Effects of Selective Planting and Invasive Plant Management on Ecosystem Function

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Sage Hill

Coastal sage scrub (CSS) ecosystems in Southern California are under serious threat due to **disturbance**, **development**, and **invasive species**.

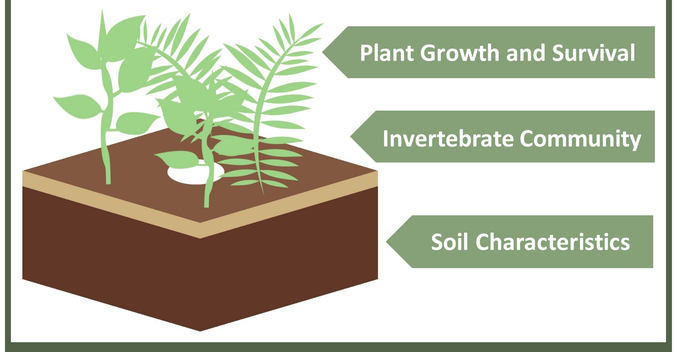
On the **UCLA campus**, there are four acres of undeveloped CSS called **Sage Hill**. This space has been recently disturbed.

Question: How can we best restore the ecosystem and ecosystem function on Sage Hill?

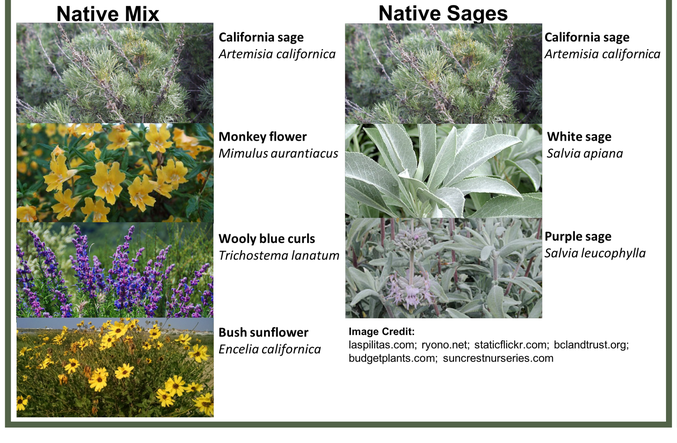
Objectives

Our goal was to test a proof of concept of **CSS ecosystem restoration**.

- Test different **assemblages of California natives** and **invasive plant removal**
- Observe effects on:

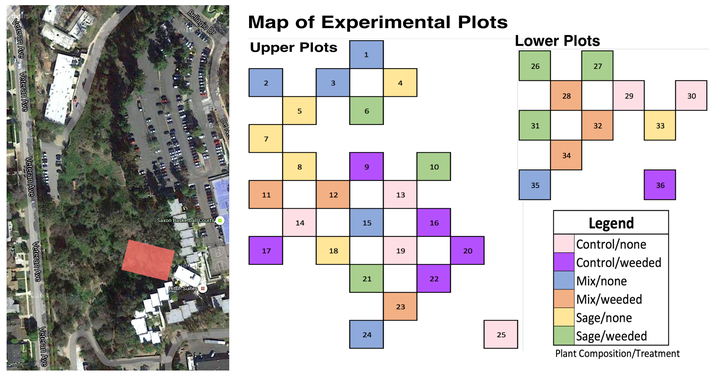


Plant Assemblages

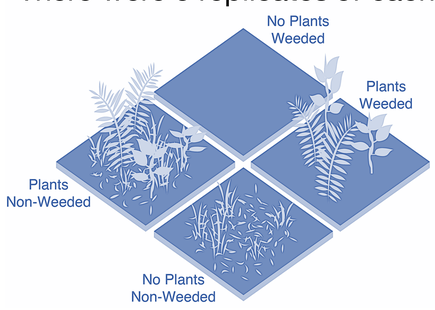


Experimental Design

36 one-meter^2 plots in a checkerboard pattern



Treatments were randomly assigned to plots.
There were 6 replicates of each treatment:



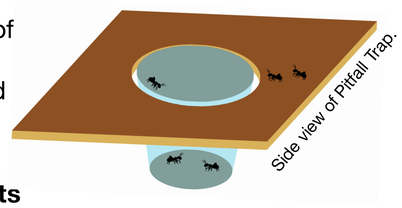
1. **Native Sage Weeded**
2. **Native Sage Non-weeded**
3. **Native Mix Weeded**
4. **Native Mix Non-weeded**
5. **Control (No plants) Weeded**
6. **Control (No plants) Non-Weeded**

Methods

Soil samples*:
- 0cm and 15 cm depth
- Samples dried in oven and calculated soil moisture.

Invertebrate samples*:
- Pitfall traps in the center of each plot
- Measured abundance and species richness

**before and after experiment*



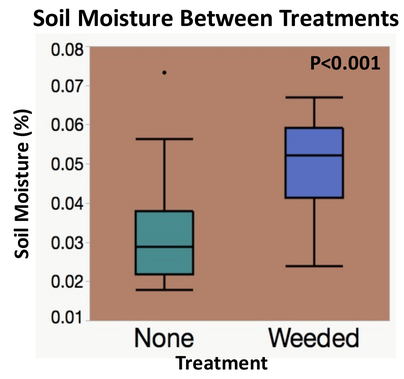
Weekly Plant Measurements
- Stem length
- Individual survival

Two-sampled t-tests run in JMP 12.1

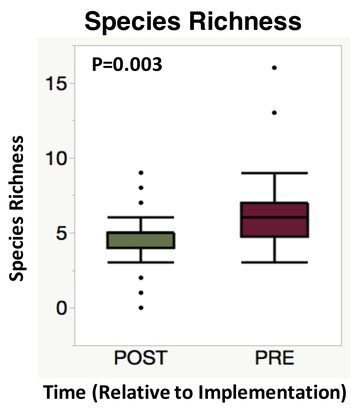
Results

Soil

- Preliminary samples showed no difference between plots.
- **Difference in soil moisture between weeded and non-weeded plots (P<0.001).**
- No difference between plant compositions.



Invertebrates

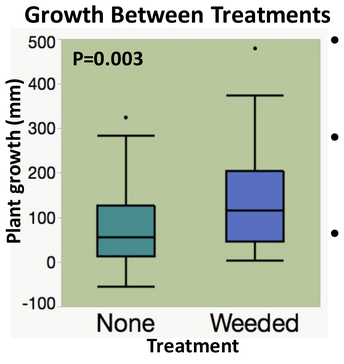


- Difference between species richness **before and after experiment** (P=0.003).
- No difference between richness or abundance between the weeding treatments or plant compositions (P>0.050).

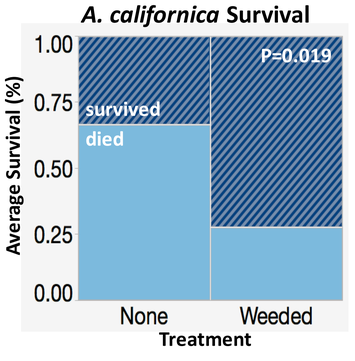
Invertebrate Community Before and After Experiment

Common Name	Family	PRE	POST
Pincer Bug	Dermaptera	X	X
Ant	Formicidae	X	X
Aphid	Aphididae	X	X
Spider Mites	Tetranychidae	X	
Ladybug	Coccinellidae		X
Bee	Apidae		X
Jerusalem Cricket	Stenopelmatidae		X

Plants



- Difference in **growth** with weeding (P=0.003).
- Difference in **survival** with weeding (P=0.042).
- Difference in ***A. californica* survival** with weeding (P=0.019).



Conclusions

Weeding had the greatest impact on changes in ecosystem characteristics.
- *Soil* moisture increased
- *Plant* survival increased

Possible Seasonality Effect
- *Invertebrate* community change

Future Management and Study:
- Focus on invasive management for future restoration work
- Research other combinations of plants
- Expansion to other levels of biodiversity
- Longer studies

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