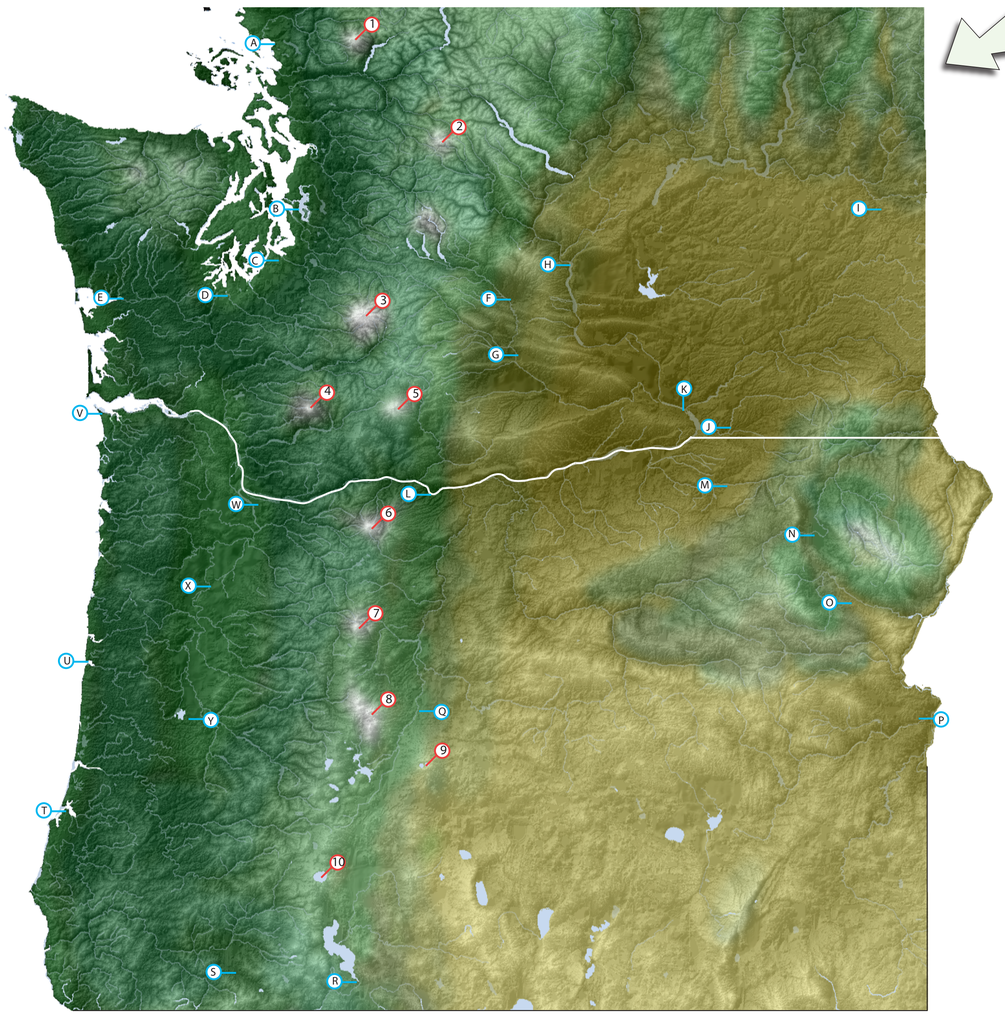
Tectonic Setting & Generalized Geologic Maps of Washington and Oregon

Frank D. Granshaw and Jenda Johnson, 2009

Physical Geography

Relief map of Washington and Oregon showing major cities, volcanoes, lakes and waterways.



Legend for Geography

Map colors correspond to vegetation and surface types:

- **Greens**—dense vegetation
- **Browns**—grasslands and desert
- **Light gray to white**—unvegetated alpine regions in the Cascade Range

Cities

A Bellingham, WA	N La Grande, OR
B Seattle, WA	O Baker, OR
C Tacoma, WA	P Ontario, OR
D Olympia, WA	B Bend, OR
E Aberdeen, WA	R Klamath Falls, OR
F Ellensberg, WA	S Medford, OR
G Yakima, WA	T Coos Bay, OR
H Wenatchee, WA	U Newport, OR
I Spokane, WA	V Astoria ,OR
J Walla Walla, WA	W Portland, OR
K Pasco, WA	X Salem, OR
L The Dalles, OR	Y Eugene, OR
M Pendleton, OR	

Cascade Volcanoes

1 Mount Baker	6 Mount Hood
2 Glacier Peak	7 Mount Jefferson
3 Mount Rainier	8 Three Sisters
4 Mount St. Helens	9 Newberry Volcano
5 Mount Adams	10 Crater Lake

Legend for Geology

Igneous Rock

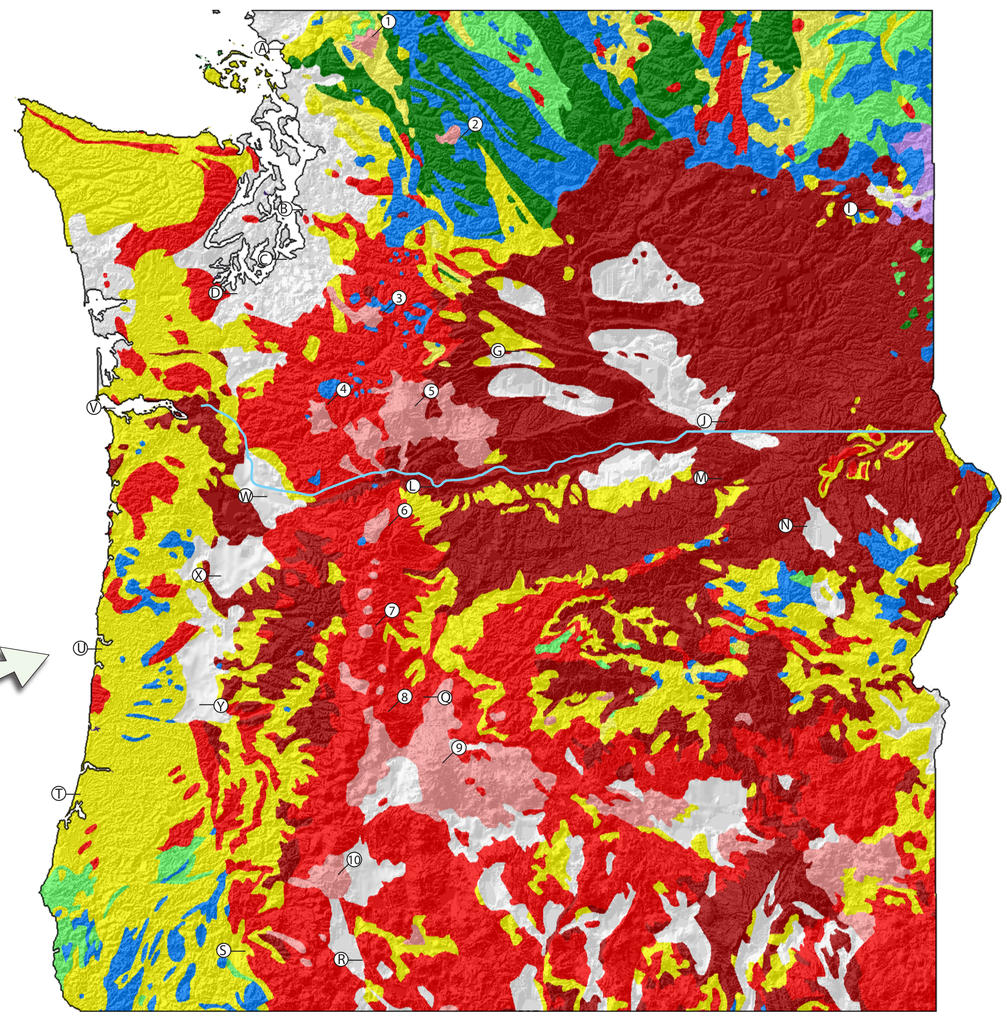
- Volcanic (Less than 1.6 million years)
- Volcanic (More than 1.6 million years)
- Volcanic (Mostly 16.5- to 6-million-year-old flood basalts)
- Intrusive rock

Sedimentary and Metamorphic Rock

- Unconsolidated sediment
- Sedimentary rock
- Sedimentary & metamorphic rock
- Metamorphic rock

Geology[1]

Generalized geologic map of the Pacific Northwest.
(Circled numbers are the same as on Physical Geography legend)



Physiographic Provinces[2]

Map of major physiographic provinces in the Pacific Northwest.

A physiographic province is characterized by terrain, rock type, geologic structure, and geologic history.

Coastal Mountains

- Olympic Mountains and Coast Ranges—Folded and faulted Cenozoic marine sedimentary and volcanic rock.
- Klamath Mountains—Folded and faulted Mesozoic intrusive, sedimentary, and metamorphic rock.

The Western Basins

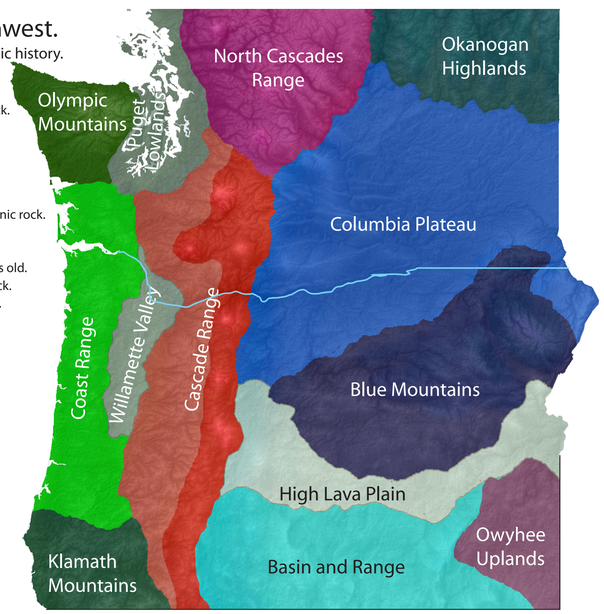
- The Puget Lowlands—Broad marine embayment filled with Cenozoic glacial and fluvial (river) sediment. Paleozoic and Precambrian rocks exposed in places.
- The Willamette Valley—Broad river valley filled with Cenozoic sediment and occasionally exposed older volcanic rock.

Interior Mountain Ranges

- Cascades—Volcanically active range of Cenozoic lava flows and pyroclastic deposits. Peaks are <2 million years old.
- North Cascades—Younger peaks overlie Mesozoic and Paleozoic metamorphic, intrusive, and sedimentary rock.
- Okanagan Highlands & Blue Mountains—Folded and faulted intrusive, metamorphic, and sedimentary rock. Precambrian through Cenozoic.
- Basin and Range—Actively extending north-south trending valleys and mountain ranges consisting of Cenozoic volcanic rock and lake deposits.
- Owyhee Uplands—A mountainous region consisting largely of Cenozoic volcanic rock.

Interior Plains and Plateaus

- The Columbia Plateau—A large plateau covering much of central Washington composed of thick layers of mid-Cenozoic flood basalts (16.5 to 6 million years ago).
- The High Lava Plains—A high plain covering much of central Oregon, dotted with numerous Cenozoic- to Holocene-age volcanoes.



TIME SCALE

Cenozoic	65.5 million years to present
Mesozoic	251– 65.5 million years ago (dinosaur time)
Paleozoic	542 – 251 million years ago
Precambrian	>542 million years ago

Tectonics[3]

Relative motions of the crustal plates and distribution of Cenozoic volcanoes in the Pacific Northwest. The Cascadia Subduction Zone is the locked boundary between the Juan de Fuca and overlying North American plates.

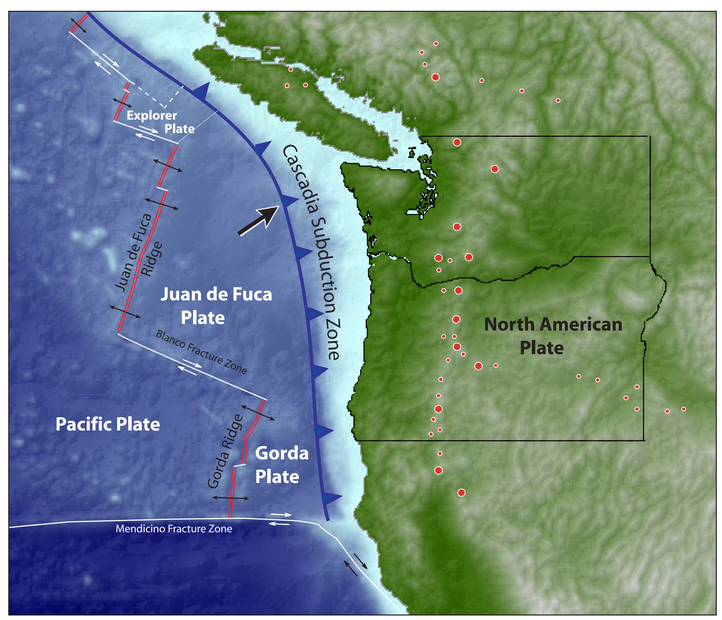
Legend

Crustal Plate Boundaries

- Convergent (plates are colliding)
- Divergent (plates pull apart)
- Transform (plates slide past each other)
- Direction of relative plate movement
- Direction of movement of Juan de Fuca plate beneath the North American plate

Volcanoes

- Major volcanoes
- Minor volcanoes



[3] Schruben, P.G., Arndt, R.E., Bawlect, W.J., King, P.B., Beikman, H.M., 1994; Geology of the Conterminous United States at 1:2,500,000 scale—A Digital Representation of the 1974 P.B. King and H.M. Beikman Map.

[2] Adapted from Orr, W., and Orr, E., 2002, Geology of the Pacific Northwest

[1] Adapted from "Subduction and Volcanism" in Loy, W.G., Allen, S., Buckley, A.R, Meacham, J.E., Allen, S., Andreas, L.J., Martin, G.E., and West, R., 2001, Atlas of Oregon, University Oregon Press