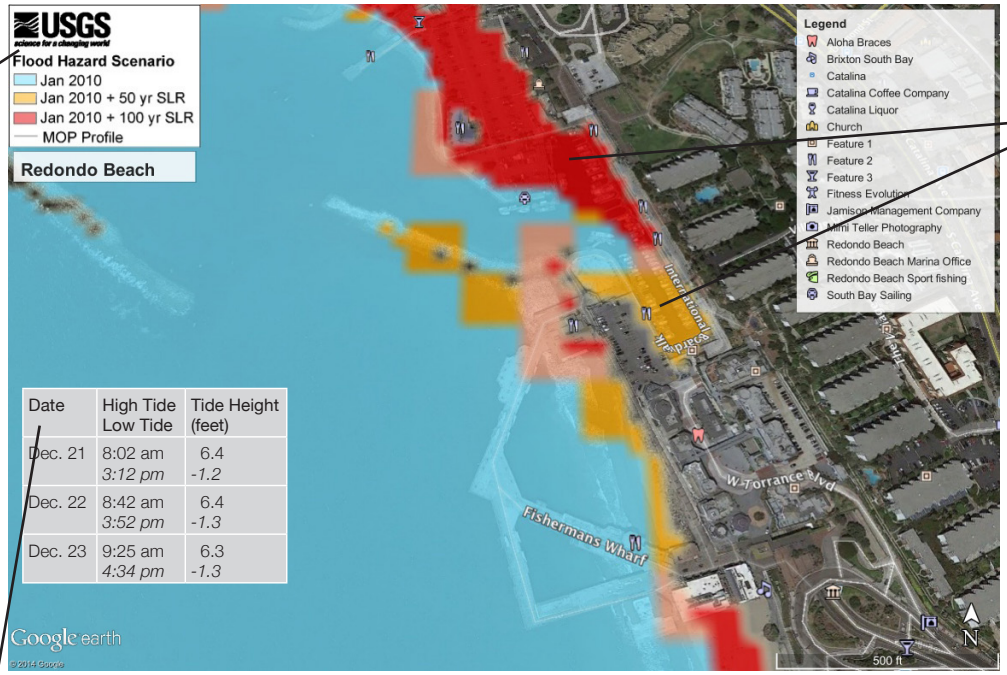
How to Read These Flood Hazard Maps

- The United States Geological Survey (USGS) has developed the Coastal Storms Modeling System (CoSMoS), which projects coastal flooding and erosion from coastal storms, in combination with rising seas.
- CoSMoS recreated, or "hindcast," a 2010 winter storm that occurred along the Southern California coast. It then used this to forecast, or project, the impacts of a similar storm with 0.5 meters (1.6 feet) and 1.4 meters (4.6 feet)
- Based on this information, coastal planners and managers can begin to understand which areas of their community are most vulnerable and need to be managed first.
- The "Management Needs" box along the bottom of the flood map indicates the areas of highest concern for coastal municipalities and where King Tides pictures are most needed.

Flood projections are overlayed on a Google-based image of the coastline. The legend indicates the color scheme utilized to delineate the different projections.

- Blue indicates the extent of flooding from the January 2010 storm;
- Yellow indicates where a similar storm with 1.6 feet of sea level rise (~50 years in the future) is projected to occur;
- Red indicates where a similar storm with 4.6 feet of sea level rise (~100 years in the future) is projected to occur.

Areas in yellow are projected to be impacted sooner (e.g. ~2050) than the areas in red (e.g.~2100).



Date	High Tide Low Tide	Tide Height (feet)
Dec. 21	8:02 am *3:12 pm*	6.4 *-1.2*
Dec. 22	8:42 am *3:52 pm*	6.4 *-1.3*
Dec. 23	9:25 am *4:34 pm*	6.3 *-1.3*

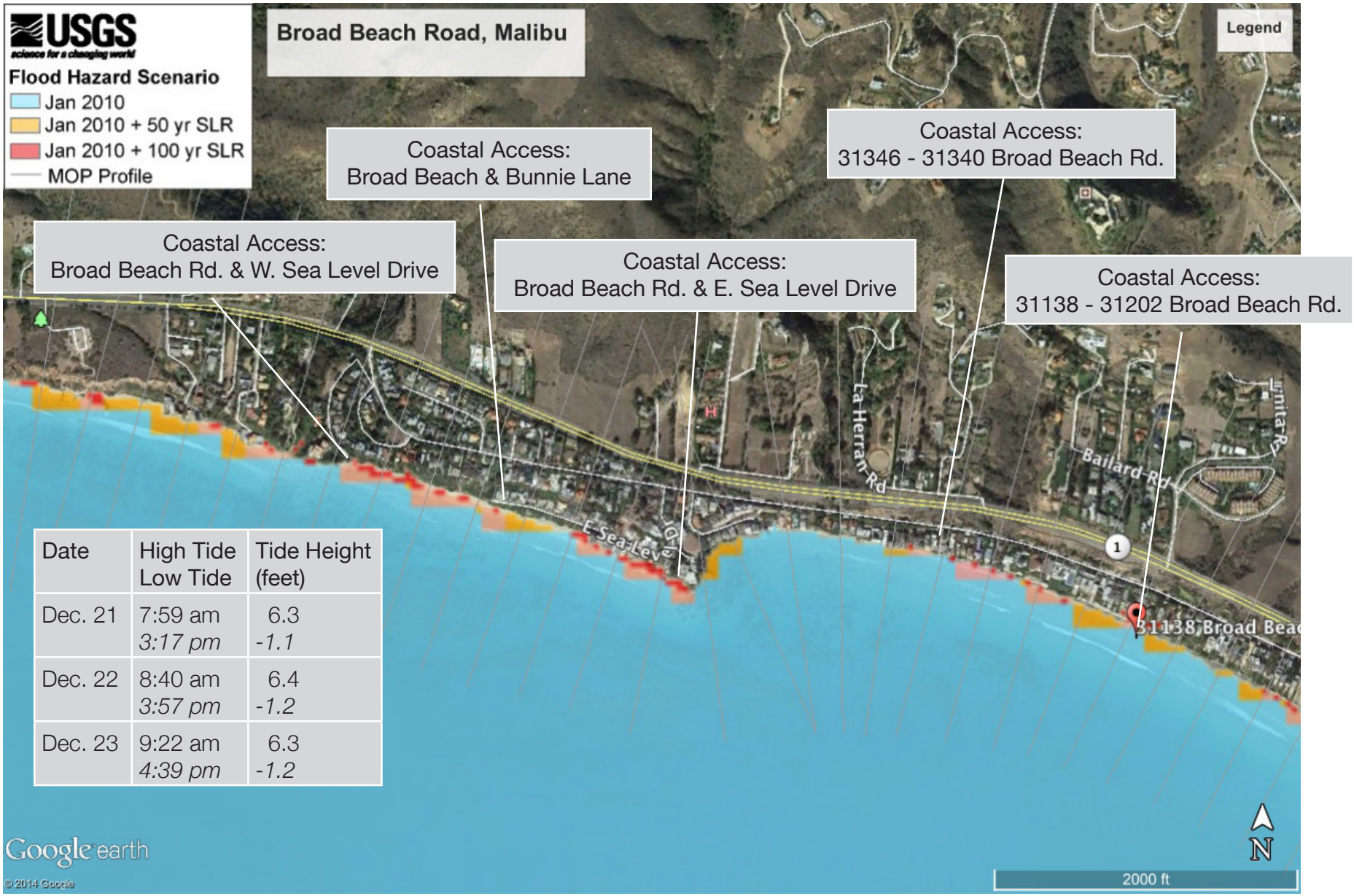
In the instance of Redondo Beach, the area near the south side of the International Boardwalk is projected to be vulnerable to flooding from a coastal storm by ~2050. This is compared to the area north, which is projected to be vulnerable later in the century.

This information can be determined from both looking at the blue, yellow and red color overlays as well as reading the "Management Needs" box.

Management Need:

- The area north of International Boardwalk currently floods under high tides and major storms. The City of Redondo Beach has requested images from this area during King Tide and major storm events. They hope to use these images to help communicate their current vulnerability to elected officials and city residents and to provide a visual representation of what they might anticipate under rising seas.

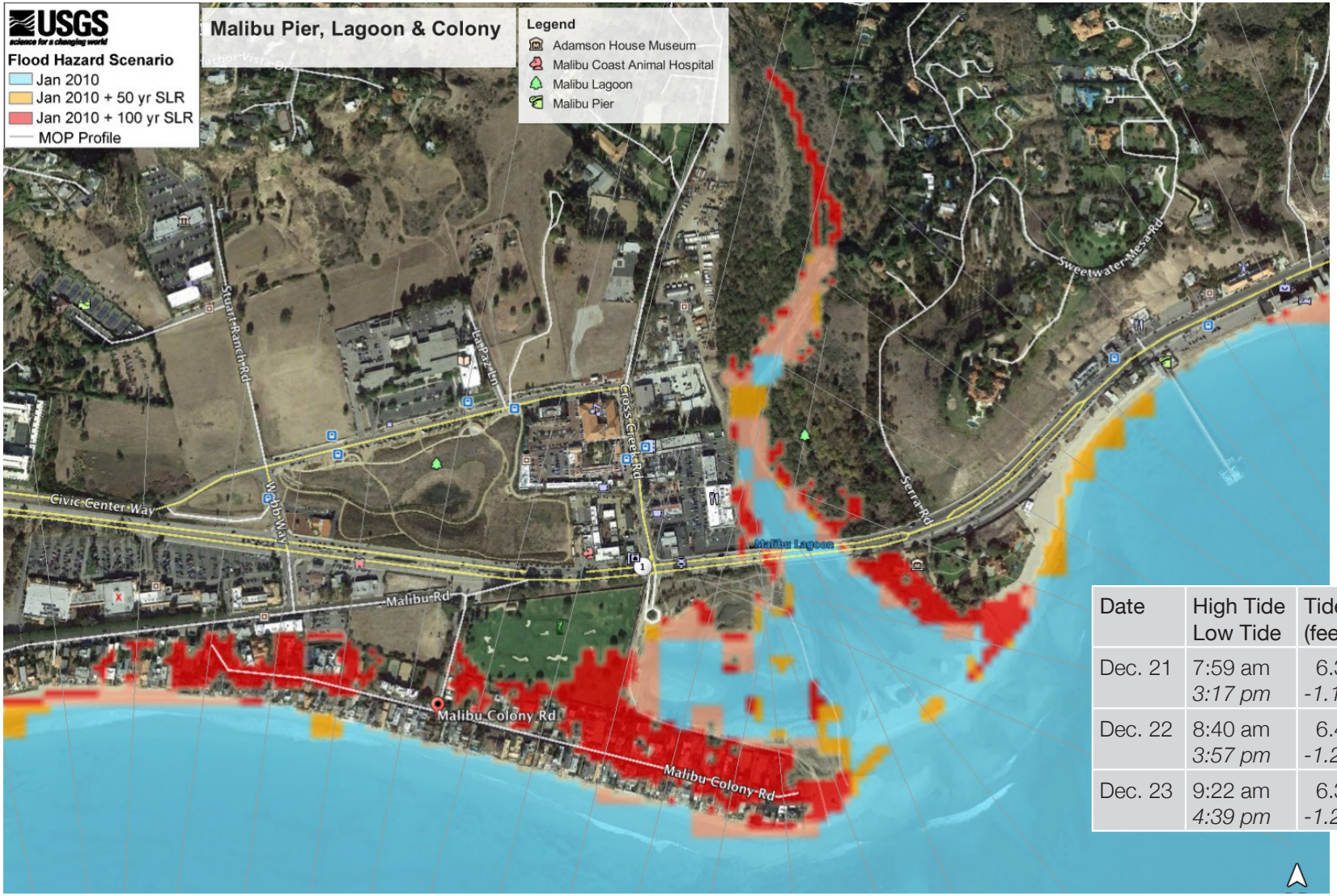
King Tides are the highest high tides of the year. For 2014, they will occur on Dec. 21, 22, and 23. This box provides the time of the highest high tide and the lowest low tide. It also provides the tide height - which is a measure of how much higher, or lower, the sea level is compared to current sea level. When shooting King Tides images, it is best to be at the location at the time of the highest high tide in order to capture the most dramatic images. If possible, it is also great to capture the lowest low tide in order to provide a comparison between the tides. But, above all, it is most important to BE SAFE!



Date	High Tide Low Tide	Tide Height (feet)
Dec. 21	7:59 am *3:17 pm*	6.3 *-1.1*
Dec. 22	8:40 am *3:57 pm*	6.4 *-1.2*
Dec. 23	9:22 am *4:39 pm*	6.3 *-1.2*

Management Need:

- Homes along Malibu's Broad Beach Road are vulnerable to current high tides and storms. Some homes are protected by coastal armoring such as sea walls, revetments and cobble; others are only protected by eroding sandy beaches. King Tides images will help homeowners better understand their future vulnerability and will help local and elected officials plan accordingly.
- Please note the coastal access points included on the map above.



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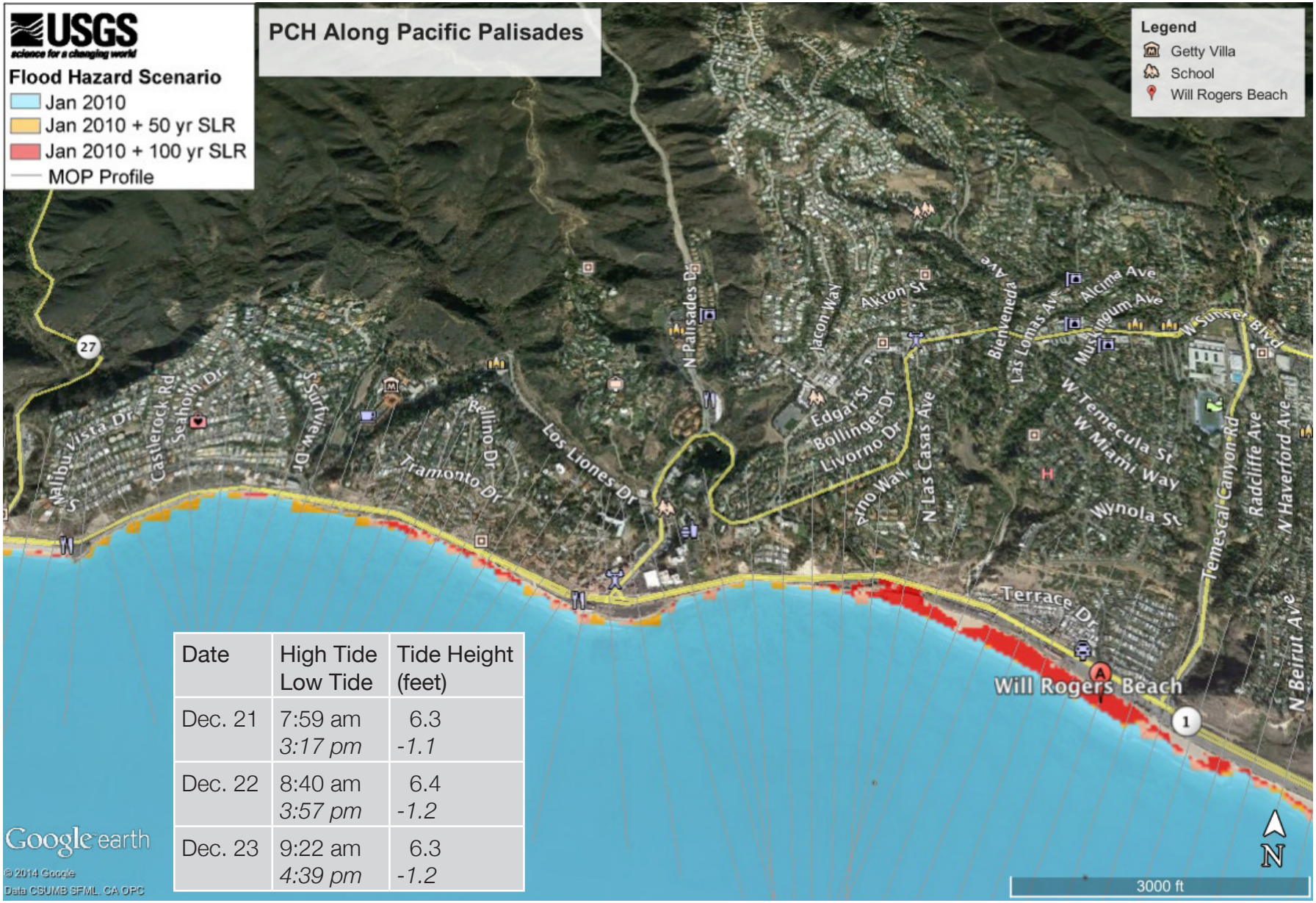
Management Need:

- Malibu Pier is currently vulnerable to storm-related impacts; it was recently damaged by Hurricane Marie this past Sep. 2014. The parking lot near the pier also experiences flooding during high tides in combination with storms. The model does not demonstrate high storm hazard, therefore images that demonstrate the high tide water line will help the model developers refine their model.
- Malibu Lagoon is highly vulnerable to sea level rise. King Tides images will help restoration ecologist and Malibu planners better understand the lagoon's vulnerability.
- Malibu Colony is also vulnerable and contains many expensive homes. Visualizing the impacts of high tides as a proxy for sea level rise will help homeowners understand their vulnerability.



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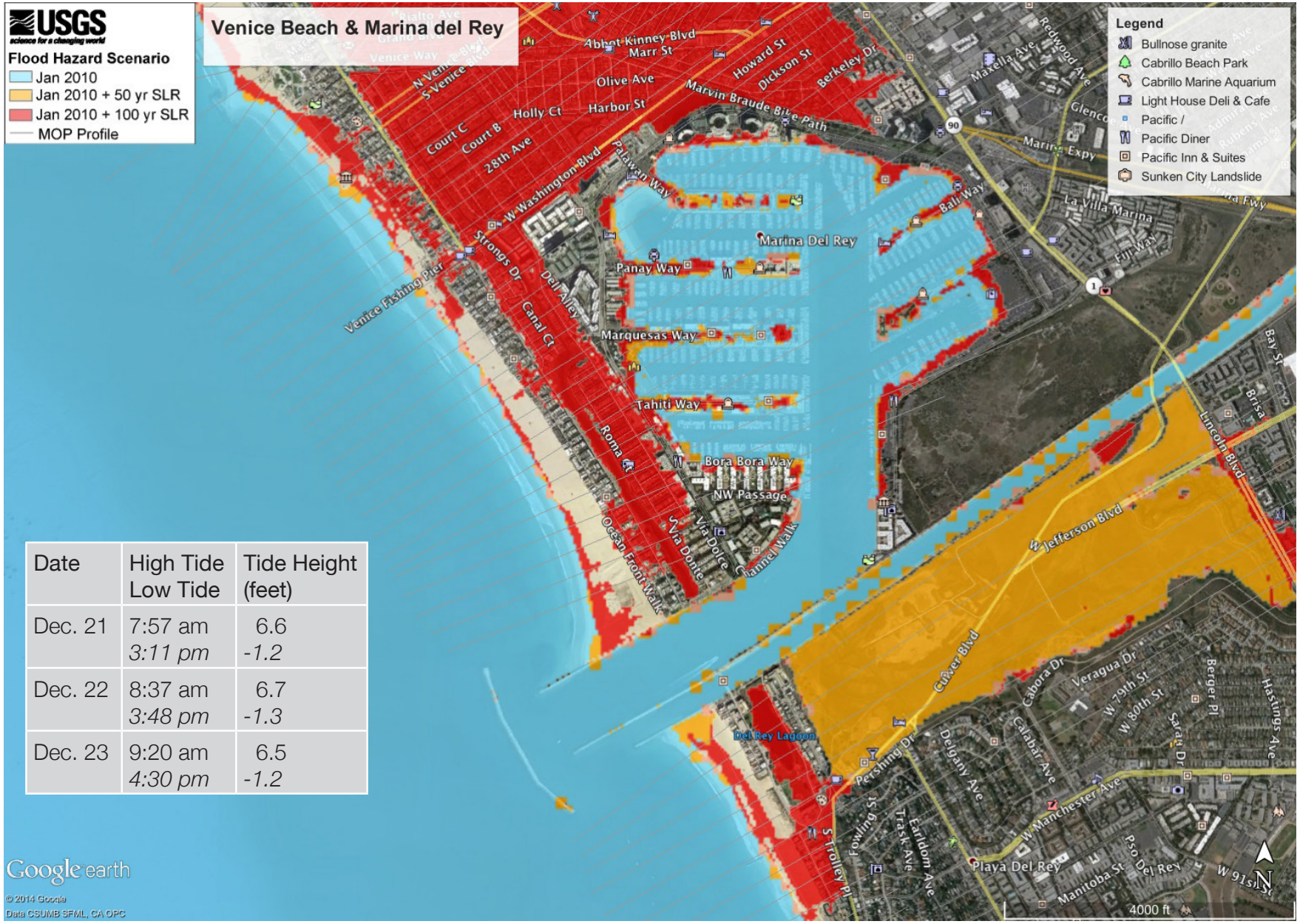
Management Need:

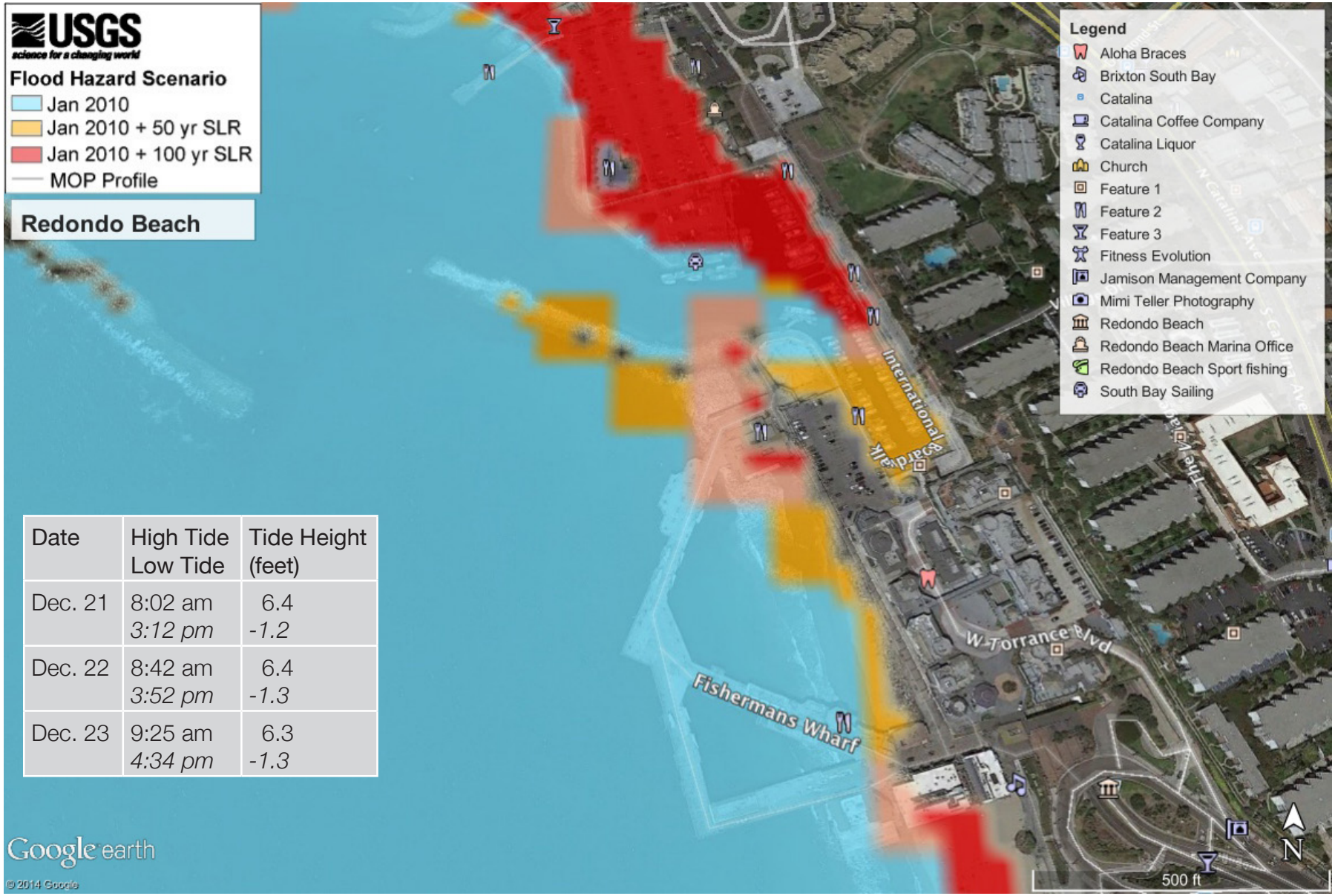
- PCH is the major access road for Pacific Palisades residents and is a critical emergency route, but it is already vulnerable to flooding from high tides and coastal storms. Visualizing how higher tides might impact this important access road will help city officials and emergency managers plan appropriately for the future.



Date	High Tide Low Tide	Tide Height (feet)
Dec. 21	7:57 am *3:11 pm*	6.6 *-1.2*
Dec. 22	8:37 am *3:48 pm*	6.7 *-1.3*
Dec. 23	9:20 am *4:30 pm*	6.5 *-1.2*

Management Need:

- Venice Beach and Marina del Rey are projected to be sites of considerable flooding during coastal storms as sea levels rise. King Tides images will help local planners, elected officials and community members envision future flooding from coastal storms and high tides.



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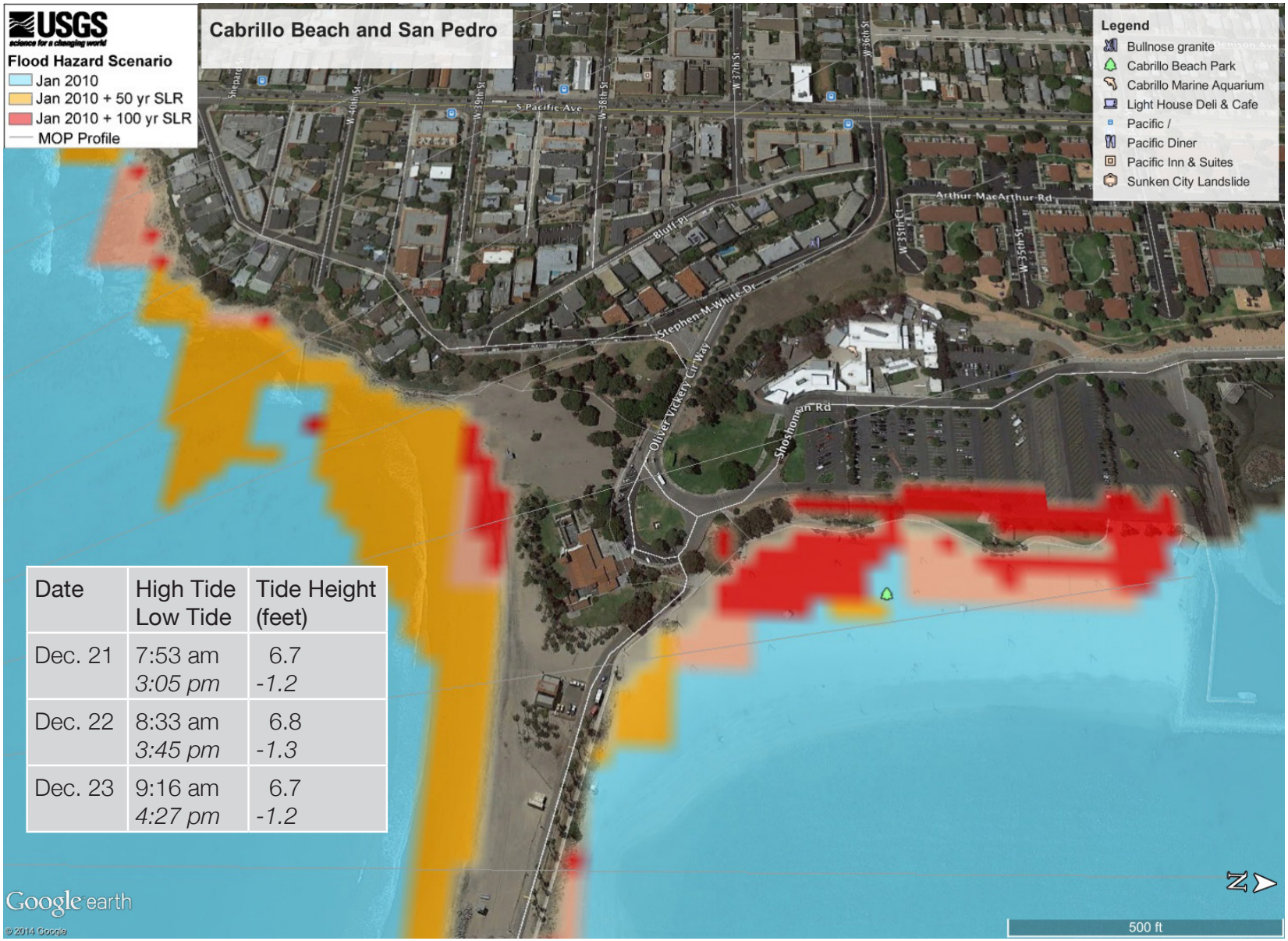
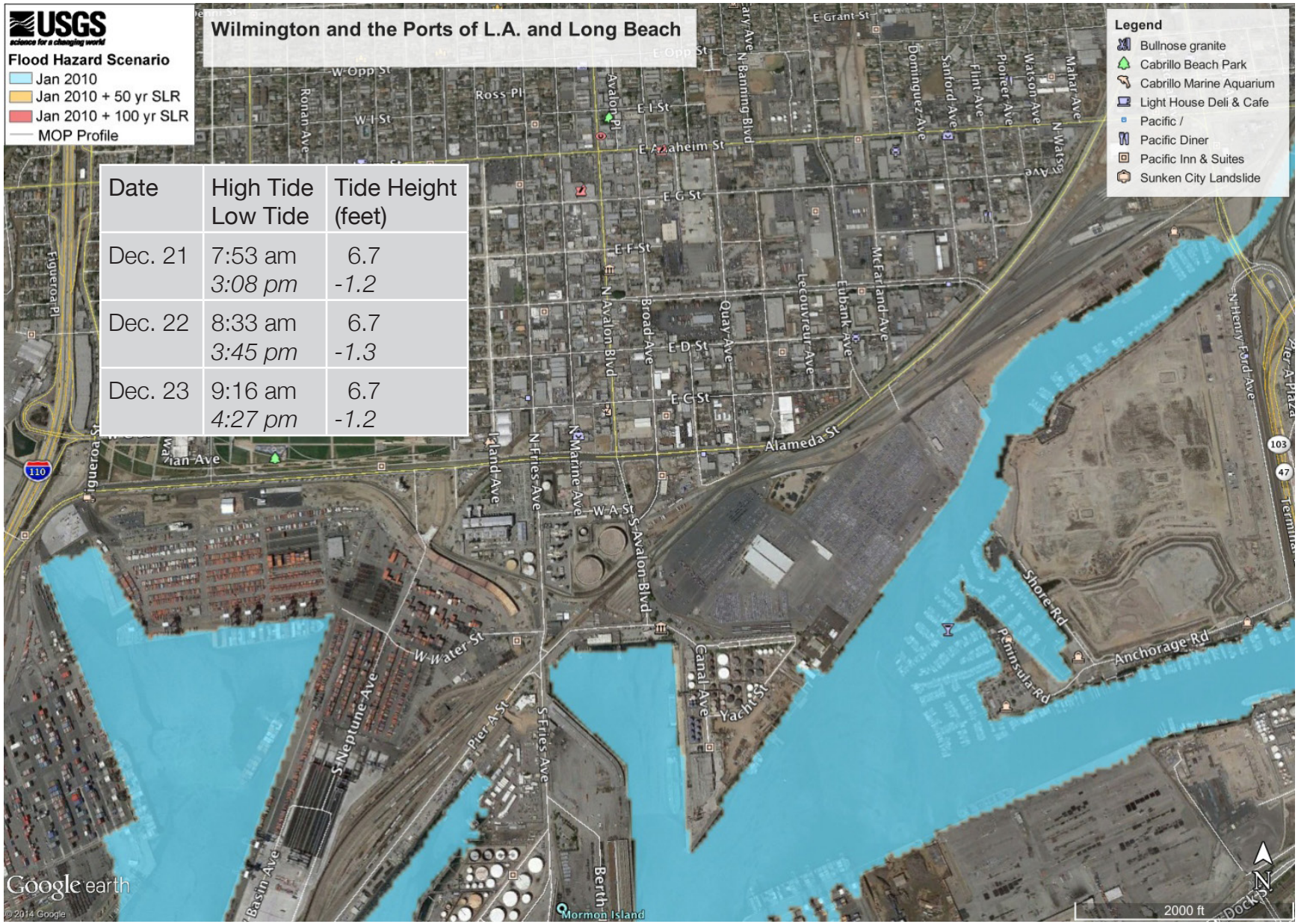


Date	High Tide Low Tide	Tide Height (feet)
Dec. 21	7:53 am *3:05 pm*	6.7 *-1.2*
Dec. 22	8:33 am *3:45 pm*	6.8 *-1.3*
Dec. 23	9:16 am *4:27 pm*	6.7 *-1.2*

Management Need:

- Cabrillo Beach is currently vulnerable to impacts from high tides and major storms. Images along the beach would help LA County Beaches and Harbor in planning beach management under future conditions.
- Homes on Pt. Fermin (on the other side of Cabrillo beach) are built above a heavily armored coast. Images that demonstrate how high the water levels reach will provide valuable information in determining the vulnerability of the rock revetment supporting those homes.



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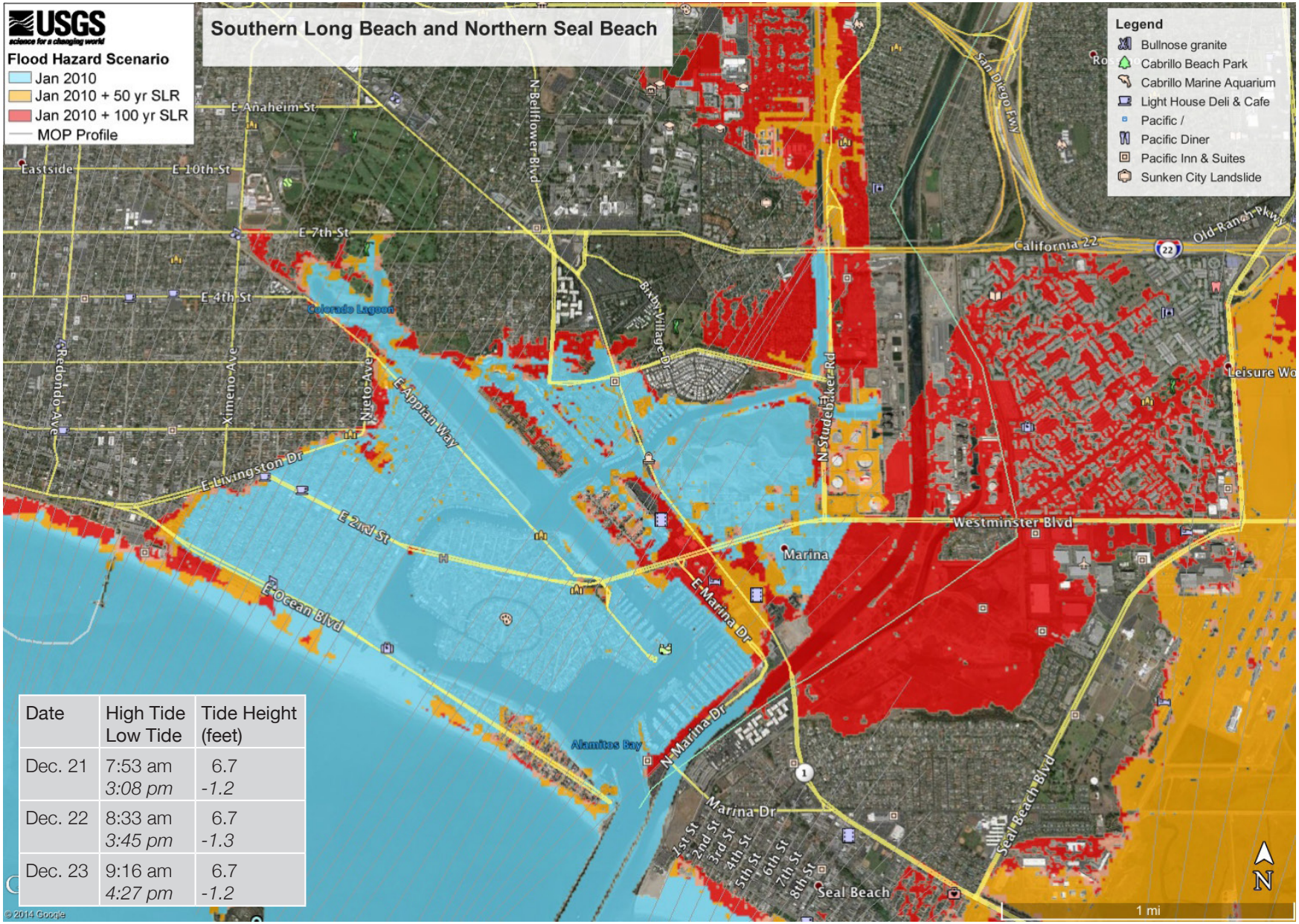
Dec. 22	8:33 am *3:45 pm*	6.7 *-1.3*
Dec. 23	9:16 am *4:27 pm*	6.7 *-1.2*

Management Need:

- Roads along the coast in Wilmington are known to flood during high tides and major storms. This version of the Coastal Storms Modeling System, however, does not project increased risk of flooding from coastal storms with rising sea level. King Tides images would help groundtruth model results and provide valuable information to the model developers to help them refine their models in the next round.



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Management Need:

- Alamitos Bay and northern Seal Beach are projected to be sites of considerable flooding during coastal storms as sea levels rise. King Tides images would help local planners, elected officials and community members envision future flooding from coastal storms and high tides.