PRBO Conservation Science

Wildlife Habitat Metrics

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Goals:

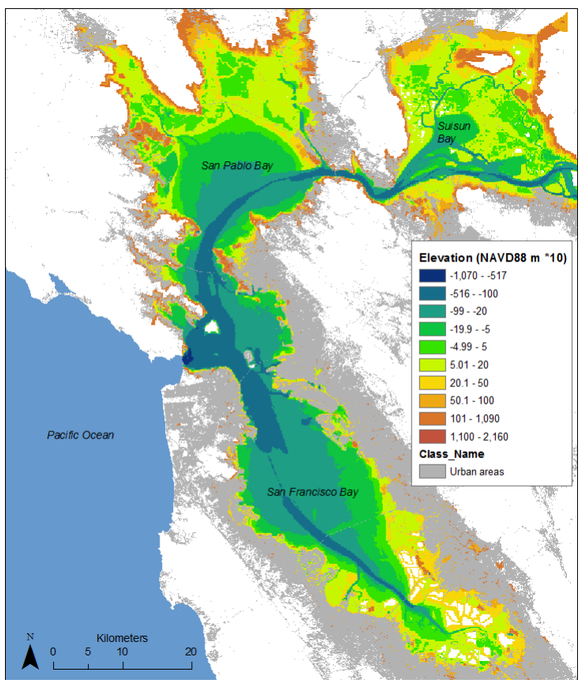
Our overall goal is to help ensure the conservation of San Francisco Bay tidal marsh habitats and the birds and other wildlife dependent upon them in the context of sea level rise, changing salinity, and other rapidly changing climate change related conditions.

Methods

•Models for tidal marsh vegetation and bird distributions were developed using statistical models based on the current associations between species occurrences and biophysical variables.

•Population viability models were developed to assess climate change impacts on tidal marsh bird population viability

Elevation Current elevation was primarily based on LiDAR data provided by the USGS (Knowles, 2010)



Biophysical variables and their sources

Salinity: Maps of spring and summer salinity were calculated based on a spatial interpolation of salinity observations throughout the bay. Future values were based on projections provided by the USGS (Cloern et al. In Prep).

Future elevation was modeled using MARSH98 by PWA ESA. Future elevation was modeled at 20 year increments for two sea-level rise scenarios, two suspended sediment scenarios and three organic accumulation scenarios. The bird and vegetation models included the results from both sediment and sea- level rise scenarios and the lowest organic accumulate scenarios. Other elevation metrics were derived from the modeled elevation.

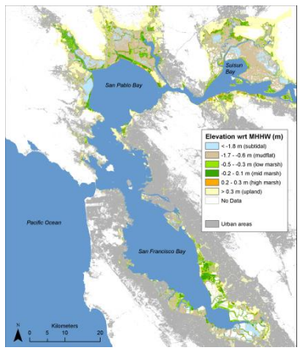
Tidal range: Interpolated from tide gauges .

Distance to bay: Measured in GIS using EcoAtlas.

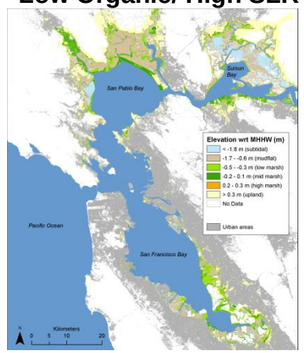
Distance to channels: Percent area that is channels: Measured in GIS based on current elevations.

Distance to levees: Bases on GIS layer provided by Lisa Schile and field observations.

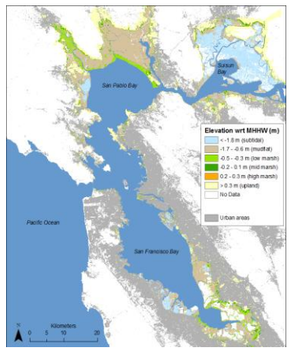
Current tidal marsh habitat

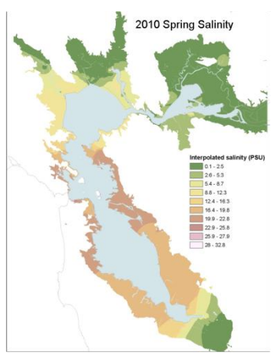


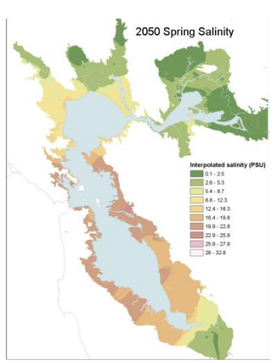
Year 2050: Low sediment/ Low Organic/ High SLR

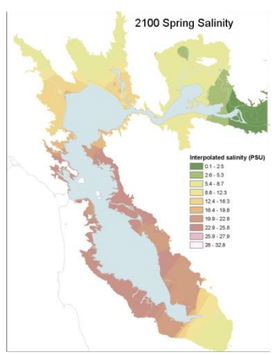


Year 2110: Low sediment/ Low Organic/ High SLR

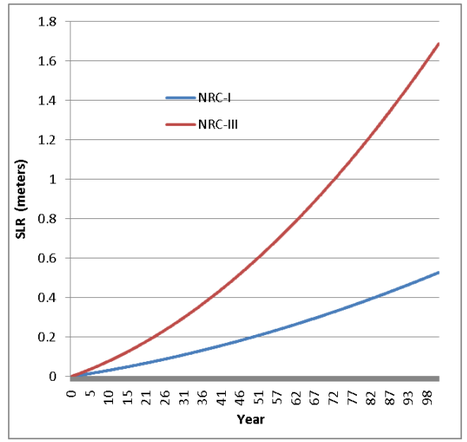




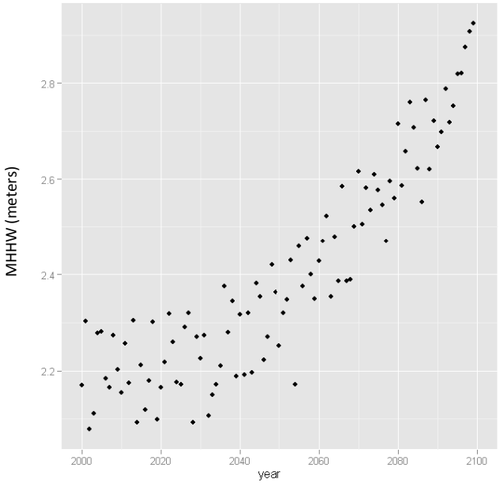




Sea-level rise projections and extreme high water events



Sea-level rise projections and extreme high water events based by the NRC and ACOE,



Maximum high water events at tidal marsh nest locations given marsh accretion under high sea-level rise and future tides (Cayan et al . 2009)

Which inputs could be improved for future modeling efforts?

- Need for improved high resolution for DEM
- More accurate spatially complete data or maps of suspended sediment concentrations.
- Need for realistic projections of extreme storm events/ high tides.
- Improved current maps and future projections of salinity.
- Tidal extremes and tidal prism changes.

References

Cayan, D., Tyree, M., Dettinger, M., Hidalgo, H., Das, T., Maurer, E., Bromirski, P., Graham, N., Flick, R. Climate change scenarios and sea level rise estimates for the California 2009 climate change scenarios assessment. California Climate Change Center CEC-500-2009-014-D.

Cloern JE et al, 2011. Projected evolution of California's San Francisco Bay-Delta-River system in a century of climate change. In preparation.

Knowles, N. 2010. Potential Inundation Due to Rising Sea Levels in the San Francisco Bay Region. San Francisco Estuary and Watershed Science, **8**: 1:19.