

New Understanding: The Baylands and Climate Change

Appendix B: Change in the Extent of Baylands Habitats

CHANGE IN THE EXTENT OF BAYLANDS

For the Science Update, change in the distribution and abundance of baylands habitat types was estimated using the EcoAtlas Historical and Modern Baylands data sets for 1800 and 1998 from the 1999 Goals report, the Bay Area Aquatic Resource Inventory (BAARI) 2009 data, and input from restoration experts to create a picture of likely future restoration (i.e., those projects with funding and permits in hand). Mapping discrepancies were mitigated as much as possible and Baylands habitat types were binned into equivalent categories across different time periods and data set (“cross-walked”) to the best accuracy possible (**Table 1.1**). Given the need to cross-walk the habitat types among the different mapping efforts, some calculations are slightly different here than in the 1999 Goals report. Baylands habitat type extents were summarized at a regional scale and included tidal marsh, tidal flat, managed ponds, salt ponds, diked wetland, and agriculture, undeveloped lands, and developed areas. National Land Cover Database (NLCD) datasets from 2001 and 2006 were used to determine areas of agriculture and undeveloped areas for the 1998 and 2009 maps respectively.

Table 1.1. Habitat Type categories for each time period and data set.

EcoAtlas 1850 Historical Baylands	Science Update
Deep Bay / Channel	Bay/Channel
Dune	Non-wetland
Island	Non-wetland
Lagoon	Lagoon
Salt Pond	Salt Pond
Sandy Beach	Non-wetland
Shallow Bay / Channel	Bay/Channel
Shellflat	Tidal Flat
Shellmound	Non-wetland
Tidal Flat	Tidal Flat
Tidal Marsh	Tidal Marsh

EcoAtlas 1997 Modern Baylands	Science Update
Bay Flat	Tidal Flat
Bay Flat within Modern but not Historical tidal extent	Tidal Flat
Channel Flat	Tidal Flat
Channel Flat within Modern but not Historical tidal extent	Tidal Flat
Crystallizer	Salt Pond
Deep Bay	Bay/Channel
Deep Major Channel	Bay/Channel
Deep Major Channel within Modern but not Historical tidal extent	Bay/Channel
Developed Aeolian Land within Modern but not Historical tidal extent	Non-wetland
Developed Island or Fill	Non-wetland
Diked Marsh	Diked wetland
Dune (of aeolian origin)	Non-wetland
Dune(origin of deposit is fill;wind-shaped but not wind-deposited)	Non-wetland
Farmed Bayland	Non-wetland
Grazed Bayland	Non-wetland
High Salinity Salt Pond	Salt Pond
Inactive Salt Pond	Salt Pond
Lagoon	Managed Pond
Lakes on fill, i.e. at Golden Gate Fields	Diked wetland
Low Salinity Salt Pond	Salt Pond
Managed Marsh	Diked wetland
Medium Salinity Salt Pond	Salt Pond
Medium Salinity Salt Pond within Modern but not Historical extent	Salt Pond
Muted Tidal Marsh	Tidal marsh
Old High Tidal Marsh	Tidal Marsh
Ruderal Bayland	Non-wetland
Shallow Bay	Bay/Channel
Shallow Bay within Modern but not Historical extent	Bay/Channel
Shallow Major Channel	Bay/Channel
Shallow Major Channel within Modern but not Historical tidal	Bay/Channel

extent	
Shell Beach	Non-wetland
Storage or Treatment Basin	Managed pond
Undefined Bayland	Non-wetland
Undeveloped Alluvial Plain within Modern but not Historical tidal extent?	Non-wetland
Undeveloped Fill	Non-wetland
Undeveloped former island	Non-wetland
Undeveloped Island (Hillslope)	Non-wetland
Willow Grove in diked setting	Non-bayland
Young High Tidal Marsh	Tidal Marsh
Young High Tidal Marsh within Modern but not Historical extent	Tidal Marsh
Young Low/Mid Tidal Marsh	Tidal Marsh

	Science Update
BAARI Baylands 2009	
Deep Bay	Bay/Channel
Lagoon Perennial Open Water Natural	Managed Pond
Lagoon Perennial Open Water Unnatural	Managed Pond
Lagoon Perennial Unvegetation Flat Natural	Managed Pond
Lagoon Perennial Unvegetation Flat Unnatural	Managed Pond
Lagoon Perennial Vegetation Natural	Managed Pond
Lagoon Perennial Vegetation Unnatural	Managed Pond
Shallow Bay	Bay/Channel
Tidal Bay Flat	Tidal Flat
Tidal Ditch	Tidal Marsh
Tidal Engineered Channel	Bay/Channel
Tidal Marsh Flat	Tidal Marsh
Tidal Nascent Vegetation	Tidal Flat
Tidal Panne	Tidal Marsh
Tidal Vegetation	Tidal Marsh
BAARI wetlands 2009 (clipped to Baylands Extent)	Science

	Update
Depressional Open Water Natural	Non-baylands
Depressional Open Water Unnatural	Managed Pond ¹
Depressional Vegetated Natural	Non-baylands
Depressional Vegetated Unnatural	Diked wetland
Fluvial Channel	Bay/channel
Fluvial Ditch	Bay/channel
Fluvial Engineered Channel	Bay/channel
Fluvial Unvegetated Flat (in-channel)	Bay/channel
Fluvial Vegetated (in-channel)	Bay/channel
Lacustrine Open Water Natural	Non-baylands
Lacustrine Open Water Unnatural	Managed Pond
Lacustrine Vegetated Natural	Non-baylands
Lacustrine Vegetated Unnatural	Diked wetland
Playa Open Water Unnatural	Managed pond
Playa Unvegetated Flat Natural	Non-baylands
Playa Unvegetated Flat Unnatural	Managed pond
Playa Vegetated Unnatural	Diked wetland
Seep or Spring Natural	Non-bayland
Seeps or Spring Unnatural	Non-bayland
Vernal Pool	Non-bayland
Vernal Pool Complex	Non-bayland

- 1 Depressional Open Water Unnatural polygons in BAARI wetlands 2009 included habitats considered managed ponds and habitats considered diked wetlands. This layer was manually reviewed for consistency with other habitat type categories. All wastewater treatment ponds were classified as managed ponds. Most other polygons were classified as diked wetlands.

NLDC Land Cover 2001 and 2006		BEHGU
11	Open Water	Agriculture and Undeveloped Land
31	Barren Land	Agriculture and Undeveloped Land

	(Rock/Sand/Clay)	
41	Deciduous Forest	Agriculture and Undeveloped Land
42	Evergreen Forest	Agriculture and Undeveloped Land
43	Mixed Forest	Agriculture and Undeveloped Land
52	Shrub/Scrub	Agriculture and Undeveloped Land
71	Grassland	Agriculture and Undeveloped Land
81	Pasture/Hay	Agriculture and Undeveloped Land
82	Cultivated Crops	Agriculture and Undeveloped Land
90	Woody Wetlands	Agriculture and Undeveloped Land
95	Emergent Herbaceous Wetlands	Agriculture and Undeveloped Land

Restoration, enhancement, and mitigation projects that have been funded, permitted or both and therefore have a high probability of completion within the next 20–30 years have been included in this estimation of future baylands habitat. The estimated acreage of these anticipated projects (construction completed after 2009) was taken from the San Francisco Bay Joint Venture and San Francisco Estuary Institute project tracking databases and further vetted with regional restoration managers to incorporate the best understanding of expected habitat types and extents that are planned to be created through these projects. Due to uncertainty in estimating expected habitat acreage from planned restoration projects, certain assumptions were made for this analysis. If one expected habitat type was listed in the database, the entire restoration project extent was allocated to that type. If more than one habitat type was listed, then the restoration area was divided into individual polygons representing the different habitat types, whenever possible. These refined restoration data were overlaid on the BAARI 2009 map and replaced the 2009 habitats for quantification and display. Thus, this estimate of future baylands habitat extents is based on updates to current habitat type maps using the information available in project tracking databases; it is neither a modeling exercise nor a predictive analysis, and it does not include the effects of sea-level rise or other climate change impacts.

Habitat acreages

Table 1.2 Habitat extents for the Baylands in different time periods, rounded to the nearest thousand acres.

	c. 1800	1998	2009	Future
Tidal Marsh	190000	36000	36000	36000
Restored Tidal Marsh	0	4000	8000	38000
Tidal Flat	50000	29000	28000	28000
Restored Tidal Flat	0	0	6000	0
Diked Wetland	0	63000	52000	44000
Restored Diked Wetland	0	2000	4000	7000
Managed Ponds	0	41000	37000	19000
Restored	0	0	2000	8000

Managed Ponds				
Developed Land	0	87000	90000	84000

Table 1.3 Change in restored habitat extents over time, rounded to the nearest thousand acres.

Habitat Type	Acres
Restored Tidal Marsh	
Change in restored area 1998-2009	4000
Change in restored area 2009-future	30,000
Restored Tidal Flat	
Change in restored area 1998-2009	6000
Change in restored area 2009-future	-6000
Restored Diked Wetlands	
Change in restored area 1998-2009	2000
Change in restored area 2009-future	3000
All Diked Wetlands (restored and non-restored)	
Change in total area 2009 to future	-5,000
Restored Managed Ponds	
Change in restored area 1998-2009	2000
Change in restored area 2009-future	6000
All Managed Ponds	
Change in total area 2009 to future	-12,000