



Partnering Transportation and Coastal Zone Management Agencies: The California Example of Success

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CALIFORNIA
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California's Federally-certified Coastal Zone Management Act (CMZA) Program



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Coastal
Conservancy



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CONSERVATION & DEVELOPMENT
COMMISSION



Local Coastal Program Projects



Ventura Highway 101 HOV Project

Collaboration between the California Coastal Commission, Caltrans, and local governments resulted in a significant multi-modal project





Caltrans and Federal Highway Administration



California Department of Transportation





Caltrans & California Coastal Commission

History of Coordination & Partnership

History of Collaboration



Devil's Slide, San Mateo County

Two new tunnels at "Devil's Slide" on State Route 1 in San Mateo County, completed in 2014 to bypass an unstable segment vulnerable to erosion and rockslides



History of Collaboration



Devil's Slide, San Mateo County

State Route 1 at "Devil's Slide"
repurposed as new part of the
California Coastal Trail



I-5 San Elijo Lagoon Highway Bridge, San Diego County
Along North Coast San Diego, the Interstate 5 HOV project incorporated lengthened bridges to promote lagoon restoration; construction initiated in 2017



Pedestrian Bridge, San Elijo Lagoon, San Diego County
A new north-south suspended bike and pedestrian bridge west of the highway and above the San Elijo Lagoon as part of the I-5 San Elijo Highway project

Climate Change in California: Wildfires



Waddell Creek at State Route 1
Santa Cruz County
CZU Complex Fire, August 2020



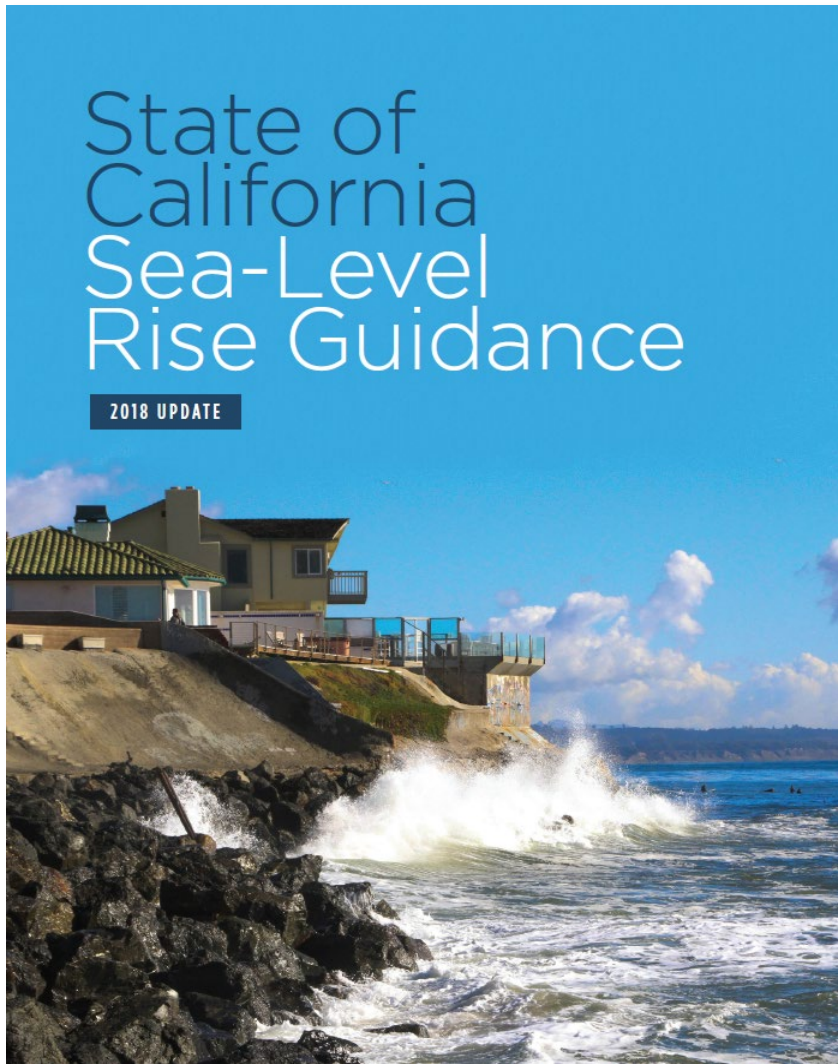
North of Meyers Grade Rd, State Route 1
Sonoma County
LNU Complex Fire, August 2020

Transportation System in the Coastal Zone



San Francisco Bay Bridge Approach
Winter high tide

California State Guidance on Sea Level Rise



CALIFORNIA COASTAL COMMISSION SEA LEVEL RISE POLICY GUIDANCE

*Interpretive Guidelines for Addressing
Sea Level Rise in Local Coastal Programs
and Coastal Development Permits*



Original Guidance unanimously adopted – August 12, 2015
Science Update unanimously adopted – November 7, 2018



Policy guidance for consideration of SLR in
repairing and building critical infrastructure, including the transportation system

Draft Sea Level Rise Guidance

Critical Infrastructure at Risk Sea Level Rise Planning Guidance for California's Coastal Zone

Public Review Draft
August 2021



California Coastal Commission



Guidance on Incorporating Sea Level Rise

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Guidance on Incorporating Sea Level Rise

For use in the planning and development of
Project Initiation Documents

Prepared by the Caltrans Climate Change Workgroup, and the HQ Divisions of
Transportation Planning, Design, and Environmental Analysis

May 16, 2011

This guidance is intended for use by Caltrans Planning staff and Project Development Teams to determine whether and how to incorporate sea level rise concerns into the programming and design of Caltrans projects. Because of the evolving nature of climate change science and modeling, this guidance is subject to revision as additional information becomes available.

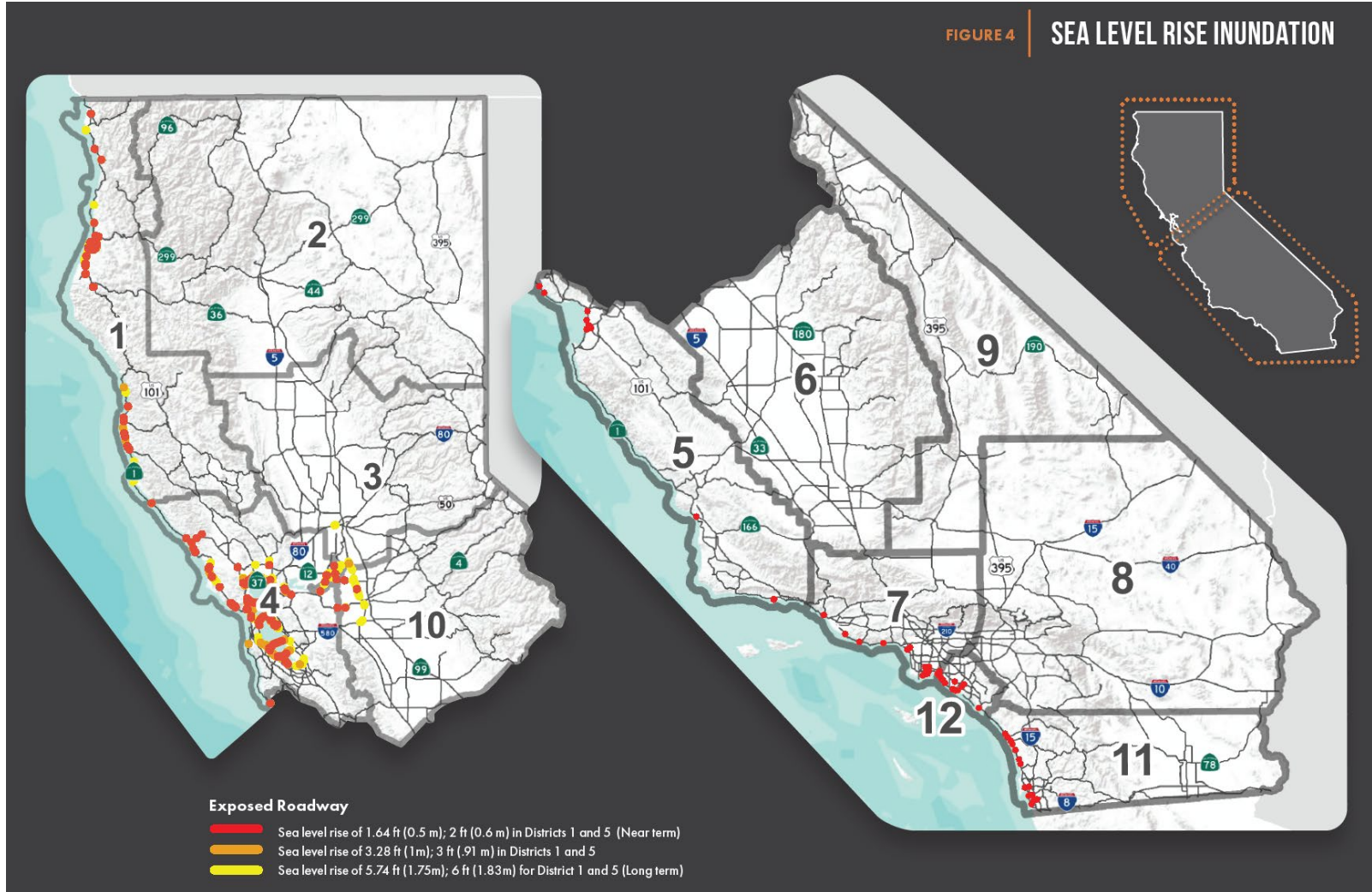


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The Coastal Commission's draft guidance (left), released for public review in August 2021, focuses on water and transportation infrastructure. Similarly, Caltrans is updating Department guidance (right) on sea level rise.

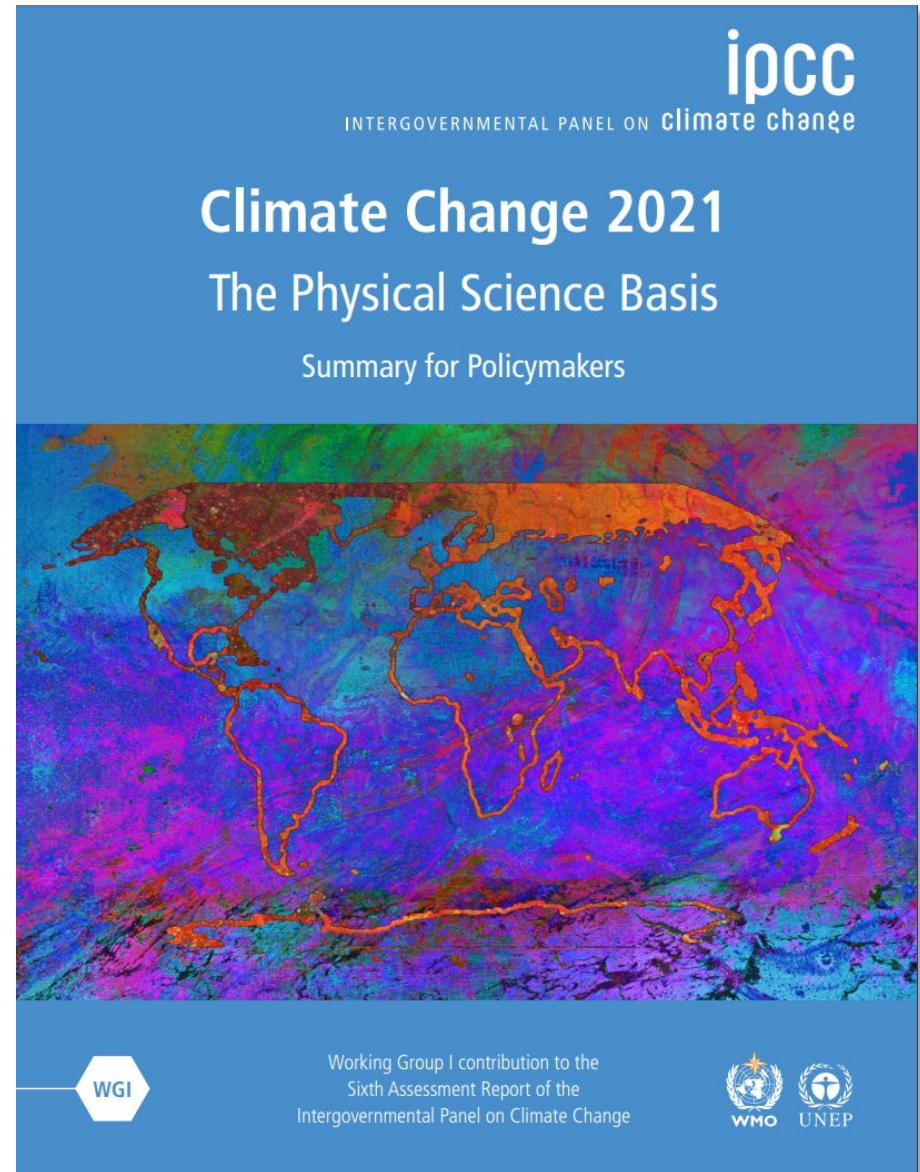
Statewide Vulnerability to Sea Level Rise



Caltrans District Vulnerability Assessments (2019) show vulnerability to sea level rise, storm surge, and cliff erosion; highways are already exposed to flooding and erosion—and as seas rise, the number of vulnerable roadway segments will increase

Best Available Science

"Many changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level."





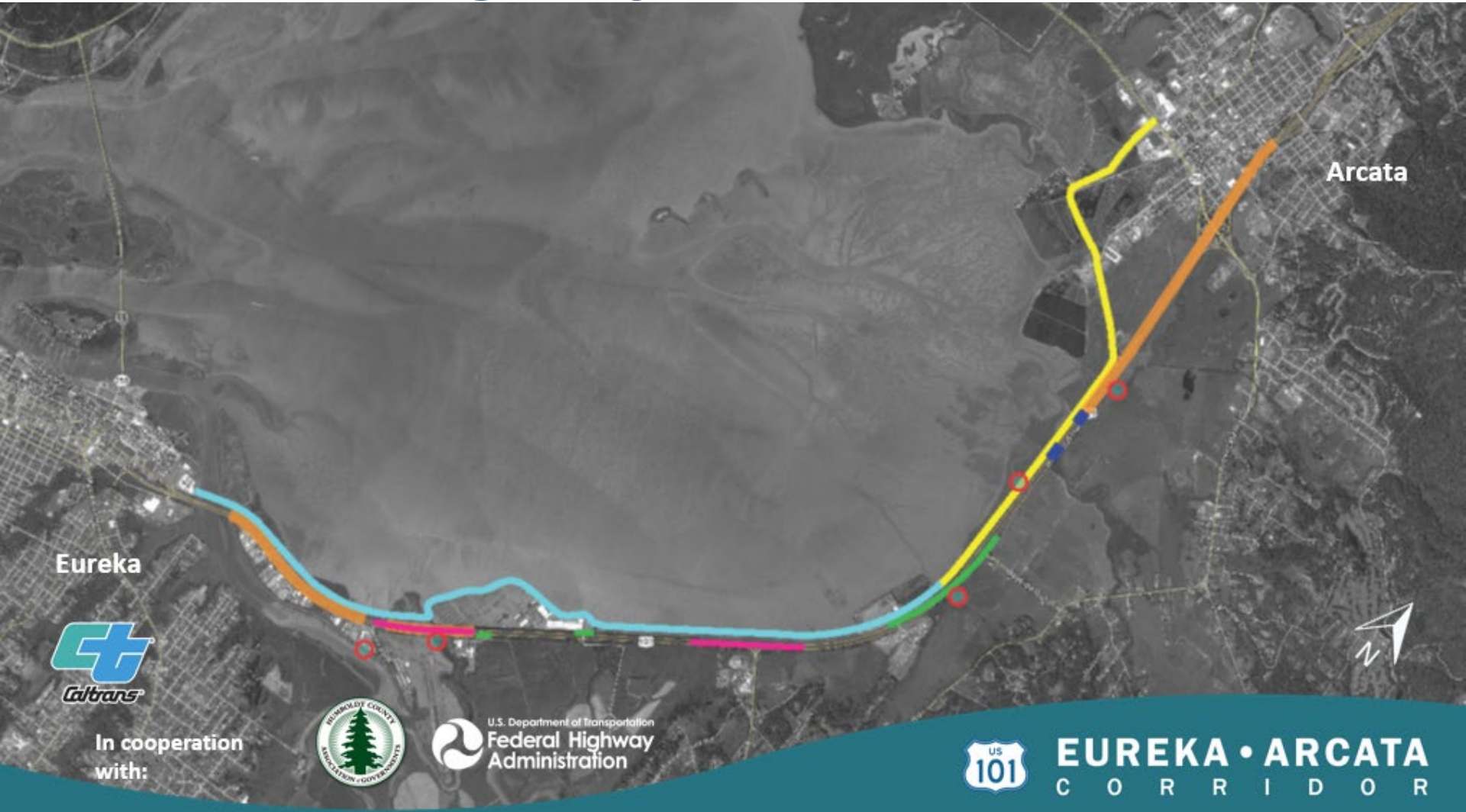
5 Key Insights from California

Key Insight 1: Corridor Approach is Essential



Portions of the Eureka Arcata Highway 101 Corridor during high tide January 2021
North Bracut (left) and Jacoby Creek (right)

Case Study: Eureka Arcata Highway 101 Corridor



Eureka

Arcata



In cooperation
with:



U.S. Department of Transportation
Federal Highway
Administration



EUREKA • ARCATA
CORRIDOR



Case Study: Pacific Coast Highway Oxnard – Santa Monica Corridor



Storm damage to the Pacific Coast Highway shoulder at Sycamore Cove day use beach at Point Mugu State Park in the Santa Monica Mountains

Case Study: Pacific Coast Highway Oxnard – Santa Monica Corridor

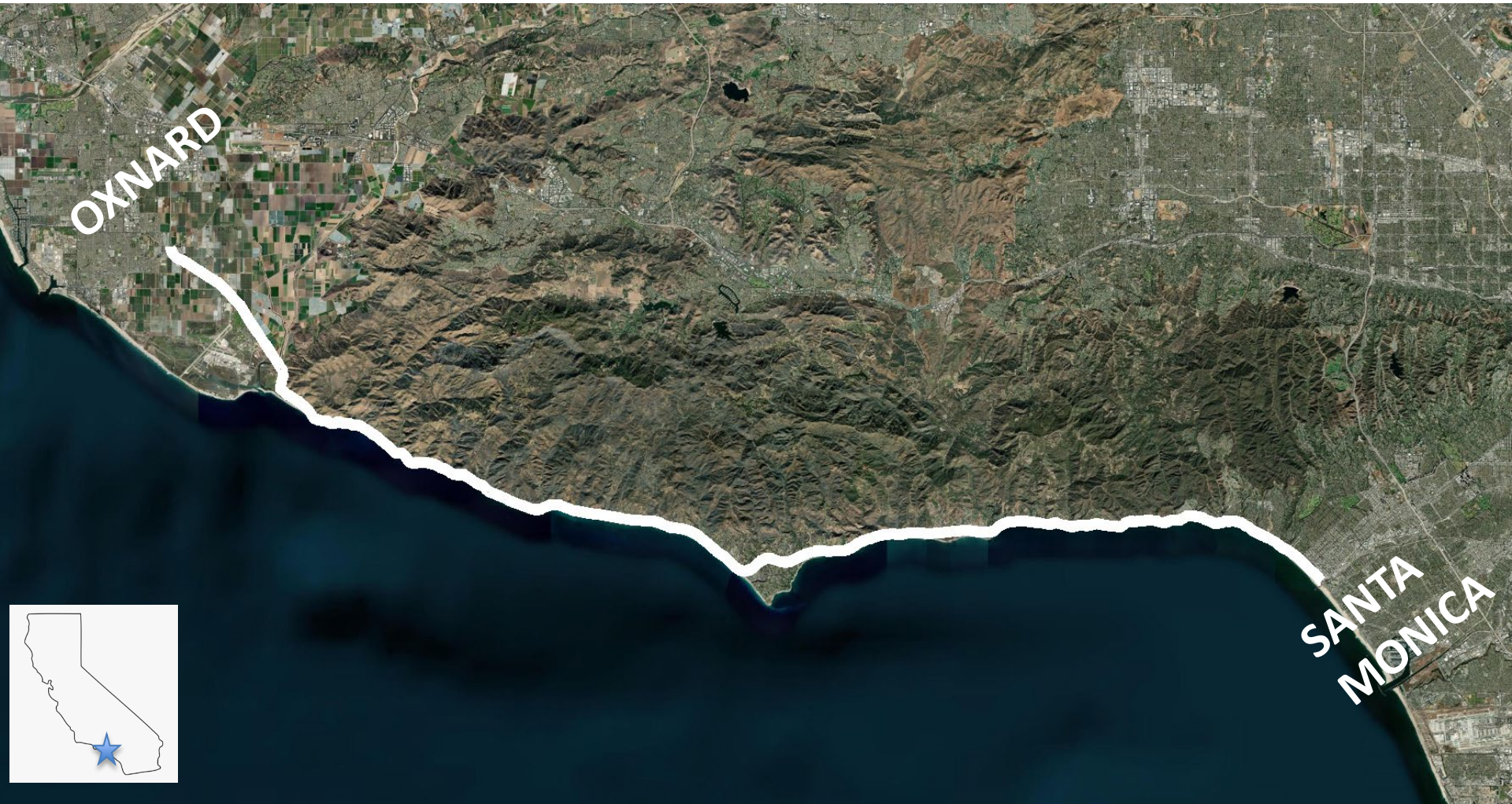


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Pacific Coast Highway along Sycamore Cove, Ventura County

Case Study: Pacific Coast Highway Oxnard – Santa Monica Corridor Plan



The geographic scope of the Corridor Plan



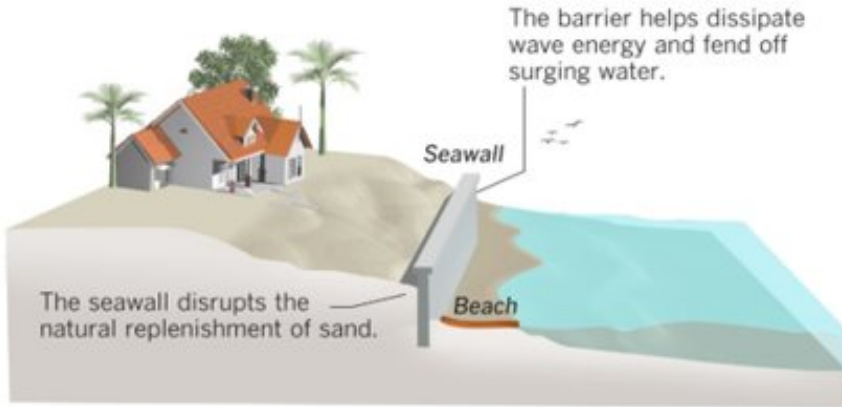
Key Insight 2: Avoid Coastal Squeeze



Torrey Pines State Beach
San Diego

Key Insight 2: Avoid Coastal Squeeze

Shoreline with seawall



Gradual loss of beach



Shoreline without seawall

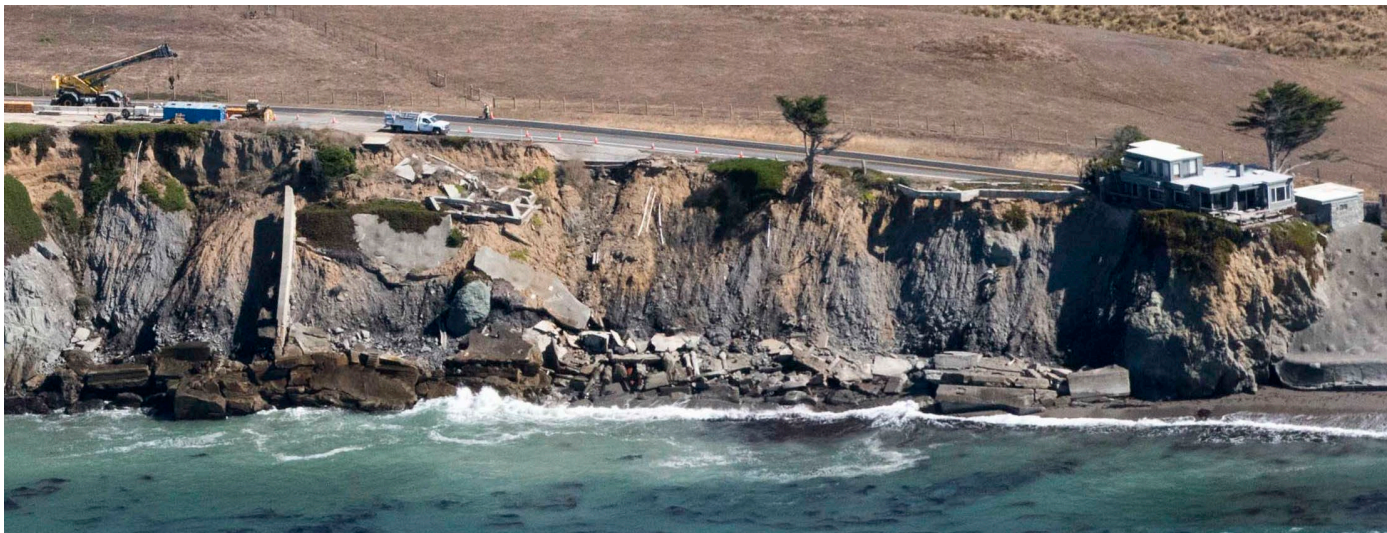


Case Study: Gleason Beach Highway Realignment



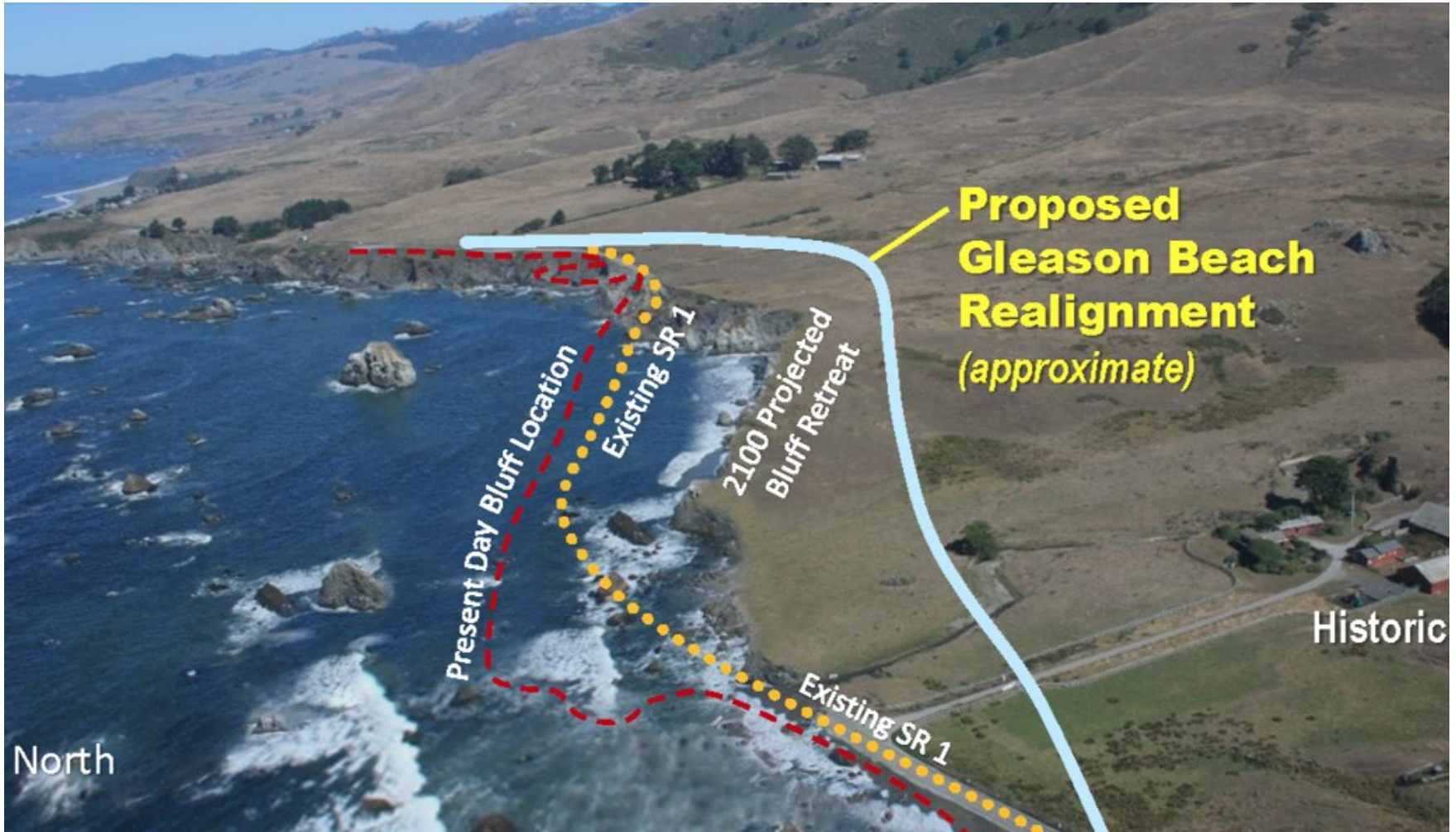
Along State Route 1 in Sonoma County, bluff erosion has destroyed houses west of the highway and now threatens the road

Case Study: Gleason Beach Highway Realignment



Houses were built west of the highway (above), which have been destroyed by bluff erosion (below)

Case Study: Gleason Beach Highway Realignment



Project level bluff erosion and sea level rise risk assessment

Case Study: Gleason Beach Highway Realignment



Rendering of the approved **\$40 million** project shows the realigned highway and improved coastal access

Key Insight 3: Rural Versus Urban Adaptation Approaches



Copyright, John Gibbons, San Diego Union-Tribune



Case Study: Del Mar Bluffs, San Diego County
Local officials are ramping up awareness of the danger of eroding cliffs at the beach in Del Mar, shown in August 2019

Case Study: Pleasure Point Coastal Access



The Army Corps of Engineers and Santa Cruz County constructed full-bluff seawalls to protect development, including public access mitigations to and along a popular beach

Case Study: Scott Creek Bridge



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Past their useful lifespans, the bridge and the Highway 1 corridor in Santa Cruz County are vulnerable to coastal erosion and increasingly threatened by projected impacts from sea level rise

Case Study: Scott Creek Bridge



With initial designs for the lagoon restoration completed, the effort is now shifting to the initiation of a highway resiliency project to reorient the bridge and highway approaches and prepare for anticipated sea level rise, which has been included as a priority project in the current federal infrastructure bill

Key Insight 4: Phased Adaptation

Case Study: Piedras Blancas, San Luis Obispo County

Highway 1 north of the Piedras Blancas Lighthouse in San Luis Obispo County was heavily armored and vulnerable to wave runup before **\$74 million** highway realignment project completed in 2017



Case Study: Piedras Blancas Highway Realignment



Case Study: Piedras Blancas Highway Realignment



Removing temporary rock slope protections has allowed the beach near Piedras Blancas to return

Case Study: Piedras Blancas Highway Realignment



The open areas are now a popular stop for elephant seals, who return each year to mate and care for their pups

Key Insight 5: Nature Based Strategies



Case Study: Cardiff State Beach

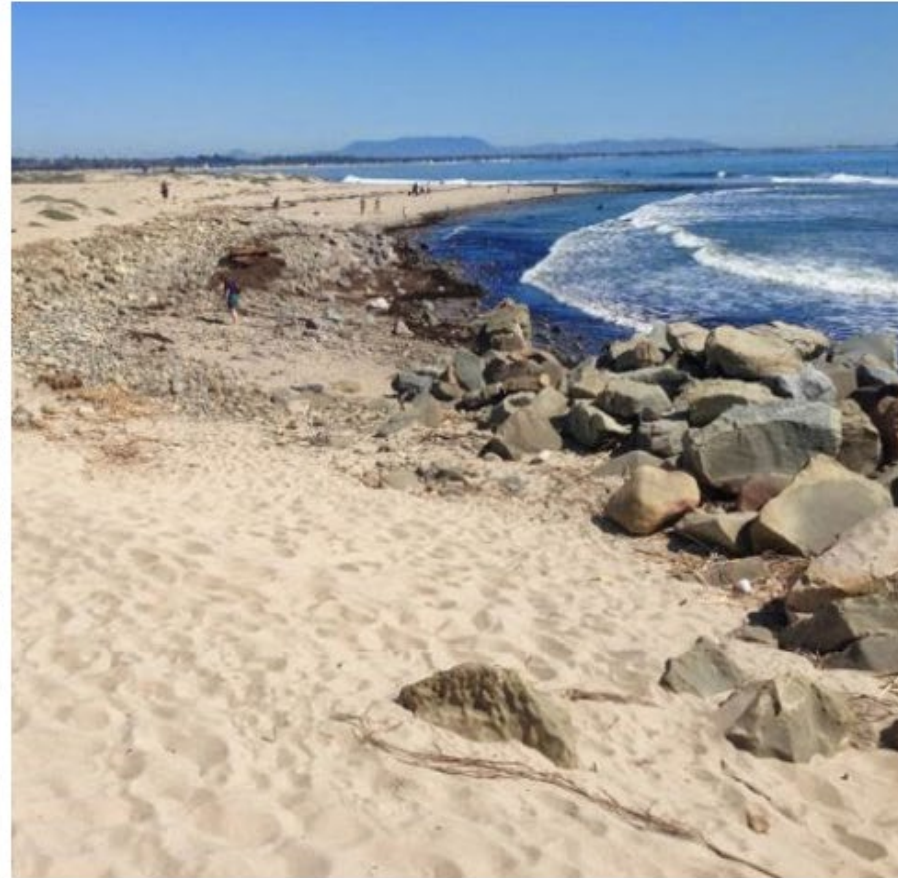
Highway 101 in San Diego near Cardiff Beach before project during high- (left) and low-tide (right) conditions, August 2010

Case Study: Cardiff State Beach



Post-construction of the Cardiff State Beach Living Shoreline Project
Engineered hummocks across the fore-slope rise to the dune crest to facilitate planting
and recruitment of native dune vegetation, ~April 2021

Case Study: Surfer's Point, Ventura



Ventura's Surfer's Point was heavily damaged by coastal erosion and was restored using managed retreat and nature-based solutions



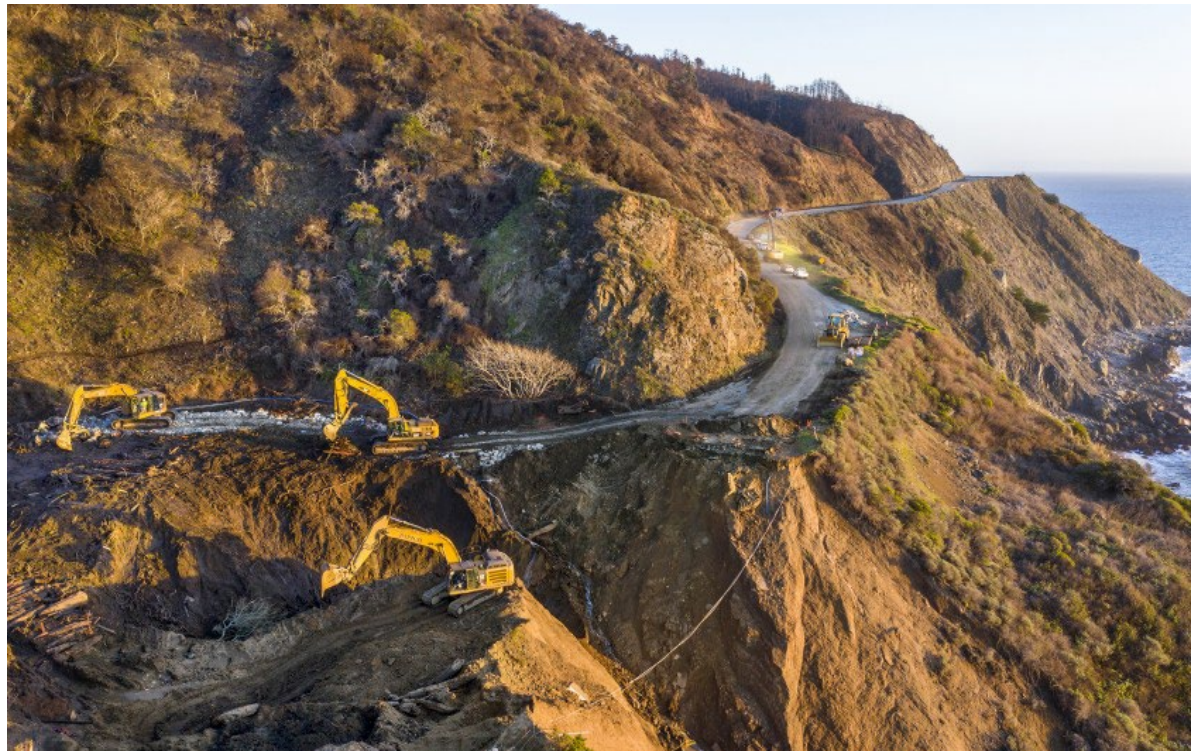
Grand Challenges and Conclusions

First Takeaway: Need Federal Support for SLR Adaptation

- For California, Caltrans estimates the rough order of magnitude in construction costs for adaptation to be **\$9 – 11 billion by 2030** and **\$45 billion by 2100** (Source: *Draft 2021 State Highway System Management Plan*)
- Additional right-of-way, maintenance, mitigation costs, and other related requirements will **increase estimates substantially**
- Within the state's broader economic context, **\$150 billion** in property is at risk of flooding from SLR by 2100, and it could cost the San Francisco Bay **\$450 billion to be resilient to 6.6 ft of SLR** (Source: *L.A. Times (2019) / USGS (2019)*)
- The 2018 National Climate Assessment concluded that **\$1 trillion** in real estate is threatened by SLR (Source: *2018 National Climate Assessment*)

Rat Creek Slide, Monterey County

Total cost of repairs and clean up
was **\$11.5 million**, April 2021



Second Takeaway: Opportunities for Reimagining Communities

- Long-term solutions provide social, environmental, and economic benefits



Hagemann Gulch Bridge connects the Arana Gulch Trail to Broadway in Santa Cruz County, expanding multi-modal educational opportunities and community connections



Surfers Beach, San Mateo County
King Tide, November 2020





Beaches are the state's pride and joy; many could vanish by the end of the century, depending on how Californians choose to adapt to sea level rise





Thank You

Additional Information:

Caltrans Coastal Program: <https://dot.ca.gov/programs/environmental-analysis/coastal-program>

California Coastal Commission website: <https://www.coastal.ca.gov/>

Presentation Materials: <https://bit.ly/3mUMOys>

