

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

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Tsunamis—should we worry?



Crescent City was slammed by the tsunami generated by the 1964 Alaska earthquake with the loss of 11 lives.

The word "tsunami" generates an emotional response, much like earthquake or shark. It's just one of those scary things that is beyond our control and one that we never want to experience. The 225,000 people that died the day after Christmas in 2004 from the Indian Ocean tsunami was a cruel reminder of the forces that lurk offshore around the Pacific rim.

While most tsunamis result from subduction zone earthquakes in deep trenches, they can also occur where oceanic volcanoes erupt catastrophically or where large

landslides run down steep underwater slopes. The biggest tsunamis that might ever occur come from asteroid impacts, but so far, no large ones have struck since humans have been on the scene. The 6-mile-wide asteroid that smashed into the Gulf of Mexico 65,000,000 years ago was traveling at 45,000 mph and created waves 100s of feet high that ran up a then inland sea as far as South Dakota. No worries though, asteroid impacts even one-one hundredth that size hit Earth only once in about a million years.

With so many others things to worry about, do we also need to get stressed out about tsunamis here in Surf City? The short answer for me is that it's not up there on my top 10 concerns. Your odds of dying in a tsunami in Santa Cruz are far lower than virtually any other risk we all face daily, commuting over Highway 17, biking on Mission Street or riding a motorcycle on Highway 9.

On the other hand, tsunami hazards are something that city planners, public safety officials and structural engineers ought to be aware of and plan for. There have been six tsunamis large enough to cause significant damage along the coast of California over the past 200 years. Over this time span, 16 lives have been lost; one of those was in Santa Cruz. On April 1, 1946, an older man was drowned while walking along Cowell's Beach when water rose fifteen feet above normal quickly from a large earthquake in the Aleutian Trench off Alaska. Crescent City on the north coast was hit hard by a tsunami from the huge Alaskan earthquake of 1964. Water levels rose 8 feet, and much of the low lying downtown area was inundated as waves washed 2000 feet inland, drowning 11 people and destroying 150 businesses. Water levels in the Santa Cruz harbor surged 11 feet, sinking a dredge and a 38-foot boat.

Following the 2004 Indian Ocean earthquake, concern was expressed about the risk from a tsunami generated in the "trench" in Monterey Bay. Fortunately the gash that cuts through the center of the bay is a submarine canyon, an undersea drainage system, and not the type of trench that generates large earthquakes. A fault does slice through the ocean floor 10 miles offshore and it has the potential to generate magnitude 7 earthquakes. The ocean floor on either side of this fault however, is sliding north and south rather than up and down as needed to produce a tsunami. To the north lies the Cascadia subduction zone, however, perhaps the greatest threat, and that story is yet to come.