

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

#50 March 13, 2010

Migrating shorelines



1928 Aerial photograph of Opal Cliffs area with Capitola pier on the right and 41st Avenue crossing from upper right to lower left.

In the scale of geologic time, the coastline of California, like the coastline of any area on Earth, is a very temporary feature. Twenty-thousand years ago, just a blink of an eye in the long-term scheme of things, the shoreline near Lighthouse Point was about ten miles offshore to the west. The Farallons were a 25-mile hike across a sandy plain. In central and southern Monterey Bay, the sand that was being brought to the shoreline by the Salinas and Pajaro rivers was deposited five to ten miles seaward from the present beach along the exposed shelf. Onshore winds

blew this sand into large dunes, which extend inland today from Sunset Beach to Monterey and underlie the old Fort Ord army base.

As the last Ice Age drew to a close the weather gradually began to warm, and the glaciers that covered the upper mid-west, Canada and northern Europe, began to retreat. As they melted, all of that ice water poured into the oceans, eventually raising sea level globally about 400 feet. The first humans slipped across the Bering Land Bridge into North America before sea level rose too high, and began their trek southward.

If you were one of those early human arrivals that populated coastal California, you would have simply moved inland to keep your feet dry and your camp above the level of the slowly advancing ocean. During the interval from 15,000 to 5,000 years ago, sea level was rising about a third of an inch a year and the shoreline was advancing inland at perhaps two feet annually along the northern Monterey Bay shoreline. Off the Golden Gate where the seafloor slopes more gradually, the shoreline was advancing at over seven feet each year. This didn't matter much in those days. The Pacific Ocean is 10,000 miles wide and a few miles one way or other at the edge doesn't matter too much to the ocean.

Shoreline migration or coastal retreat wasn't a concern in the Monterey Bay area until about the last 100 years. Older civilizations elsewhere around the world did have to deal with the slow rise in sea level, however, and marine archeologists regularly come across the drowned harbors and the sunken remains of ancient settlements around the margins of the Mediterranean.

In Santa Cruz, however, the first homes were set well back from the shoreline. The oldest aerial photographs of the Santa Cruz coast were taken in 1928 and show that homes weren't built on the cliff edge in those days. There wasn't a house within a block of the cliff edge along Opal Cliffs in 1928. Ocean views either weren't in the same demand as they are today, or the earlier coastal residents had a greater respect for the temporary position of the coastline than the builders and homeowners of the last half of the 20th century. Sea level has gone up and down and coastlines have advanced and retreated for as long as we have had an Earth and an ocean. The consequences of a rising sea level are just a lot greater today than at any time in the geologic past.