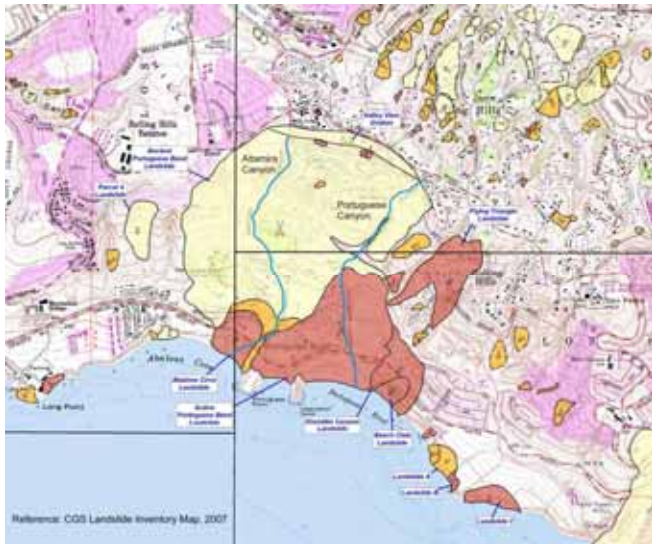


# Marine Sanctuary Restoration Project

## Mitigating the Portuguese Bend Landslide



Rancho Palos Verdes, in California, has the distinction of having one of the largest, if not the largest, landslides in the contiguous 48 states.

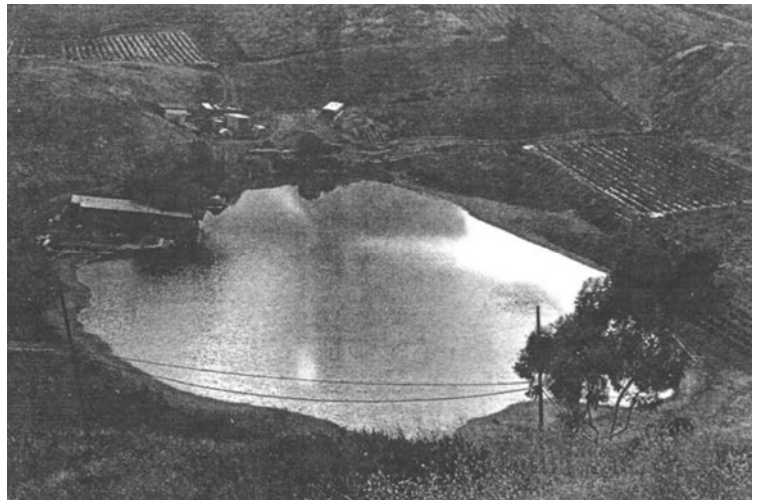
The Portuguese Bend landslide has been active and a problem since 1956. It has been attributed to the increasing groundwater levels from rain, irrigation, installation of pools and septic tanks from housing developments in the area as far back as the early 1950s, as well as the attempted construction of the extension of Crenshaw Blvd. Studies have also shown that the slide is accelerated by the continual coastal erosion from wave action washing away the toe of the slide.

Therefore the ultimate solution to the Portuguese Bend Landslide is a two part solution, remove the ground and surface water from the area and the elimination of the erosion of the toe of the slide.

### Ground and Surface Water

Over the years shallow wells have been drilled all through the area of the slide. Movement of the slide continues to destroy the wells so that out of 29 wells drilled only four are presently active. As a result the wells have not had a significant impact on the slide.

Historically at one time, before the slide started, there was even a lake in the area where the slide is most active, Lake Ishibashi. This lake was used by the local farmers to irrigate their crops. The lake was filled in to remove the water but the area still remains the natural collection point for groundwater from Portuguese and Paintbrush Canyons. The third source of groundwater in the area is from Klondike Canyon.



A more realistic solution to slowing the slide is not to initially drill more shallow wells in the active slide area but up slope with deep wells to catch the water before it enters the most active areas. New horizontal drilling technologies are available that could increase the flow of water by acting like a French drain. The hardscape water from above the slide needs to be diverted. Once the slide is slowed wells could then be drilled in the location of the lake to catch any residual groundwater. Additionally catch basins need to be constructed in the three canyons to catch the surface water before it enters the slide area. Finally, homes above the slide on septic tanks need to be moved to a sewer system.

## Slide Toe Erosion



Several years ago an idea was developed to construct a breakwater across the cove to mitigate toe erosion and the damage that it caused to surrounding beaches. This concept was dropped as too costly and added to the damage of the surrounding habitat. A rock revetment was tried and was soon washed away.

An alternative to the slide toe erosion is the installation of an artificial reef and the restoration of the natural ecosystem of the area by reestablishing the kelp forests that once flourished along the coast. Prior to 1970 dense kelp beds helped to weaken currents and

waves, minimizing the erosion along the beaches.

There are several reasons, including pollution, why the kelp has disappeared especially in the Portuguese Bend area. Instead of tree-like roots that extend into the seabed, kelp has "anchors" called holdfasts that grip onto rocky substrates. Because of the slide the seabed in the cove is sand with no place for the kelp to grip.

But more important to the survival of the kelp was the sea otter. The sea otter played a critical role in maintaining a stable equilibrium in the ecosystem. The otter preyed on the sea urchin which eats the kelp. With the disappearance of the otter due to fur hunters, all but for a small pocket in Northern California, the sea urchin grazed uncontrolled on the kelp and had reached population densities large enough to destroy the kelp forests at the rate of 30 feet per month. It wasn't until 1977 that the sea otter was listed as an endangered species. In Southern California where the otter competed with humans for crabs and abalone, a law was passed that required the capture and deportation of all sea otters found between Point Conception and the Mexican border. Up until recently this policy has been in effect for the past 24 years.



What has this got to do with the Portuguese Bend landslide? By re-establishing the kelp forest in conjunction with the artificial reef we can slow or eliminate the erosion of the toe of the slide as well as restore the natural ecosystem of the area. The reef optimizes the biological benefits of the kelp forest to ensure that the marine environment, tide pools and marine organisms are protected, restored, enhanced and sustained.

Of course the ultimate solution to stop or slow the slide and the resultant buildup and pressure on the toe is to remove the water that is lubricating the bentonite layer the ultimate cause of the slide. Most of the slide motion, 9 feet a year, is due to the groundwater from irrigation, installation

of pools and septic tanks from housing developments in the area. This enables the slide pushing to the toe and aggravates the erosion on the toe.

By restoring the ecosystem we would be returning the area to its original state and preserving the vital undersea habitat for future generations. More important is that by establishing a new colony of sea otters we can prevent the loss of the species if the Northern California colony is decimated by disease or other catastrophes.

Kelp forests are home to more than 800 species. One-fourth of California marine organisms depend on the kelp forests for some part of their life cycle. Marine life, including birds and mammals, may retreat to kelp during storms or high-energy regimes because the kelp helps to weaken currents and waves. With the return of the kelp smaller fish will once again seek safety from predators which in turn attracts larger fish. The marine life also provides a food source for birds.

Once completed the Portuguese Bend tideland and marine sanctuary could become part of the Forrester Preserve and conservation area which would include Abalone Cove.

## **Financing**

Of course funding is the issue. This will take multi-millions of dollars over many years to slow the slide. But there is a solution. California is in a perpetual drought. Billions of dollars are being spent on water and conservation programs. Presently there is a \$24 billion proposal to dig two tunnels under the Delta to save the snail darter and bring water to Southern California. San Diego is bringing online a water desalination plant at a cost of \$1 billion.

The dewatering of the slide can be sold as a water conservation program with the water pumped out of the slide area piped to the Trump National Golf Course and to the Terranea Resort. Both facilities are within a mile of the slide area and use thousands of gallons of water each year for their golf courses and landscape. This will benefit both facilities, saving hundreds of thousands of dollars on water bills and the State on the need to provide the water.

Reestablishing the kelp forest and creating a marine sanctuary at Portuguese Bend enhances the potential support in pursuit of adequate funding to accomplish the project. This is a natural as it is a win-win for everybody, the City, the animal rights organizations, "Save the Coastline", progressives and naturalists in both State and Federal agencies.

A final source of funding is the Los Angeles County Sanitation District. The District is spending equivalent of the City in maintaining the sewer line through the slide area.