Living Shorelines

in Southern Ca

State of California
Coastal Conservancy

A Legacy of Shoreline Hardening

14% of U.S. shoreline is hardened

Southern Ca is most hardened

Gittman et al. 2015 *Frontiers in Ecology and the Environment*

Coastal Hardening

- Necessary in certain locations
- Physical benefits
- Minimal to no biological benefits
- Begins degrading day after construction
- Costly
- Frequent maintenance

Impacts of Coastal Hardening

- Impacts to shorelines, wetlands, & subtidal habitats
  - Direct & indirect loss
  - Wave deflection & erosion
- Cuts off ecosystem processes & connectivity
- Shoreline access & use



Living Shorelines

Living Shorelines can include any shoreline management system that is designed to protect or restore natural shoreline ecosystems through the use of natural elements and, if appropriate, manmade elements.

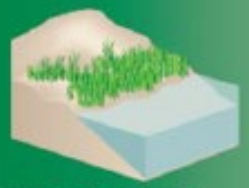
NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

RESTORE AMERICA'S ESTUARIES

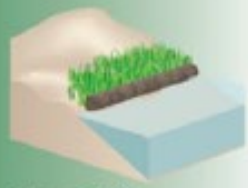
Green-Grey Spectrum

GREEN - SOFTER TECHNIQUES → **GRAY - HARDER TECHNIQUES**

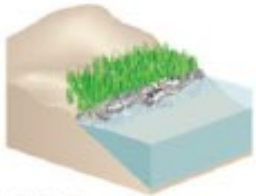
Living Shorelines



VEGETATION ONLY - Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.



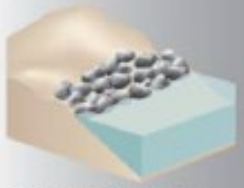
EDGING - Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.



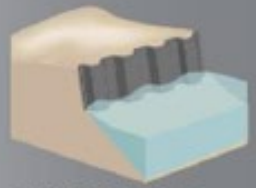
SILLS - Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.

Coastal Structures

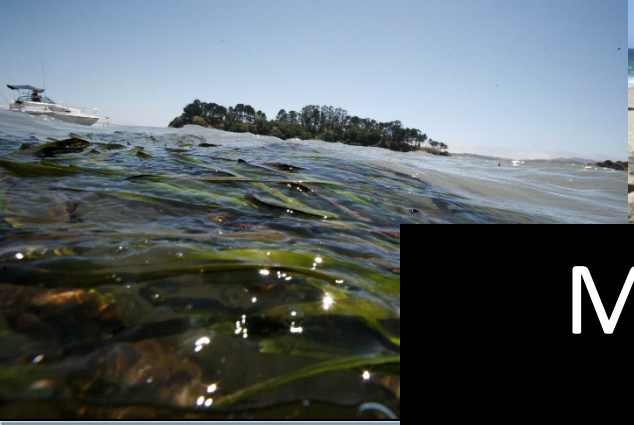
BREAKWATER - (vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.



REVETMENT - Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with existing hardened shoreline structures.

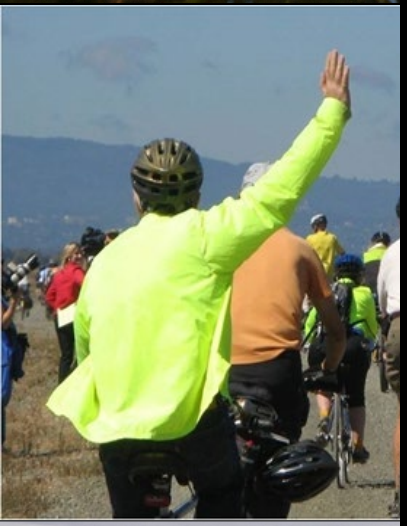


BULKHEAD - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.



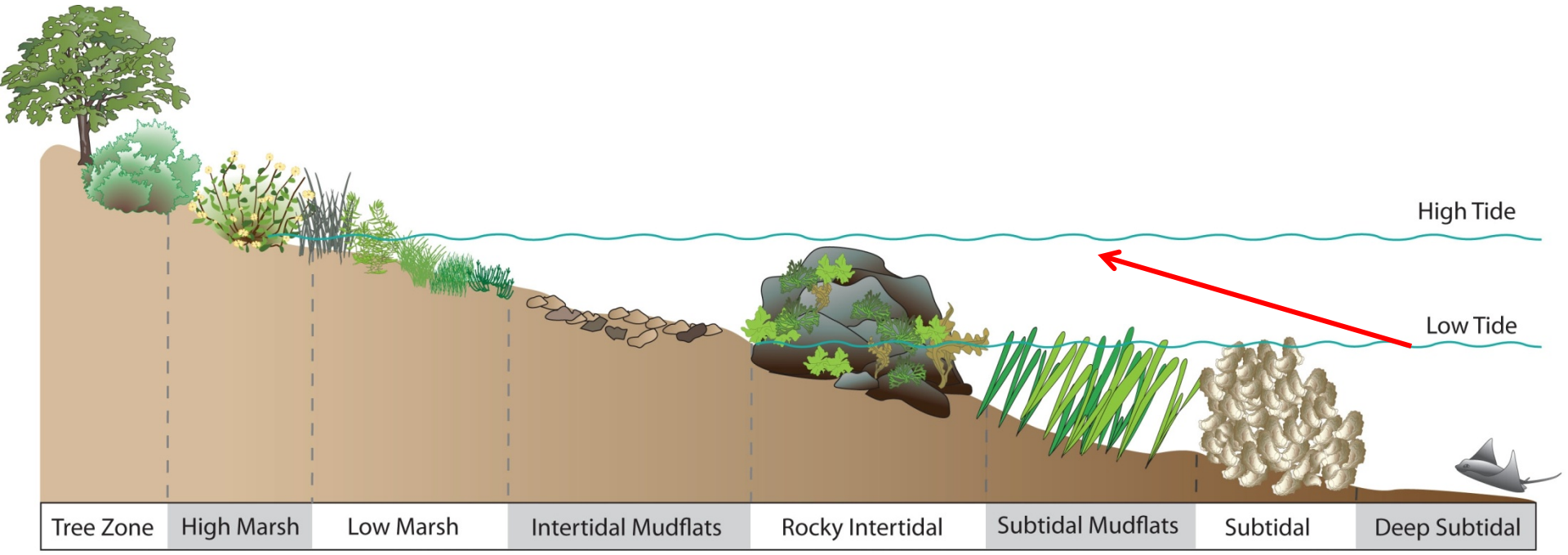
Multiple Co-Benefits

- Create Fish and Wildlife Habitat
- Maintain Coastal Processes
- Attenuate Wave Energy
- Accrete Sediment
- Reduce Erosion
- Adapt to SLR
- Can Provide Outdoor Recreation
- Sequester Carbon
- May Buffer Ocean Acidification






Shallow Subtidal



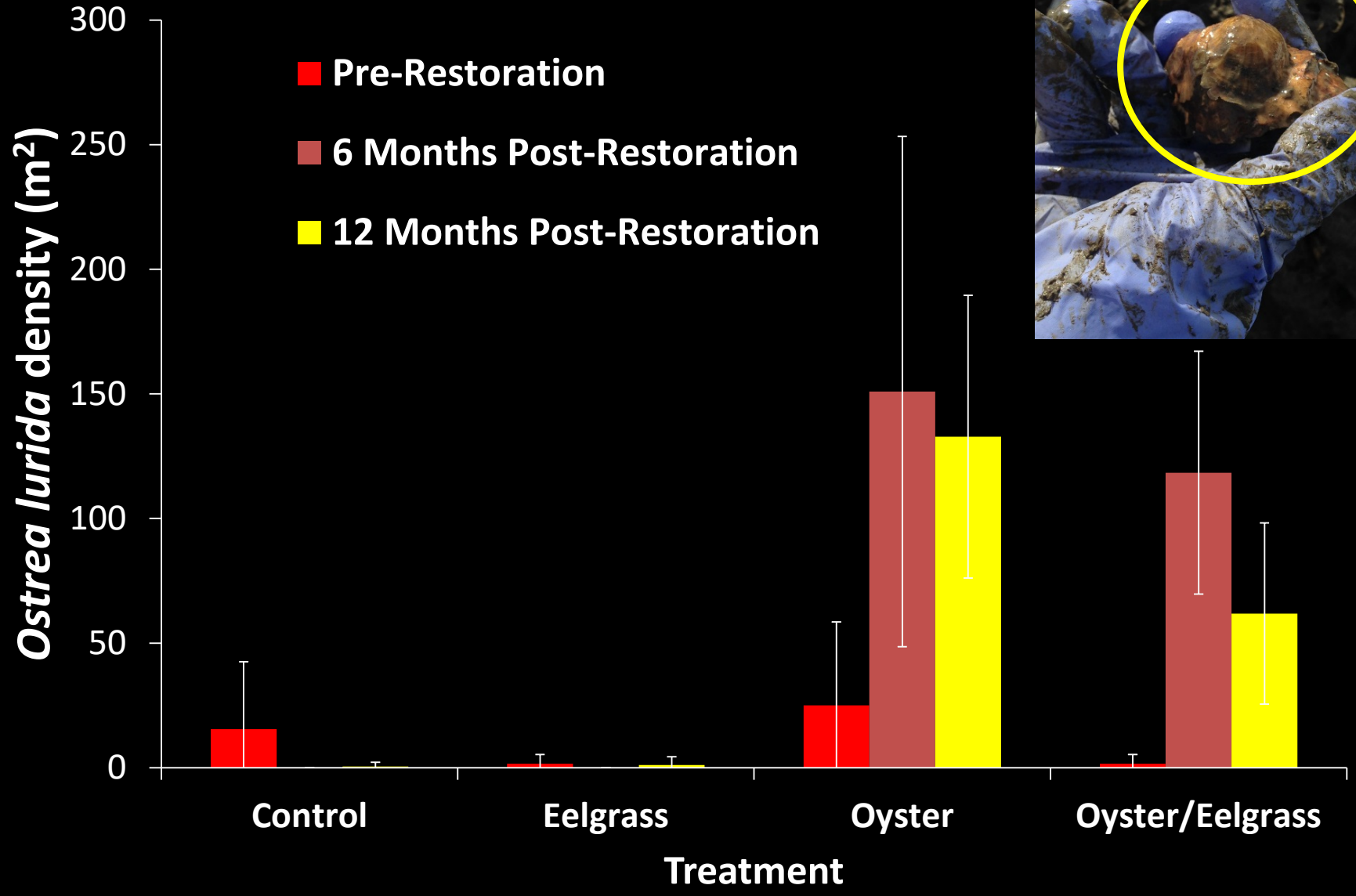
Upper Newport Bay Living Shoreline

Upper Newport Bay Living Shoreline

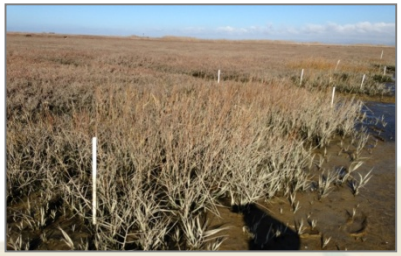
Upper Newport Bay Living Shoreline

- Very successful eelgrass restoration
- Initial target restoration 1,280 m^2 - Aerial extent in 2018 was 3,376 m^2 or .93 acres, 3 x the initial target!
- Difficult to keep eelgrass out of control plots

Oyster numbers:
Adult density by treatment



New SF Bay Living Shoreline: Giant Marsh



CA sea-blite:
Suaeda californica

Pacific cordgrass:
Spartina foliosa

Pickleweed, marsh gumplant, and other native vegetation

Pacific cordgrass

Terrestrial transition zone

Enhancements to existing vegetation

Oysters

Eelgrass

Upland

High Marsh

Marsh Plain

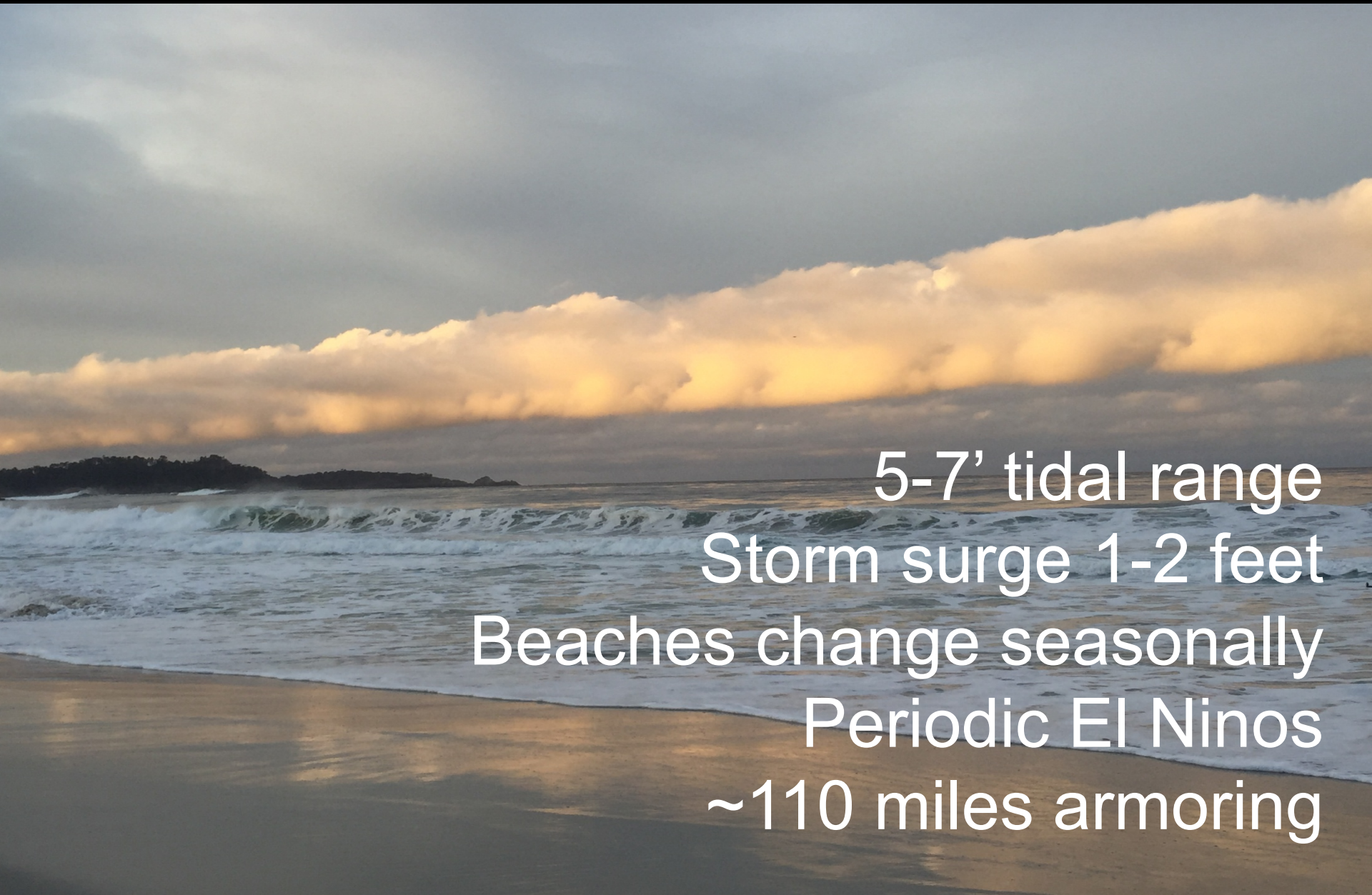
Low Marsh

Mudflat

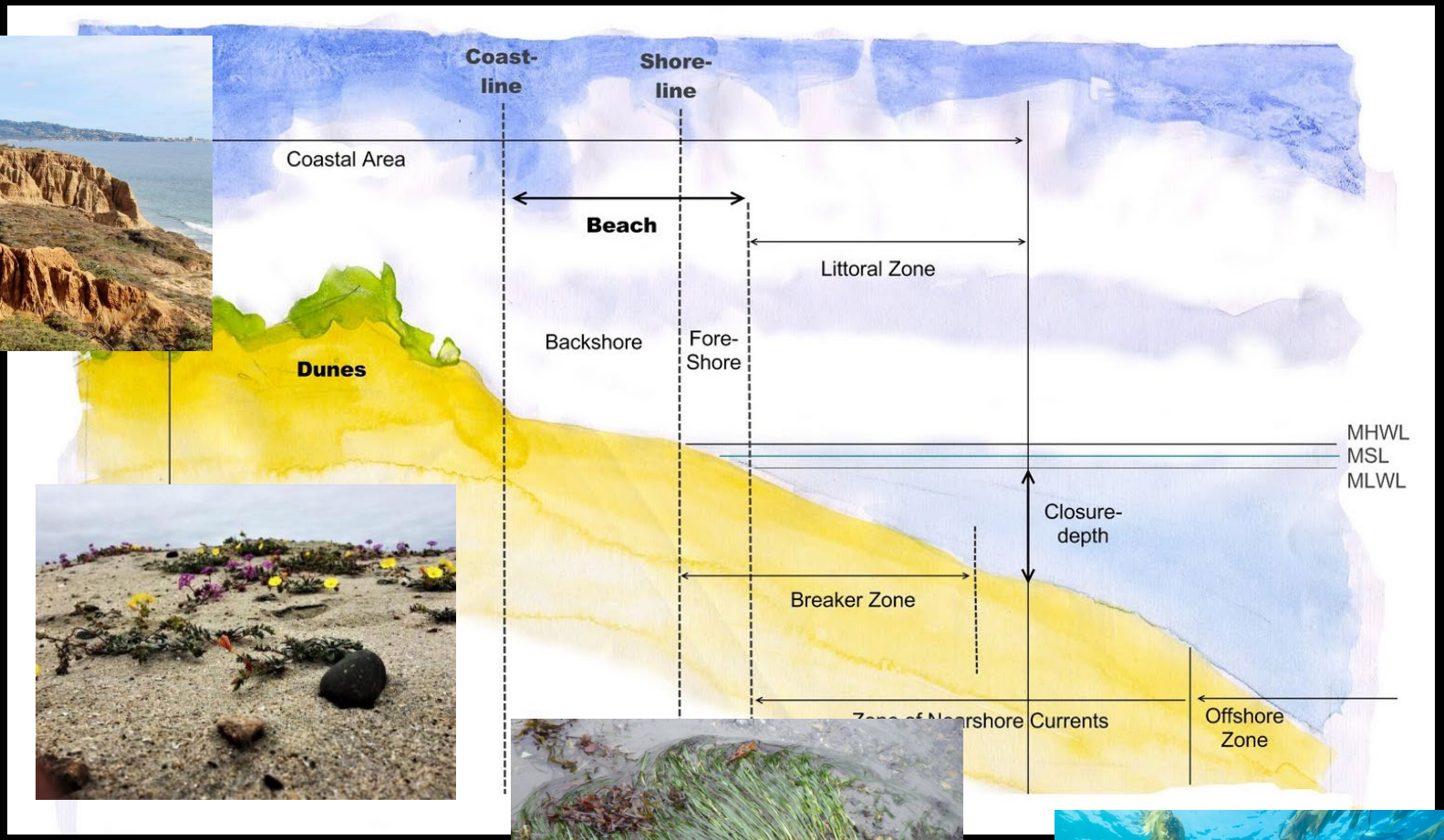
Subtidal

Transition Zone

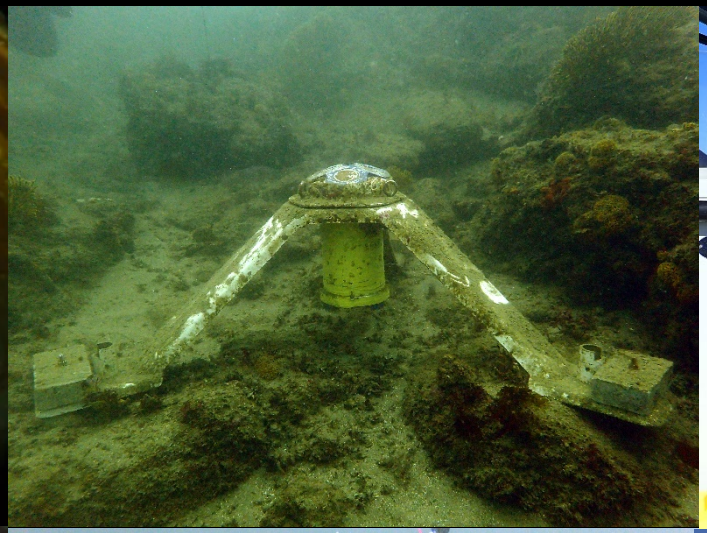
Open Coast Is Different



Outer Coast Gradient

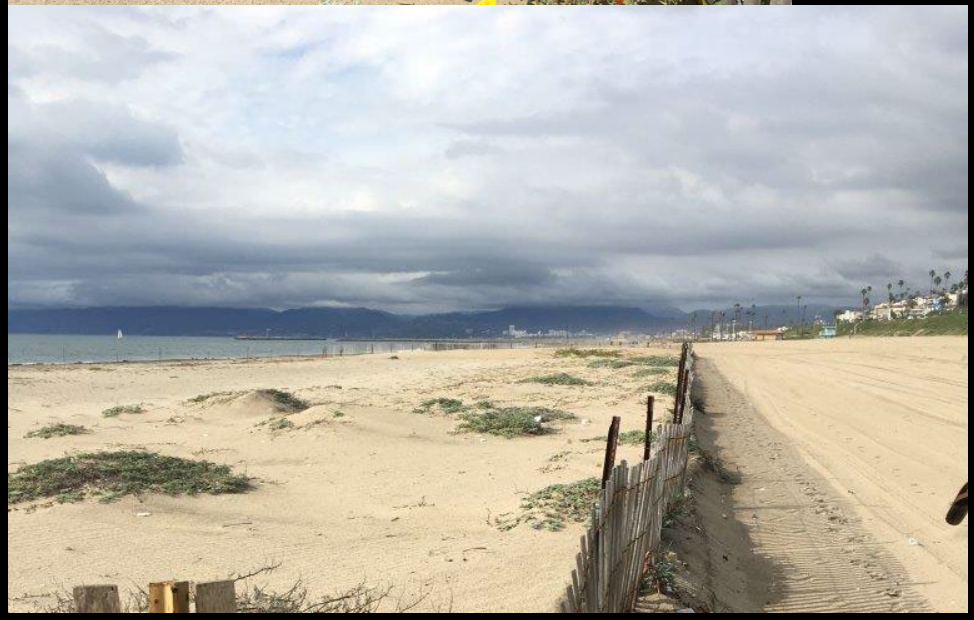


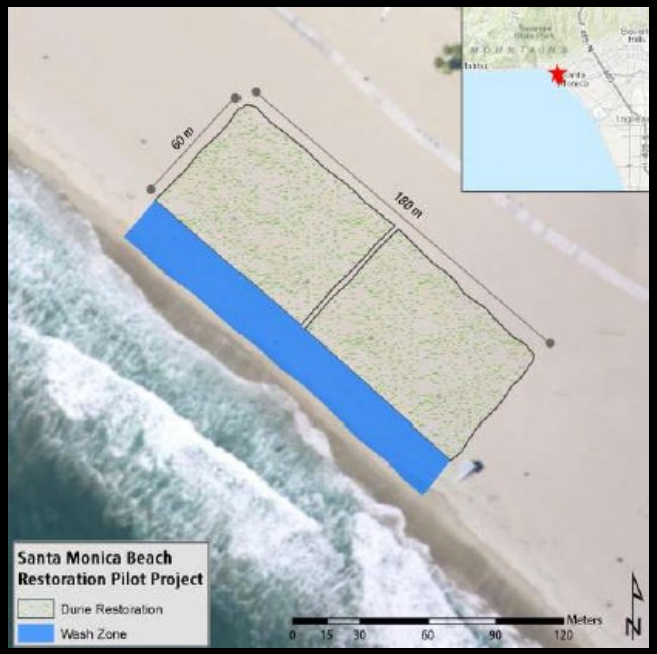
Kelp Forests



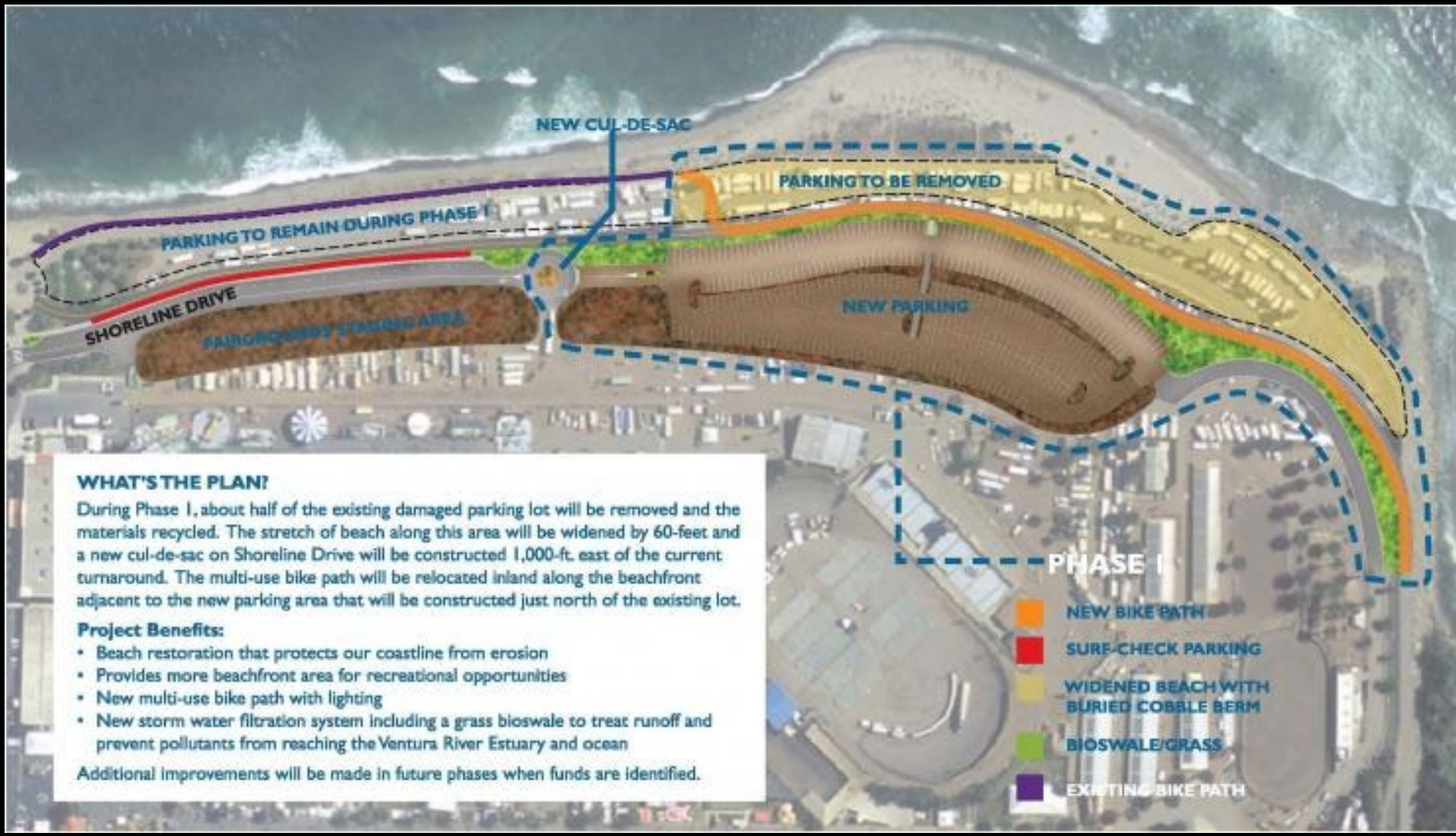
Los Angeles Living Shoreline





Surfer's Point Living Shoreline

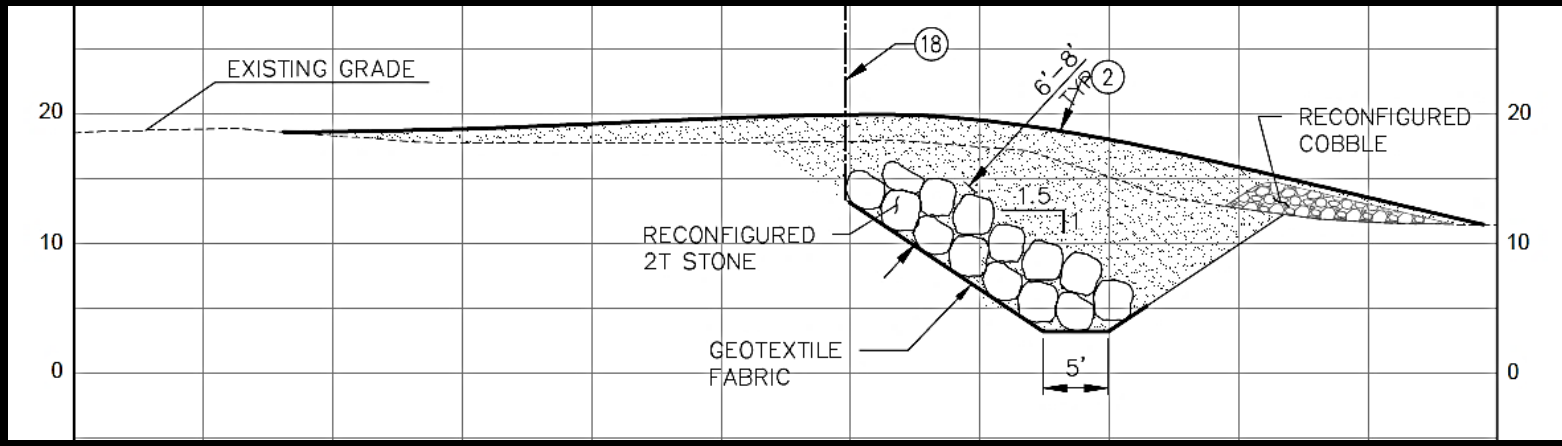
Project Design



Hybrid Green-Grey Solution - Cardiff Living Shoreline Project

Pre-construction

Simulated Visualization



Cardiff Living Shoreline Project
February 2019

One Size Does Not Fit All

- Permitting
- Design for specific conditions
  - Substrate/soil
  - Wave energy
  - Adjacent infrastructure
- Local support
  - Government willingness
  - Community engagement

California needs demonstration projects

- Efficacy of natural habitats as shoreline protection
- Habitat potential for green-grey infrastructure
- Monitor for both physical & biological performance
- Public education
- Horizontal & vertical managed retreat

Thank You!

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