No rain much pain:

Challenges and lessons learned in transition zone restoration during a drought

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Abstract

The transition zones between coastal marshes and upland areas of San Francisco Bay are critical habitat for hundreds of species, some threatened or endangered. Transition zones are integral habitat for wildlife as they move between marshes and uplands during high tides and storm surges. These areas provide cover from predators, especially during high tides, and provide a food source for insects, birds, reptiles, and small mammals. Save The Bay's Habitat Restoration Department has focused on enhancing transition zones around the Bay for the past 15 years. In 2013 Save The Bay began work at a 4.25-acre site at Eden Landing Ecological Reserve in Hayward, CA, where restoration efforts have been challenged by difficult conditions including drought, harsh soils, and a limited work window due to the site's proximity to habitat for a federally threatened species.

Unpredicted drought conditions lead to a failed hydroseed attempt, an increased need for supplemental watering for newly installed plants, and an increase in staff resources. The reduced rainfall also slowed the potential leaching of salt on the grated levee, leaving a harsher medium for plants to try and establish and a higher mortality of species with lower salt tolerances. Site visits by restoration staff were also limited by proximity to Snowy Plovers who use the adjacent former salt ponds as nesting grounds. The reduced access to seedlings between November and March limited the amount of watering and maintenance that could be done during spring and summer.

These challenges provided insight into how to experiment and adjust our restoration strategies, such as adding soil amendments and modifying the plant palette, to increase plant survivorship. These lessons learned can be applied to existing and future transition zone restoration designs.

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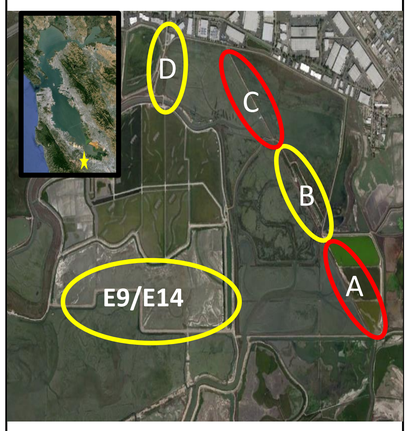
Background

Eden Landing Ecological Reserve



E9/E14 Site History

- SFPUC Supplemental Environmental Project
- Component of the South Bay Salt Pond Restoration Project

Restoration Goals for E9/E14 Site

STB Site Eden D, 2008 — STB Site Eden D, 2013

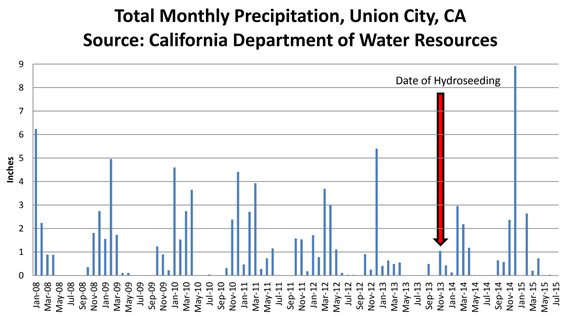
- Create habitat
- Reduce invasive species cover
- Create 40% cover of native vegetation
- Install transition zone specific flora

Marsh Baccharis (*Baccharis glutinosa*)

Marsh Gumplant (*Grindelia stricta var. augustifolia*)

Challenges

Drought



Saline Soil

Salt accretion along pond shoreline (Eden Landing)

Barren transition zone (Eden Landing)

Snowy Plovers

- Federally threatened species
- Nesting season (March-September) coincides during driest season for plants
- Nesting activity in ponds restricts access

Source: Michael L. Baird, flickr.bairdphotos.com

2015 Snowy Plover nesting sites at Eden Landing

Lessons Learned

- Without rain, hydroseed unsuccessful in drought year
- Water restrictions limit usage
- Without irrigation, dedicated manual watering days necessary

Hydroseeding (November 2013)

Hand watering of native plant installations (Spring 2015)

Site-specific plant palette

- Increased installation of vegetation with higher tolerance to saline conditions

Salt Grass (*Distichlis spicata*)

Soil amendments

- Installed less salt tolerant seedlings with potting mix

Western Goldenrod (*Euthamia occidentalis*)

- Staff workdays critical before nesting season
- Dedicated, long-term volunteers to support staff efforts

Staff and volunteer workday (Winter 2015)

Staff and volunteer workday (Winter 2013)

Next Steps

- Continue staff watering and invasive species removal
- Continue working until 40% native cover is achieved
- Additional planting of salt tolerant species

Alkali Heath (*Frankenia salina*)

- Monitor long term success of amendments with potting mix in these soil conditions
- Inform other restoration projects around the Bay

- Prioritize this site for maintenance and monitoring
- Continue working with SFBBO to ensure SNPL nesting success

Conclusion

Over the two years that Save The Bay has been implementing transition zone restoration at Eden E, severe drought has presented unforeseen challenges in the restoration process, exacerbated by difficulties associated with an already ecologically challenging site. This has forced staff to refine techniques currently used and test new ideas to restore transition zone habitat along salt pond levees.

Though this has proven frustrating at times, small successes have been achieved, and restoration work will continue at the site until completion. Additionally, determining best practices during extreme weather provides insight to future restoration work in the face of global climate change and accompanied unpredictable weather patterns .