Restoring Gaviota Tarplant in a Sea of Iceplant: Challenges and Opportunities

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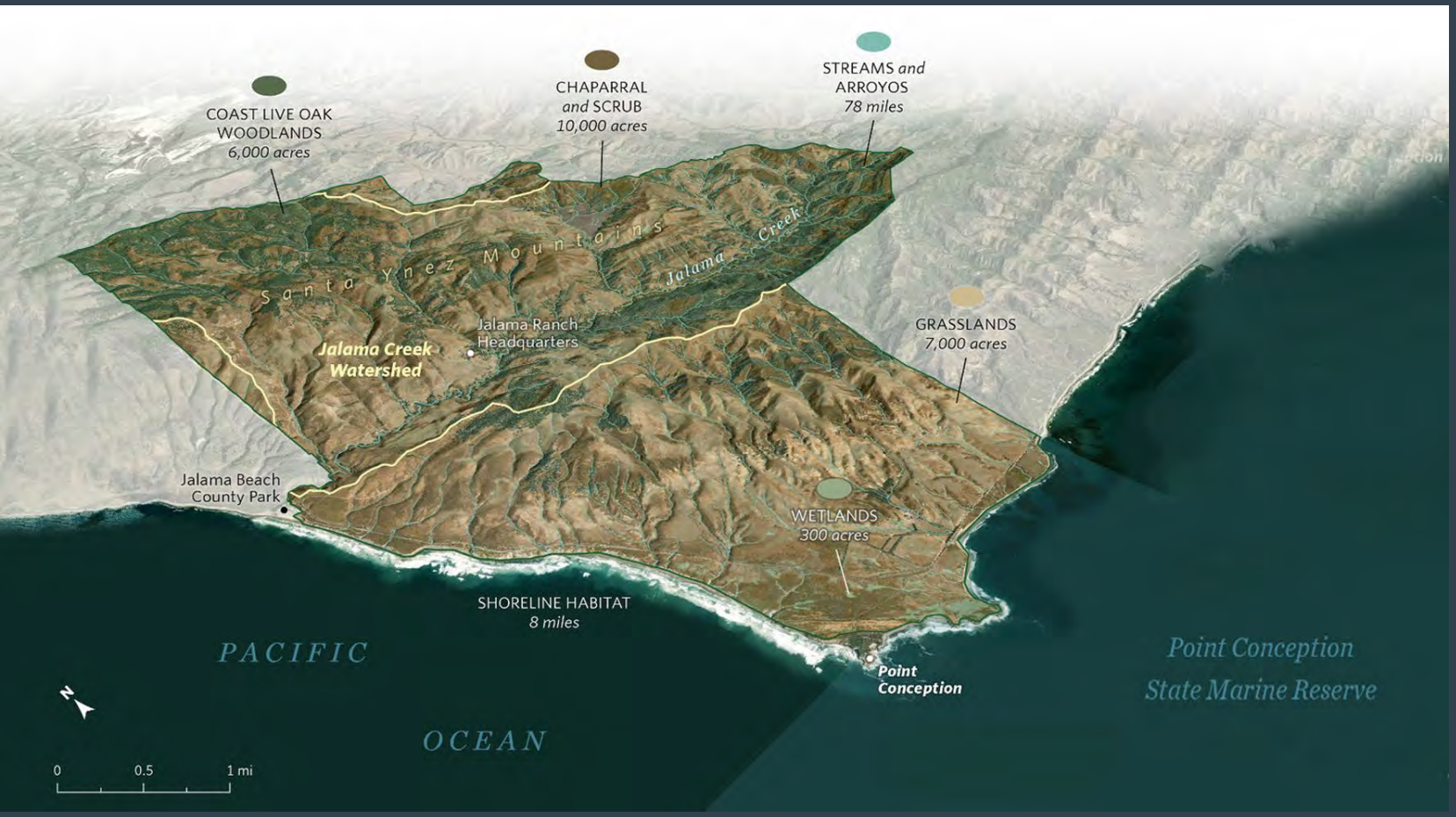
Jack & Laura Dangermond Preserve

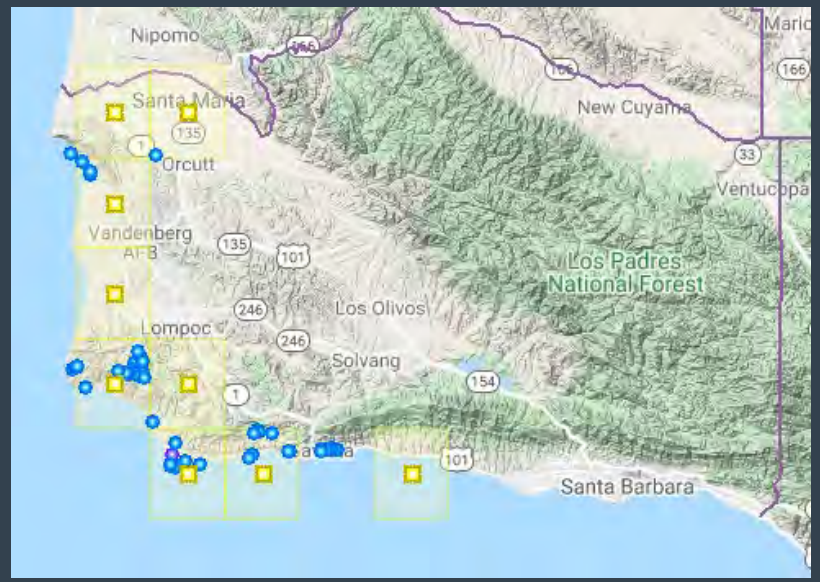
Dangermond Preserve By the Numbers



Nearly 25,000 acres
Land-sea protection w Point Conception State Marine Reserve (22 mi2)
8 miles of coastline
78 miles of streams
20 mi2 Jalama watershed
300 ac wetlands
50 natural communities (50% sensitive category)
700 species
60 species of concern
14 threatened & endangered species

Gaviota Tarplant

(*Deinandra increscens ssp. villosa*)



Source: CalFlora

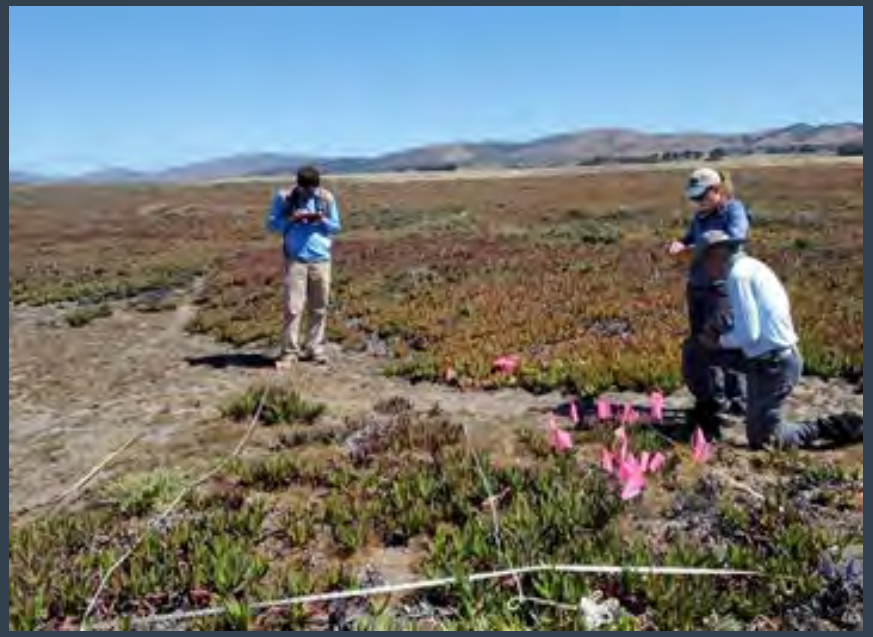
- Federally endangered
- Endemic to the central coast region
- 7 Populations
  - *Gaviota*
  - *Hollister Ranch*
  - *Santa Ynez Mountains*
  - *Point Conception*
  - *Tranquillon Mtn./Sudden Peak*
  - *Point Arguello*
  - *Lion's Head*

Existing Conditions For Gaviota Tarplant

What are baseline conditions?
How are invasive species and local site conditions affecting Gaviota tarplant populations?

Measured from 3x3m^2 plots over two years at the Dangermond Preserve, Vandenberg SFB, and Gaviota SP (1 yr)

- Density: 1-51 plants/m^2
- Highly variable reproductive output (est. 1-293 flower heads/m^2)
- Low native cover (2-34%)
- Moderate/high non-native cover (25-68%)
- Dominated by Carpobrotus, Brome grasses
- Gopher/ground squirrel disturbance common, creating openings for to tarplant establish



Existing Conditions (cont.)

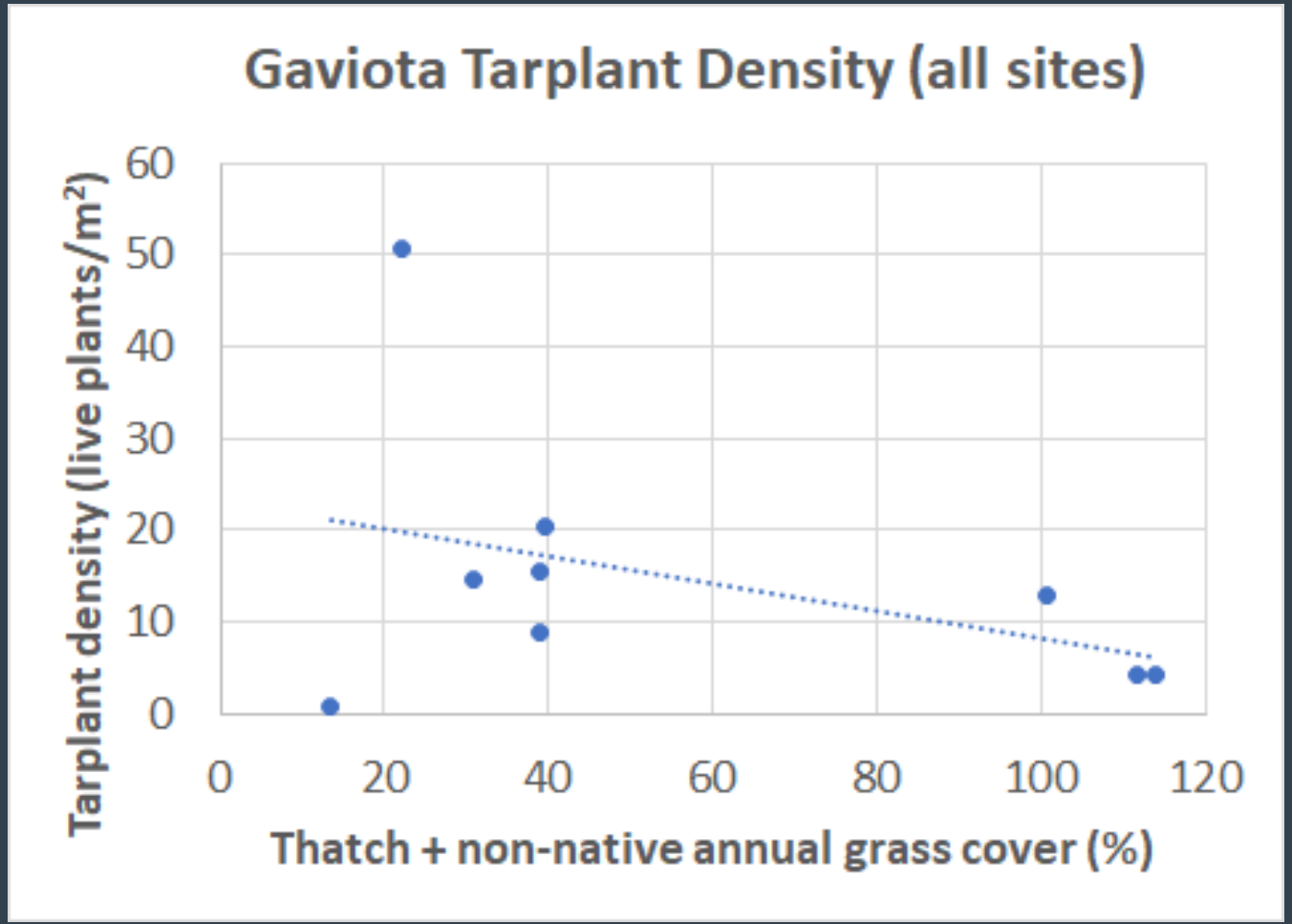
Non-native Cover (JLDP)	%Cover
Iceplant (Carpobrotus)	24
Brome grasses	10
Fillaree	7
Rattail fescue	5

+ Perennial veldt grass at low cover
== >invasion risk!

Remnant Native Cover (JLDP)	%Cover
California sage	3
Coast goldenbush	2
Purple needlegrass	1
Gaviota tarplant	1

+ several uncommon natives (e.g., Blochman's Dudleya, Fritillaria, beard grass, giant Coreopsis) in plots nearby
==> restoration potential!

Reducing thatch and direct competition for space with iceplant could increase Gaviota tarplant populations and grow the seedbank



The Cojo Terrace

The Challenge

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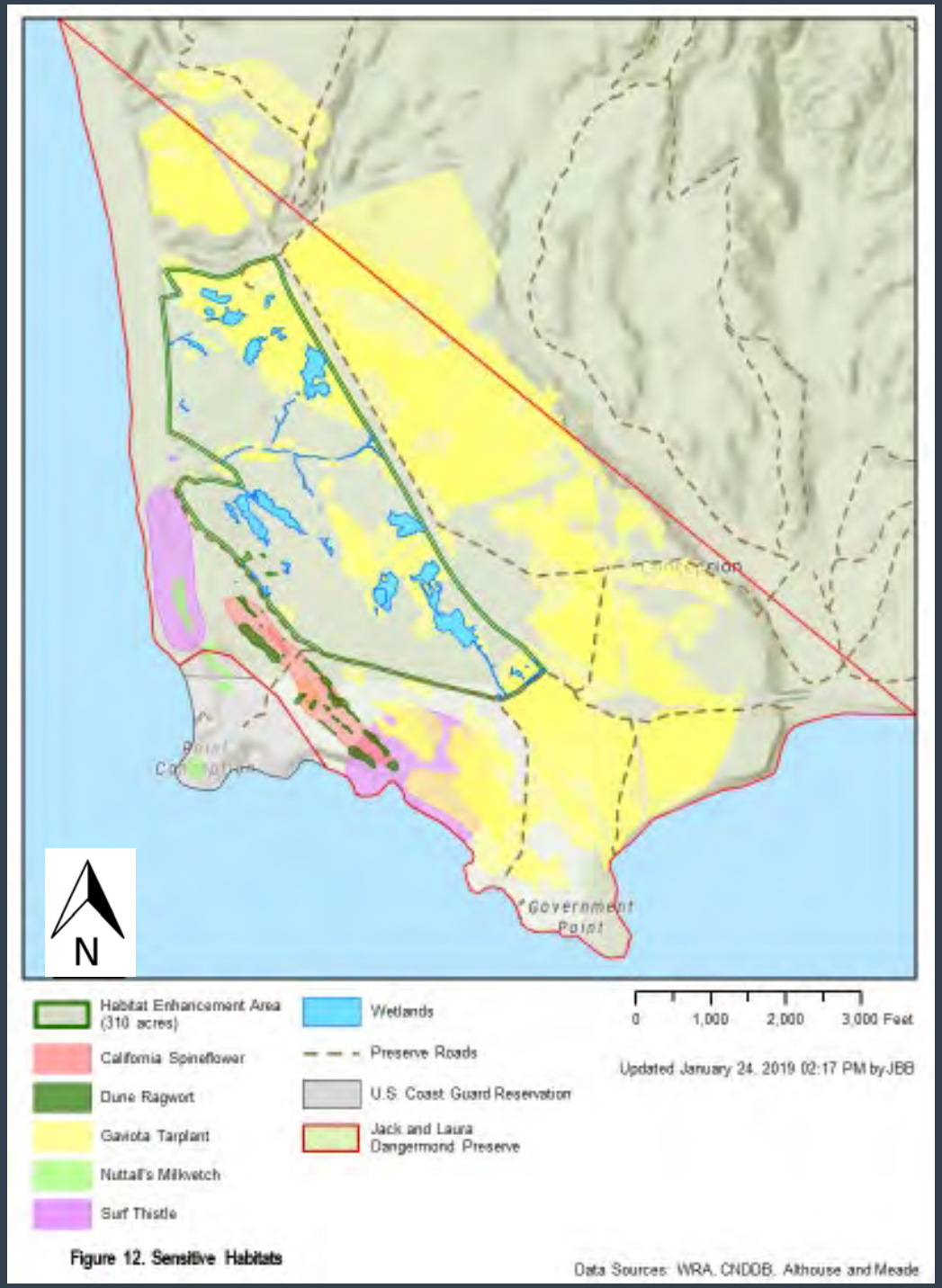


How do we do this at scale?

400 Volunteer Hours = 1 acre removed

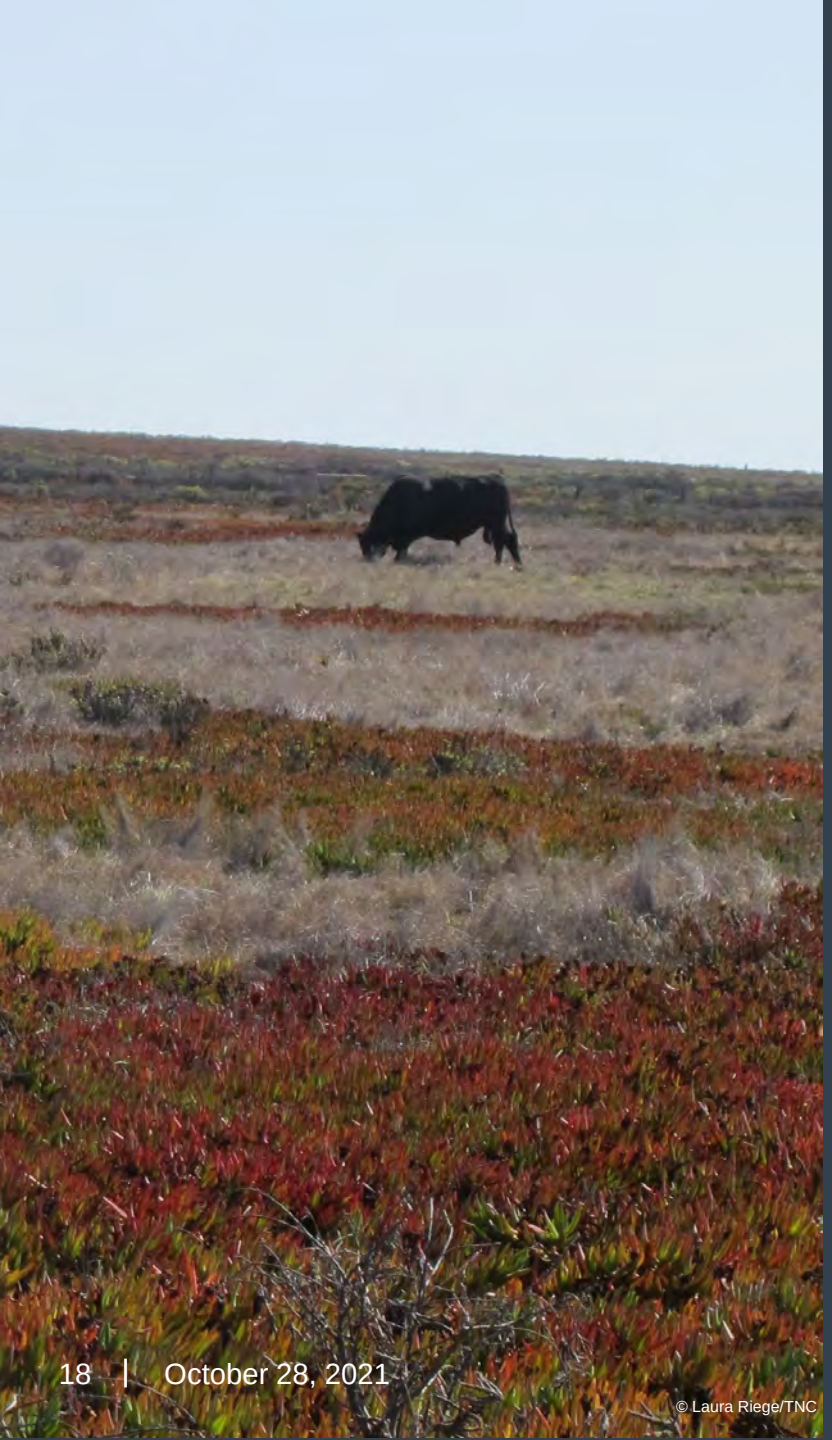
- Where should the project start?
- What is a reasonable and practical restoration unit size?
- Treat dune soils, coastal prairie and wetlands differently?
- What site-specific methods should be employed?
- Are there herbicides we should include/exclude?
- How do we maximize crew efficiency during windy hours?
- Restoration + cultural resources protection?

Restoration Plan - Opportunities

Science Working Group:

- Identify a range of approaches
- Chunk it down to manageable pieces
- Outline experimental tests and phasing scheme
- Apply what we learn to next treatment area(s)
- Be adaptive
- Set reasonable expectations
- Share lessons learned

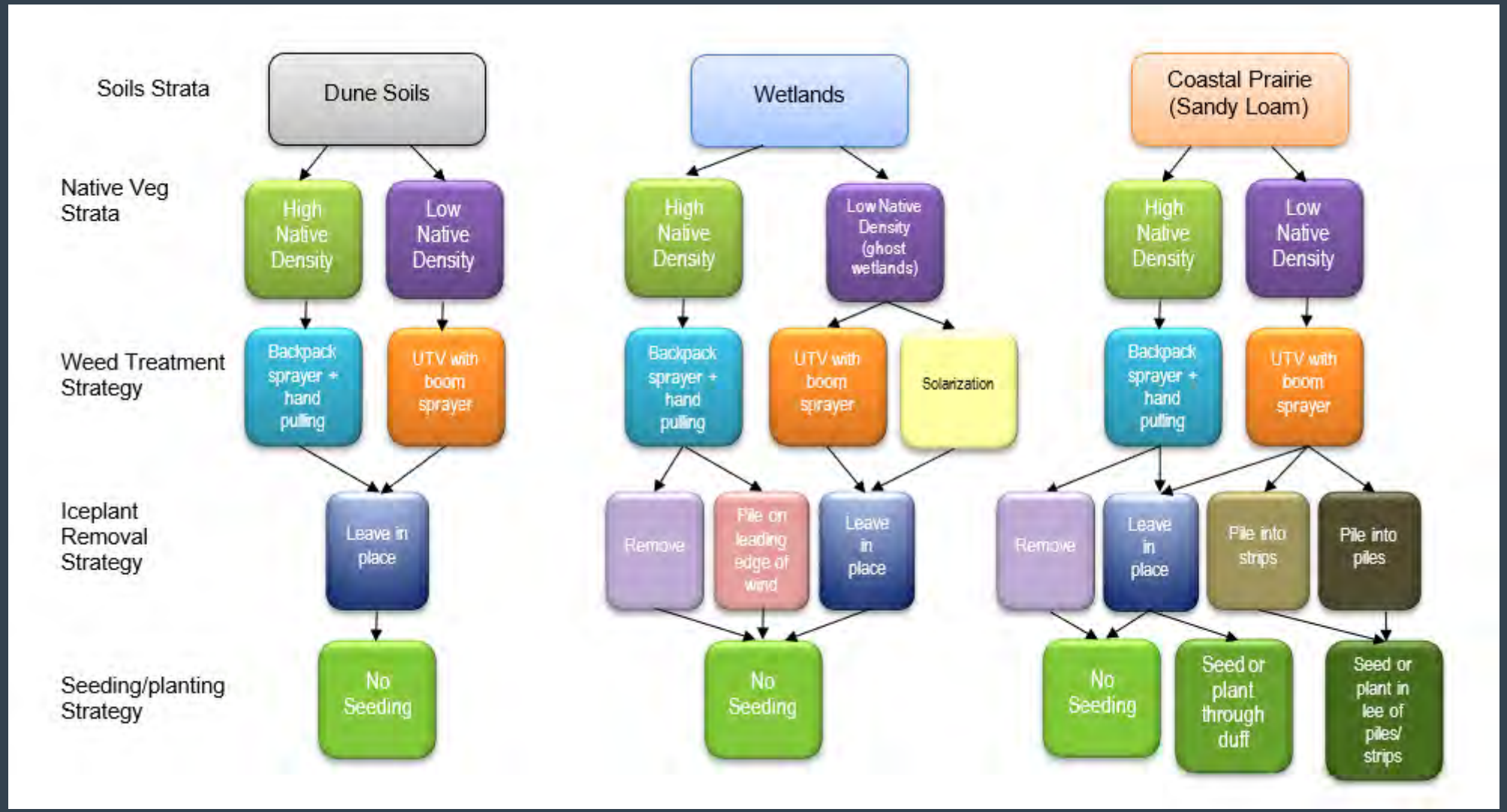
❖*Protect Cultural Resources*
❖*Minimize wind erosion*
❖*Protect Gaviota tarplant*



Proposed Approach

- Herbicide treatment
  - Glyphosate
- Hand pulling around natives and wetlands
- Grass-specific herbicides for veldtgrass and ripgut brome
  - clethodim, fusilade
- Solarize selected wetlands and ghost wetlands
- Livestock grazing for weed control and to improve seed/soil contact
- ~~Drill seeding through ice plant thatch~~

Approach



Next step: pilot studies!

Conservation Seed Collections

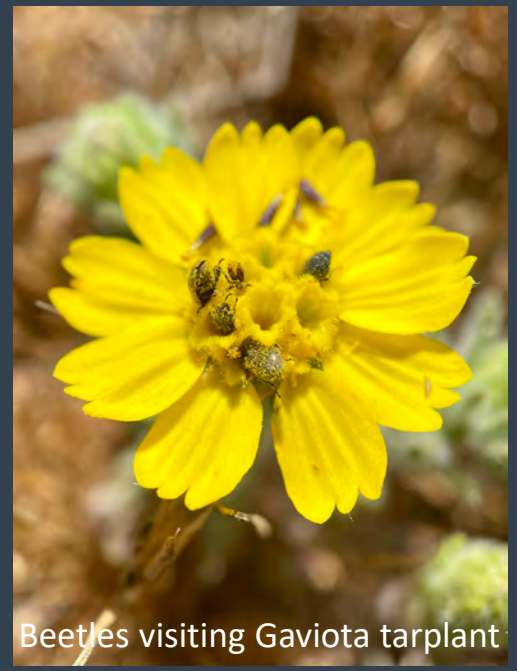
2020
- Collected from 246 individuals across 4 sites on the preserve

2021
- Collected from 206 individuals across 4 sites on the preserve

Seeds were collected and stored for long-term conservation in the Santa Barbara Botanic Garden Conservation Seed Bank

Why make conservation seed collections?

- Long-term conservation – an insurance policy against extinction
- To facilitate research
- For future restoration or reintroductions


Beetles visiting Gaviota tarplant

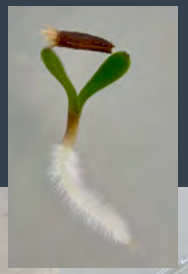

Collecting Gaviota tarplant seeds

Seed Germination Study

- Disk vs Ray flowers: Different seed germination strategies
- Seeds from disk flowers: ready to go!
  - 100% germination without pre-treatment
- Seeds from ray flowers: built to last
  - Seeds coat was nicked prior to germination
  - 14.5% mean germination rate

Why study germination?

- Monitor viability of seed bank collections
  - Detect when collections need to be replenished via field collections or nursery increase
- Develop propagation protocols
  - Learn how to grow plants prior to restoration
- Understand seedbank dynamics and germination cues
  - Ray flowers are dormant and provide seedbank longevity
  - Inform predictions for long-term persistence under climate/environmental change



Conclusions & Next Steps

Ice Plant Science Working Group:

- Pilot studies

Tarplant Studies:

- Iceplant and annual grass removal trials; track tarplant plant size and density (+ideally seed bank) response
- Determine if infrequent annual grass treatment can increase tarplant seed bank
- Evaluate how site and species vulnerability might change with future climate change scenarios

Seed germination:

- Viability test seeds collected at the preserve
- Test additional treatments to increase germination rates of ray seeds
- Develop seed increase protocols for restoration

Special Thanks to our Science Working Group and Partners!

The Nature Conservancy

Ice Plant Science Working Group design group

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The Nature Conservancy
Thank You