

AB 691 Synthesis Report

Proactively Planning for Sea Level Rise Impacts on
Granted Public Trust Lands

CMANC Fall 2022

Dr. David Revell

*Principal – Coastal Resilience
Integral Consulting*

drevell@integral-corp.com



AB 691 Legislation

Muratsuchi, Chapter 592, Statutes of 2013

Protecting & Adapting Public Trust Lands & Resources

- 1) Assess Vulnerability to Sea Level Rise
- 2) Mapping of Sea Level Rise Projections
- 3) Estimate Financial Costs
- 4) Propose Adaptation Strategies



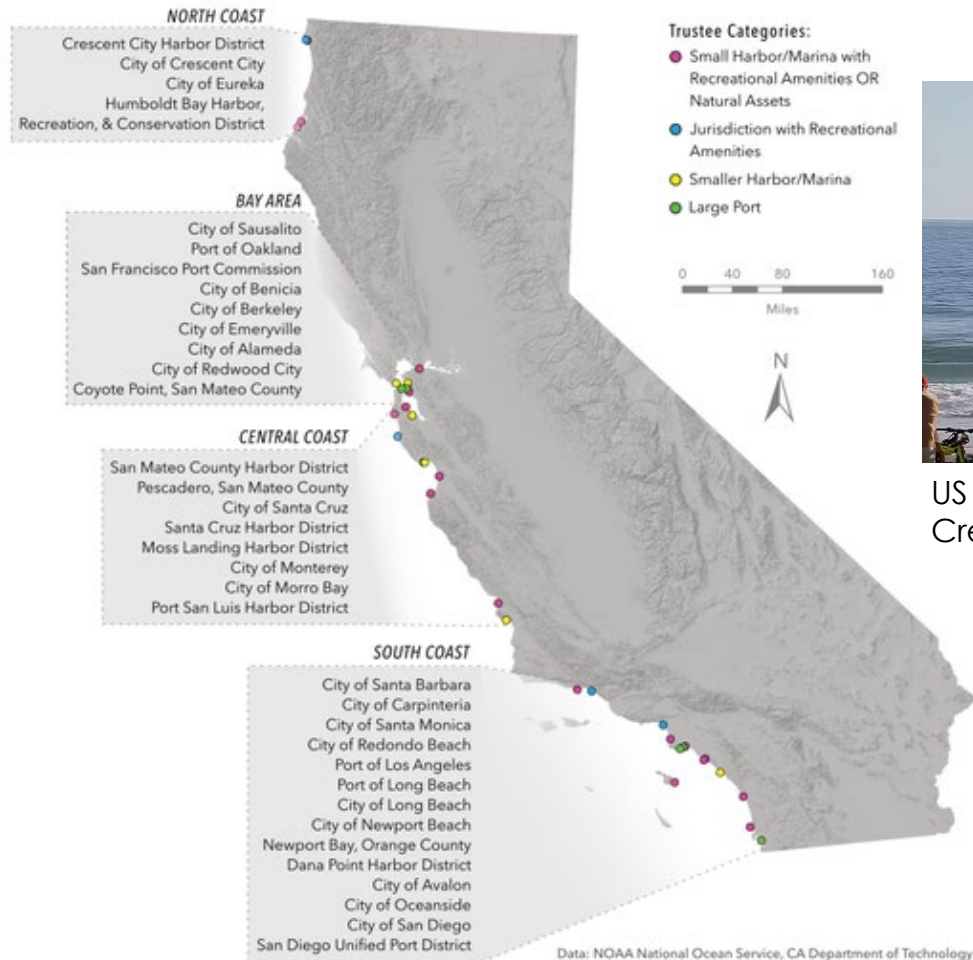
Kayakers, Redwood City. Credit: GalliBM via Wikimedia Commons



Beachgoers at Redondo Beach. Credit: SLC



TRUSTEES REQUIRED TO SUBMIT AN AB 691 SEA-LEVEL RISE ASSESSMENT



Trustees



US Open of Surfing in Huntington Beach
Credit: World Surf League



Synthesis Report

AB 691 Synthesis Report

Proactively Planning for Sea Level Rise
Impacts on Granted Public Trust Lands

California State Lands Commission
100 Howe Avenue, Suite 100 South
Sacramento, CA 95825

Integral Consulting Inc.
200 Washington Street, Suite 201
Santa Cruz, CA 95060

August 2022



Crescent City Harbor District

Del Norte County

Site Description

Crescent City Harbor District (CCHD) is situated on a low-lying portion of the Pacific coast in northern California. In 1931, CCHD was formed in accordance with Statutes of 704 and originally consisted of tide and submerged lands measuring 400 acres. The CCHD owns and controls land and tideland properties seaward of the 1948 ordinary high-water mark bounded by Crescent City to the west, Crescent Beach to the east, a U.S. Highway 101 corridor to the north, and Lighthouse Way Breakwater to the south. CCHD's property is bounded by a series of breakwaters, except to the north where the boundary becomes less linear. These sovereign lands were granted in 1963, and CCHD now consists of approximately 4,052 acres of land and water area.

Like much of California, CCHD and the surrounding areas are vulnerable to extreme coastal events combined with rising seas. Extreme events such as storm surges and tsunamis can and have caused widespread adverse impacts to coastal resources and infrastructure without the addition of higher sea levels.

Coastal Hazards considered:

tidal inundation, storms/tsunamis, earthquakes,
saltwater intrusion, shoreline change



Granted Land Type:
Smaller Harbor/Marina
with Recreational
Amenities or Natural
Assets

Public Trust Uses

Primary Uses: Commerce,
Navigation
Secondary Uses: Environmental
Stewardship, Fisheries, Recreation



Modeling system used for mapping:
NOAA

Sea level rise scenarios/elevations
[LINK TO FULL ASSESSMENT](#)

Vulnerable Public Trust Resources

Built Facilities

Pump-out station, boat ramps, docks, dredge ponds, breakwaters, maintenance/storage buildings, office/retail buildings, restrooms, roads/parking areas, seafood processing plants, shipyard building, solar array, seawall, synchro-lift, travel-lift, utilities, and groin

Natural Assets

Beaches

Findings – Vulnerabilities

Most Identified Vulnerabilities:

- Vessel Infrastructure
- Protective Structures
- Beaches and Habitats

Missing From Most:

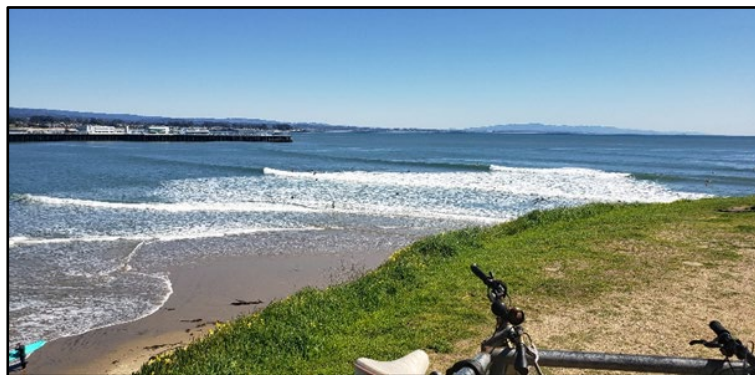
- Consideration of dependent external infrastructure (utilities, waters, etc.)



Container ships at Port of Los Angeles. Credit: US FDA



Dana Point Harbor breakwater. Credit: Dana Point Harbor



Santa Cruz Wharf. Credit: D. Revell

Findings – Estimated Costs

Estimated Costs (2020-2100):

- Damages & Replacements – \$19 billion
- Loss of Natural Resources – \$5 billion
- **Total – Over \$24 billion**
- Uneven revenue distribution, affects ability to pay
- Need standardized methods to estimate costs
- Most analyses underestimated the costs

Inability to pay for adaptation

Trustee Category	Estimated Costs (2020-2100)
Large Ports	7x Annual Revenues
Small Marinas & Harbors with Recreational Amenities	71x Annual Revenues
Small Marinas & Harbors	77x Annual Revenues
Jurisdictions with Recreational Amenities	166x Annual Revenues

(Based on 2013 to 2019 revenues)

Findings – Adaptation Strategies

Short-Term Strategies:

- Repairing & replacing damaged assets
- Maintaining & elevating protective structures
- Elevating docks & wharves

Mid-Term Strategies:

- Improve navigation Infrastructure
- Lack of discussion of beneficial sediment reuse

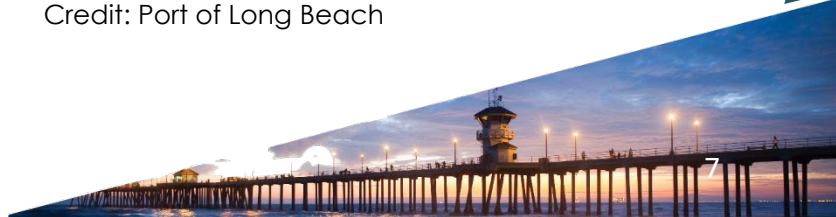


Example of beneficial reuse – dredged sediment application to raise marsh elevation. Credit: San Mateo County.



Location of a proposed seawall retrofit (red line) to protect chemical storage tanks, Port of Long Beach

Credit: Port of Long Beach

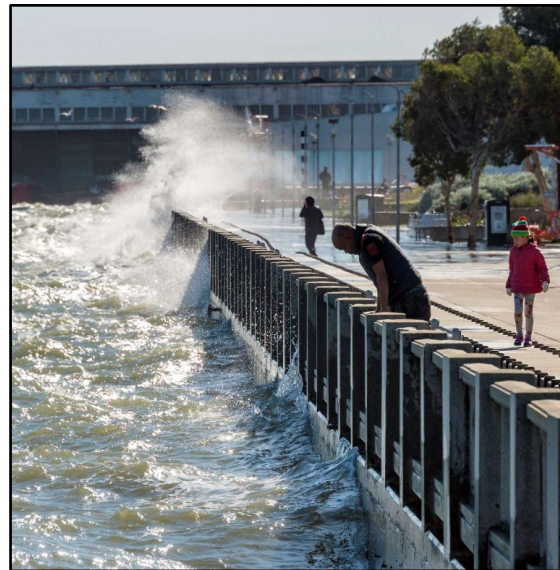
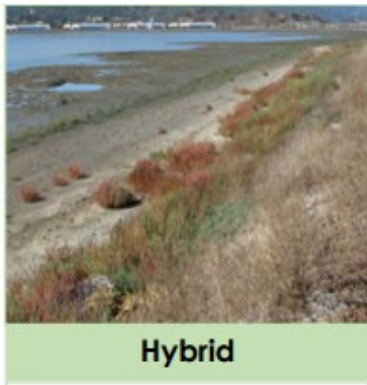


Findings – Adaptation Strategies

Long Term Strategies:

- Managed retreat or realignment
- Policies to guide their future selection of adaptation plans
- Triggers & Thresholds to guide phased adaptation strategies
- Limited consideration of upland land acquisition

Examples of Potential Shoreline Protection Strategies for Adaptation



Embarcadero Seawall, Port of San Francisco
Credit: Coastal Commission



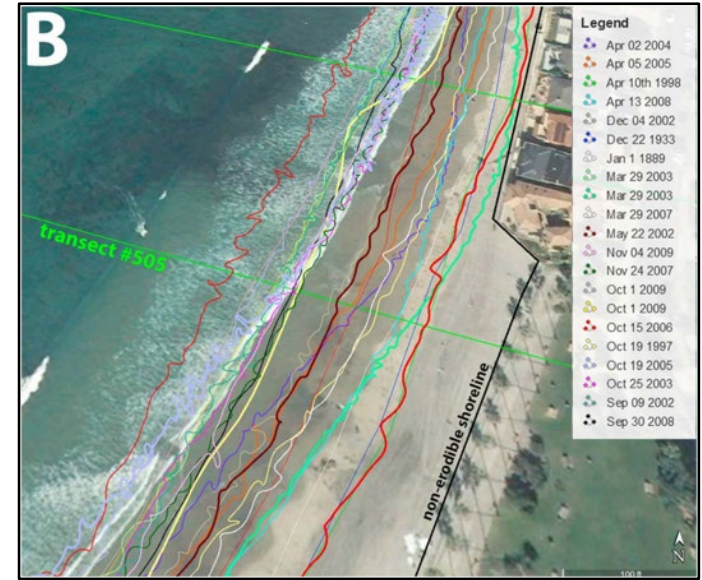
Challenges & Recommendations

Challenges

- Ambulatory boundaries
- Sea level rise is causing boundaries to migrate landward

Recommendations

- Complete mapping of current granted lands boundaries
- Consider the future location of boundaries in vulnerability assessments & adaptation plans



Example of different surveys identifying high tide lines used in determining the ambulatory mean high tide line. Credit: SLC

Challenges & Recommendations

Challenges

- Lack of Guidance
- Inconsistent Guidance



Recommendations

- Align statewide policies & guidance
- Expand guidance for assessing:
 - Social Vulnerabilities
 - Cost Impacts
 - Natural Resources
 - Vulnerable Infrastructure



Beachgoers, Oceanside. Credit: SLC



Challenges & Recommendations

Challenges

- Lack of Resources
- Permitting Challenges



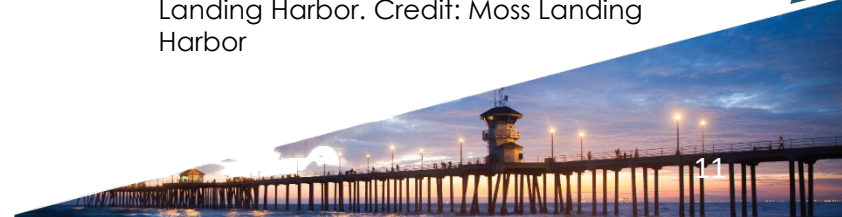
• Eelgrass over rocky tidepool,
Monterey Bay. Credit: Dr.
Dwayne Meadows

Recommendations

- Increase State funding & support for:
 - Research & Data
 - Vulnerability assessments
 - Adaptation Plans & Implementation
 - Damages & Losses
- Simplify permitting & funding for nature-based projects



Nature-based adaptation plans, Moss Landing Harbor. Credit: Moss Landing Harbor



Looking Ahead

- Updates to State guidance (SLR State Action Plan)
- New OPC-funded Research
- Proposed legislation (SB 867)
- Staff Recommendation: Consider codifying periodic updates to AB 691 Assessments



Container ships leaving port. Credit: Tryaging.

Adaptation Case Study: Santa Cruz

Examined Four Options

- Business as Usual
- Coastal Recreation Focused
- Protection Focused
- Managed Retreat

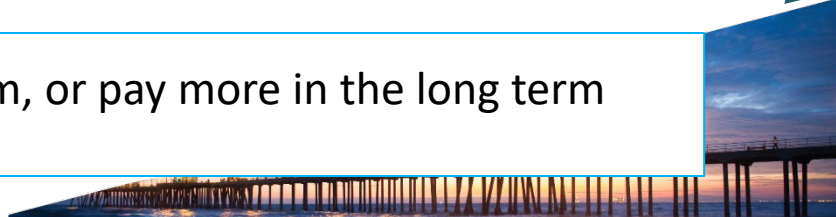


Recreation Focused Actions – keeping surf and beach recreation along with Recreational Trail showed highest benefit and probability of success

Business as usual cost the most in the long term

Managed Retreat and Protection Focused better if undertaken before SLR gets above about 9"

Key decision is whether to invest in the short term, or pay more in the long term

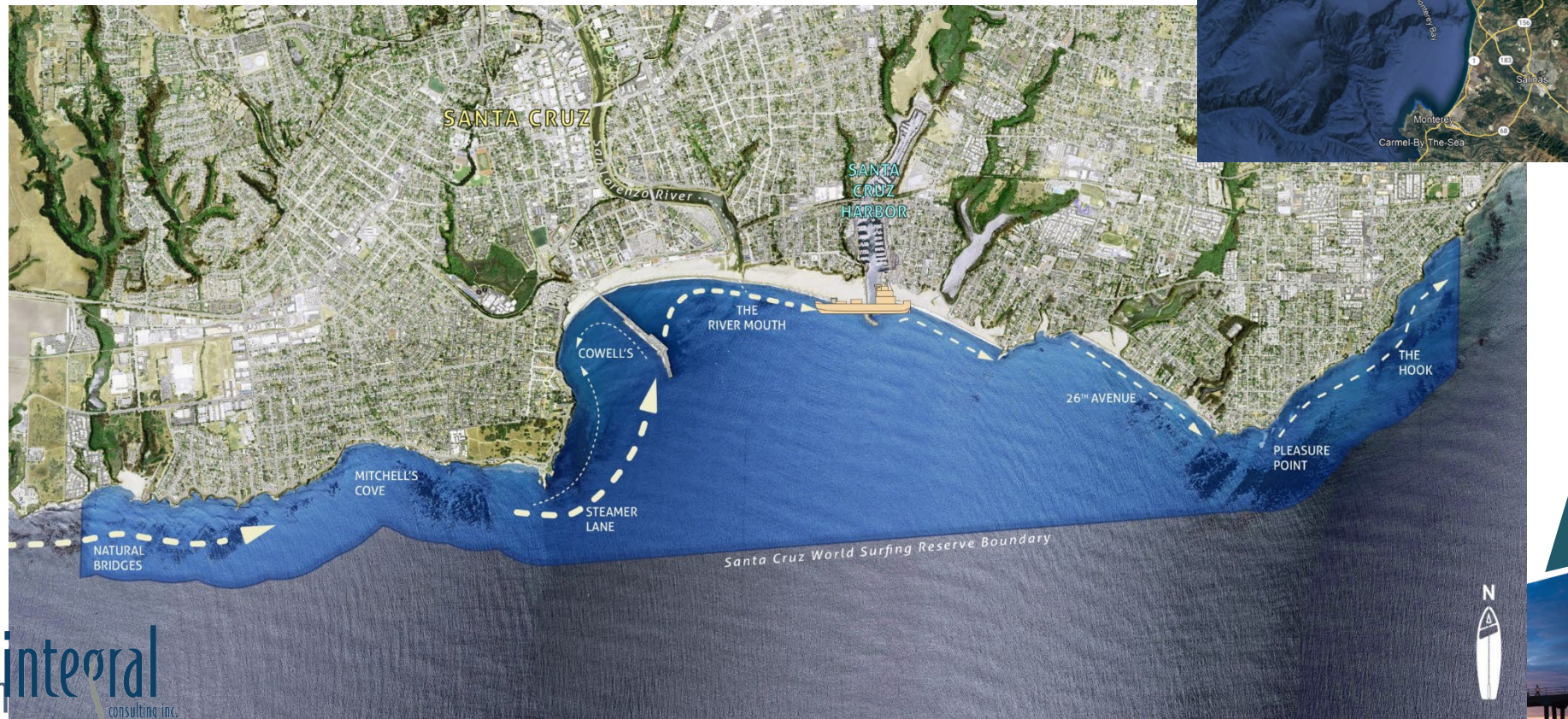


West Cliff Drive: Sand Management Feasibility Study

- Backpass sand to improve recreation along West Cliff Drive
- Place sand at Pyramid Beach
- Sand will move downcoast filling small beaches and improve surf quality
- Feasibility study to examine costs, sand volumes, permitting, sand transport and engineering



Natural Sediment Transport



West Cliff Drive Sediment Backpass



Backpass sand to West Cliff Beaches to enhance beach and surf recreation and reduce maintenance costs and erosion



Potential County Sediment Management



Change timing and location of dredge placement to use seasonal sand transport patterns to enhance downcoast beaches



THANK YOU & QUESTIONS

David Revell, PhD

drevell@integral-corp.com

Maren Farnum & Michael Wells

Executive Office

maren.farnum@slc.ca.gov

michael.wells@slc.ca.gov

