VASHON ROCKS! FAQs

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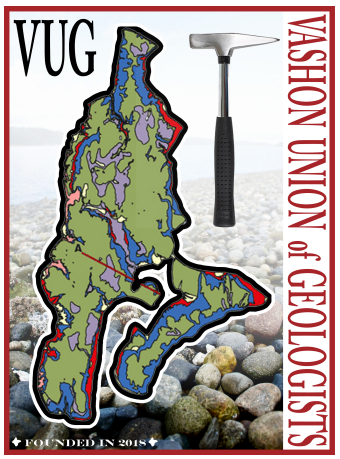

Q. *Why is Vashon an Island?*
A. Vashon is sandwiched between two active East-West fault systems (named the Seattle & Tacoma faults) and is being horizontally pressed from the south, lifting it higher than its surroundings. About 80,000 years ago, before the last glacial advance, large rivers draining the Cascades deposited sands on Vashon, prior to it becoming an island. Intense erosion by streams of water under the most recent ice sheet, just prior to 10,000-15,000 years ago, carved deep channels to Vashon's east and west. After the ice sheet melted away, the sea entered Puget Sound and filled the lowlands to the north and south of Vashon Island and the channels to the east and west, thereby creating an island.

Q. *Should residents and visitors be concerned about geological hazards on Vashon?*
A. Yes, depending on where you live or stay. You could be impacted by landslides, which commonly occur during very wet winters. Slopes that have been over-steepened by wave erosion or human activity are most liable to fail, as are slopes underlain by deep slip surfaces. Depending on the winds, you could be covered by ash from volcanic eruptions, although the last nearest eruption was at Mt. Rainer almost 600 years ago. Mudflows related to catastrophic slope failures on Mt. Rainier happen more often than major eruptions, but mudflows are exceedingly unlikely to cross Puget Sound and reach Vashon Island. Not so for Orting, WA, situated between the Carbon and Puyallup Rivers less than 30 miles from Mt. Rainier and built entirely on several layers of lahar deposits.

For Vashon islanders, major earthquakes in the Puget Sound region pose a real risk, being capable of producing much more damage than the large earthquakes in 1949 and 1965 and the equally large 2001 Nisqually earthquake, which had a magnitude of 6.8. The largest earthquakes, fortunately, occur less frequently. The most recent very large earthquake inside Puget Sound happened about 1100 years ago with a magnitude of about 7.5. Parts of Bainbridge Island and Alki Point shot up 20 feet from beach level and a 16-foot-high tsunami bore down on the north end of Vashon Island. The most recent major "subduction earthquake" happened 300 years ago off the coast of Washington and had a magnitude of about 9.0. Such an event would be devastating for the Washington coast but somewhat less inside Puget Sound. For earthquakes of magnitude 7 expect less than a minute of shaking in contrast to the magnitude 9 events which would have up to ten minutes of shaking.

Q. *Why is Vashon in the Puget Lowlands surrounded by mountain ranges to the west & east?*
A. The Puget Lowlands are located in a forearc basin with the Olympic Mountains to the west, thrust up by collision and subduction of the Juan de Fuca Plate, and the Cascade Range to the east, resulting from subduction-related magmatism and the growth of volcanoes. The last few glacial advances and associated stream activity also contributed to the Puget Lowland topography.

Q. *Where do the rocks on Vashon beaches come from?*
A. Rocks on Vashon beaches come from the erosion of the glacial and fluvial deposits that cover all of Vashon and Maury islands. Waves remove all the finer sand, silt and clay from the beach, leaving behind pebbles, cobbles, and boulders that ice sheets had and rivers carried down from elsewhere in Washington State, Vancouver Island, and British Columbia. Some of the rocks found on Vashon beaches were brought by humans to armor the beaches, and you can also find bricks and pieces of cement from century-old structures that have been disintegrating and moved around by tides, currents and waves.

Q. *Are there fossils on Vashon?*
A. Yes, although they are rare. You can find rounded bits of petrified wood and a variety of fossils in sedimentary rock boulders, cobbles and pebbles on the beaches that were transported here by glaciers, as well as much younger Pleistocene Columbia mammoth teeth and other bones in the glacial outwash deposits.

Q. *Is there an underground lake beneath Vashon?*
A. No, there are no underground lakes nor any open river channels below the surface of Vashon and Maury Island. Such bodies of water only exist where underground caves exist, like in Florida. The water that does exist beneath the surface of the island, termed groundwater, lies within tiny spaces between grains of sand in rock or sedimentary layers called aquifers.

Q. *Where does Vashon groundwater come from?*
A. Vashon groundwater comes from the atmosphere. Rain and meltwater from snow percolate into underground aquifers that feed natural springs and water wells drilled by humans; Vashon is considered a single-source aquifer, although Vashon a very complicated and variable subsurface aquifer system.

Q. *Why is till so hard to dig?*
A. Glacial till consists of sand and gravel but also silt and clay, which fill the spaces between larger grains, making for a dense and hard material. The glacial till deposited on Vashon about 15,000 years ago was further compacted by an ice sheet over 1000 feet thick, which helped to produce our modern cement-like hardpan.

Q. *Why is there a sand spit at KVI beach?*
A. The KVI sand spit is caused by the intersection of two opposite-flowing drift cells that erode sand from the bluffs to the north and south and transport it along the coast by wind, waves, and currents.

Selected Resources

Books: *(all available through the Vashon Library- KC Library System)*

Northwest Exposures: A Geological Story of the Northwest, by Alt & Hyndman (1995)
The Restless Northwest: A Geological Story, by Williams (2002)
Geology Underfoot in Western Washington, by Tucker (2015)
The Geology of Washington and Beyond, from Laurentia to Cascadia, edited by Cheney (2016)
Roadside Geology of Washington, by Miller & Cowan (2017)
Geology of the Pacific Northwest, by Ort & Ort (2019, 3rd edition)
Washington Rocks! A guide to geologic sites in the Evergreen State, by Kiver, Pritchard, & Orndorff (2016)
Washington & Oregon Rocks & Minerals: A Field Guide to the Evergreen and Beaver States, by Lynch & Lynch (2012)
Regional Geology of Washington State, by Lasmanis & Cheney (editors, 1994) WA DNR Bulletin 80
Cascade Revealed: A guide to plants, animals & geology of the Pacific Northwest Mountains, by Mathews (2016)
Rocks, Minerals & Geology of the Pacific Northwest, by Moclock & Selander (2021)
Living with thunder: exploring the geologic past, present, and future of the Pacific Northwest, by Morris Bishop (2014)
Cascadia - The Geologic Evolution of the Pacific Northwest, by Bates McKee (1972)

Internet links:

King County Vashon Geology Underfoot
King County Vashon Water Resources Review (2013)
WA DNR Geology of King County Bulletin 63 (1971)
USGS Geological Map Vashon Quadrangle (2015)
Puget Sound Geology: https://www.burkemuseum.org
https://www.dnr.wa.gov/programs-and-services/geology/publications-and-data/story-maps

Nice 3 minute video: https://www.youtube.com/watch?v=WYtF-ZdTr7s
Earthviewer App Interactive-slider bar time scale-shows past plate reconstructions
You tubes of: Nick Zentner

Four basic Earth Science concepts to understand (modified after the American Geosciences Institute):

1. The Earth has a long history; *4.55 billion years of geologic time is hard to grasp.*
2. The Earth constantly changes. *We live on a very active and dynamic planet due to plate tectonics and the complex interaction of Earth systems. Some changes are fast, whereas others are slow; nothing is permanent.*
3. Understanding present-day Earth processes is the key to unraveling the past. We look for the results of past processes in the rock record to reveal Earth history. In turn, the rock record helps us understand the present (and future) because not all Earth processes are currently active.
4. All societies and inhabitants exist at the mercy of Earth processes. We depend on Earth resources, and are variably vulnerable to Earth hazards. Our impact on the planet has changed its "natural" course and we now need to correct for these impacts by healing the Earth or future generations will suffer the consequences. *We don't need to save the planet, yet we might save ourselves if we act.*

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Feel free to contact Steve, Tom, or other VUG members if you have additional questions.