upper south flank; lava dome near Crater Rock, pyroclastic flows, lahars in south and west valleys; substantial tephra falls near volcano



30,000 to 15,000 years ago

Multiple episodes of lava dome growth, pyroclastic flows, lava flows, lahars, and tephra fall; valleys on all flanks affected

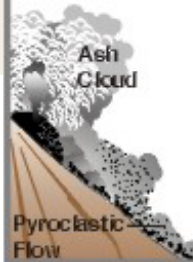


Volcano Hazards

Lava Flows and Domes

Lava is molten rock that flows onto the Earth's surface. **Lava flows** move downslope away from a vent and bury or burn everything in their paths. **Lava domes** form when lava piles up over a vent.

Pyroclastic Flows



Pyroclastic flows are high-speed avalanches of hot rock, gas, and ash that are formed by the collapse of lava domes or eruption columns. They can move up to 100 miles per hour and have temperatures to 1500°F. They are lethal, burning, burying, or asphyxiating all in their paths.

Tephra



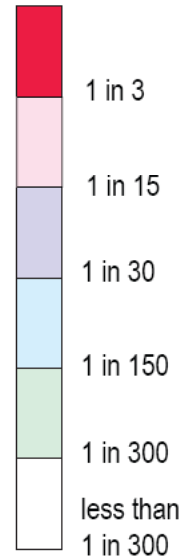
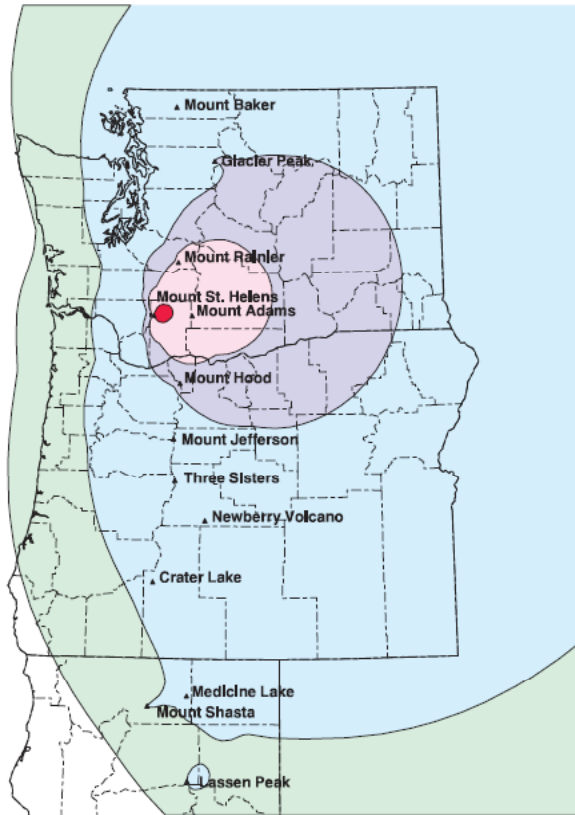
Explosive eruptions blast lava fragments (**tephra**) and gas into the air. Tephra can also be carried aloft in billowing ash clouds above pyroclastic flows. Large fragments fall to the ground close to the volcano, but smaller fragments (**ash**) can travel hundreds to thousands of miles downwind.

Debris Avalanches and Lahars

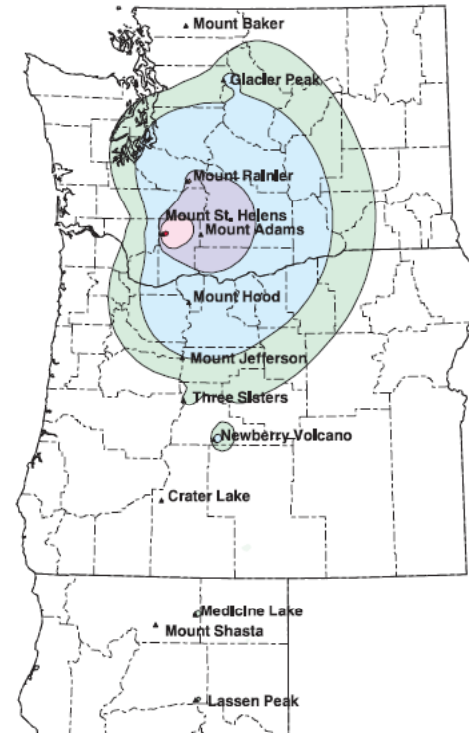
Debris avalanches are rapid landslides of rock, soil and overlying vegetation, snow, or ice. They can bury or smash objects in their path. All or some portion of debris avalanches can transform into lahars. **Lahars** are fast-moving slurries of rock, mud, and water that move down river valleys. They can bury, move, or smash objects in their path. Lahars form when pyroclastic flows melt snow or ice, or by the transformation of debris avalanches, or by mobilization of loose debris on the flanks of volcanoes.



Map showing 30-year probability of accumulation of 1 centimeter (0.4 inch) or more of tephra from eruptions of volcanoes in the Cascade Range.



Map showing 30-year probability of accumulation of 10 centimeters (4 inches) or more of tephra from eruptions of volcanoes in the Cascade Range.



Hazards Zonation Map



Minimum time for lahar to reach an area, in hours:minutes

1:30

0 5 MILES

Proximal Hazard Zones (P) (lava flow, pyroclastic flow, debris avalanche, lahar)		Distal Hazard Zones (D) (lahar)	
PA	PB	DA	DB
Major valleys		Bank Erosion	

EXPLANATION




This volcano-hazards-zonation map delineates the relative degree of hazard near Mount Hood from future eruptions and other hazardous geologic events. Eruptive events are characterized by extrusion of lava domes and, less likely, of lava flows. Collapse of growing lava domes generates pyroclastic flows that can melt snow and ice to produce lahars and floods. Landslides of altered rock from high on Mount Hood can be triggered by eruptions, but can also occur without eruptive activity. Such landslides, called debris avalanches, also produce lahars. Eruptions of Mount Hood, as well as other volcanoes in the Cascade Range, generate tephra clouds that are transported by wind and can affect areas hundreds of kilometers (hundreds of miles) away.

Boundaries between hazard zones do not represent sharp changes in hazards. Rather, the degree of hazard decreases gradually in a down-valley direction and more rapidly as height above valley floors increases.

Numerals in brackets refer to end notes in booklet.





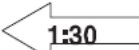





Proximal Hazard Zones

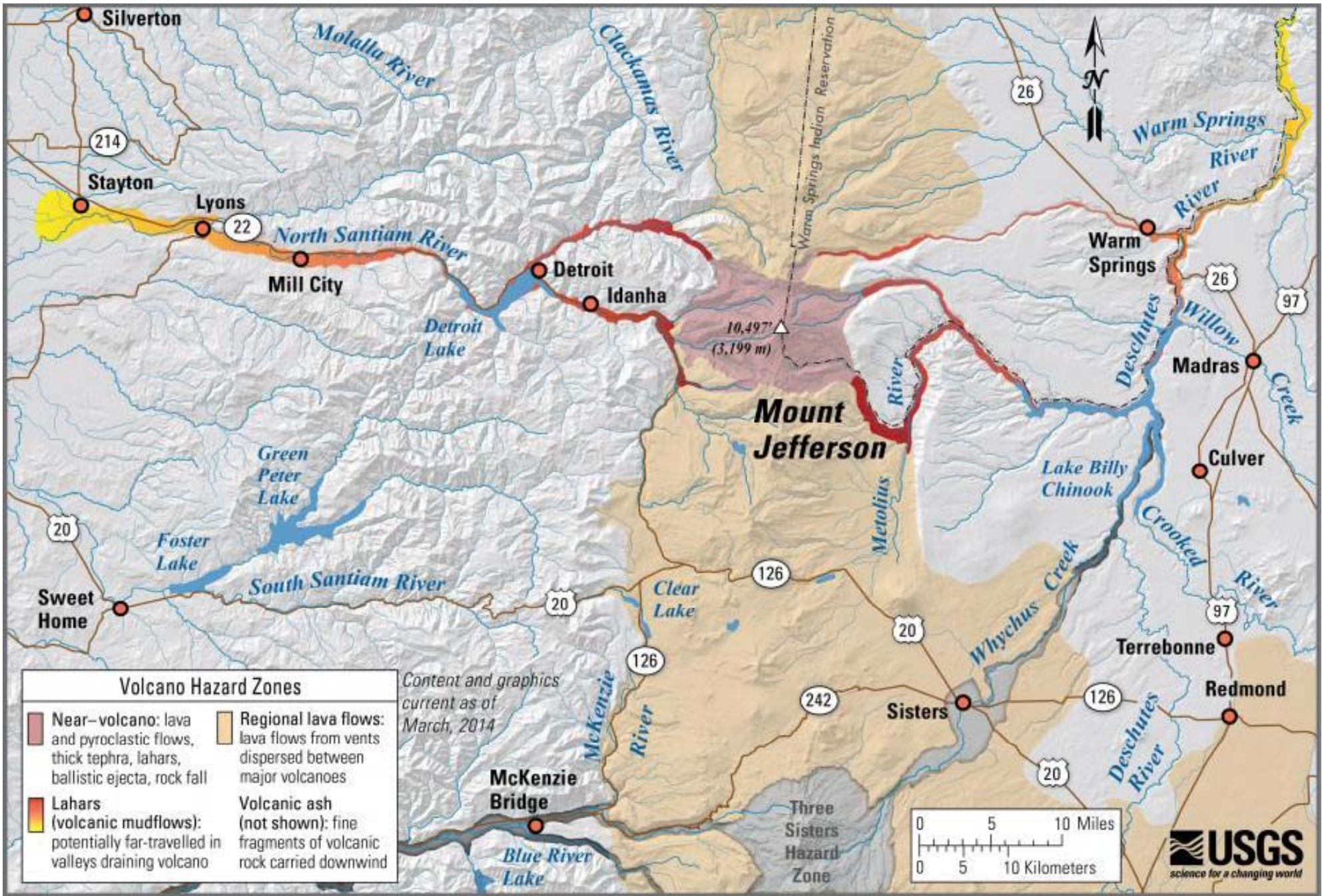
Areas subject to rapidly moving, devastating pyroclastic flows and surges, lahars, and debris avalanches that can sweep out to the hazard boundary in less than 30 minutes. Also subject to ballistic projectiles and lava flows. Subdivided into two zones depending on vent location.

-  Hazard zone PA — vent at or near Crater Rock, which is considered the most likely case during future eruptions. The 30-year probability of an eruption affecting a substantial portion of zone is estimated to be 1 in 15 to 1 in 30 [4]
-  Hazard zone PB — vent on east, north, or west flank, or the summit (a summit vent also would endanger zone PA). The 30-year probability of an eruption affecting a substantial portion of zone is estimated to be about 1 in 300 [4]
-  Major valleys that pyroclastic flows and lahars would follow from lava-dome collapses on the upper flanks or summit. As an eruptive episode progresses, one or more of these valleys might become filled with debris, so that pyroclastic flows and lahars could then spill into adjacent valleys and affect a broader sector of a hazard zone. Also includes areas that are affected frequently (several times or more per century) by small lahars and debris avalanches generated by storms and rapid snowmelt

Distal Hazard Zones

Valleys heading on Mount Hood that are subject to lahars and debris avalanches. Marks along the valley floor show the estimated travel time for lahars of the size used to define zones DA and DB. Subdivided into three zones on the basis of vent location, event magnitude, and probability of inundation.

-  Hazard zone DA — Areas along Sandy River and its tributaries and White River that are subject to lahars generated by eruptions at vent located at or near Crater Rock and to debris avalanches and related lahars generated from steep upper flanks on west and south sides of Mount Hood. The 30-year probability of inundation of a substantial portion of zone is about 1 in 15 to 1 in 30 [4, 5]
-  Hazard zone DB — Areas along Hood River that are subject to lahars generated by eruptions at vents located on upper east or north flanks and to debris avalanches and related lahars of about 50 million cubic meters. The 30-year probability of inundation of a substantial portion of this zone is about 1 in 300 [4, 6]
-  Areas along Sandy and Hood Rivers subject to inundation by a debris avalanche and lahar of about 500 million cubic meters, which is considered to be among the largest magnitude events possible at Mount Hood [9]. Estimated 30-year probability of such an event is very low—less than 1 in 3000
-  Columbia River islands and areas along the Washington shore that could be affected by bank erosion and flooding induced by lahars and sediment-rich floods from Sandy and Hood Rivers during and immediately following eruptions
-  Estimated travel time for lahars in hours:minutes [3]
-  Diversion structure for irrigation or power canal
-  Conduit crossing for irrigation, power, or municipal water
-  Railroad bridge across White River
-  Major electric-power transmission line
-  Boundaries of municipal watersheds of Portland (Bull Run) and The Dalles



Silverton

Molalla River

Clackamas River

214

Stayton

Lyons

22

North Santiam River

Mill City

Detroit

Idanha

Detroit Lake

10,497'
(3,199 m)

Mount Jefferson

Warm Springs River

Warm Springs

26

Deschutes River

Willow River

Madras

97

Creek

Culver

Lake Billy Chinook

Crooked River

20

Sweet Home

Foster Lake

South Santiam River

20

Clear Lake

126

McKenzie River

126

McKenzie Bridge

Blue River Lake

20

Sisters

Whychus Creek

242

Terrebonne

126

Redmond

Three Sisters Hazard Zone



