Hwy 37 Adaptation to Rising Seas

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Photo: Marin IJ

Overview

- Hwy 37: State-wide Significance
- Transportation, Flood, Climate Adaptation, Ecosystem Restoration
- Existing Setting: Degradation of Tidal Marsh System and Public Ownership of Inland Marshes
- Regulatory Considerations
- Forward Thinking

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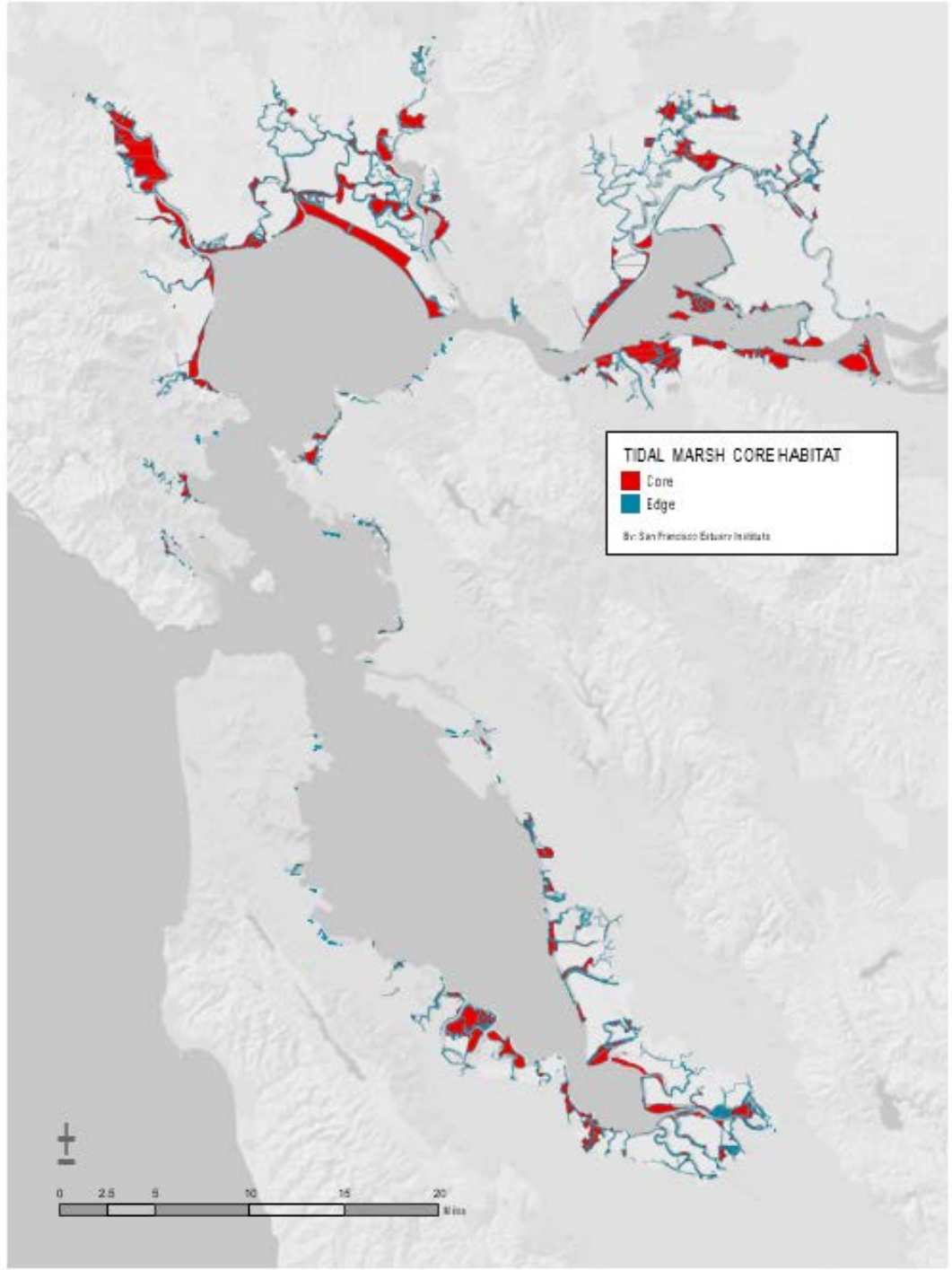
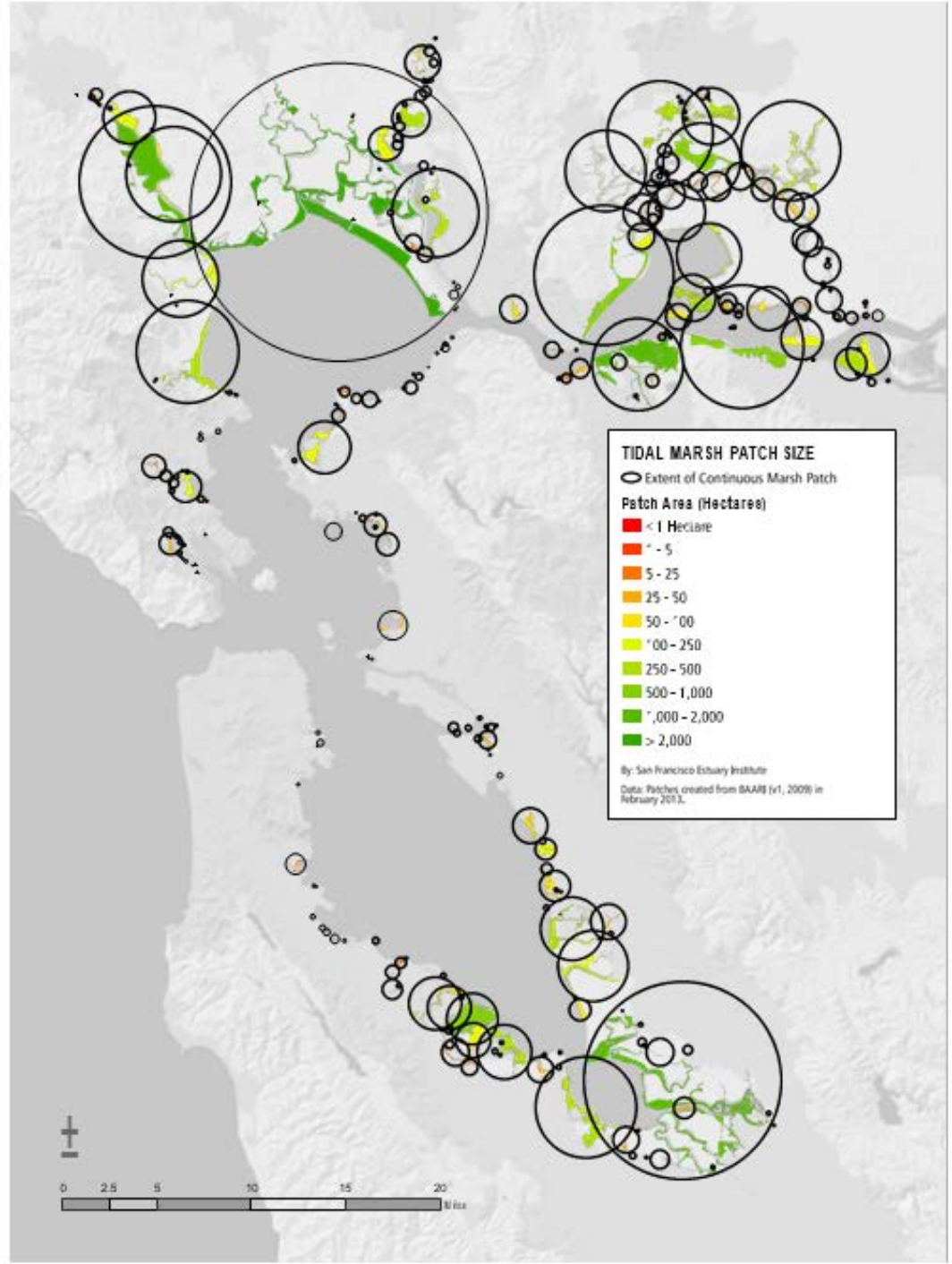
Existing Setting: Degradation of Water Resources

- Water Quality Effects of Current Highway
  - Stagnation, pH (and Ammonia Toxicity), Low DO, Harmful Algal Blooms, Odors, Methylation of Mercury, Toxics, Lost Opportunities for Productivity
- Ecological Effects of Current Highway
  - Corridor interruption, lack of channel complexity and evolution
- Flood Effects of the Current Highway – barrier to flood attenuation
- What would the Water Do without a Highway?
  - High point that periodically floods, refreshing adjacent systems that are now isolated and degraded.
  - How can we mimic this in the design?
  - “Let Nature do the Heavy Lifting”

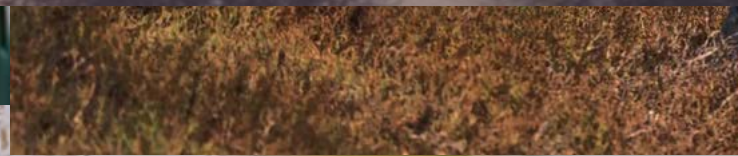


San Francisco Estuary Institute, 2009

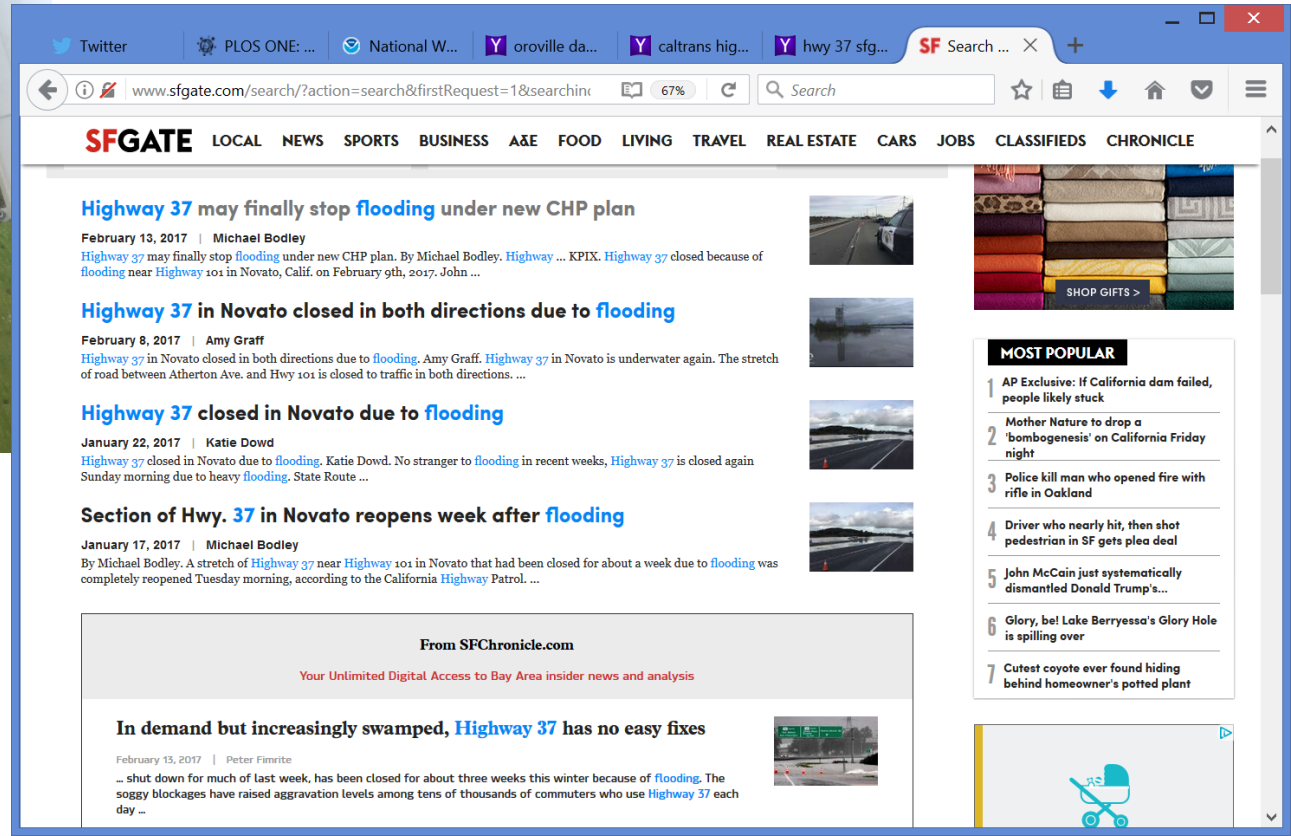


San Francisco Estuary Institute, 2009

Tidal Marshes have Value



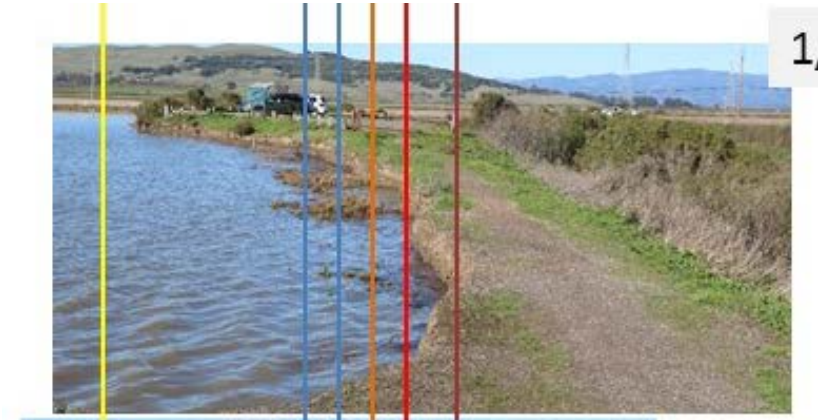
In the news … again & again



Critical infrastructure is eroding

Tolay Lagoon/Hwy 37

This shows the approximate movement of the erosion front on the Tolay Lagoon levee (E end of lagoon) between 2/2013 and 1/2017.



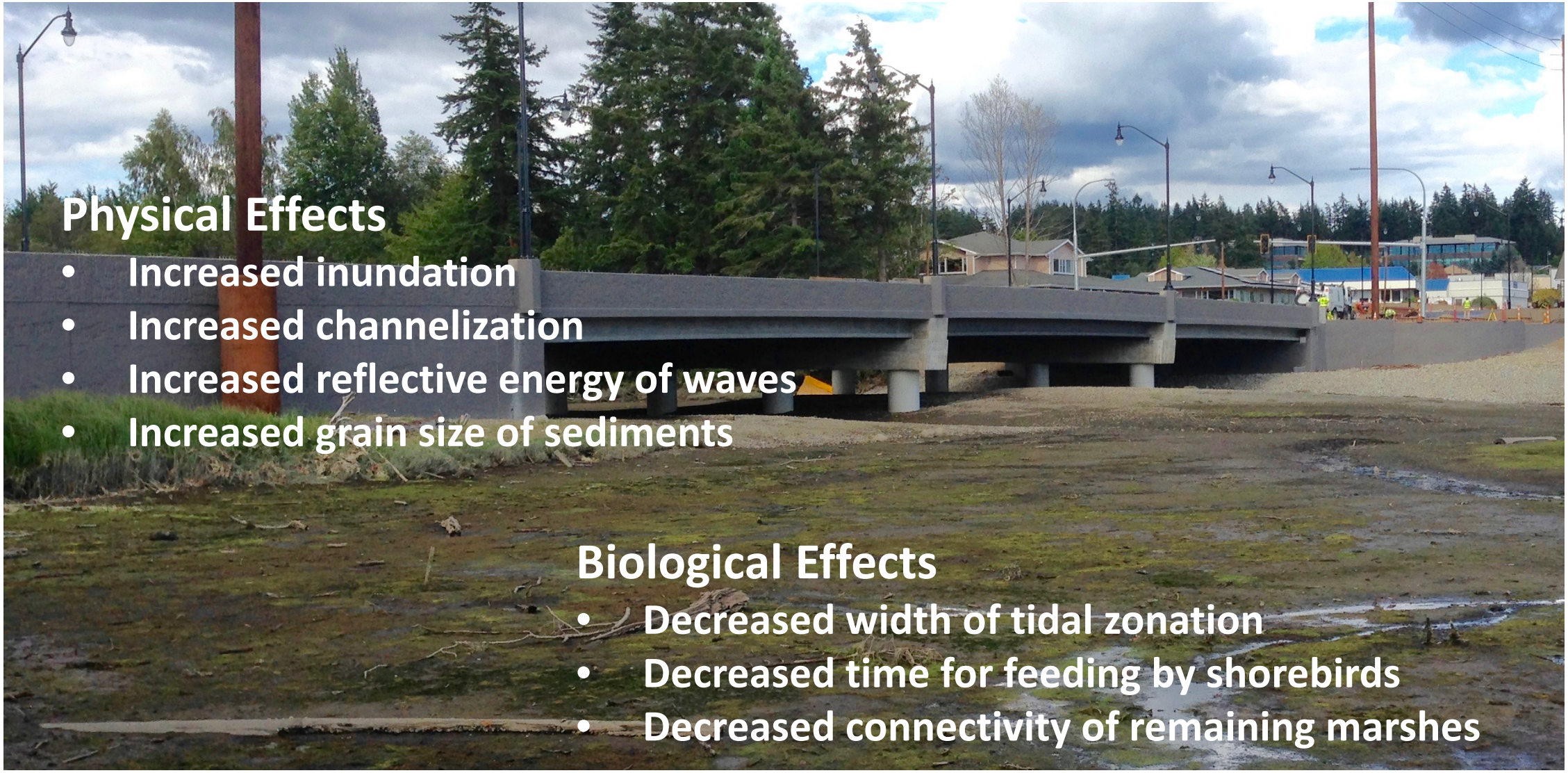
1/14/2017

11/10/2015

1/2/2015

2/5/2013

Mechanisms: Armoring Effects on Marsh Adaptation to Sea Level Rise



Regulatory and Engineering Considerations

- Regulatory Requirements: Clean Water Act 404(b)1 Guidelines – Avoid Fill, then minimize, only then mitigate
  - Where would you get the Fill? Where would you mitigate?
  - Why not design a “self-mitigating” project?
- Engineering Considerations- Wetlands Fill Challenges
  - Bay mud environment, liquefaction
  - Culverts concentrate flows and cause scour, and eventually fail from sediment or erosion.
  - Backwaters along levee/berm with high residence time and WQ Problems, sediment accumulation

Forward-Thinking

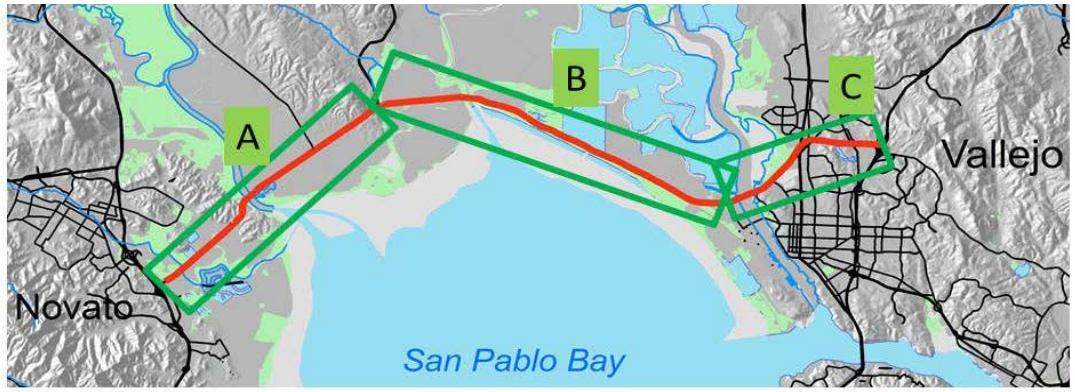
Consider alternatives with approaches that maintain transportation function, not just the structure.

Focus on enhancing the environment of the North Bay through environmentally sensitive design.

Economic benefits of regional flood capacity enhancement – help fund this infrastructure package

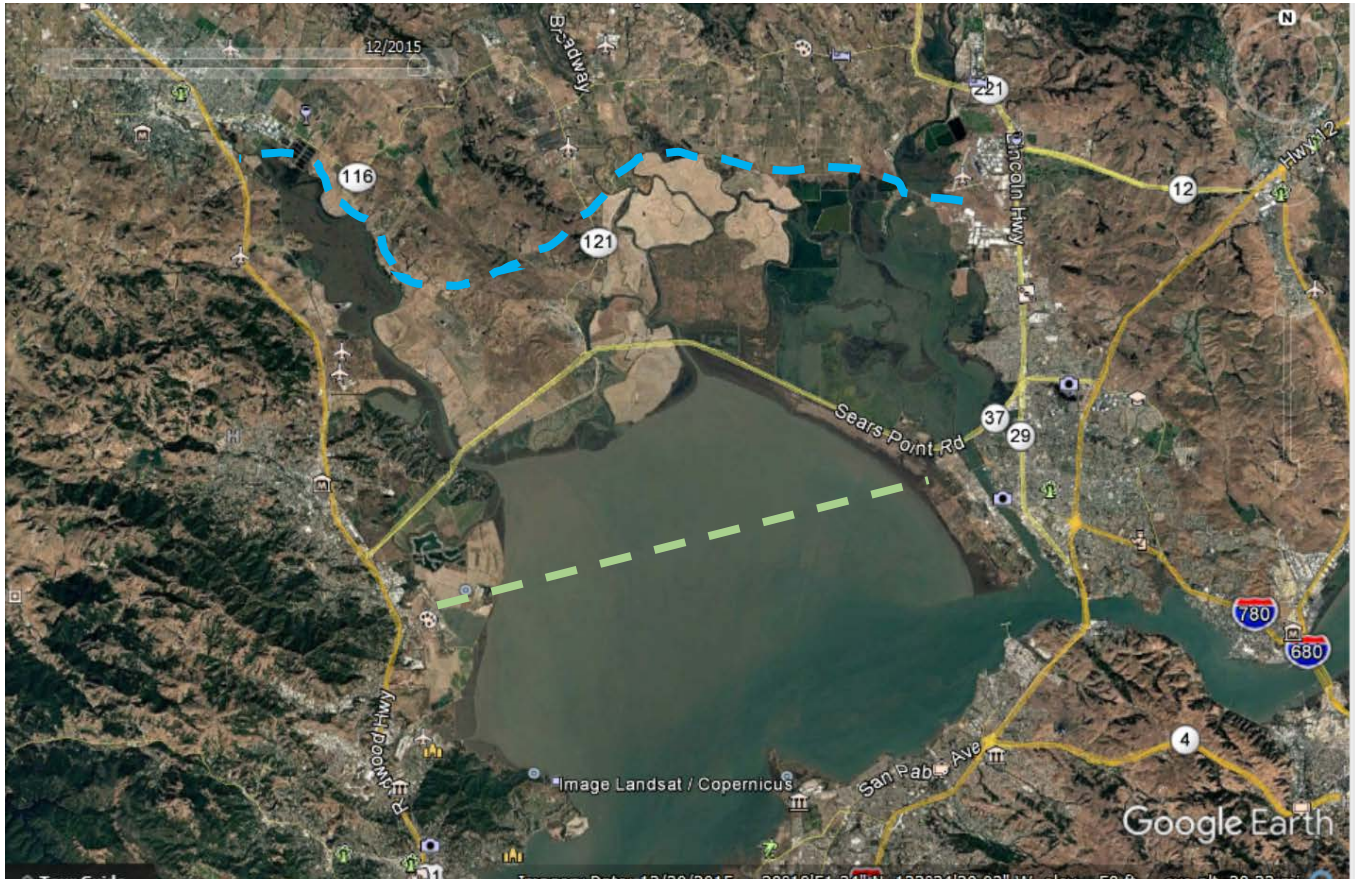
Be ready with partners and funding packages when opportunities arise! *(Measure AA – minor role, if any)*

Developing Resilient Landscapes



Preserving structures

“keep the big picture in mind of the North Bay economies, communities, ecosystems”



Preserving function

Suggested Next Steps

- Consider a Broad Project Definition: *Transportation, Water Resources, Ecosystem Restoration, Regional Flood Management*
- Include Water Specialists on the Design Team
  - Design *with* Nature (bridge) vs. *against* (berm)
  - ASCE perspective: Project that "bridges" the transportation and water "tracks"
- Regional Partnership: Upfront Engagement of Regulatory & Resource Agencies