

The Feasibility of Chaparral Restoration on Type-converted Slopes

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5/24/2013 9:01

Introduction to the Project

- This study is being conducted in the San Timoteo Canyon on an Ecological Preserve owned by the Riverside Land Conservancy
- Historically this area had been used for rangelands.
- 1930s imagery indicates that the slopes had once been chaparral.



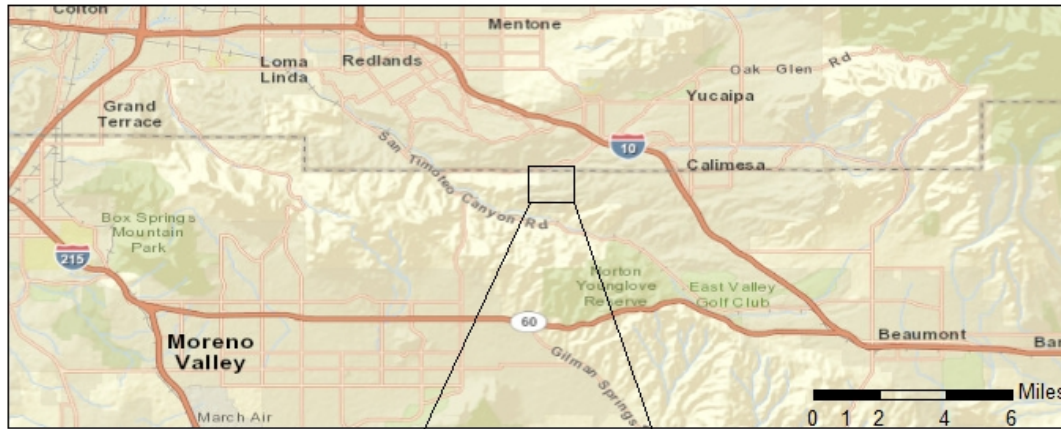
Live Oak Canyon Road and San Timoteo Canyon Road



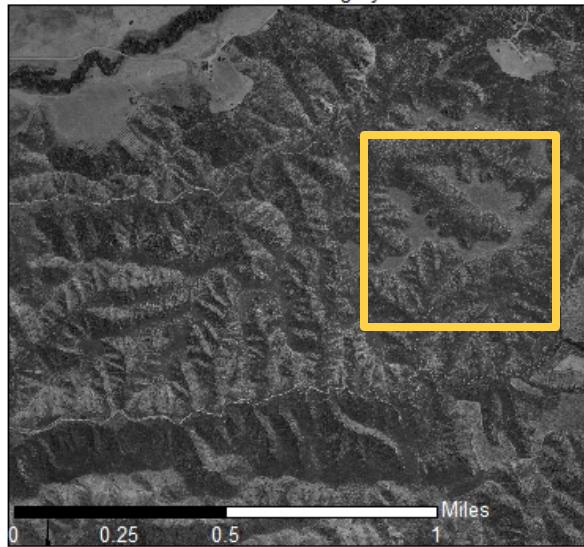
El Casco Lake prior to development

1938 Aerial Imagery Comparison to 2013 Aerial Imagery

(For the same locality south of Live Oak Canyon Road)



1938 Aerial Imagery



2013 Aerial Imagery



Base Map Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
1938 Aerial Imagery Source: USDA (1938-05-27 - 1938-10-17)

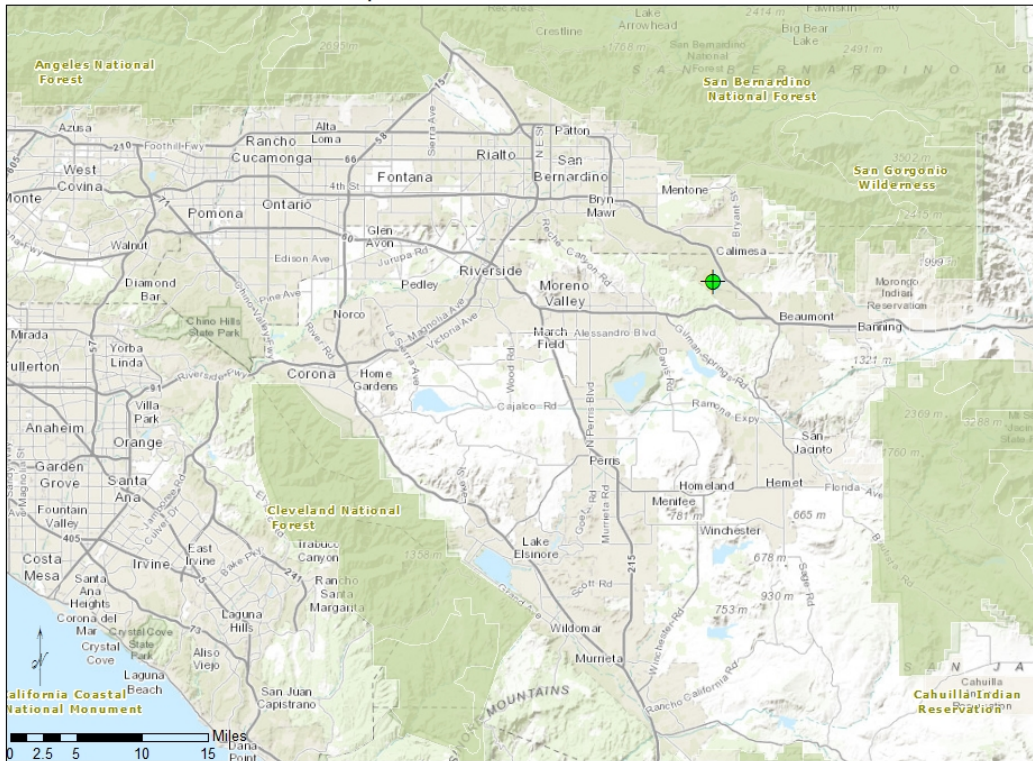
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Objectives


- Compare the effectiveness of a broad-spectrum herbicide against a grass-specific herbicide
- Assess the difference between seeding and planting seedlings as a mode of restoration and which is more effective
- Analyze the seed bank of the research area to see if a relict seed bank that could possibly be used for restoration

Study Area

Chaparral Restoration Research Area



Base Map Sources: ESRI, National Atlas of the United States and the United States Geological Survey

 Study Area

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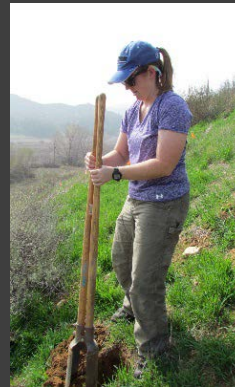


Plot Design

Treatment	No treatment	Smoke Water Application	Seeding	Planting
No Herbicide	Control Control	Control SW	Control Seeding	Control Planting
Fusilade	Fusilade Control	Fusilade SW	Fusilade Seeding	Fusilade Planting
Glyphosate + Fusilade follow up	Gly + Fus Control	Gly + Fus SW	Gly + Fus Seeding	Gly + Fus Planting

Planting and Maintenance

- 4 different species were purchased:
 - *Adenostoma fasciculatum*
 - *Eriogonum fasciculatum*
 - *Quercus berberidifolia*
 - *Rhus ovata*
- Control and Fusilade plots were planted 20 Dec 2012, and Glyphosate + Fusilade follow-up plots were planted on 30 Jan 2013.



Seeding

- The following species were purchased for seeding treatment:
 - *Artemisia californica*
 - *Adenostoma fasciculatum*
 - *Eriogonum fasciculatum*
 - *Gutierrezia sarothrae*
 - *Quercus berberidifolia*
 - *Rhus ovata*
 - *Rhus trilobata*



*Seeding was unsuccessful

Transplant Success

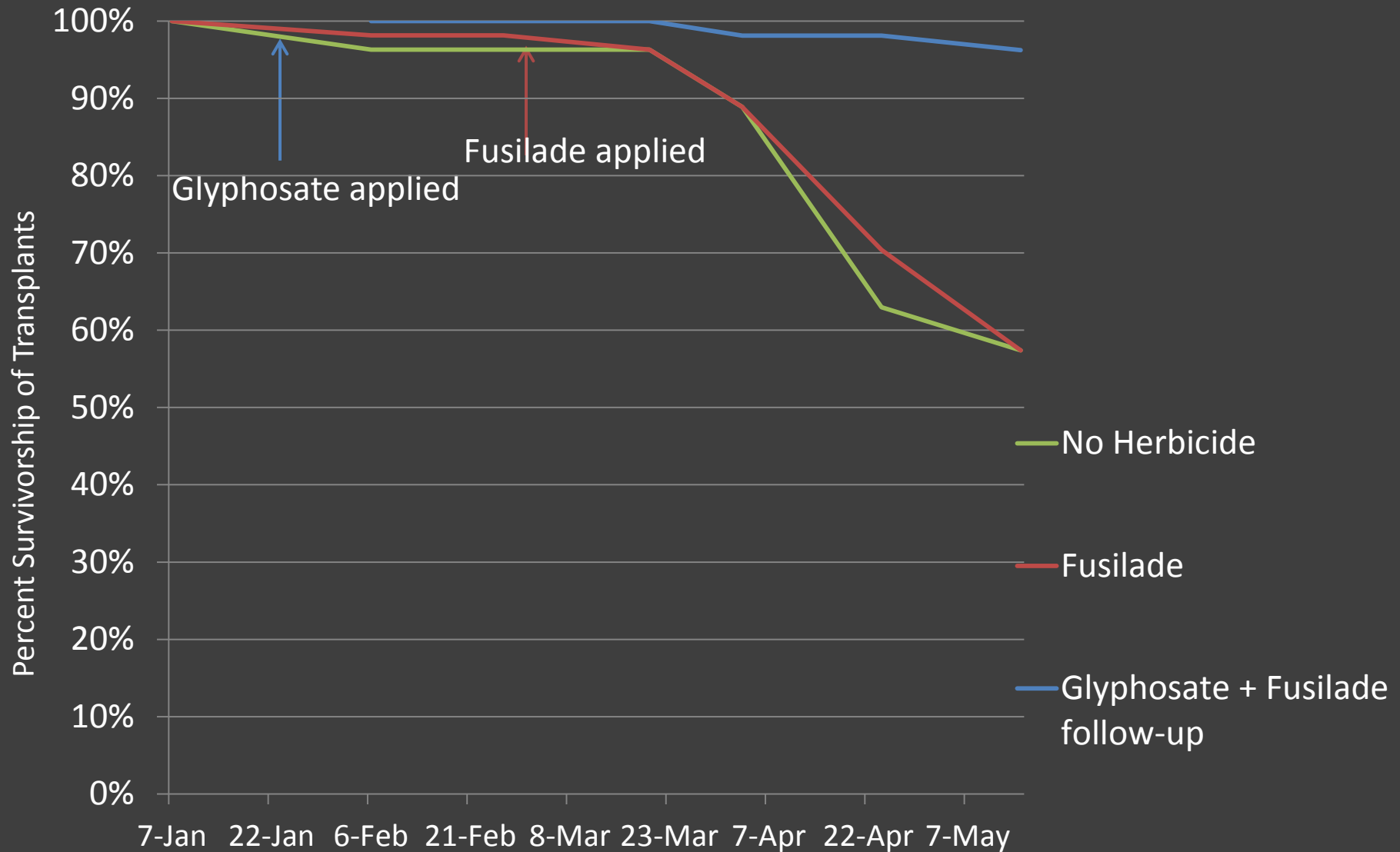
Control plot



Glyphosate + Fusilade follow-up plot



Survivorship of Transplants



Flowering Plants in Glyphosate + Fusilade follow-up Plots

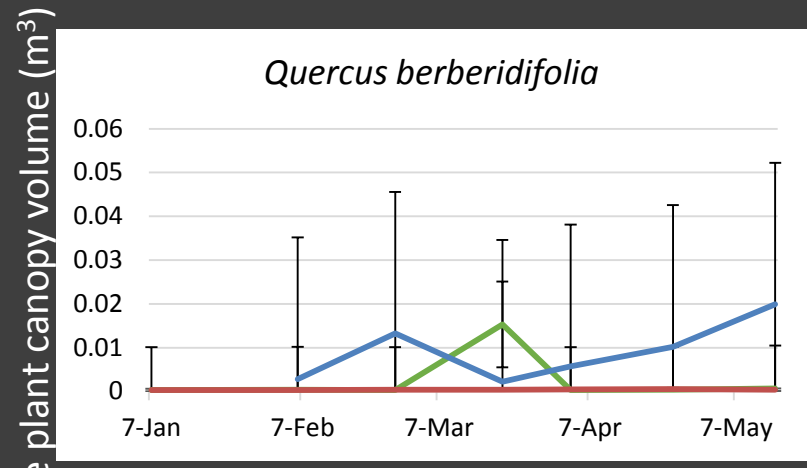
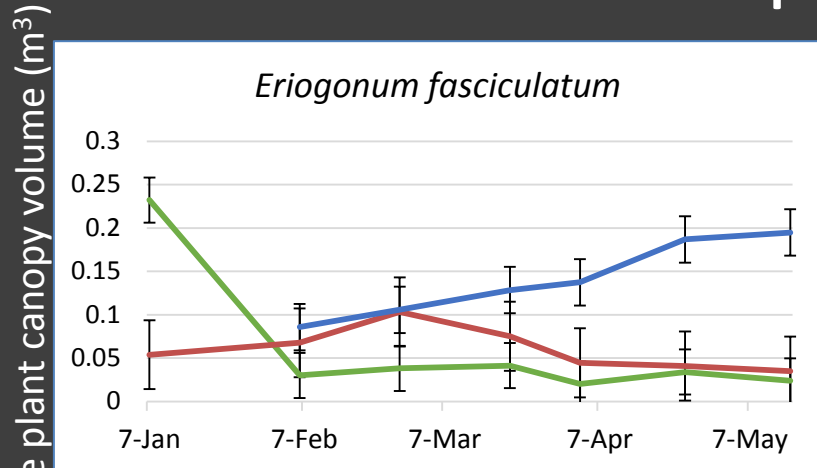
Adenostoma fasciculatum in flower



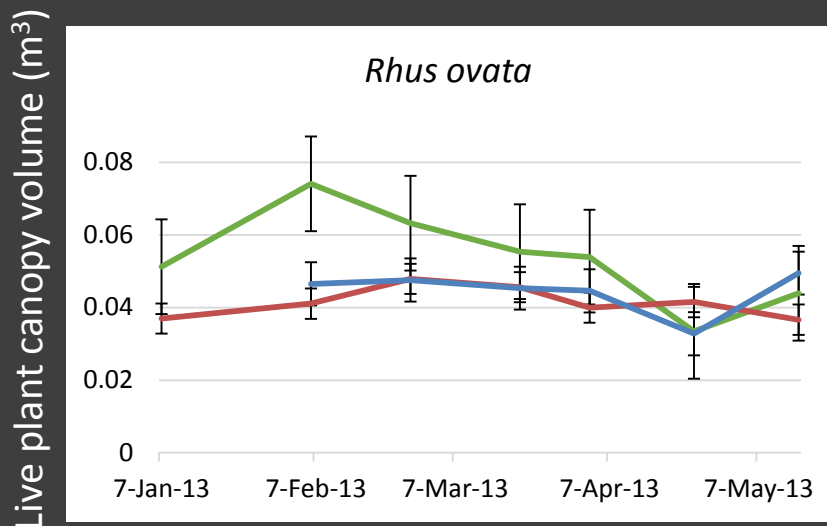
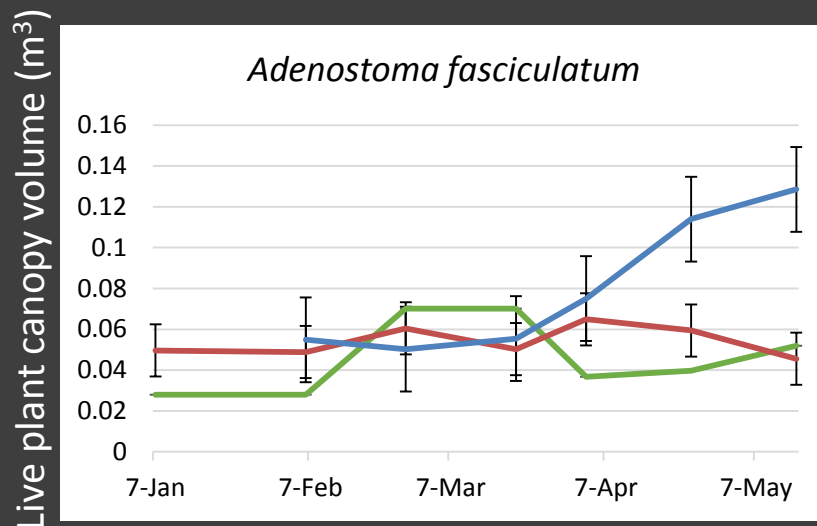
Eriogonum fasciculatum in flower



Live Plant Canopy Volume



■ No Herbicide
 ■ Fusilade Only
 ■ Glyphosate + Fusilade Follow-up



Soil Moisture

Sample Depth increments:

- 0-5 cm
- 5-15 cm
- 15-35 cm

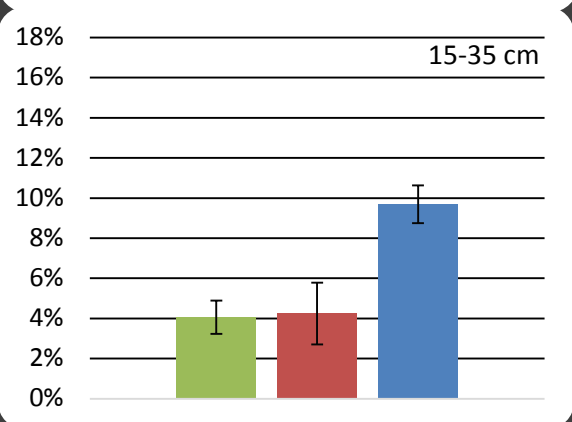
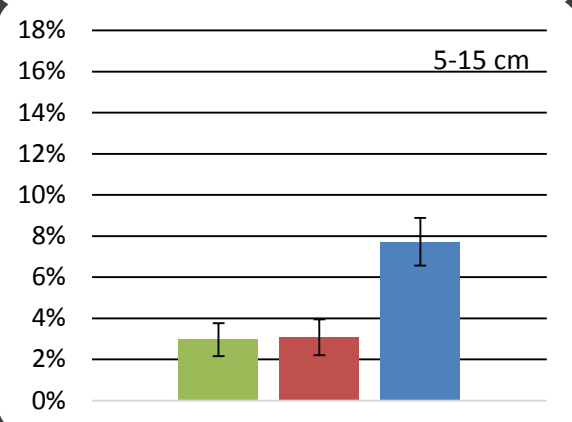
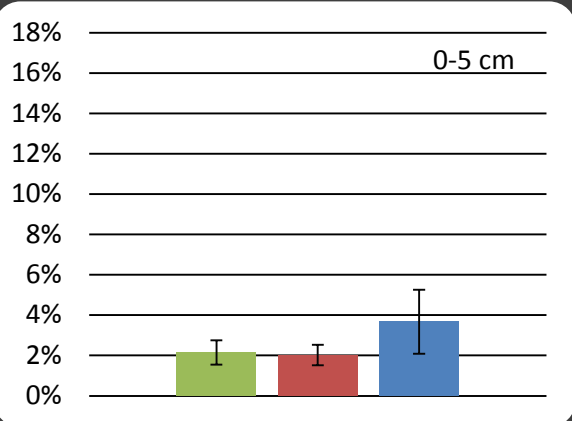


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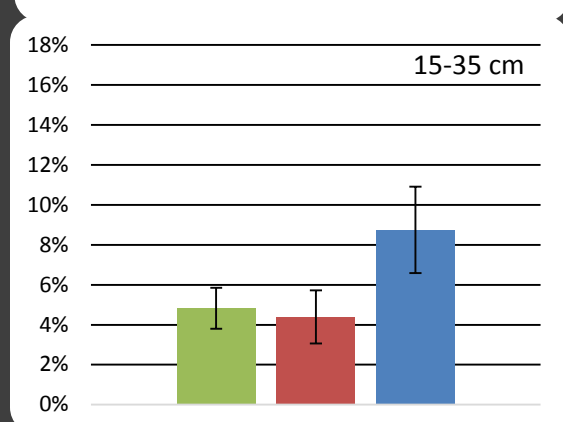
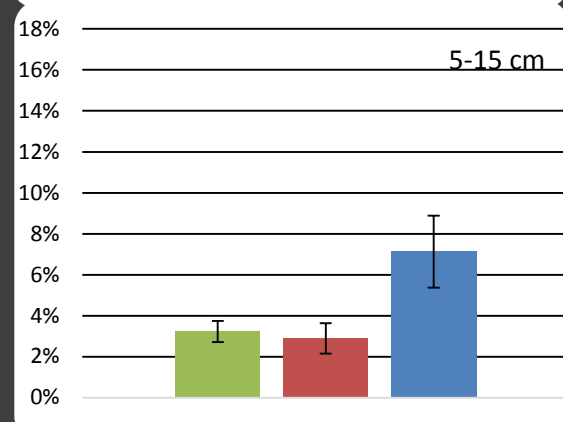
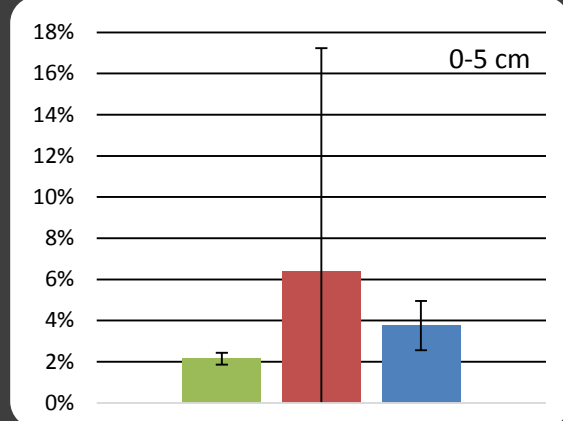
Soil Moisture Results

No Irrigation (not planted)

% Soil Water Content (g H₂O/g dry soil)



With Irrigation (planted plots)



- No Herbicide
- Fusilade Only
- Glyphosate + Fusilade follow-up



Partial Summary

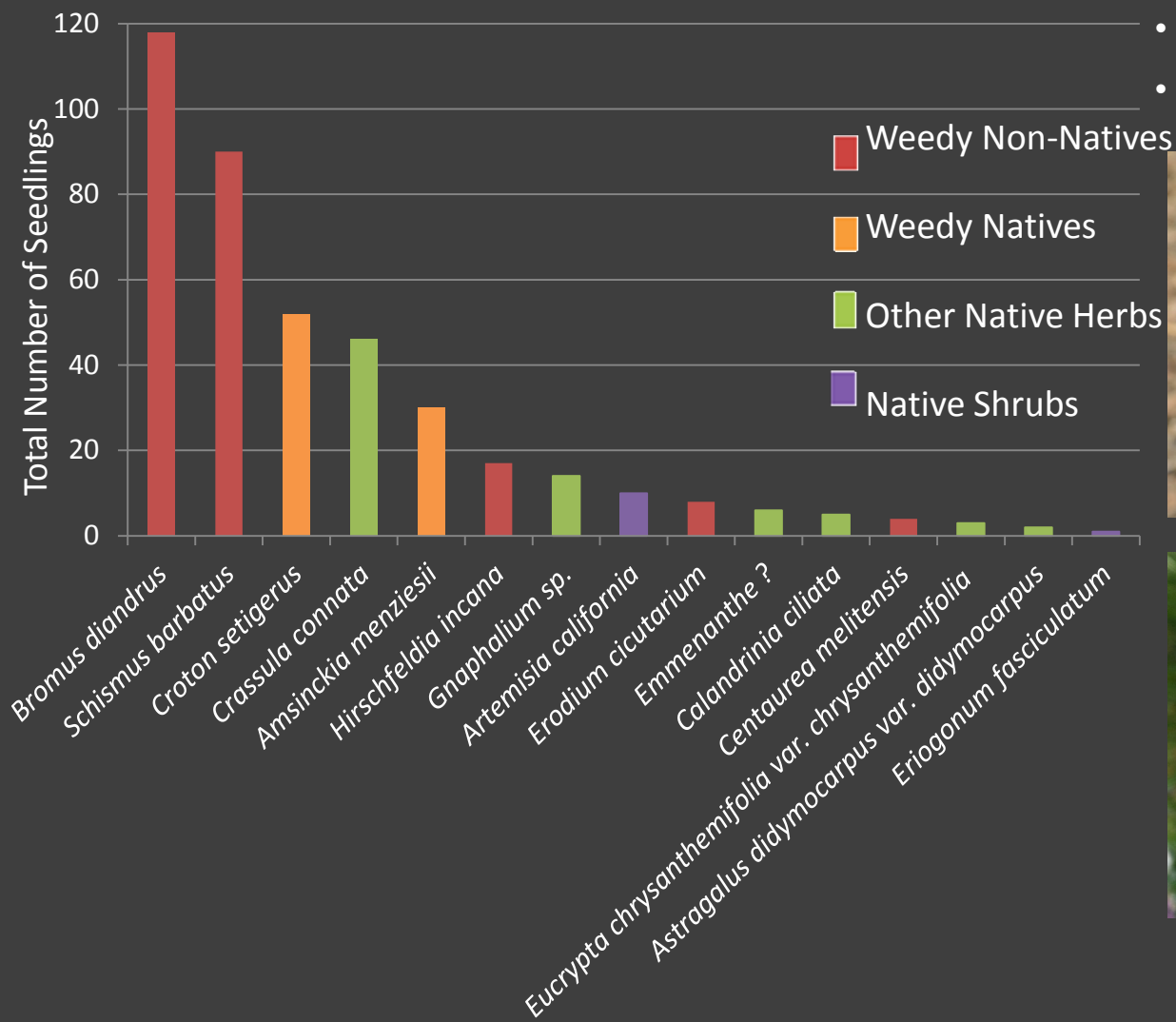
- The Glyphosate + Fusilade follow-up treatment promoted survival, growth and flowering of shrub seedlings
- Fusilade-only treatment was not effective
- Soil moisture content of the Glyphosate + Fusilade follow-up treated plots was higher

Is There a Relict Native Seed Bank on the Site?

- The soil was spread into flats, and 4 different treatments were applied
 - no treatment
 - smoke water
 - smoke water + heat
 - gibberellic acid.
- Plants were then transplanted and keyed



Seed-Bank Results



Native Species in plots that did not come up in the seed-bank Study:

- *Calochortus plummerae*
- *Dichelostemma capitatum*



Summary

- Glyphosate + Fusilade follow-up was most effective.
- Plant growth and survivorship in the plots with the Glyphosate + Fusilade follow-up treatment was more effective than non herbicide plots.
- Seeding was unsuccessful, and planting was successful in those plots that were treated with the Glyphosate + Fusilade follow-up.
- On this site, the relict seed bank was minor and may be insufficient to assist in restoration.

Acknowledgements



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