

Friday July 15, 2022

# Regional Sediment: Science, Policy, and Programs

*BEACON*

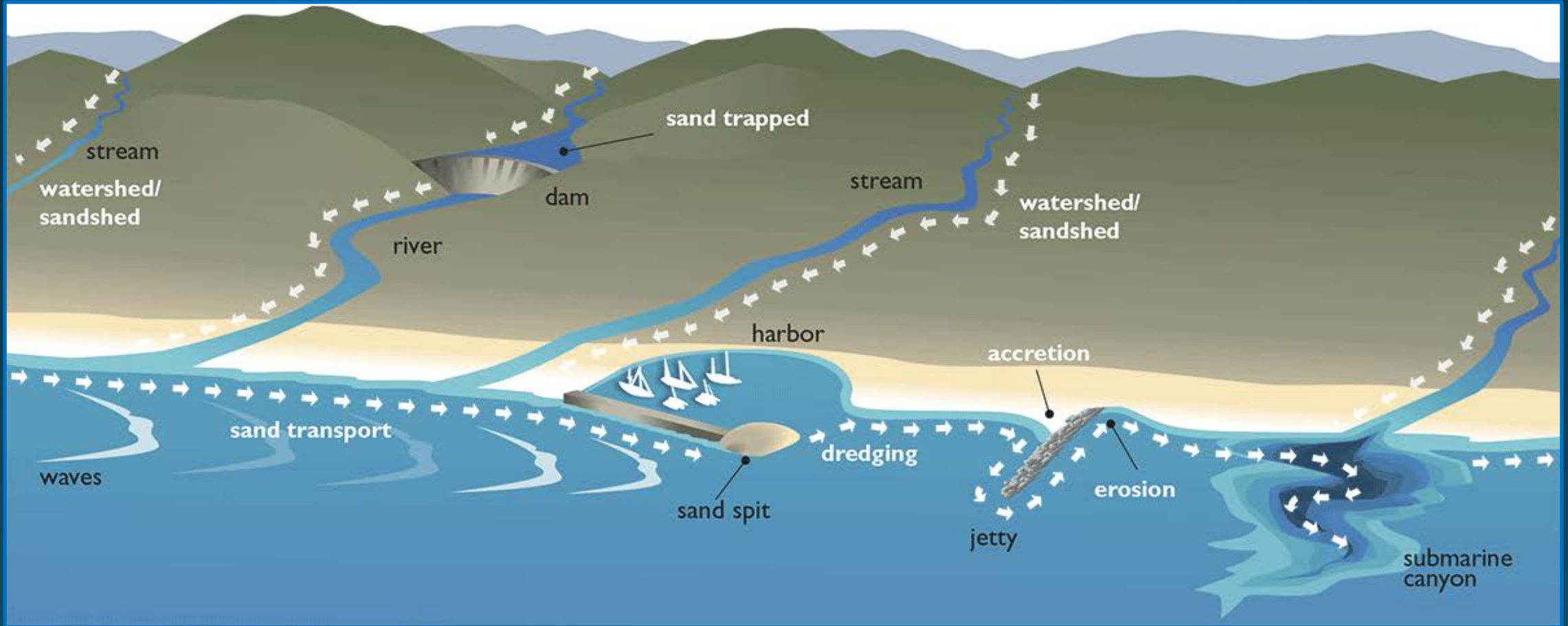
Dr. Kiki Patsch

Associate Professor

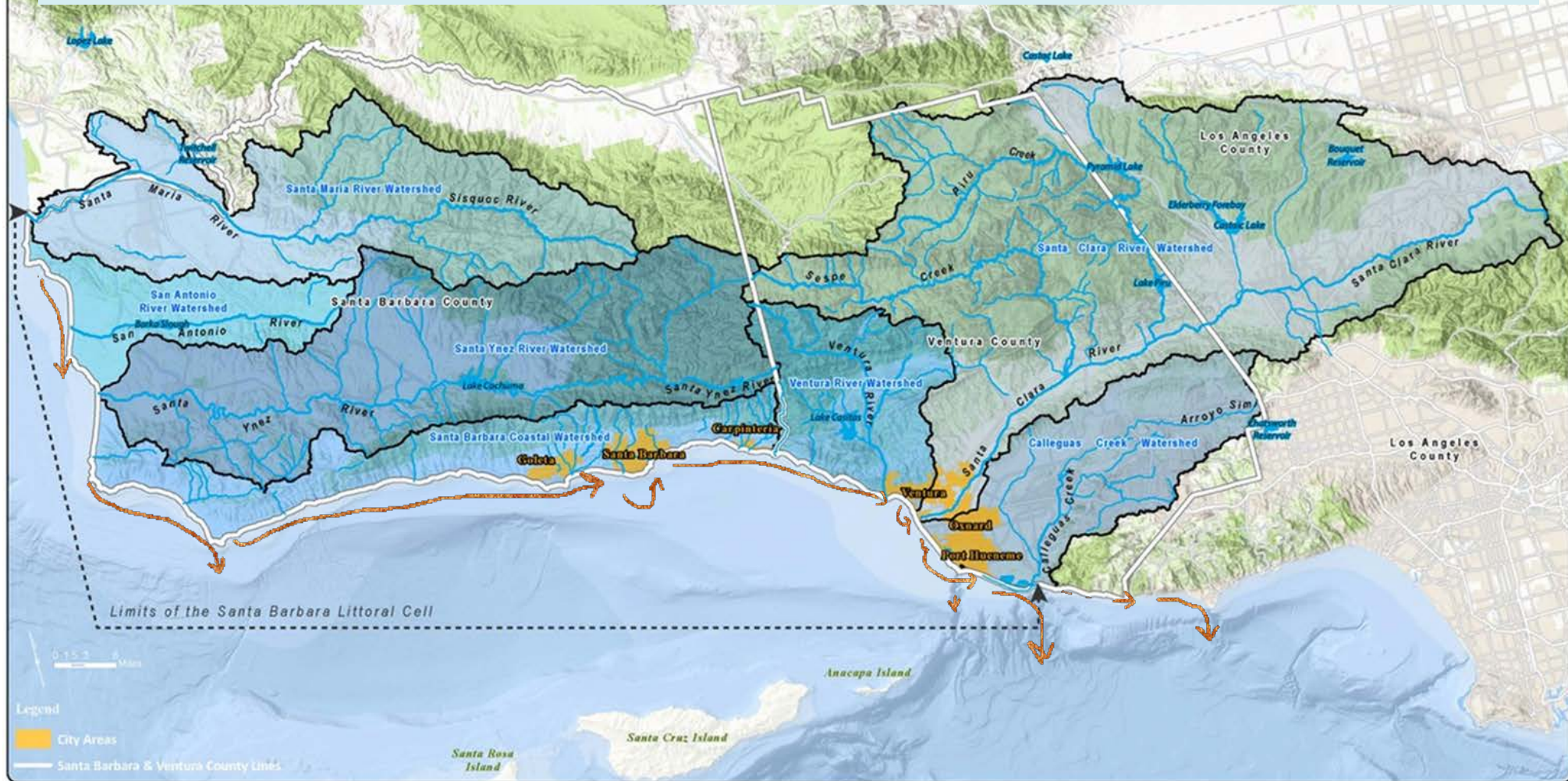
California State University Channel Islands



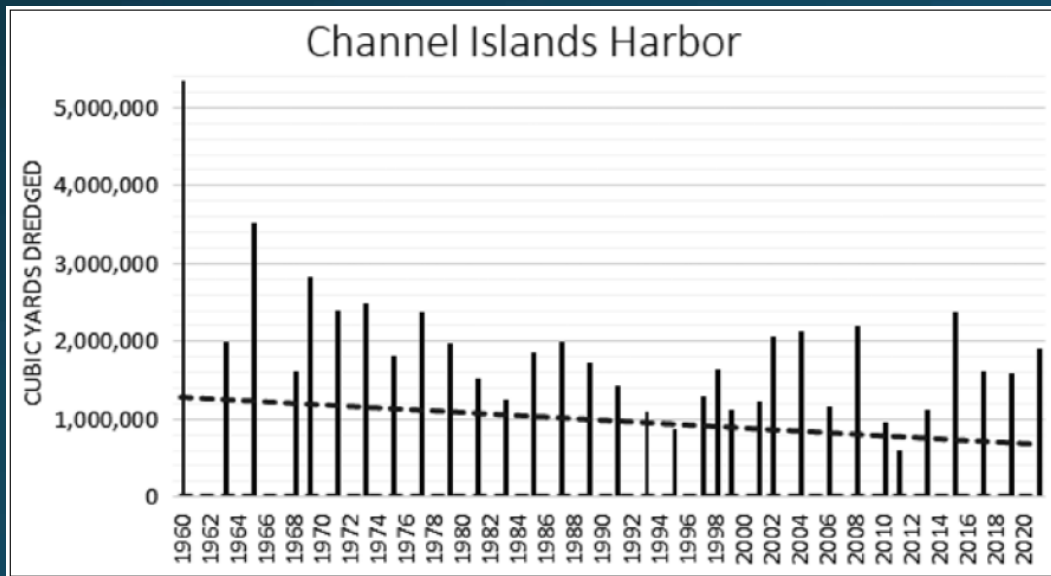
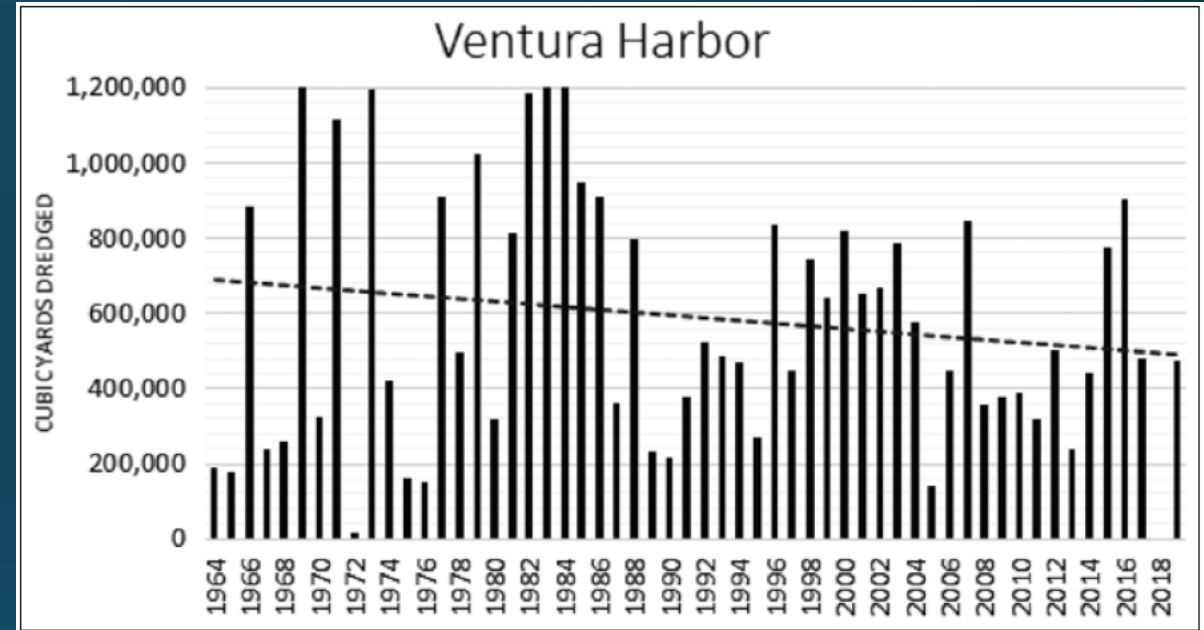
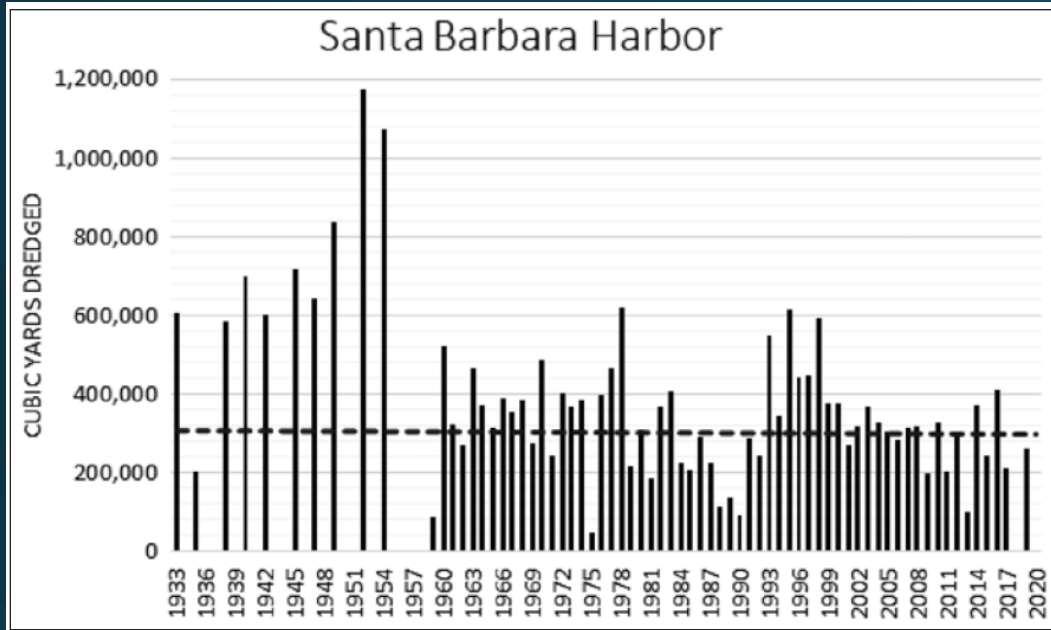
# Sand Movement: The River of Sand



# BEACON Landscape: The Santa Barbara Littoral Cell



# Harbor/Sand Trap Dredging



## Implications of Harbor Dredging for the Santa Barbara Littoral Cell

Kiki Runyan<sup>1</sup>  
Gary Griggs<sup>2</sup>

2004

## California harbor dredging: History and trends

By

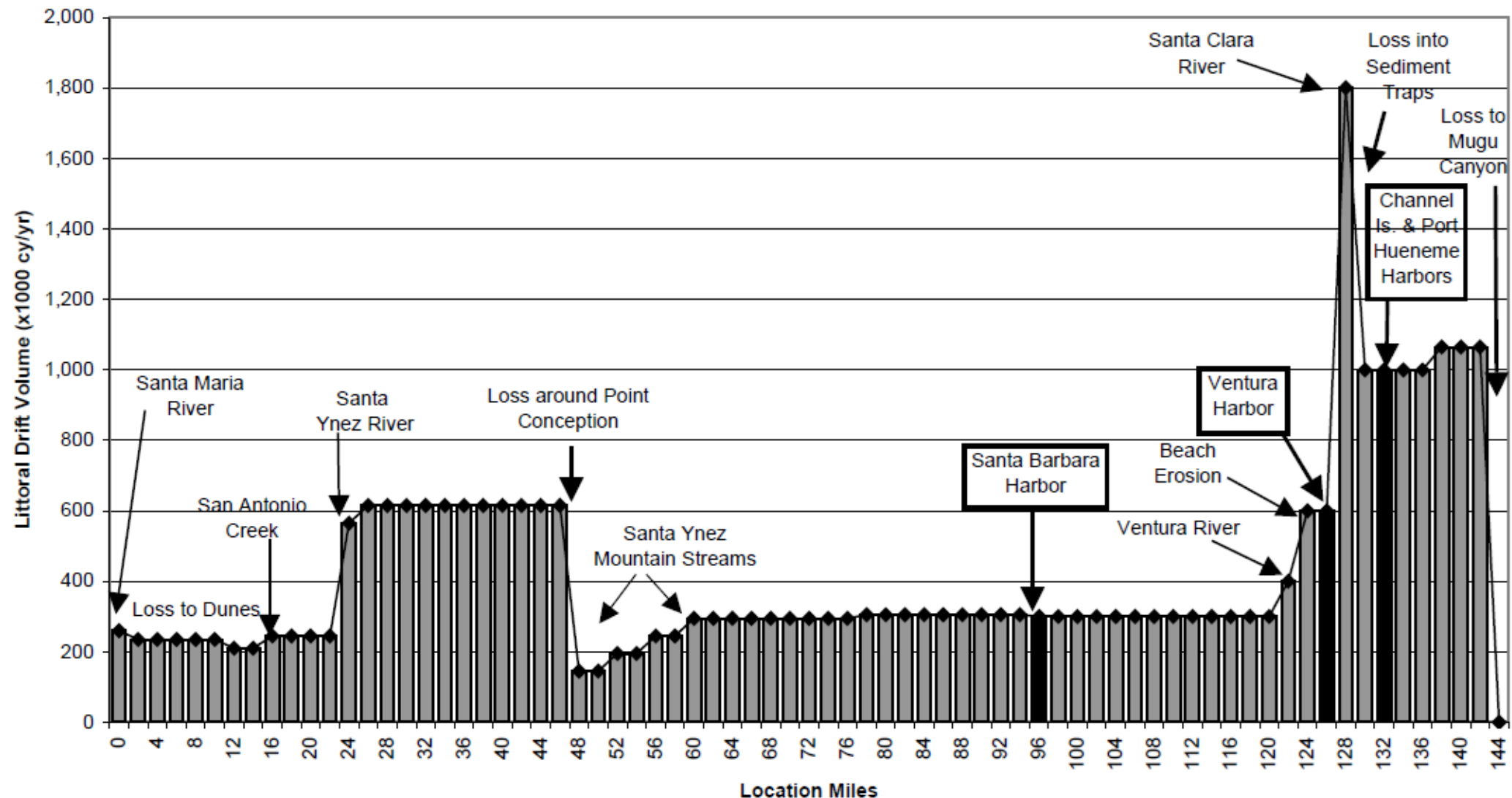
2021

Kiki Patsch<sup>1</sup> and Gary Griggs<sup>2</sup>

1) Department of Environmental Sciences and Resource Management,  
California State University, Channel Islands, Camarillo, CA 93012

2) Department of Earth and Planetary Sciences, University of California Santa Cruz, Santa Cruz, CA 95064

# Understand sand routing along the coast



# Sand Sources

Sand Source	Natural (cy/yr)	Actual (cy/yr)	Reduction (cy/yr)
Rivers	2,785,000 (99.6%)	1,658,000 (99.5%)	1,128,000 (49.5%)
Seacliff Erosion	10,700 (0.4%)	8,600 (0.5%)	2,100 (19.6%)
<b>Total Input</b>	<b>2,796,000</b>	<b>1,666,000</b>	<b>1,129,000 (40.4%)</b>



Eroding bluffs in Santa Barbara



Santa Clara River Mouth, south of Ventura Harbor

# Balancing the Budget

- Sources = Sinks    Equilibrium
- Sources > Sinks    Accretion
- Sources < Sinks    Long-term Erosion



# Sand is ESSENTIAL to managing coastal systems

**Without sand there is NO**

- Public recreation space
- Sandy beach ecosystem
- First line of defense against storm surge and sea level rise

## A glimpse of California without sand and surf



BEACH CLOSURES give Californians a taste of what life will be like when we lose our beaches to climate change. (Allen J. Schaben Los Angeles Times )

BY SEAN ANDERSON, KIKI PATSCH AND DAN REINEMAN

Los Angeles Times OP-ED- April 3, 2020. [LINK](#)



# Focus on the Sand

# Reduction to the sand supply from armoring sea cliffs

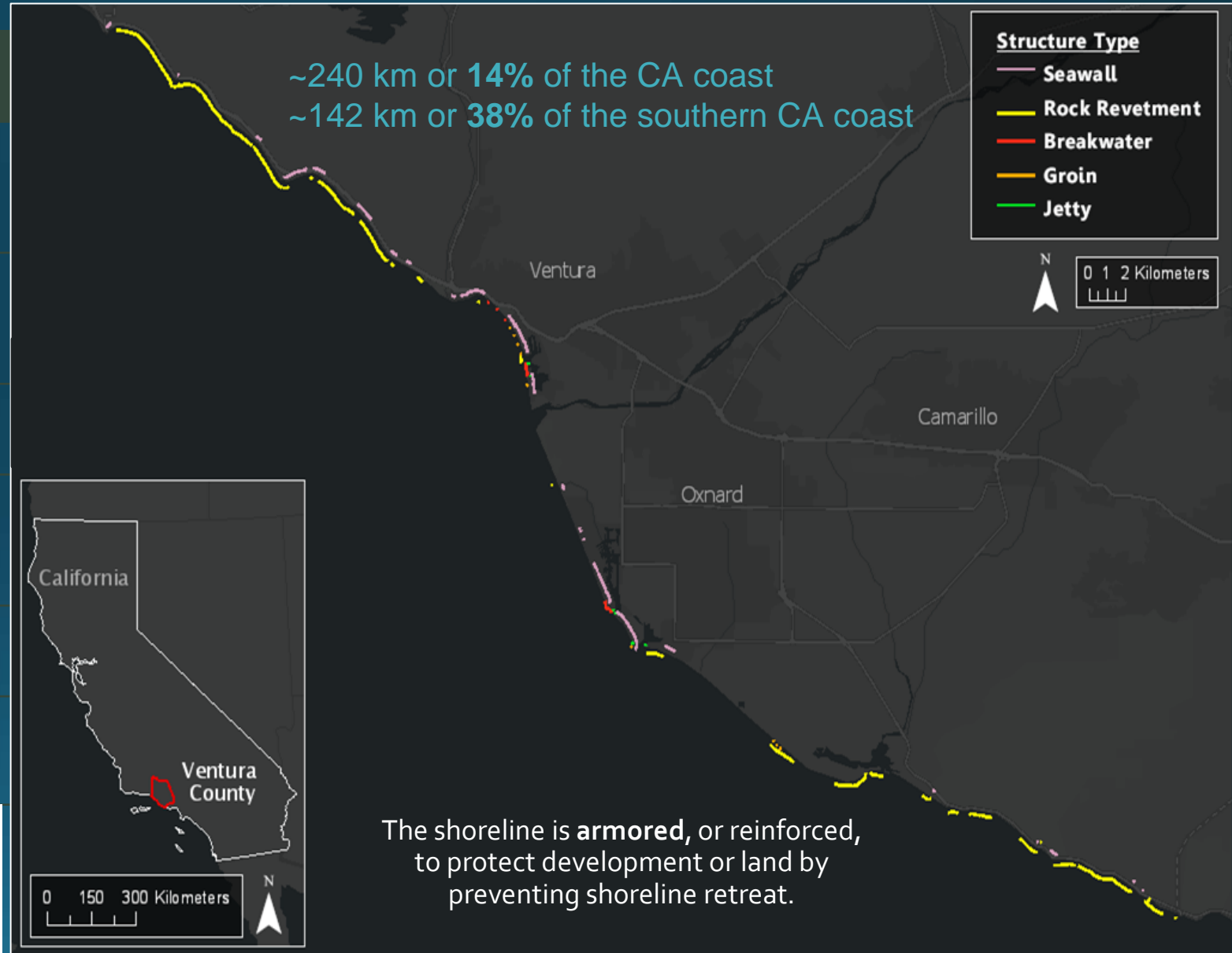
Armoring such as rip-rap or seawalls built in front of a sea cliff hinder erosion and thus prevent a natural source of sand from reaching the beach.



# California Coastal Armoring Database

Previous Inventory: 2003

County	% Armored
San Luis Obispo	52%
Santa Barbara	11%
Ventura	56%
Los Angeles	28%
Orange	40%
San Diego (excluding bay)	39%



REVIEW ARTICLES



www.cerf-jcr.org

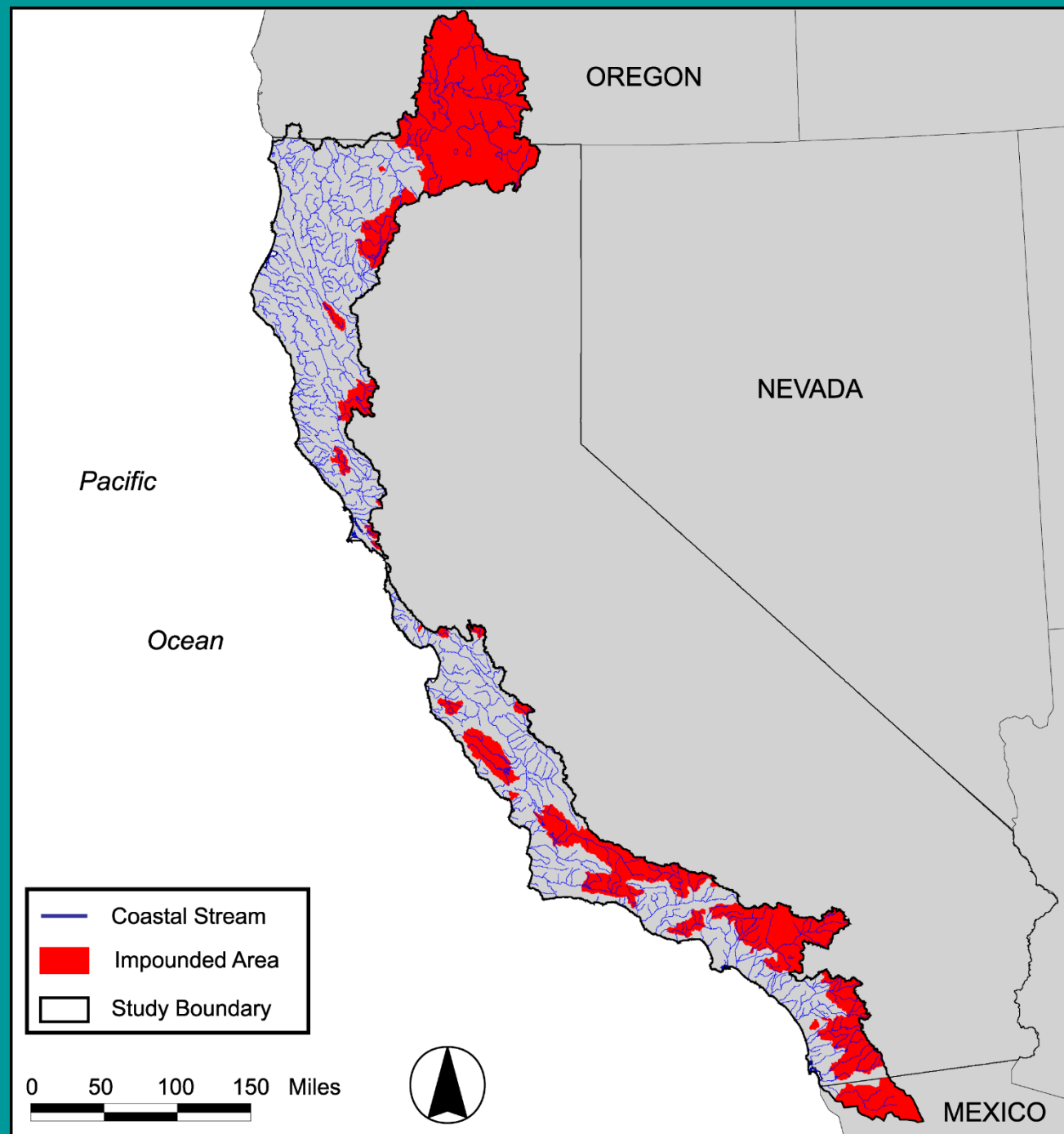
The Protection/Hardening of California's Coast: Times Are Changing

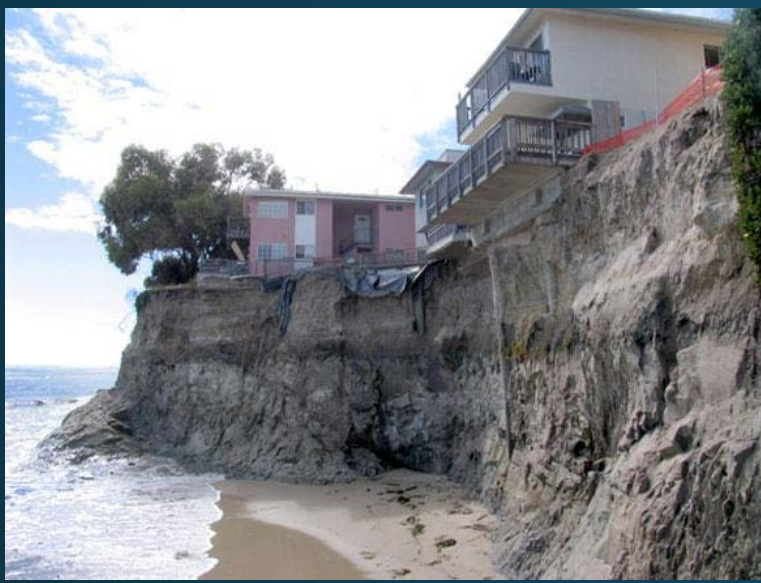
Gary Griggs<sup>†\*</sup> and Kiki Patsch<sup>‡</sup>

# Cumulative Impacts of Coastal Dams in California

- 480 major dams have been built in California's coastal watersheds, primarily for water supply, irrigation, and flood control
- 38% of coastal watersheds (16,300 mi<sup>2</sup>) are impounded by dams (area equal to Massachusetts and New Hampshire combined)
- Average annual sand supply has been reduced by **26%** (or 3.7 million yd<sup>3</sup>/yr)







With the reductions to sand supply and an increasing sea level, what do we do to maintain our beach width?



# Regional Sand Management involves Researchers, Managers, and State Agencies

- Science to inform policy
- Science in the hands of the policy makers
- BEACON's science advisory group aims to do just that



# Teamwork, Teamwork, Teamwork

- Work as a regional team
- Scientists working together on interdisciplinary and multidisciplinary teams
- Connecting science to policy, managers and planners



## TEAMWORK

Together Each Achieves More

# Beach Sustainability Assessment



**Beach Sustainability Assessment: The Development and Utility of an Interdisciplinary Approach to Sandy Beach Monitoring**

Kiki Patsch<sup>†\*</sup>, Philip King<sup>‡</sup>, Dan R. Reineman<sup>†</sup>, Sarah Jenkins<sup>‡</sup>, Clare Steele<sup>†</sup>, Emily Gaston<sup>†</sup>, and Sean Anderson<sup>†</sup>

Siloed Monitoring for Permits  
Should be replaced by  
regional multidisciplinary  
monitoring

Figure 1. Ventura Harbor Maintenance Dredging Regional Location with Inner and Outer Harbors Maintenance Dredging Areas and Approved Dredge Material Placement Locations



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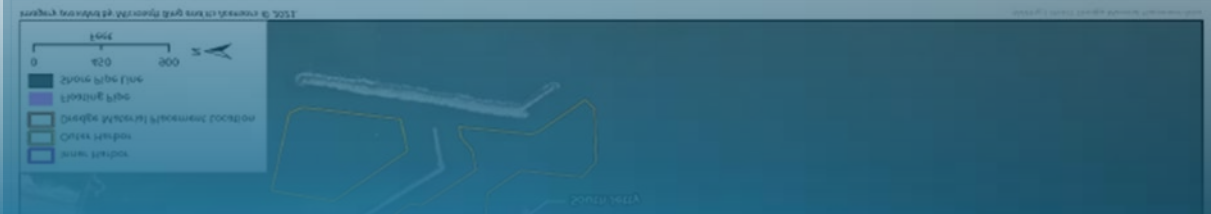
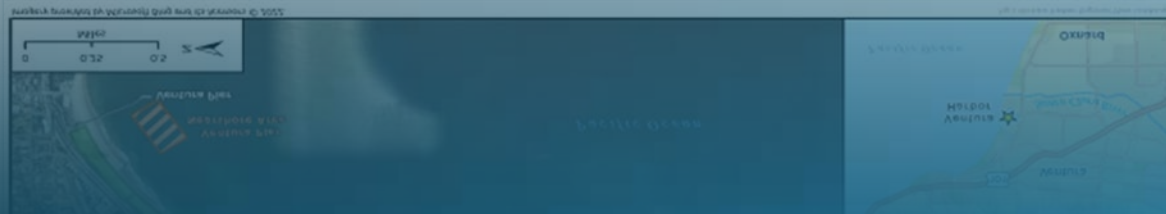
Fig. 3 United States Parkways Regional Flow Landscape

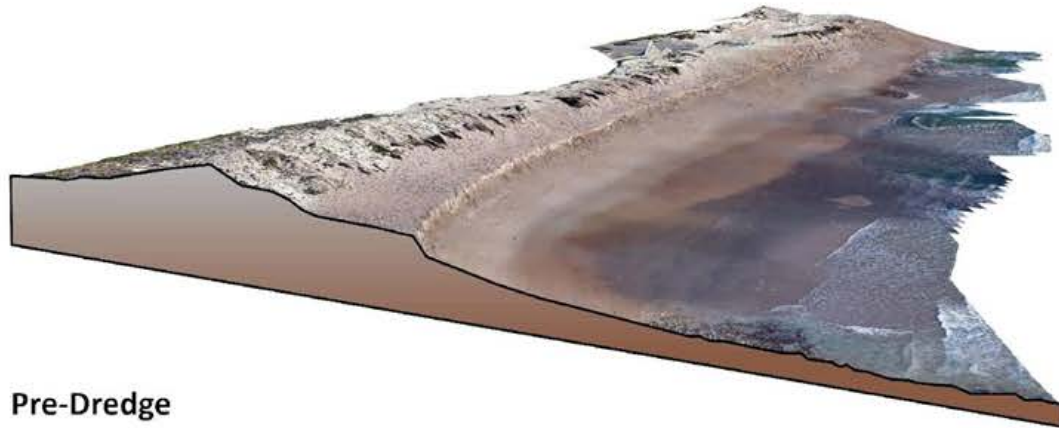
Figure 2. Ventura Outer Harbor Dredge Material Placement Location and Pipelines Implemented from February to March 2022



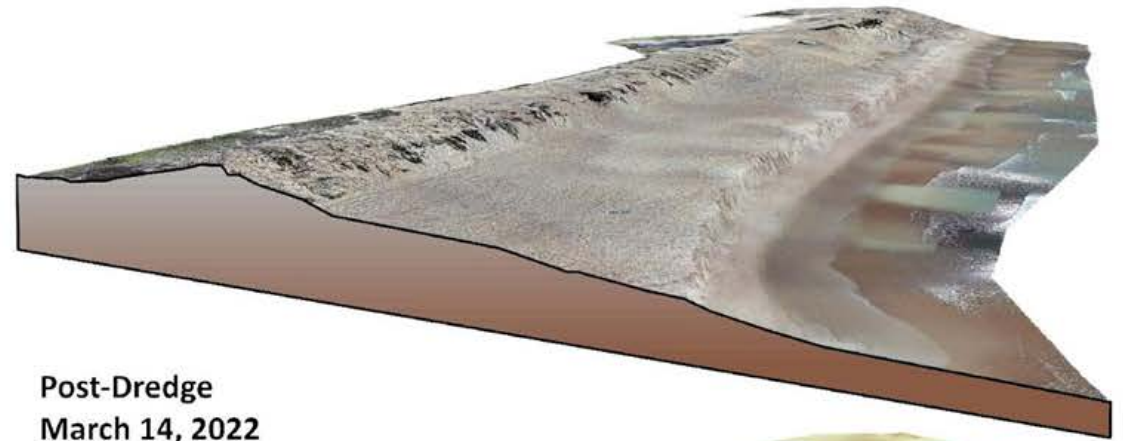
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### Building a Model Using a General Purpose Model

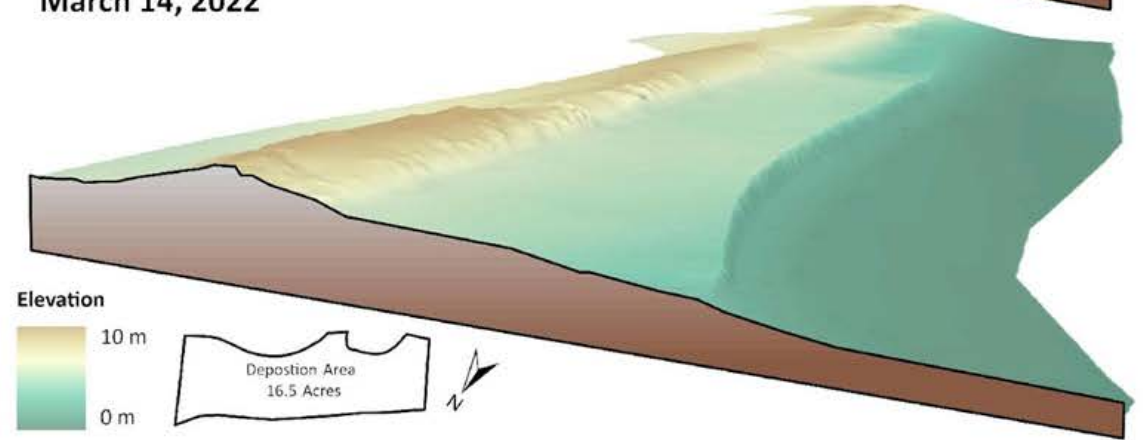
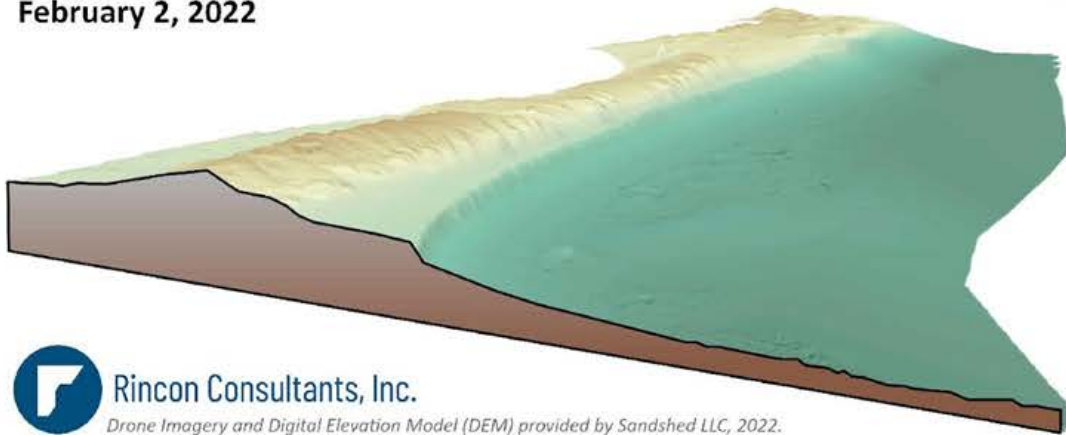




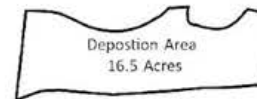
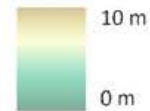
Pre-Dredge  
February 2, 2022



Post-Dredge  
March 14, 2022



Elevation



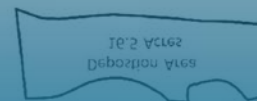
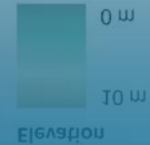
Rincon Consultants, Inc.

Drone Imagery and Digital Elevation Model (DEM) provided by Sandshed LLC, 2022.



Drone Imagery and Digital Elevation Model (DEM) provided by Sandshed LLC, 2022.

Rincon Consultants, Inc.



Using a newly-developed computer model called “CoSMoS-COAST” (Coastal Storm Modeling System – Coastal One-line Assimilated Simulation Tool) scientists predict that with limited human intervention, 31 to 67 percent of Southern California beaches may become completely eroded (up to existing coastal infrastructure or sea-cliffs) by the year 2100 under scenarios of sea-level rise of one to two meters.

04 • 25 • 2018

# Will California’s Beaches Go Extinct?

By msackett

## Adapting to shoreline retreat: Finding a path forward

By

Ryan Anderson<sup>1</sup>, Kiki Patsch<sup>2</sup>, Charles Lester<sup>3</sup>, and Gary Griggs<sup>4</sup>

*1) Department of Anthropology, Santa Clara University*

*2) Environmental Science and Resource Management Department, California State University Channel Islands*

*3) Ocean and Coastal Policy Center, University of California Santa Barbara*

*4) Earth and Planetary Sciences Department, University of California Santa Cruz*

## California’s coastal development: Sea-level rise and extreme events — where do we go from here?

By

Gary Griggs<sup>1</sup> and Kiki Patsch<sup>2</sup>

## Groins, sand retention, and the future of Southern California’s beaches

By

Gary Griggs,<sup>1</sup> Kiki Patsch,<sup>2</sup> Charles Lester,<sup>3</sup> and Ryan Anderson<sup>4</sup>

# Conclusion

- BEACON is bringing together the best:
  - available science
  - available policy
  - available decision support tools
  - analysis
- Bringing together individual cities, counties, harbors etc. within the Santa Barbara Littoral cell to reduce the knowledge gaps, coordinate efforts, and streamline coastal management to the regional scale.