Updating Occupancy Analysis of Mohave Ground Squirrels

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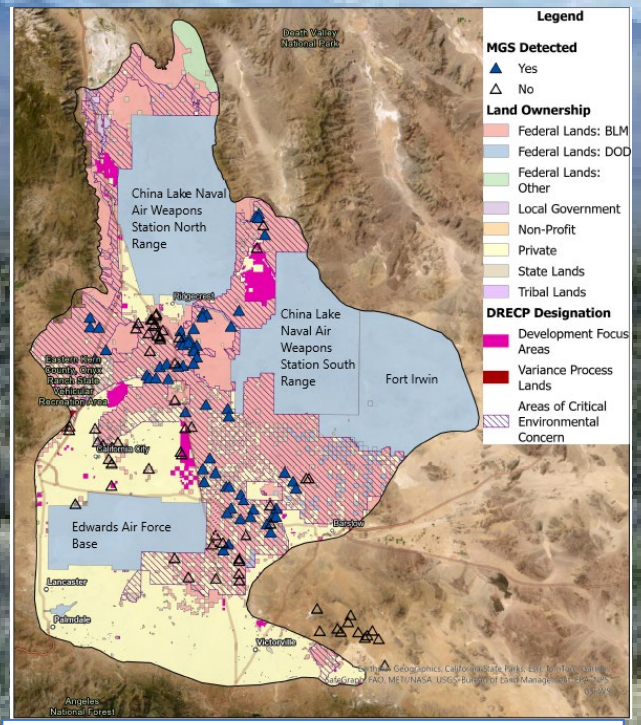
Project Objective

The purpose of this work is to update a manuscript from my dissertation and prepare it to submit to a journal.

Background

Mohave ground squirrels (MGS) are listed as Threatened under California's Endangered Species Act (CESA) and are endemic to the western Mojave Desert. In 2011-2012, my collaborators set up 10 baited camera traps for five days across 110 different sites to try and detect MGS. They trapped each site at least two times during the active season for MGS. They also performed vegetation sampling where they measured shrub and herbaceous plant density and cover across the sites. All of the sites were collected on public lands throughout the MGS range. I used that data to estimate occupancy and detection probabilities with information on vegetation, and model-derived precipitation (PRISM 2018) histories from the various sites. This type of modeling is called occupancy analysis. The original work, where all sites across the MGS range were aggregated into one large model of environmental covariates that influence site occupancy, failed to reveal strong positive relationships between individual habitat features and MGS occupancy. Instead, a negative relationship was shown between MGS site occupancy and creosote bush density (Orcutt 2019). From a conservation perspective, understanding the features that deter a species are less informative than those that are positively associated with species presence, so this finding was a bit disappointing.



Selected Works Cited

Orcutt, E. L. 2019. Understanding and Defining Habitat Quality for a California Endemic in a Non-Equilibrium System. Dissertation submitted for Doctor of Philosophy in Geography, University of California, Davis.

PRISM Climate Group, Accessed 2018, Oregon State University, http://prism.oregonstate.edu,

created 4 Feb 2004.

Methodology

I began by reviewing the initial draft of the manuscript which I had written as part of my dissertation in 2019. I did a literature search to find updated sources and information so that my work would be presented in a more updated context. Additionally, I rewrote several key sections of the manuscript, including the introduction, to make the work more relevant to a general audience. I updated one of the figures to show our study sites in the context of the Bureau of Land Management's Desert Renewable Energy Conservation Plan (DRECP), since information from those sites was provided to the BLM when they were developing the plan. Additionally, I decided to research and learn a new form of analysis to group our study sites into sub-models that might show patterns that were previously masked by the large, all-site model.

Results & Future Directions

The updated figure can be seen in the middle of the poster. This figure shows the land ownership and designated development areas under the DRECP. I am still finalizing the results of the new analysis that I learned about during this semester, but once that analysis is completed, the manuscript will be updated and submitted for publication. Additionally, in 2021-2022 my collaborators repeated their data collection and developed new vegetation survey techniques. I am going to apply the hierarchical modeling techniques that I have learned about in updating the first paper to the updated study to test if the new vegetation methods reveal new patterns in the habitat structure. The knowledge I have gained by updating the first study will directly translate to analyzing the new data, which will lead to an additional publication in the future.