Using CMECS to Meet Sub-Tidal Goals in San Francisco Bay

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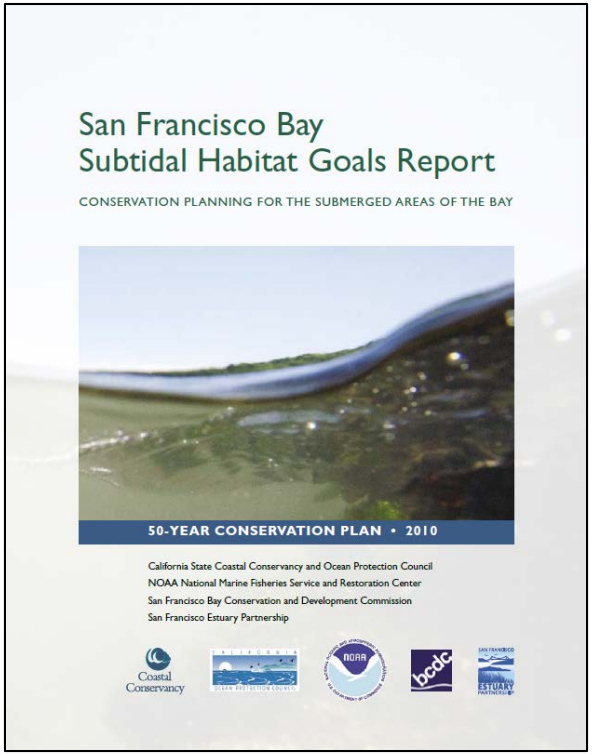
Background

State Sub-Tidal Goals

- Recognition of importance of the estuary and its vulnerability
- Bay-Area wide scope
- Partnership effort (state, federal, NGOs)
- Guidance for regional conservation and restoration agencies
- Support for ESA, EFH designations, Bay area Comprehensive Conservation and Management Plan

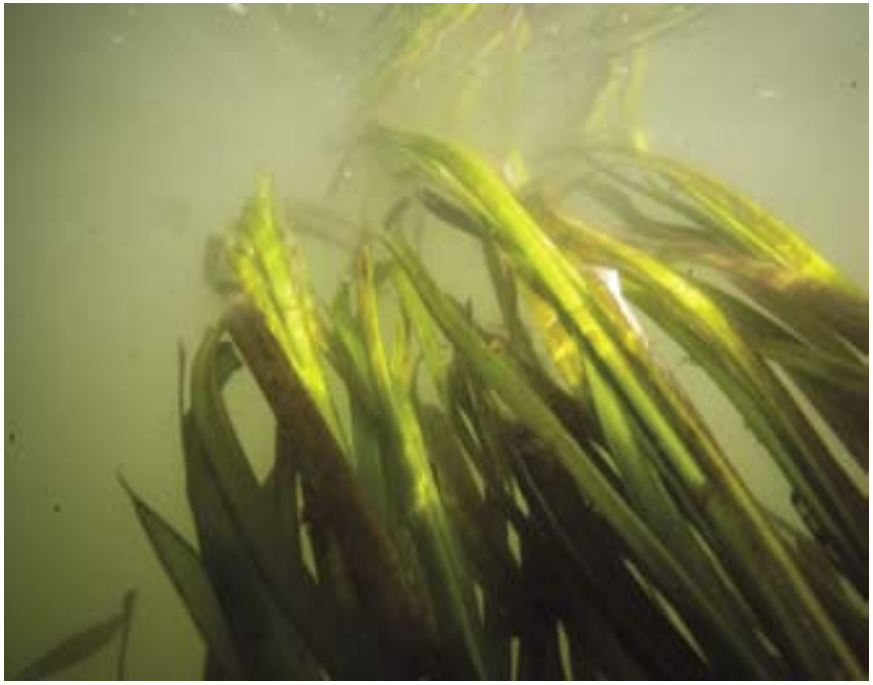
State Sub-Tidal Goals (Cont.)

- Focused around habitats, stressors, ecosystem services, and issues (spill events, etc.)
- 2010 report
- Project priority habitats:
  - Rocky Substrate
  - Soft Substrate
  - Artificial Structures
  - Shellfish
  - Tidal Marsh
  - Macroalgae
  - Eelgrass



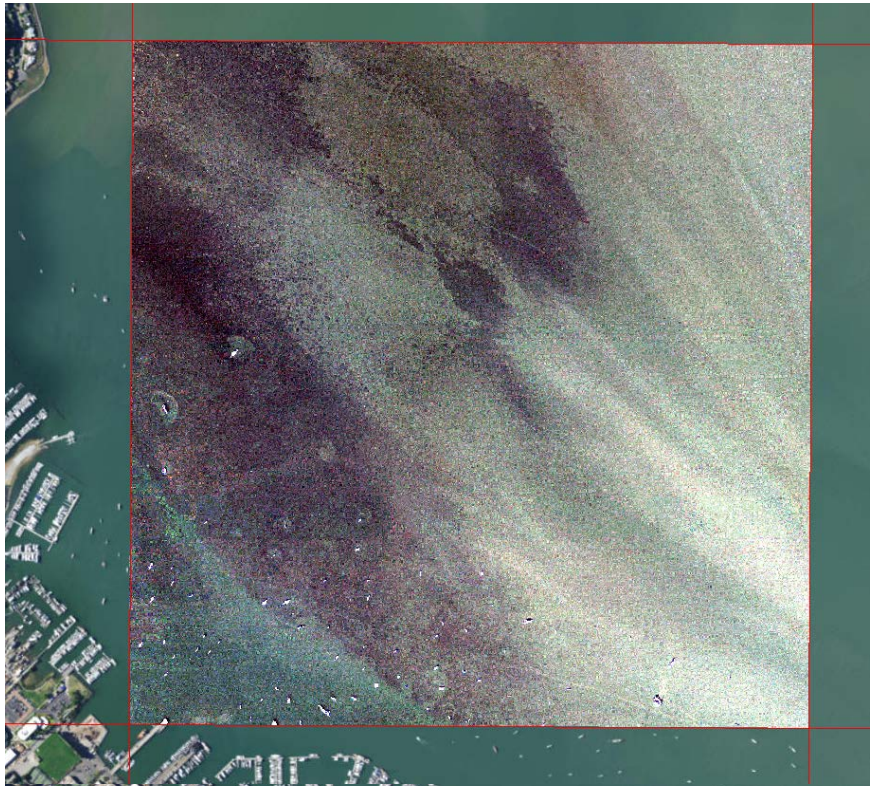
Eelgrass Habitat Goals

- Management Goals
  - No net loss from 2009 baseline (3,700 acres) *Merkel and Assoc.*
  - Location
- Science Goals
  - Connectivity
  - Fragmentation
  - Extent
- Restoration Goals
  - +25 acres (5 years)
  - +100 acres (10 years)
  - +8,000 acres (50 years)

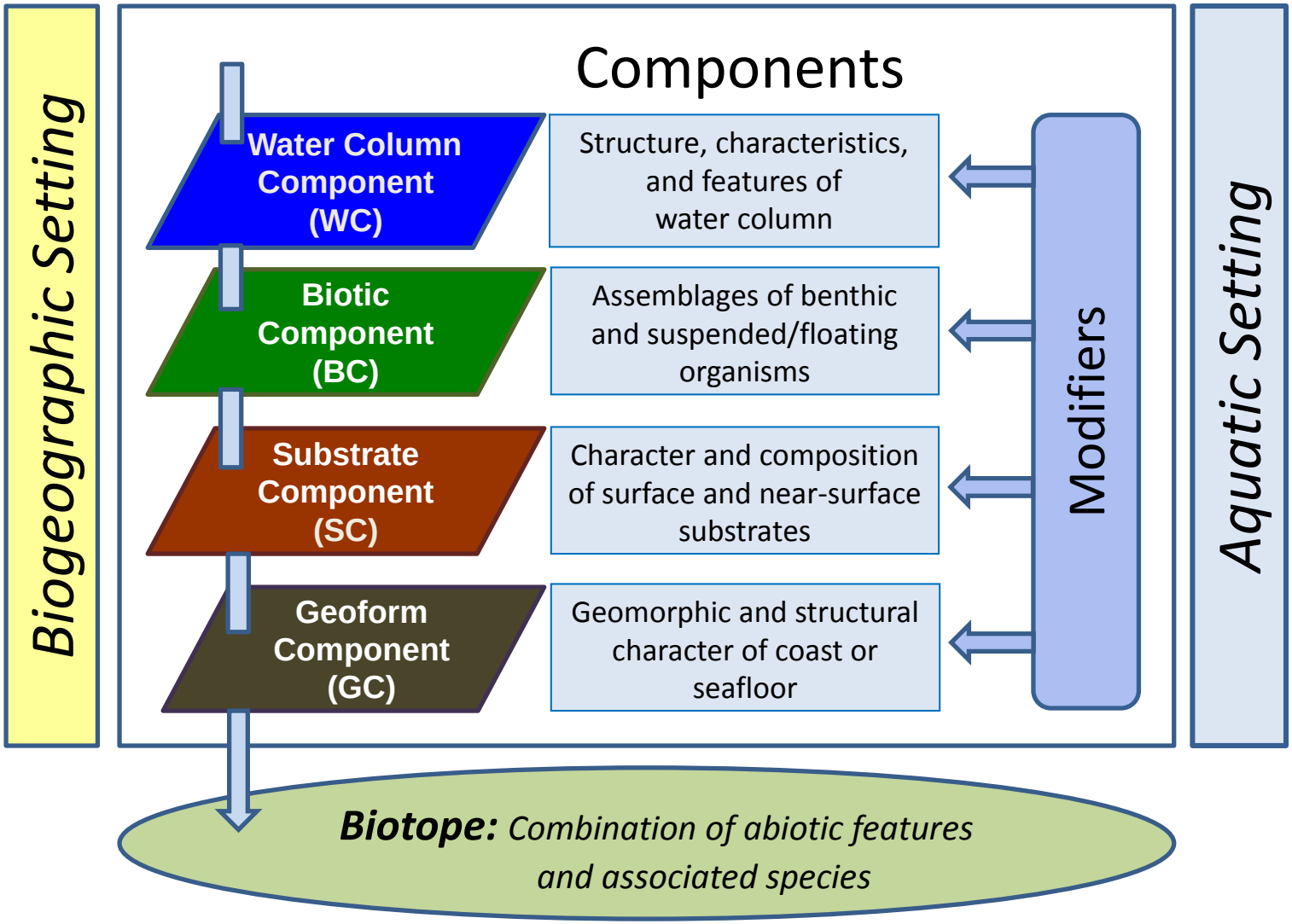


Data Sources

- 2003-2009 spatial habitat data
  - SAV (stuckenia, ruppia, zostera)
  - Mollusc reef (points)
- usSEABED grab samples
- Bay bathymetry
- 2011 multi-spectral imagery
  - 4 band ADS-40 imagery
  - 0.3m resolution
  - Tidally controlled



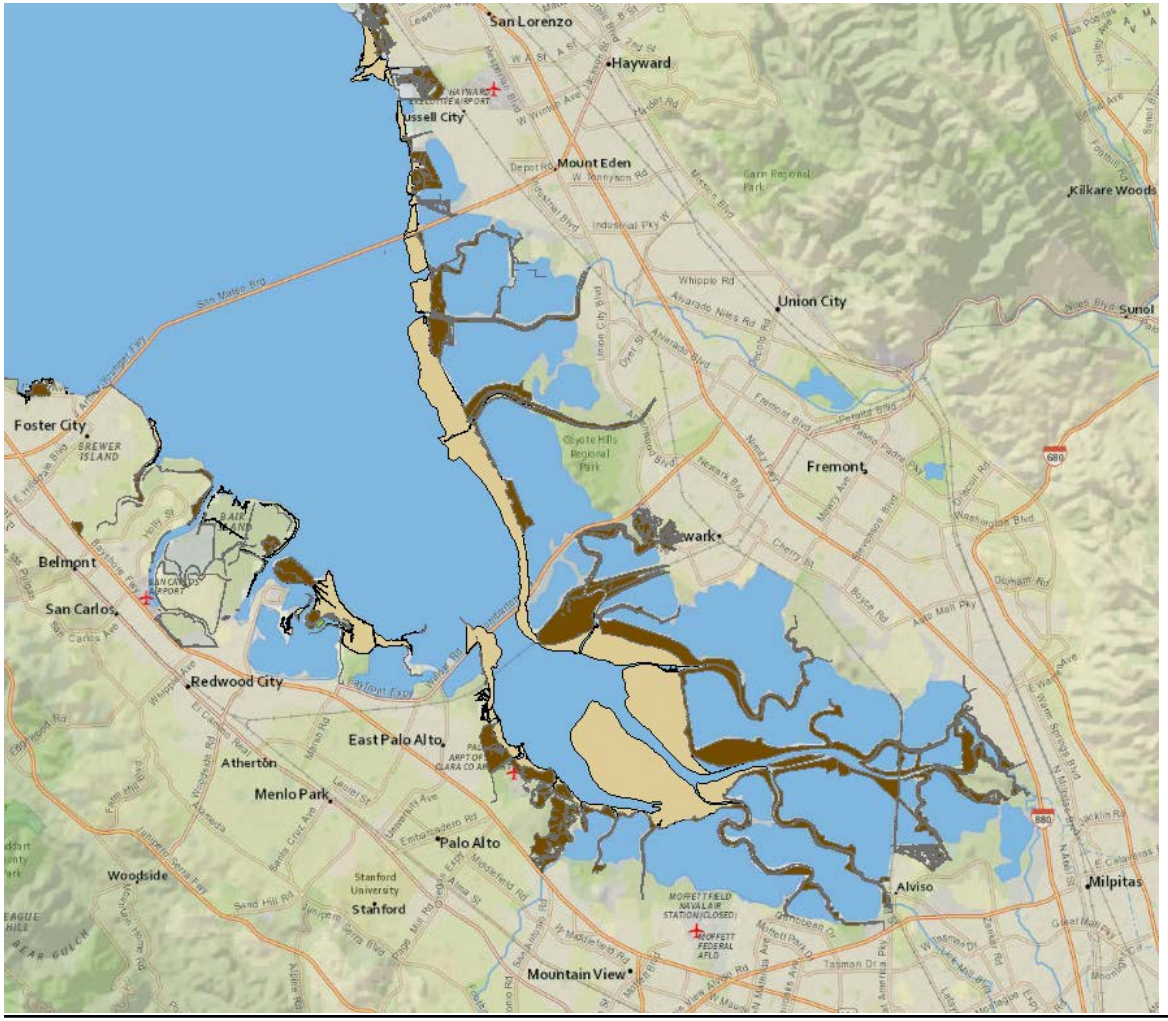
CMECS Structure



Why CMECS?

- Scale independent
- Technology agnostic
- Hierarchical
- Flexible
  - User applies units that they can based on their technology
  - Opportunity to use provisional units
- Ability to accommodate complex observations
- Additional mapping planned in SF Bay with different technologies
- Other successful projects on west coast

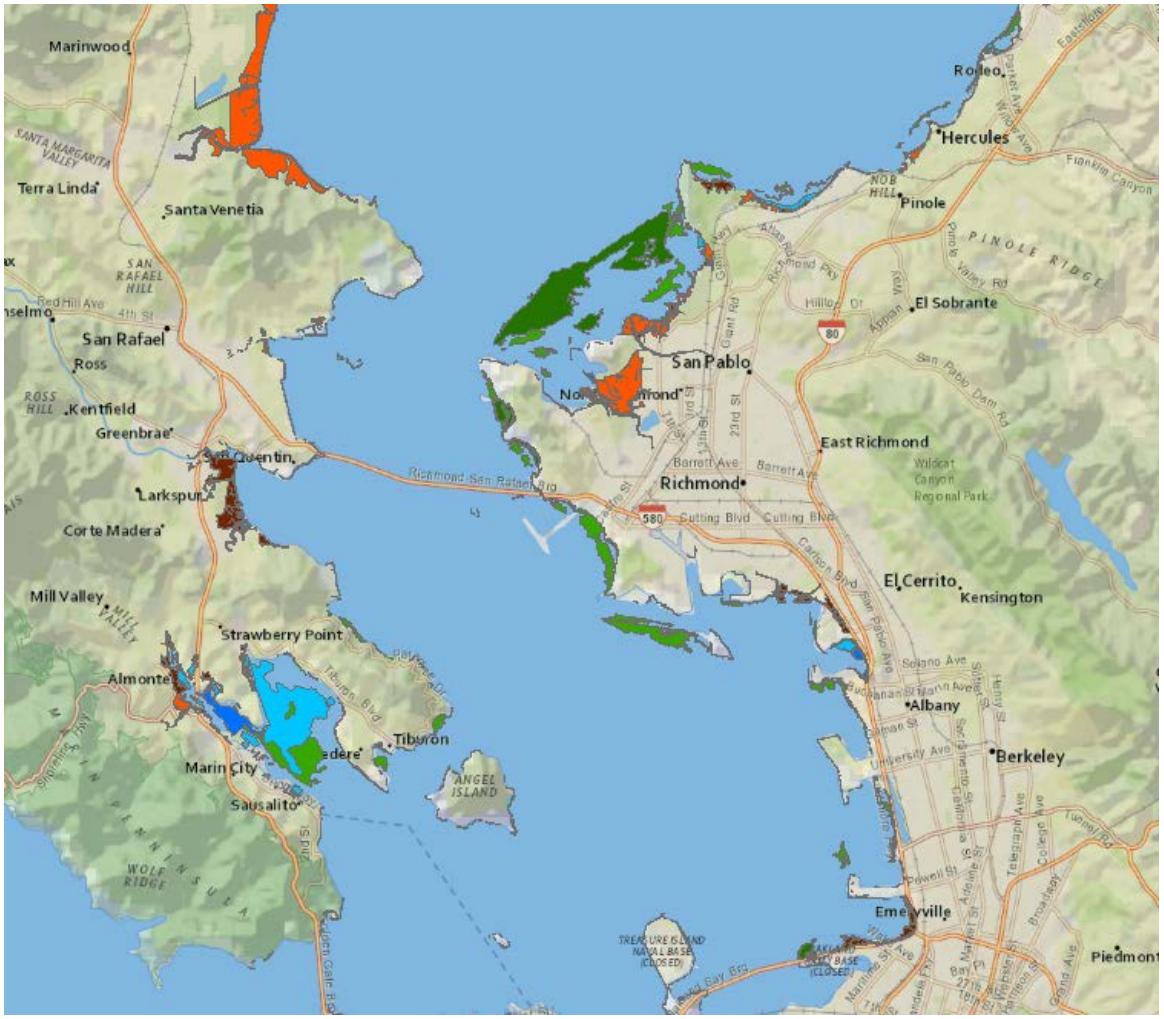
CMECS Geoform Component



CMECS_UNIT

- Riverine Estuary, Tidal Flat
- Riverine Estuary, Marsh Platform
- Riverine Estuary, Shoal
- Riverine Estuary, Rip-Rap Deposit
- Riverine Estuary, Wreck
- Embayment, Ebb Tidal Delta
- Embayment, Tidal Flat
- Embayment, Marsh Platform
- Embayment, Shoal
- Embayment, Patch Mollusk Reef
- Embayment, Rip-Rap Deposit

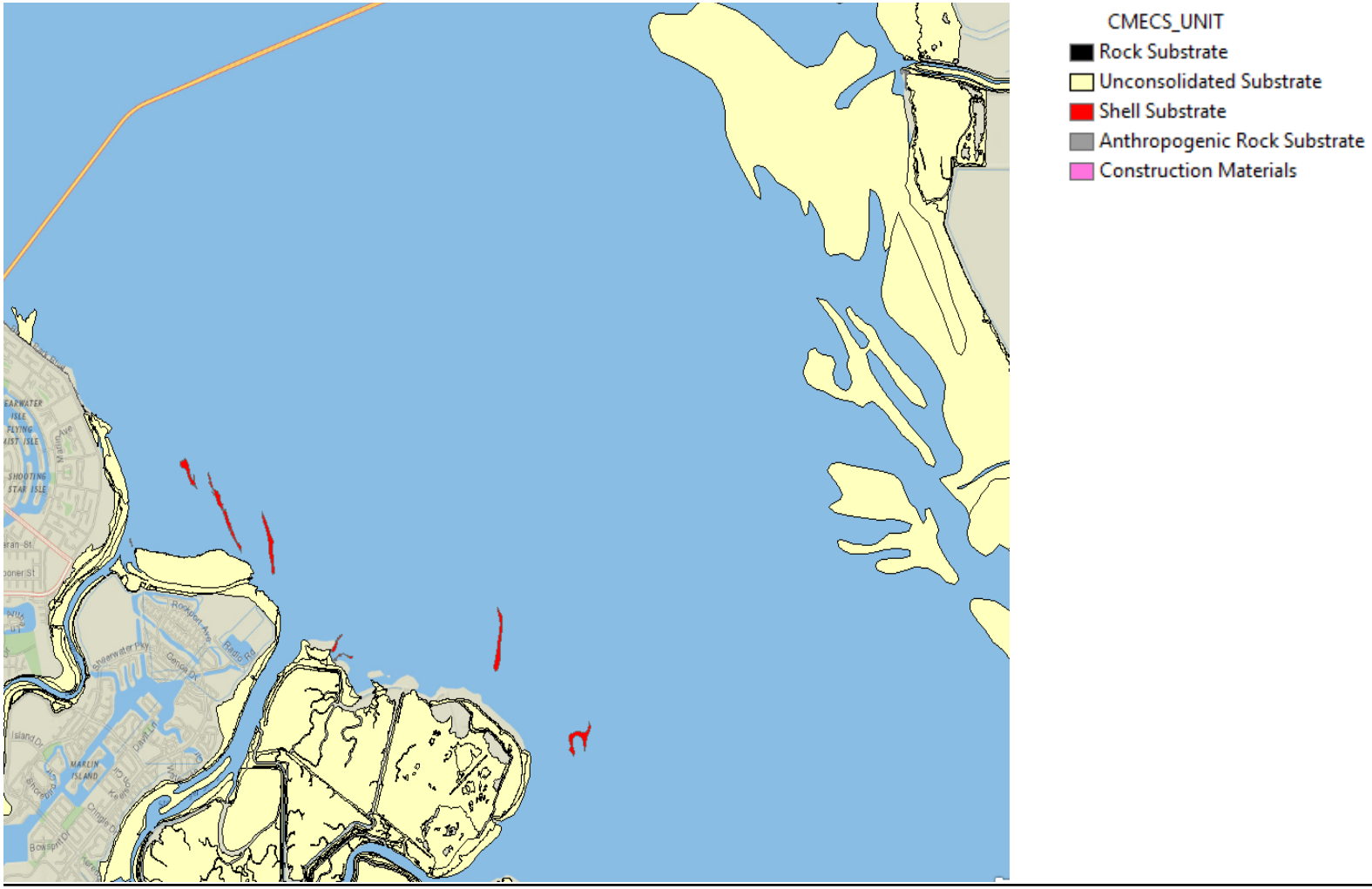
CMECS Biotic Component



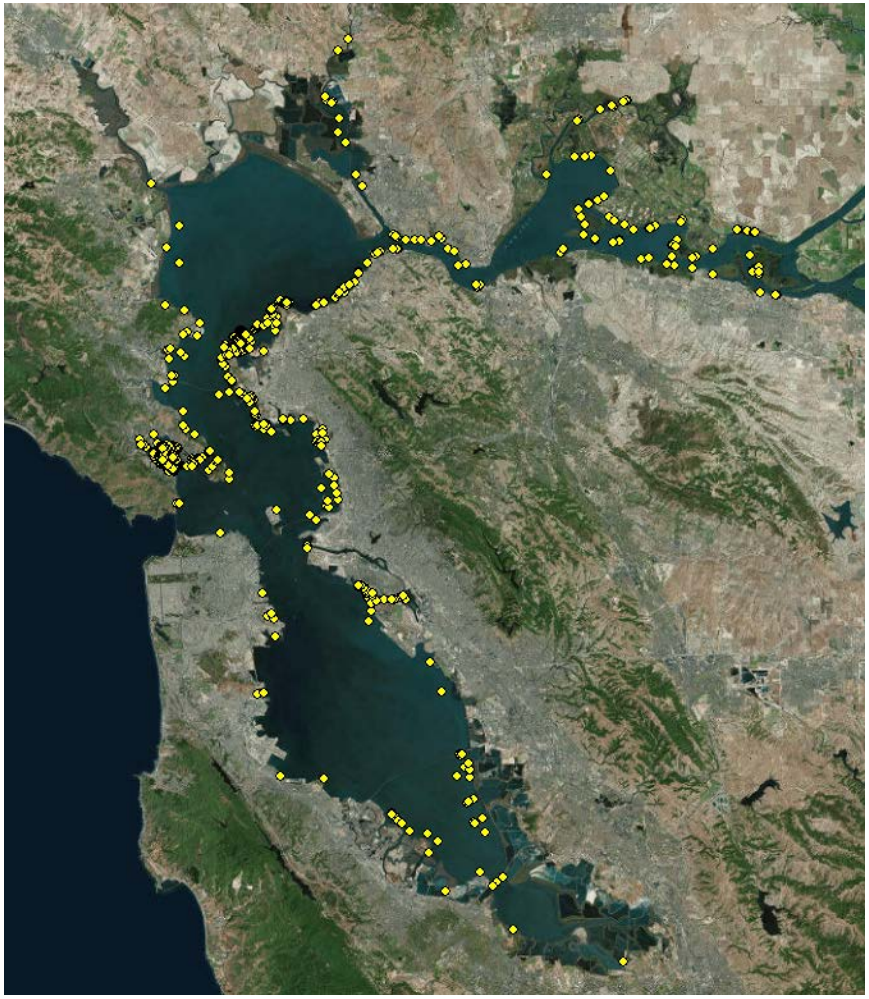
CMECS_UNIT

- Oyster Reef
- Microphytobenthos
- Benthic Macroalgae
- Filamentous Algal Bed
- Leathery/Leafy Algal Bed
- Stuckenia sp. Herbaceous Vegetation-Patchy
- Stuckenia sp. Herbaceous Vegetation-Continuous
- Seagrass Bed-Patchy
- Seagrass Bed-Continuous
- Freshwater Tidal Marsh
- High Salt Marsh
- Low/Intermediate Salt Marsh
- Tidal Forest/Woodland

CMECS Substrate Component



Field Data Points



670 field points

- Transects and single-sites
- Signature development and validation
- 2013- 2014

Parameters

- Meta-information (date, depth, etc.)
- Biotic
- Substrate
- Modifiers
- Co-Occurring Elements

SAV Habitat Results

2011 metrics

- 150 individually mapped *zostera* meadows
- 329 individually mapped *stuckenia* meadows
- 76% patchy/sparse coverage
- Avg. distance to another meadow 166.5 meters

  47% within 50 meters, and 73% within 100 meters
- 2,547 acres seagrass; 724 acres *stuckenia* = 3,271 acres SAV
- 51 *zostera* and 23 *stuckenia* beds are adjacent to un-vegetated, unconsolidated substrate visible in the imagery
- Avg. depth 0.6m. Maximum depth 1.8m

2003 - 2009 metrics

- 4,315 individually mapped *zostera* meadows/clones
- 24 *stuckenia* points

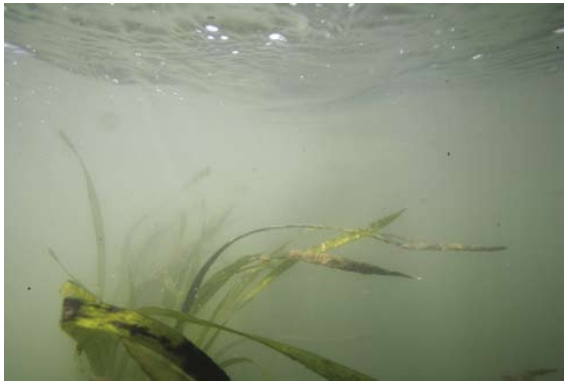
CMECS Results

Applicable CMECS units

- Biotic Community (remote sensing and field)
- Substrate Class (remote sensing) and Subgroup (field)
- Geoform level 1 and 2 based on biotic layer
- Induration modifier (field)
- Biotic co-occurring elements (field). Mostly secondary vegetation types
- Code set and sentence
- ESRI file geodatabase structure, with individual FGDC metadata records

Conclusions

- CMECS determinations could be made with confidence from remotely sensed imagery
- Field observations could be incorporated into the remote sensing data hierarchy without difficulty
- Modifiers and Co-occurring elements were important to full field site characterization



Acknowledgements

- California Ocean Protection Council, San Francisco State Univ., Dewberry Inc., San Francisco Bay Conservation and Development Commission, NOAA NMFS Southwest Regional Office

- Data available at Digital Coast - https://coast.noaa.gov/digitalcoast/data (*benthic*)

- CMECS Web Site - https://iocm.noaa.gov/cmecs