# Hwy 37 1.0 & 2.0

Transit

Re-align/
Move

SEA LEVEL RISE

STAKEHOLDERS

Levee

4 LANES

Rail

TIDAL MARSH

CAUSEWAY

Timeframe

CONGESTION

Responsible/Lead

Tunnel

Cost

# Hwy 37 1.0 & 2.0

Transit

Re-align/Move

SEA LEVEL RISE

STAKEHOLDERS

Levee

4 LANES

Rail

TIDAL MARSH

CAUSEWAY

Floating Bridge

Timeframe

CONGESTION

Responsible/Lead

Tunnel

Cost

# Hwy 37 1.0 2.0 & 3.0

Transit

Privatization

SEA LEVEL RISE

Levee

Stakeholders

4 LANES

Rail

CAUSEWAY

TIDAL MARSH

Timeframe

CONGESTION

Responsible/Lead

Flooding

Cost

# Will this simplified path be adaptive?

- Depth to bedrock?
- Actual landscape ground-elevations?
- Adaptive structures connected to ??? Communities, other roadways, marshes
- What is going on in and under the marshes?
- How fast are changes happening, and
- Are our predictive models working?

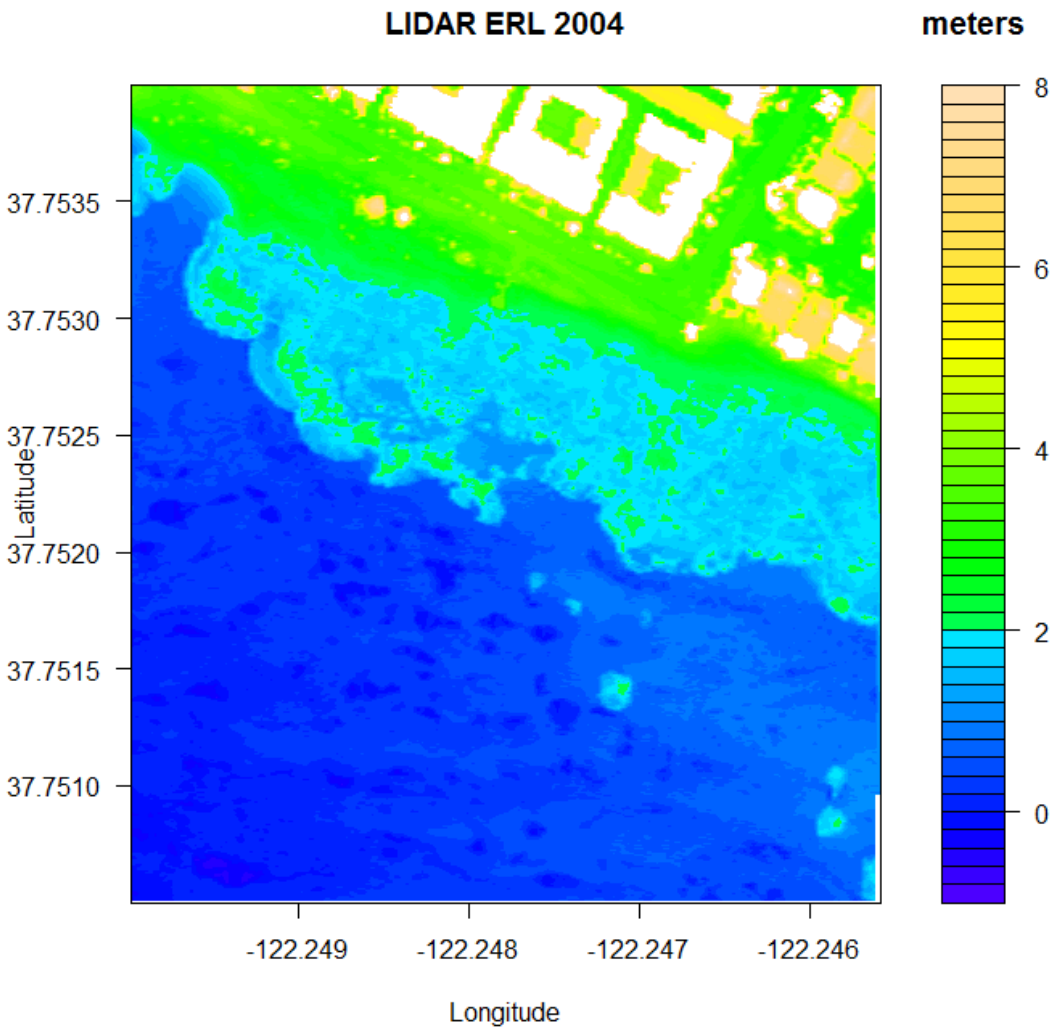
# UC Davis Shoreline Tracking Program

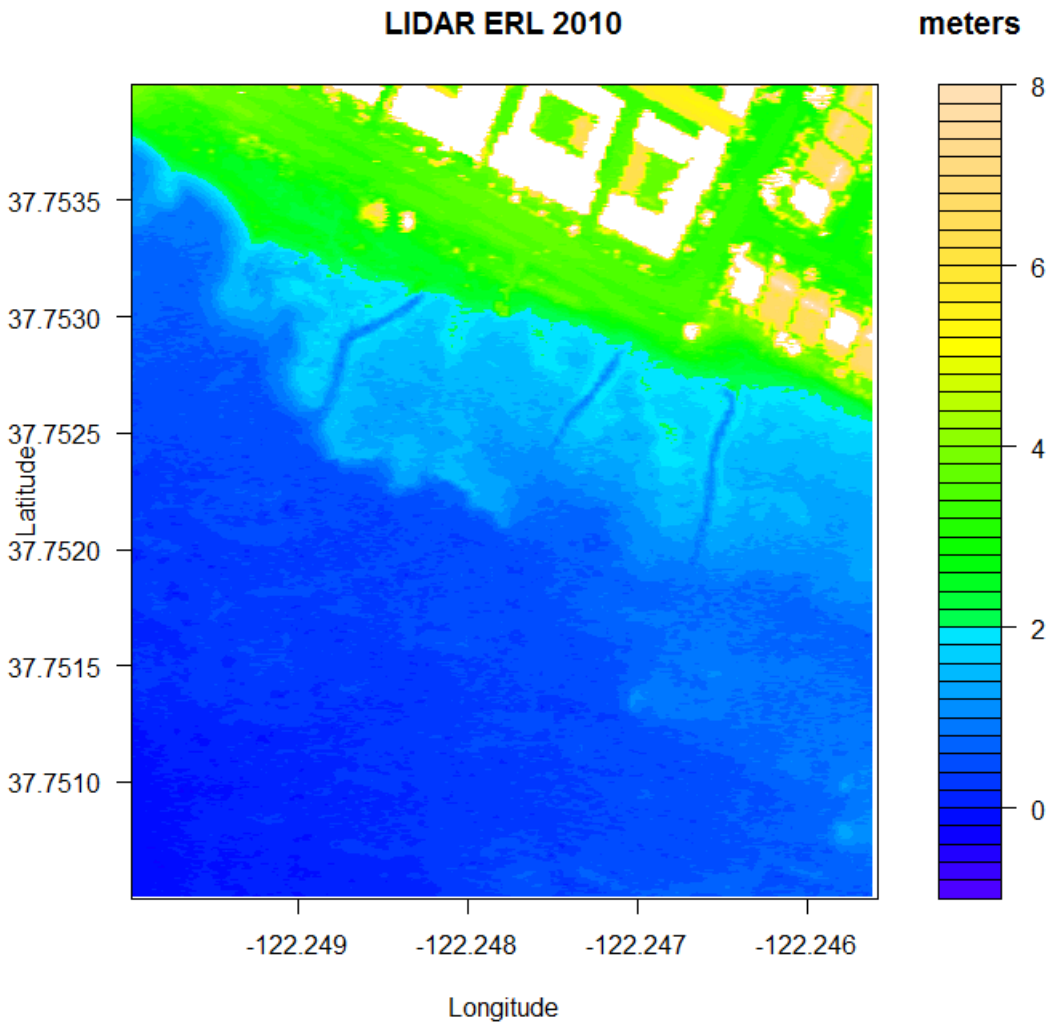
Road Ecology Center (Shilling) Lead

Ted Grosholz, Susan Ustin, John Largier, Erik Grijalva, David Waetjen

UGA, GA-Tech Partners

# Elevation Change at 10 Sites 2004-2010

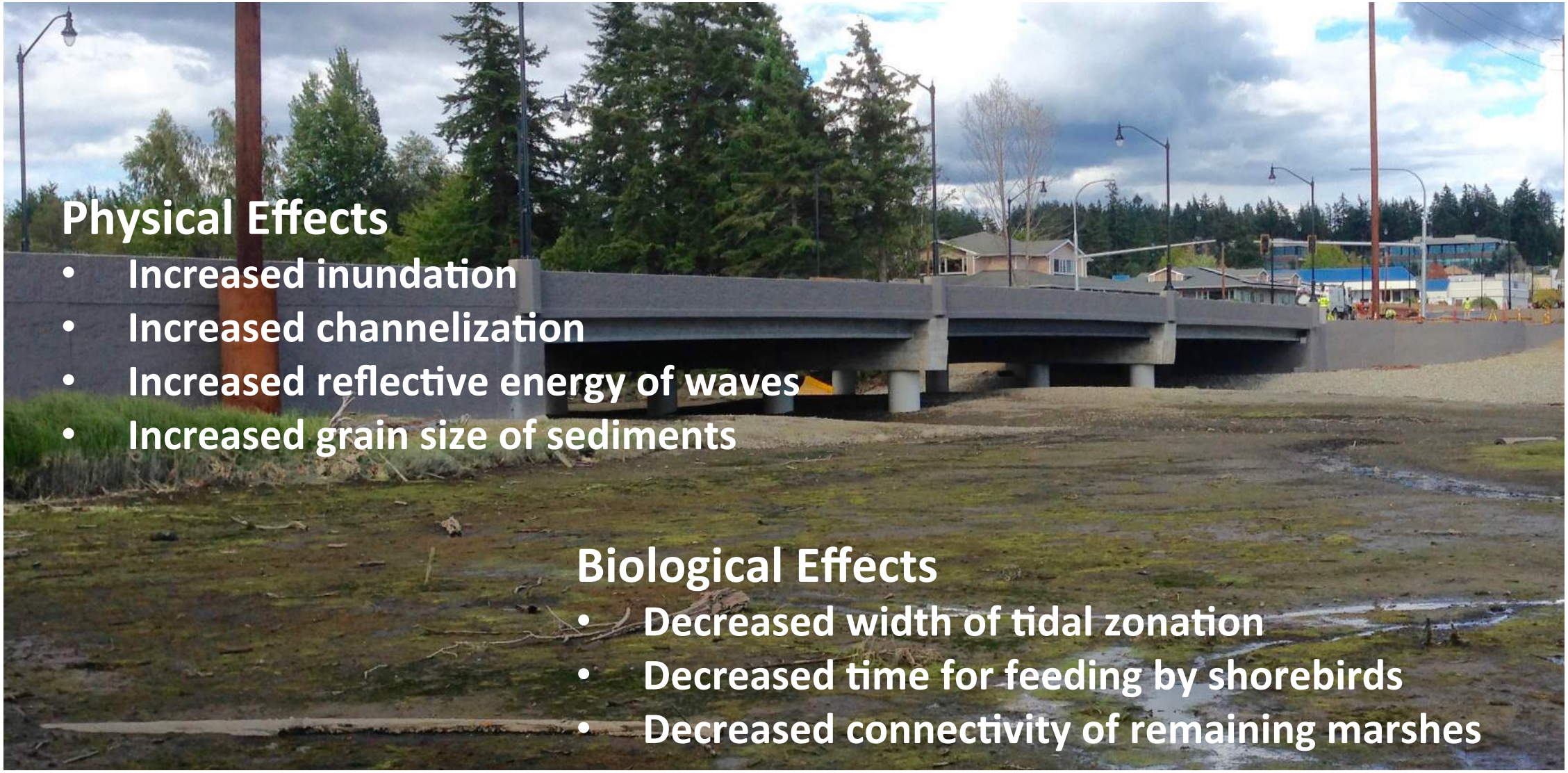


# Marshes

Nov 7 4.3(4.6)’
Dec 7 5.9(5.9)’
Jan 7 6.4(7.0)’
Jan 8 6.7(7.9)’
Jan 10 7.2(8.0)’
(at this point, tidally connected to Bay)
Feb 7 6.7(7.9)’

# 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

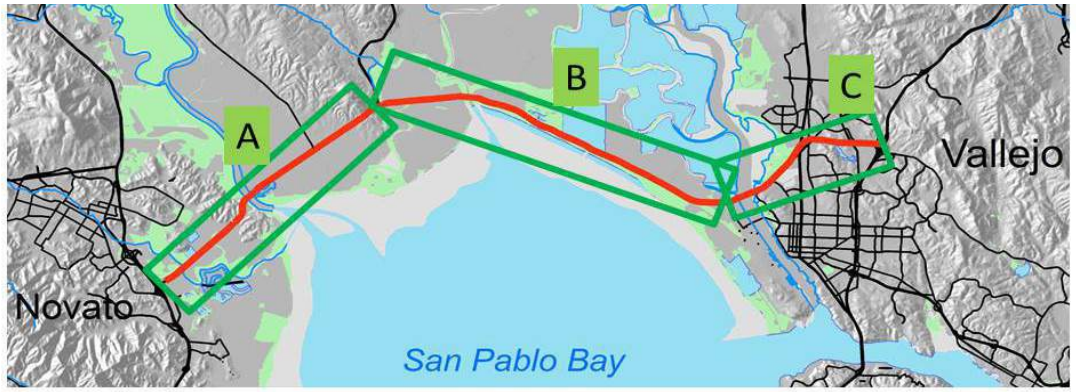
Consider alternatives with approaches that maintain transportation function, not just the structure.

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)
- Regional Partnership:  Upfront Engagement of Regulatory & Resource Agencies