A contrast camera trap imagery of the Mojave National Preserve and Carrizo National Monument to examine animal interactions with foundation plant species

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Introduction

Foundation plant species are able to directly or indirectly facilitate other taxa through various mechanistic pathways (Filazzola and Lortie 2014). Understanding the role of foundation plants is key for desert restoration and conservation as global desertification and climate change continue to be pressing issues.

Objective & Prediction

Objective: To investigate the ability of foundational plant species *E. californica (Mormon tea), L. tridentata*, and *C. acanthocarpa (Buckhorn cholla)* to act as benefactors.

Prediction: These species are in fact able to positively impact other taxa, such as vertebrates, through canopy volume and various other amelioration pathways.

Ephedra californica

Larrea tridentata

Cylindropuntia acanthocarpa

Methods

- Cameras were set to survey on consecutive days from March 23rd, 2017 to May 3rd, 2017 in the Mojave National Preserve and the Carrizo National Monument, California; though, not continuously.
- Open sites served as control.
- A total of 102,398 and 209,714 images were collected in each location, respectively.
- Statistical workflows and map of locations can be found here: https://cjlortie.github.io/Camtrap.contrast.2017/#camera_trap_contrasts.

Results

- There were significant differences in size (volume) between the three species tested ($p > X^2 = 2.2e-16$).
- Capture rates were microsite-specific, varying from 0 to 0.4 images/second ($p > X^2 = 0.0001$).
- Shrub size was not significantly correlated with animal capture rate for any of the foundational species (Estimates for buckhorn, Ephedra, and Larrea: adjusted $r^2 = 0.2628, 0.01436, -0.0388$; *p-Value*= 0.07434, 0.2514, 0.43).
- Buckhorn was shown to be the best 'magnet' for vertebrates; having a greater capture instance than both Larrea and Ephedra.
- Animal richness was also significantly different between the microsites ($p > X^2 = 6.385e-6$).

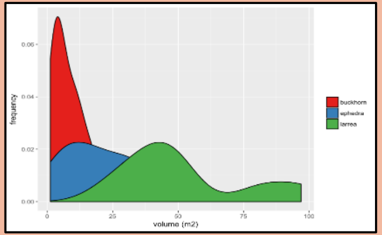

Figure 1. Smoothed density estimate plots for size of foundational species buckhorn, Larrea, and *E. californica*. The frequency estimate demonstrates the probability of those measures occurring at a given volume on the x-axis.

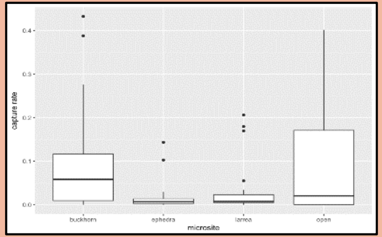

Figure 2. Boxplot showing capture rate at each of the four microsites. Solid middle lines shows the median of the data, whilst whiskers show 1.5 standard deviation. Solid dots are outliers >1.5 interquartile range (IQR).

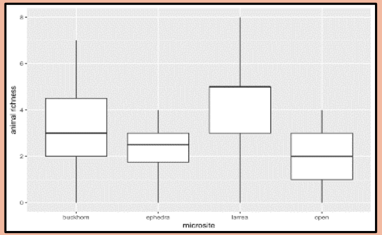

Figure 1. Boxplot of species richness at each microsite.

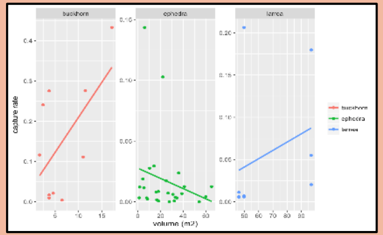

Figure 1. Linear regression of the shrub volume versus capture rate for each species.

Conclusion

- Buckhorn was the best magnet for animals: small shrubs can have significant, positive impacts.
- Foundation species are used differently at different sites.
- Larrea showed the highest species richness: Larrea has the ability to ameliorate harsh environments and has a strong impact on community assembly.