The Geology of the Youngberg Hill Vineyards and Vicinity

This is a very broad overview of the geology of Youngberg Hill derived primarily from information presented on the Oregon Department of Geology and Mineral Industries Interpretive Map No. 28 which was published in 2009. This map is available free online from the Oregon Department of Geology website. http://www.oregongeology.org/sub/publications/IMS/ims-028/resources.htm
The location of Youngberg Hill vineyards is indicated by the A call out on a map from Google Maps (Figure 1). This and a satellite version of the same map (Figure 2) are included because they are key to locating Youngberg Hill on the geologic map to follow.

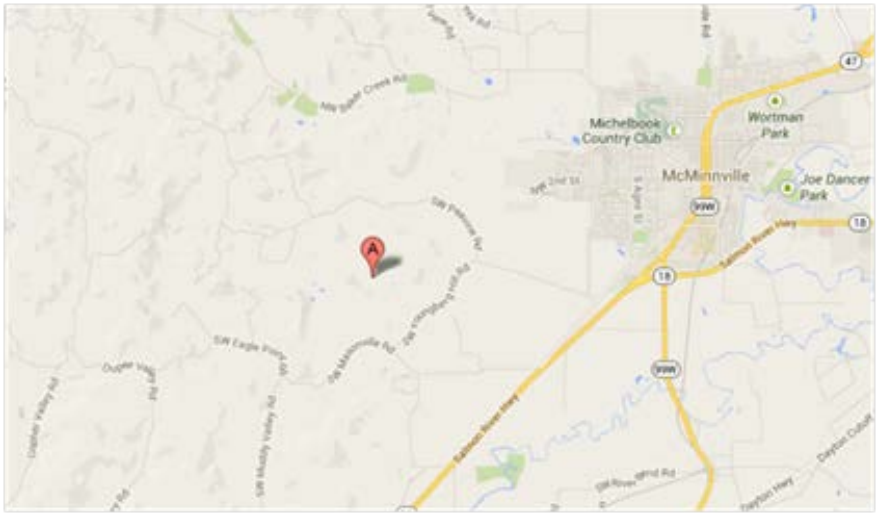

Figure 1: Location of Youngberg Hill (the A call out) from Google Maps.


Figure 2: Satellite image showing the location of Youngberg Hill (the A call out).

Note that the change from continuous farm land to mixed forest and fields marks the edge of the Willamette Valley alluvial plain and the beginning of rolling hills often capped by basalt. On the geologic map of the area (Figure 3), the alluvial plain is colored in blue while the rocks exposed on the rolling hills to the west are colored light green and lavender.

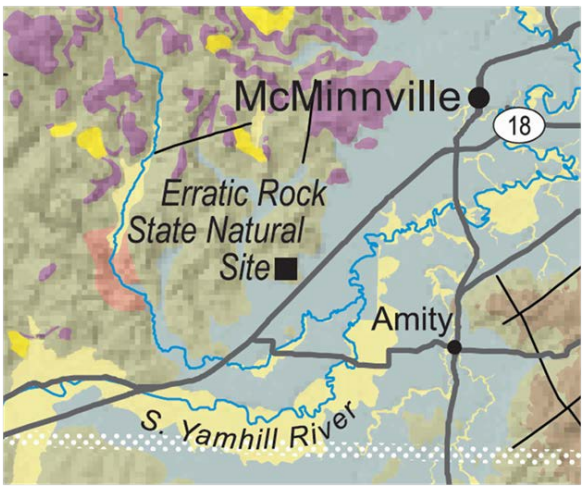

Figure 3: Geologic Map of the Youngberg Hill area.

The location of Youngberg Hill on the geologic map is not precisely known but based on the presence of both basalt and marine sediments at the surface on the property I would put the location at the southern extent of basalt (lavender), where marine sediment (light green) emerge from under the capping basalts. Alternately, Youngberg Hill may be located slightly west of the point of the call out and sit astride the fault (north-south trending black line) which juxtaposes basalt and marine sediments. Either location would put the Natasha vineyards growing on marine sediments downhill from the Jordan vineyards growing on basalt.

Figure 4 (below) is the key to the geologic map. The age, geologic events and resulting deposits from the three geologic episodes, Early Volcanic Arc, Coastal Range Sediments, and Coastal Range Volcanoes are discussed in detail. I included the discussion of the Early Island Arc episode because volcanic rocks from that episode were likely the source of the Coastal Range episode marine sediments that the Natasha vineyard grapes grow on. Assuming that is the case, I would speculate that because the volcanic rocks deposited during the Early Island Arc episode were more compositionally diverse (see explanation below Figure 4) one would expect that the Coastal Range marine sediments and soils derived from them would contain a greater, possibly richer suite of minerals which would be available to the Natasha grapes.

The material issuing for the Coast Range Volcanoes on the other hand is described as basalt and diabase (a coarse-grained version of basalt). In addition to the fact that these basalts form a rocky soil under the Jordon vineyard at Youngberg Hill, basalt may yield a more limited suite of minerals to support the Jordon grapes. I would be curious this sort of nutrient difference between the two vineyards is observed.

In summary, the Early Volcanic Arc episode began about 52 million years ago (mya) and resulted in volcanic rocks that were the likely source of Coastal Range marine sediments (sandstones, siltstones, etc.) that began to be deposited about 50 mya and form the soils for the Natasha vines. Coastal Range Volcanoes began extruding and intruding basalts about 45 mya and these basalts form the soils for the Jordan vines.

Early Volcanic Arc: Oregon's tropical volcanoes

52 million to 6 million years ago

basalt, andesite, dacite, rhyolite, mudflow breccia, conglomerate, tuff

As the **subduction zone** moved westward under the Pacific Ocean about 52 million years ago, volcanic activity from this shift built a broad **volcanic arc** across much of the eastern two thirds of the state. The eruptions continued until about 20 million to 6 million years ago and built a huge pile of lava flows, tuff, and interlayered river and lake sediments. Hundreds of volcanoes of all types and sizes erupted across the landscape. Huge explosive calderas erupted enormous ash clouds that deposited ash tuff over large areas. The near-tropical climate supported a wide range of now extinct plants and animals, whose fossils are spectacularly preserved in ash layers and old lake beds in the John Day Fossil Beds National Monument. Much of the ancient arc is now buried in the east by Columbia River Basalt, Rift Volcanoes, and High Cascade Volcanoes.

OGDC units: Eocene through Miocene volcanic, intrusive and volcaniclastic rocks and interbedded terrestrial sedimentary rocks of the Little Butte, Early Western Cascades and Late Western Cascades, Skamania, Steens Mountains, Tower Mountain, Warner Peak, and Goble Volcanics; Colestine, John Day, Clarno, Alvord Creek, Eagle Creek, Heppsie, Mollala, Pike Creek, Rhododendron, Roxy, Sardine, Scorpion Mountain, and Wasson Formations

DID YOU KNOW? Early Volcanic Arc rocks are one of the best sources of Oregon's state rock, the thunderegg.

■ **GO SEE IT!** Smith Rock State Park; John Day Fossil Beds National Monument

Coast Range Sediments: 50 million years of mud

50 million years ago to now

mudstone, sandstone, siltstone, shale

After the volcanic rocks of Siletz Terrane were stuck onto the edge of North America, silt, sand, and mud began to build up on the Pacific Ocean floor off the coast of Oregon. Over tens of million of years, sea level went up and down, nearby volcanoes erupted and were eroded away, species arose and went extinct, and the two tectonic plates continued to smash into each other. Throughout this time, ocean sediments accumulated steadily and were compressed into a thick stack of sedimentary rocks. Today, many of the older rocks remain beneath the water offshore, but uplift, folding, and faulting associated with the **subduction zone** have pushed up others to form much of the Coast Range. Today, sediment washed into the ocean by Oregon's rivers continues to pile up off the coast, covering virtually all of the Oregon seafloor as far west as the Cascadia Subduction Zone.

OGDC units: Eocene Lorane Shale and the Bastendorff, Bateman, Bushnell Rock, Camas Valley, Coaledo, Cowlitz, Elkton, Hamlet, Keasey, Kings Valley, Nestucca, Spencer, Tenmile, Trask River, Tyee, White Tail Ridge, and Yamhill Formations; Eocene-Oligocene Alsea and Eugene Formations; Oligocene Sager Creek, Pittsburg Bluff, Scotts Mills, Yaquina, and Tunnel Point Formations; Oligocene-Miocene Scappoose, Smuggler Cove and Northrup Creek Formations; Miocene Nye Mudstone, Whalecove Sandstone and Astoria, Gnat Creek, and Empire Formations

DID YOU KNOW? Oregon's only known significant natural gas field is in the Coast Range Sediments, near the town of Mist.

■ **GO SEE IT!** Shore Acres State Park; Gold and Silver Falls State Park

Coast Range Volcanoes: Oregon's first hot spot

45 million to 36 million years ago

basalt, diabase

A few million years after the Siletz Terrane joined the continent and began to be buried by sand and mud, the newly formed northwest corner of Oregon, moving with the North American continent, drifted west across a hot spot, triggering huge eruptions of lava that built up along the coast. For several million years the hot spot fed magma from deep within the Earth into the layer of marine sedimentary rocks (Coast Range Sediments) that was growing on the ocean floor. Today these volcanic and intrusive rocks make up the Tillamook Highlands and some of Oregon's most famous coastal landmarks, including Cascade Head and Cape Perpetua.

OGDC units: mafic intrusive and volcanic rocks of the Eocene Grays River Volcanics, Mary's Peak Intrusives, Tillamook Volcanics, Yachats Basalt, basalt of Cannery Hill, basalt of Waverly Heights, basalt of Cascade Head and diabase of Lee's Falls

DID YOU KNOW? Mary's Peak, the highest point in the Coast Range (4,097 ft), is supported by resistant intrusive basalt of the Coast Range Volcanoes.

■ **GO SEE IT!** Heceta Head Lighthouse State Park; Neptune State Park

Figure 4: Key to Geological Map.