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

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El Niño in the rearview mirror

Collapse of an arch West Cliff Drive over 25 years.

I often ask an audience- what's the difference between climate and weather? And the short answer is climate is what we predict and weather is what we get. This past winter is a good example of the difference.

One of the largest El Niño events in recent history was predicted for this winter, based on the very large and warm body of ocean water moving towards South America from the western Pacific during summer and fall. It's the size and temperature of this water mass that usually provides a reasonably good prognosis of how large an El Niño we can expect. More warm ocean water leads to more evaporation and, other things being equal (which they rarely are), more precipitation.

Last fall, all indications were that this winter's El Niño was going to be really big. After four years of drought, all the state's water providers, the Central Valley farmers, and most everybody else in California who uses water welcomed this as good news.

On the precipitation side, things did improve, snow actually fell in the Sierra Nevada, although the last survey at the end of March showed snow water content already below average.

The early winter expectation was that southern California had a higher probability of getting more than normal rainfall, northern California had a lower probability, and the central part of the state (us) was somewhere in between.

It didn't turn out that way, however. It's that climate-weather thing. The northern part of the state got the rain, and the big reservoirs went from close to empty to nearly full. As of May 9, Lake Shasta was at 93% of capacity, Lake Oroville was at 96%, Folsom Lake 86%, and Trinity Lake 61%. On average these reservoirs are 84% full. These are all big reservoirs, so this is great news for the warm months ahead.

Central California reservoirs didn't get as much runoff, but overall have a lot more water than last year at this time, averaging 50% of total capacity. Santa Cruz this winter received two inches more rainfall than our average. Loch Lomond, the city water department is happy to report, is at 99.8% of capacity. Can't ask for more than that.

Southern California, however, got the short end of the stick, and received just over 50% of normal rainfall. El Niño didn't really deliver rain to the Southland, and their two major reservoirs, which don't compare in size to those in the north, are at just 46% of capacity.

The entire state's coastline, however, seemed to get pretty well hammered by elevated ocean levels and storm waves, week after week through the entire winter. The warmer El Niño water that moved north along the California coast from the equatorial region raised sea level by as much as 12 inches at times this past winter.

A higher sea level moves the position of the shoreline landward, and combined with large storm waves, can lead to local flooding, severe beach erosion, and also accelerated cliff and bluff erosion. All of these impacted the California coast this past winter, in fact impacted Santa Cruz, and these conditions are giving us a glimpse of what the future may hold.

The overall wave energy this past winter was greater along the central coast than any other winter with good wave data for the past 18 years. I heard from a number of people about beach erosion not seen in over 30 years, and also the collapse of iconic sea stacks that had been observed for years.

The attached photographs follow the changes in one somewhat unique rock outcrop on the beach near the end of Almar Avenue below West Cliff. Over the

course of 25 years, it went from an arch, to a sea stack, to just a stub and a mere shadow of its former stature.