SANDAG Grazing Study Progress and Next Steps

September 27, 2022

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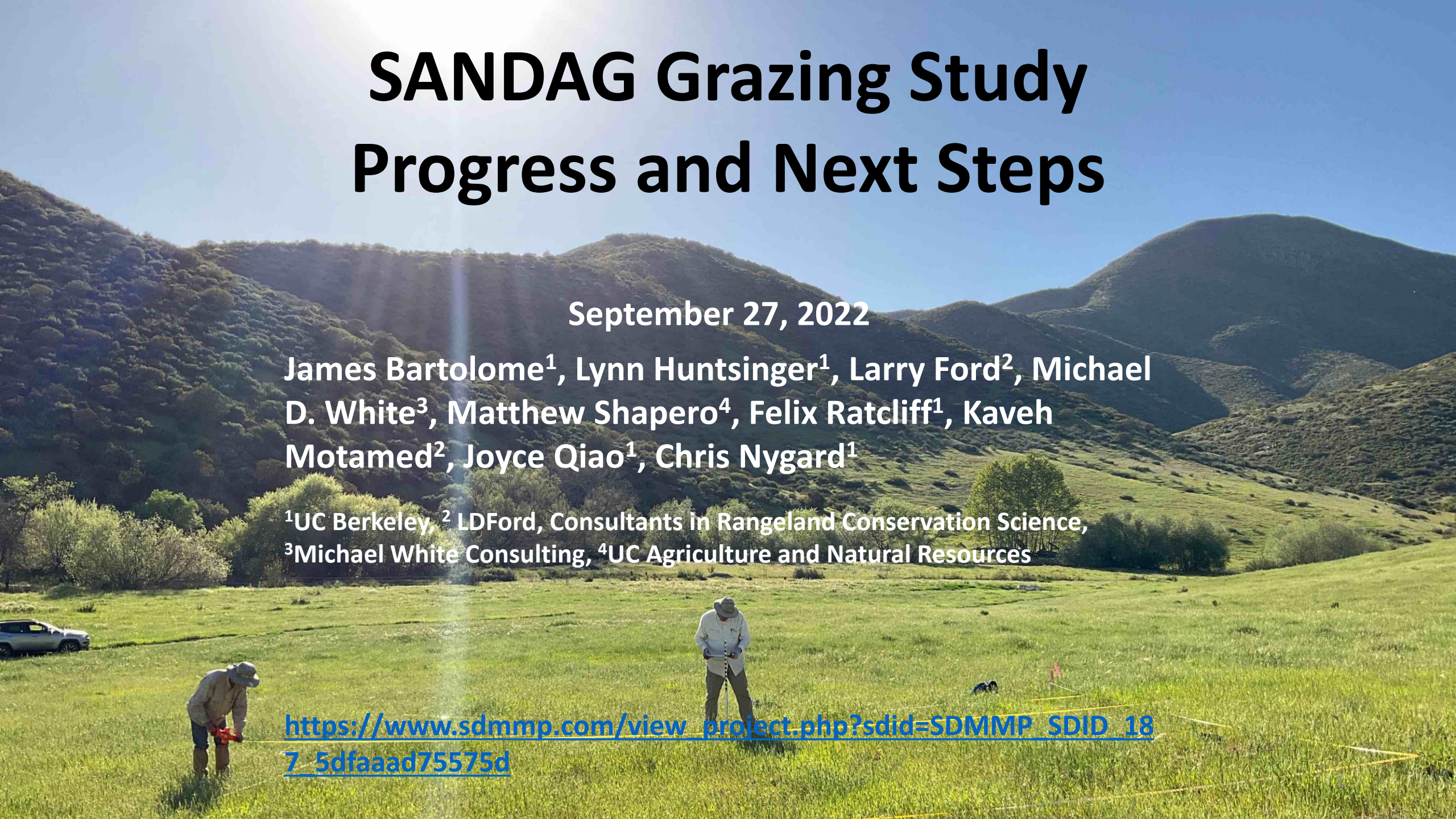

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Presentation Outline

- Project Background and Goals
- Fieldwork and Data Collection
- Analysis and Preliminary Results
- Next Steps
- Discussion

Project Goals

Lynn Huntsinger, UCB

September 27, 2022

Project goal: Grazing Monitoring Plan

The purpose of the MSP Grazing Monitoring Plan is to determine the effectiveness of using grazing as a management tool to enhance ecological integrity of natural habitats on Conserved Lands in western San Diego County.

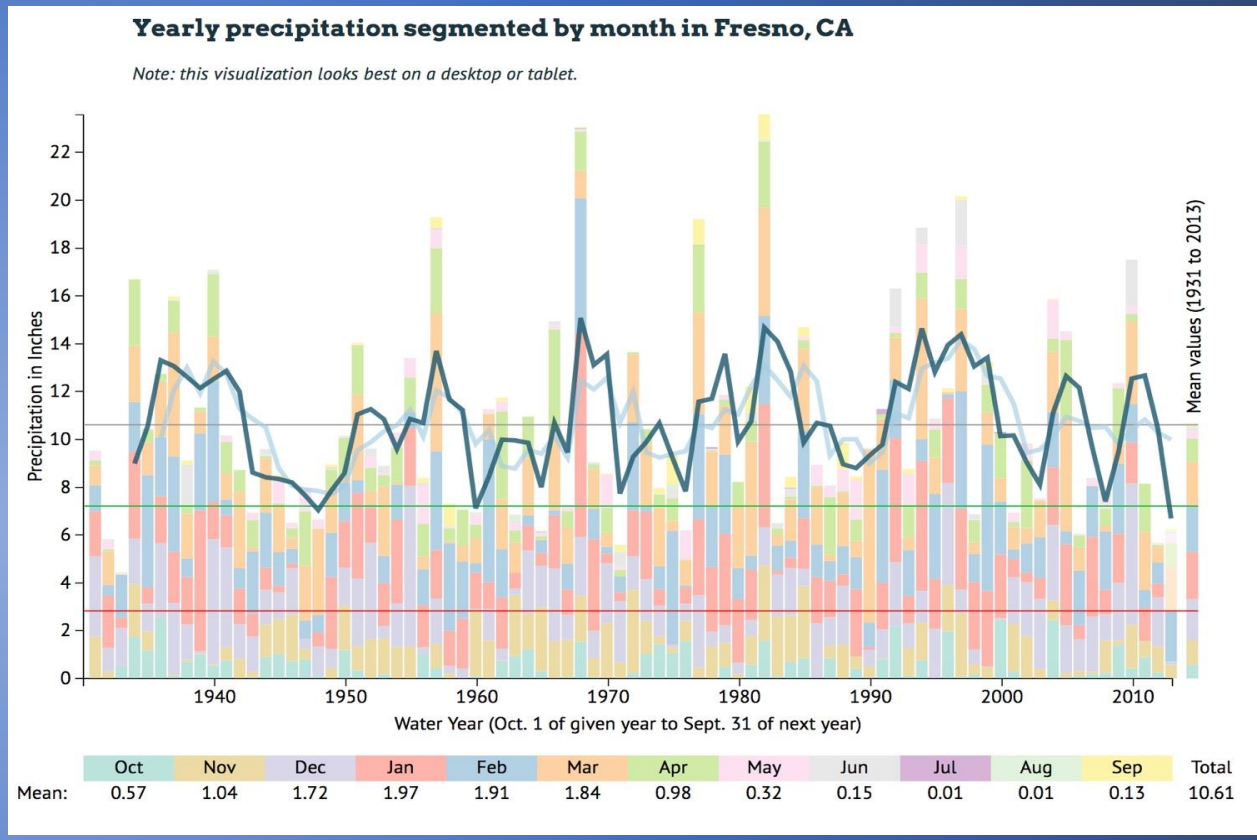
- Can grazing be used to manage fire risk?

- Can grazing be used to enhance disturbed native grassland and forbland habitats?

- Can grazing be used to enhance disturbed native coastal sage scrub habitat—including habitat for MSP listed species?

Rainfall is the constraining factor in vegetation response

- Rainfall and temperatures, soils and topography, interact with:
  - History of land use
  - Management actions

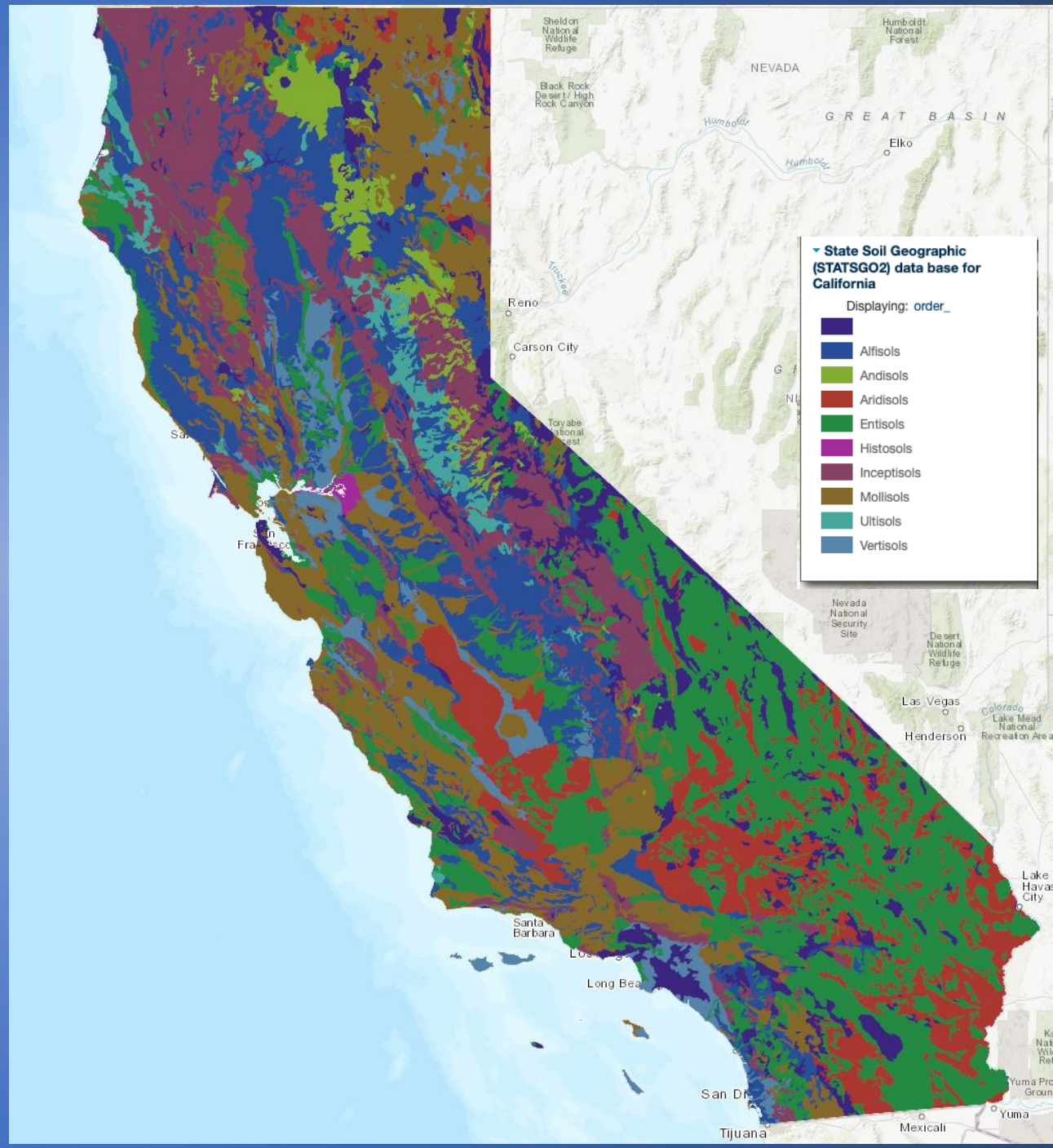


C. Polis, Bytemuse.com

- **Grazing effects differ with site characteristics and weather**

California soils are diverse,
adding variation

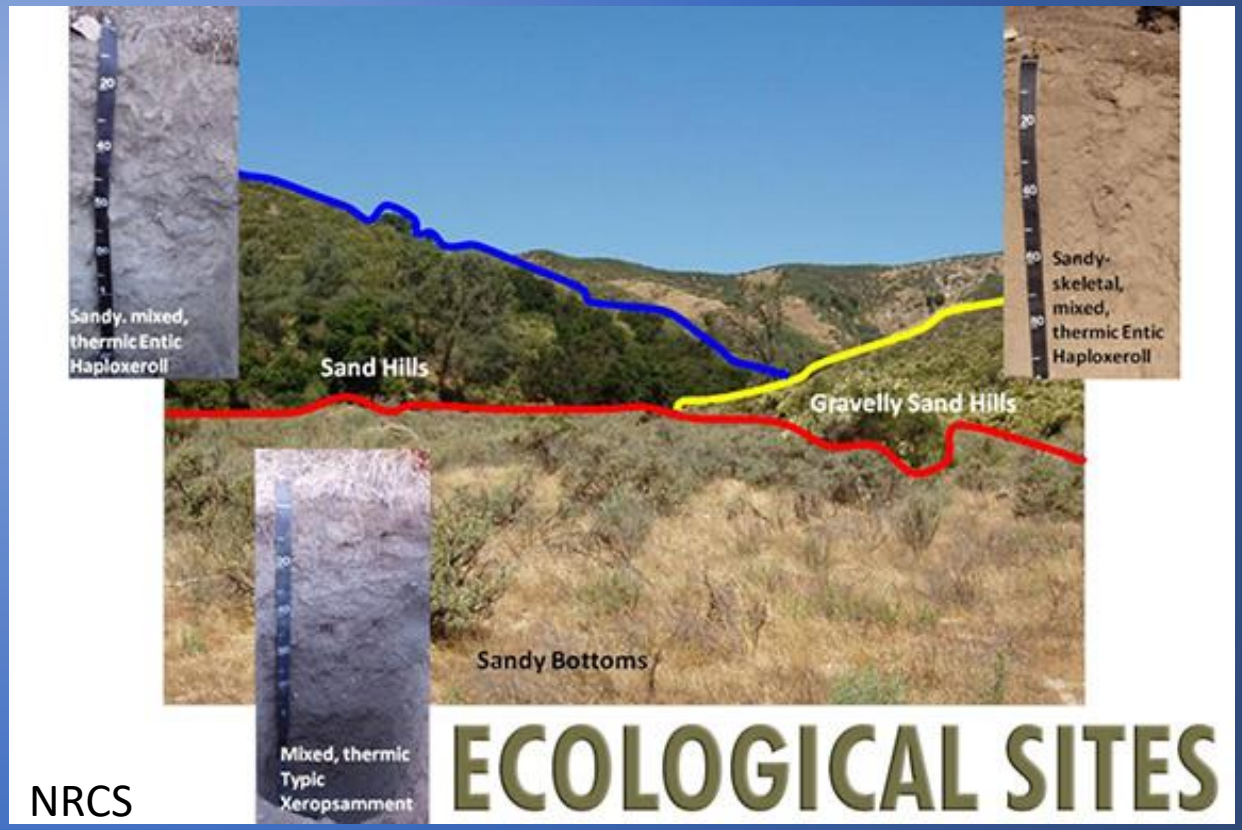
Soil series' and weather are not amenable to management, but important drivers of vegetation



Ecological Site Description (ESD): a foundation for management

An ecological site is defined as a distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land in its ability to produce a distinctive kind and amount of vegetation and its ability to respond similarly to management actions and natural disturbances. An ESD describes the ecological site.

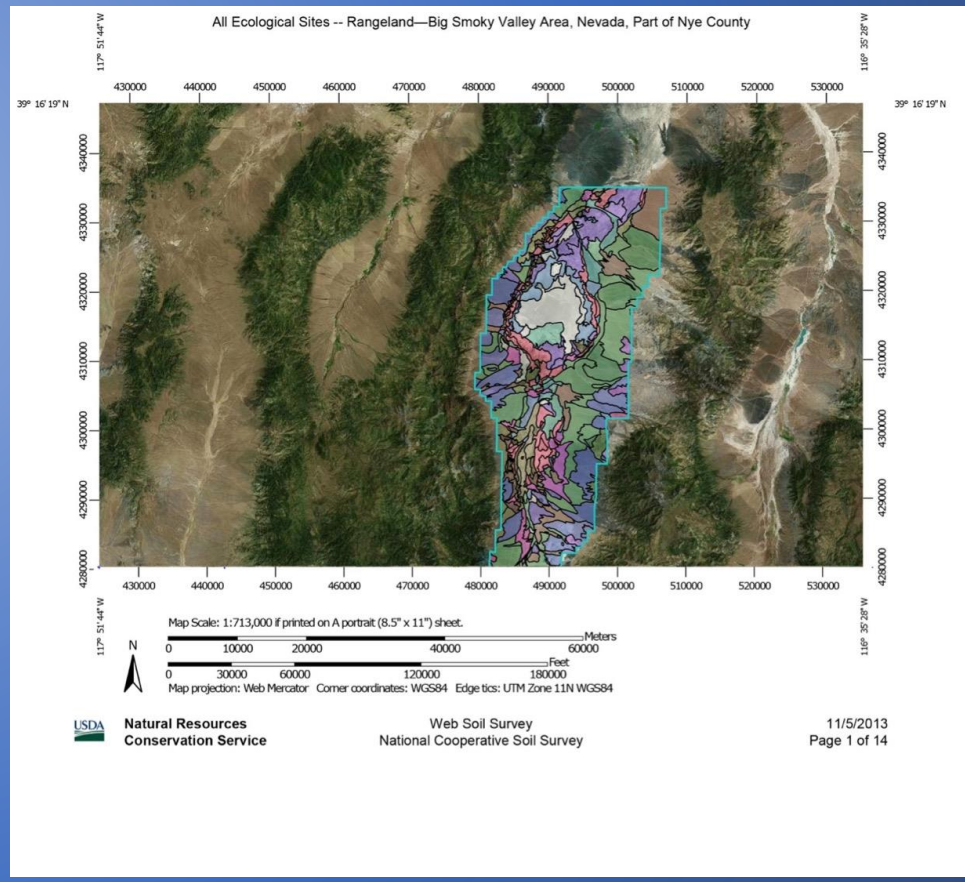
- Defined area
- Soils, topography, climate
- Site history (fire, cultivation, etc)
- States and transition models: data-driven models of vegetation dynamics and response to management

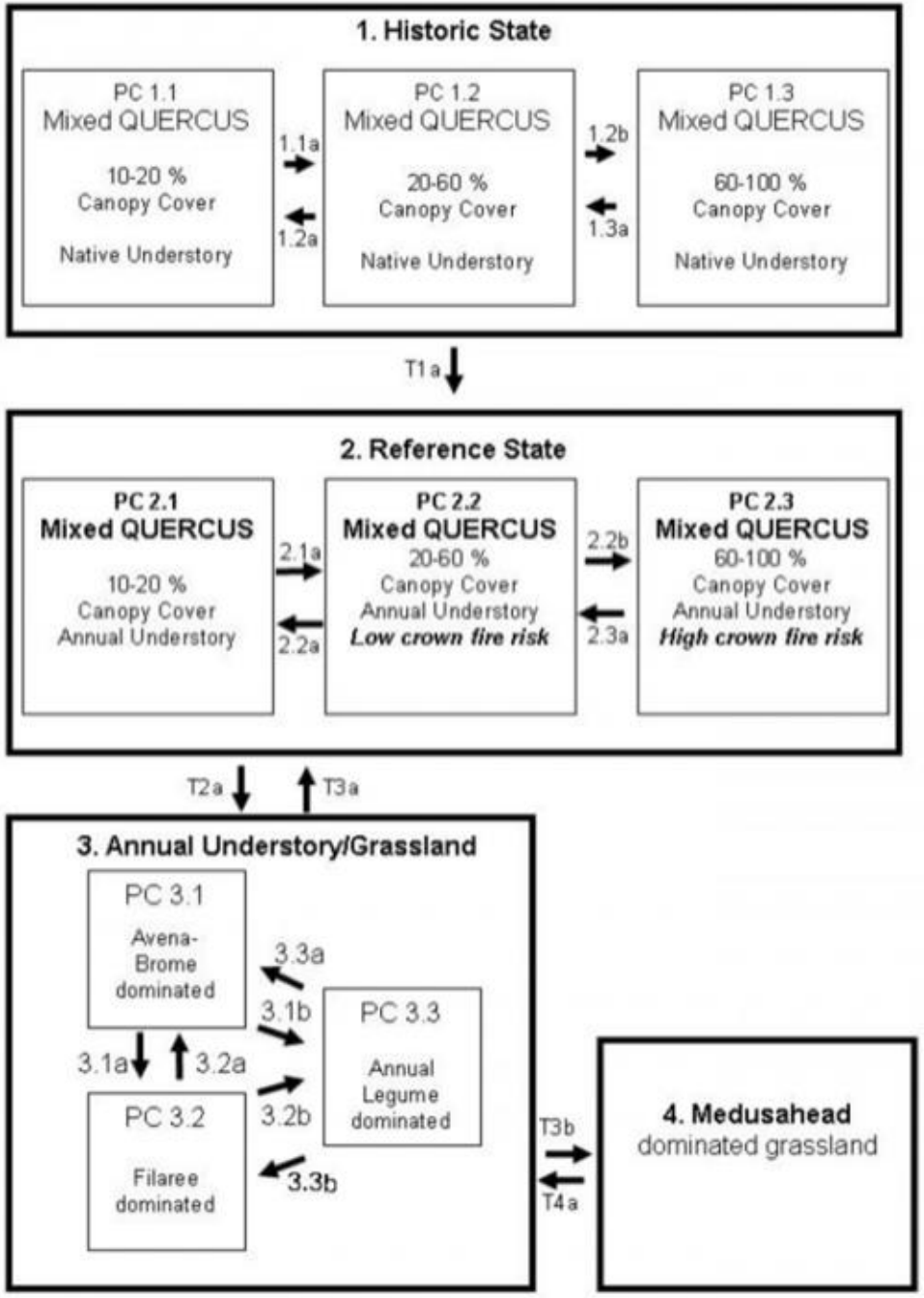


Ecological Site Descriptions: ESDs

- Different sites respond differently to management, grazing

- A landscape is made up of ecological sites
- Long term benefit to Jamul and Hollenbeck
- Nation-wide effort
- Grazing, weather, and site interact to create outcomes





States and Transitions Model

Without definition and understanding of specific sites, management outcomes cannot be anticipated.

Our Approach

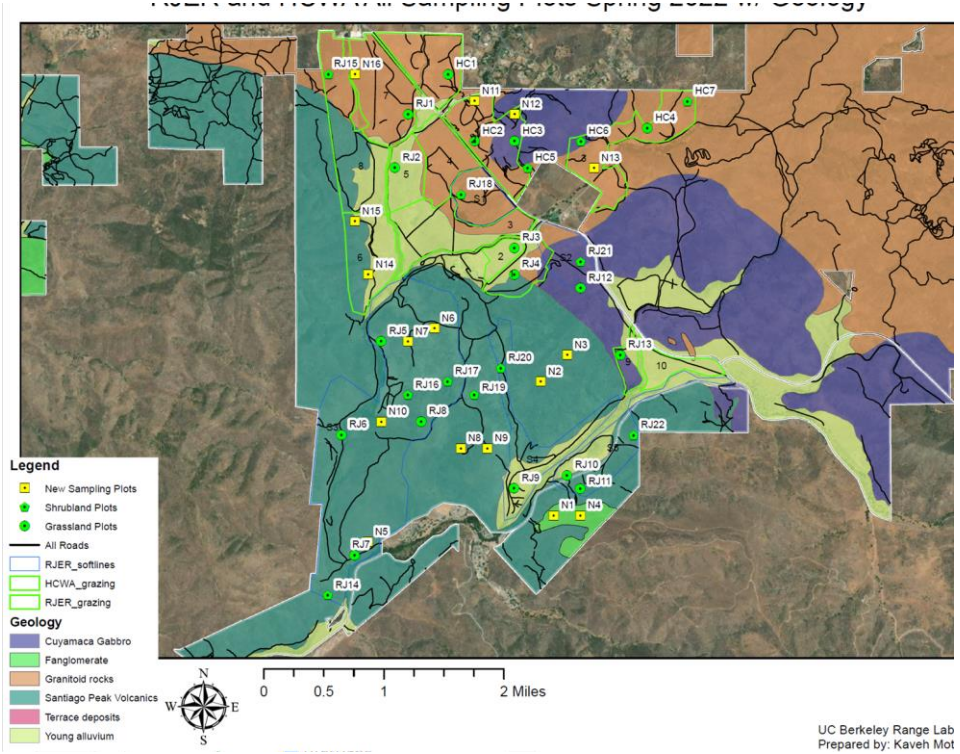
- Conduct Literature Review
- Develop Conceptual Model
- Collect Field Data
- Populate Model with Field Data
- Next steps
  - Evaluate grazing and fire within model
  - Add temporal replicates
  - Evaluate historical change

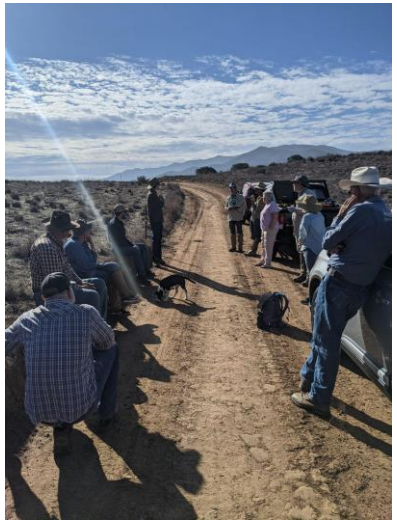
Site Visits

Kaveh Motamed, UCB/LDFord
Associate Rangeland Manager

Fall 2021

- Establish monitoring plots
- Establish a sampling approach
    - SANDAG, CDFW, and John Austel (Rancher)
- Data collection
    - Site characteristics
    - Residual dry matter (RDM)
    - Soil (chemical analysis & phytoliths)





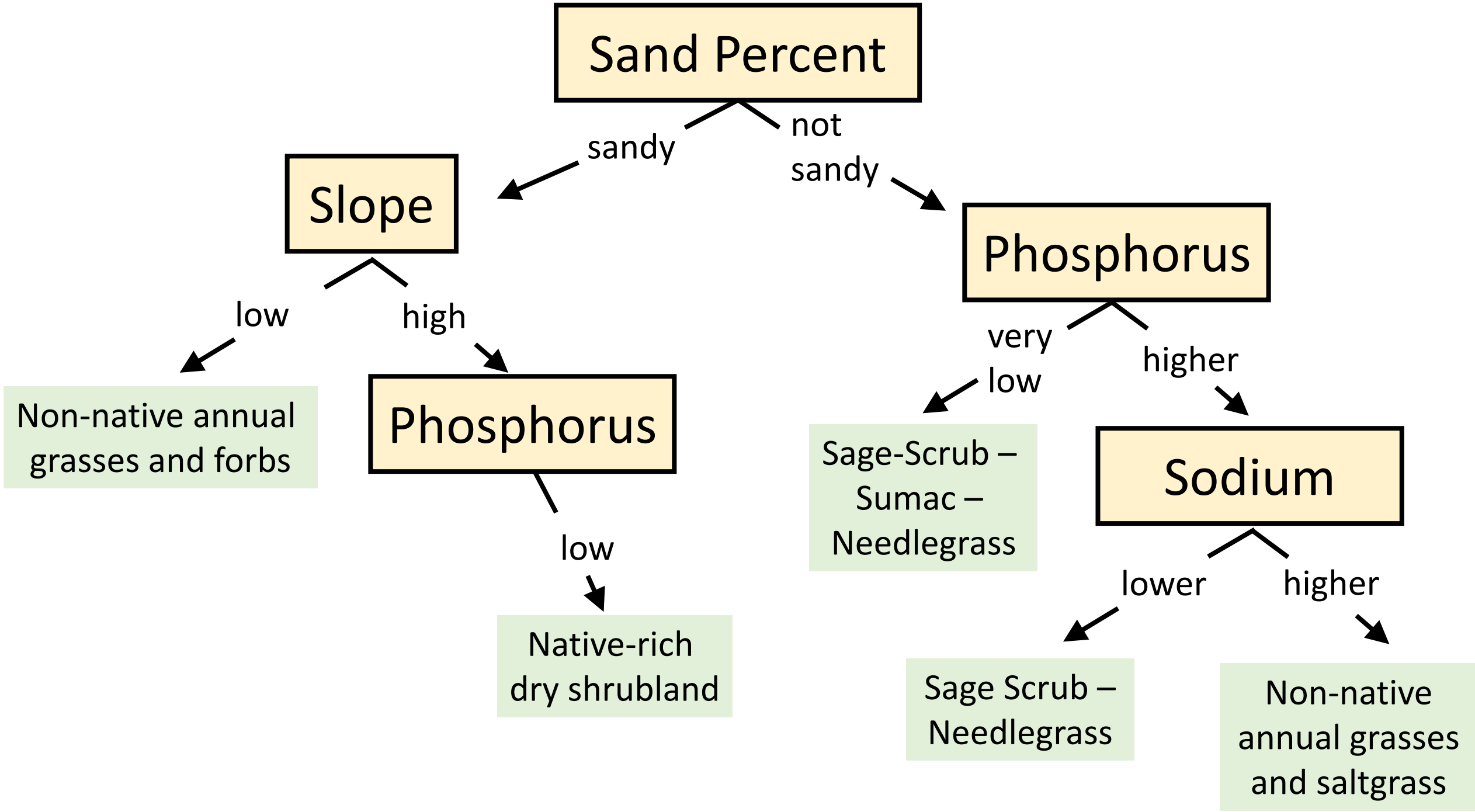
Spring 2022

- Additional monitoring plots
- Composition monitoring
  - % cover
  - Species richness
- Spring biomass monitoring

Other Visits

- Discuss ranch operations with J. Austel
- Evaluate production and phenology
- Observe grazing practices and impacts
- Observe wildlife

Preliminary Results


Sand Percent
sandy
not sandy
Slope
low
high
Non-native annual grasses and forbs
Phosphorus
low
Native-rich dry shrubland
Phosphorus
very low
higher
Sage-Scrub – Sumac – Needlegrass
Sodium
lower
higher
Sage Scrub – Needlegrass
Non-native annual grasses and saltgrass

Ecological Sites

Ecological Site	Landform	Sand (%)	Nitrogen	Phosphorus	Potassium	Sodium
1. Low-slope, alluvial site	Low-slope, valley-bottoms	52%	High	High	High	High
2. Hilly Granitic/Gabbro Site	Hills	75%	Moderate	Moderate	Low	Low
3. Hilly metavolcanic site	Hills	40%	Moderate	Very low	Moderate	Moderate

Preliminary Vegetation ‘States’

- Methods:
  - Hierarchical cluster analysis to define patterns
  - Based on species occurrence not cover
- Five different ‘States’ across 32 plots
  - 3 shrub states
  - 2 grassland states
- Relatively consistent species occurrence within states
- Different composition and structure between states

Characteristics of the five states

Vegetation State	Common/Dominant Species	Bare Ground	Spring Herbaceous Biomass
1. Non-native annual grasses and forbs	Wild oats, filaree, fiddle necks, lupines	17%	1900 lbs/acre
2. Non-native annual grasses and saltgrass	Rip-gut brome, wild oats, bindweed, purple false brome	10%	2400 lbs/acre
3. Native-rich dry shrubland	CA sagebrush, CA buckwheat, Bahiopsis, Mirabilis, dodder	33%	500 lbs/acre
4. Sage scrub – Needlegrass	CA Sagebrush, CA buckwheat, red brome, spike moss, pygmy weed, needlegrass	11%	3000 lbs/acre
5. Sage scrub – Sumac – White Sage -- Needlegrass	CA Sagebrush, Sumac, white sage, needlegrass	6%	1300 lbs/acre

State 1. Non-native annual grasses and forbs


23 Mar 2022, 10:50:19


22 Mar 2022, 10:47:24

State 3.
Native-rich dry shrubland

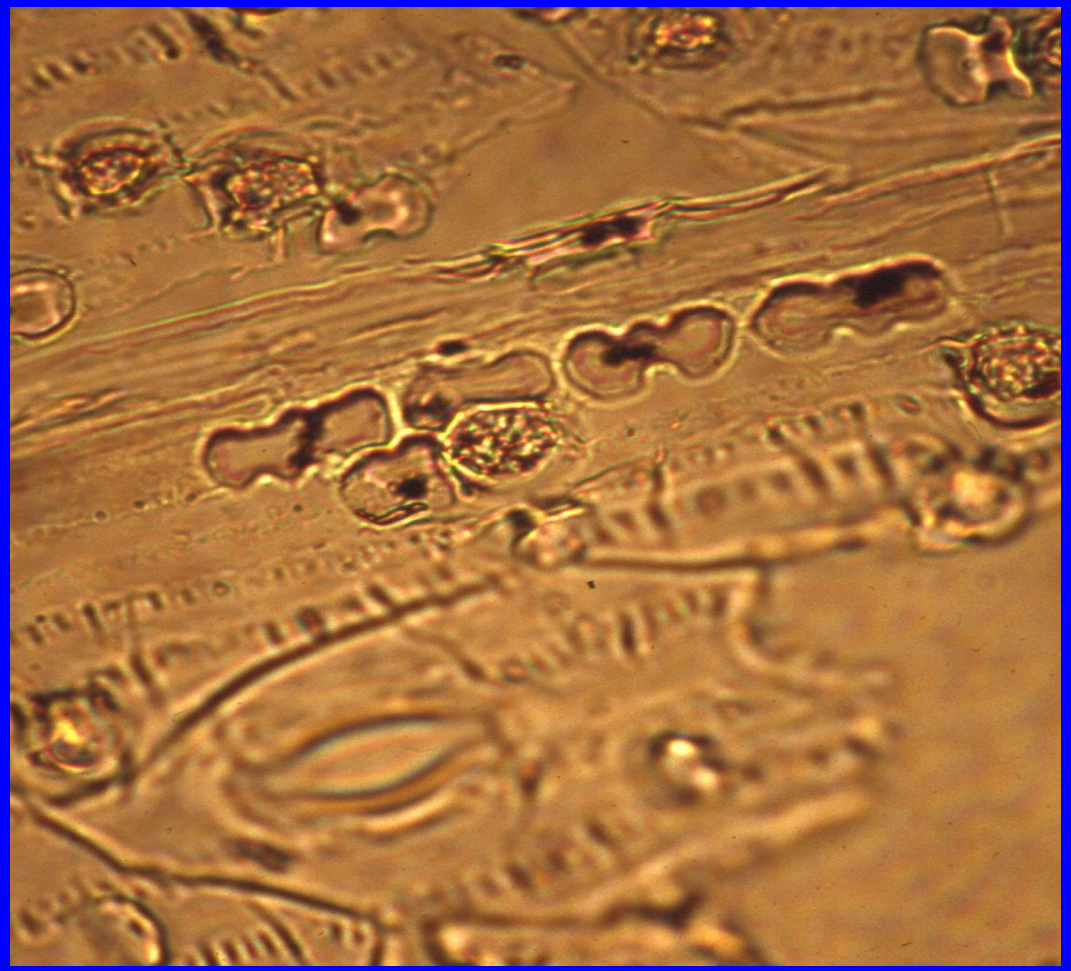

S
180
10
SW
240
(T) 32°41'56"N, 116°52'21"W ±13ft
21 Mar 2022, 13

State 5.
Sage scrub – Sumac – White Sage – Needlegrass

Chemistry and Phytoliths

- Mixed shrubs, native perennial, and exotic annual grasses in a grazed pasture at Jamul

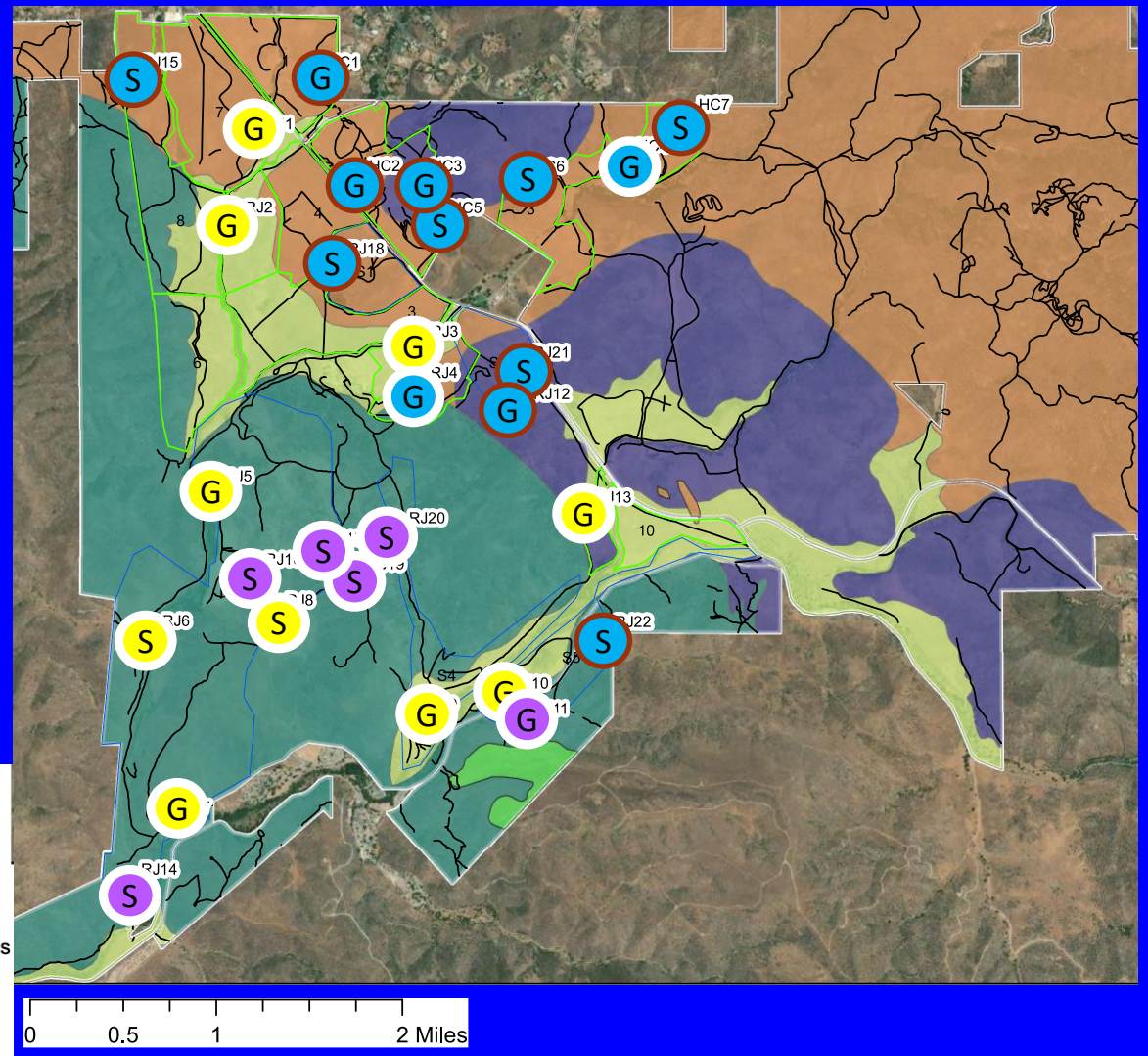
Dumbell-shaped opal phytoliths in *Nassella lepida* leaf



Alluvial sites; all geology types

Hilly sites; granitic and gabbro geology

Hilly sites; metavolcanic geology



UC Berkeley Range Lab 202
Prepared by: Kaveh Motame

Comments

1) Biological diversity and its potential drivers are dependent upon spatial and temporal scale.
2) Arid grass dominated systems tend towards non-equilibrium types: only a limited set of drivers are subject to management intervention.
3) Ecological Site Descriptions and associated State-Transition models are a useful framework for promoting, planning, and evaluating biodiversity drivers but are hampered in California by funding.

Next steps:
Fuels characterization

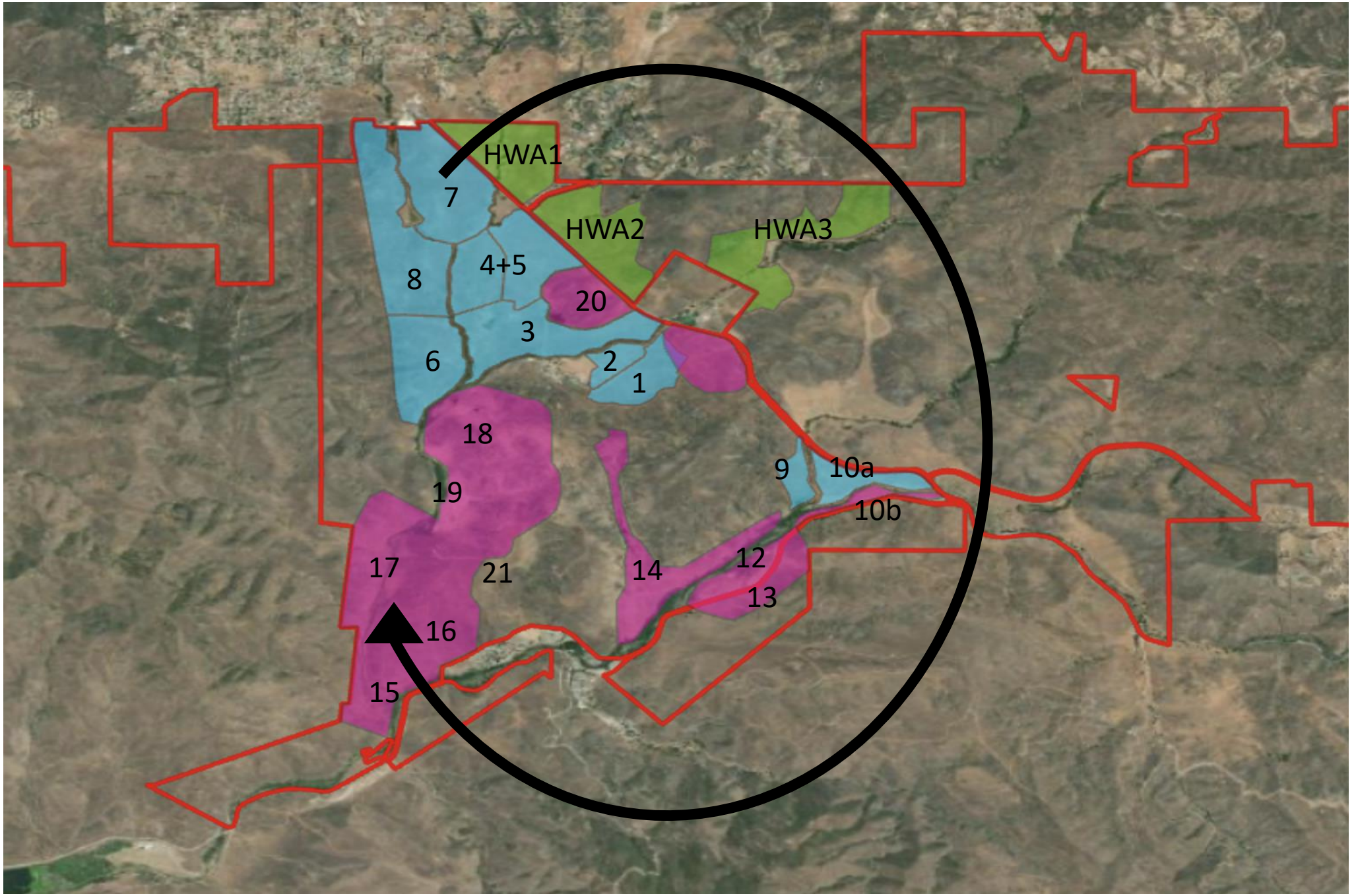
Matthew Shapero, M.S.
California Certified Rangeland Manager (Lic #M125)

1. **How effective is grazing at reducing fire risk?**

    - Objective 1: To reduce flammable non-native herbaceous fuels to protect preserve from fire ignitions and spread.
    - Objective 2: To reduce native and non-native fuel loads in a fuel break to protect preserve from fire.

2. Can grazing effectively enhance disturbed native grassland and forbland habitats?

3. Can grazing enhance disturbed native coastal sage scrub habitat?


HWA1
HWA2
HWA3
7
8
4+5
20
3
6
2
1
18
19
9
10a
10b
17
21
14
12
13
16
15
RJHC boundary
Hard fences (RJ)
Hard fences (HC)
”Soft lines”

Grazing Chart

Year 2021-2022

Pastures	Acres	October				November				December				January				February				March				April				May				June				July				August				September				AUD	AUD/acre
1	70																	2/5	2/16						3/26	4/2				5/1					6/11																1349	19
2	30																																					7/1													2957	99
3/4/5	328	9/24						11/24												2/16			3/12														6/11	7/2												11768	36
6	128																																																0	0
7	162															1/15	2/5										4/2																							2100	13
8	200																	2/5	2/16																			6/26	7/15											4052	20
9	30																			2/16	2/25				3/26															7/1											2150	72
10	54																					2/25		3/26																				8/1			9/1					8178	151
11																																					7/2			7/31									4002	
12																																															9/1				4140	
13		10/1											12/31																																					4830	
14																																															8/18				5934	
15								11/24		12/15																																								2860	
16											12/15						2/5																																	6760	
17																								3/12	3/29																									2210	
18																												4/22				5/28																		4968	
19																																																		0	
20														12/31	1/15																																				788	
21																																																		0	
HWA1	123																									3/29		4/22																						3312	27
HWA2	144																																	5/28			6/26													4002	28
HWA3	163																																						7/15			8/18								4692	29
Total	1432																																																	

Supplement or feed																																																	
Type and amount	16% Natural Protein (1#/hd/day)																																															16% Protein (0.5#/hd/day) for stockers				2 bales alfalfa/day for bulls			

Type of animals	**No.**	**AUs**																																														
Cows	130	130	130	130	130	130	130	130	130	130	130	130	130	130	138	138	138	138	138	138	138	138	138	138																								
Yearlings	70	52.5	70	52.5	70	52.5	70	52.5	70	52.5	70	52.5	70	52.5	0	0	0	0	0	0	0	0	0	0																								
Stockers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	28	56	28	56	28	56	28	56	28																								
Bulls	8	10	8	10	8	10	8	10	8	10	8	10	8	10	11	13.75	11	13.75	11	13.75	11	13.75	11	13.75																								
Total	**208**	**192.5**		**192.5**		**192.5**		**192.5**		**192.5**		**192.5**		**192.5**	**205**	**179.75**		**179.75**		**179.75**		**179.75**		**179.75**																								

Remarks: 20 steers to feedlot (3/26)

"AUs," or Animal Units, are calculated as follows: Mature Cow (x1), Yearlings (x0.75), Bull (x1.25), Stockers (x0.5)
"AUDs" -- Animal Unit Days

Ongoing and future tasks during the grazing years (2021-2024)

- Continue to document spatial and temporal patterns of grazing
  - Grazing chart (J. Austel)
  - "In" and "out" photo point monitoring (J. Austel)
  - Forage production (Spring '22) and RDM monitoring (Fall '21, '22)
  - Fine-tune pasture fence line spatial records

- Use grazing records, Fall RDM biomass data, and modeled daily intake figures to calculate reduction of non-native herbaceous fuels (Ratcliff et al., 2022)

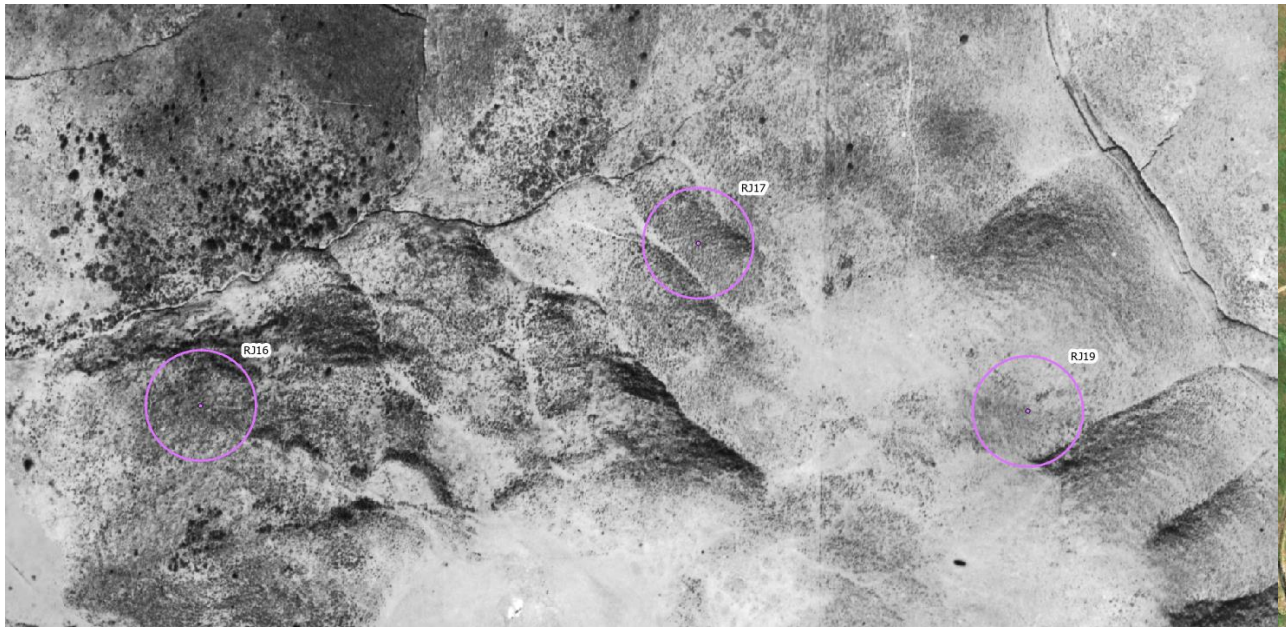
- Use measured RDM biomass data to draw conclusions about anticipated fire behavior (Shapero et al., *in press*)

- Produce "heat map" of Rancho Jamul-Hollenbeck Canyon to communicate extent and intensity of fuel reduction through grazing

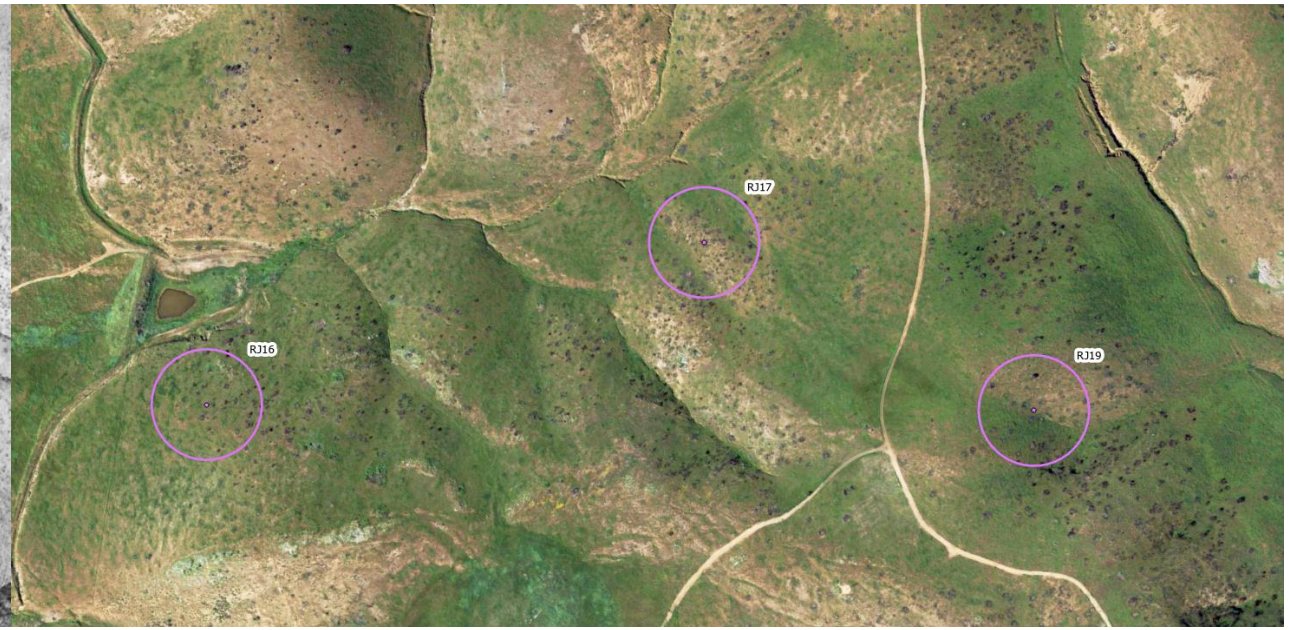
- Discuss viability of small-scale experimentation with grazing and prescribed fire to directly address "effectiveness" question in both grassland and shrubland habitats.

Spatial analysis of long-term change

Joyce Qiao
UC Berkeley, Masters Student in Range Management

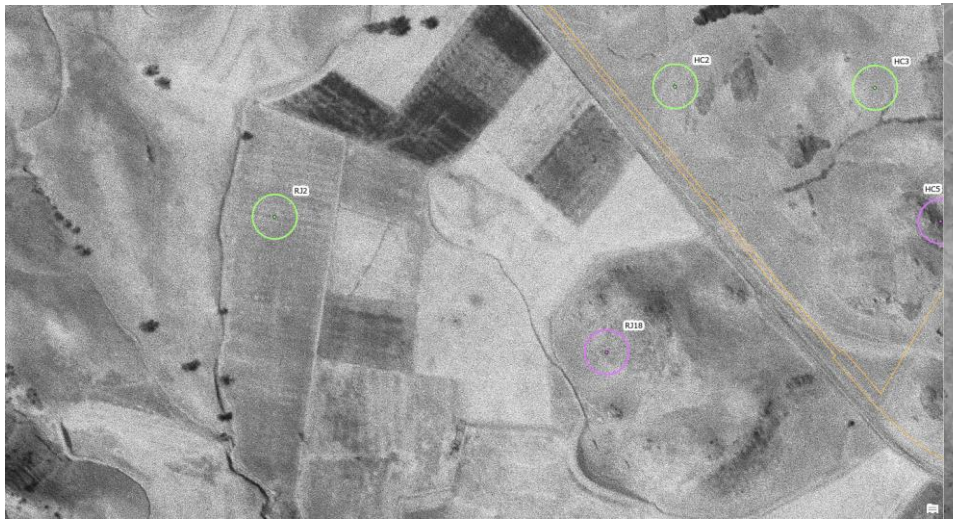


1928 County Historical (1ft)
Month unknown

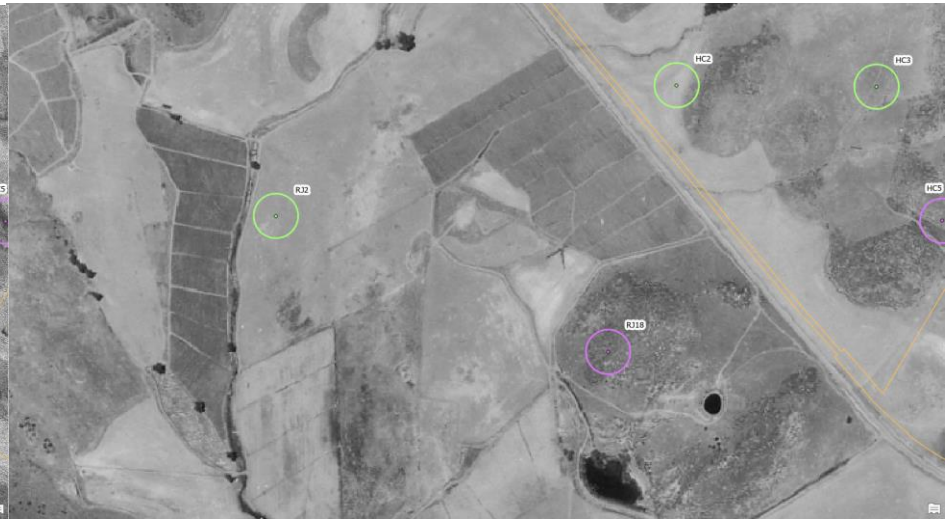


2008 SANDAG (1ft)
Jan-Feb

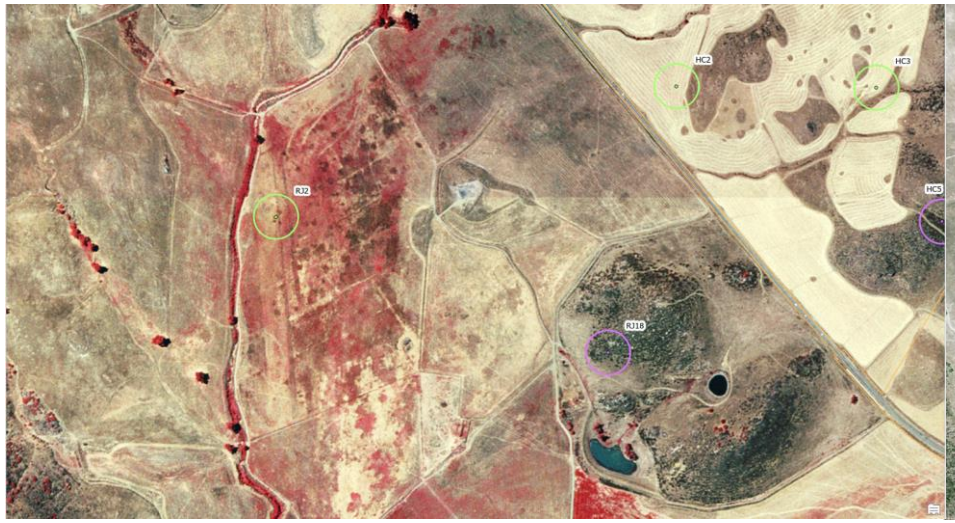
Historical land management & use: grazing, agriculture



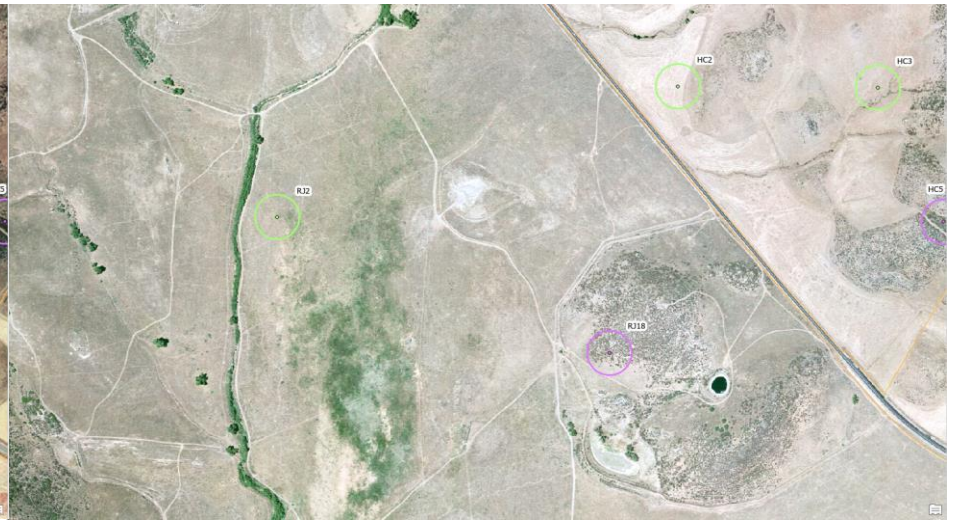
1956 Earth Explorer (1.8ft)
September



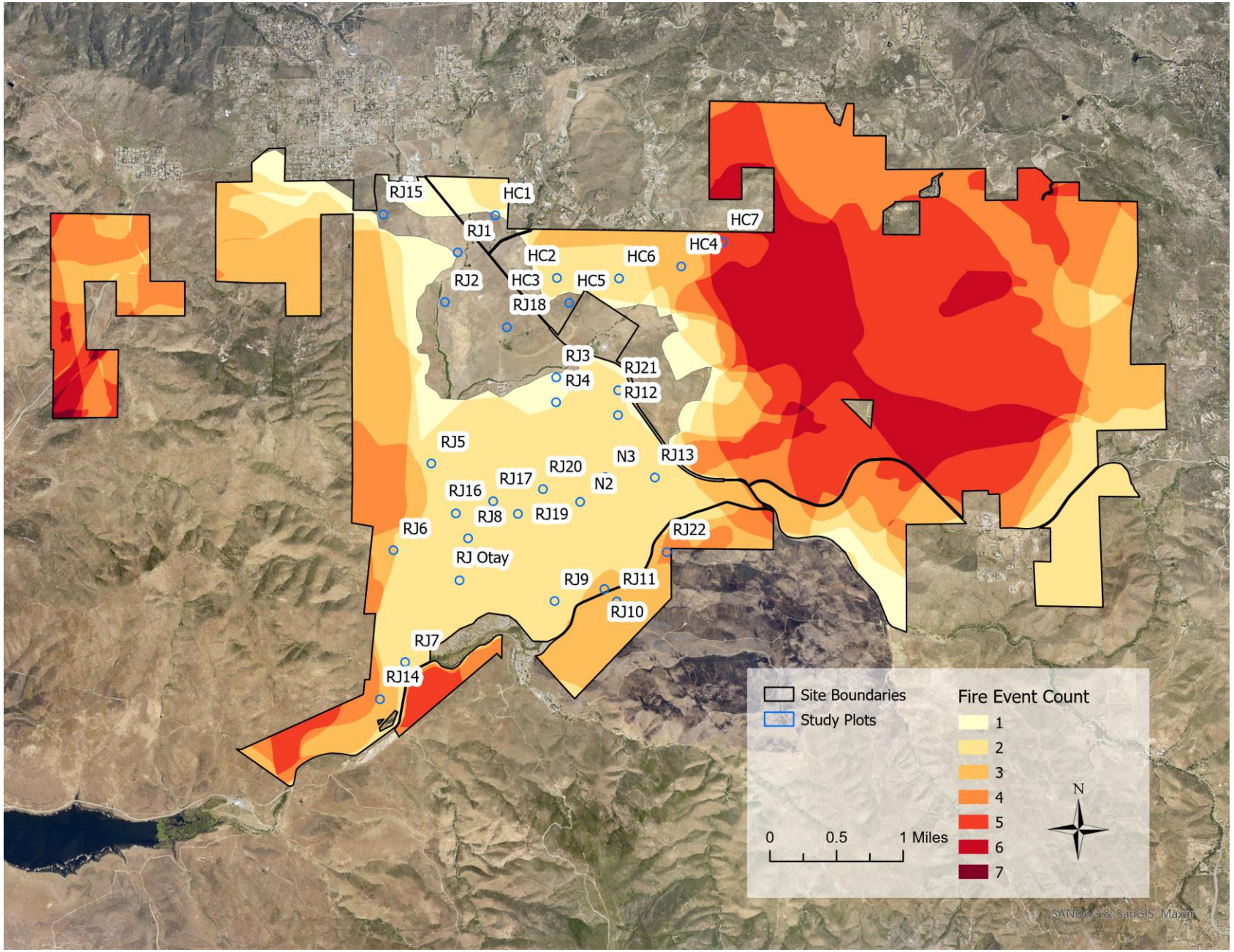
1989 County Historical (9.59ft)
May



1996 SANDAG (?ft)
Color-Infrared only; Month unknown

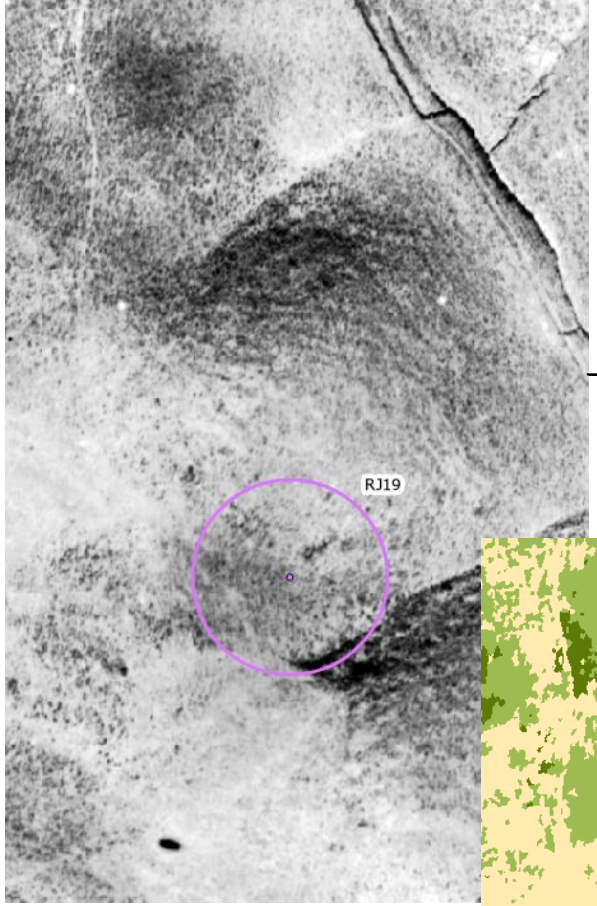


2000 County Historical (2ft)
Month unknown

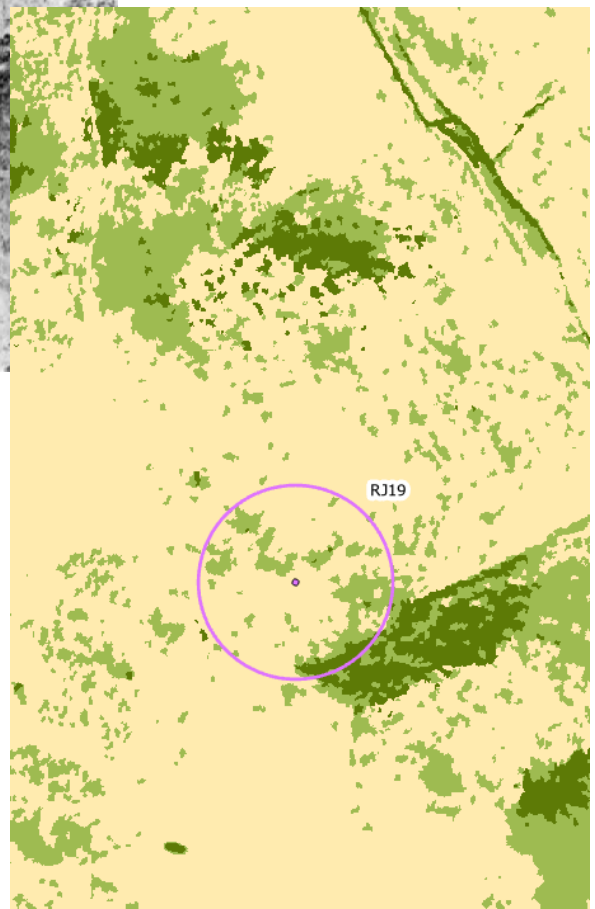


Fire History

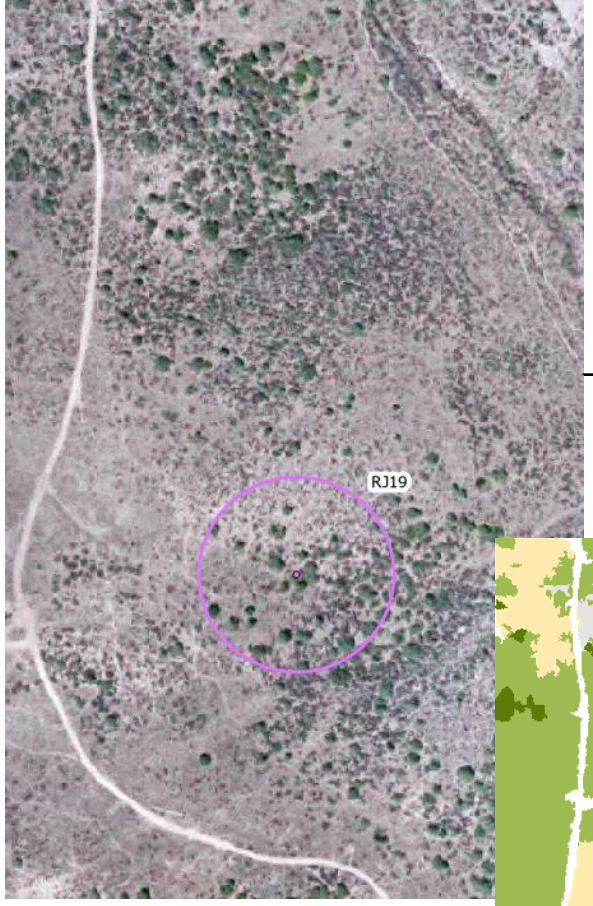
Fire frequency: Cal-FIRE Perimeters 1910-2017 (31 total fire events)
Aerial imagery: Spring 2017 SANDAG (9in)



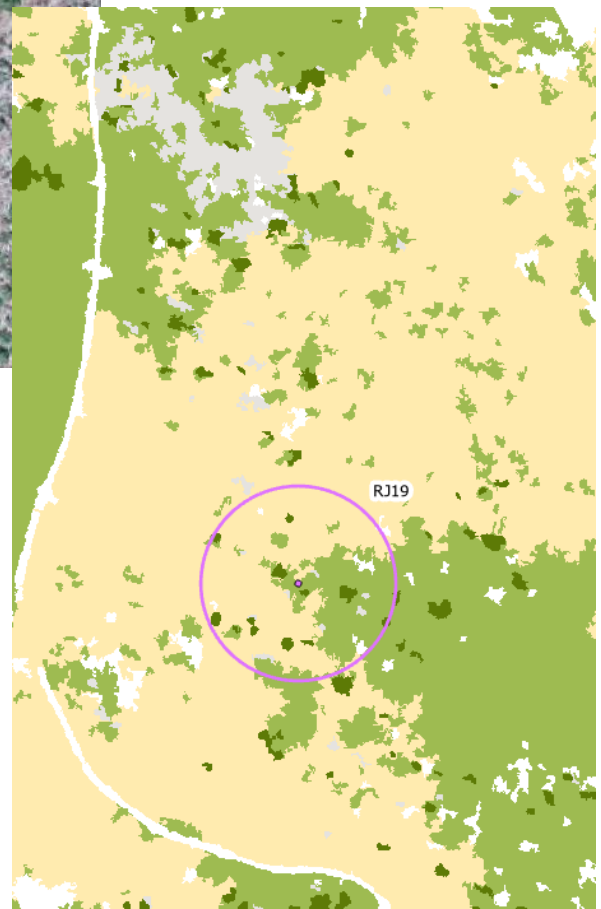
1928 County Historical (1ft)
Month unknown

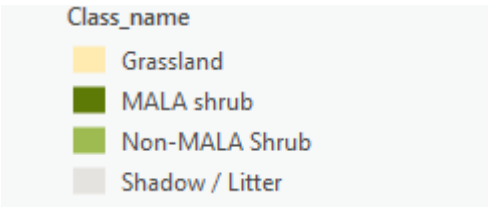


Shrub cover ex: classifying *Malosma laurina*



2000 County Historical (2ft)
Month unknown





Future Study Plans

- Evaluate grazing systems other than cattle (e.g., goats, sheep) on the research questions developed by the Grazing Working Group?
- Evaluate cattle grazing in additional locations with new ecological sites and vegetation states
  - Additional sites at Ranch Jamul/Hollenbeck Canyon
  - Other locations in MSCP, North County MSCP, MHCP


Warner Valley
Pamo Valley
Santa Ysabel
Ramona Grasslands
R. Jamul/ Hollenbeck Cyn
SD County Habitat Planning Areas
MHCP
MSCP
MSCP - No. County Subarea Plan
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community