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## The making of the Laguna de Santa Rosa



By Jane Nielson May 6, 2011 12:47 am

Like all landscapes, the Laguna de Santa Rosa is the sum of many natural events. Long ago, deep-seated forces of sub-duction laid the foundation of coastal California. Tectonic forces shoved the eastern Pacific tectonic plate, formed at a volcanic ridge in the early Pacific Ocean, beneath continental rocks of the overriding North American plate. (Recall that sub-duction has caused the world's largest recorded earthquakes, including the recent Sendai, Japan quake.)

Some 30 million years ago, the East Pacific plate's mid-Pacific ridge began to disappear beneath North America. Starting from what is now northern Mexico and progressing northward, the San Andreas "transform fault" gradually replaced the sub-duction zone.

Now 810 miles long, the San Andreas Fault currently ends abruptly at Cape Mendocino. To the north, a small remnant of the East Pacific plate still dives into a sub-duction zone beneath North America, creating Mt. Lassen, Mt. Shasta, and the Cascades volcanoes of Oregon and Washington. Eventually, that plate and its ridge will disappear beneath North America, extending the San Andreas Fault to the Aleutian Islands.

Along the San Andreas Fault, rocks of the western Pacific plate were (still are) being shoved northward, grinding past the North American plate's continental rocks at about two inches per year. The friction of the two plates encroaching on each other has warped and fractured the North American plate's western edge. Early on, fragments broke off the North American plate and became welded to the Pacific plate margin, so southern Sierra Nevada rocks have moved northward over 300 miles to their current sites at Bodega Head and Point Reyes.

By about six million years ago, satellite faults had branched from the San Andreas and splintered the plate margin. The San Francisco Bay region was then a coastal plain. Sediments eroded from the North American plate were deposited across a shallow bay and adjacent landscape, on top of subduction zone rocks.

Between-plates pressures also have warped the North American plate's margin into hills and valleys, similar to the rippling effect from pushing at the edge of a towel. The warping created a series of inland valleys and ridges between the San Andreas Fault and its generally parallel satellite, the Rodgers Creek Fault.

In Sonoma County these up-warps include the Coast Range, Sonoma Mountain, and additional ridges to the east. The Santa Rosa Plain is an oval basin between the Coast Range and Sonoma Mountain, with the Rodgers Creek Fault forming part of its eastern boundary. Creeks flushed sediments from flanking hills to progressively fill the Santa Rosa Plain basin as down-warping continued.

Located at the Santa Rosa Plain's western edge, the Laguna de Santa Rosa marks its lowest elevations. Before European settlement, permanent to semi-permanent lakes and pools collected there during the winter and spring. For many tens of thousands of years, the basin probably contained much larger lakes from time to time.

Basin filling, and the various faulting processes continue today, making Sonoma County a very geologically-active area. The Sebastopol Fault forms the Laguna's western (Coast Range's eastern) edge. It may not generate earthquakes, but instead may reflect weaknesses in the rocks that at first folded due to warping pressures, then progressively fractured when no longer able to fold. In contrast, the San Andreas and Rodgers Creek faults do generate earthquakes, and we all need to respect their power.

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