

# Strip-seeding, targeted grazing, and prescribed fire to manage and restore California grasslands

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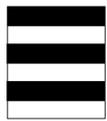
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## BACKGROUND

### California grasslands are highly invaded

- Native grassland restoration efforts are often hindered by highly competitive invasive annual grasses and high costs for investment and maintenance

### Restoration & Management Techniques



**Strip-seeding** is a proposed cost-effective seeding method to establish native species that increases spatial heterogeneity



**Targeted grazing** removes specific invasive species at the point in their life cycle when they are most vulnerable



**Prescribed fire** prevents seed dispersal of late season invasive species, reduces thatch accumulation, and promotes forbs

## QUESTION: Is integrating strip-seeding, targeted grazing, and prescribed fire an effective method to promote native species and reduce non-native species?

## METHODS

**Fall 2012:** 24 m x 44 m native strip-seed treatment fields (24 total) were established

- 3 strip-seed treatments (33%, 50%, 66%)
- 2 controls (0%, 100%)

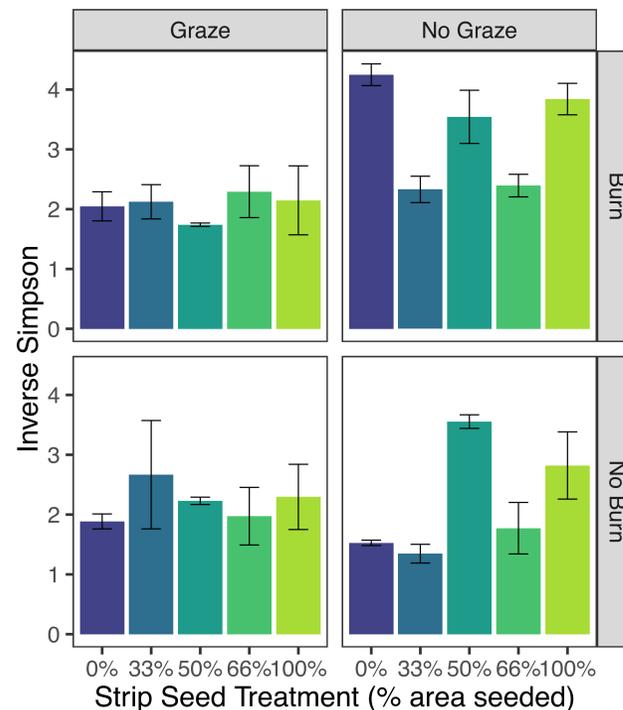
**Spring 2017:** Two 1m<sup>2</sup> plots were established in an unseeded strip of each field

- Targeted grazing** of half of the fields in mid-spring
- Prescribed burning** of one of the two 1m<sup>2</sup> sample plots

**Spring 2018:** Community composition measurements

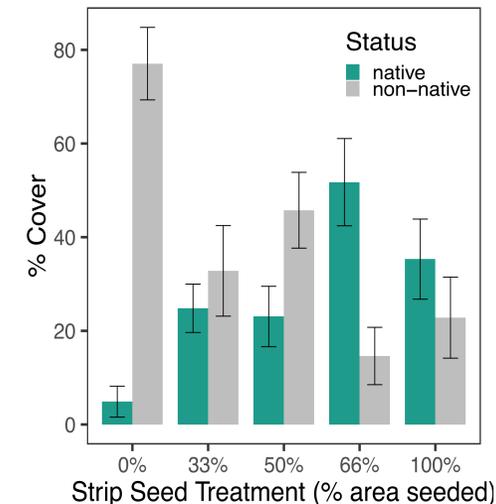


## RESULTS



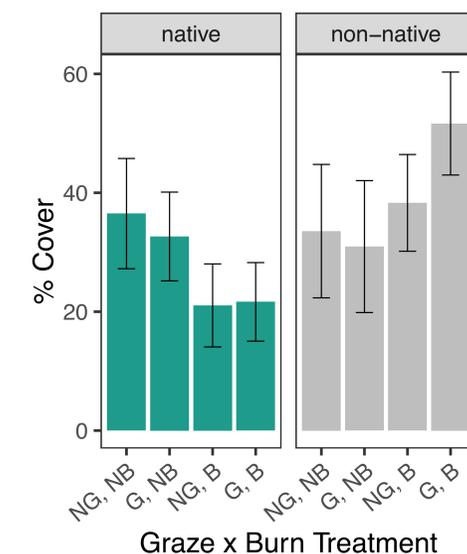
**Fig 1. Grazing, burning, and strip-seeding treatment effects on diversity**

- There was a significant graze x burn interaction.
- The No Graze, Burn treatment had the **highest diversity**, and the No Graze, No Burn and Graze, Burn treatments had the **lowest diversity** (Tukey HSD,  $p < 0.05$ )



**Fig 2. Strip-seeding treatment effects on native and non-native cover**

- Native cover** was significantly lower in the 0% treatment (GLM,  $p = 0.003$ ) and significantly higher in the 66% treatment ( $p = 0.005$ )
- Non-native cover** was highest overall in the 0% treatment, and significantly higher in the 50% treatment than the 66% treatment (Tukey HSD,  $p < 0.05$ )



**Fig 3. Grazing and burning treatment effects on native and non-native cover**

- Burning reduced **native cover** (GLM,  $p = 0.039$ ), regardless of grazing treatment
- Grazing had no significant effect on **native cover** ( $p > 0.05$ )
- Burning and grazing had no significant effect on **non-native cover** ( $p > 0.05$ )

## CONCLUSIONS & NEXT STEPS

- Applying an early summer prescribed fire increases diversity, but decreases native cover
- Grazing and burning did not interact with treatment to alter outcomes
- To determine changes in the community through time, grazing and burning treatments will continue annually through Spring 2019, and we will continue to monitor community composition through Spring 2020

## ACKNOWLEDGEMENTS

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