

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

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Harbors and dredging



The dredge at the Santa Cruz Small Craft Harbor removes about 225,000 cubic yards of sand each year and places it on Twin Lakes Beach.

Every year the dredge at the Santa Cruz Harbor sucks up about 250,000 cubic yards of sand and pumps it out onto Twin Lakes Beach where it continues its journey down coast. If it were put in dump trucks, it would fill about 25,000 of them, but the waves move all that sand without any carbon emissions. After being carried along Opal Cliffs, Capitola, New Brighton, Rio Del Mar, Seacliff, Seascape, Manresa and Sunset beaches, all that sand flows down into the head of Monterey Submarine Canyon, never to be seen again.

The dredging is an endless and thankless task, but we really don't have much choice if we want to maintain the harbor. If it's any consolation, a lot of other California coastal harbors share the same challenge, how to deal with all the sand that continues to move into their entrance channels. Santa Barbara harbor dredges a bit more than Santa Cruz, about 300,000 cubic yards annually, while a short distance down coast, Ventura must move about 600,000 cubic yards a year. A few miles farther east, Channel Islands harbor dredges close to a million cubic yards, every year! At about \$2/cubic yard, these are costly undertakings. And the problem will never go away.

Interestingly, not all of California's harbors have sand problems. Neither Moss Landing nor Monterey harbors do any significant dredging. King Harbor in Redondo Beach doesn't need to move sand, and Dana Point Harbor has never been dredged. Why is that? Why do we have to move 250,000 cubic yards of sand every year out of the Santa Cruz Harbor, and 20 miles away, Moss Landing has a channel that doesn't need to be dredged?

Sand moves along the shoreline of California within self-contained beach compartments or littoral cells. The sand that moves along Cowell's or Main Beach is in a completely different compartment than the sand coming out of the Golden Gate or found along the beaches of Santa Barbara or Santa Monica. Each cell or compartment consists of 1) sources of beach sand (rivers and streams and some bluff erosion); 2) littoral drift, driven by waves typically coming from the northwest, which move sand southward along most of the California coastline; and 3) sinks, or locations where beach sand leaves the shoreline. In California the major sinks are either sand dunes, such as those along the shoreline of southern Monterey Bay or at Pismo Beach, where wind transports the sand inland off the beach; or deep submarine canyons, where sand flows offshore and down slope to the deep sea floor 10,000 to 12,000 feet below.

Monterey Submarine Canyon is one of the largest in the world, but there are many others along the California coast, Carmel Canyon, Hueneme Canyon, Redondo Canyon and Newport Canyon to name a few. The Santa Cruz beach compartment begins north of Half Moon Bay and terminates at Moss Landing where the head of Monterey Canyon extends almost to the shoreline. After being transported for 90 miles along the shoreline, the sand that began its journey a few miles south of San Francisco disappears offshore right at the entrance to Moss Landing harbor. There is no sand left to dredge.