San Francisco Bay Joint Venture

Manager Concerns, Needs & Information Gaps regarding Sea Level Rise (SLR) Impacts on Estuaries

Tidal Marsh Vulnerability to SLR Manager Needs

- Understand localized SLR rates (i.e. SF Bay regions vs. Tomales Bay)
  - need accurate models depicting water levels over time under various conditions;
- Know tidal marsh vulnerability to SLR given current topography and current sediment loading rates in respective watersheds
  - i.e. Storm events at high-tides, influence of levee structures, etc.
- Determine vulnerability of future marsh in subsided baylands
  - Can we expect the marsh to form in our anticipated 20-year timeframe and will it keep pace with sea level rise?
- Understand potential for marshes to migrate inland in response to SLR
  - taking into consideration topographic and infrastructure constraints
- Understanding of what factors will be most important in the ability of coastal marshes to mitigate sea level rise
  - i.e. Will organic matter accumulation be more important than sedimentation in allowing marshes to respond to increases in sea level?
- Understanding the fate of the habitat itself, and also the fate of all the plant and wildlife species utilizing it
- Need to have information on local trends on climate, hydrology, and geology
  - to be able to make informed management decisions

Clapper Rail

Salt Marsh Harvest Mouse

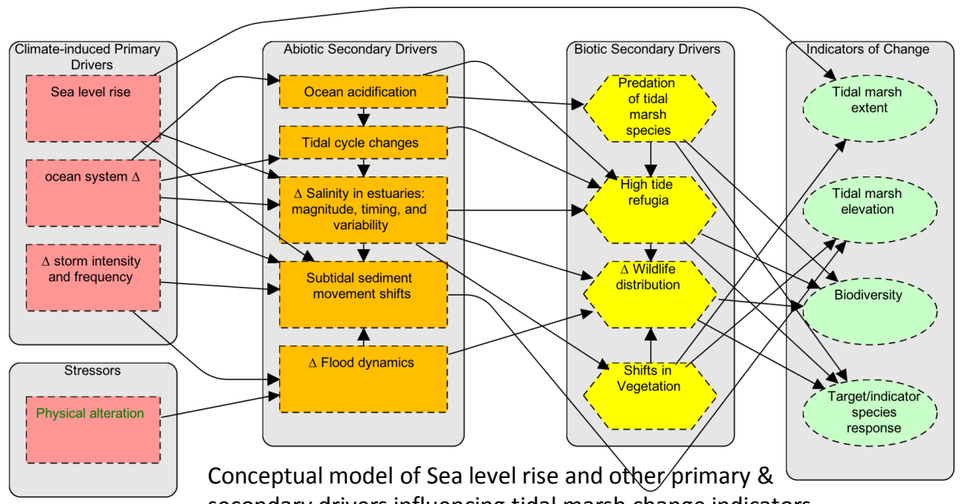
SF Bay Tidal Marsh

JV SLR Concerns

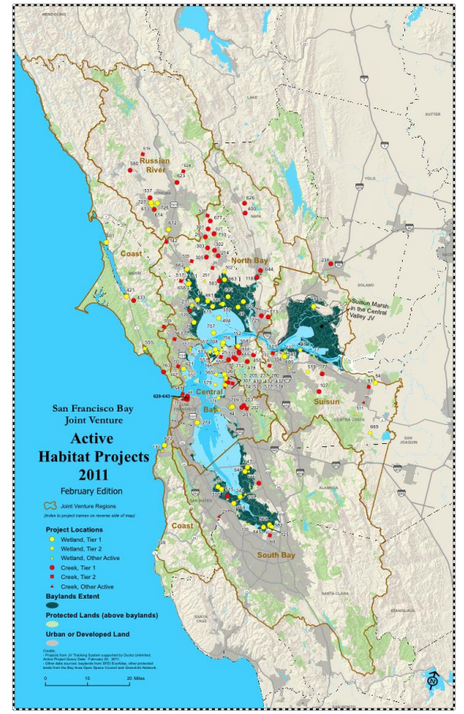
- PAST – Fate of restoration investment
- PRESENT – Vulnerability assessments & adaptation strategies for target ecosystems & species
- FUTURE – Climate-smart restoration & management

Impacts of Most Concern

- Conversion of habitats (tidal marsh to mudflat or subtidal) and related loss of restoration investment
- Primarily losing mid and upper marsh zones to lower marsh and open Bay water habitat.
- Changes in salinity regime & related impacts on fauna & flora
- Associated storm events as they are least predictable and can occur far more quickly than actual sea level rise



Conceptual model of Sea level rise and other primary & secondary drivers influencing tidal marsh change indicators



Main Information Gaps

- Site specific height and rate of sea level rise and sediment availability
- No good current modeling for potential changes along the California coast
- Perceived gaps in the exchange of information among those organizations (scientists!) collecting, analyzing, and conveying the info

Urgency for Vulnerability Assessments

- Need to complete vulnerability assessments as soon as possible
  - BUT important to have the best information available to inform these efforts !
- Urgency for having information on localized trends in climate, hydrology, and geology
- The sooner the better! We are moving forward now.
- *Yesterday has passed already, so, sometime in the near future!*

SLR Vulnerability Analysis Main Concerns

- Information will be used to make decisions that are not truly reflective of changes that might occur in our region
- Mainly that the science is not advanced enough to accurately predict what will happen. We don't really know:
  - how much sediment is out there
  - when and how fast sea level will rise

  The benefit of unrefined maps is outweighed by the alarm they raise
- Whether we'll have enough quantity and quality of refugia habitat to provide for the species entrusted by the public to our agency
- Results will tell us that there isn't much we can actively do and our previous work is lost

Priority Research Needs

- SLR impacts on habitat evolution- can passive marsh accretion keep up with SLR?
- Vulnerability assessments for tidal marsh ecosystems and key indicator species
  - Site specific rate or SLR & sediment availability
- High tide refugia distribution & associated predation risk
- Projected storm severity & frequency in conjunction with SLR impacts on key species
- Effects of changing salinity & ocean – estuary linkages

Priority Monitoring Needs

- SLR in conjunction with salinity Δ, storm frequency
- Tidal water & extreme event surface elevations & rates of Δ at local scale
- Impacts on marsh fauna, flora, special status species
  - Indicators developed via SFEP-DWR effort