Ranch-scale Approaches for Conservation Grazing

An update from the SDMMP grazing study

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September 25, 2024

SDMMP Management and Monitoring Coordination Meeting

SDMMP Grazing Study

SDMMP Grazing Working Group Developed Study Premise

San Diego County Rangelands:

- Many conservation goals on rangelands
- Increasing threat of wildfire

Core question: *Can grazing effectively reduce rangeland fuels, while helping achieve rangeland conservation goals?*

Key conservation goals in San Diego County:

- Maintain healthy coastal sage scrub and grassland ecosystems
- Improve sensitive species habitat in degraded grassland and shrubland

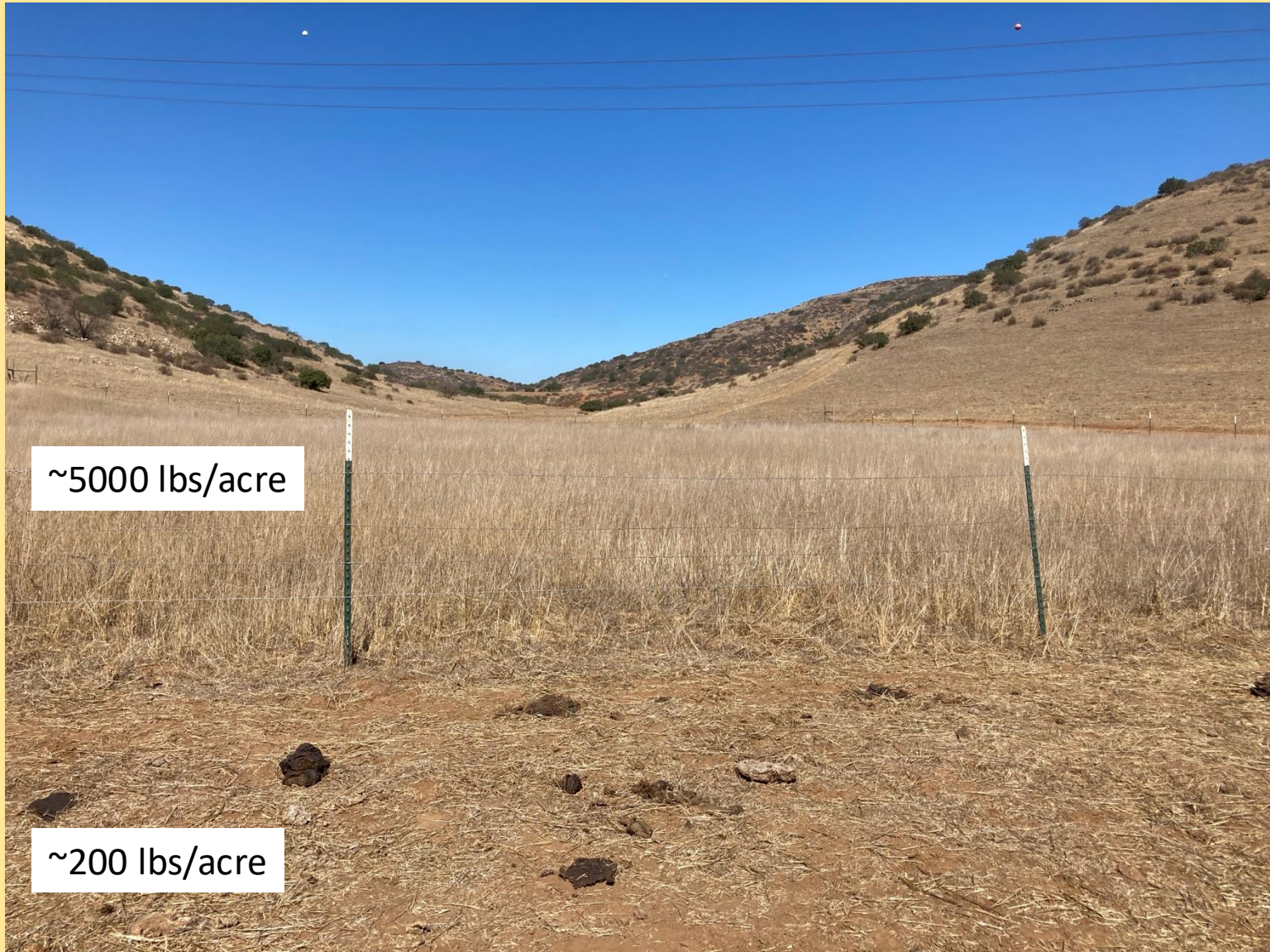
Frequent Fires Harm Coastal Sage Scrub

Fire ⟶ Annual Grass Feedback Loop

Livestock grazing can reduce fine fuels

Grazing can lead to:

- Reduced fine fuel loads and more manageable fire behavior (Ratcliff et al. 2022; Foss 2023)
- Reduced probability of burning (Starrs et al. 2024, Siegel et al. 2022)



Grazing and Species Composition

- Grazing can be good, bad, or negligible for different goals
- Past studies in CA show that livestock grazing can:

↑ Native Annual Forb Richness

↑ Exotic Annual Forb Cover

? Native Forb Cover

? Native Grass Cover

? Southern Coastal Sage Scrub Cover

Climate, weather and site factors are dominant drivers of composition

Photo by L. Nygard

Wealth of Research and Information on Conservation in San Diego County


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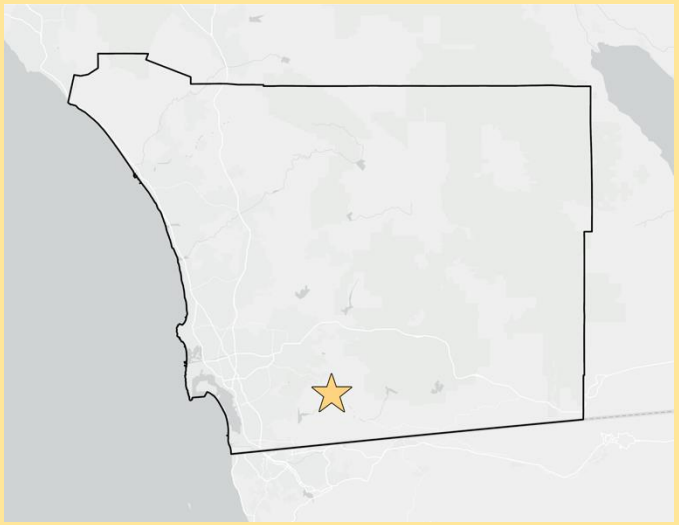
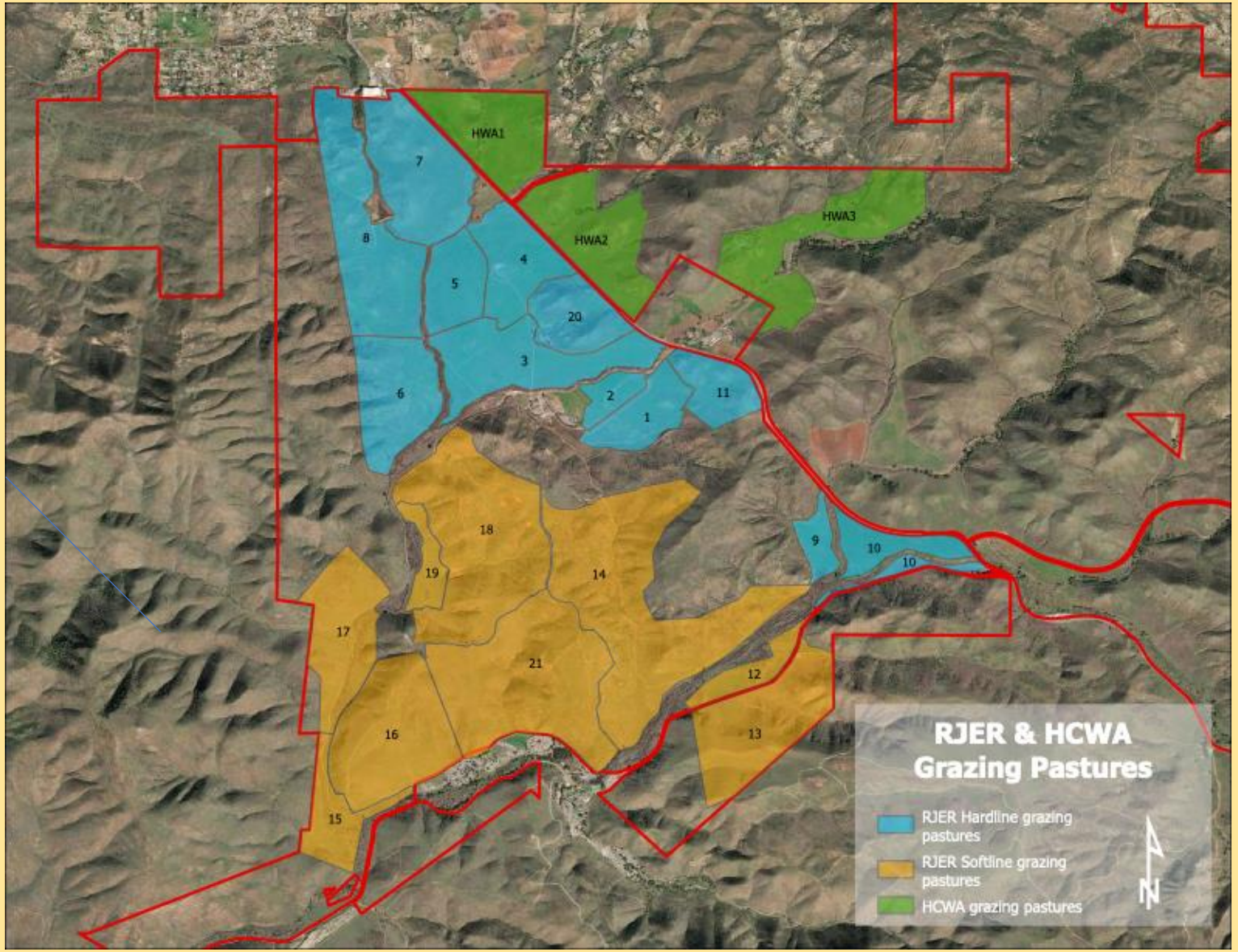
Photo by G. Russell

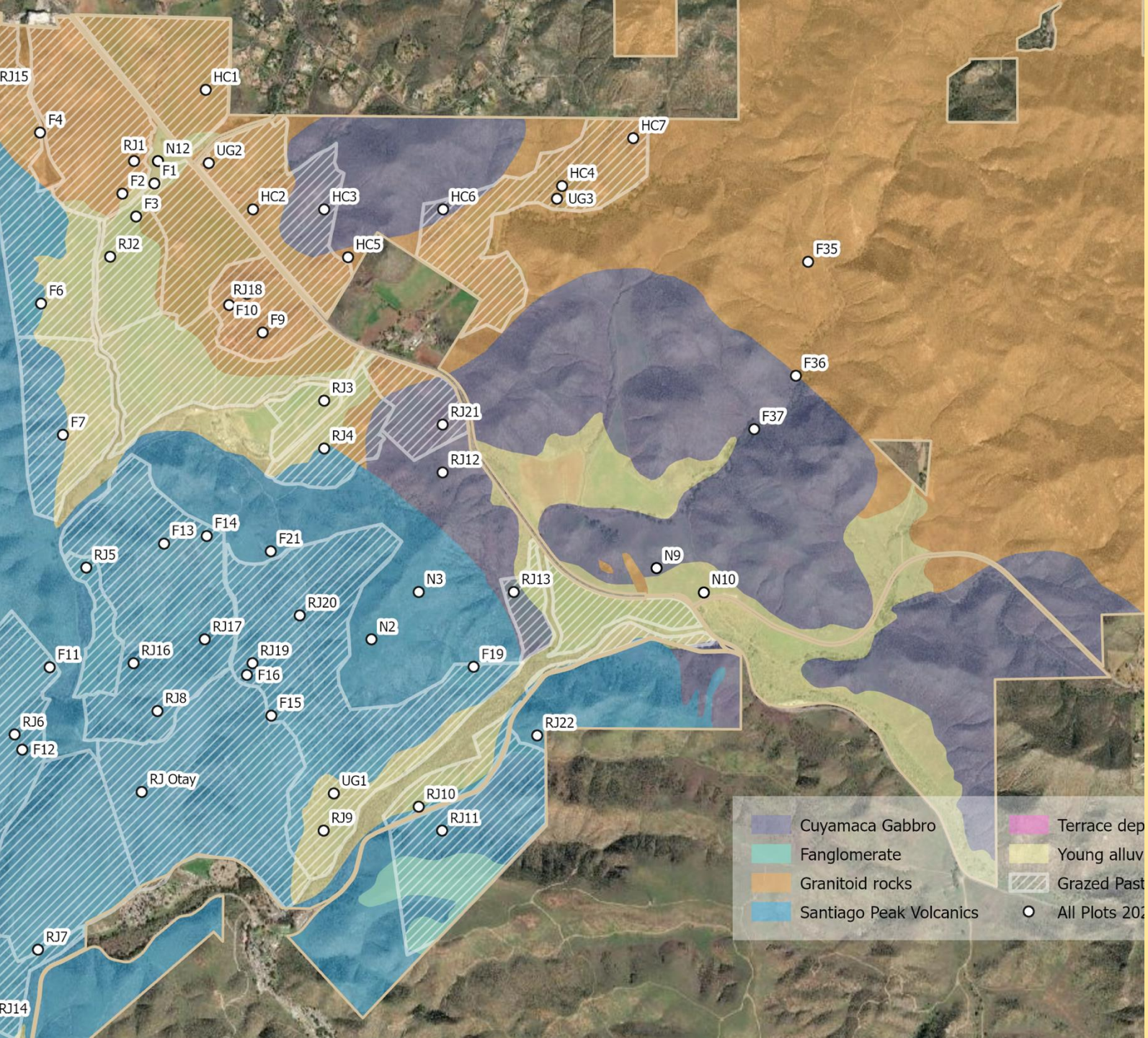
Greg Russell


Photo by USFWS

Rancho Jamul and Hollenbeck Canyon







High Spatial Diversity

Spatial variability in:

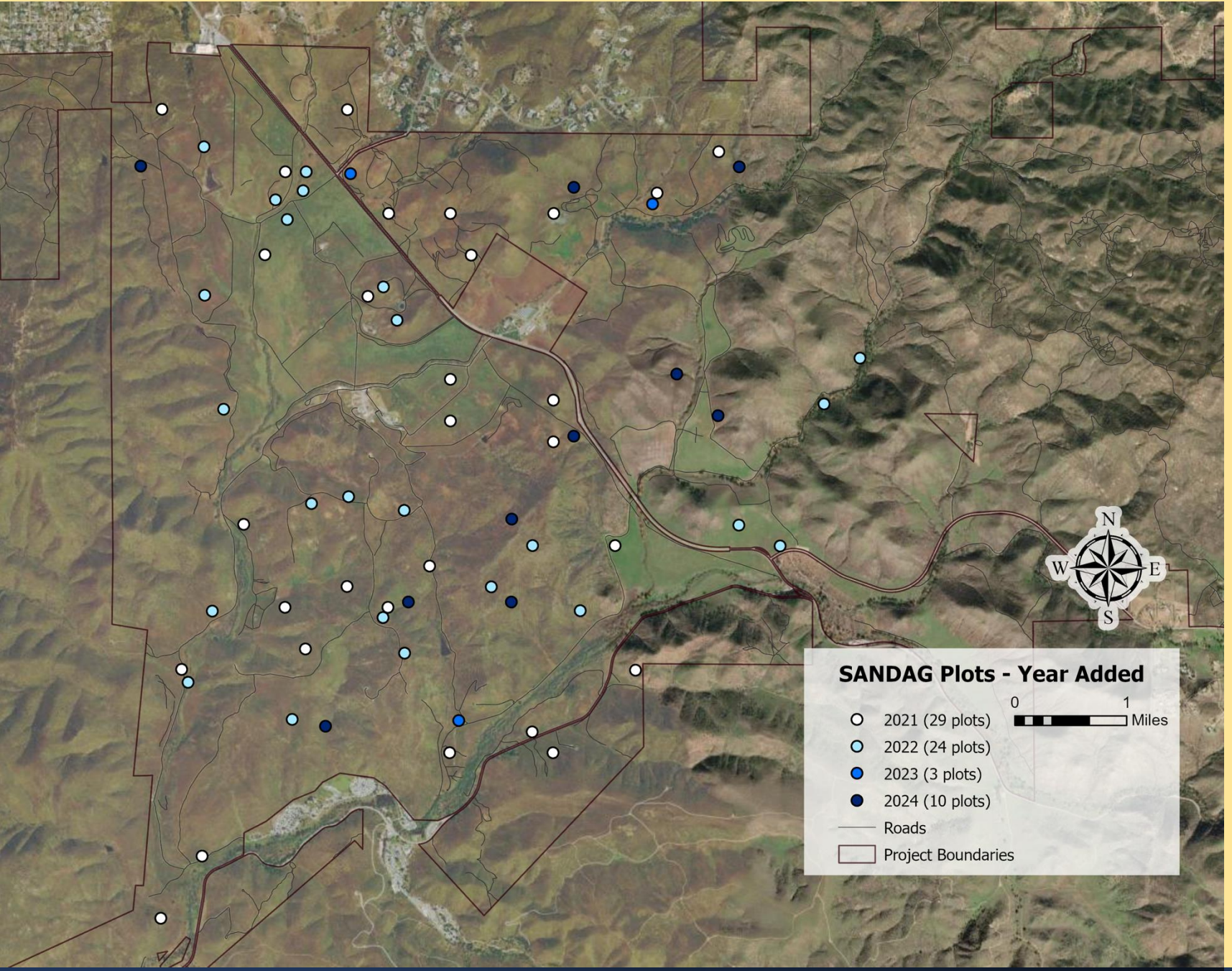
- Geology
- Topography
- Management and Fire History

Has created a landscape with:

- highly diverse plant communities
- variable ecosystem processes

Ecological sites as a conceptual model

- Ecological Sites – “a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation” – NRCS
- Our approach: ground-up classification of ecological sites and vegetation states
  - Data-based
  - Created at the “ranch” scale
  - Designed to answer conservation questions



Study Plot Locations

64 plots total

- Random locations (mostly)
- Stratified by:
  - geology type
  - plant cover
  - topography
  - management history

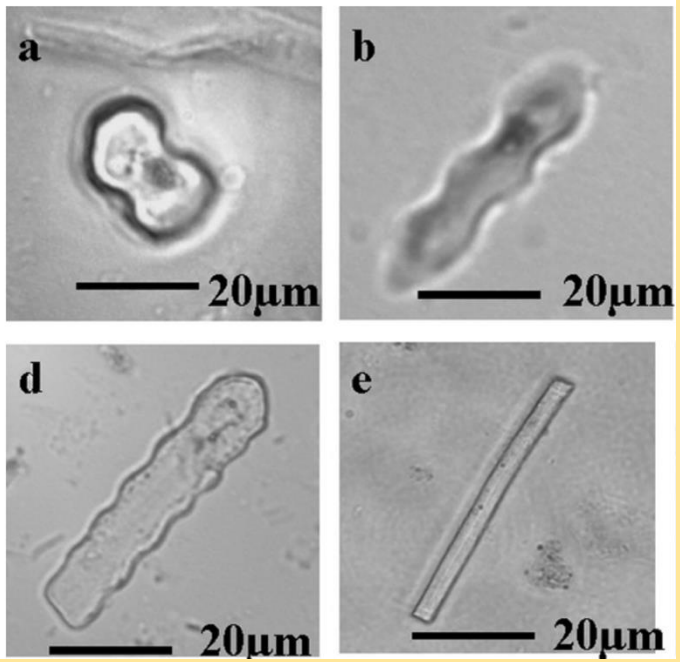
Monitoring at Study Plots

- Evaluated grazing use
- Spring monitoring:
  - Plant species composition
  - Vegetation height
  - Forage production
- Fall monitoring:
  - Residual dry matter (RDM)
  - Vegetation height

Ecological Site Sampling

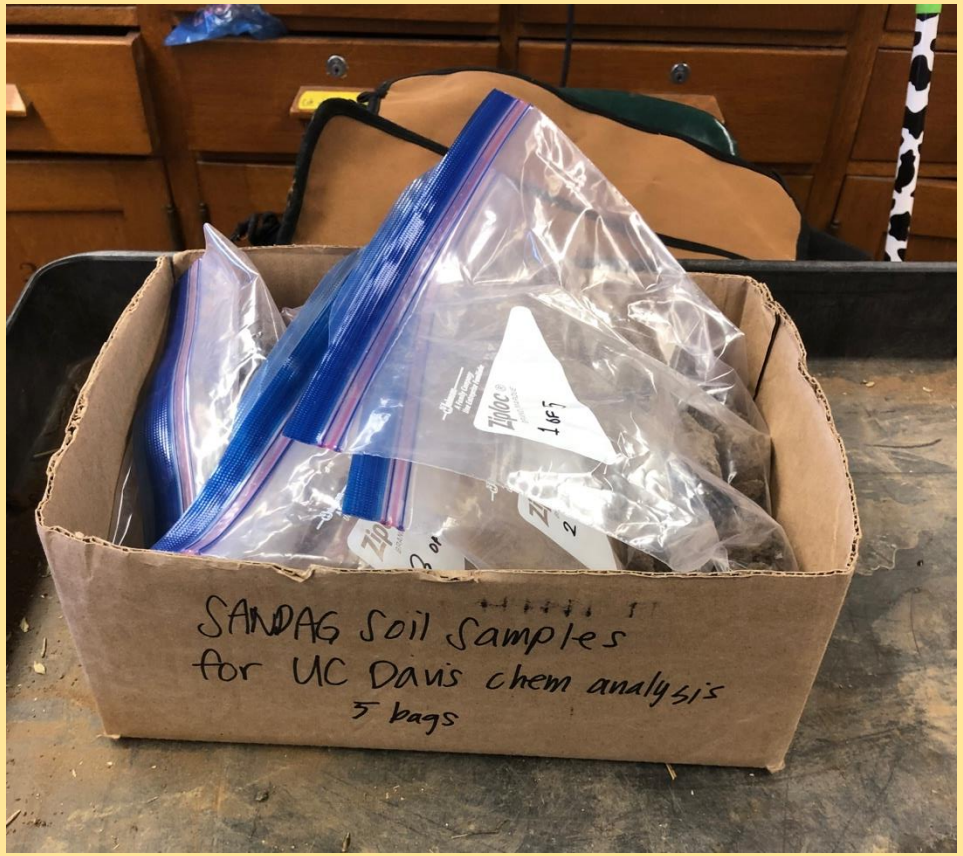
- Soils (from field samples)
  - Texture
  - Nutrients
- Slope/Aspect
- Solar Radiation
- Geomorphologic Variables

Processing soil and phytolith samples



Morris et al. 2010

Phytolith Analysis



Soil Chemistry and Texture

Ecological Sites

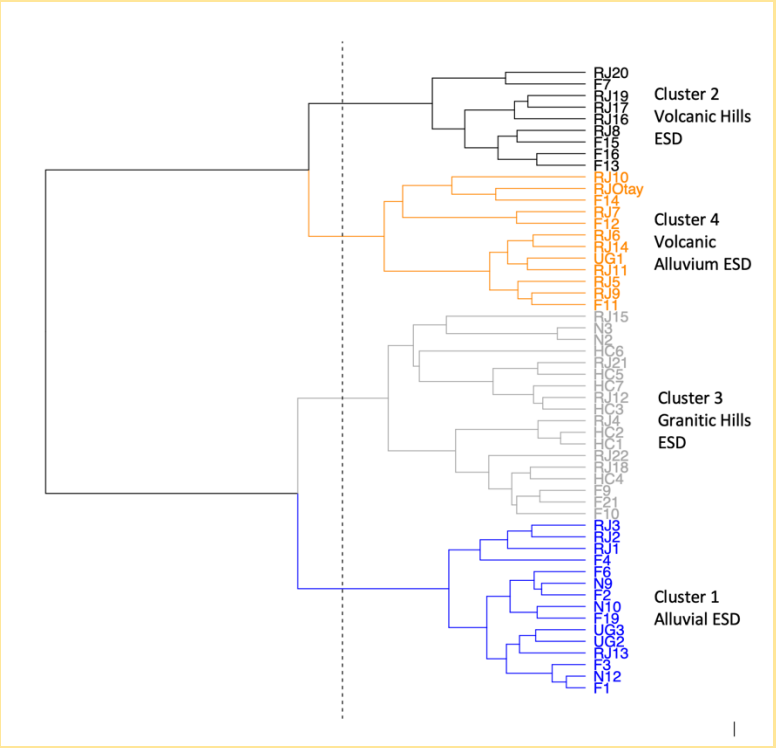
Four ecological sites

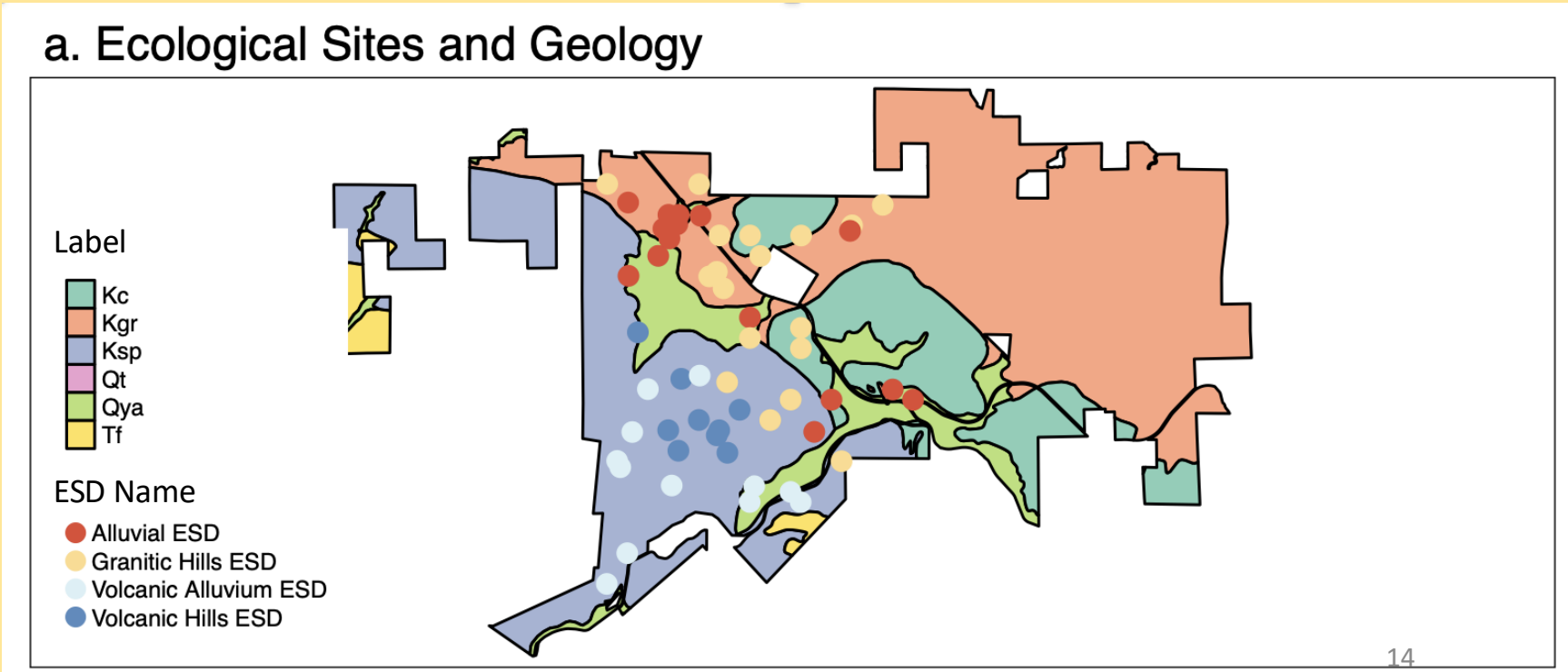
- Largely corresponded to geology and landform

Sites varied in:

- Herbaceous production
- Plant species composition
- Wildlife occurrences
- Special-status species occurrence

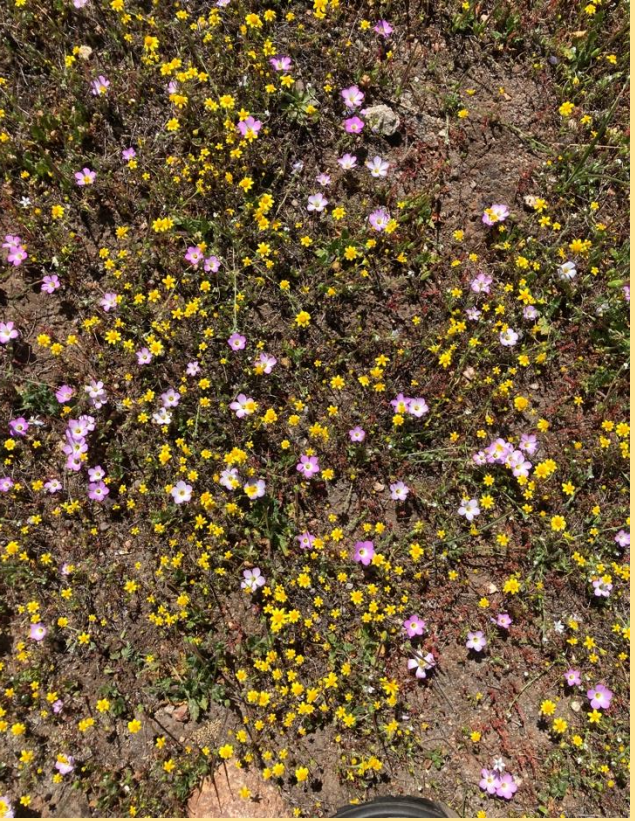
2-3 vegetation states per ecological site





Ecological Sites and Vegetation

Three ecological sites support coastal sage scrub vegetation states (one did not)



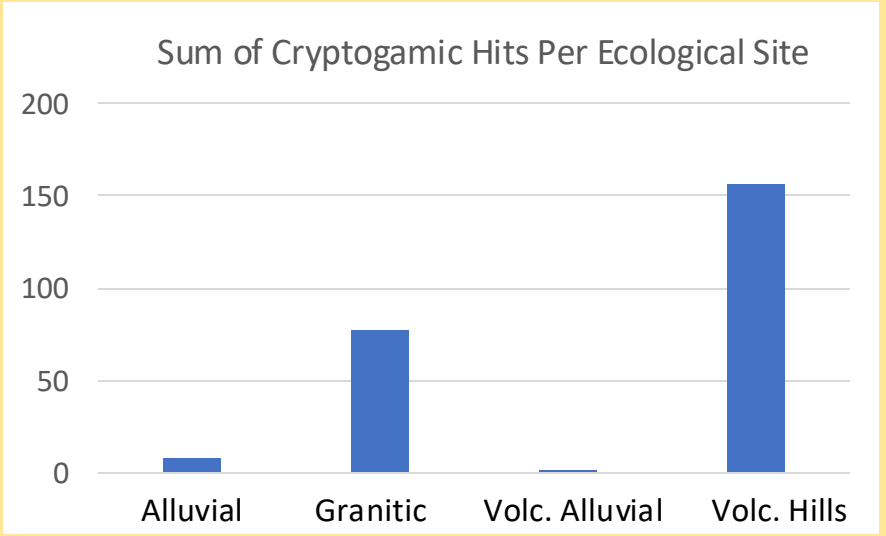
Ecological Sites and Vegetation

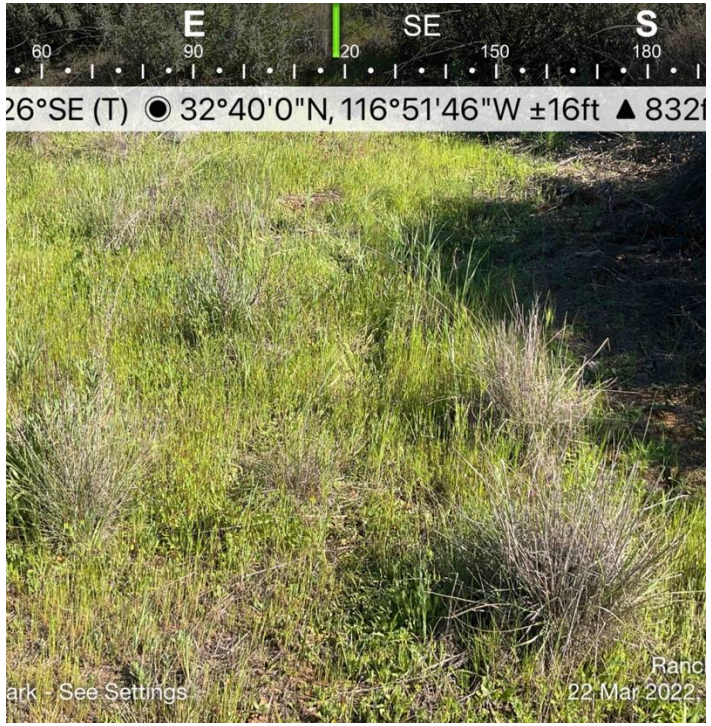
Ecological sites and vegetation states have different grass and forb species

- Within ecological sites, presence and abundance of forbs was a major difference between herbaceous states
- Weed species showed preference for different ecological sites

Ecological Sites and Soil Crusts

Cryptogamic soil crusts only occurred in two sites

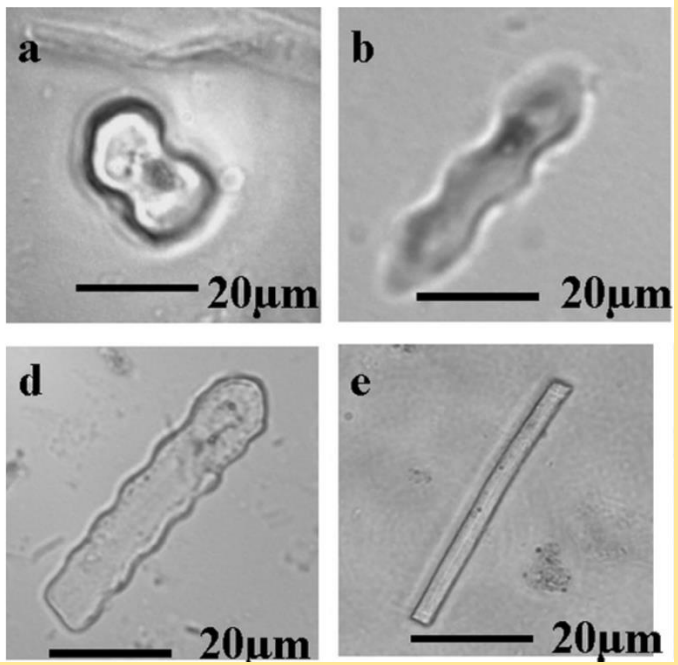




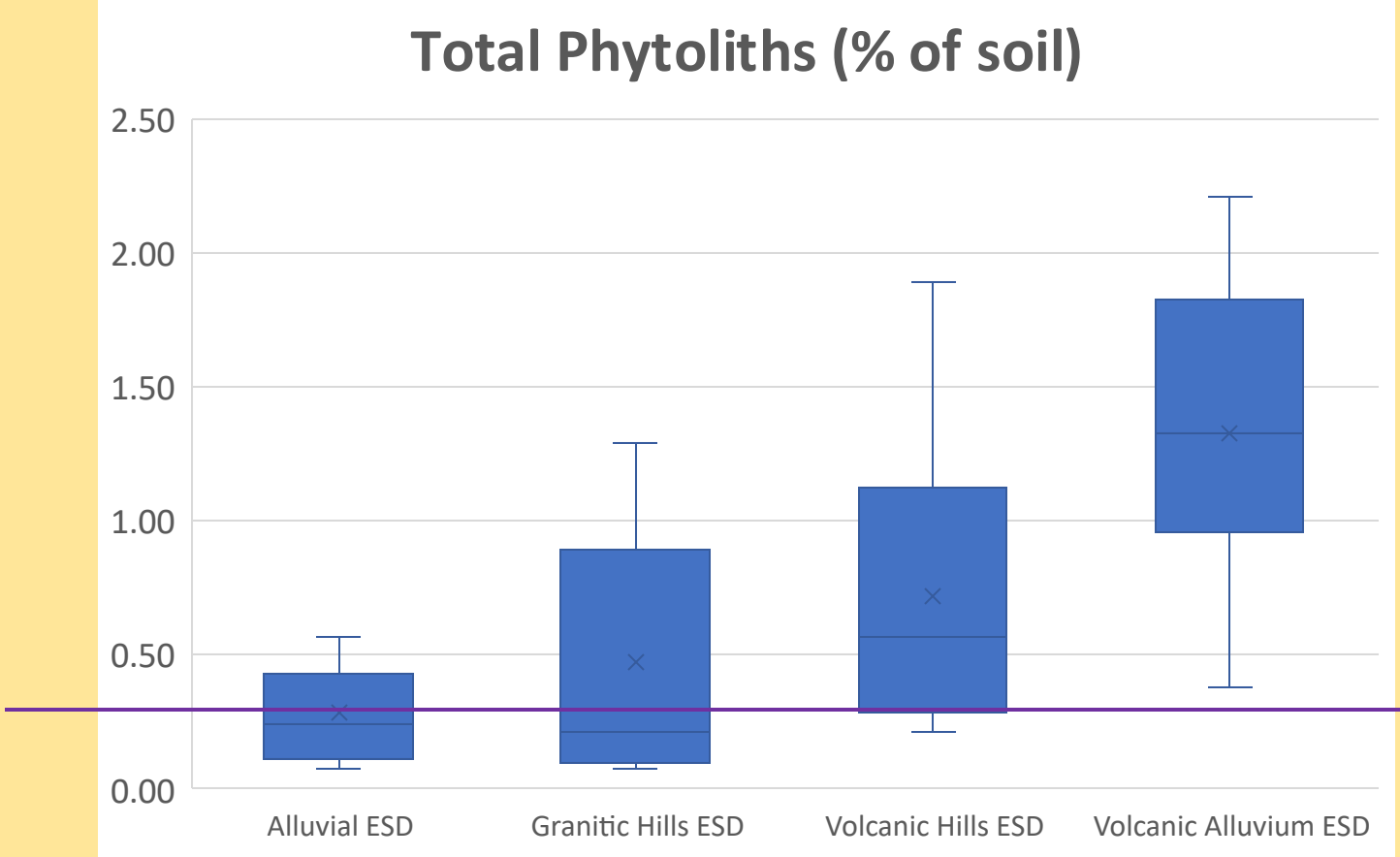
Ecological Sites and Target Species

Target species (native grasses, Otay Tarplant, Burrowing Owl, butterly host plants) only occur in one or two ecological sites

Phytoliths in Soils

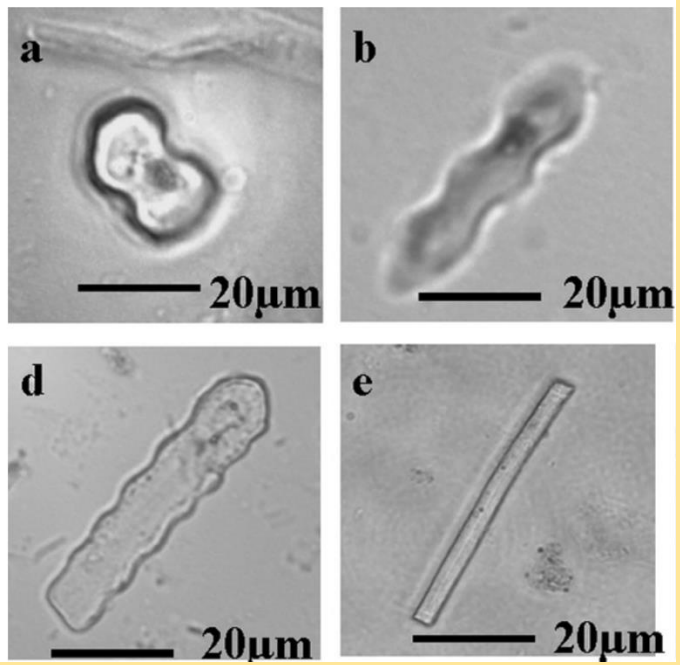


Morris et al. 2010



- Higher levels of soil phytoliths metavolcanic ecological sites
- Some sites historically supported more grasses
- Bilobate phytolith types were higher in these ecological sites too

Phytoliths in Soils



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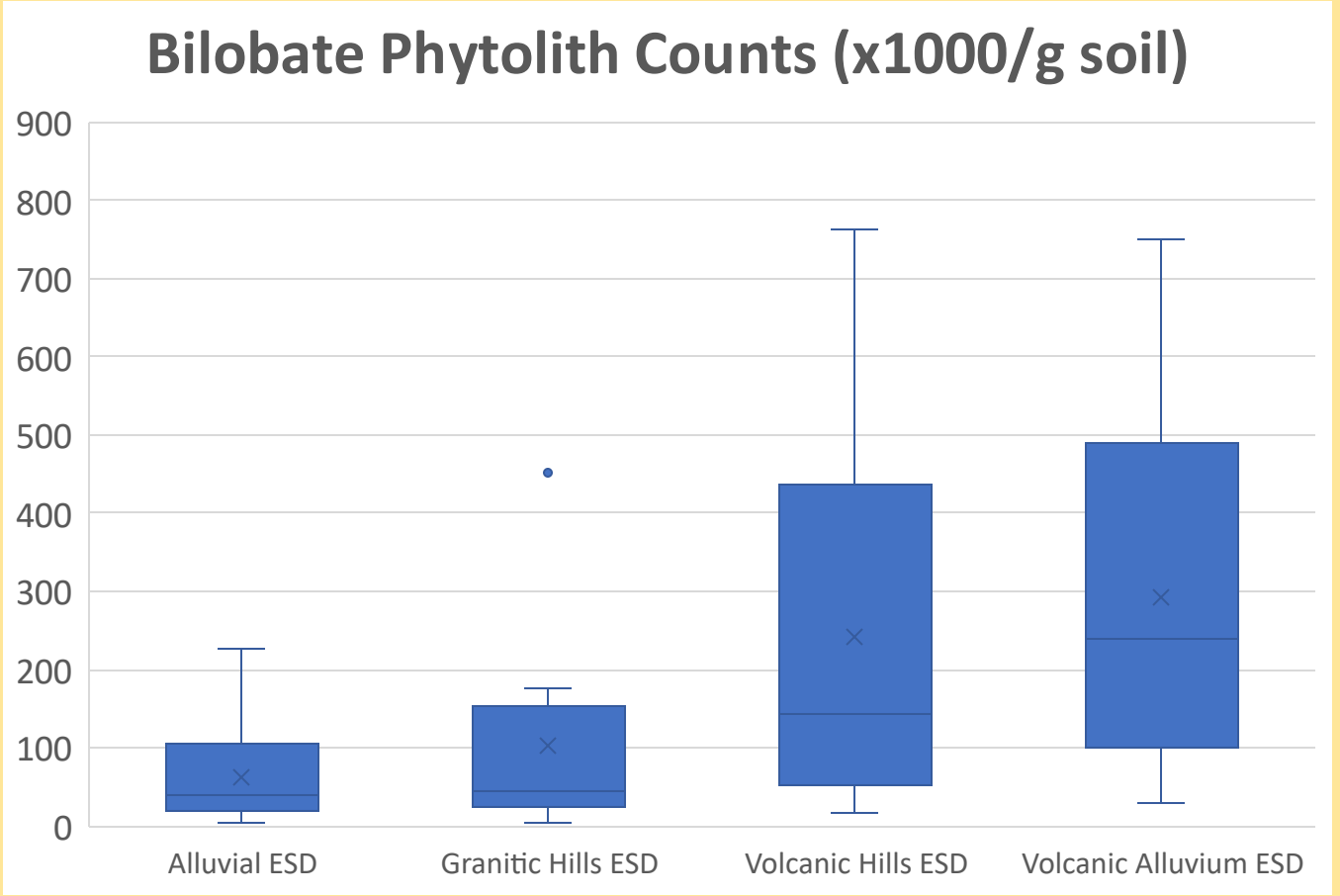
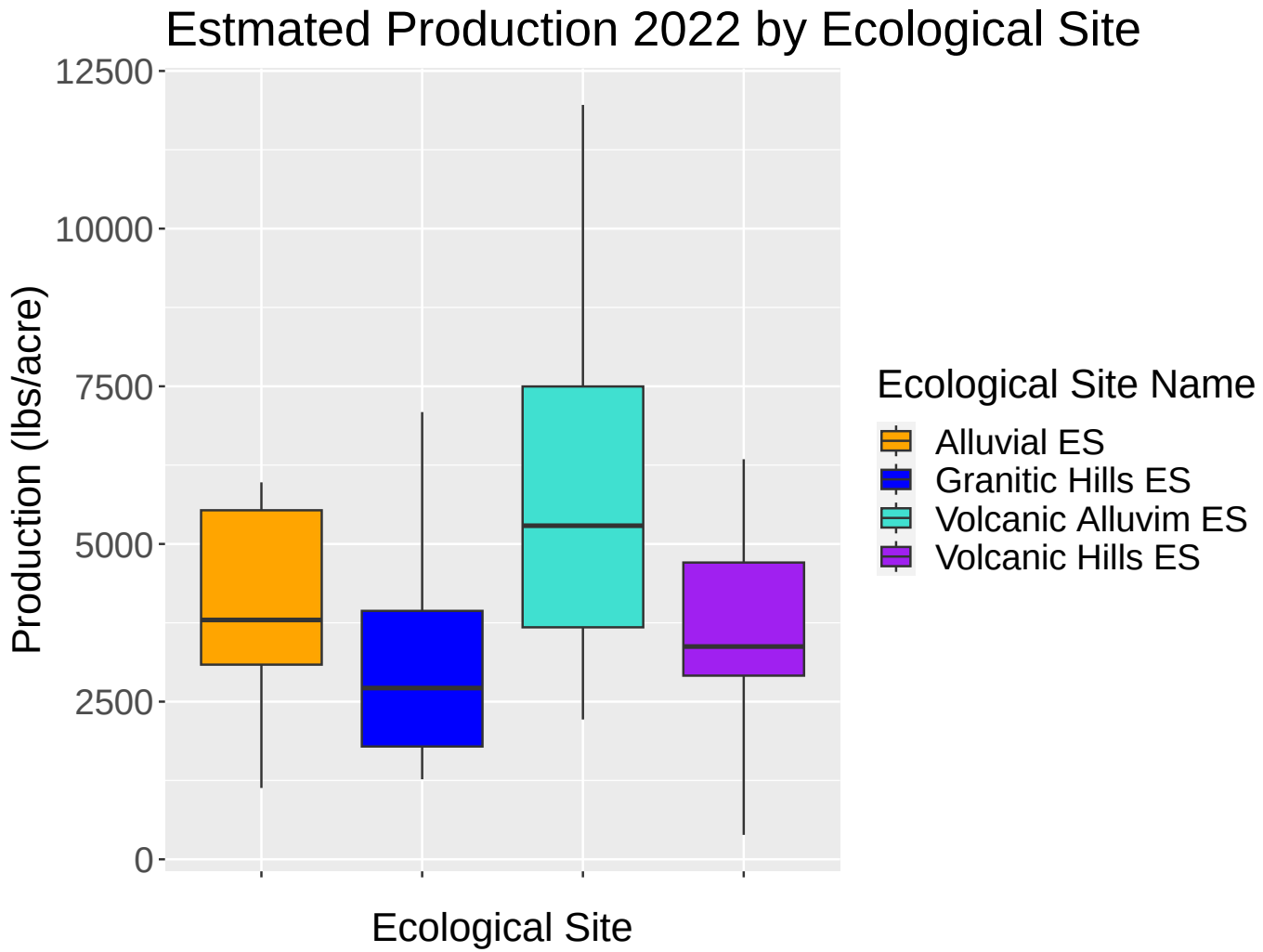


- Higher levels of soil phytoliths on two of the four ecological sites
- Some sites historically supported more grasses
- Bilobate phytolith types were higher in these ecological sites too

Herbaceous production varies by Ecological Site

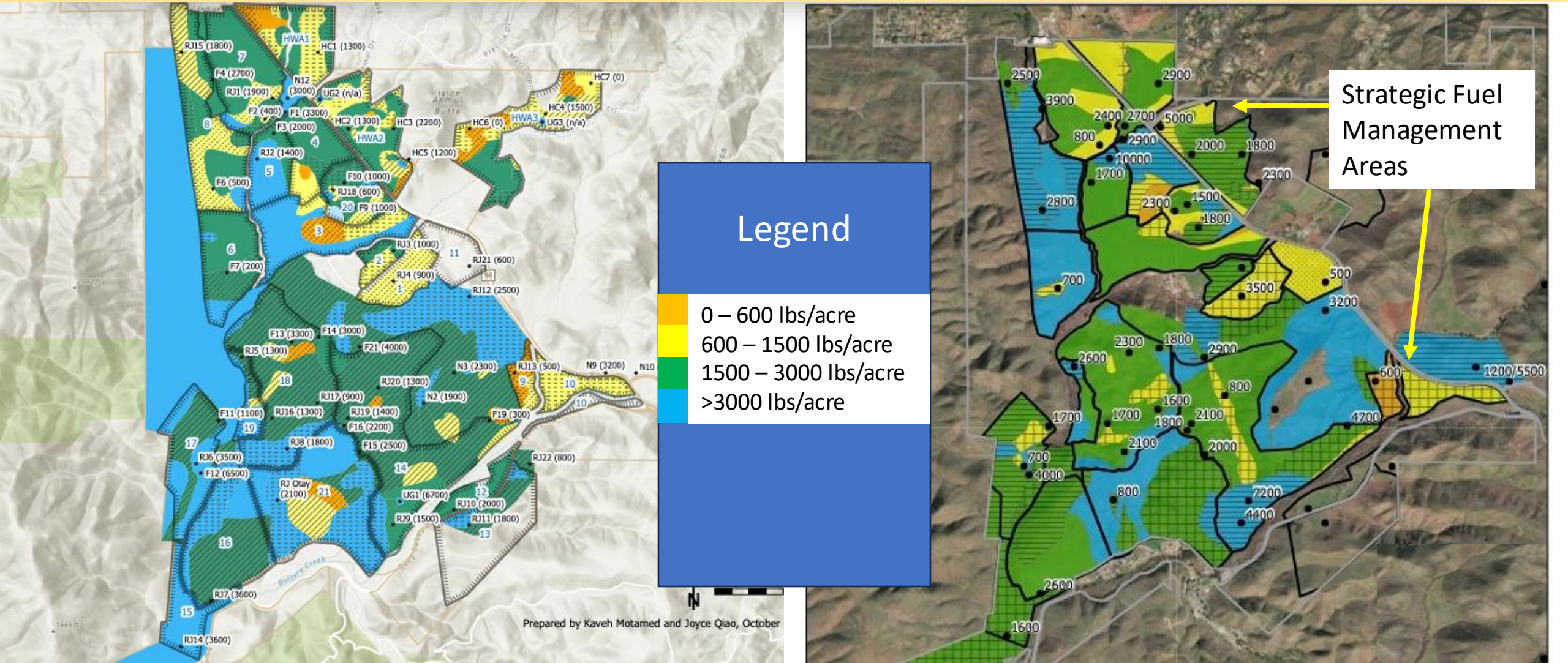


Did Grazing Achieve Study Goals?

RDM Maps – herbaceous fuel loads 2022 and 2023

2022

2023



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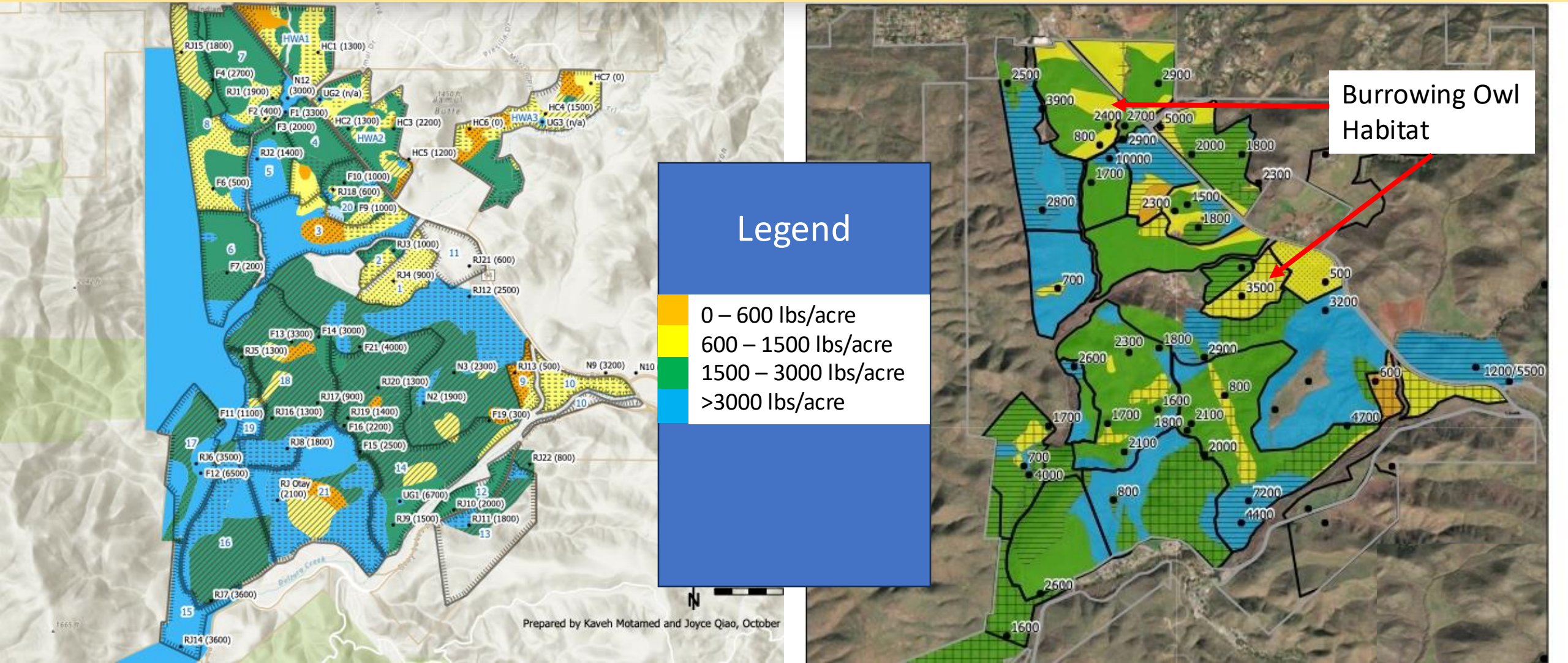
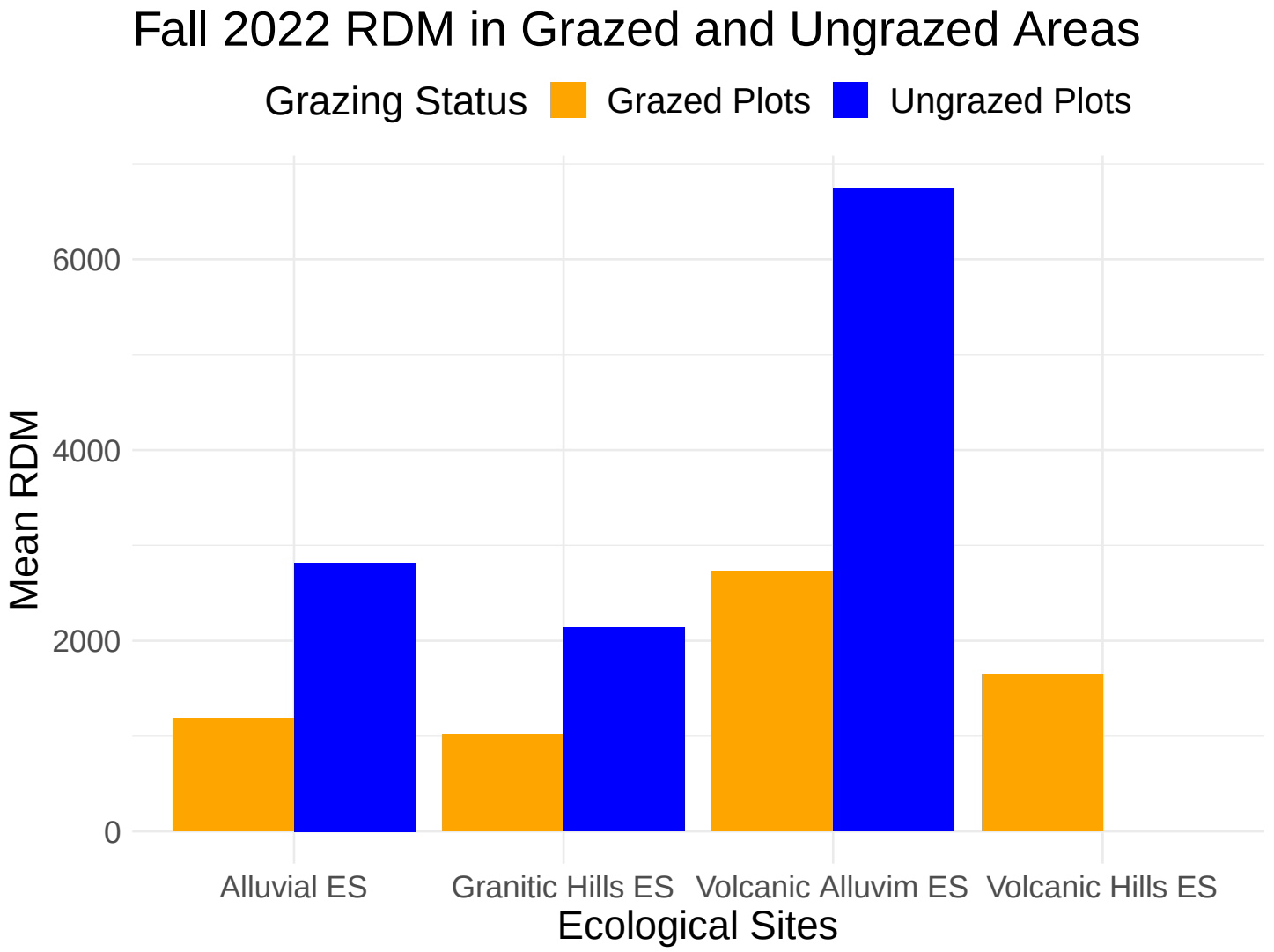


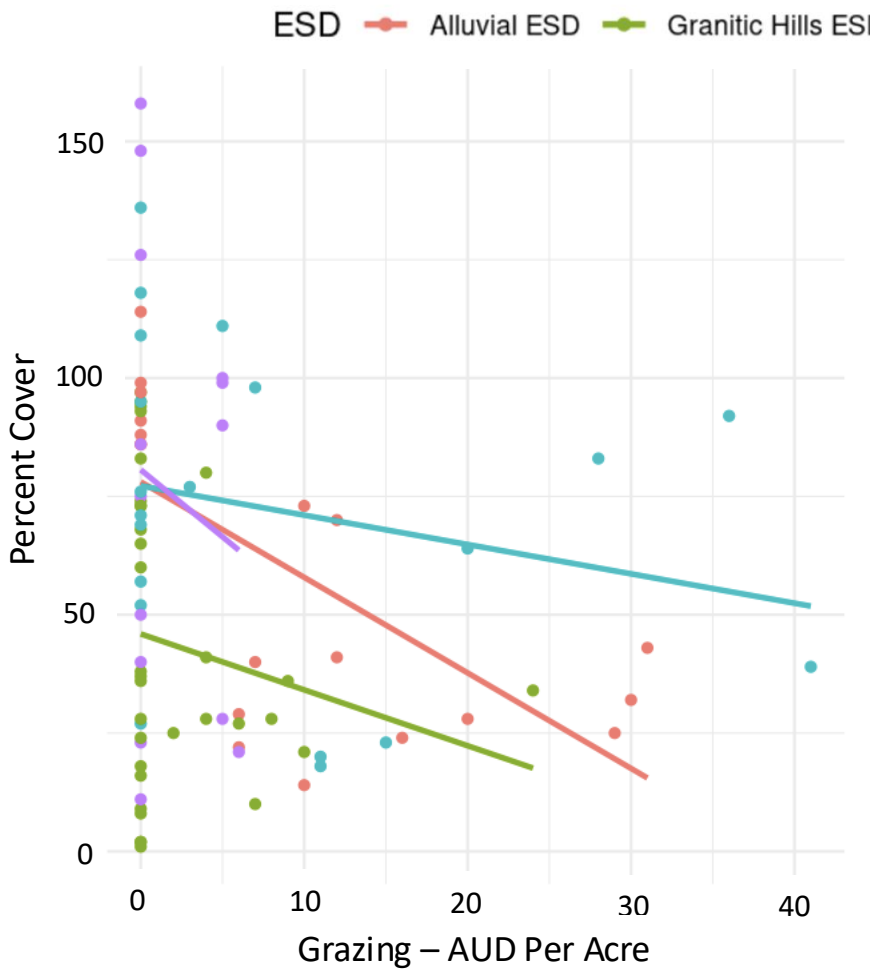
Grazing Reduces Residual Dry Matter – and Fall Fuel Loads

- >1 season effects
- Ungrazed plots had significant thatch build up
- Grazing effect is significant BUT site production is an important factor

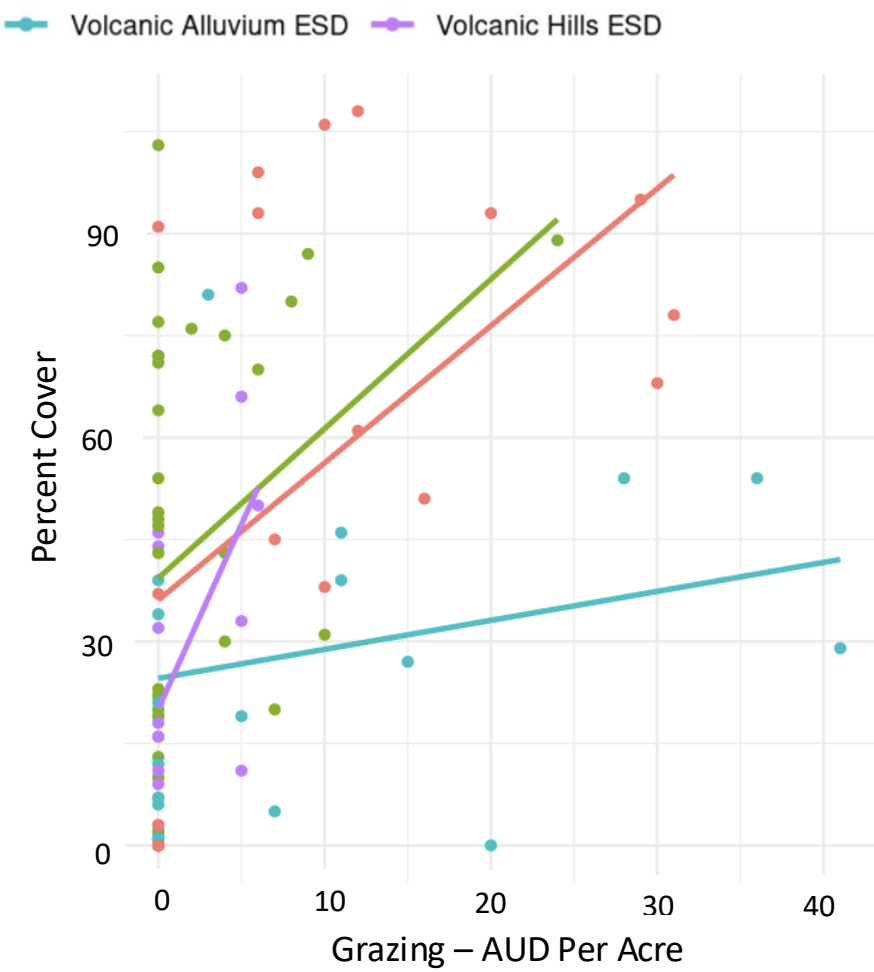


Grazing Intensity and Functional Group Cover

Exotic Annual Grass Cover and Grazing

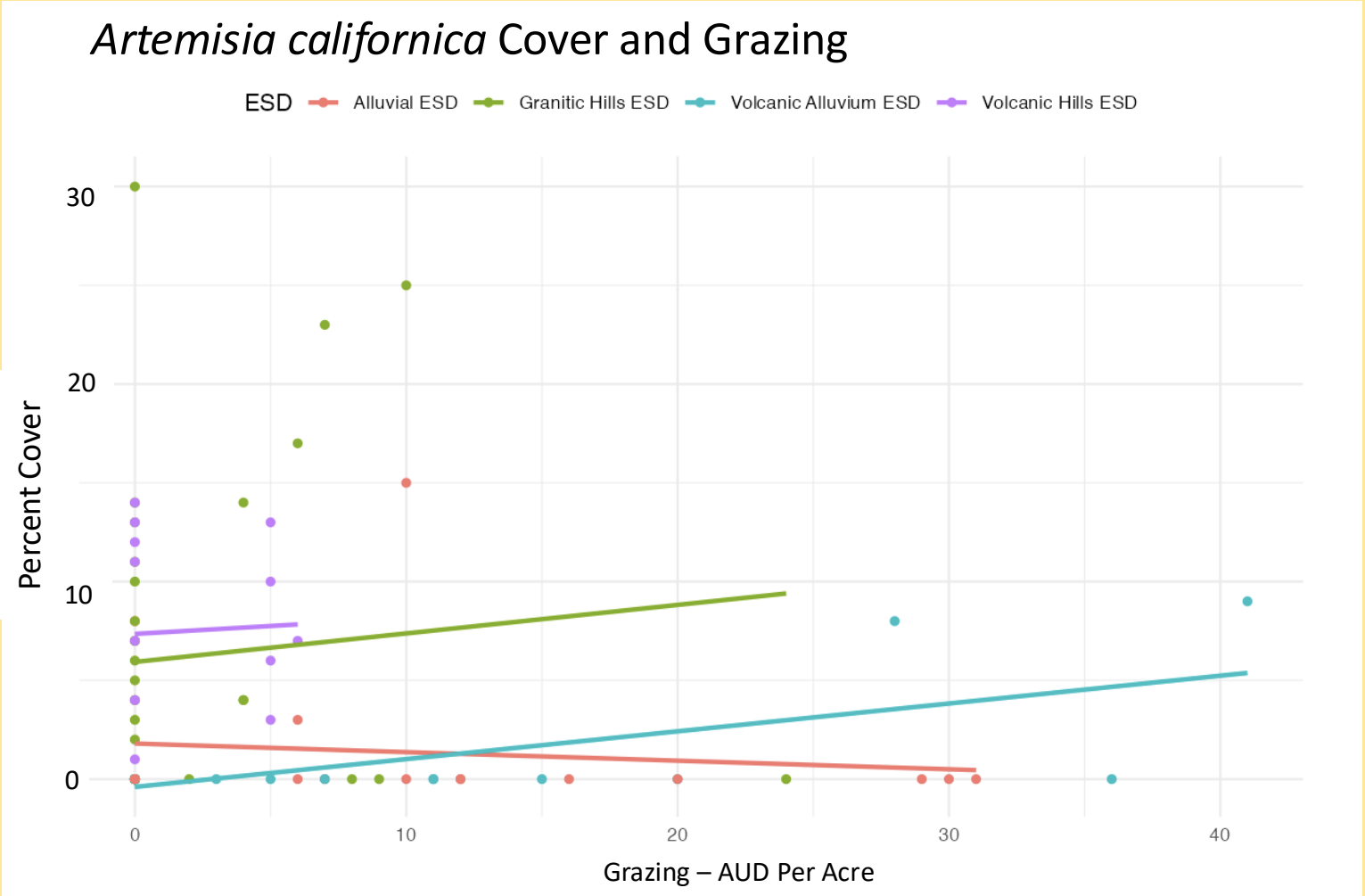


Forb Cover and Grazing



Shrub Cover and Grazing

- *Artemisia* and *Eriogonum* positively associated with grazing intensity
- *Malosma* negatively associated with grazing intensity
- Little sign of livestock browsing (in high forage production years)



Ungrazed

Grazed

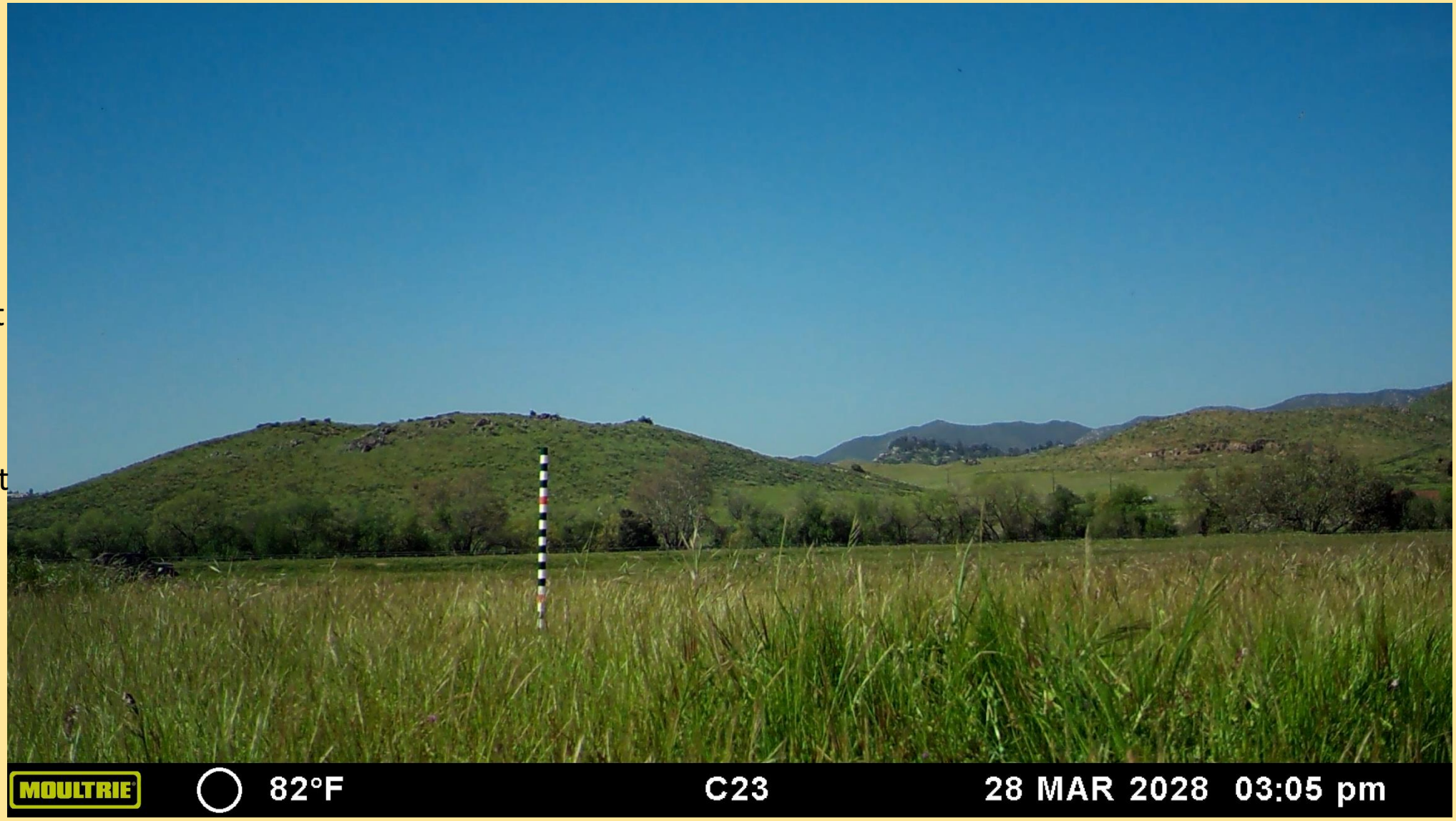
Alluvial Ecological Site

Burrowing Owl Habitat – Grazed Site

Start:
- March 28, 2024
- 8” obstruction height

End:
- June 23, 2024
- 0” obstruction Height

Thanks SDZWA for saving our camera!



Burrowing Owl Habitat – Ungrazed Site

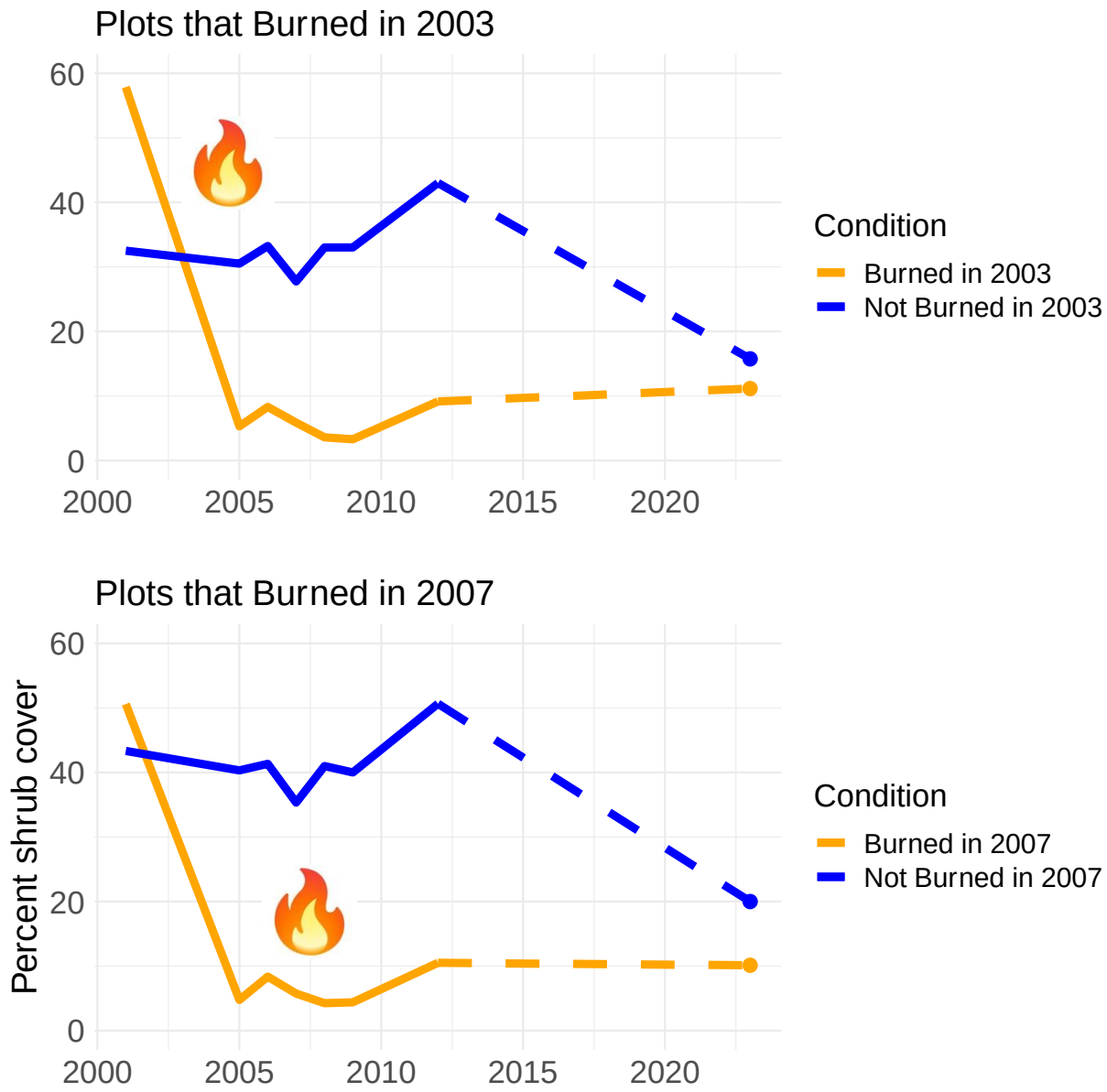
Start:
- March 29, 2024
- >36” obstruction height

End:
- June 23, 2024
- 9” obstruction Height

Long-term Change on Plots

22-year Change in Shrub Cover

Using Robert Fisher's 2001 – 2012 Data



Study Implications

Three levels:

- For Rancho Jamul and Hollenbeck Canyon
- For Conservation Grazing in San Diego
- For Rangeland Management broadly

Study Implications

For Rancho Jamul and Hollenbeck Canyon

- Created ranch-scale models which can be used to target management and monitoring to improve management outcomes
- Identified areas with different ecological potential regarding:
  - RJER/HCWA's conservation goals and objectives
  - Grazing management
  - Fire risk
  - Restoration
- Described drivers of vegetation dynamics
  - Including the role of grazing
- Evaluated the long-term impacts of historical management and fire

Study Implications

For San Diego Conservation Grazing

- Our approach can be replicated elsewhere to include other study sites and management goals. Key attributes are:
  - Site-specificity
  - Flexibility (re: management practices and goals)
  - Ability to incorporate existing data
- Upcoming report will outline methods for applying this approach elsewhere

Study Implications

For Rangeland Management

- Alternative approach to developing Ecological Site Descriptions
- Demonstrates the benefit of **bottom-up** models built at the **ranch-scale**

Next steps

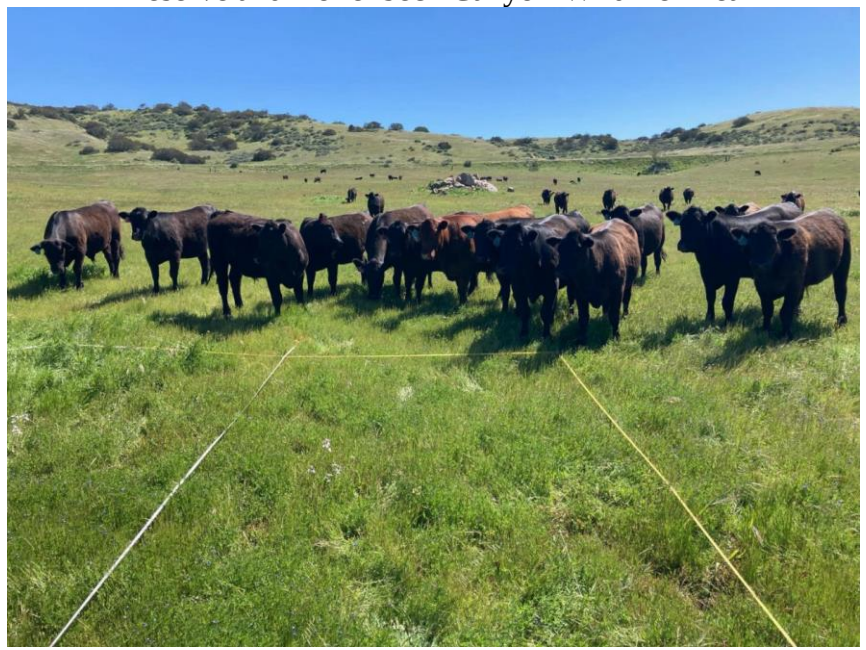
- Include evaluation of grazing and special-status species
- Expand to new sites in Ramona
  - New target taxa and special systems:
    - Stephen's Kangaroo Rat Habitat
    - North County Coastal Sage Scrub
    - Vernal Pools
- Work with San Diego Zoo Wildlife Alliance and others to study grazing at new sites with BUOW and other special-status species
- Develop guidelines for implementing this approach to other grazed conservation lands in San Diego County
- Look into anomalous phytolith results

Reports

- Report on first 2 years of study will be on SDMMP website soon
- Report #2 – Monitoring Plan Guidelines: will be completed in October 2024

Evaluating Grazing for Conservation and Fuel Management

Results from a 2-year Study at Rancho Jamul Ecological Reserve and Hollenbeck Canyon Wildlife Area



December 2023

Revised in July 2024

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Prepared for San Diego Association of Governments
SANDAG CONTRACT NO. S684214

Conclusions

Ecological Sites improved our ability to:

1. Describe ecosystem drivers
2. Demonstrate conservation potential
3. Identify opportunities for grazing to achieve goals
4. Distinguish constraints to achieving goals

These models will improve as we get more years of data

Acknowledgements

- San Diego Management & Monitoring Program (SDMMP)
  - Kris Preston and Sarah McCutcheon
- San Diego Association of Governments (project funding)
  - Kim Smith and Courtney Becker
- California Department of Fish and Wildlife
  - Tracie Nelson and Nick Aponte
- John Austel (rancher at Rancho Jamul)
- Robert Fisher's Lab (US Geological Survey)
  - Robert Fisher and Carlton Rochester
- The rest of our project team
  - Larry Ford, Matthew Shapero, Kaveh Motamed, Chris Nygard
- The many volunteers who helped us with fieldwork