

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

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Seacliffs and seawalls



The Cliffs Hotel in Pismo Beach was built too close to the cliff edge and led to a request for a seawall shortly after construction.

Seawalls are one of the most polarizing elements of our human interaction with the coastline. We seem to have a love hate relationship with armor depending upon our perspective on the coast. A former chair of the California Coastal Commission stated many years ago that in the Commission's early years they often received requests of two sorts. One group who claimed that their oceanfront property was as stable as the Rock of Gibraltar, that it hadn't eroded an inch in historic time, and therefore, building their cliff top dream home was perfectly safe. The second group believed that their oceanfront property was the most rapidly eroding in California, that their house was threatened, and that if didn't get a permit to build a seawall that they were going to lose their home. The Commission chair's final observation was that quite frequently these two property owners were next door to each other.

In order to assess the threat of coastal cliff retreat to an existing or future structure, which is what the Coastal Commission wants to know before making any decision on armoring, we first need to determine how fast a cliff is eroding. And perhaps to

state the obvious, wherever we see vertical or near vertical sea cliffs, such as along West Cliff, Opal Cliffs and Depot Hill, you can be pretty certain that these cliffs are actively eroding.

The question, however, isn't simply are they eroding, but how fast and does this pose an immediate risk to a structure? While this may seem straightforward to determine, it often isn't. We need an accurate record of how the position of the cliff edge has changed over time, ideally over 50 to 75 years or more. Because cliff failure tends to be an episodic process, where large blocks fail instantaneously, the longer the time period, the more representative our information will be. There may be no large failures or retreat for 10 or 15 years, but that short period of observations or data may not be typical of long-term conditions. And if you are going to invest your life savings in an oceanfront house, the half-life or the expected lifespan of the property is worth looking into.

The most common sources of information geologists use are historical vertical aerial photographs or survey maps. We need to find the oldest available maps or photographs, determine their scales, and then with the right tools and lots of experience, determine how much retreat has taken place over time. And different consultants looking at the same property may come up with different answers, which confuse everyone. Why different erosion rates for the same cliff? The scale and quality of the photographs or maps, the nature of the cliff edge and whether or not it is covered with vegetation or clearly exposed, the skill of the person conducting the investigation, and perhaps the reputation or ethics of the consultant may also play a role.

The proposal to build the Cliffs Hotel in Pismo Beach is a good example of this problem. When proposed in 1983 the applicant's geological analysis indicated an erosion rate of 3 inches per year for the 75-foot high cliff. A 100-foot setback from the cliff edge was required, which was more than adequate to provide 100 years of stability. The hotel was built and 13 years later the owners returned and asked for approval to build a riprap revetment for protection. A second geologic report was submitted based on 18 months of new data, which now indicated that the erosion rate was not 3 inches per year but 4 feet per year! At this rate the hotel would be threatened in less than 20 years. This is one example of a problem that both cliff top homeowners and the Coastal Commission must deal with on almost a daily basis.