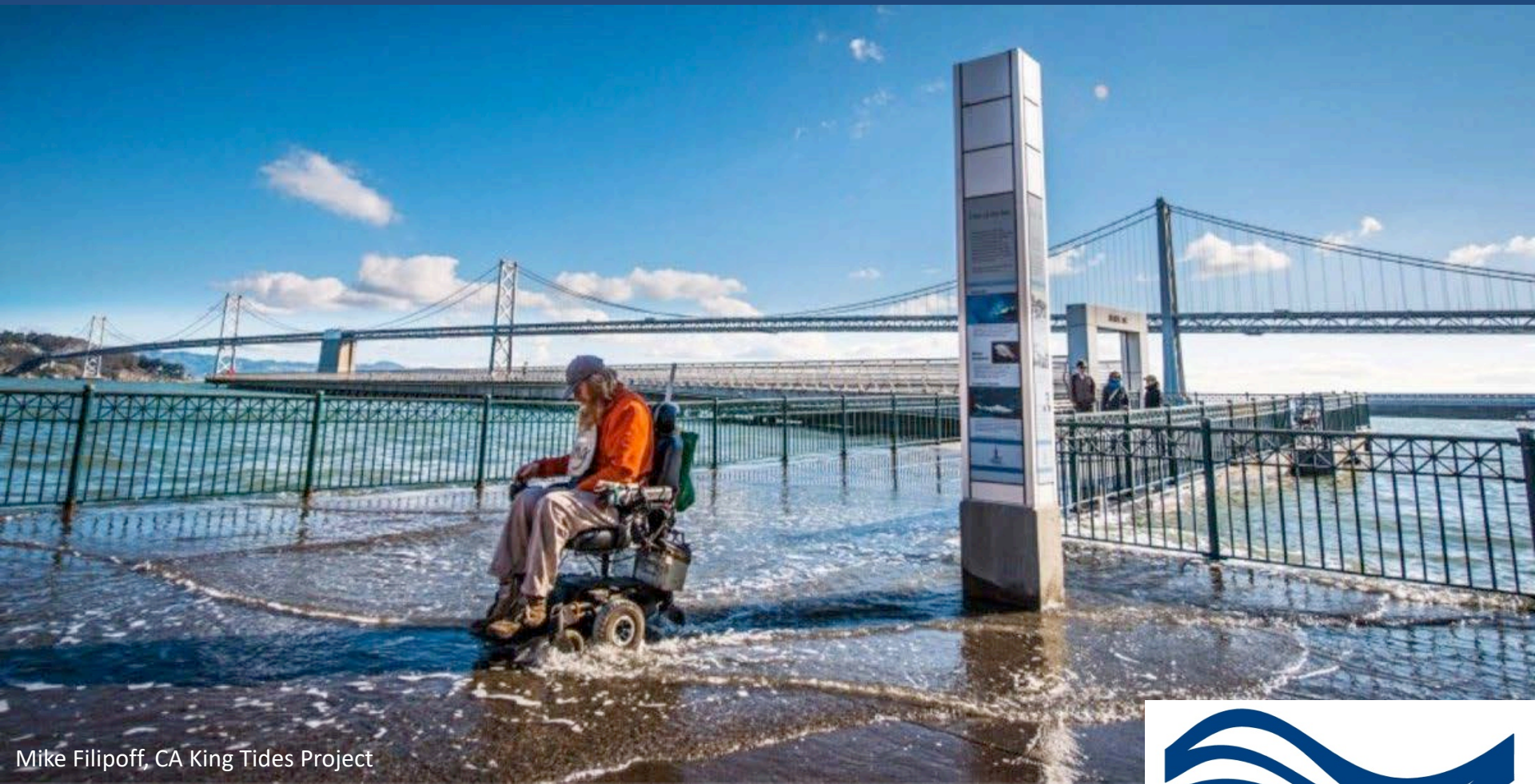


# Meeting the Challenge of Climate Change



Mike Filipoff, CA King Tides Project

**Christina Toms**  
Senior Environmental Scientist (Specialist)





# Climate Change Threats

- More frequent and severe droughts and floods
- Sea level rise



# Projected Sea Level Rise

(b) San Francisco, Golden Gate

<i>Feet above 1991-2009 mean</i>	<b>MEDIAN</b>	<b>LIKELY RANGE</b>	<b>1-IN-20 CHANCE</b>	<b>1-IN-200 CHANCE</b>
<b>Year / Percentile</b>	<i>50% probability SLR meets or exceeds...</i>	<i>67% proba- bility SLR is between...</i>	<i>5% probability SLR meets or exceeds...</i>	<i>0.5% probability SLR meets or exceeds...</i>
2030	0.4	0.3 – 0.5	0.6	0.8
2050	0.9	0.6 – 1.1	1.4	1.9
2100 (RCP 2.6)	1.6	1.0 – 2.4	3.2	5.7
2100 (RCP 4.5)	1.9	1.2 – 2.7	3.5	5.9
2100 (RCP 8.5)	2.5	1.6 – 3.4	4.4	6.9
2100 (H++)	10			
2150 (RCP 2.6)	2.4	1.3 – 3.8	5.5	11.0
2150 (RCP 4.5)	3.0	1.7 – 4.6	6.4	11.7
2150 (RCP 8.5)	4.1	2.8 – 5.8	7.7	13.0
2150 (H++)	22			



# Climate Change Threats

- More frequent and severe droughts and floods
- Sea level rise
- Coastal flooding, overtopping, erosion
  - Higher groundwater tables
  - Drowning of tidal marshes





# Wetland Policy Update



- What we're doing
- What we've learned
- What we're going to do



# What We're Doing

1. Case studies: Planning and permitting projects
2. Engaging in collaborations and outreach
3. Supporting the Adaptation Atlas

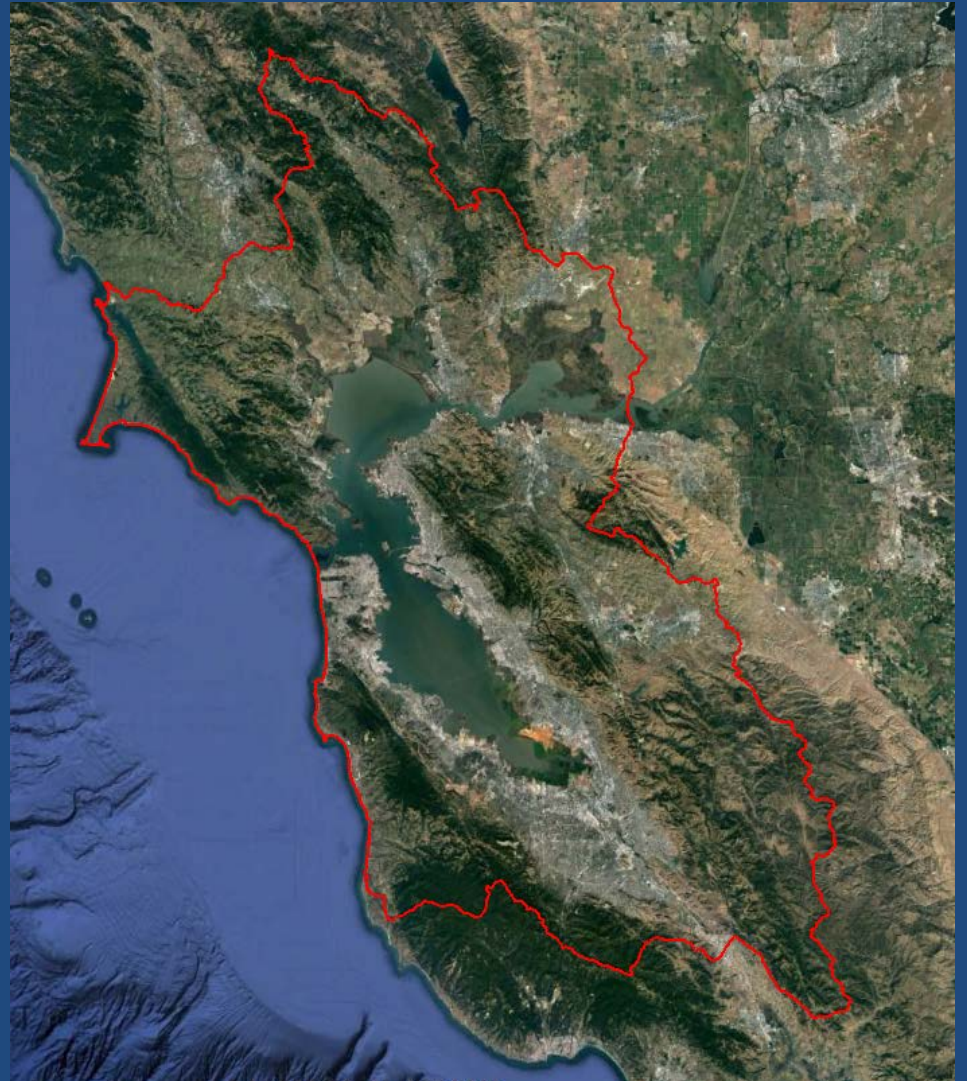


# 1. Case Studies: Project Planning and Permitting



# Key Water Board Authorities

- Placement of fill in wetlands and waters
- Dredging and beneficial reuse
- Nearshore discharge of treated wastewater





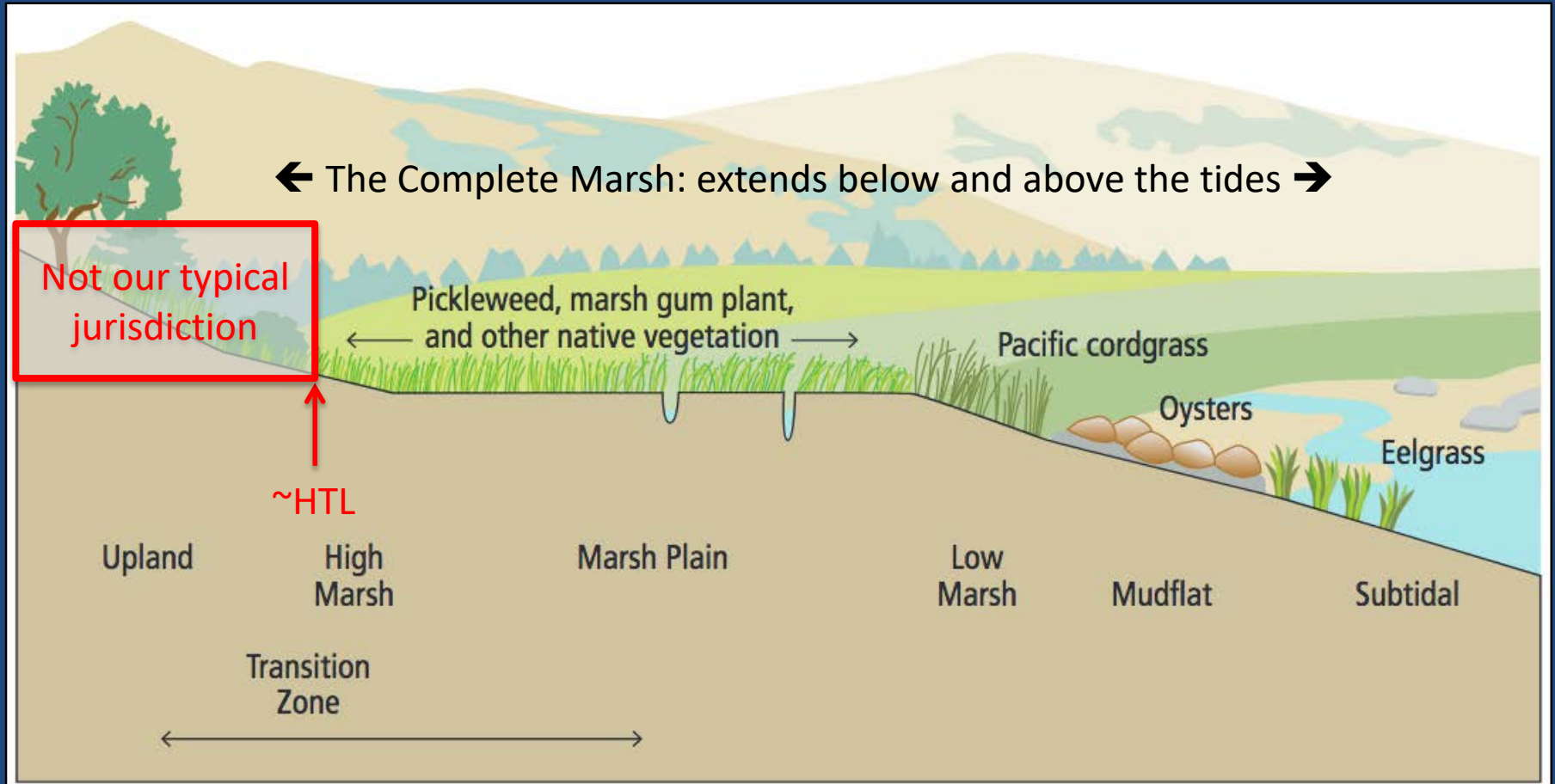
# CA Wetlands Conservation Policy

- “No Net Loss”
- Ensures no overall net loss and a long-term net gain in wetlands acreage, functions, and values
- Emphasizes regional restoration goals, planning, and strategies



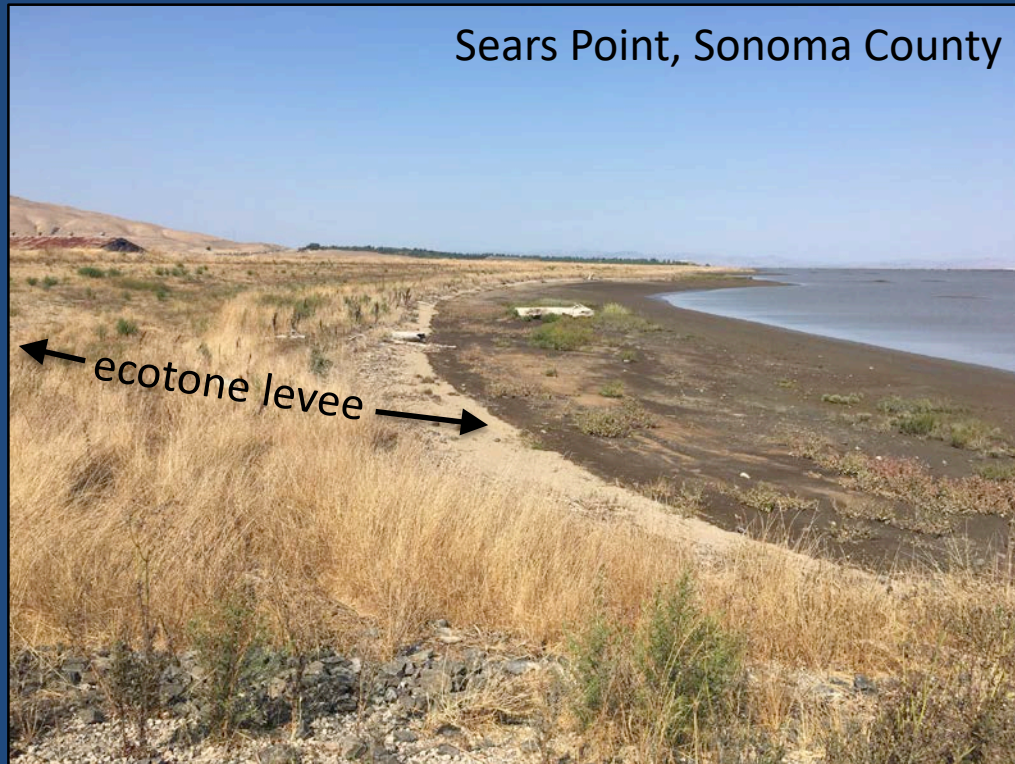
# The Complete Tidal Marsh

- Important habitats above the high tide line (HTL)





# Features Above the High Tide Line



# Case Studies: Multi-Benefit Projects

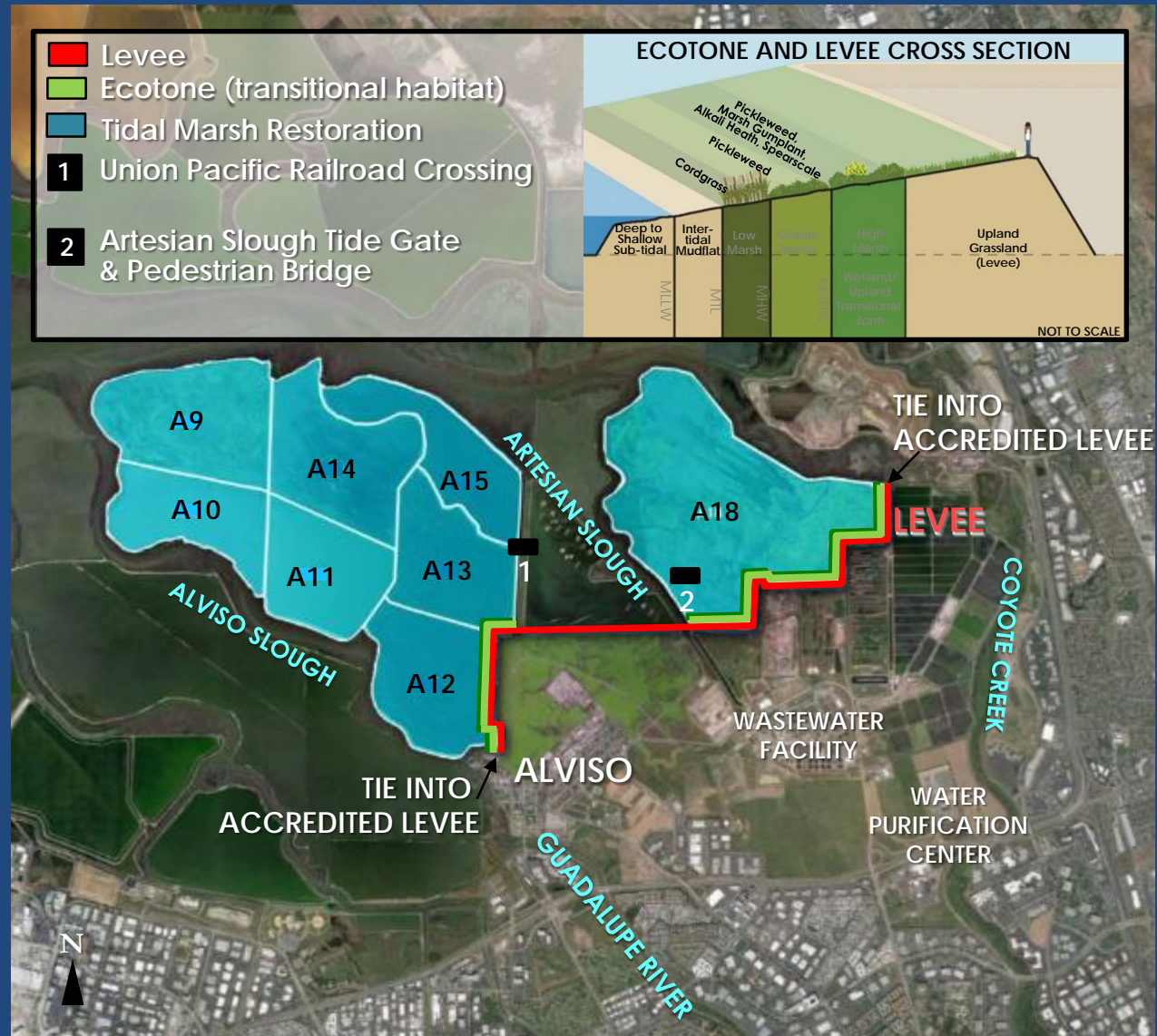
- Tidal wetland restoration
- Shoreline adaptation
  - Grey infrastructure
  - Green/nature-based infrastructure





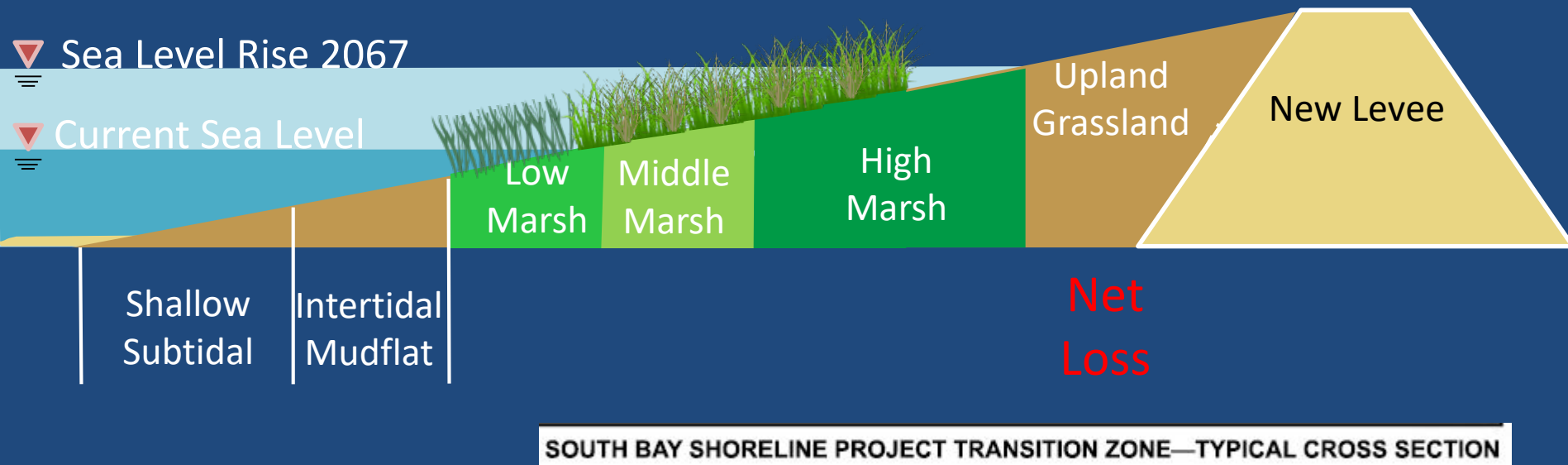
# Tidal Wetland Restoration

- South Bay Shoreline (San Jose) Protection Project



# Tidal Wetland Restoration

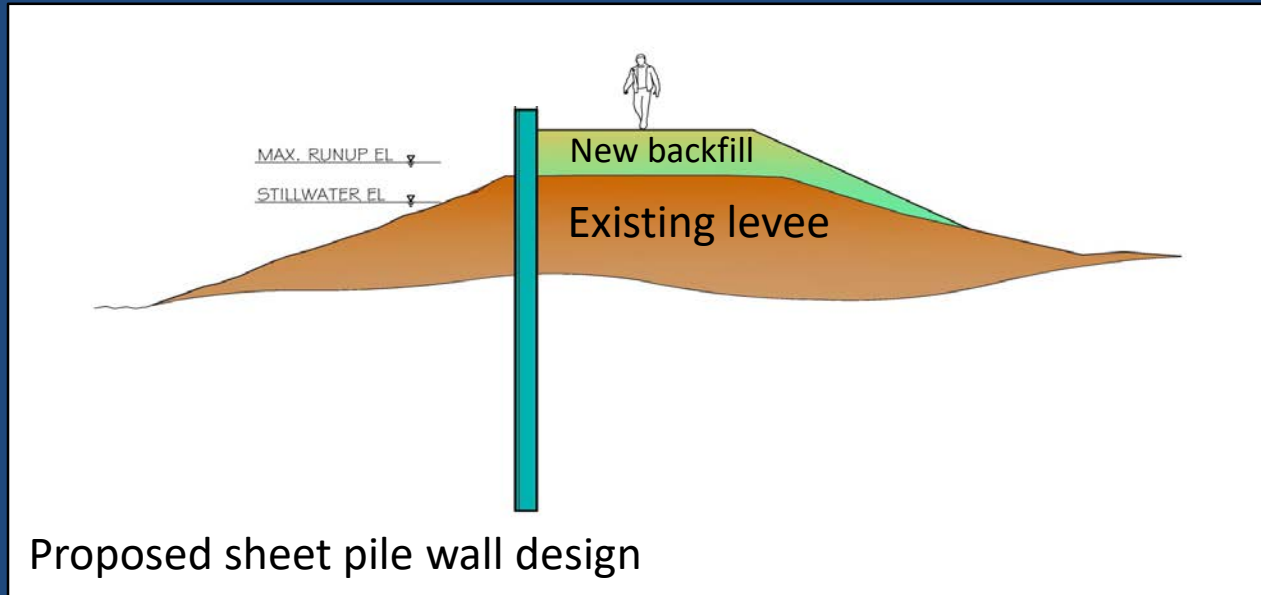
- South Bay Shoreline (San Jose) Protection Project





# Grey Infrastructure

- Foster City Levee Improvement Project



# Nature-Based Infrastructure

- Aramburu Island (Mill Valley) Beach Enhancement Project (led by Water Board!)





# Dredging and Beneficial Reuse

- Novato Creek 2016 Dredge and Thin-Lift Placement





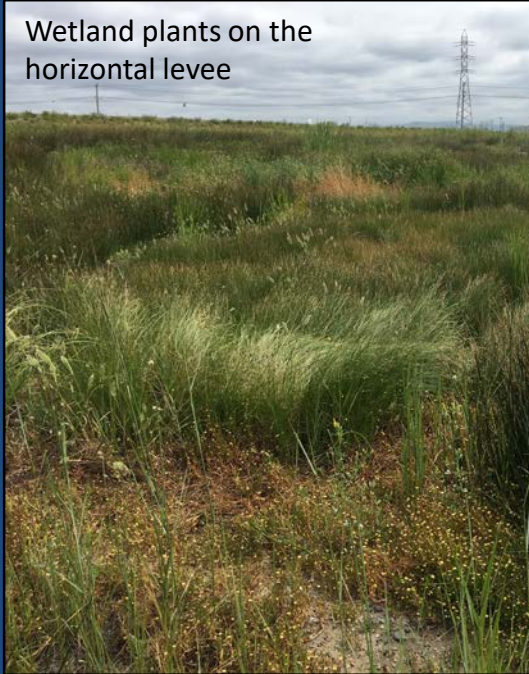
# Nearshore Discharge of Treated Wastewater

- Oro Loma Horizontal Levee Pilot Project

Water Board staff with Dr. Peter Baye and Dr. David Sedlak



Wetland plants on the horizontal levee



Willows on the horizontal levee





## 2. Collaboration & Outreach



# San Francisco Bay Restoration Regulatory Integration Team

- Inter-agency coordination of permitting for multi-benefit projects
- Outgrowth of SF Bay Restoration Authority





# Bay Conservation and Development Commission

- Bay Plan Amendment on Fill for Habitat
- Adapting to Rising Tides Project



# Wetland Regional Monitoring Program

- Core Team, Steering Committee, and Science Advisory Team
- Lead the Physical Processes Team
- Four workshops with a broad range of decision-makers and scientists

## **Collaborative Science for Healthy Wetlands**

**A pilot program to monitor  
tidal marsh habitat in the San  
Francisco Estuary**



# National and Regional Forums

- EPA Wetland Type Conversion Workgroup
- NOAA: National Thin-Lift Sediment Placement Technical Advisory Committee (TAC)
- Coastal Conservancy: Living Shorelines TAC
- The Nature Conservancy: Natural Infrastructure in California TAC
- SF Bay Joint Venture: Science Steering Committee

# Conferences & Workshops

- Bay-Delta Science Conference
- State of the Estuary Conference
- Restoring America's Estuaries Summit
- Living Shorelines Tech Transfer Workshop
- Beneficial Reuse of Treated Wastewater Workshop





# Collaborative Project Planning

- Bothin Marsh Evolving Shorelines (Mill Valley)
- Pond A8 Area (San Jose)
- Novato Baylands & Highway 37 Corridor
- San Pedro Road (San Rafael)
- Peyton Slough (Martinez)



## BOTHIN MARSH OPEN SPACE PRESERVE

EVOLVING SHORELINES: A VISION FOR THE FUTURE AND A PLAN FOR TODAY



Tomales Bay Living Shorelines

Haire Ranch / Skaggs Island

Highway 37

EcoRestore

Sears Point

Novato Baylands

McInnis Marsh

San Pedro Road

Peyton Slough Marshes

Drake's Lagoon

Giant Marsh - Living Shorelines

Bolinas Lagoon

Bothin Marsh

San Francisco Embarcadero

Oro Loma WWTP

San Francisco Airport

South Bay Salt Ponds

Foster City 3rd Ave.

Palo Alto WQCP

South Bay Shoreline

Pond A8

Pescadero Marsh

# Collaborative Project Planning



# 3. Operational Landscape Units

DRAFT - December 4, 2018

## SAN FRANCISCO BAY SHORELINE **Adaptation Atlas**

**Working with Nature to Plan for Sea Level Rise**

USING OPERATIONAL LANDSCAPE UNITS





# What We've Learned



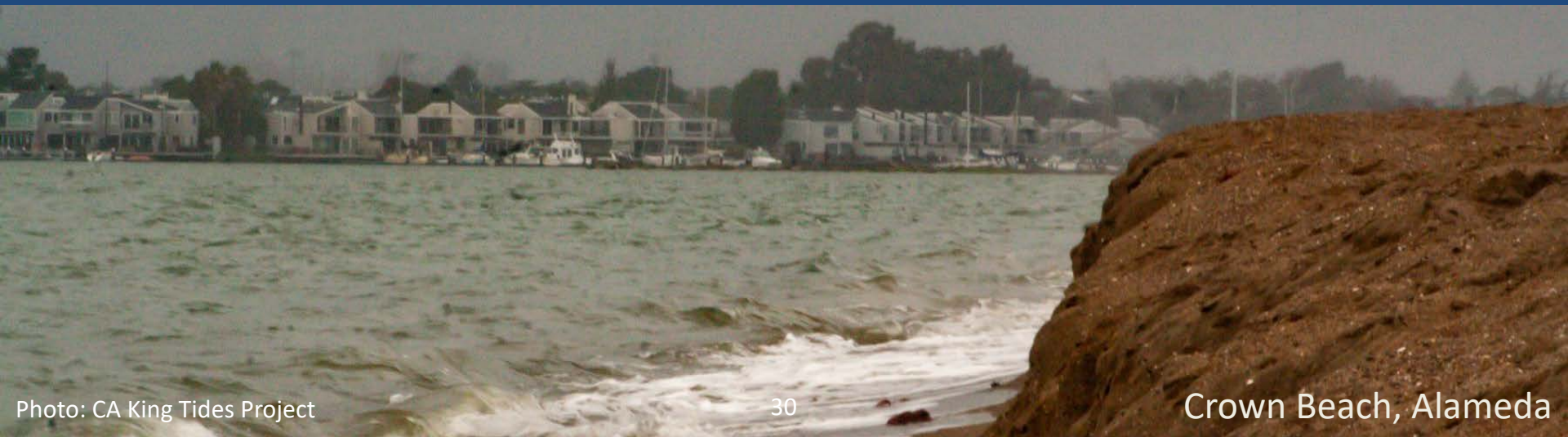
# Key Regulatory Opportunities

1. Clarify how we will apply “No Net Loss” for
  - Horizontal and ecotone levees
  - Living shorelines, beaches, dunes, and hybrid “green-grey” infrastructure
  - Strategic/thin-lift sediment placement
  - High tide refugia



# Key Regulatory Opportunities

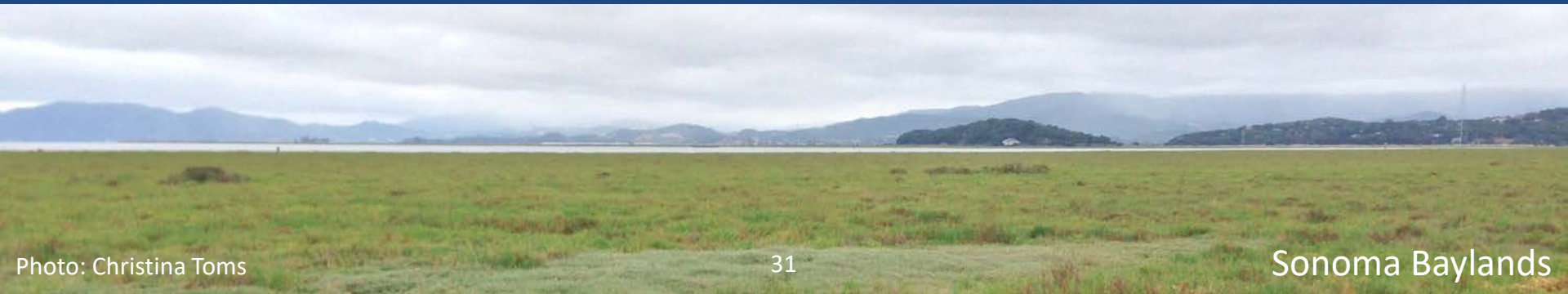
2. Identify benefits of “complete” tidal wetland systems
3. Identify preferred strategies for SLR adaptation – Adaptation Atlas
4. Provide technical guidance for projects





# Key Regulatory Opportunities

5. Clarify acceptable wetland type conversions
6. Consider temporal and spatial tradeoffs and uncertainties
7. Define “multi-benefit” projects
8. Incentivize landward alignments of shoreline protection, movement of natural shorelines



# Key Regulatory Opportunities

9. Minimize shoreline hardening

10. Evaluate mitigation on a regional basis

11. Support regional tidal wetland monitoring





A photograph showing a red SUV driving through a flooded road. The vehicle is splashing water, and a yellow diamond-shaped sign with the word 'FLOODED' is in the foreground. The sign is on a post with a 'COUNTY OF MARIN' sign below it. The background shows a road curving through a wooded area with a car in the distance.

# What We're Going To Do



# Leverage Internal and External Resources

- Continue existing collaborations and outreach
- Identify internal project team
- Develop external advisory committee





# Climate Change Technical Report

- Further technical detail
  - Climate change and the Bay's tidal wetlands
  - Permitting procedures and case studies
  - Key regulatory challenges and opportunities
  - Next steps: Developing an update regulatory framework
- Internal and external peer review
- Release: This summer

# Stakeholder Engagement Strategy

- Hold workshops with Staff and Board on key technical and policy issues
- Collaborate on policy updates





# New Partnerships

- Metropolitan Transportation Commission
- Bay Area Flood Protection Agencies Association (BAFPAA) Climate Hazards Adaptation Resiliency Group (CHARG)
- Bay Area Regional Collaborative (BARC)



# Acknowledgments

- Water Board: Naomi Feger, Lisa Horowitz McCann, Thomas Mumley, Xavier Fernandez, Keith Lichten, Richard Looker, Sami Harper
- SFEI: Julie Beagle, Warner Chabot, Josh Collins, Letitia Grenier, Jeremy Lowe
- Photos: California King Tides Project, <http://www.coastal.ca.gov/kingtides/>





Questions?

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