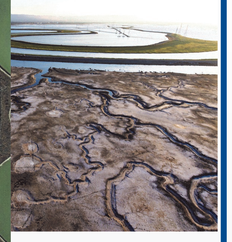
Restoring Tidal Marsh–Upland Ecotones

2011 Progress Update by David Thomson for the SFB NWRC



Pond A6

The construction of Pond A6 included lowering some levees to ecotonal elevations, or scraping the upper foot from the soil horizon to remove salt crusting, and tilling to prepare for seeding this October. We believe this will take care of most weeds, but spot treatments for perennial pepperweed (*Lepidium latifolium*) are planned. The remaining 13-acres near or above MHHW will be seeded with many of the species found in Table 1. Because construction turned much of the site into islands we plan to seed the site via aerial hydroseeding.

Table 1. Working List

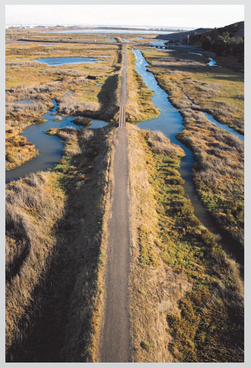
Species	Common Name
Achillea millefolium	common yarrow
Ambrosia psilostachya	western ragweed
Amsinckia menziesii	**fiddleneck**
Artemisia californica	California sagebrush
Artemisia douglasiana	mugwort
Aster chilensis	Pacific aster
Atriplex triangularis	spearscale
Calandrinia ciliata	red maids
Centromadia pungens	**common spikeweed**
Conyza coulteri	Coulter's horseweed
Cressa truxillensis	**alkali weed**
Deschampsia cespitosa	tufted hairgrass
Epilobium brachycarpum	**annual willow herb**
Eriophyllum confertiflorum	golden yarrow
Eschscholzia californica	**California poppy**
Euthamia occidentalis	Western goldenrod
Festuca rubra	red fescue
Frankenia salina	alkali heath
Grindelia stricta	marsh gumplant
Heliotropium currasavicum	seaside heliotrope
Hemizonia congesta ssp luzulifolia	woodrush tarweed
Heterotheca grandiflora	telegraph weed
Hordeum depressum	alkali barley
Iva axillaris	**poverty weed**
Limonium californicum	**California sealavender**
Lotus purshianus	Spanish clover
Lupinus succulentus	**arroyo lupine**
Madia sativa	coast tarweed
Malvella leprosa	**alkali mallow**
Phacelia californica	California phacelia
Rumex maritimus	golden dock
Sarcocornia subterminalis	Parish's pickleweed
Suaeda moquinii	inkweed
Trifolium wormskioldii	cows clover
Vulpia microstachys	**annual fescue**

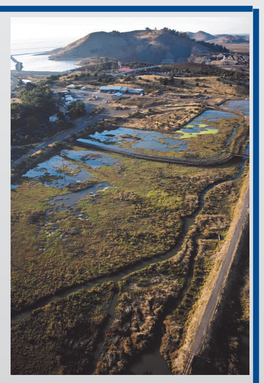
Abstract

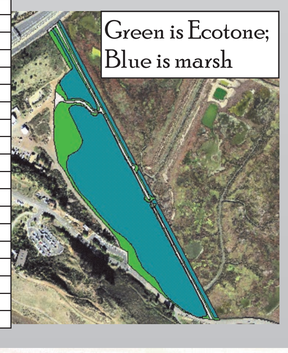
Restoring vegetation adjacent to the tidal marshes of San Francisco Bay at large scales has been an elusive goal. While restoring one hundred thousand acres of tidal marsh is a regional goal for the estuary, restoring the tidal marsh–upland ecotones and surrounding habitats at such scales is not within our current capabilities. And these habitats immediately above the intertidal zone are a critical component of the tidal marsh ecosystem.

We are beginning our 5th year of applied research, with a goal of describing plans and specifications for restoring tidal marsh–upland transitional plant communities feasibly across large acreages. Our methods have progressed to the point that we will begin testing them at other sites, such as Pond A6, which was restored to tidal action late last year. Phase I began with pre-seeding weed abatement last fall to prepare for seeding this fall.

New Sites



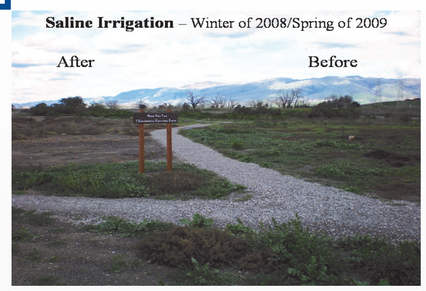




La Riviere Marsh

Arguably one of the best salt pond restorations in the estuary, but the upland ecotones continue to be dominated by non-native plants. We have begun weed abatement testing on 5-acres, comparing herbicide, salinization (both dry salt & saline irrigation), as well as flaming & mowing, with both repeated treatments and one preceding seeding. And we will broadcast seed this October with many of the species found in Table 1.

5 Years in the Making...



January 2009 during saline irrigation treatments

July 2009 after saline irrigation treatments

Spring 2010 after seeding weedy natives

Summer of 2010

KITE AERIAL PHOTOGRAPHY
BY CRIS BENTON
"KAP CRIS" ON FLICKR

Some Success

Results from the 2009–2010 seeding were mixed across the site, ranging from poor to excellent. We think the main positive performance factor was identifying native broadleaf species that perform well from seed on disturbed sites. Grasses do not appear competitive with forbs given the South Bay's sub-50 centimeter average rainfall. Even non-native grasses that dominate much of the estuary's surroundings do not perform well in our habitats.

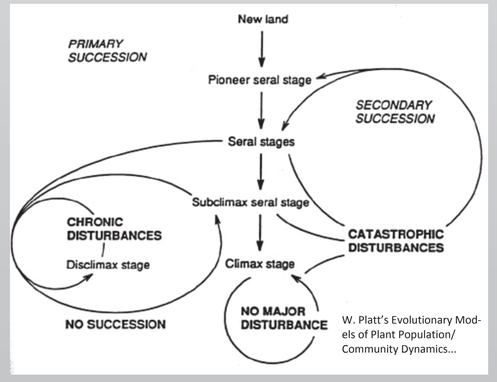
But many native forbs appear to be very competitive. Those that are disturbance-oriented, early seral, or pioneers have done well from seed on our site. This is critical because the scale at which projects occur makes only the most modest methods feasible. So in order to keep pace with intertidal habitat restoration we must rely on direct competition from seeding, with just a bit of pre-seeding weed management. We are currently monitoring these areas for year-two performance, as most of them are annuals, and performing some additional testing.

Important Concepts

Success without Succession?

Disturbances will occur in the future. But without a seedbank full of native species capable of capitalizing on these gaps they will remain opportunities for weeds to recolonize sites. Early seral, pioneering natives play an important role in the ecology of plant communities, so without them restoration cannot be claimed.

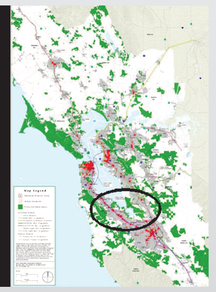
In addition we can capitalize on these species' ability to thrive from seed on disturbed sites to help control site preparation costs and improve direct competition with non-native species. This can further reduce implementation effort as well as ongoing weed management costs.



W. Platt's Evolutionary Models of Plant Population/ Community Dynamics...

Even if all open space was weed-free (imagine...)

many would continue to be swamped by weed seed from city, county and private lands.



Imagine...

that open space is weed-free, or at least we have the upper-hand for once. Unfortunately refuges like the Don Edwards San Francisco Bay NWR (circled above) are surrounded by urban areas, which are dominated by non-native species. So weeds will continue to be introduced by people, animals, or simply blown in by the wind. This means managers must "tread water" trying to stem the tide flooding their sites with weeds.

But there might be a way to change that by introducing weed managers in the surrounding areas to the benefits of direct competition from seeded natives.