

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

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Coastal cliffs and rolling rocks



This 1978 photograph shows one of the rock falls on Highway One at Waddell Bluffs that made it through the trench that was designed to catch the rocks.

Watch for falling rocks! Do you ever notice that sign just as you cross the bridge over Waddell Creek and start into the stretch of Highway 1 below the overhanging cliffs? I've never been exactly sure what a driver is supposed to do if he or she does in fact see a large falling rock. The death of a passenger in a tow truck in 1976 from a several hundred pound boulder, which rolled down the slope and through the front window, led to a lawsuit and some major changes in how CalTrans dealt with falling rocks along this old sea cliff.

The sections of Highway 1 that cross Devil's Slide, Waddell Bluffs, Big Sur and parts of the Malibu coast were all hacked out of steep and unstable bedrock or talus deposits, and while providing an up close and often exciting view from the family station wagon, also come with some warning signs and hazards.

As described in an earlier column, the 350-foot high cliffs at Waddell formerly plunged into the sea and the rocks that regularly fell, slid and rolled down the cliff came harmlessly to rest along the shoreline as a wide talus slope. This begs the question: are there geologic hazards without people?

The Ocean Shore railroad engineers couldn't figure out how to get tracks safely across the base of the cliffs. Early travelers, whether on horseback, stagecoach, or Stanley Steamer, waited for low tide and then raced across the beach as fast as they

could. From an 1849 manuscript provided by my traveling companion Sandy Lydon, one can get the full picture of what this adventure was like 160 year ago.

Justo Veytia, a Mexican citizen, set out on horseback for San Francisco via the North Coast in November of 1849. Passing the slide at present-day Waddell: “Two days of this expedition were the most difficult. The second day on the road one has to travel along the beach very close to the water and this can only be done when the tide is low. The day we passed the sea was quite choppy. Neither Arana nor I knew the road so when we went onto the beach we figured it was all right because when a very big wave came up, it only reached the horses’ hooves. So we rode on about 300 varas (about 300 yards), experiencing two very bad spots because of some rocks, when the very rough sea began to wash over us up to the pommel of our saddles. We didn’t deliberate in making a decision—to go back was clearly dangerous because the rocks were now under water and we couldn’t see the openings between them, so we resolved to continue forward to look for some pass where we could go up, for the waves had us pinned against a fairly high cliff. We went on walking for about 200 varas until we found a foot path to ascend and as soon as we were safe we undressed completely to put our clothes to dry because the waves had knocked us down three times, horses and all, so we had to dismount and pull them forcibly.”

During construction of Highway 1 along the bluffs in the mid-1940s, substantial cutting and talus removal took place over about a mile of coastline. Fifty to 120 feet of horizontal cutting into the loose hill slope for a roadbed steepened the lower slopes substantially and required the removal of about a million cubic yards of material. Not surprisingly, the rocks continued to fall from the slopes, only now instead of rolling out onto the beach, they rolled towards Highway 1. Winter rainfall, as well as wetting and drying, and heating and cooling, all weakened the heavily fractured mudstone and siltstone cliffs.

The California Department of Highways realized that rocks would continue to fall and be a hazard to the 280,000 vehicles they originally estimated would traverse this section of roadway each year on their way up or down the coast. Both a barrier wall and a trench were originally considered, but they felt that a barrier wall would be costly, aesthetically unacceptable and only to be used as a last resort. A trench to catch the rocks could be cleaned out periodically, or as required, with little or no inconvenience to motorists. Would it work? The rest of the story in two weeks.