Green to Grey SLR Solutions:

A Constructed Living Dune for Coastal Protection in San Diego

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State of California
Coastal Conservancy

Historical Coastal Dune Habitat Lost

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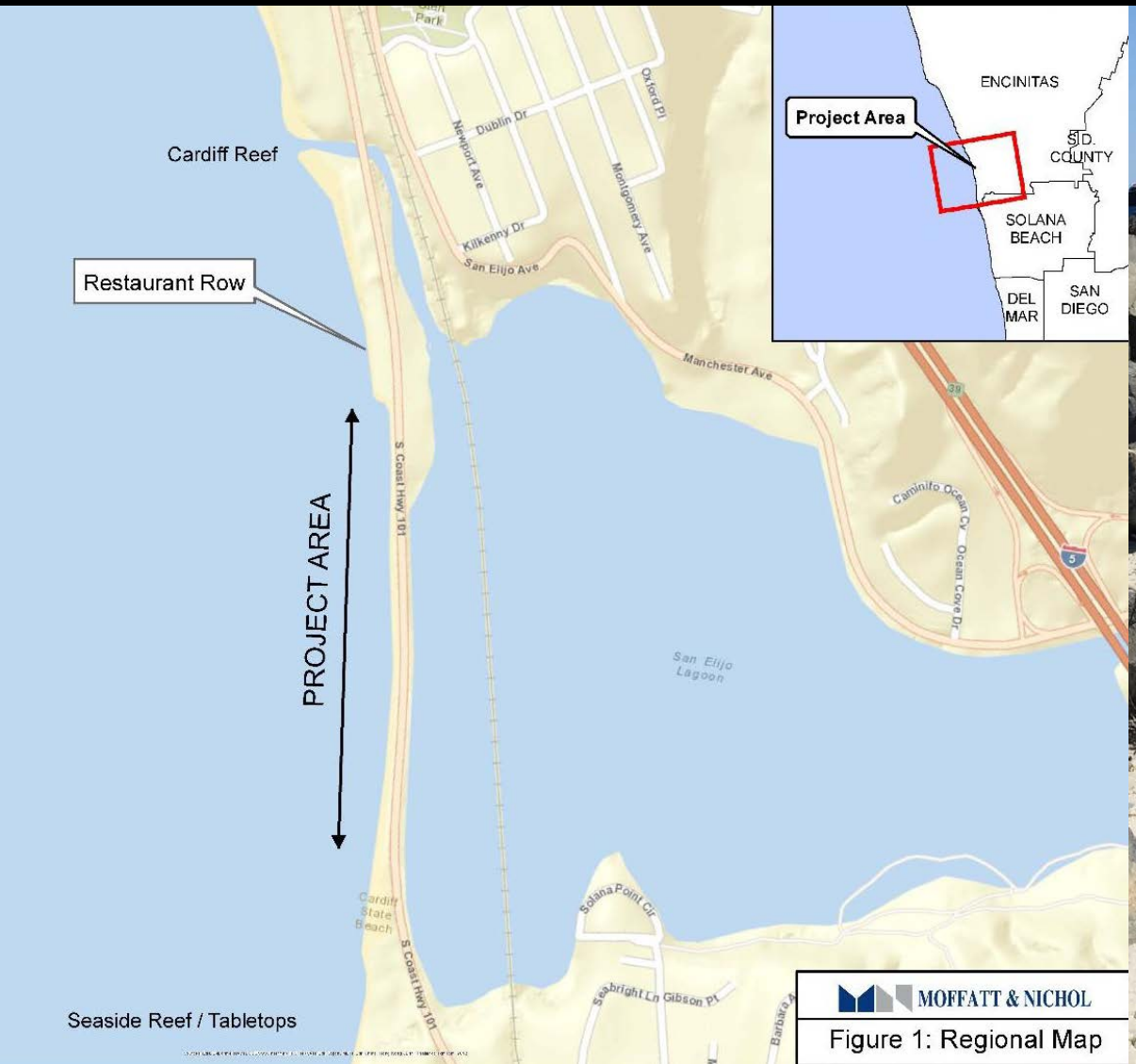
Cardiff State Beach & Highway 101

Cardiff Beach Present Day



Living Shoreline Visualization

State of California
Coastal Conservancy

CITY OF ENCINITAS
Incorporated 1986

CALIFORNIA STATE PARKS
SINCE 1864

SAN ELIJO LAGOON CONSERVANCY

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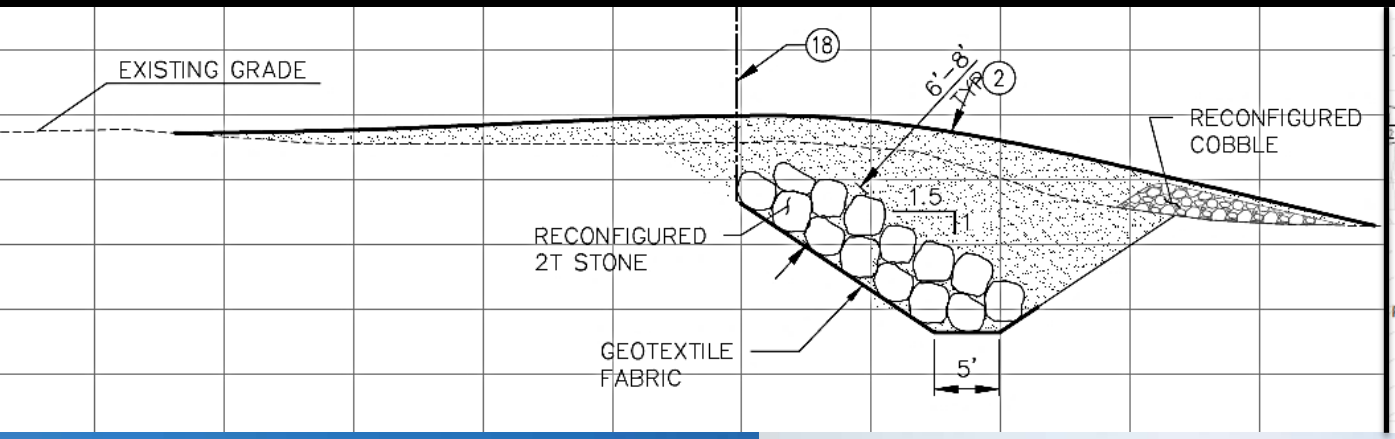
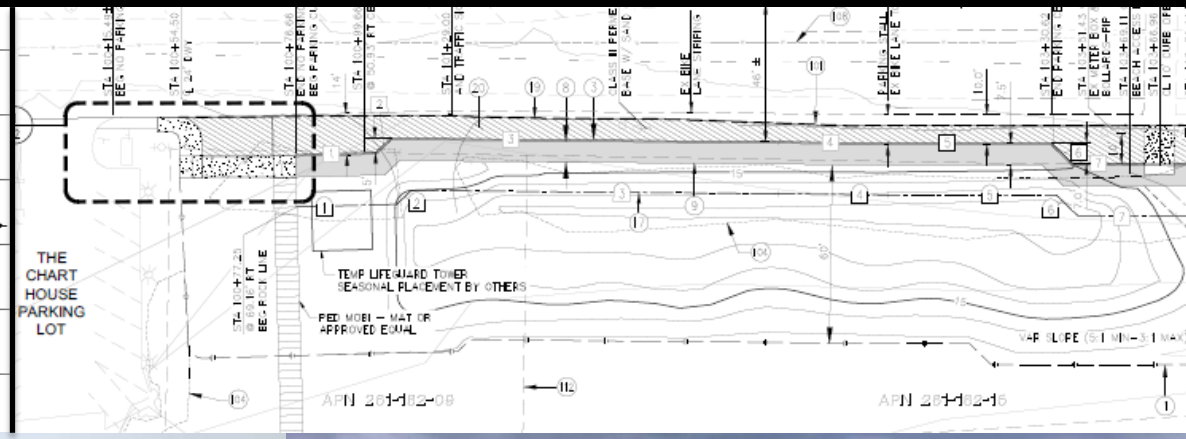
Critical infrastructure

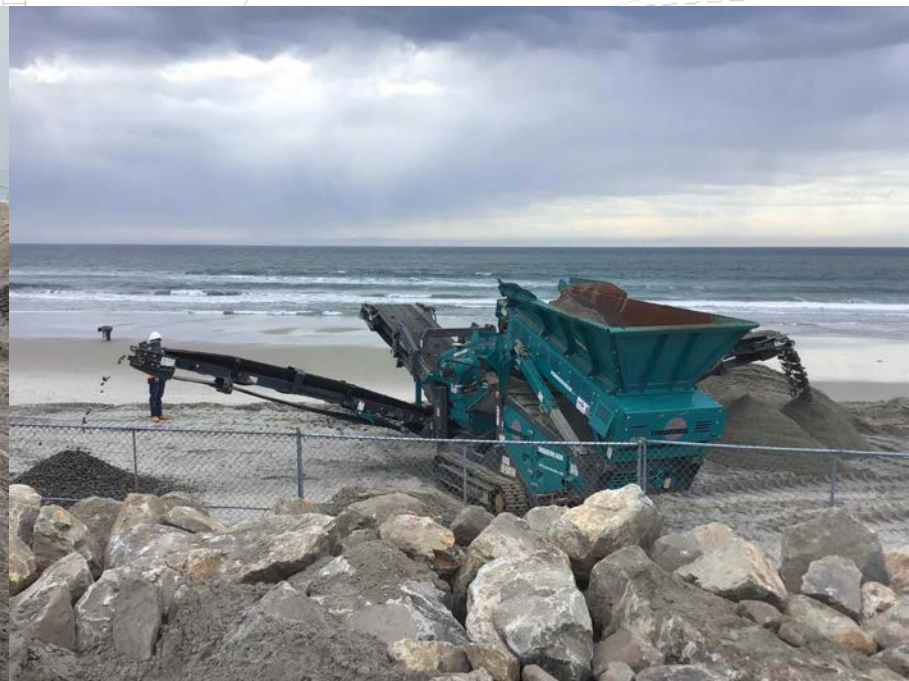
Limited space

Rip Rap & Cobble

Cardiff State Beach Living Shoreline Design & Construction



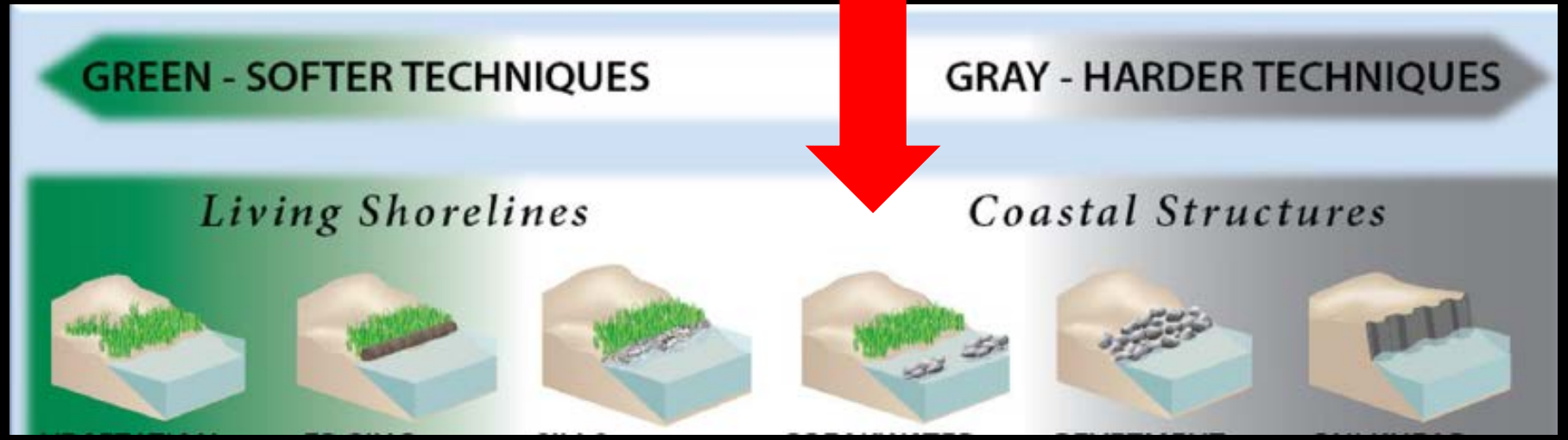




Cardiff State Beach Living Shoreline

Plovers want the habitat now!

Green-Grey Approach



NOAA 2015











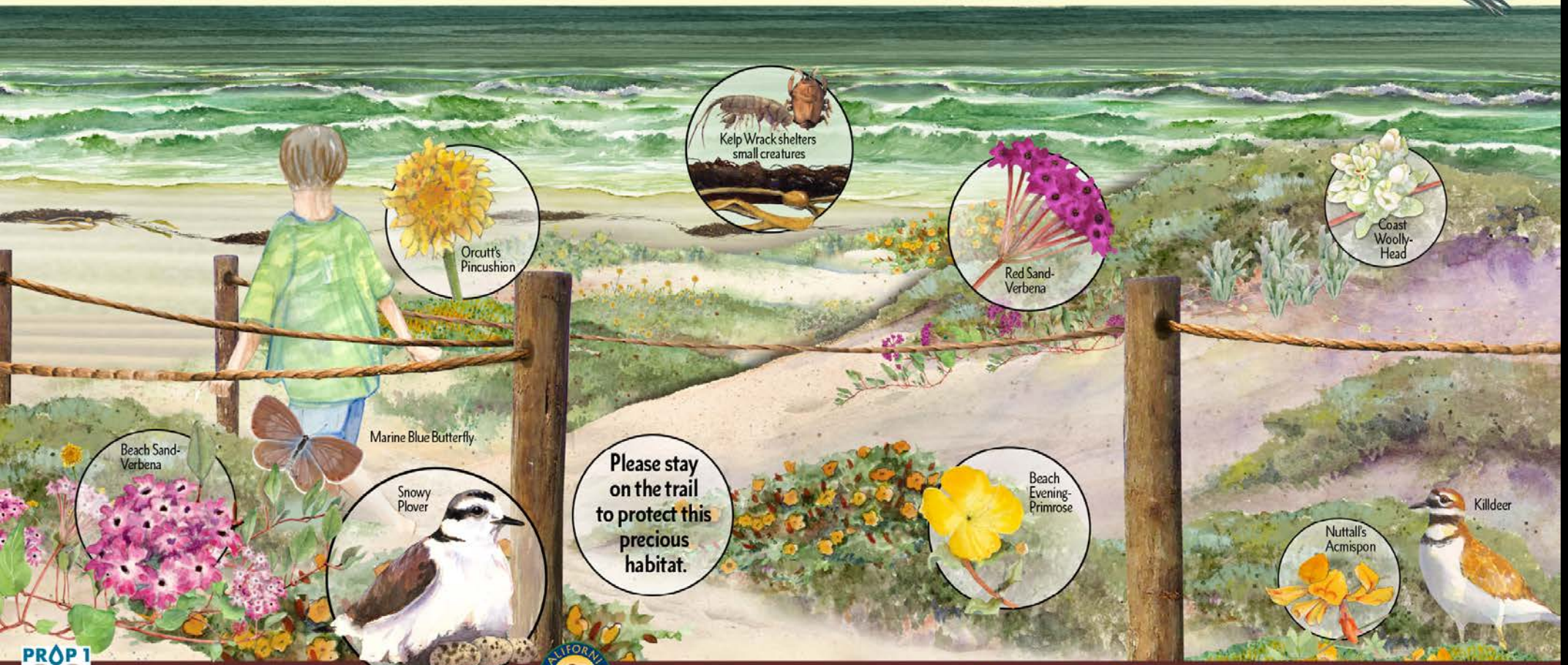

Our Living Shoreline

Building a Natural Habitat

Dune Plants Do Double Duty.

The native coastal scrub and strand plants growing on the dunes help prevent erosion and provide homes for wildlife. Sand-verbena, beach evening-primrose, woolly-heads, and other native vegetation trap sand and help stabilize the dunes.

Resident and migrating seabirds and shorebirds, including the threatened western snowy plover, find food and resting places here.



PROP 1 WATER BOND 2014
Another project to safeguard California's water funded by voter-approved proposition 1 through the California Natural Resources Agency
Edmund G. Brown, Governor
John C. Laird, Secretary for Natural Resources
CALIFORNIA STATE PARKS SINCE 1864
Cardiff State Beach
CALIFORNIA COASTAL COMMISSION
Coastal Conservancy
San Elijo Lagoon Conservancy
SANDAG TransNet

Our Living Shoreline

Resisting a Rising Sea

Our coastal dune systems have been heavily impacted by development. This leaves nearby roads and buildings vulnerable to increasingly intense storms and sea level rise. Dune restoration will help reduce storm damage by creating a natural buffer against waves and tides.dunes were with native vegetation to create a natural dunes habitat.

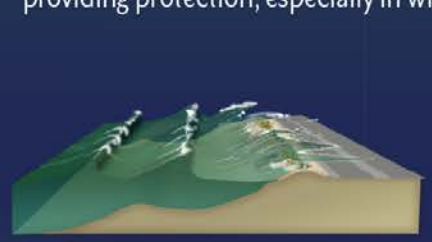
The Cardiff Beach Living Shoreline Project, completed in 2018, constructed four acres of dunes with sand from the San Elijo Lagoon. A half-mile foot path offers a safe, scenic route for families, walkers, and joggers with multiple points to get to the beach.

Coastal Collaboration
Between Beach and Lagoon

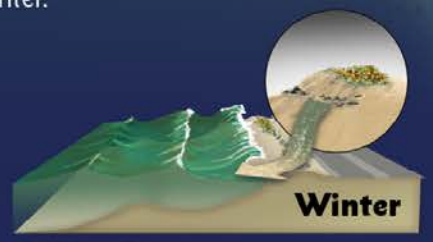
Sand and silt from the San Elijo Lagoon washes into the ocean and builds the beach. These constructed dunes will help protect the lagoon from coastal flooding that could impact the diversity of this rare estuarine habitat.

Dunes Form a Natural Defense

These constructed dunes form a natural defense against winter storm surges and expected sea level rise. Wave action changes with the seasons, pulling sand away in winter and pushing it back in summer. Native vegetation planted on the dunes helps hold the sand in place, providing protection, especially in winter.



Coast Highway has been flooded in the past due to extreme waves and high tides. Sea level rise would increase the frequency and severity of damage.



Fall/Winter: The beach and dunes act as a buffer against winter waves to protect the land beyond. As they erode throughout the season, the beach becomes narrower and steeper.

Spring/Summer: Wind and waves bring in sand during the summer and the beach widens. Sand is trapped by dune vegetation, naturally rebuilding the dumes

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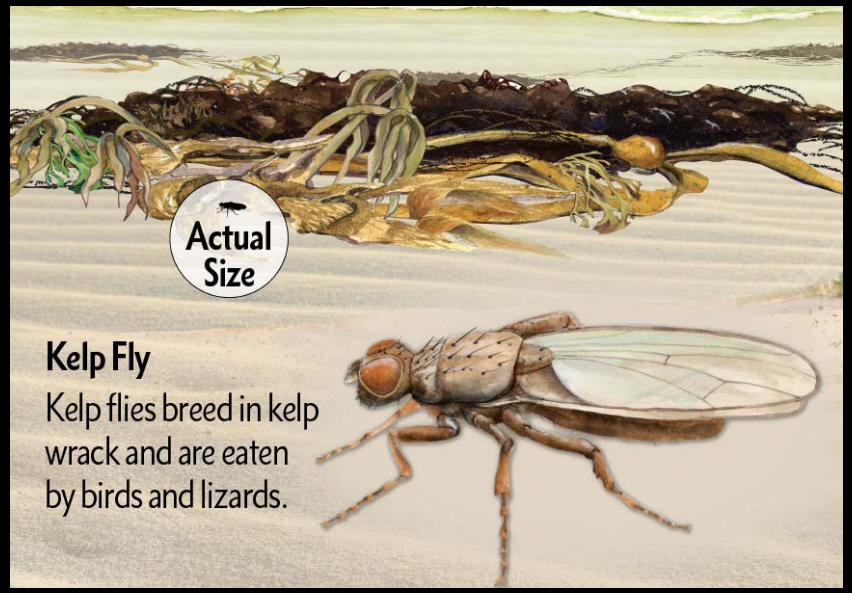
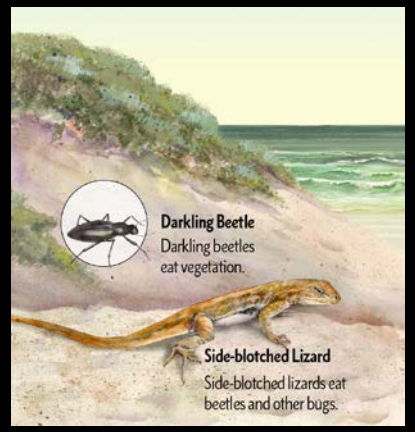
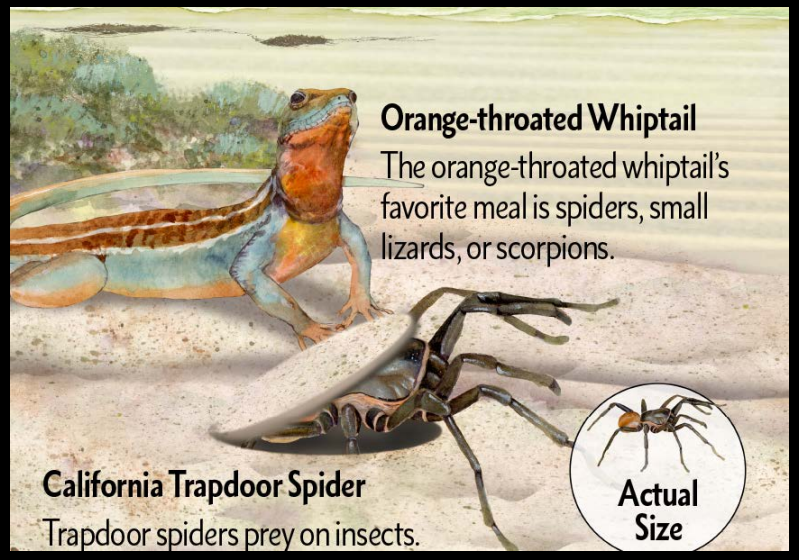
Access & Education







Project Monitoring

Thank You!

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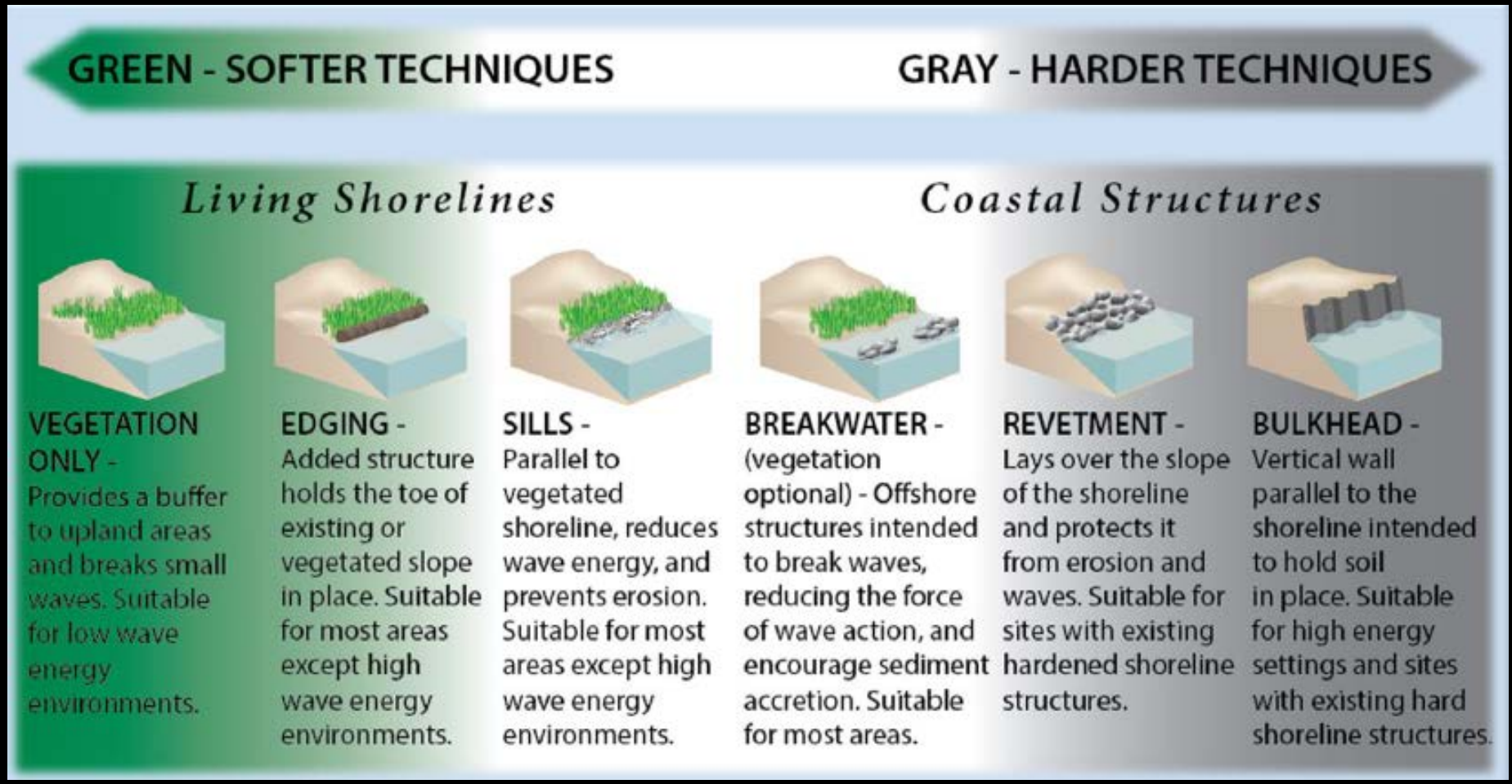
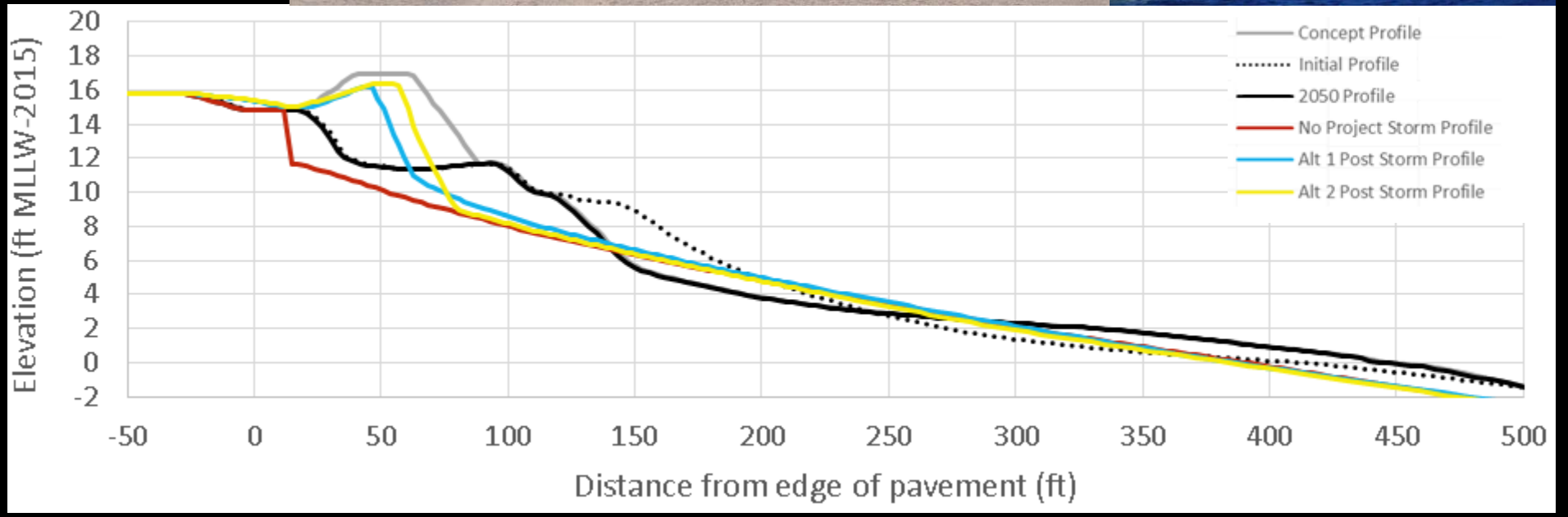
RESILIENT SHORELINES SAGE THRIVING COMMUNITIES

Green-Grey Spectrum



Sea Level Rise & Storm Modeling



Beach Nourishment

Ludka, B.C., Gallien, T.W., Crosby, S.C., Guza, R.T., 2016. Mid-El Niño erosion at nourished and unnourished southern California beaches. Geophysical Research Letters, 43, 4510-4516. doi: 10.1002/2016GL068612