SANDAG Grazing Study Handout
RMAC/CalPAC Meeting
May 8th, 2023
James Bartolome and Felix Ratcliff

Project Website:

Introduction (Bartolome)

- Project proposed by SANDAG Grazing Monitoring Plan Working Group in March 2021
- Problem: California's grasslands have, in most places, been invaded by non-native herbaceous species. Resulting in:
    - increased density and contiguity of biomass (and fuel)
    - negative consequences for native plants and animals

  In coastal sage scrub, higher fire frequencies due to grass invasion are believed responsible for losses of coastal sage scrub – important habitat for many rare species.
- Primary Goal: *to determine the efficacy of grazing as a management tool to enhance the ecological integrity of natural habitats on conserved lands in western San Diego County. Specifically, to control invasive plants, decrease fire risk, provide suitable habitat for MSP Species, and improve ecosystem functions.*
- Primary Questions
    - How effective is grazing at reducing fire risk?
    - Can grazing effectively enhance disturbed native grassland and forbland habitats?
    - Can grazing enhance disturbed native coastal sage scrub habitat?

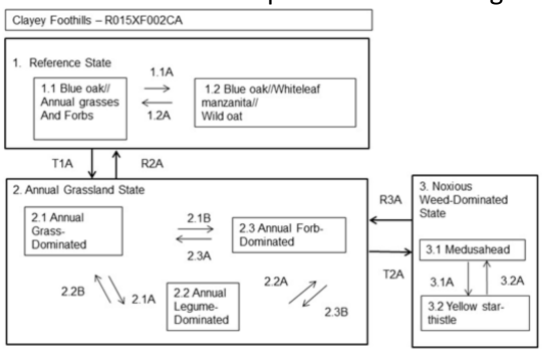
Study Sites: Rancho Jamul Ecological Reserve and Hollenbeck Canyon Wildlife Area

Team

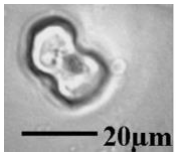
- UC Group: James Bartolome, Lynn Huntsinger, Joyce Qiao, Chris Nygard, Larry Ford, Felix Ratcliff, Kaveh Motamed, Mike White, Matthew Shapero
- Primary collaborators: Kris Preston, Sarah McCutcheon, John Austel, Tracie Nelson, and Nick Aponte

Approach

- Literature review: wealth of information on species-habitat relationships and fire, lack of information on grazing effects and ecological sites.
- Conceptual model: Ecological Site Descriptions and State and Transition Models



- ESDs – "distinctive kind of land that differs in its ability to produce a distinctive kind and amount of vegetation" (paraphrased NRCS definition)
- STMs – method of describing vegetation characteristics and their change over time. Box = vegetation state Arrow = transition (change) between states
- Applied to rangeland planning, but not well-developed in San Diego County
- Provides description of vegetation states at each Ecological Site, and catalog of the changes (and drivers of those changes) between states
- Ground-up approach –> classifications from plot-based data



- Phytoliths
    - Plant micro-fossils, often taxonomically-distinct, resistant to decay
    - Shows us areas once dominated by perennial grasses (but not why they may have changed)

Acknowledgements

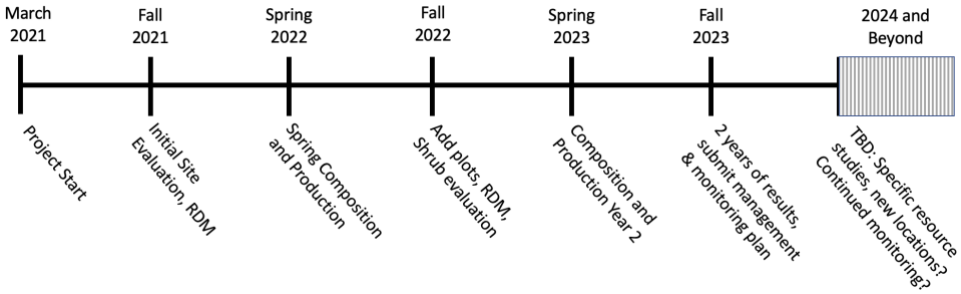
- This project funded by SANDAG
- Many people have contributed to fieldwork and given feedback on the process

Monitoring and Preliminary Results (Ratcliff)

Monitoring

- 54 plots (38 study plots, 16 resampled Fisher plots)
- Plots sited to capture spatial diversity in ecological site factors and management
- Ecological site data: soils, topography, landform
- Vegetation data: plant composition/structure, herbaceous production, residual dry matter, browsing and shrub recruitment

Timeline



Preliminary Results

- 3 Ecological Sites (largely correspond with geology and landform)

Ecological Site	Landform	Sand	N	P	K	Na
1. Alluvial Sites	Flat toeslopes	52%	High	High	High	High
2. Granitic Hills*	Hills	75%	Moderate	Moderate	Low	Low
3. Metavolcanic Hills	Hills	40%	Moderate	Very low	Moderate	Moderate

*Granitic Hills includes significant areas mapped as Cuyamaca Gabbro geology

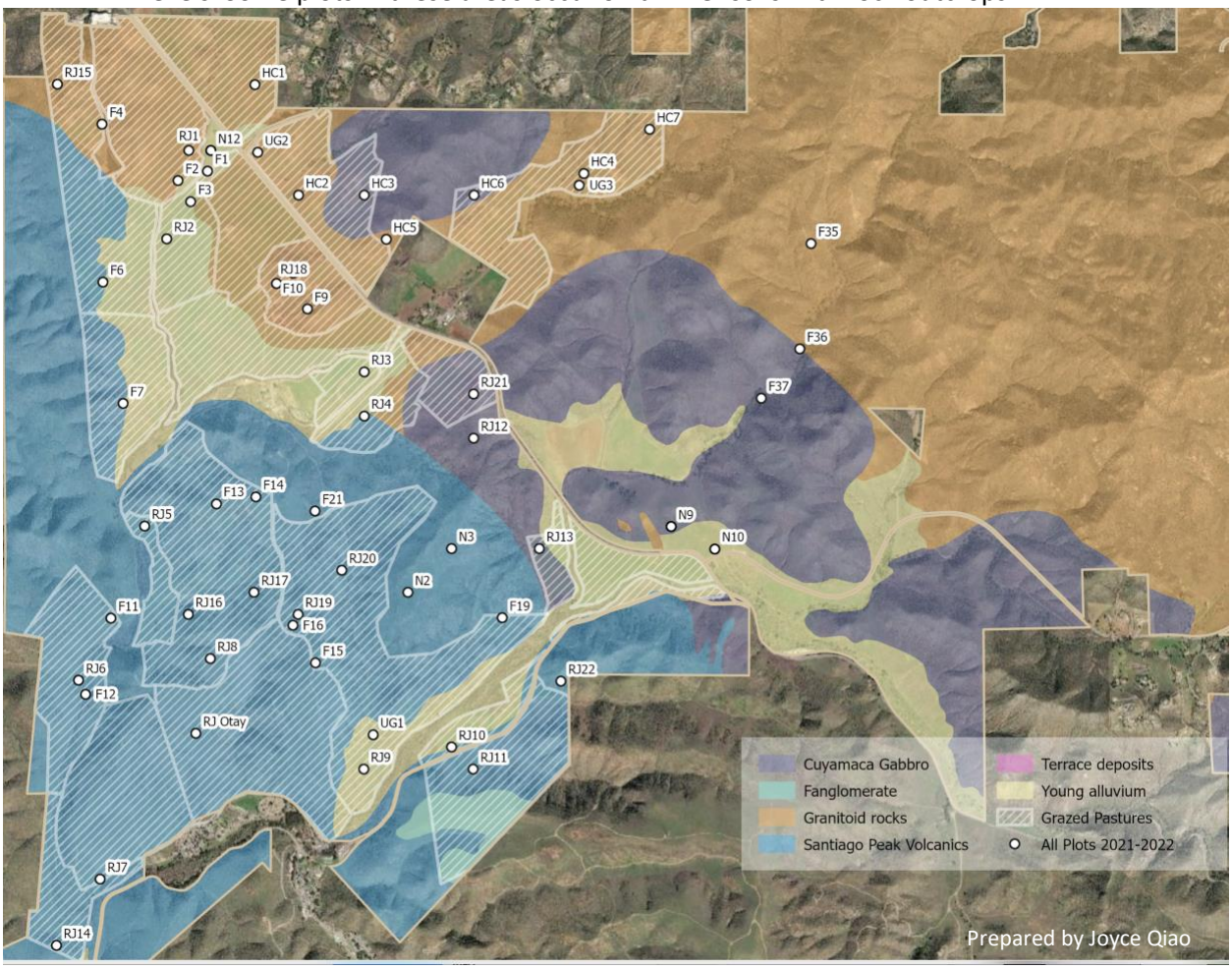
- 6 Vegetation States

Vegetation State	Common/Dominant Species	Production	Ecological Site Associations
1. Annual Grass and Forbs	Wild oats, filaree, fiddle necks, lupines	Moderate	Alluvial, Granitic
2. Annual Grass and Saltgrass	Wild oat dominant, some salt grass	High	Alluvial, [Granitic]
3. Ripgut Grasslands	Ripgut brome dominant, no forbs, low diversity	High	Alluvial, Granitic
4. Needlegrass Shrubland	Purple false brome, needlegrass, blue-eyed grass, CA sagebrush, CA buckwheat, laurel sumac	High	Volcanic, [Alluvial]
5. Native-rich Shrubland	CA sagebrush, CA buckwheat, Bahiopsis, Mirabilis, native forbs	Low	Granitic
6. Cryptogammic Shrubland	CA sagebrush, CA buckwheat, native forbs, spike mosses, soil crusts	Low	Volcanic, [Granitic]

- Shrub browsing: Generally insignificant for most species including CA Sagebrush, CA buckwheat, Bahiopsis. Significant for some other species, especially Baccharis.
- Ecological sites explain much of the variation in species composition, production and herbaceous fuels, and special habitat / MSP species occurrence.
- Grazing affects species richness/cover, especially forbs occurring on alluvial and granitic grassland sites.
- Grazing reduces fuels, demonstrated by RDM levels inside/outside of grazed areas.

Site 2 – Burrowing Owl Area – overview of landscape

- This is the transition between the metavolcanic hills to the south and west and the young alluvium characteristic of much of the lowland areas.
    - Alluvial soils tend to be very fertile and many have a history of cultivation.
    - Metavolcanic hilly areas have intermediate soil nutrient levels, but very low phosphorus
- Much of Hollenbeck Canyon and western Rancho Jamul has granitic and Cuyamaca gabbro geology.
    - Soils derived from these rock types tend to be very sandy and have intermediate nutrient levels. Some plots in these areas occur on thinner soils with rock outcrops.



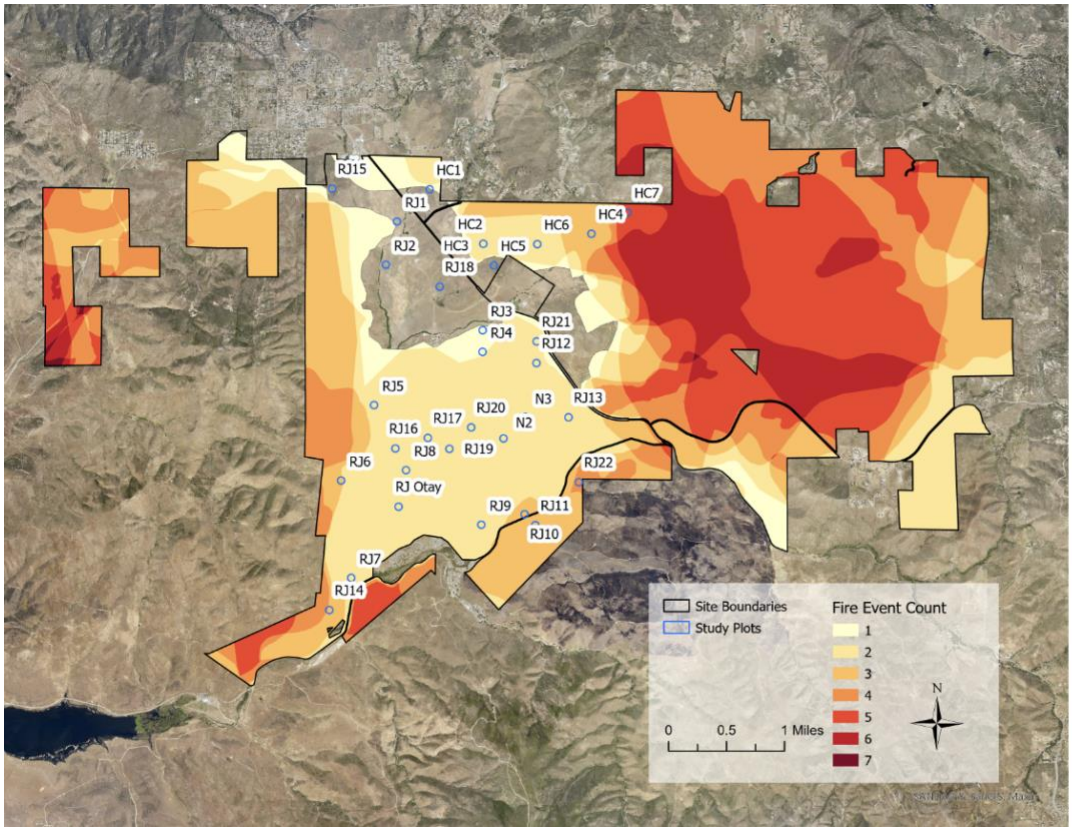
- Distribution of ESDs and states on the landscape – largely mirrors geology and landform
- Distribution of grazing (see map)
- Ecology & management of alluvial sites:
    - Generally low shrub cover (when not riparian), annual grass dominated
    - Productive areas (ungrazed alluvial areas >3000 lbs/acre RDM last fall – can be >6000 lbs/acre)
    - Ungrazed plots here are dominated by rip-gut brome. Grazed plots have other annual grasses and more forbs
    - These sites also abut much of Hwy 94 and Otay Lakes Road. Concern for fire ignition/spread

Site 3 – Site overview, ecological site context

- Granitic Hills Site
- This area is shrub-dominated: CA Sagebrush, CA Buckwheat, Mirabilis, associated forbs
- Similar shrublands in much of the granitic hills
- Lack of cryptogammic soil crusts, often bare soil substrates
- Low production compared to other sites (500 lbs/acre last year)
- Tend to occur on sites with very sandy soils and lower phosphorus (for granitic areas)
- These shrub states can be habitat for CA Gnatcatcher, Quino Checkerspot (in some areas), and generally tend to be high in native forb diversity.
- Cattle effects:
    - In many areas, cattle not affecting these shrublands much. Little sign of use.
        - Common shrub species here not browsed much by cattle (with exceptions)
        - Usually, on slopes above productive grasslands
        - Grazing pressure generally not very high
        - New shrubs appear to be successfully establishing
    - Less fuel between shrubs than elsewhere, but high value to reducing fuel continuity
    - Generally in granitic sites (especially grasslands), we see lots of rip-gut invade in the absence of grazing, more annual forbs in grazed fields

Recent fires at Jamul/Hollenbeck

- Mine/Otay. October 2003 – Burned most of Jamul – including all the volcanic hills
- Harris. October 2007 – Burned most of Jamul and Hollenbeck
- Gate. May 2017 – burned portion of Jamul by intersection of Otay Lakes Rd and Hwy 94
- Lots of fires over the past century (see map below)



Fire History

Fire frequency: Cal-FIRE Perimeters 1910-2017 (31 total fire events)
Aerial imagery: Spring 2017 SANDAG (9in)

Prepared by Joyce Qiao

Site 5 -- *Plateau shrub community*

- Metavolcanic Hills Site
- Mostly shrubland. CA Sagebrush, CA Buckwheat, but also: laurel sumac, white sage
    - May get broken into two ESDs: “Mesa” distinct from other areas of metavolcanic hills
- Purple-false brome common, grows among shrubs – fuel and competition with plants
- Needlegrass common (area with by far the most needlegrass)
- Special management considerations: Quino Checkerspot, Otay Tarplant, cryptogammic soils
    - Targeted studies
- Thinner-soil areas often with cryptogammic soil crust, diverse native forbs
- Soils here remarkable for consistent lack of phosphorus. Correlated with Stipa occurrence and with phytolith occurrence.
- Grazing effects:
    - less difference observed for herbaceous species than at other sites
- browsing effects minimal for most shrub species; however, broken laurel sumac branches
- Phytoliths (see figure below)
    - Strong phytolith signature in Metavolcanic Hills (and in most Alluvial areas)
    - Weak Phytolith signature in Granitic hills [note: one location with high phytolith content in Hollenbeck Canyon]