







Land Use History

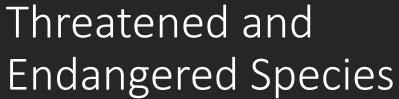
- Coast Miwok
- Azorean dairy farmers
- Golden Gate Bridge brings vacationers
- George Wheelwright channelizes creek
- Tavern and the 1960s
- Golden Gate National Recreation Area











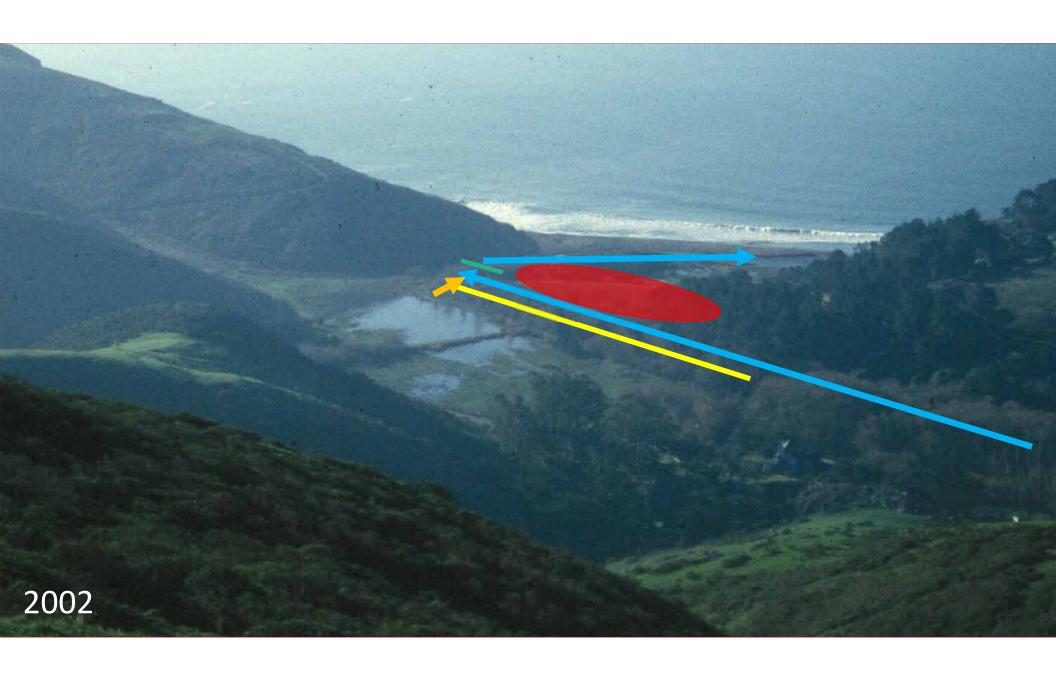
- Coho salmon
- Steelhead trout
- California red-legged frog

Western pond turtle





Beautiful land with some problems...

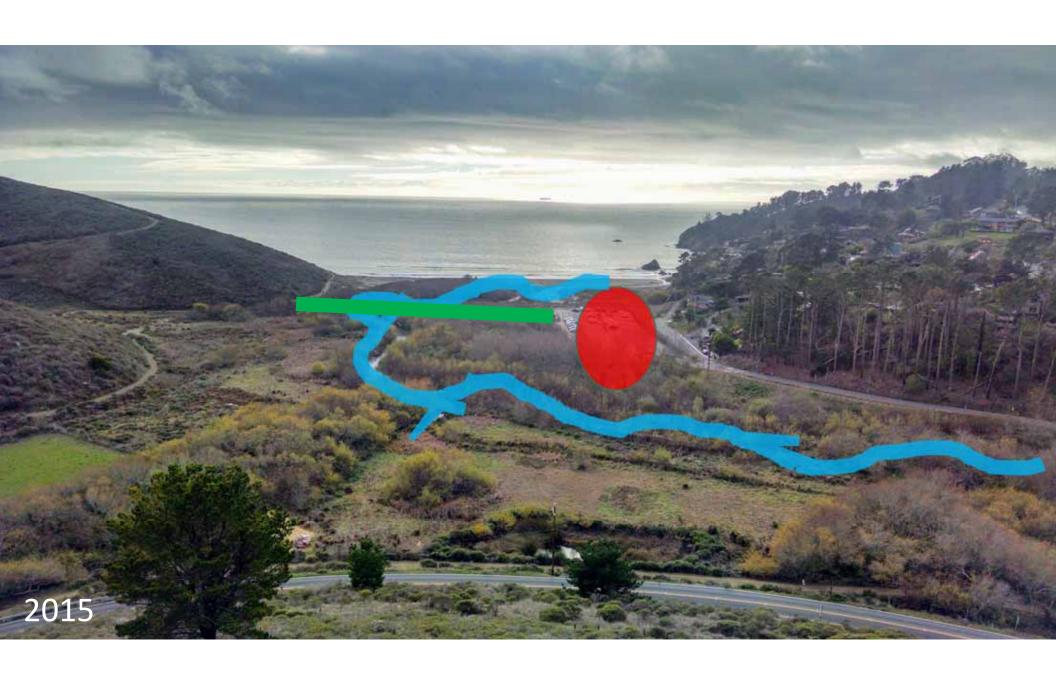




- Reconnect creek to floodplain
- Restore healthy creek meander and conveyance
- Improve habitat for T&E species
- Improve visitor and emergency vehicle access







Construction is done...
Now what?









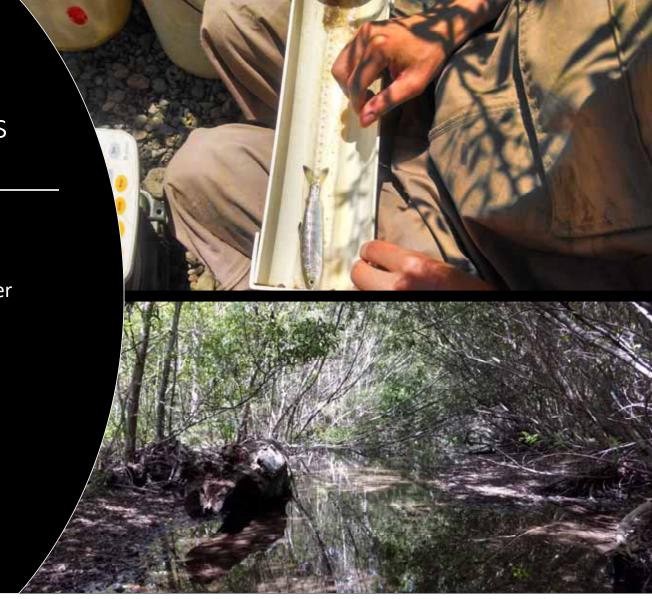
Don't alter the erosion control



Reduced access during rainy season



- Work in creek channel and on banks during driest time of year
- In winter and early spring, do not enter standing water or ponds
- Biomonitor ahead of power tools
- Do not pile weeds on site for disposal



No Herbicide





Don't alter erosion control

Reduced access during rainy season

T&E species restrictions

No herbicide

Ensure beautiful, healthy habitat

Ok, I've got this!





Challenge #1: Revegetation

- Four different methods used
- Many different labor sources: volunteers, CCC, contractors

Container Plants

- Possibly most expensive method
- Sourced from local seeds and grown by Conservancy nurseries
- Time intensive installation, especially in clay soils
- Phytophthora worries
- Easy to monitor



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Direct Seeding

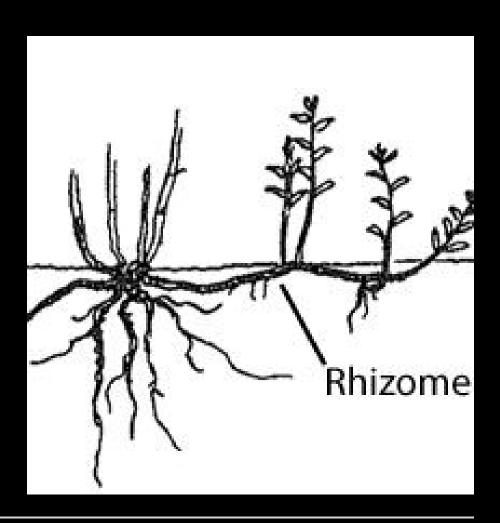
- Sourced within parks
- Timing for seed distribution important
- Need lots of seed for good outcomes
- Can install over or under erosion control
- Focused on "nurse" plants and pioneer species
 - Madia sativa
 - Elymus glaucus
 - Hordeum brachyantherum

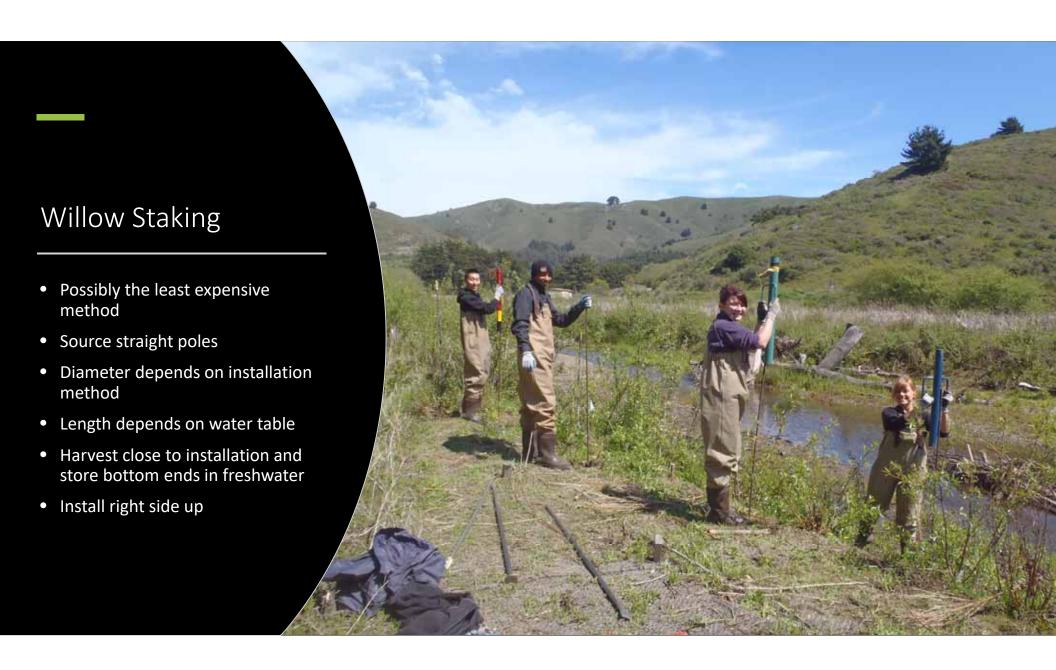




Field to Field Divisions

- Salvage plants ahead of construction
- Source from outside project area
- Store in moist and shaded place ahead of install
- Install under erosion control awesome!
- Naomi's favorites
 - Elymus triticoides
 - Carex preagracilis
 - Juncus lesceurii
 - Carex obnupta
 - Scirpus microcarpus

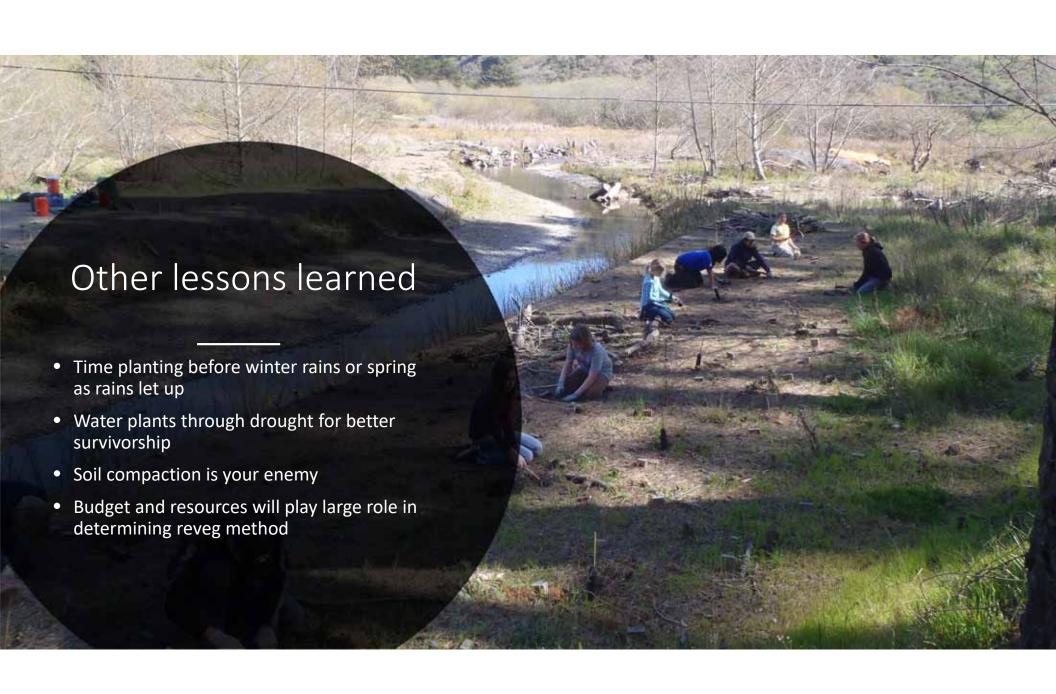




Deer will browse willows

Stakes may need exclosures







Challenge #2: Weed control in project area

- Mark plant locations
- Hand remove weeds
- Straw mulch
- Great volunteer project
- Greater survivorship of plants







Early Invaders

- Trifolium fragiferum and T. repens
- Lotus corniculatus
- Polypogon interruptis
- Festuca perennis
- Raphanus sativus
- Hirschfeldia incana
- Conium maculatum
- Cirsium vulgare



Manage to Low Level

- Ehrharta erecta
- Festuca arundinacea
- Alopecuris pratensis
- Holcus lanatus*
- Lotus corniculatus
- Hedera helix & H. canarensis
- Rubus armeniacus
- Mentha aquatica
- Zantedeschia aethiopica & Arum italicum

*H. lanatus is a landscape level issue in some areas



Zero Tolerance

- Delairea odorata
- Carex pendula
- Clematis vitalba
- Tradescantia fluminensis
- Salsola soda
- Iris pseudacorus
- Calendula arvensis
- Anthoxanthum odoratum
- Cortaderia jubata & C. selloana
- Pennisetum clandestinum*

*P. clandestinum added recently with permission to apply herbicide



EDRR Creek Sweep

Once a year when creek at lowest

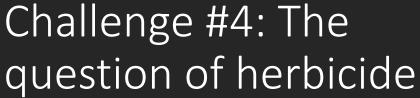




Twice yearly full site sweep for Delairea odorata

- Three containment lines to clear
- Takes 2-3 days of a five-person crew





 Biological Opinions - no herbicides to be used within 100' of the project boundary

 Some species impossible or ridiculously expensive to control manually or mechanically



Pennisetum clandestinum

- Have covered and manually removed patches for years.
- Got quote for treating four patches totaling around 250 sq. ft.... \$36,000
- Is this really the best for the habitat?
- How can we show that we can apply herbicide safely?



Re-initiate consultation

 Convince NPS contact that reinitiation is needed and worth their time

• Invite regulators out to site!





Lessons Learned

- Great habitat restoration can happen with restrictions
- Field to field divisions and willow stakes are awesome
- Straw mulch is your best friend

Lessons Learned

- Managing weeds downstream of infestations takes a good plan and lots of resources
- Get to know your regulators and ask for what you want
- Wetlands are wild, beautiful places!





