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THE EVER-CHANGING LANDSCAPE OF CENTRAL OREGON

In Celebration of Newberry National Volcanic Monument

Aerial view of lakes and cinder cone at Newberry Volcano Caldera - Pallister, J. (2011, January 23).

Newberry Volcano

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Newberry volcano has shaped the landscape of Central Oregon for hundreds of thousands of years. The formation of Newberry volcano started around 400,000 years ago; likely 100,000 years prior to the existence of modern humans (Stringer, 2016). Newberry is what we call a shield volcano; its slopes are gradual and covers a large area. From the formation of this shield volcano to around 75,000 years ago, it went through a series of eruptions that induced its lava flows to reach as far north as Smith Rock, and as far south as Fort Rock State Natural Area. These lava flows

marked the beginning of a series of volcanic events that would lay the foundation for future populated areas such as Bend and Redmond - though Newberry volcano was just getting started (see Figure 1).

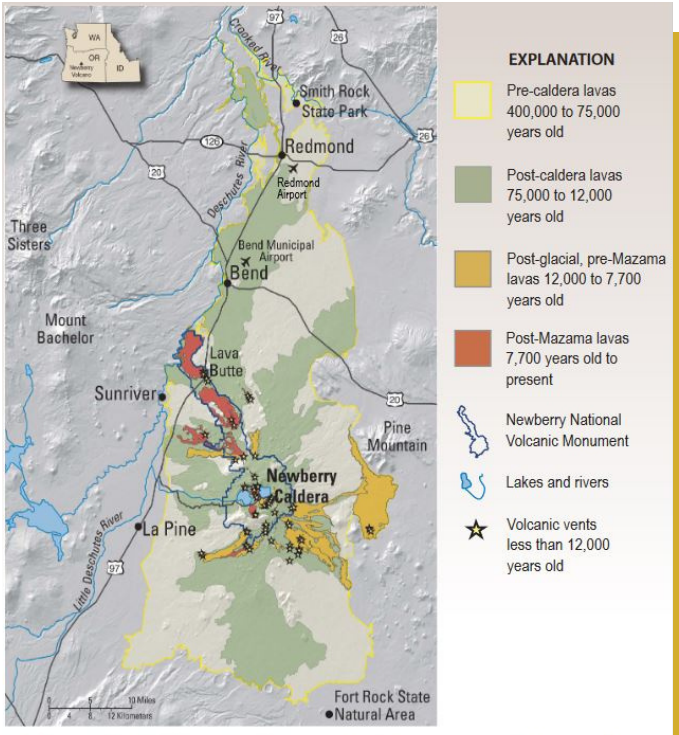

Figure 1: Donnelly-Nolan et al. (2011). Extent of Newberry lavas including approximate ages of surficial flows [Illustration].

After 325,000 years of shaping Central Oregon through various eruptions and lava flows, Newberry exploded violently, spewing volcanic ash, pumice, and other fragmental debris into the air. The explosion was so immense, that "volcanic-ash deposits can be found as far away as the San Francisco Bay Area in California" (USGS n.d.). The implications of this explosion caused the volcano to collapse in on itself, creating a caldera. A caldera is a fancy way of describing a collapsed volcano. When Newberry's magma chamber had emptied from the violent eruption, all the landmass that was hovering above the magma chamber was too heavy to sustain itself, causing a cave-in. Although today we see Newberry caldera as Paulina and East Lakes, it was not until sometime after the eruption of Mt. Mazama 7,700 years ago (the ancient volcano that formed Crater Lake), that a fissure opened up spawning the "ridge that divides East Lake from Paulina Lake" (Donnelly-Nolan et al., 2011b). Today, this ridge - along with the central pumice cone - provides great hiking opportunities for outdoor enthusiasts.

Seven-hundred years after the central divide of the caldera, a "20-mile-long fissure system extending northwest from the caldera opened up to form the Northwest Rift Zone" (USGS, n.d.-b). This fissure created many prominent geological features such as Lava Butte and the lava fields that stretch to the Deschutes river. In fact, it was these lava flows that spewed from Lava Butte that ended up damming the Deschutes

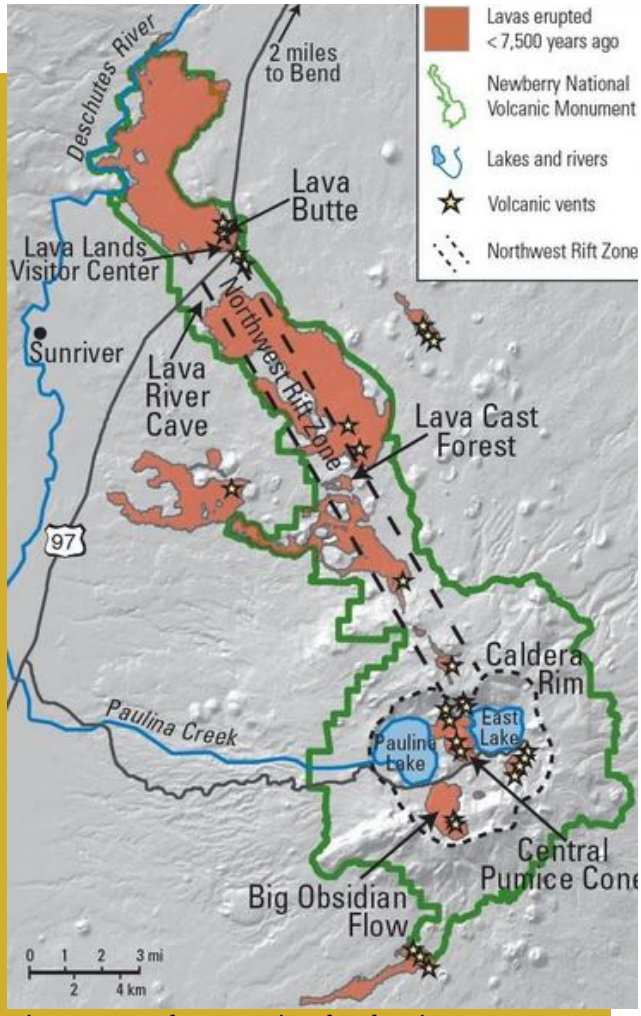

Figure 2: Newberry National Volcanic Monument with the youngest lava flows - Donnelly-Nolan et al. (2011b) Illustration Courtesy of USGS

river, submerging what we now call Sunriver under water (see figure 2). It would take many years for the Deschutes to carve its way back into a flowing river. The impacts of this lava blockage created some of the best rapids for rafters on the Deschutes: the Big Eddy. Lava Butte is not the only cinder cone or volcanic vent to erupt off the flanks of Newberry volcano; along with Pilot Butte, Newberry volcano has more than "400 cinder cones that represent over 300 eruptions during the half-million-year history of the volcano" (USGS, 2020). The cinder cones that you can see scattered across Central Oregon has impacted the way vegetation grows around them.

If we take a look at Lava Butte for example, we can see that trees grow densely on the northern side of the butte, in contrast to its southern side with little to no vegetation (see Figure 3). The cinder cones and volcanic vents scattered across the flanks of Newberry also impacts what type of vegetation can grow. Since the volcanic rocks and ash that spewed from these vents are mostly porous, vegetation that thrives in well-drained soils thrive in these areas. Examples of such vegetation include ponderosa pine, lupine, and mountain hemlocks.

Figure 3: Lava Butte from above - Public Domain

Some of the not-so-porous volcanic rocks created from Newberry's volcanic system were formed during the Big Obsidian Flow, which is "the youngest volcanic feature at Newberry" (USGS n.d.). This eruption happened around 1300 years ago and created a plethora of volcanic glass called obsidian (shown in the distance of Figure 5). Obsidian was used by many Indigenous Peoples to create tools that required a sharp edge. We know that Indigenous Peoples have occupied the caldera for thousands of years due to the discovery of seasonal hunting camps underneath the layer of ash from the Mt. Mazama eruption 7,700 years ago (USGS n.d.). More to come on that fascinating discovery in a later article.

Figure 5: Morgan, S. (11-07-11). Newberry caldera with Paulina Peak, Big Obsidian Flow and Paulina Lake.

Just like the eruptions of Newberry volcano affected the lives of Indigenous inhabitants for thousands of years, it will continue to do so for future generations. Newberry volcano's rich history of eruptions over a span of 400,000 years has shaped the breathtaking views we get to enjoy every day. With new eruptions on the horizon, the question is: what type of cool geological features will it create, and who will be the first to explore them?

Citations:

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