LANDSCAPE ANALYSIS OF THE SOUTH BAY

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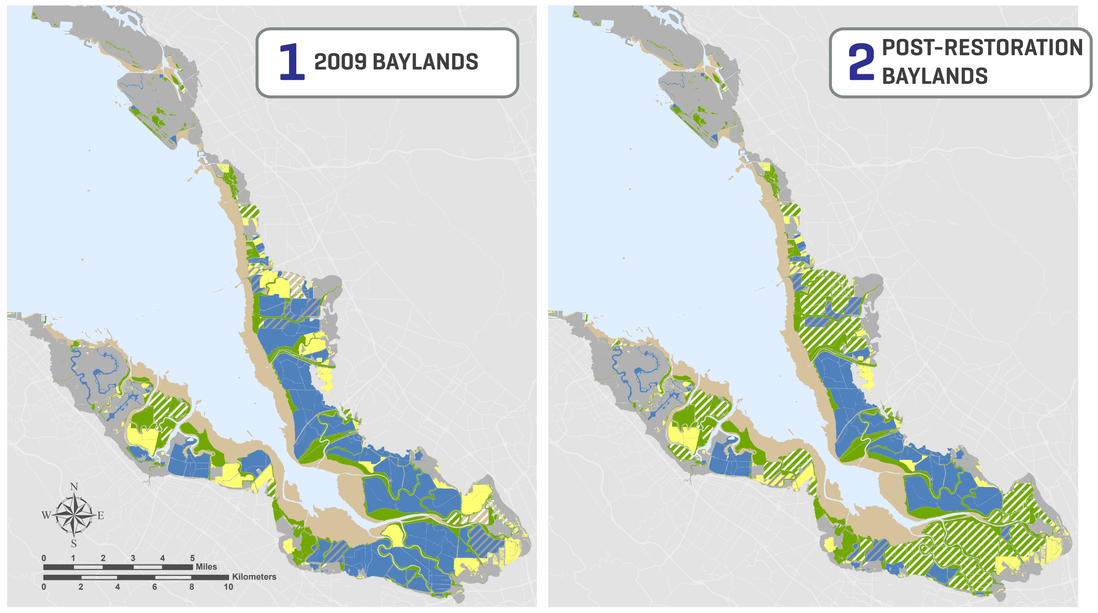
BACKGROUND

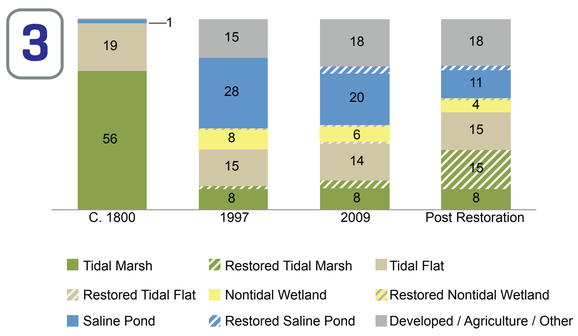
Post European settlement, the San Francisco Bay has incurred significant loss of tidal habitats, including about 150,000 acres of tidal marsh and 20,000 acres of tidal flats from circa 1800 to 1998. These losses were mainly from diking and filling during the urban growth of the area, and replacing natural resources with artificial salt ponds and seasonal non-tidal wetlands. Although not dominant habitats historically, both saline ponds and non-tidal wetlands play a vital role in supporting shorebirds, waterfowl, and other waterbirds, which have lost habitat in other regions (Goals 1999). Since the release of the Goals Report in 1999, there has been a large effort to restore tidal habitats according to the recommendations laid out in the report. This year marks 15 years since bayland ecological habitat goals were set for the region and with the development of several new datasets we're able to quantify change in habitat And perform landscape ecology analyses.

NET HABITAT CHANGE

The San Francisco Estuary Institutes performed a habitat change analysis to quantify the extent and distribution of bayland habitats for four time periods:; pre-European settlement represented by c. 1800's data, the publish date of the first Goals report represented by 1998 data, current conditions found in the 2009 data, and the future habitat acreages based on known restoration/mitigation activities that are likely to be implemented within 10-30 years. The various datasets that provided the information to evaluate bayland habitat change include the Bayland Historical (c. 1800) and Bayland Modern (1998), the Bay Area Aquatic Resource Inventory (BAARI) (2009), and Wetland Tracker and San Francisco Bay Joint Venture project-tracking ("Post-restoration Estimates"). The classification of each dataset was crosswalked to a common set of habitat types. Information from the Tracker, Joint Venture databases, which were verified with local restoration experts, were overlaid on each temporal period to quantify habitat change due to restoration efforts. This poster displays the results of the change analyses from 2009 to Post-restoration for the South Bay Region. To see results from analyses of all 4 temporal periods across the entire Bay Area, please see the forthcoming Bayland Ecological Habitat Goal Update for Climate Change report (estimated 2014).

NET HABITAT CHANGE RESULTS





1. Current (2009) distribution and extent of bayland habitats in the South Bay. Many significant restoration projects have been completed between 1998 and 2009 as depicted above including parts of Bair Island, New Chicago Marsh, Alviso Ponds 19, 20, and 21. However, while the South Bay Salt Pond restoration project is well under way as of 2009 the landscape is still dominated by saline ponds (blue in map).

2. The distribution and extent of bayland habitats in the South Bay due to known restoration and/or mitigation projects likely to be constructed within the next 5-30 years (post-restoration).

3. Quantification of habitat change in the South Bay from c. 1800 to Post-restoration. Values are in 1,000 of acres. Bar colors are associated with the legend in the Net Change maps.

ECOLOGICAL ANAYLSES

Landscape Ecology analyses were performed to gain a general understanding of the current pattern of tidal marsh distribution as important in order to understand the opportunities and constraints of species movement within the baylands, and provide useful information about resource protection and restoration priorities Analyses were performed on the Bay Area Aquatic Resource Inventory (BAARI) data and represent the current (2009) distribution patterns of tidal marsh. We used the marsh patch boundaries as potential barriers to movement for tidal marsh rails (based on Collins and Grossinger 2004). We used rails as our focal species for defining marsh patches because both Black Rails and Clapper Rails are protected species of high management concern. Also, there is extensive ecological data available for these two species in San Francisco Bay.

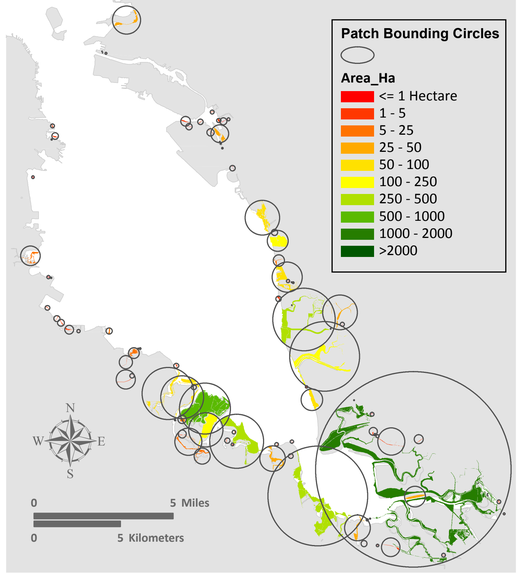
FOR THE PURPOSES OF THESE ANALYSES, PATCHES ARE DEFINED BY:

- **THE FORESHORE**
- **ANY NON-TIDAL AREA AT LEAST 200 FT WIDE**
- **ANY AREA OF OPEN WATER AT LEAST 200 FT WIDE AT LOW TIDE**
- **ANY CHANNEL LARGER THAN 200 FT WIDE FROM TOP-OF-BANK TO TOP-OF-BANK**
  Note: roads and levees were not considered barriers unless they were over 200 ft wide.

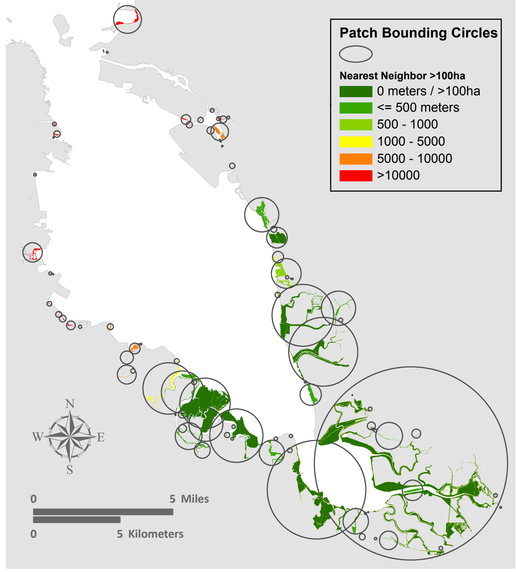
This poster shows South Bay results from three of the analyses performed for the Bayland Ecological Habitat Goals Update for Climate Change report.

ECOLOGICAL ANALYSES RESULTS

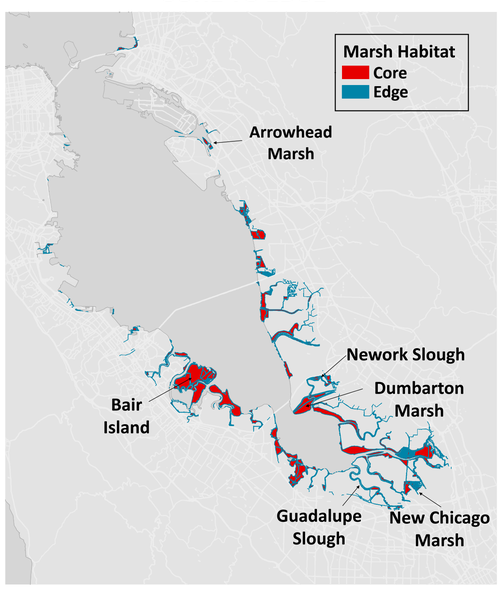
PATCH SIZE DISTRIBUTION



NEAREST LARGE PATCH



CORE TO EDGE



Patches (as earlier defined) are displayed by color according to size. Green marshes are larger patches, red are smaller in size. Because tidal marsh patches in 2009 are not typically round in shape bounding circles have been included to visually indicate the extent of a patch.

Patches (as earlier defined) have been analyzed for their distance to large patches (100 ha). Definition of large patch was borrowed from the work done by Spautz and Nur 2008 and Liu et al 2012. Patches have been colored to indicate their proximity to the nearest large patch. Green patches are closer to large patches than those colored red.

The Core to Edge metric intends to visualize the extent of edge habitat compared to the core habitat to better understand the distribution of potential edge effects for tidal marsh species. Core is defined as 50 meters from the edge. In today's landscape with many fringing marshes there are still areas of core habitat for refugia and predator protection.

CITATIONS

Collins, JN, Grossinger RM. 2004. Synthesis of Scientific Knowledge: for maintaining and improving functioning of the South Bay Ecosystem and Restoring Tidal Salt Marsh and Associated Habitats over the next 50 years at Pond and Pond-Complex Scales. San Francisco Estuary Institute, Oakland, CA.

Liu, L., Wood, J., Nur, N., Stralberg, D., & Herzog, M. 2009. California Clapper Rail (Rallus longirostris obsoletus) population monitoring: 2005-2008. Report to California Department of Fish and Game from PRBO Conservation Science. PRBO Conservation Science, Petaluma, CA.

San Francisco Estuary Institute (SFEI). Modern Baylands GIS Dataset, 1999: Richmond, CA.

San Francisco Estuary Institute (SFEI). Historical Baylands GIS Dataset, 1999: Richmond, CA.

San Francisco Estuary Institute (SFEI). Bay Area Aquatic Resource Inventory (BAARI) GIS dataset, 2011: Richmond, CA.

San Francisco Bay Joint Venture. Active Habitat Projects GIS Dataset. Retrieved February 2013: San Francisco, CA.

Spautz, H., & Nur, N. 2002. Distribution and abundance in relation to habitat and landscape features and nest site characteristics of California black rail (Laterallus jamaicensis coturniculus) in the San Francisco Bay estuary. Final Report. US Fish and Wildlife Service, Sacramento, CA.