

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

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**To Dredge Or Not To Dredge**



*Santa Barbara's harbor has a big dredging problem.  
Photo: California Coastal Records Project.*

At the moment the location for a harbor is selected along California's coast, their dredging future has already been determined. Interestingly, however, not all of California's coastal harbors have sand problems.

Neither Moss Landing nor Monterey harbors do any significant dredging, nor does Pillar Point Harbor at Half Moon Bay. King Harbor in Redondo Beach doesn't need to move sand, and Dana Point Harbor has never been dredged.

On the other hand, and if it's any consolation, a lot of other California coastal harbors have equal or greater dredging challenges than Santa Cruz. Santa Barbara harbor dredges a bit more than we do, about 300,000 cubic yards annually. A short distance down the coast, Ventura Harbor must move twice as much, about 600,000 cubic yards a year. A few miles farther east, Channel Islands Harbor has a huge sand problem and has to dredge close to a million cubic yards, every year!

These are expensive maintenance issues that are never going to go away. The ongoing challenge is how to deal with all the sand that continues to move into their entrance channels, how to maintain the channel and pay for it year after year.

Why such huge differences? Why do we have to move 260,000 cubic yards of sand on average every year out of the Santa Cruz Harbor entrance, and 20 miles away, Moss Landing has an entrance 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 Main Beach or Seabright, is in a completely different compartment than the sand coming out of the Golden Gate or found along the beaches of southern Monterey Bay.

Each cell or compartment consists of 1) sources of beach sand (rivers, streams and bluff erosion in California); 2) alongshore movement or 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 California's coast, Carmel Canyon, Hueneme, Mugu, Dume, Redondo Newport, Scripps and La Jolla canyons, for example. And each of these is a funnel for beach sand down to the deep sea. The southern Monterey Bay littoral cell is also unique in California in having a huge and additional sink, sand mining from the shoreline.

The Santa Cruz beach compartment begins at Pt. San Pedro, north of Half Moon Bay, and terminates at Moss Landing, where the head of Monterey Submarine Canyon extends almost to the beach. After being transported by waves for 90 miles along the shoreline, the sand that began its journey 15 miles south of San Francisco disappears offshore right at the entrance to Moss Landing harbor.

There is no sand left to dredge, so Moss Landing harbor is nearly maintenance free. Fifteen miles south lies the Monterey Harbor, protected from ocean waves by a rock breakwater. Interestingly, because of the angle of wave approach and the

orientation of the shoreline, the net sand movement is actually northward or upcoast away from the harbor. They occasionally have to remove a few truck loads of sand, but it's a minor problem.

Ultimately, much of that sand also ends up at Moss Landing where it also is carried down the canyon to the deep ocean, never to be seen again. For harbors, it's all about location, location, location.