Effects of post fire ecology on plant species and abundance in Southern Californian Semi-Arid Shrublands

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Introduction

- Chaparral strands are considered to be fire-adapted due to diverse recovery mechanisms used by chaparral plant species during secondary succession.
- CSUSM campus is recovering from the May 2014, “Cocos” fire on the north-facing slope. A portion of the burned areas was hydroseeded in December 2014 to reduce erosion.
- Hydroseeding affects initial post-fire recovery of native chaparral vegetation, due to species exclusivity of seed-mixes (Vourlitis et al. 2017).
- It was hypothesized that species diversity and abundance as well as plant cover would be higher in the area treated with hydroseed.

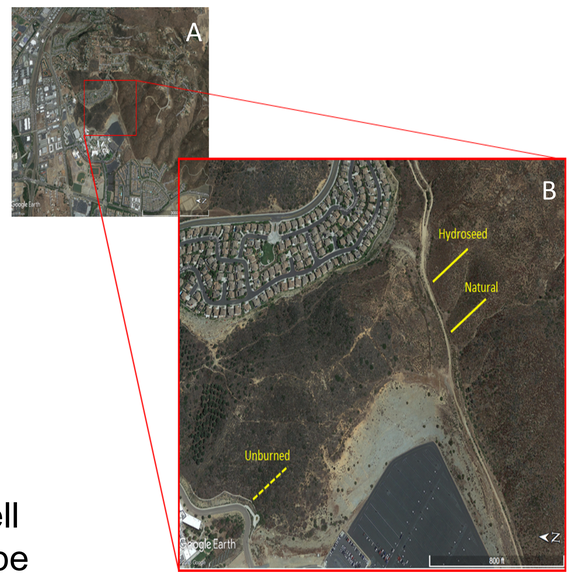

Fig. 1. (A) Aerial photo of CSUSM and (**B**) location of the unburned (U), burned-naturally regenerating (N), and burned-hydroseeded (H) stands at CSUSM.

Methods

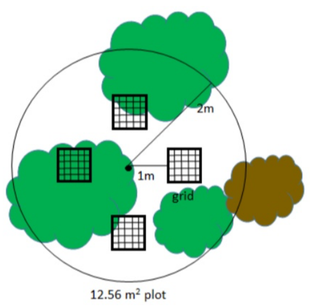

Fig. 2 Vegetation sampling in a circular plot (12.56 m^2).

- Woody shrubs (green shrubs) (**Fig. 2**) were measured for canopy area and species identification.
- Identified species included *Adenostoma fasiciculatum* (AF), *Acmispon glaber* (AG) *Ceanothus tomentosus* (CT), *Mimulus aurantiacus* (MIM), *Malosma laurina* (ML), and *Salvia mellifera* (SM).
- 8 individual plots per treatment of unburned (U) and burned, naturally regenerating (N) and hydroseeded (H), stands at CSUSM **(Fig. 2)**.
- Topsoil (0-10 cm) was collected on February 1, 2019 from 24 randomly located plots (n = 8 plots/site).

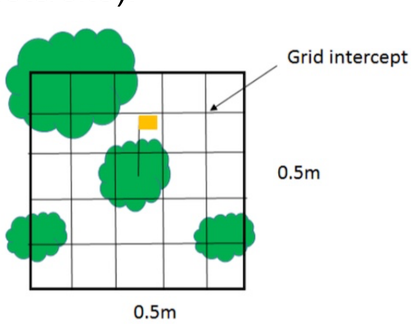

Fig. 3 Herbaceous cover was quantified by point intercept method. Measured 0.5 x 0.5m gridded quadrats (4/plot) that were placed one meter away from center of plot. .

Results and Discussion

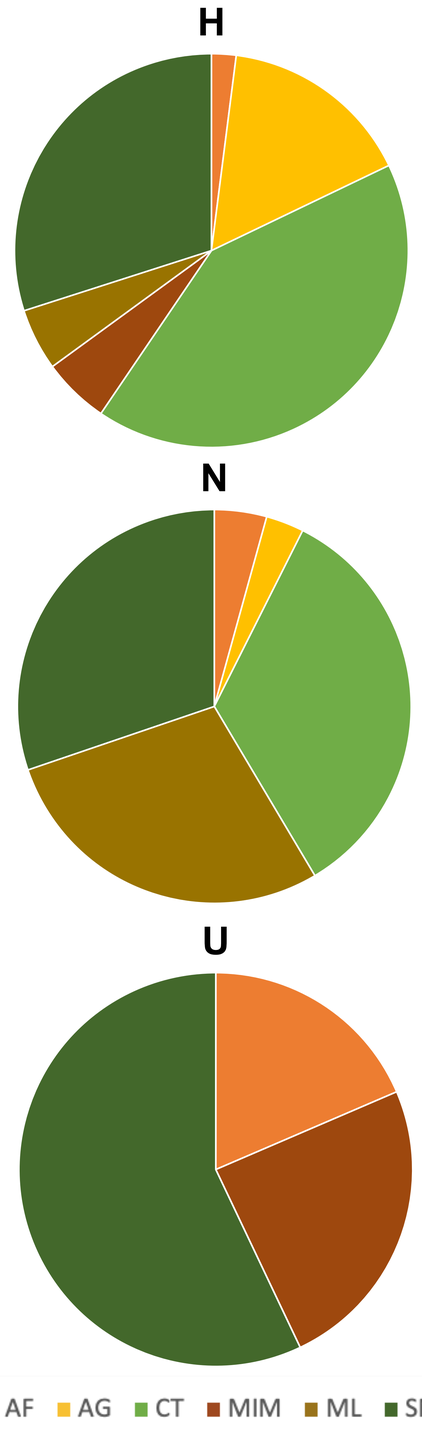

Fig. 4. Mean species represented in each of the sites; Hydroseed, Natural, Unburned. Adenostoma fasciculatum (in orange) and Salvia mellifera (in red) were the only species abundantly found in all three sites on the CSUSM campus. .

- There was no significant difference of shrub or herbaceous cover among the three sites **(Fig 5)**.
- The hydroseeded stand had the most diversity among plant species while the unburned stand had the least **(Fig 4)**. Hydroseeded stands have more diversity due to the seed mixture of mulch that was used to initiate restoration on the CSUSM site[2].
- There was a significant difference across four major plant species: AG, CT,MIM, ML **(Fig. 4)**.

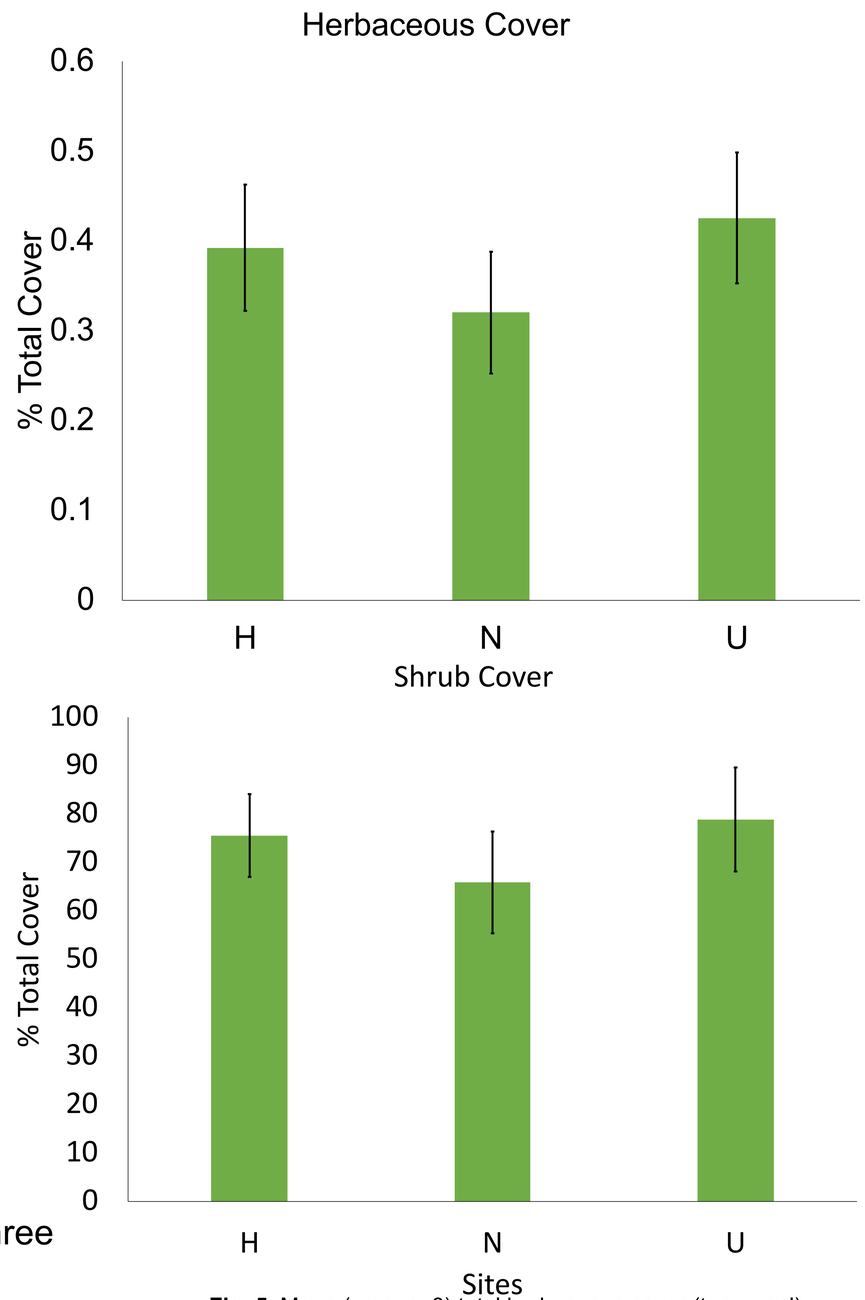

Fig. 5. Mean (±se; n=8) total herbaceous cover (top-panel) and shrub cover (bottom panel) from all three sites. Coverage of on the CSUSM campus. .

Conclusions

- The mixture of seeds used in the mulch for the hydroseeded site may be a combination of species native to California but not specific to the CSUSM site.
- Ultimately the natural emergence of native plants may be affected by hydroseeding, which can result in a decline of native plant diversity. Changes in fire frequency and/or intensity may also occur.

Literature cited

(1) Vourlitis et al. (2017) *Ecological Engineering* **102**: 46–54.

(2) García-Palacios et al. (2010) *Ecological Engineering* **10:** 1016

Acknowledgements

This research was sponsored by a USDA-NIFA grant to Drs. George Vourlitis and Arun Sethuraman (2018-67032-27701)