

# The Baylands Habitat Map 2020

Mapping progress towards habitat restoration goals

The Baylands Habitat Map 2020 (BHM 2020) was co-created by the **Wetland Regional Monitoring Program's (WRMP) Geospatial Workgroup** and San Francisco Estuary Institute (SFEI), and funded by the **USEPA Water Quality Improvement Fund**.

BHM 2020 is the first complete map of San Francisco Bay wetland and aquatic habitats produced since 2009 (BAARI 2009; sfei.org/baari). It provides updated mapping of tidal habitats and diked baylands, expanding our understanding of the full impact of recent habitat change and restoration.

This effort marks a major advancement for tracking habitat change in the Bay. The mapping team used cutting-edge automated approaches—laying the groundwork for consistent mapping and change detection for years to come.

## 18 Habitat Classes are mapped across the Bay and Suisun

- |   |  |
|---|--|
|  Shallow Subtidal   |  Managed Marsh              |
|  Deep Subtidal      |  Undetermined Other Marsh   |
|  Tidal Flat         |  Other Open Water           |
|  Tidal Pond/Panne   |  Low-Intensity Agriculture  |
|  Intertidal Channel |  High-Intensity Agriculture |
|  High Marsh         |  Developed/Urban            |
|  Low Marsh          |  Non-Aquatic Diked Bayland  |
|  Beach              |  Levee                      |
|  Muted Tidal Marsh  |  Dune                       |

### What changed? EVOLVING MARSHES

#### Sonoma Baylands •

Updated mapping shows the evolution of older tidal marsh restoration projects. These projects may take many years to evolve into mature marshes. At the Sonoma Baylands, the BHM shows this evolution from previously unvegetated tidal flat into semi-vegetated tidal marsh.

### What can we learn? MARSH LOSS FROM SLR

**Corte Madera Marsh •** The BHM shows where marsh is being lost due to erosion and SLR. At Marta's Marsh in Corte Madera, areas of tidal marsh are shrinking due to levee breakage and subsequent erosion. As rates of sea level rise accelerate, being able to track these areas of marsh loss will become increasingly important.

### What changed? RESTORATION

**Pond A6 •** The BHM captures new tidal marsh restoration projects that had not been completed at the time of the last Baywide mapping (BAARI 2009). Pond A6 is one such project, breached in 2010. This map update shows channels and tidal marsh vegetation established at this site.



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 Other map credits: Basemap by ESRI

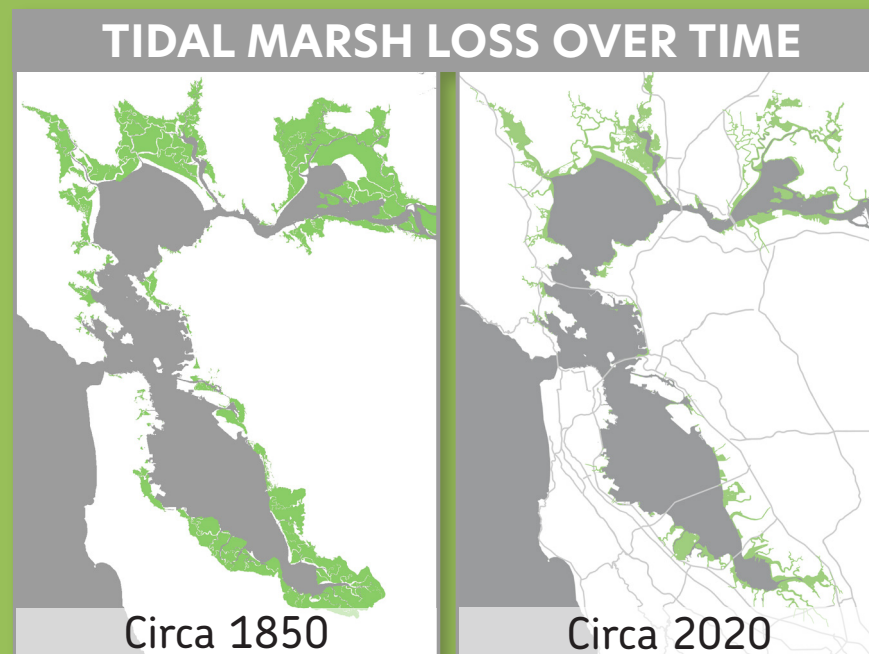


# Why is the 2020 Baylands Habitat Map so important to wetland management?

Wetland management and restoration require accurate habitat maps that can demonstrate and quantify changes around the Bay.

Past mapping efforts have been essential to understanding changes in the Baylands. An early set of maps developed by SFEI compared marsh extents between the 1850's and 1998, and was key to illustrating the immense magnitude of tidal marsh loss due to environmental degradation.

Repeated mapping over time allows us to **measure growth of vital wetland habitats due to restoration, and track losses** in these habitats due to sea level rise (SLR) and other factors. Tracking these changes will be increasingly important over time as rates of SLR increase. BHM 2020 is a critical and timely update to past mapping, providing the newest snapshot of the Baylands since the last complete mapping effort in 2009 (BAARI 2009).



## MAPPING IMPROVED WITH AUTOMATED TECHNIQUES

The mapping team utilized advanced automated techniques and best available data to ensure comprehensive coverage and accuracy.

Datasets such as NAIP imagery, LiDAR, and others were analyzed using scripted Object-Based Image Analysis (OBIA) techniques calibrated for Bay conditions. The team's scripted techniques and **meticulous ruleset process** support consistent, objective, and repeatable mappings. Mappers used a detailed habitat type key with clear definitions to guide the classification process, **ensuring consistency in future mapping efforts** to support change analysis.

Future mapping iterations will benefit from more coordinated imagery and LiDAR collection by the WRMP, as well as ground-truthing that will leverage other WRMP products.

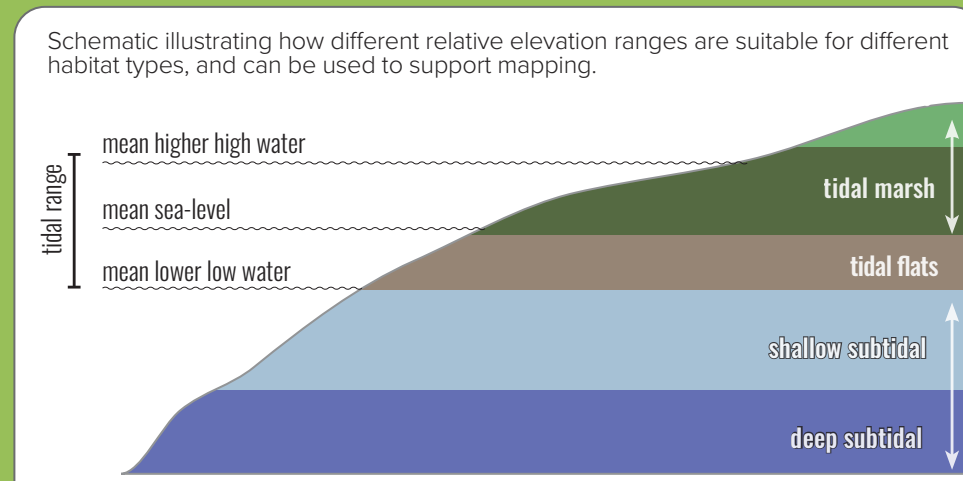


Figure adapted from: SFEI and SPUR. 2019. San Francisco Bay Shoreline Adaptation Atlas: Working with Nature to Plan for Sea Level Rise Using Operational Landscape Units. Publication #915, San Francisco Estuary Institute, Richmond, CA

## BHM 2020 SETS THE STAGE FOR FUTURE UPDATES

By leveraging advancements in automated mapping, this effort has **enabled regular cost-effective updates and change detection analysis**, significantly increasing the value of this approach and its application to map updates. With appropriate funding, the Baylands Habitat Map can be quickly updated and used into the future as a critical tool to guide the Bay through changes from sea level rise.



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Oro Loma Marsh, photo by Shira Bezalel, SFEI

### FOR MORE INFORMATION:

<https://www.sfei.org/projects/baylands-change-basemap>

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