Ecological site group R019XG901CA
Tidal Flat

Last updated: 07/05/2023
Accessed: 04/27/2024

Key Characteristics

- located on tidal flats

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Physiography

This ESG is found on tidal flats near the coastline, with slopes from 0-1% and elevations at -10 ft below sea level to approximately 30 ft.

Climate

The climate for this MLRA includes an average annual precipitation that covers a diverse landscape of valleys and mountains and can range anywhere from 8 to 53 inches (215 to 1,354 millimeters), increasing with elevation. Most of the rainfall occurs as low- or moderate-intensity, Pacific frontal storms during winter. Rain can turn to snow at the higher elevations. A little snow may fall in winter, but it does not last. Summers are dry, but fog provides some moisture along the coast. The average annual temperature is 38 to 67 degrees F (3 to 19 degrees C). The freeze-free period averages 310 days in the valleys, 245 days in the mountains, and ranges from 125 to 365 days along the coast. It decreases in length with elevation. The longest freeze-free period occurs at the lower elevations along the western edge of the area.

Soil features

Soils for these tidal flats are variable, but all will be saline and wet, with a water table at or near the surface most of the year. They are poorly drained soils that experience frequent flooding, and vary between frequently ponded to no ponding. The soils textures and pH will vary depending on parent material and source waters with most being alkaline, and others being acidic.
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Representative soils may include Aquents and Sulfic fluvaquents

Vegetation dynamics

This tidal salt flats ESG represent the myriad of seasonal wetlands that are characteristic of the Mediterranean climate coastal environment of MLRA 19 in Southern California. They are subject to intermittent flooding due to tidal or freshwater influence and remain unvegetated due to salt concentration, with soil salinities often exceeding 100-200 ppt. They are extremely dynamic features, experiencing large fluctuations in salinity and inundation. They were widespread historically and are present in many Southern California estuaries today, providing an array of ecosystem functions for resident and migratory wildlife. However, due to the extent of urbanization in this ESG, many of these tidal flats no longer exist and have become fragmented and significantly altered. Little is known about their formative processes, historical and contemporary distribution, and ecosystem functions and services of salt flats in the region relative to other estuarine habitat types.

These tidal salt flats indicate some degree of disconnectivity from regular tidal inundation that would allow for desiccation, either due to elevation (e.g., above Mean Higher High Water where inundation is infrequent) or a physical barrier such as sand dunes or inlet closure. As a result, salt flat conditions and dynamics (including shape and landscape position, inundation regime, soil and water salinity, sediment dynamics) are variable from year to year and feature to feature.

Salt flats were historically present in approximately one-quarter of Southern California 104 estuarine systems. They were found across the Bight, from Goleta Slough to the Tijuana River estuary, and covered more than 3,000 acres in total (~10% of total estuarine habitat area excluding subtidal open water Salt flat size, shape, landscape position, and ecological context varied across systems, with salt flats ranging in size from less than one acre to well over 1,000 acres (flanking either side of the San Gabriel River as it entered what is now Los Angeles Harbor). Other than the Los Angeles Harbor area, the largest salt flats (between 150 and 1,000 acres) were found in northern San Diego County (Batiquitos, San Elijo, Buena Vista, and Agua Hedionda lagoons, ranging from 160 to 475 acres), at Goleta (~200 acres), and Mugu Lagoon (largest salt flat ~180 acres; 250 acres total). Other notable salt flat complexes were found at Ballona (135 ac) and Seal Beach (135 ac).

Beller, E. 2018. Appendix 7: Salt Flats in Southern California Coastal Wetlands of the Wetlands on the Edge: The Future of Southern California's Wetlands Regional Strategy, San Francisco Estuary Institute.

Major Land Resource Area

MLRA 019X
Southern California Coastal Plains and Mountains

Subclasses

- R019XG901CA–Tidal Flat

Correlated Map Unit Components

23482491, 22665598, 22666488, 22670412

Stage

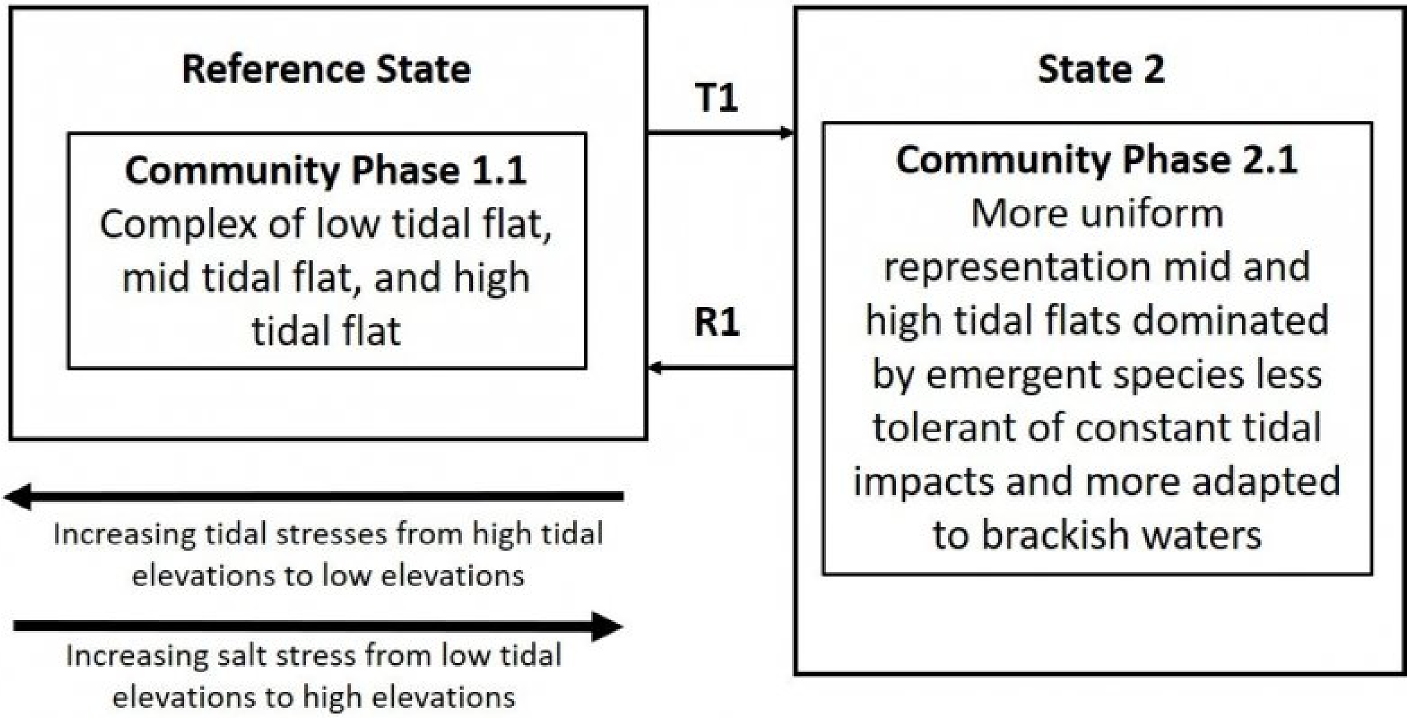
Provisional

Contributors

Curtis Talbot

State and transition model

R019XG901CA – Tidal Flats



The dynamics described below are general to the level that the site concept has been developed for Provisional ES concept identification and further investigation purposes only. It is meant to give a general overview of the ecological dynamics of the system and should not be viewed as a model for a specific ecological site level management. It is supported by the current available literature that was reviewed for a general understanding of the system and basic understanding of the abiotic and biotic drivers. Further investigations and soil-site data collection and analysis should be conducted before specific land management can be applied at the ecological site-specific scale. This STM only serves to explain the general ecology and dynamics.

Reference State (State 1) – the reference state for this ecological site is a complex of vegetation expressions based on proximity to the coastline, salinity levels, and frequency and duration of saltwater inundation and desiccation. The complex interactions between the three factors, plus interspecific and intraspecific competition between plants dictates the cover and distribution of species within this salt tidal flats concept. Due to significant alterations by humans, a very small part of this ESG is still in the reference state. At this very general scale, this reference state only really captures the generalities related to the functional groups that are most dominant and does not capture the more specific dynamics and patterns that would be found at the more detailed and refined ecological site scale that focuses on specific abiotic factors that drive some of these various complex plant expressions. More data and refinement is needed to capture the information needed in order to make specific land management decisions at the ecological site-component scale.

Community Phase 1.1 - The reference community phase for this ecological site concept is a complex of species divided typically into low, mid, and high elevation tidal flats setting, with halophyte natives dominating each elevation of the marsh. As the natural dynamics of sedimentation, desiccation, fog drip, rain, and groundwater discharge shift throughout each year, these elevations shift and move and the vegetation shift and move with it.

Transition 1 (T1) – this transition occurs through either the natural event of permanent impoundment of the salt marsh through an extremely large sedimentation event that closes off the tidal flats from the ocean waters or through human interventions that result in a similar scenario of cutting the marshes off from their inlet flooding source.

Restoration 1 (R1) – this pathway can occur by reconnecting the tidal flats with the natural hydrologic dynamics of the reference state. Especially in the case of naturally occurring sedimentation events that permanently closed off the inlet/outlet of the flats. This type of management decision may be costly and may require maintenance if the sedimentation source remains.

State 2 – This state is represented by a less dynamic tidal flats that no longer experiences the typical flooding events of an open inlet marsh due to permanent closure of the inlet. This shifts the dynamics to either seasonal high-water flooding that may be higher in freshwater sources from the upper watersheds in high rain events or man-made water inputs or from daily high tide flooding that overtops the impoundment barrier. This type of dynamic reduces the complexity of species types and distributions and shifts the sedimentation deposition and recharge of salt water. This can create scenarios that are more freshwater dominated as described above due to the inputs from the surrounding watershed or from the precipitation or it can create a scenario where the evapotranspiration rates during the warm, drier parts of the year shift the dominance more towards a more uniform distribution of higher salinity tolerant halophytes.

Community Phase 2.1 – This community phase experiences flooding events that will likely be more moderated and less consistent in duration and intensity than those of the reference state community phases that only experience temporary inlet/outlet closures. There will be a more uniform distribution of either emergent species tolerant of more brackish/freshwater conditions or emergent species more tolerant of higher water salinity. There will also likely be more species that are generalists intermixed that can take advantage of the sites new, less complex dynamics.

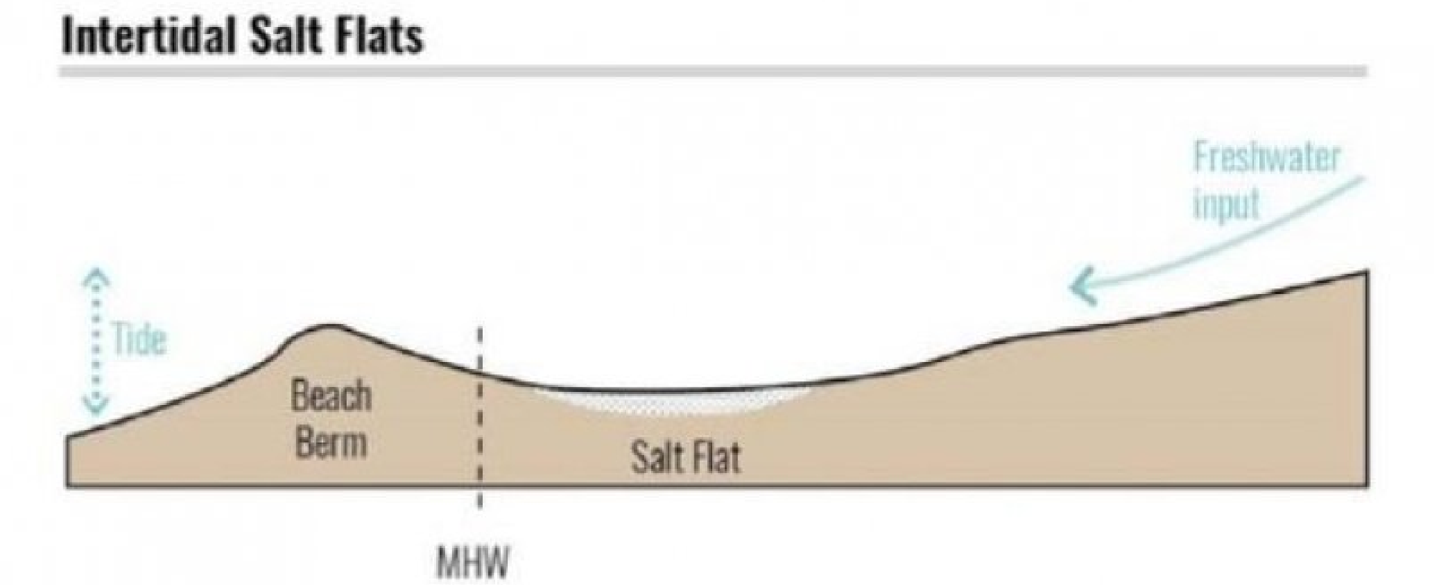


Figure . Courtesy of SFEI (Erin Beller)

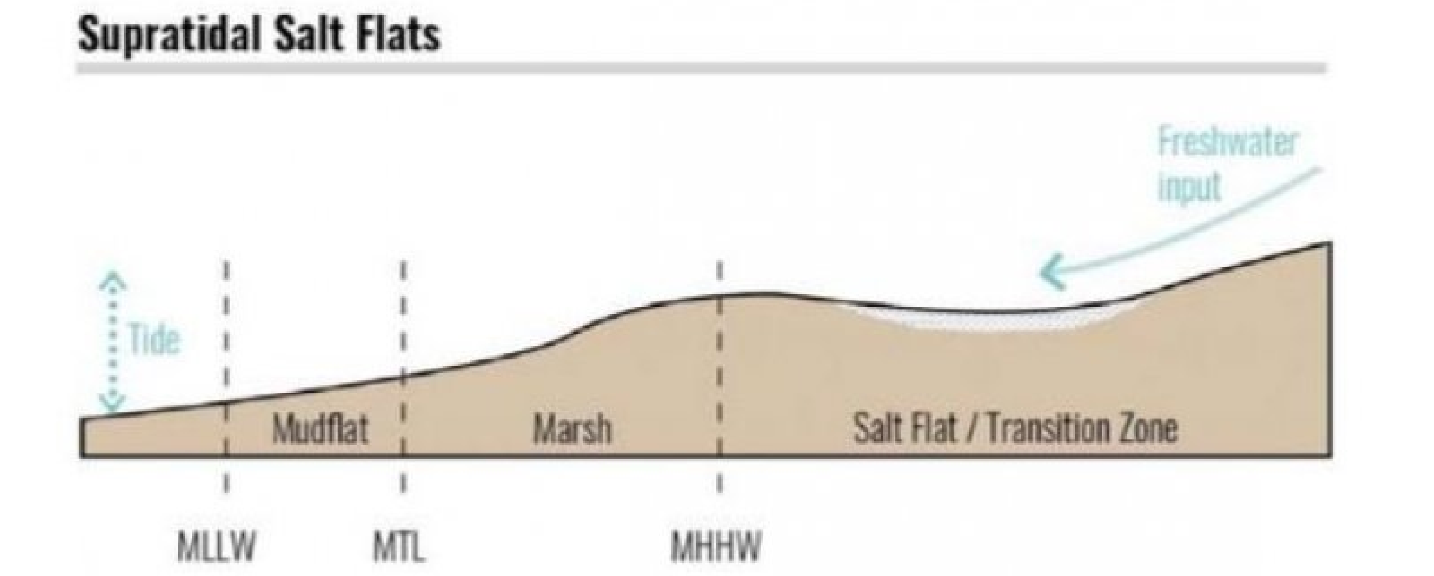


Figure 1. Courtesy of SFEI (Erin Beller)

Figure 2. Tijuana Estuary. Courtesy of SFEI (Erin Beller)

Citations