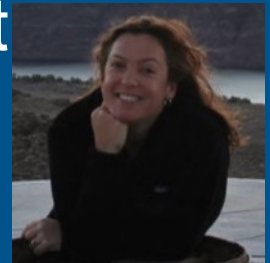
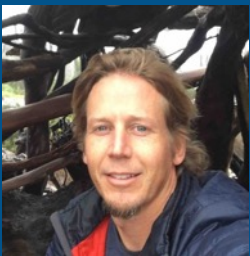


# Sonoma/Marin Sediment Management Working Group Project Team



- Cea Higgins: Working Group Chair
- Doug George: Science lead/Co-manager
- Sara Hutto: Project Manager
- Max Delaney: Policy specialist
- Jenn Gamurot: Logistics specialist
- Sage Tezak: GIS specialist



# Sonoma/Marin Coastal Regional Sediment Management



*Cea Higgins*

Pathway to  
Recommendations for  
Sediment Management

*November 15, 2017*

Sara Hutto &  
Doug George, PhD



# Sand in Our Waters

- How should we address sediment imbalance issues?
- How will climate change affect our sediment management approach?

**Coastal Erosion near Gleason Beach**

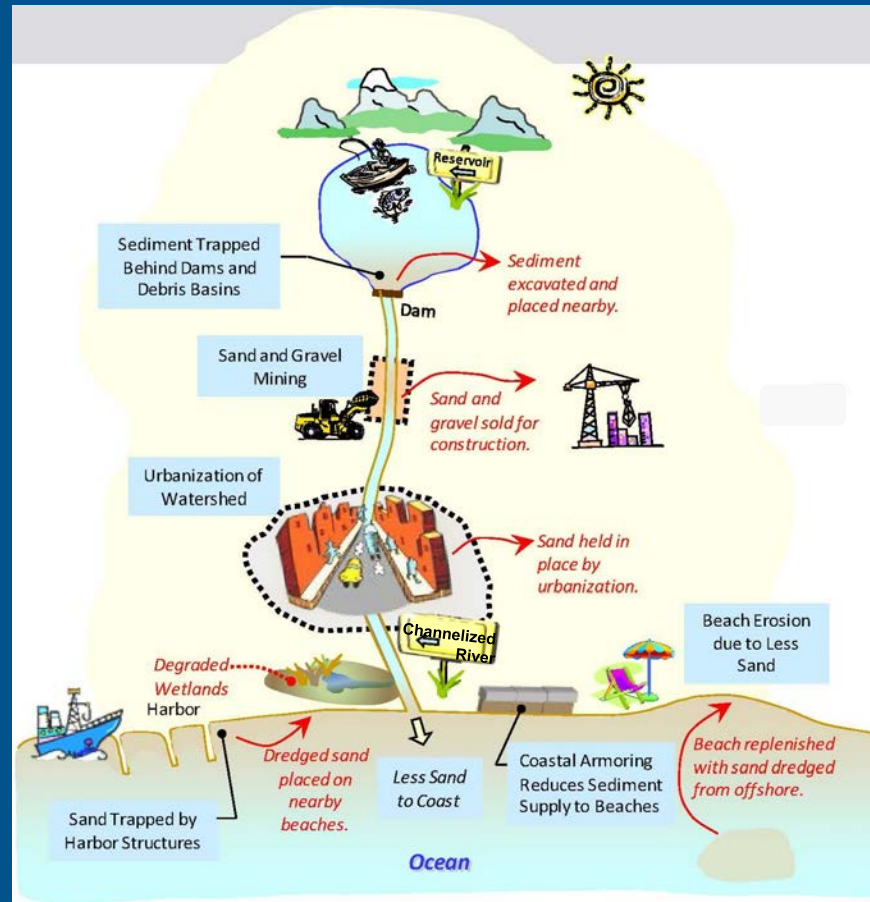


**Sediment Accumulation inside Bolinas Lagoon**

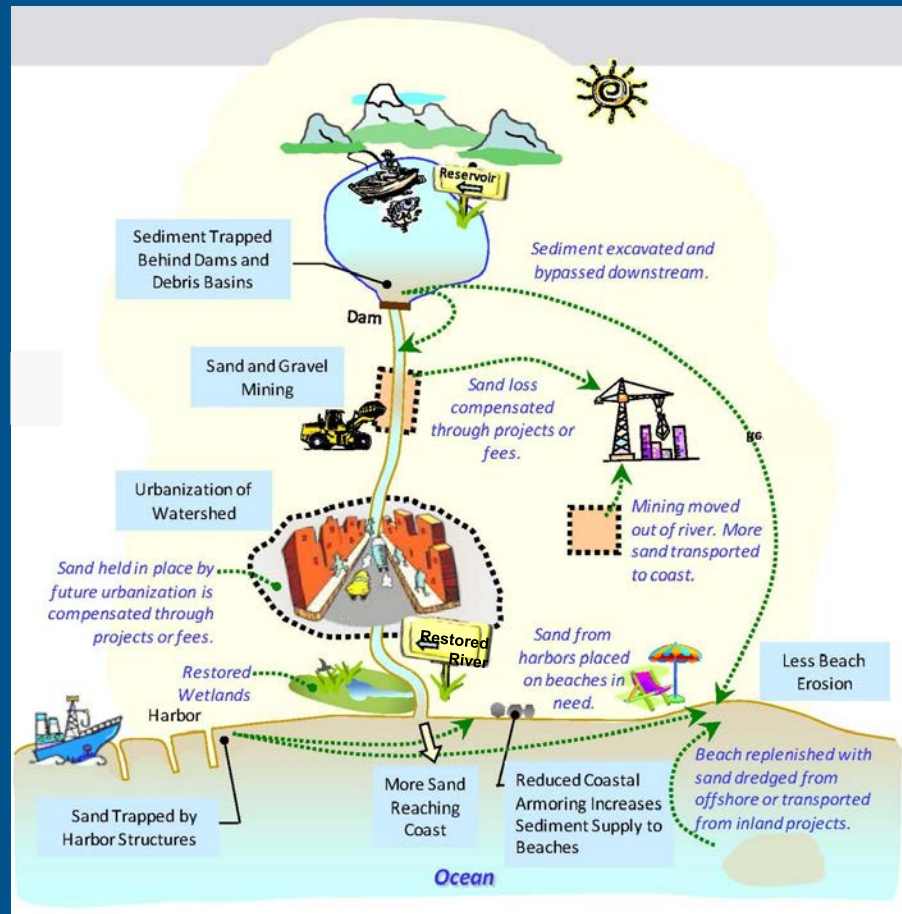


Looking toward bluffs at Bolinas groin. Note that sand has completely buried most of the groin — even during its low winter profile.

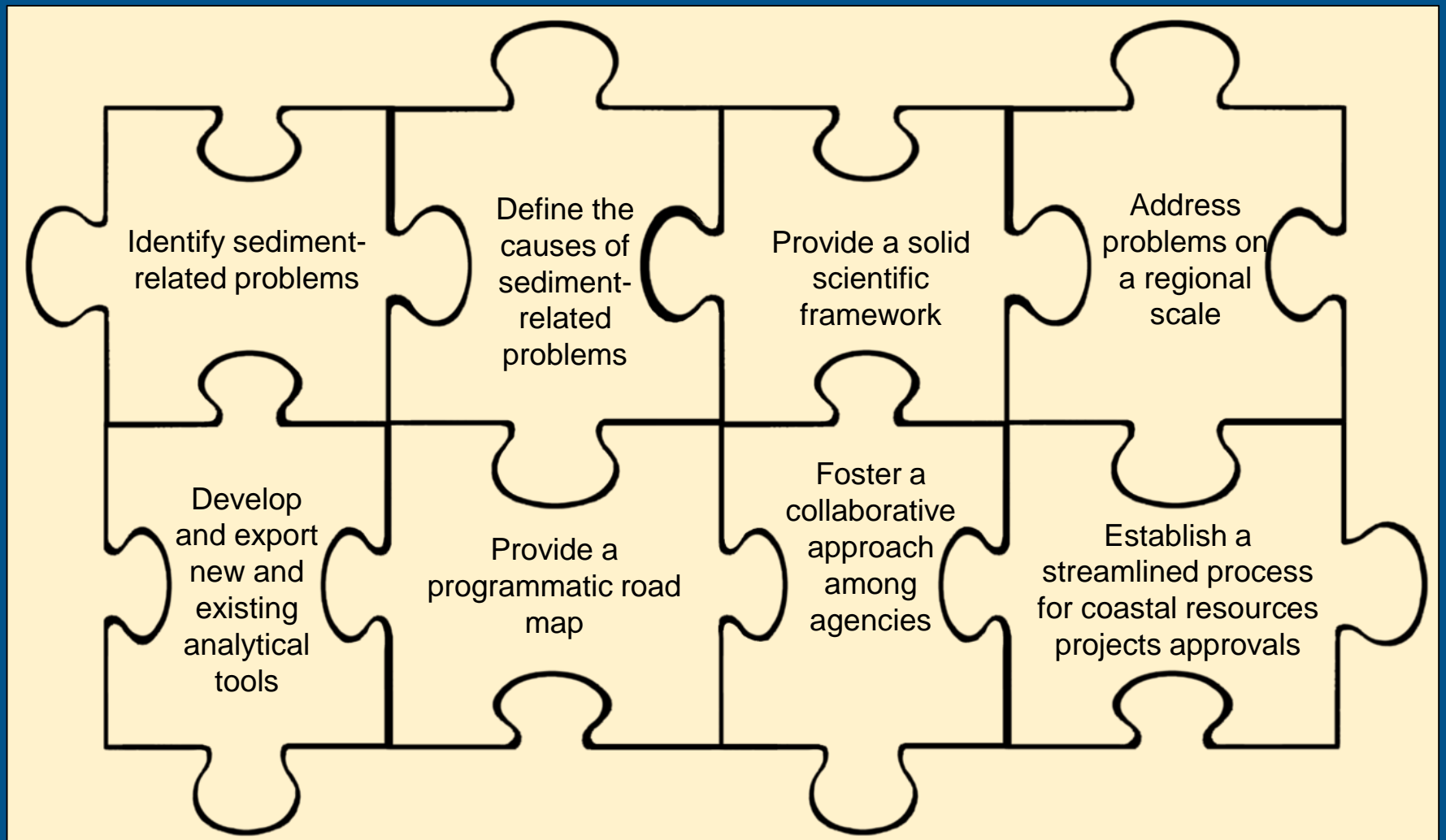
# Existing Sediment Management



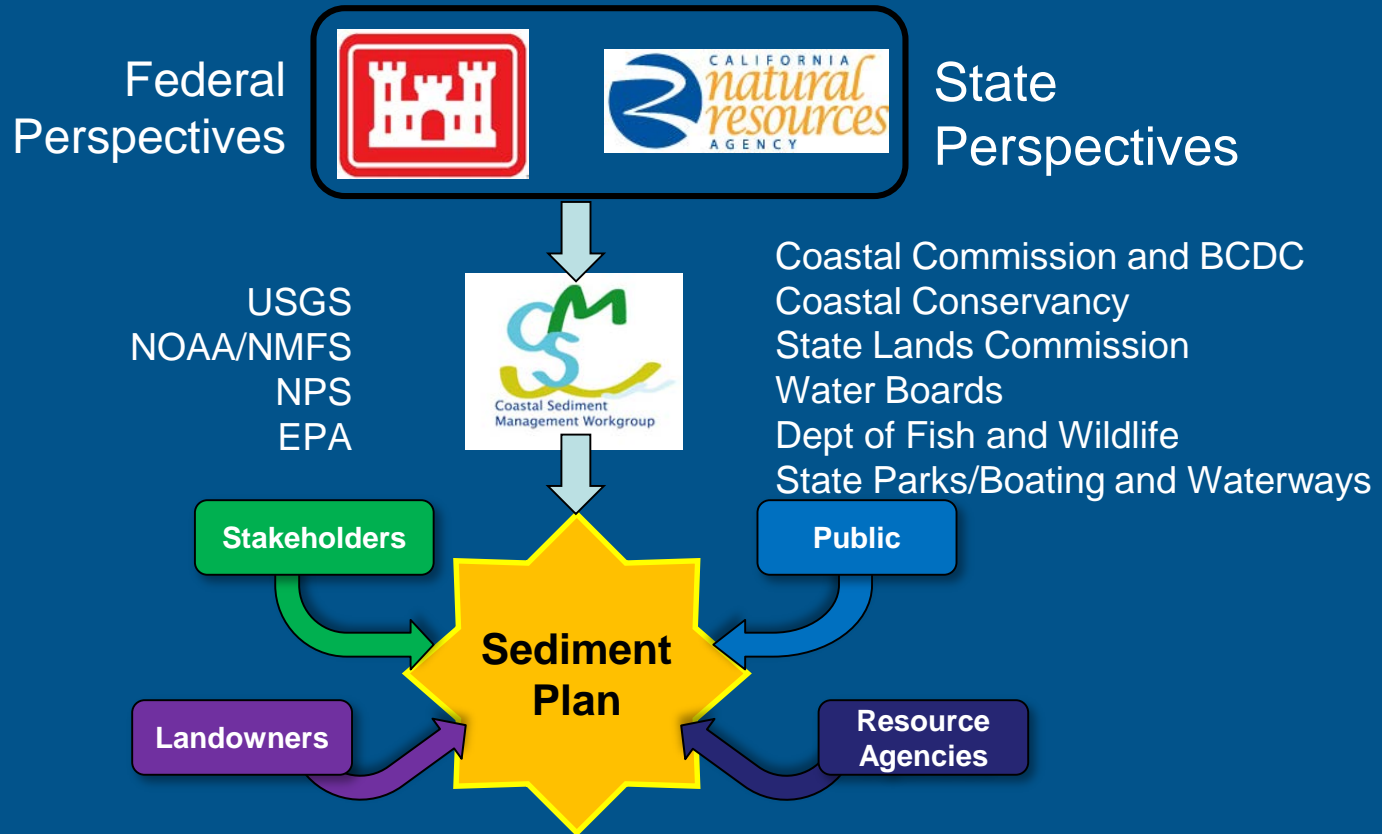
# Regional Sediment Management



# Regional Sediment Management Goals



# CA Sediment Management Players



# Coastal Regional Sediment Management Plans (CRSMPs)



Plan = Ideas for Action Later

Policy & Governance

Economics & Infrastructure

Ecology

Geology & Morphology

Physical Processes





# CRSMP Project Setting

- “G to G” – Gualala to the Golden Gate
- Approximately 340 miles (including bays)
- 5 traditional littoral cells plus adjacent SF and undetermined zones
- 15 Marine Protected Areas
- 7 Areas of Special Biological Significance



# Regional Background Knowledge

*Seadrift, Bob Wilson*



*Estero Americano, CA Coastal Records*

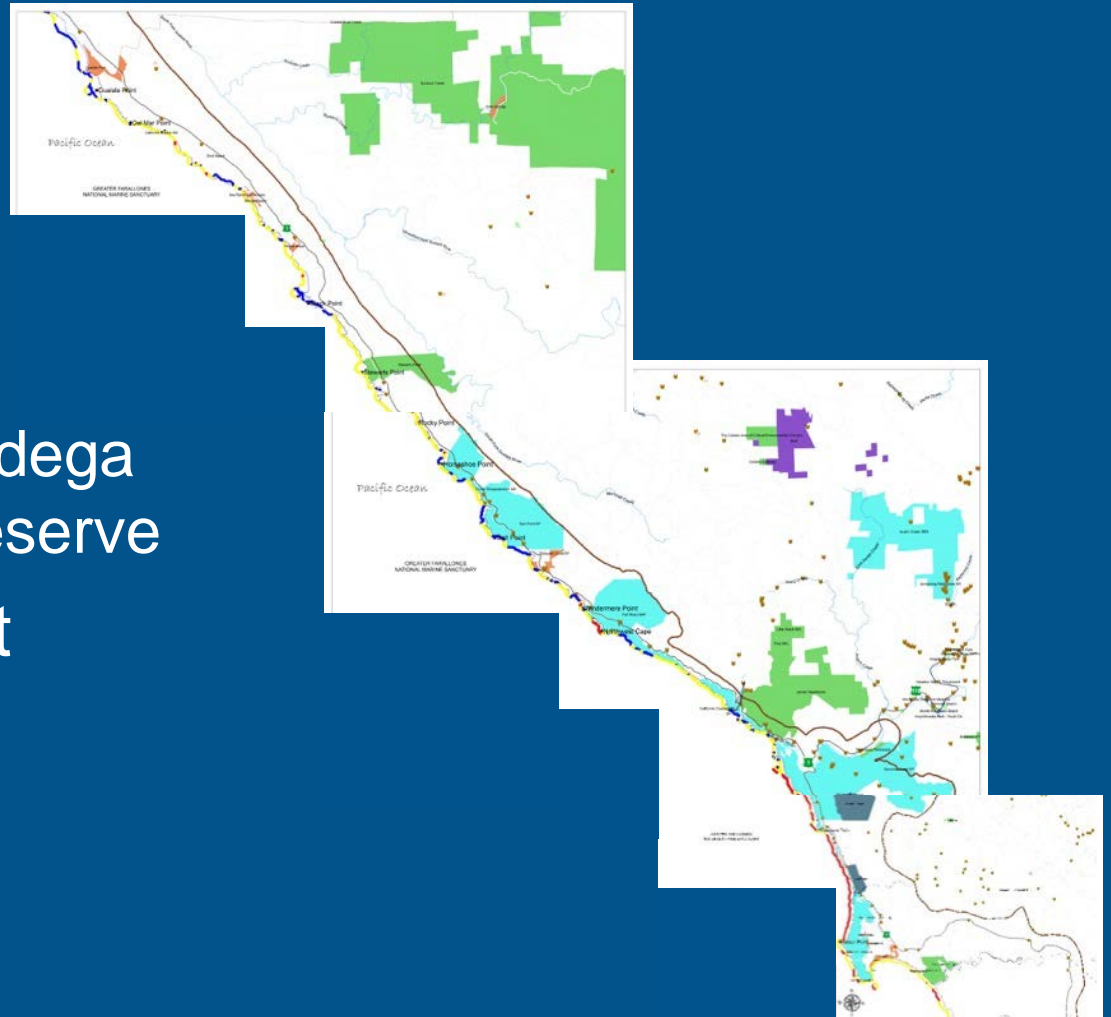


- Land Ownership
- Coastal Classifications
- Offshore Deposits
- Regional Planning Efforts

*Near Jenner, Doug George*

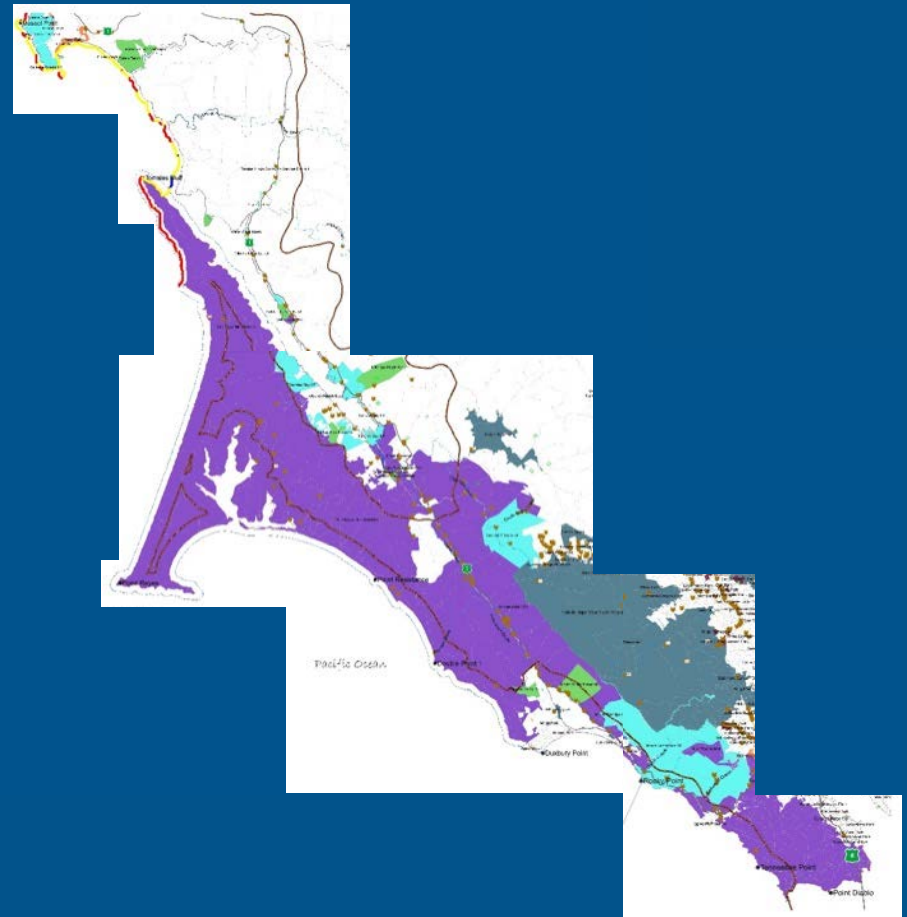
# Land Ownership

- Sonoma
  - State
    - Parks
    - UC at Bodega Marine Reserve
  - Non-Profit
  - Private
  - County



# Land Ownership

- Marin
  - Federal
    - Golden Gate National Recreation Area
    - Pt. Reyes National Seashore
  - Private
  - State
  - Non-Profit

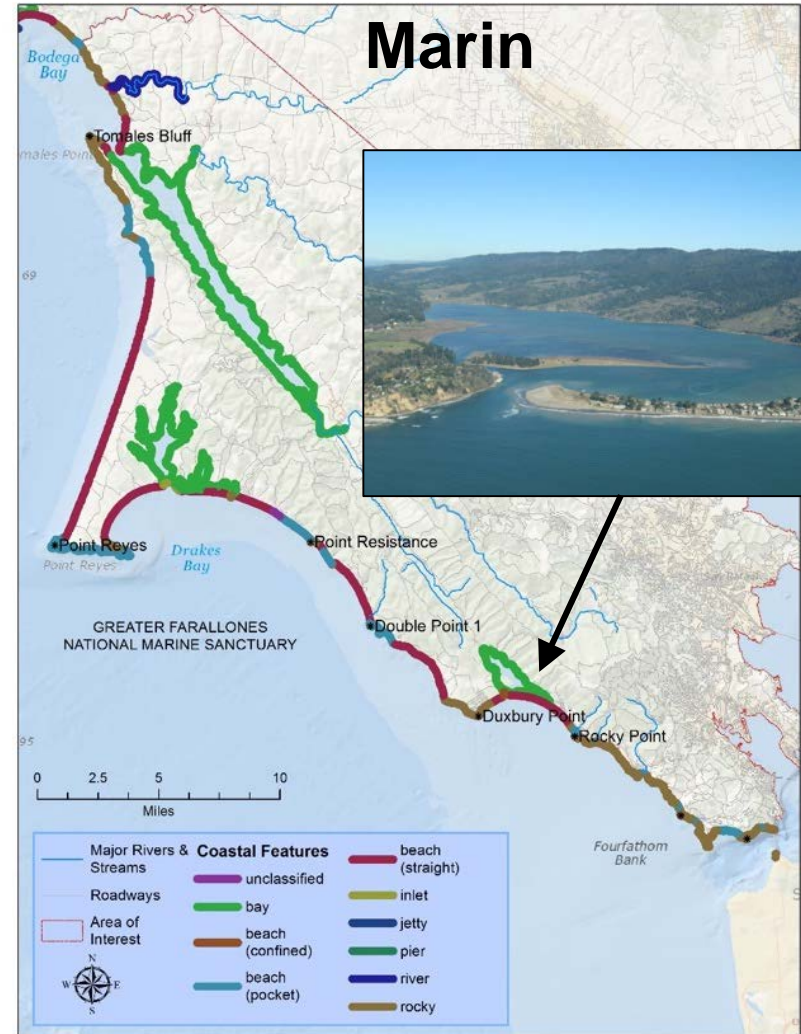


# Coastal Classifications

## Sonoma



## Marin



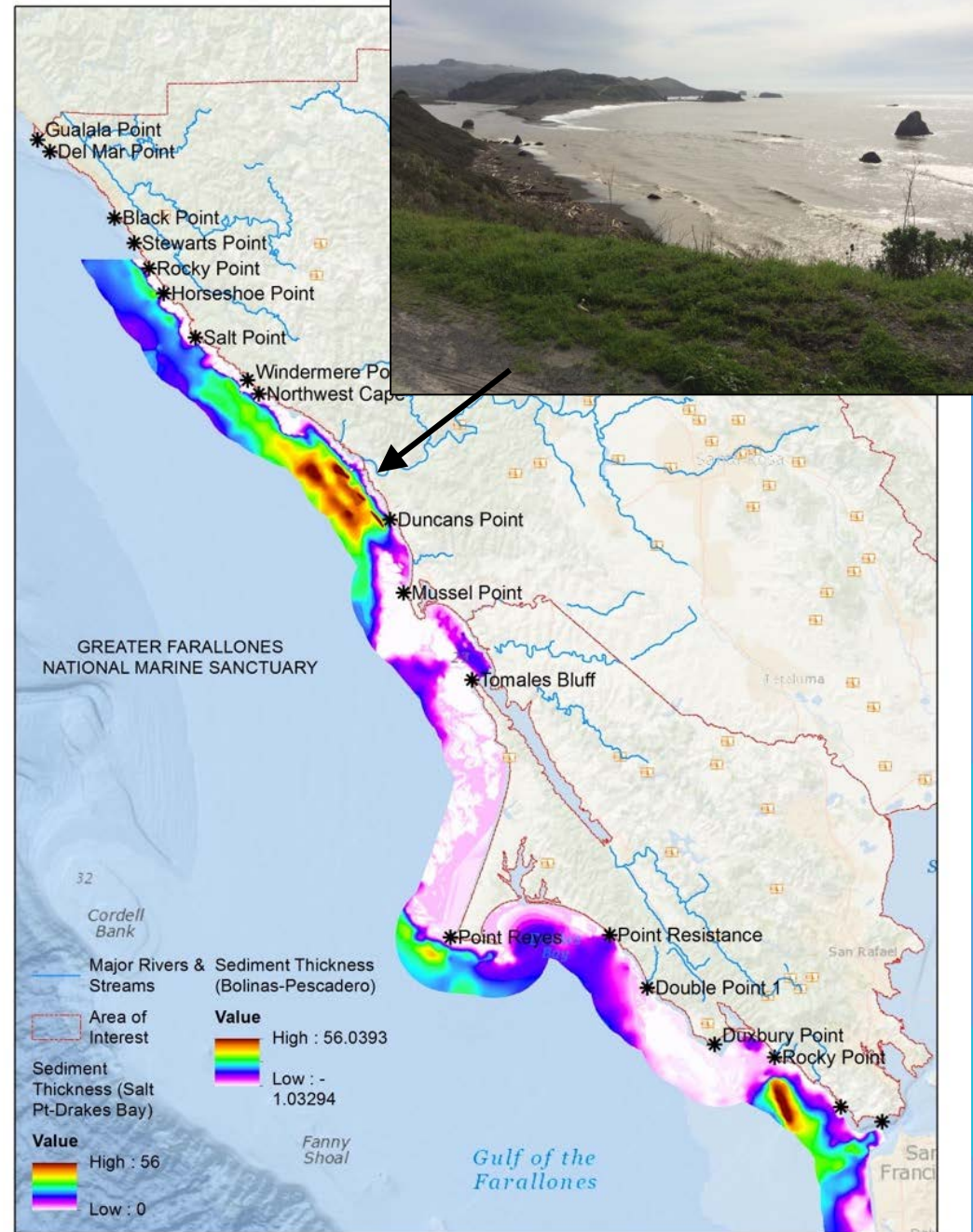
Coastal Class	Miles
Unknown/Unclassified	27
Bay	92
Beach (Confined or Pocket or Straight)	83
Jetty	1
River	58
Rocky	78



# Offshore Deposits

Thickness of sediment on seafloor

- Red – more than 50 m thick (e.g., Bolinas graben)
- White – less than 1 m thick (e.g., Bodega Head reef)



# Sediment "Budget", tbd

## Sources



Russian River	900,000 tons/yr
Gualala River	240,000 tons/yr
San Francisco Bay	1,200,000 tons/yr
Cliffs	eg, Bolinas bluffs: 5,100 tons/yr
Slides	eg, Lone Tree Slide: 1,800,000 tons
Coastal and Northern Rivers	? – more later

## Sinks

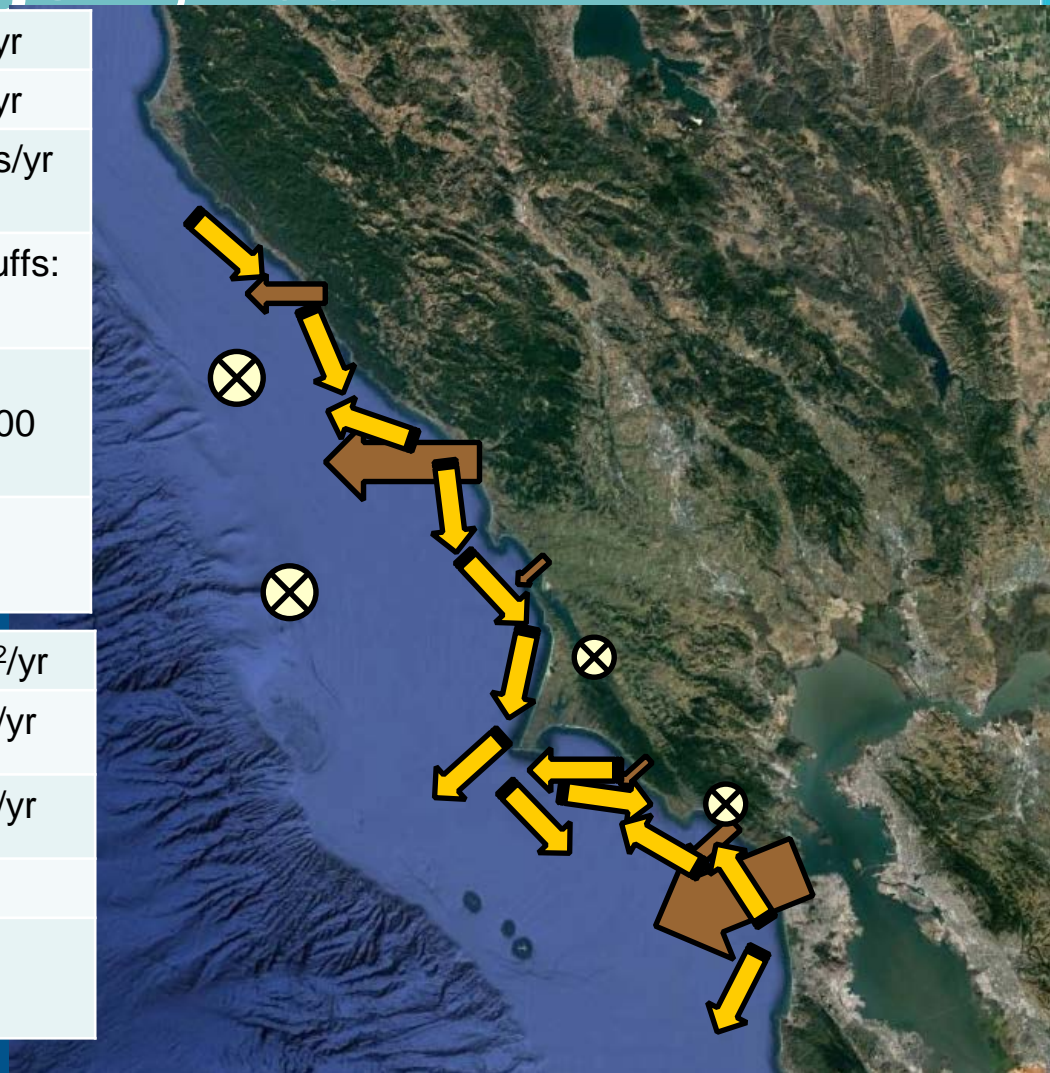


Tomales Bay	38 tons/mi <sup>2</sup> /yr
Bolinas Lagoon	5,180 tons/yr
Bodega Harbor	6,300 tons/yr
Offshore shelf	?
Bodega Submarine Canyon	?

## Pathways



Headlands disrupt and redirect flow  
 Regional studies (eg, USGS modeling)  
 Local projects (eg, PWA Bolinas work)



# Planning Underway at All Government Levels

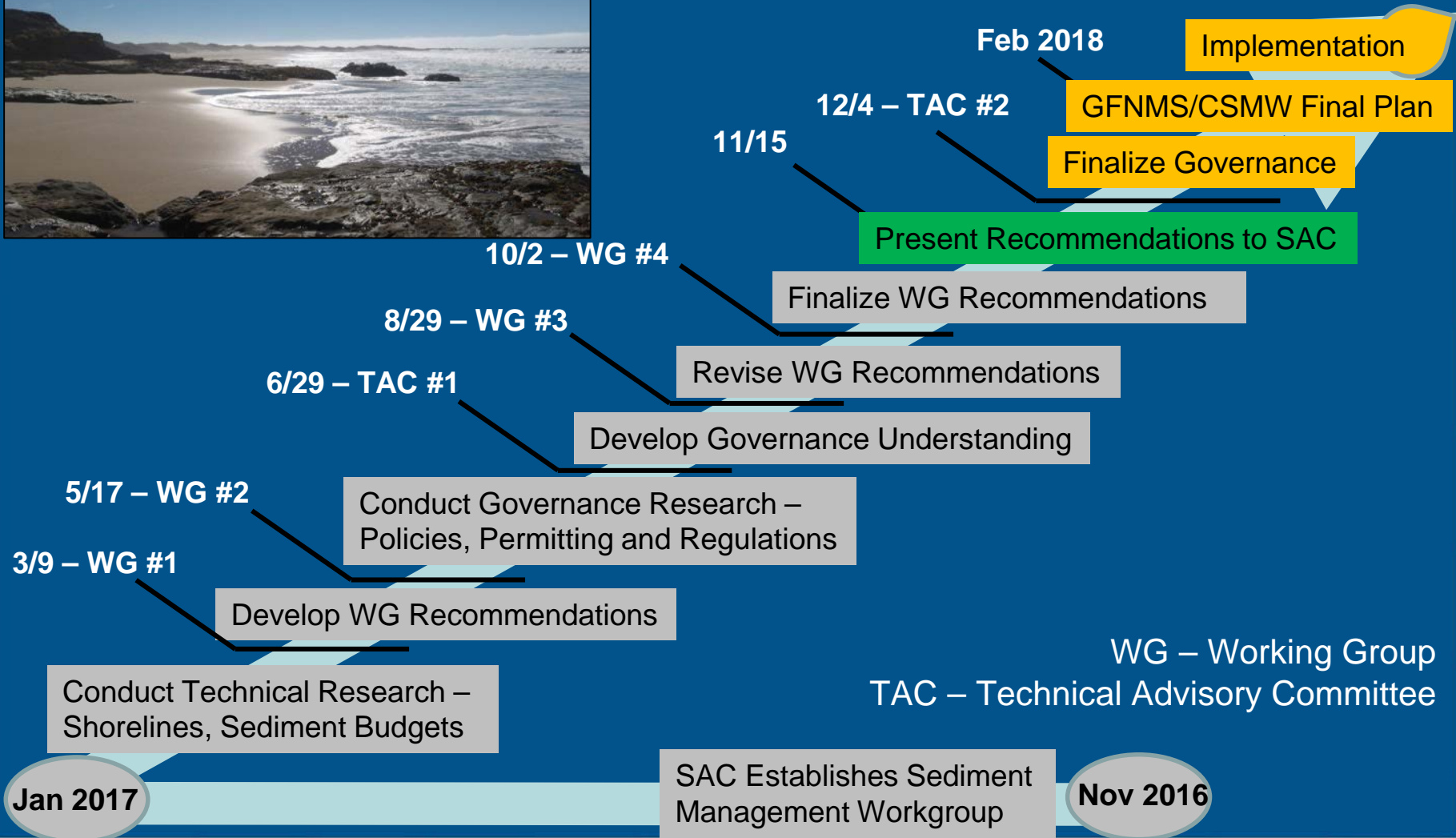
- Local
  - Local Coastal Programs (County)
  - Land Conservation (RCDs)
- State
  - Caltrans (Hwy 1)
  - Coastal Commission LCP Updates
- Federal
  - GFNMS Climate Action Plan
  - MBNMS Management Plan Update
  - Bolinas Lagoon Restoration



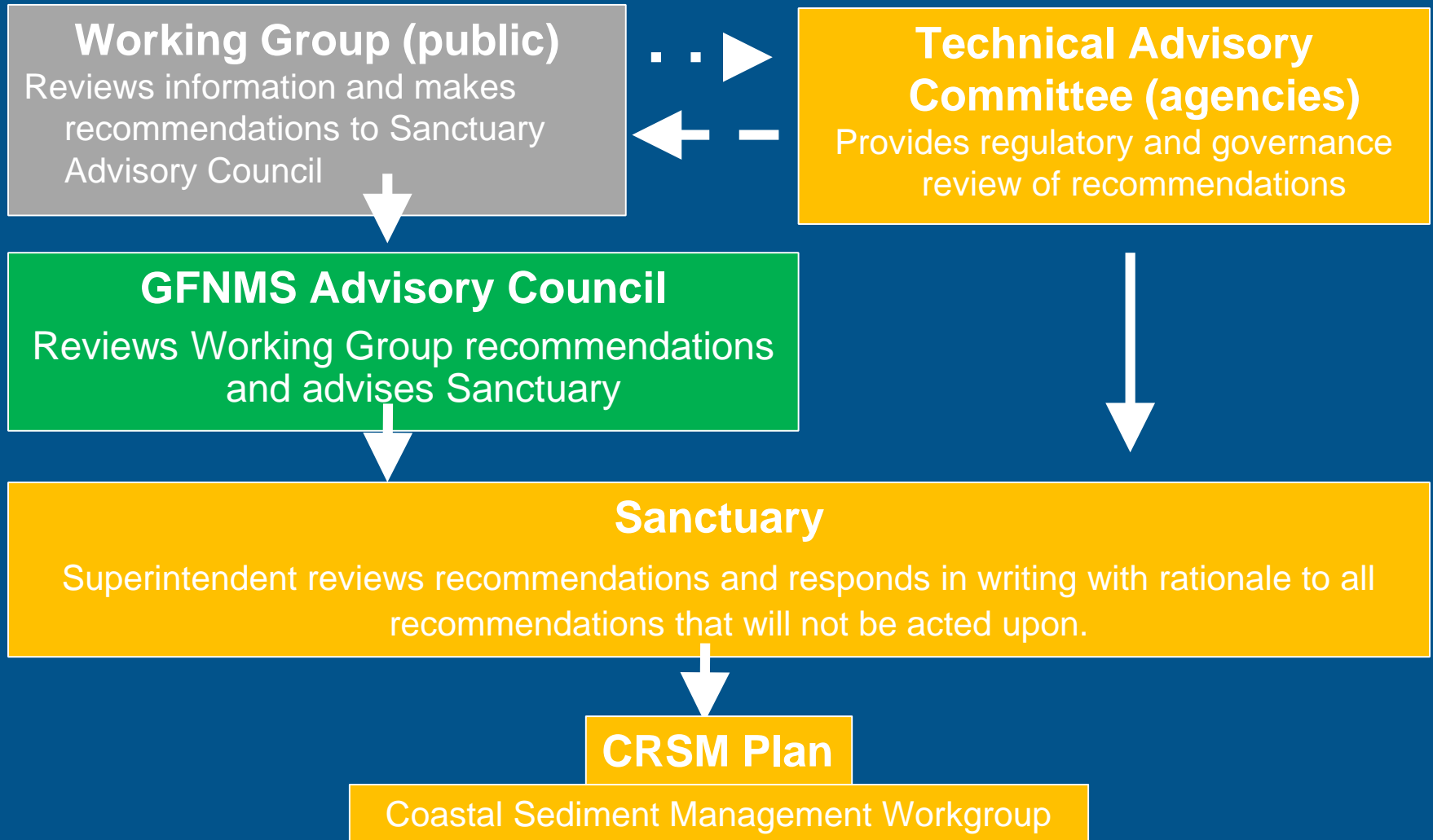
# Sonoma-Marín CRSMP Challenges

- One of the least studied
  - e.g., large gaps in cliff erosion rates
- One of the least monitored
  - e.g., most creeks' sediment loads unknown
- One of the most unconstrained
  - Handful of major headlands but very conflicting interpretations
- One of the more rural settings

# Project Timeline



# GFNMS Working Group Process



# Working Group Membership

## Stakeholders, landowners, and resource agencies

US Army Corps of Engineers\*  
National Park Service (GGRNA and  
PRNS)

California Coastal Commission  
California Geological Survey  
Caltrans\*  
California State Parks  
Natural Resources Agency

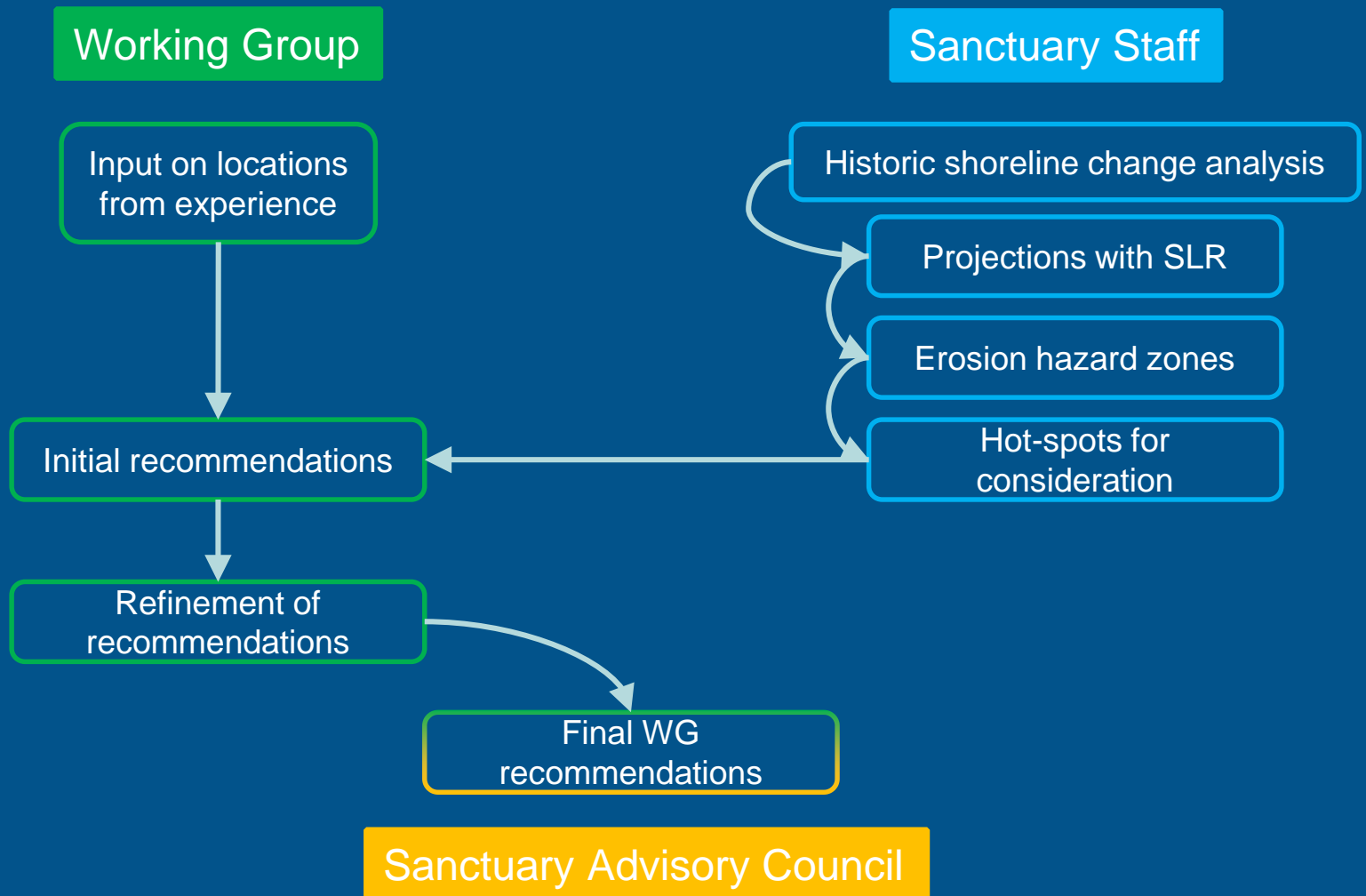
Bodega Marine Laboratory (UCD)  
Romberg Tiburon Center (SFSU)

Sonoma County (Planning, Regional  
Parks, Water Agency\*)  
Marin County (Planning)

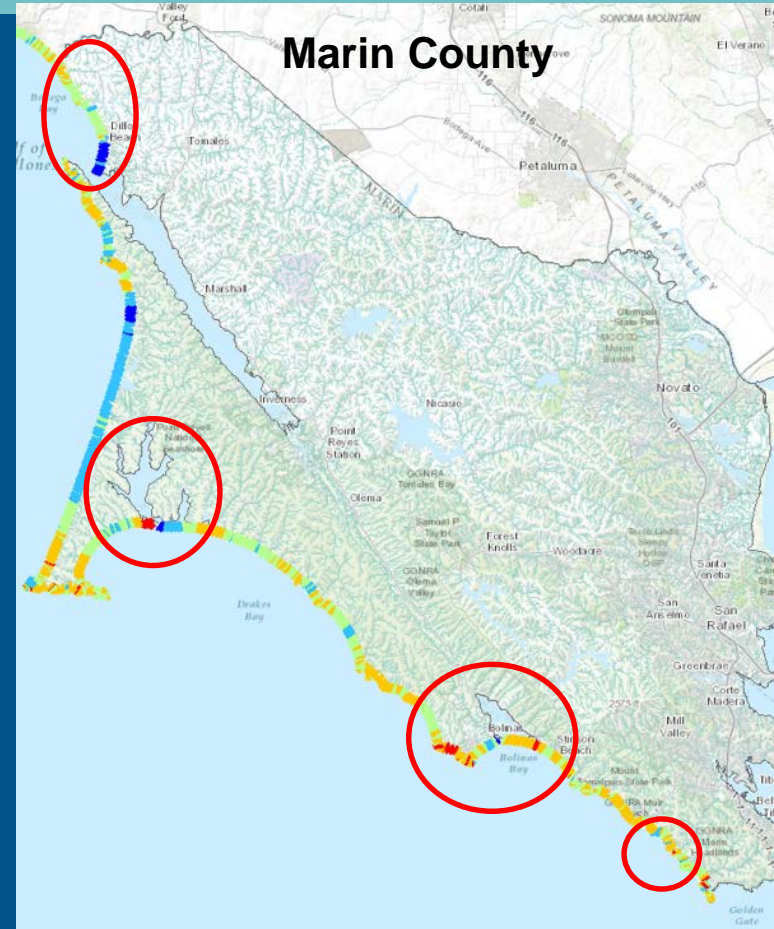
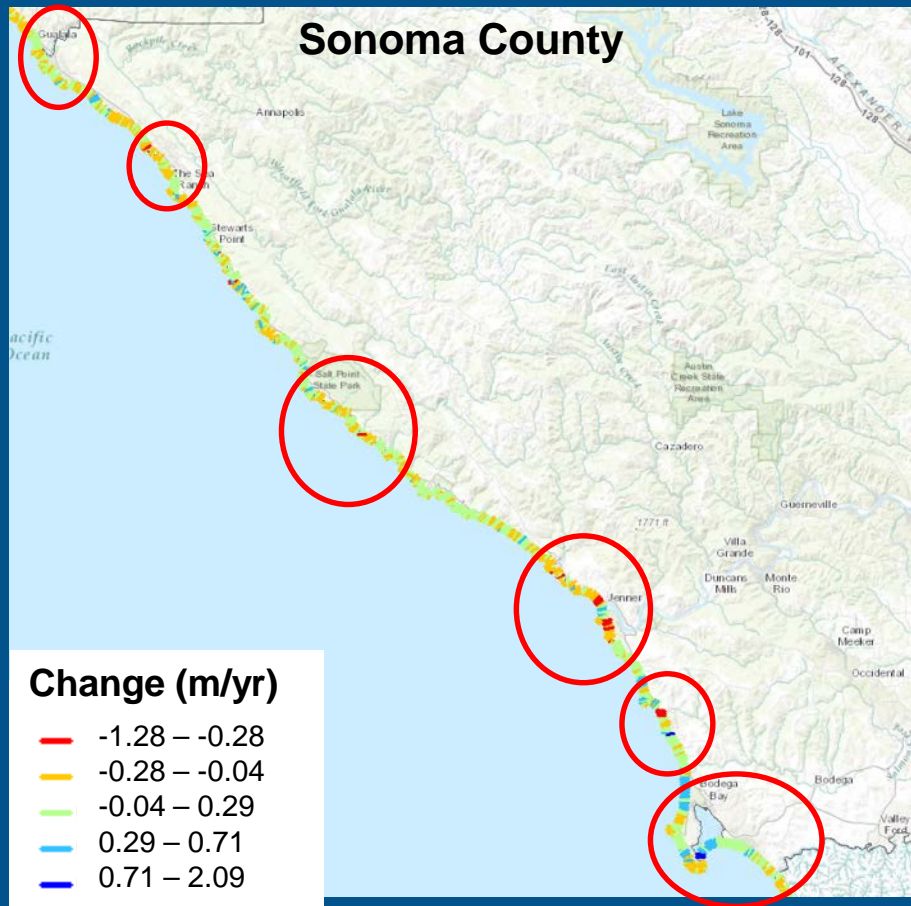
Russian Riverkeeper  
Wildlands Conservancy  
Environmental Action Committee of  
West Marin  
Bodega Bay Fishermen's Association  
Sonoma Coast Surfrider

*\*-Initial participant, did not contribute to final WG recommendations*

# Development of Recommendations

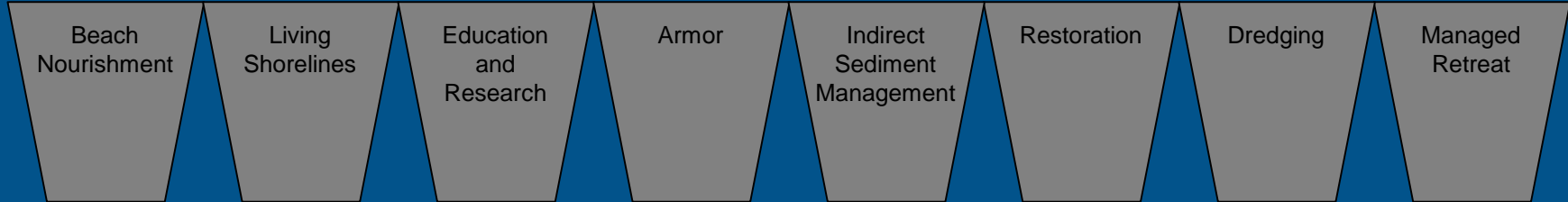
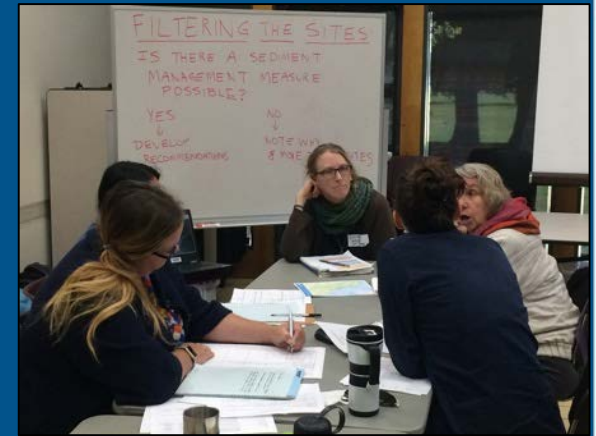


# Shoreline Change & Priority Regions



# Development of the Working Group Recommendations

Inter-Agency Coordination  
Protect Access  
Living Shoreline  
Managed Retreat  
Protect Hwy 1  
Dune Enhancement  
Watershed Management  
Active Harbor  
Beach Restoration  
Beach Nourishment  
Education  
Viticulture management  
Protect Harbor  
Retain Coastal Access  
Protect Bodega Dunes  
Dredge Materials  
Sediment Control  
Habitat Restoration  
Armor  
Access  
Timber Management  
Restore Coastal Bluff  
Address Inundation  
Houseboat



# Overview of Recommendations



Beach  
Nourishment

Living  
Shorelines

Education  
and  
Research

Armor

Indirect  
Sediment  
Management

Restoration

Dredging

Managed  
Retreat



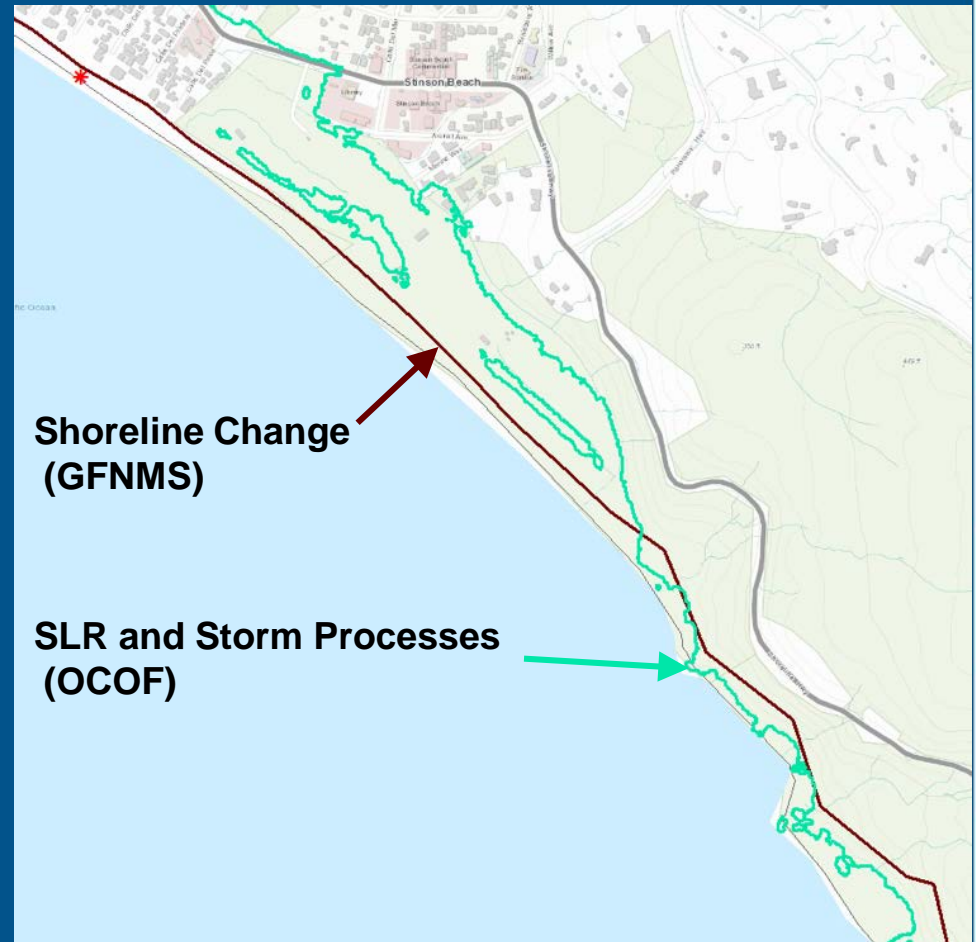
# Gaps in Working Group Recommendations

- Private landownership engagement
- Caltrans engagement
- Shoreline change analysis → proper handling of cliffs
- Sediment budget → requires completion of coastal watershed and cliff erosion analysis

# Shoreline Change Analysis

## Room for Improvement

- Beach method applied uniformly
  - Different method needed for bluff/cliff erosion
- Tomales Bay
  - Only 2 shores → not a reliable trend
- Bolinas Lagoon
  - no shorelines in LiDAR



# Coastal Watershed Analysis

- Goal: Estimate yield for each basin within study area and combined region
- Incomplete Analysis
  - Combination of rock type and vegetation
  - Known disturbance or land uses

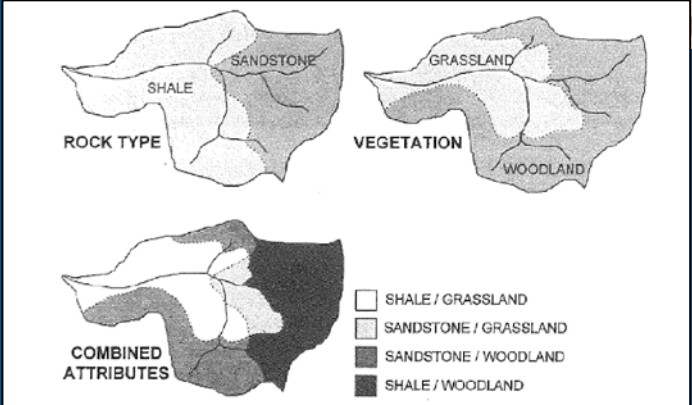
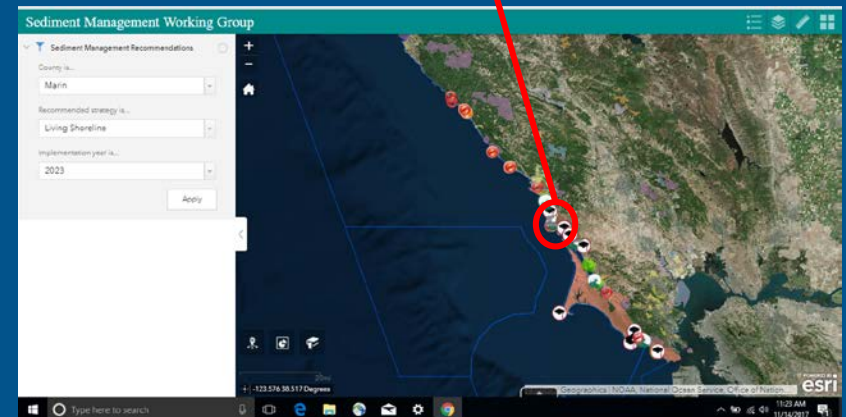
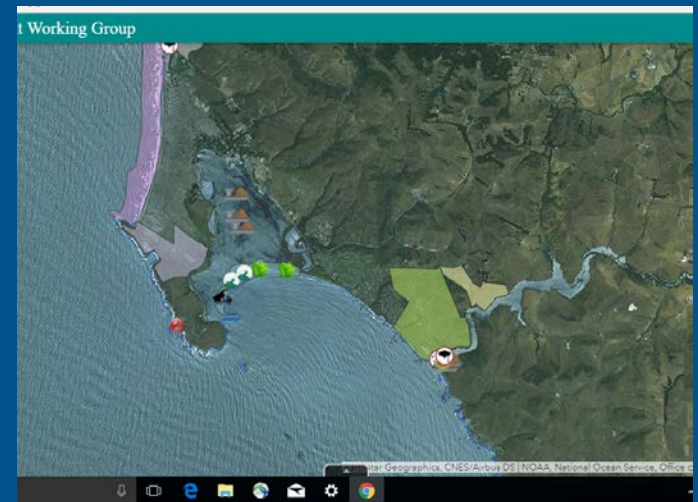


Figure 2: Definition of subareas based on bedrock and vegetation type. Superimposition of the geologic and vegetation maps defines subareas with four combinations of bedrock and vegetation.

# Plan Completion Target: Feb 2018

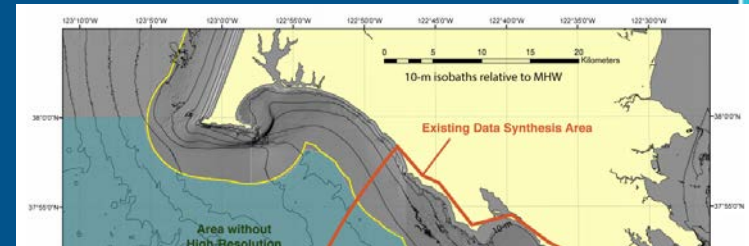
## Plan Components:

- Sediment science, physical processes and geological setting, biological resources
- Regulatory and governance considerations
- Recommendations for sediment management activities
- Story Map



# Implementation: Funding & Partnerships

- California Esteros Climate Adaptation Research Program
  - Esteros identified as requiring more study before decisions
- Bolinas Graben Study
  - Policy on dredging, sediment type and amount
- Stinson Beach Dune Restoration Proposal (Marin Co. lead)
  - Explore feasibility of dune and beach restoration, including sediment sources



## Stinson Beach

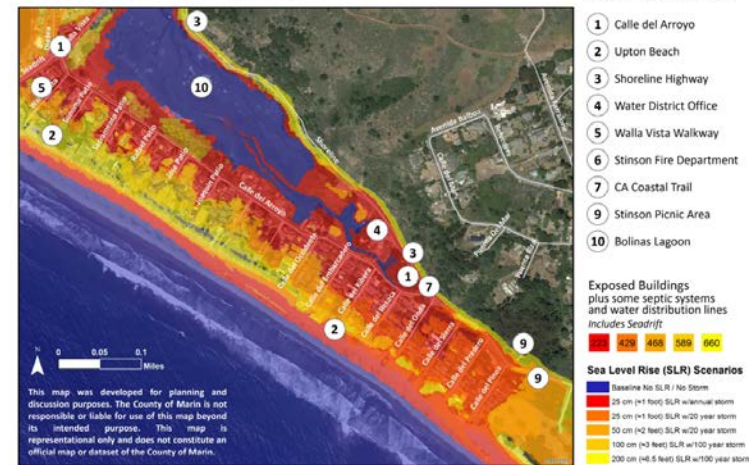


Exhibit 2. Stinson Beach exposure under the five C-SMART Sea Level Rise scenarios.

Estero Americano erosion

Questions?

# Today's Objectives

Discuss, Edit and Vote:

1. Region-wide recommendations (14 that apply to entire study region)
2. Marin County recommendations (for 14 location)
3. Sonoma County recommendations (for 11 locations)

# Recommendation Terminology

**County**: Sonoma or Marin

**Location**: the specific site within the county that is targeted by the recommendation

**Concerns and Issues**: brief description or statement describing the concerns and issues identified by Working Group members at this site.

**Management Goal**: the Working Group members described the overall goal of any sediment management actions at the location



# Recommendation Terminology

**Year**: Recommendations were considered for 3 timeframes (2023, 2033, 2063) based on erosion data and timing of projected impacts. These timeframes are not prescriptive and should not be seen as hard deadlines, rather guidelines based on urgency.

**Sediment Management Strategy**: All recommendations were binned into categories for internal analysis and assessment.

**Strategy Detail**: The specific recommendations being made.

# Recommendation Terminology

**Regulatory feasibility**: Recommendations were analyzed by Working Group members using a flowchart to determine regulatory feasibility:

**Preferred**: this action can be taken with relative regulatory ease, with existing policies or regulations. Note that the Working Group does not necessarily endorse this strategy or prioritize it over others.

**Possible**: this action can be taken, potentially with changes to current policies or regulations.

**Problematic**: this action likely cannot be taken, even with changes to current policies or regulations.