Flood Control 2.0:

Rebuilding Habitat and Shoreline Resilience through a New Generation of Flood Control Channel Design and Management

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Collaborators

Caitlin Sweeney: SFEP

Beth Huning, Sandra Scoggins: SFBJV

Brenda Goeden: BCDC

Lester McKee, Scott Dusterhoff, Julie Beagle: SFEI

Roger Leventhal, Liz Lewis: Marin County FCWCD

Mike Carlson, Mitch Avalon, Paul Detjens: CCCFCWCD

Len Materman, Kevin Murray: San Francisquito JPA

Flood control channels at the Bay interface:
A unique challenge and opportunity

Flood Protection Drivers

- Increasing costs of maintenance dredging
- Aging infrastructure
- Increasing challenges with SLR
- Current designs often date from 50-100 years ago

Significance to Bay ecosystem

- Delivery of sediment to marshes and Bay
- High ecological diversity and complexity
- Salmonid migration and rearing
- Delivery of freshwater and nutrients

Can we make our flood control channels at the Bay interface contribute to healthy ecosystems, while functioning better?

Not easy.

A lot of responsibility for Flood Protection agencies.

→Flood Control 2.0

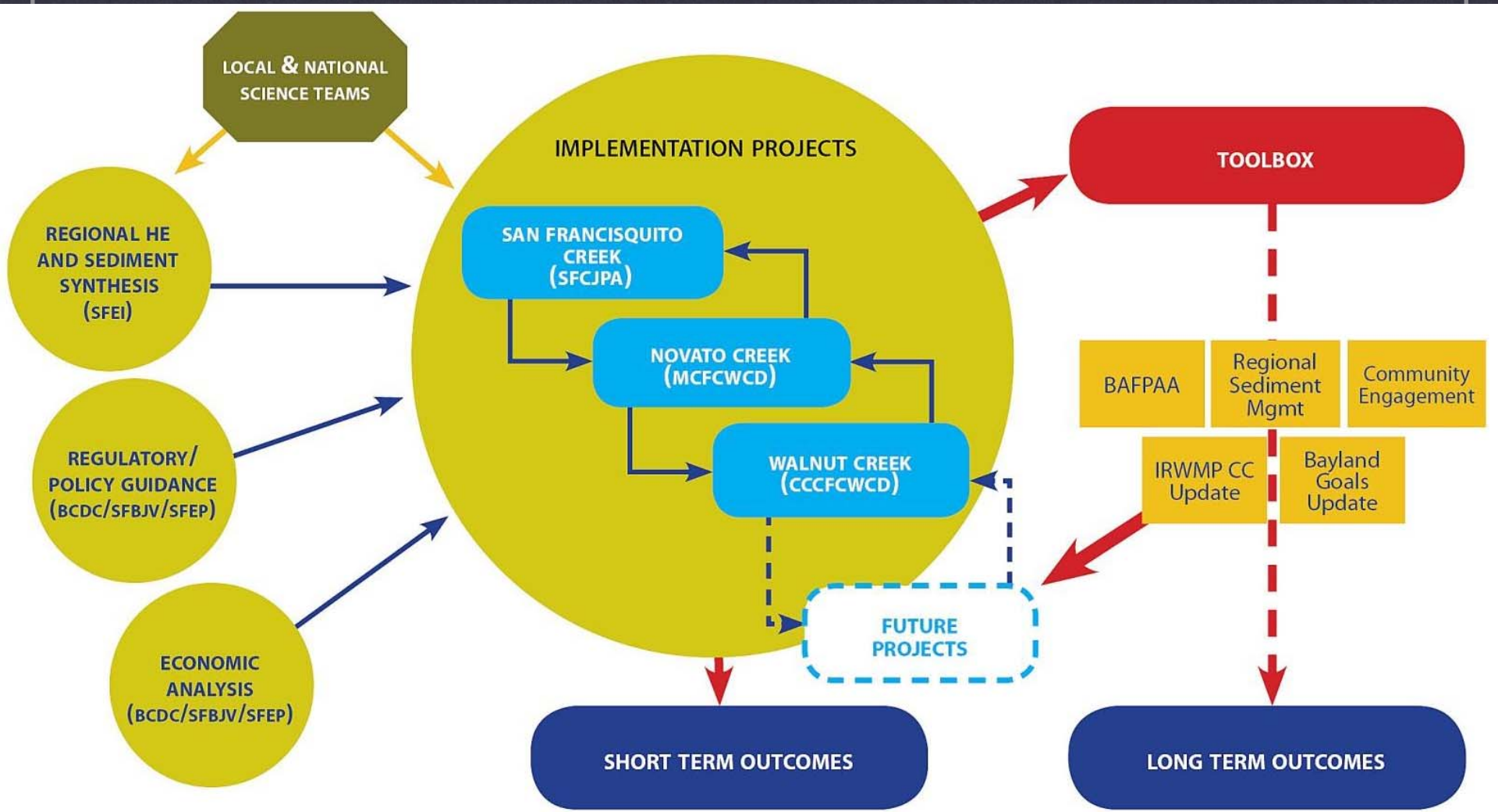
Flood Control 2.0 Project Partners

- Funder - EPA SF Bay Water Quality Improvement Fund
- Project Team:
  - SFEP (grant recipient, project manager)
  - SFEI
  - BCDC
  - SFBJV
  - SFCJPA
  - MCFCWCD
  - CCCFCWCD
- Regional Partner – BAFPAA
- Project Oversight – Regional and National Science Forums
- Regulatory Partners – RWQCB, USACE, NMFS, CDFW, Etc.

Flood Control 2.0 Project Components

- **Regional Science**
  - Historical Ecology Synthesis
  - Coarse Sediment Supply Synthesis
  - Classification and conceptual models
- **Regulatory and Economic Guidance**
- **Implementation Projects**
- **Regional Implementation Toolbox**
- **Public Outreach and Education**

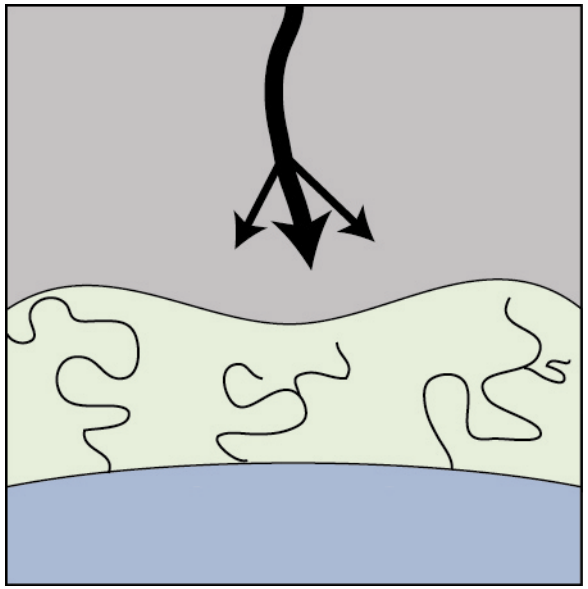
Flood Control 2.0



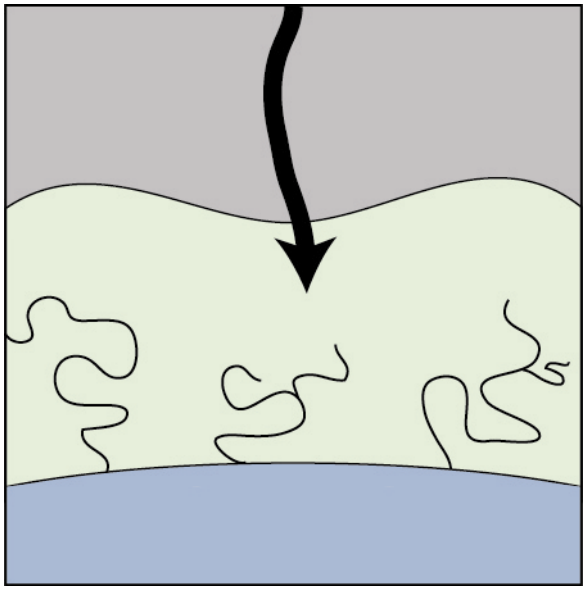
What is the fluvial-tidal interface supposed to look like?

How did local streams transport sediment across the lowlands to the Bay?

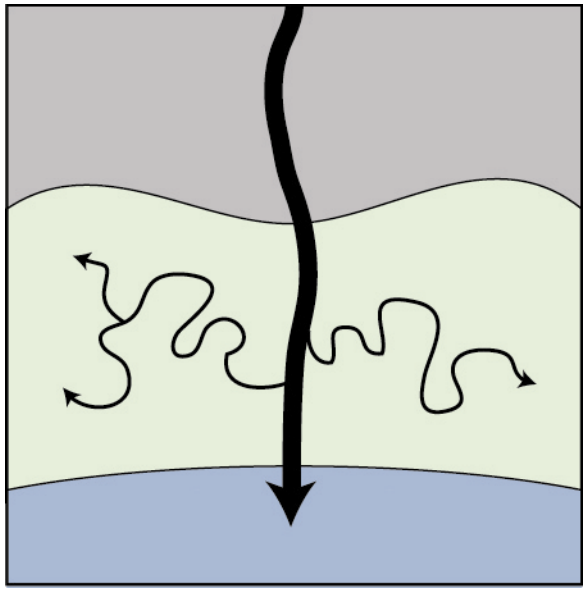
Natural Fluvial-Tidal Interface Types



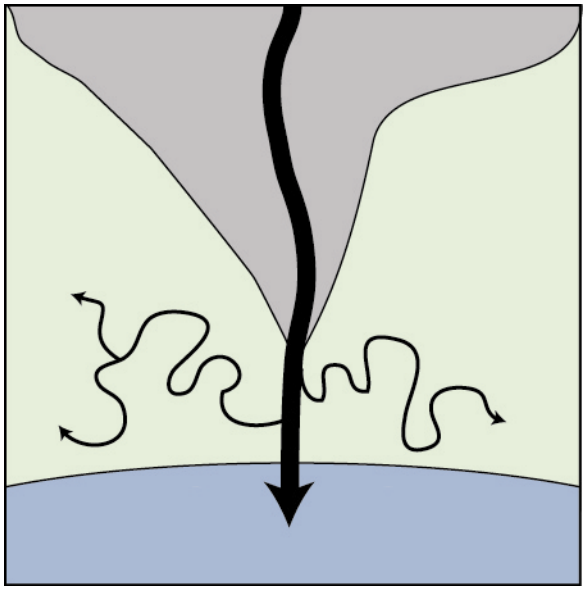
Disconnected



Connected to Baylands



Connected to Tidal Channel



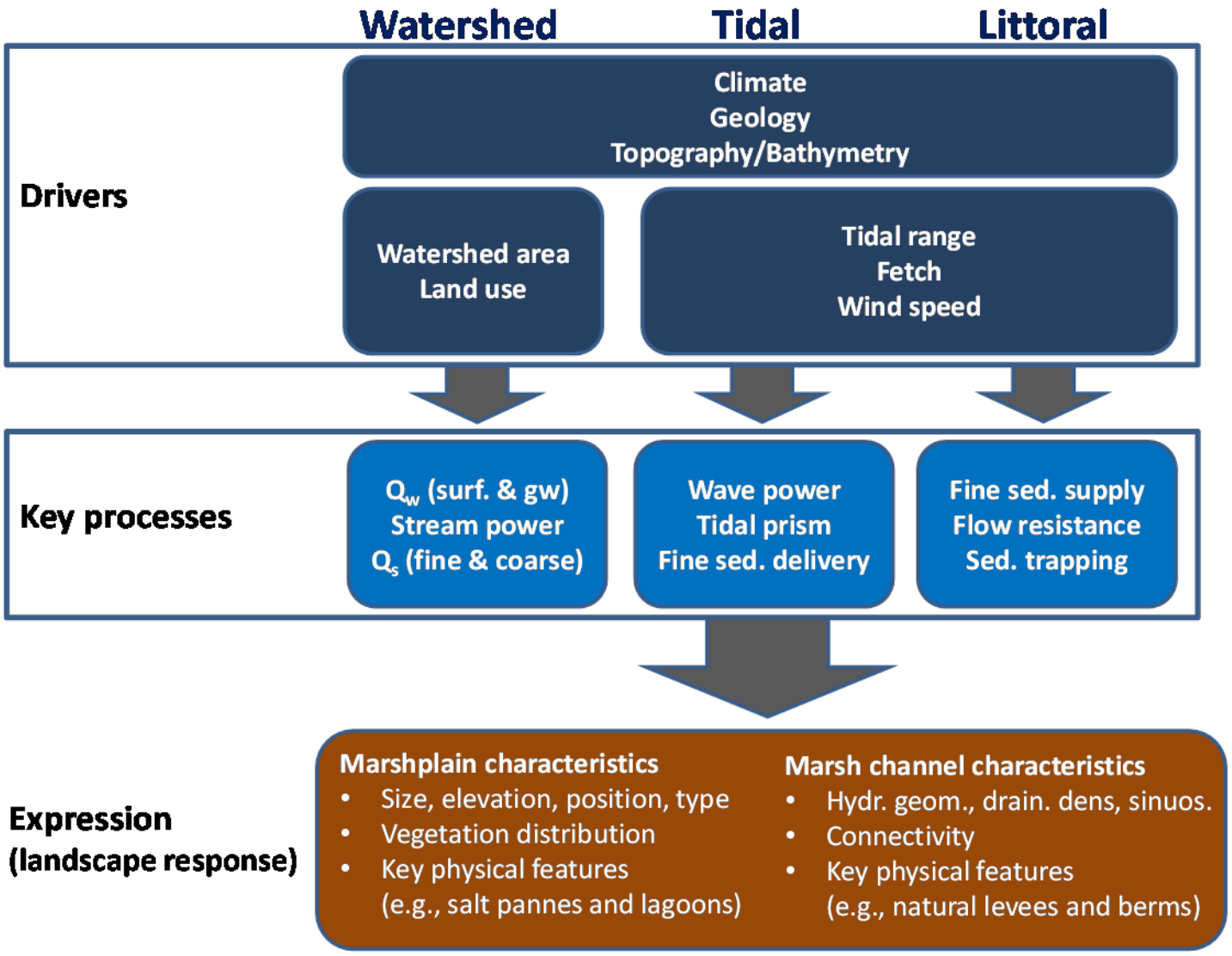
Connected through Natural Levee

Historical F-T Interface

- Disconnected
- Connected to the Bay
- Ended at natural tidal baylands (marsh)
- Connected to a tidal marsh channel
- Connected to a tidal marsh channel with a prominent levee

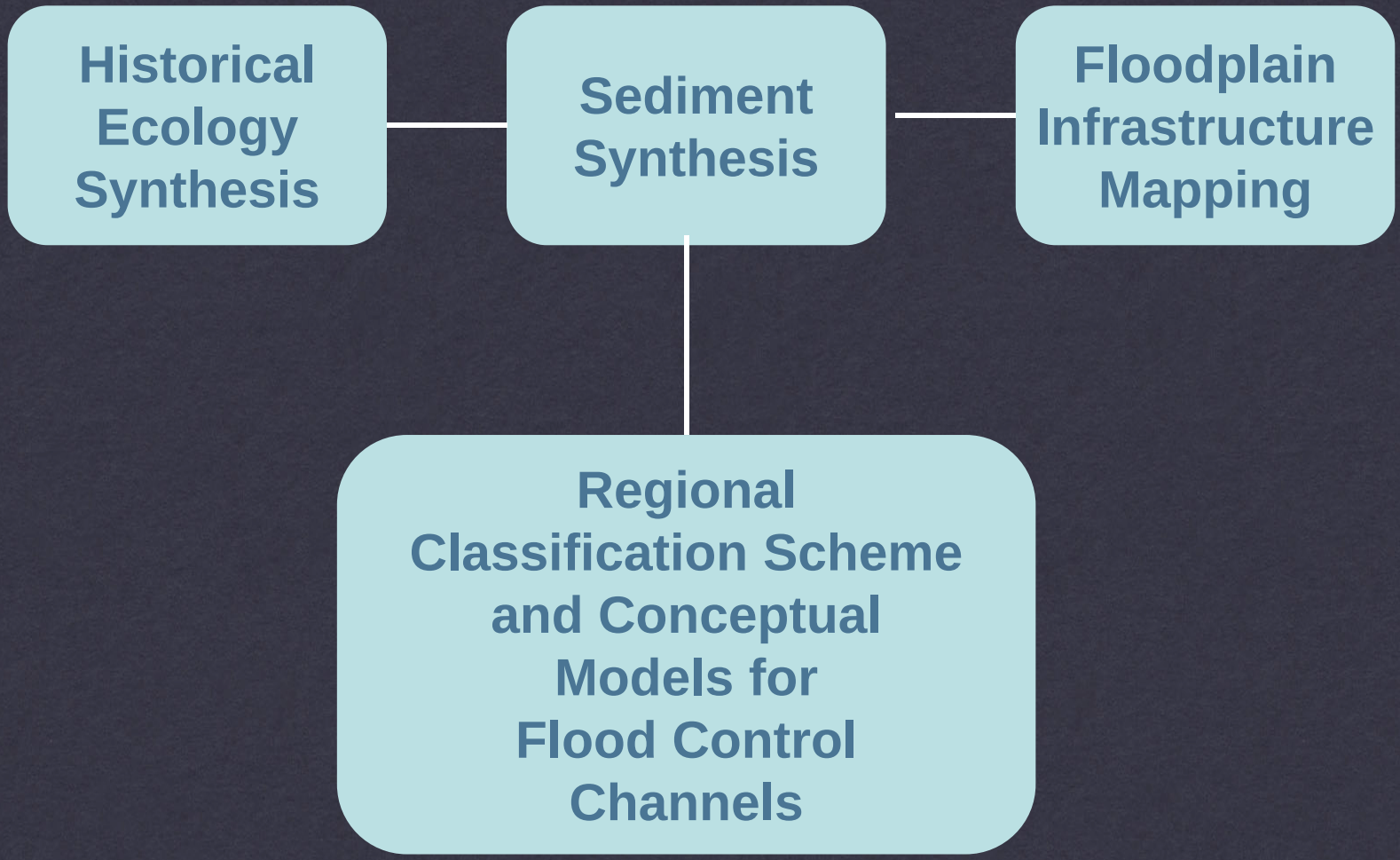
Where are different “2.0” strategies applicable?

Conceptual Framework for Marshland Establishment & Evolution



Flood Infrastructure Mapping

- SFEP, BAFPAA
- Regional GIS Map of Flood Protection and Stormwater Infrastructure
- Data Visualization and Access


Historical Ecology Synthesis
Sediment Synthesis
Floodplain Infrastructure Mapping
Regional Classification Scheme and Conceptual Models for Flood Control Channels

Historical F-T Interface

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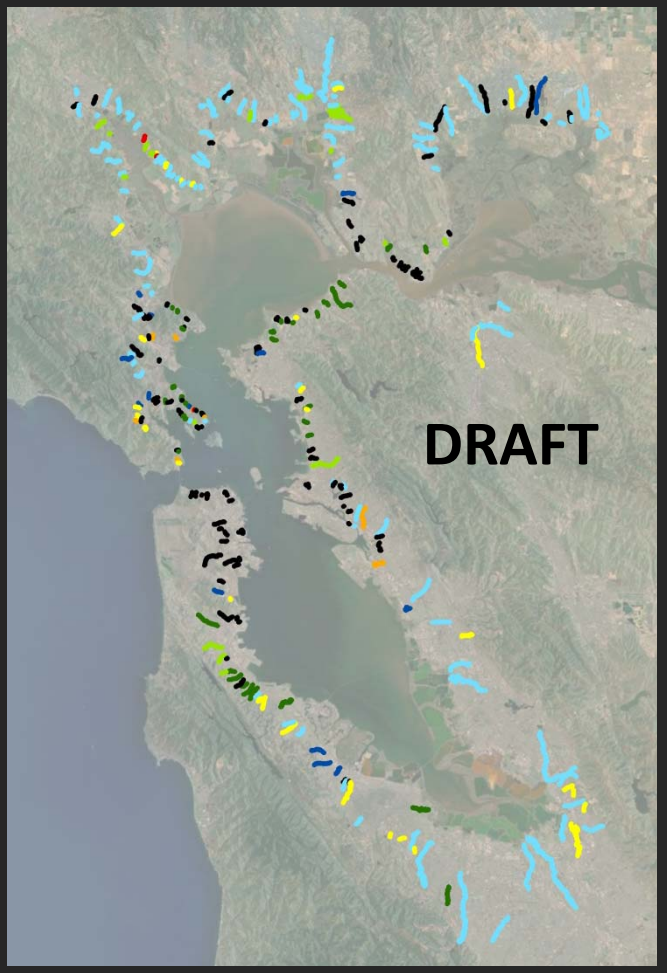
Contemporary F-T Interface

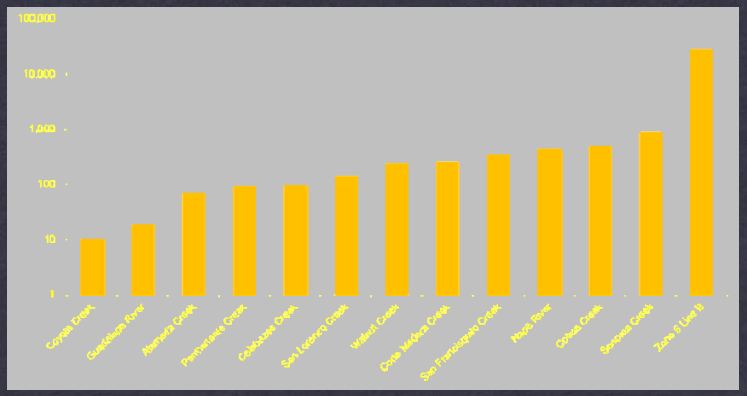


- Not present
- Tributary channel
- Ends at altered baylands (i.e. diked)
- Connected to altered baylands

How much sediment is there in these flood control channels?

Regional Sediment Synthesis

- Collect Sediment Supply and Deposition Data
- Develop Regional Sediment Classification Scheme for FCC
- Merge with Historical Ecology Classification and Flood Infrastructure Data



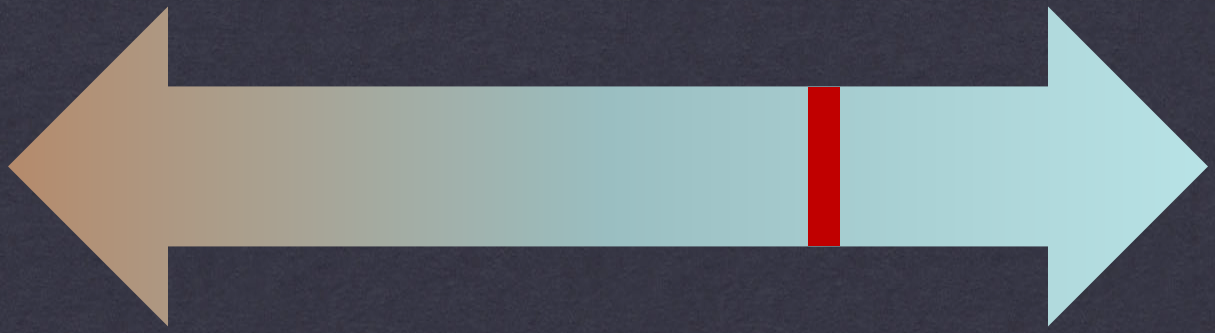
Sediment Data Used for Classification

- Channel Sediment Storage
  - Quantity Stored
  - Grain Size
  - Storage Locations
- Channel Sediment Transmission
  - High, Medium, Low
  - Grain Size
- Channel Sediment Removal
  - Quantity Removed
  - Grain Size
  - Removal Locations/Costs

What can we do with the sediment that we can't transport to the Bay with natural processes?

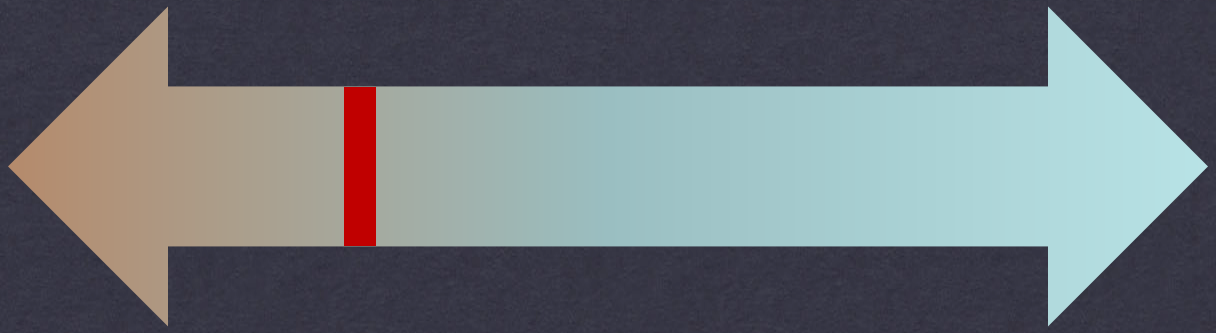
(close, cheap, maximizing its value to the Bay)

natural
sediment
transport



channel
dredging

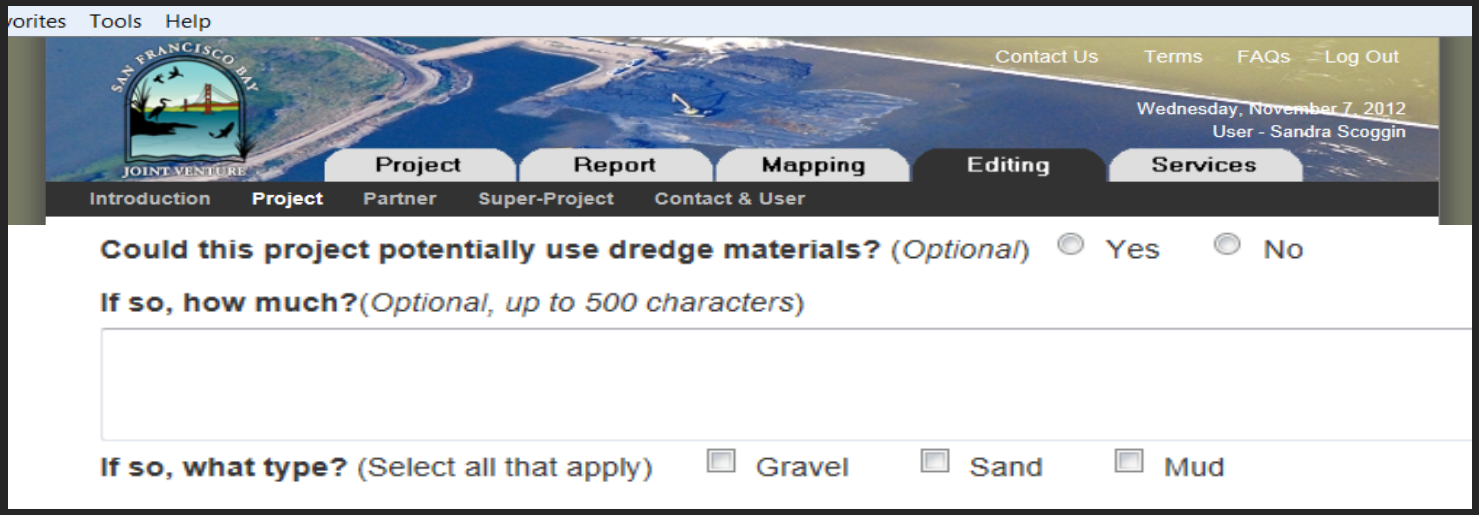
natural sediment transport



channel dredging

“SediMatch” (SFBJV)

- Sediment Match Up Website



Is it really cheaper?

Task 4: Economic Analysis of Costs and Benefits of Traditional Flood Control Practices versus Flood Control 2.0

How do we develop local projects with the array of components and scale needed to achieve ecological outcomes?

(e.g. increased resilience: patch size, connectivity, physical processes)


Peter Baye
for BEHGU

Task 3.1: Regional Science Forums

- Part of the JV Design Review Program, funded in part by SCC
- Novato Creek Forum held on November 13, 2013
- In collaboration with Marin County FCWCD
- Established a subregional "vision"
- Working on a meeting summary memo

Regional Science Advisory Team Members

- **Peter Baye, coastal ecologist, botanist**
- **Letitia Grenier, wildlife ecologist, conservation biologist**
- **Jeff Haltiner, ESA-PWA, engineer**
- **Robert Leidy, EPA, fisheries and stream ecologist**
- **Jeremy Lowe, ESA-PWA, coastal geomorphologist**

FLOOD CONTROL 2.0 REGIONAL FORUM

Novato Creek Flood Protection Project

Recommendations

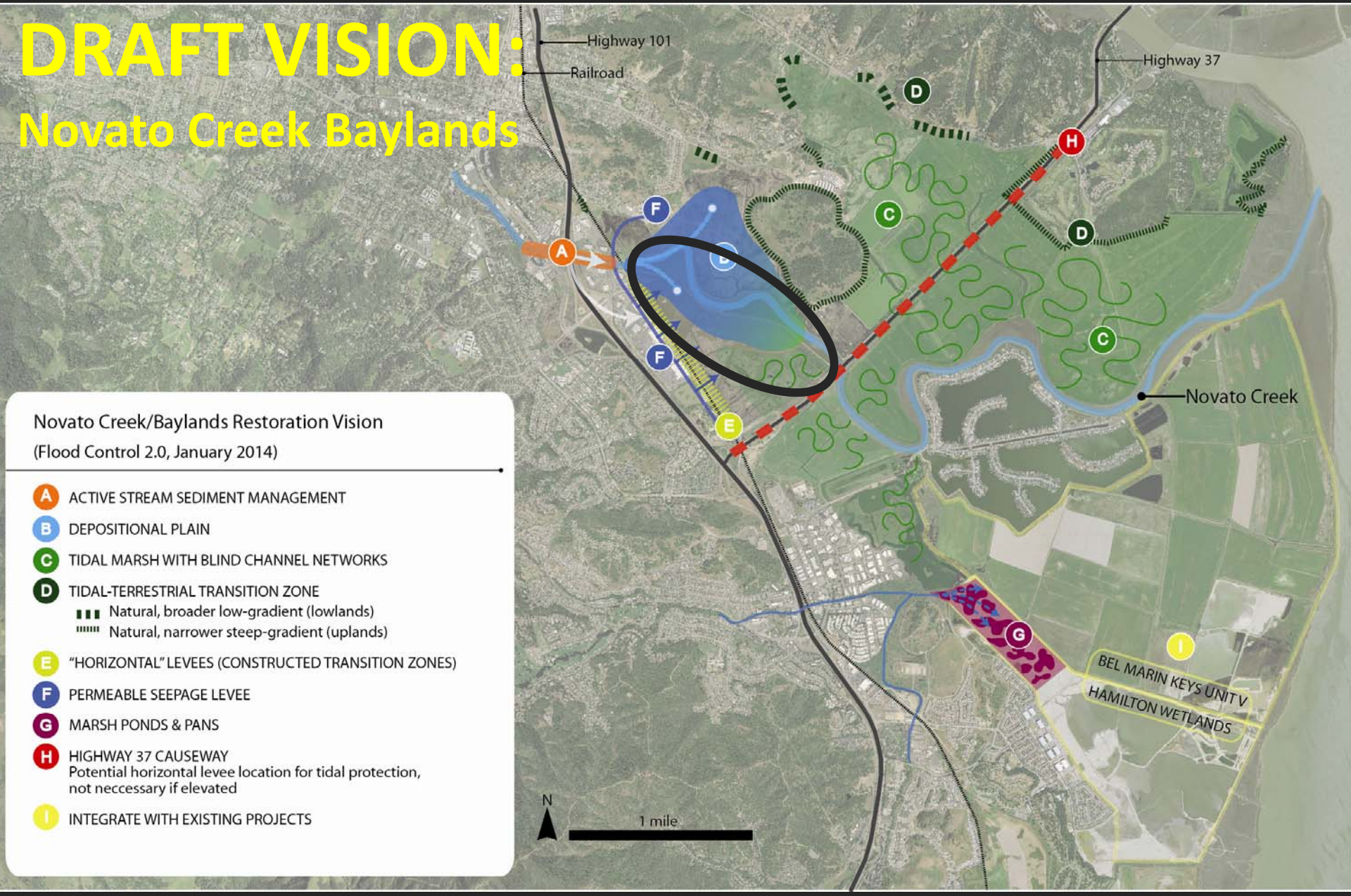
→ Need a big-picture, 200 year vision for the overall area to guide short-term and medium-term design

→ More thinking about and explicit targets for ecological functions

→ Phased integration of sediment management, wastewater treatment/discharge, flood protection for major infrastructure, and restoration

→ Context of projected Bay and watershed processes

DRAFT VISION:
Novato Creek Baylands



Regional Implementation Toolbox

- Website Clearinghouse
  - Scientific, Design, Policy and Permitting Tools
  - Economic Rationale/Guidance
  - Decision Trees for Opportunities, Constraints, Benefits

Thank You

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www.sfei.org/projects/flood-control-20

Challenge:

accelerating sea level rise threatens Bay wetlands

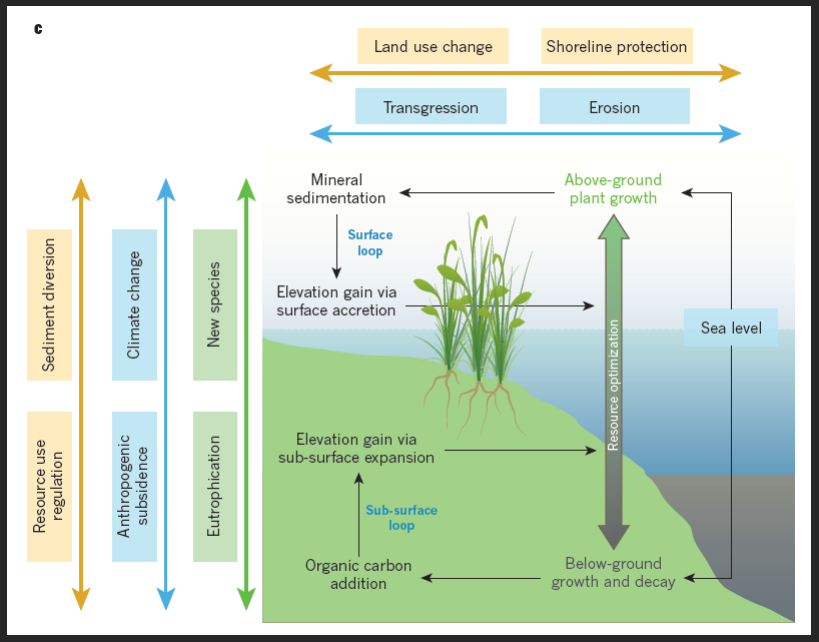
But:

marshes can be resilient

2 mechanisms

→Landward migration

→Vertical accretion



Kirwan and Megonigal 2013

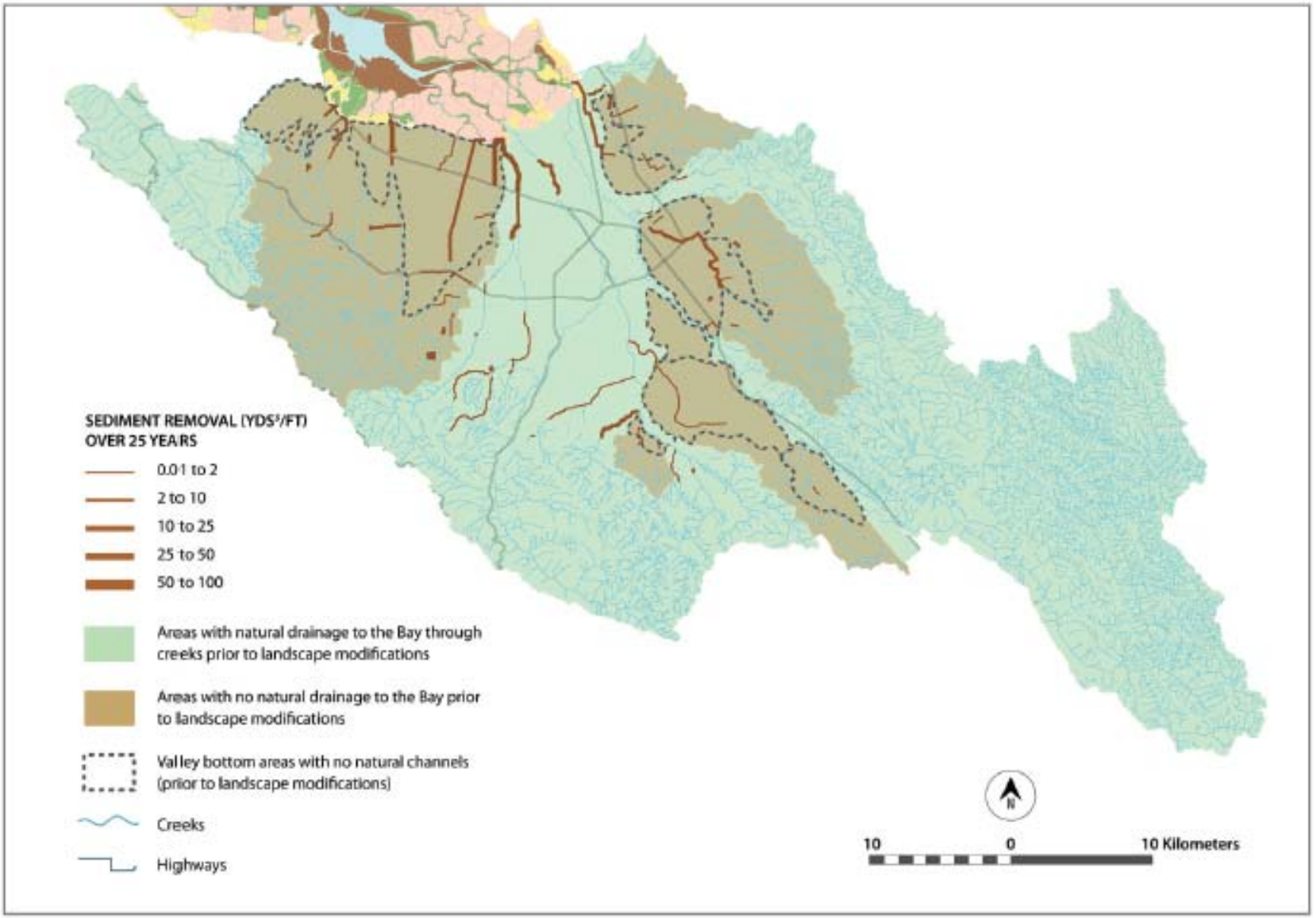


Figure 6-31: Santa Clara Valley Stream Sediment Removal, 1977-2004* Stream sediment data provided by SCVWD. Historical drainage boundaries are approximate. *2000/2001 data unavailable.

What can be done where – and how do we get buy-in for new approaches?