# California Rangeland Ecology Framework

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# "Biodiversity hot spot"



1.4% of the land surface of the Earth (Myers et al. 2000).







# California grasslands Patterns of....

# • RAINFALL

# •TEMPERATURES

- FIRE
- GRAZING
- NITROGEN DEPOSITION

## Tejon Ranch

#### March 2009



#### March 2012



March 2011

March 2013



March 2014



# Grazing patterns





# Livestock grazing can be used within the year to ...

- create shorter grass, openings
- Influence grassland structure
- manage invasives/weeds
- manage fine fuels
- influence shrub/grassland relationships

# Real time, within-season effects can be powerful...

### TULARE HILL 2002: Grazed

Photo: S. Weiss

# TULARE HILL 2007: Ungrazed

The and the set of

Livestock grazing used to counter exotic grasses and nitrogen deposition for Bay Checkerspot Butterfly habitat

Contra Costa goldfields (*Lasthenia conjugans*)





Photo: J. Funk California Ecosystems

# "non-equilibrial" system: very "noisy" with lots of unpredictable disturbance

- Many sources of variation & change: global change, annual weather, season
- Non-natives still arriving
- Hard to predict management outcomes year to year for herbaceous species
- Monitoring helps us adapt and refine management





# Scientific Literature Review: Conservation and Restoration of Native Species and Habitats

Relevant to SDMMP Lands and Management Goals

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# Annual and Native Grasslands

\* Abiotic factors are the primary drivers of vegetation in California's Mediterranean grasslands:



- \* Potential benefits of grazing California's Mediterranean grasslands:
  - ♦ Reducing fire fuel loads
  - Maintaining/improving habitat for grassland birds
  - Maintaining/improving habitat for small mammals
  - Maintaining/improving habitat for amphibians
  - ♦ Increasing pollinator plant cover
  - ♦ Reducing impacts of nitrogen deposition
  - Creating opportunities for native plants



Intermediate Disturbance Hypothesis

### Diegan Coastal Sage Scrub

- Relationship between grazing and CSS habitat not well studied.
- Environmental challenges to CSS habitat resiliency:
  - ♦ Climate change
  - ♦ Nitrogen deposition ♦ Exotic annual grasses ♦ Fire
- Can grazing help?:
  - Reducing fire fuel loads Reducing competition between exotic annual grasses and CSS seedlings







# SDMMP Covered Species and Grazing

## Key References

- Artis, S.W. 2011. Managing California's grassland ecosystems for Athene cunicularia hypugaea. California Native Grasslands Association.
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- Lawson D.M., and J.E. Keeley. 2019. Framework for monitoring shrubland community integrity in California Mediterranean type ecosystems: Information for policy makers and land managers. Conservation Science and Practice.

#### Grazing Management to Benefit Biodiversity in CA Mediterranean Grasslands



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#### The Challenge:

 Integrate biodiversity conservation into grazing management programs for CA Mediterranean grassland landscapes

• Livestock grazing is the most feasible management tool for most habitat conservation objectives in CA Mediterranean grasslands

 Determine what's most important and feasible to improve about conventional grazing to accomplish biodiversity conservation objectives; maximize benefits and minimize impacts

#### Grazing Management Strategy:

3.

hoto by James Bartolom

- 1. Translate **special habitat requirements** to grazing management targets
- 2. Designate "**Special Resource Areas**" and "Flexible Use / Auxiliary Fields"
  - Graze using targeted outcomes and deferral
  - Monitor focusing on results and applicability to management (Goals > Objectives > Performance Standards)
- 5. Management prescription is feasible, flexible, and sustainable for grazing operator

#### Example Monitoring Report for RDM/Herbaceous Mass Mapping — Height (min. & max. standards)

Figure 5. Spring 2016 Herbaceous Monitoring: Corral Hollow Unit



Contra Costa Water District, Concord, CA Grazed

#### Summary:

- 1. Grasslands converted from native to invasive Mediterranean species with introductions of pre-adapted species by explorers (1500s) and settlers (1700s)
- 2. Reduced grazing and increased frequency of wildfires in modern times have shifted State-Transition (succession) Model for grasslands and Coastal Sage Scrub
- Stewardship Grazing approach to achieve conservation objectives—add sustainability and cooperation incentives
- 4. Designate special resource/management and flexible use areas for targeted and deferral grazing
- 5. Focus monitoring on results of grazing and applicability to management

Goals and Objectives for Maintenance and Improvement of Coastal Sage Scrub with Grazing:

- 1. Goal—Minimize additional losses of CSS
  - a. Objective—Minimize fire ignitions and spread in whole reserve with strategic grazing to minimize herbaceous fuels generally
- **2. Goal**—Recolonize former CSS areas (now grassland)
  - a. Objective—Identify areas of former CSS with high potential as Special Management Areas for grazing

# Fire

Fuel loads, fire behavior, and grazing for hazard reduction

Matthew Shapero, M.S. California Certified Rangeland Manager (Lic #M125) We can think about fire on rangelands in two distinct but inter-related ways

1. Fire as ecological disturbance and driver

2. Fire as risk to public safety

All fire perimeters since 1910, CAL Fire database



Rancho Jamul Ecological Reserve





All fire perimeters since 2000, CAL Fire database



Rancho Jamul Ecological Reserve

Hollenbeck Canyon Wildlife Area



All fire perimeters since 2010, CAL Fire database



Rancho Jamul Ecological Reserve





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.



Working cattle ranch in Ventura County, California after the Thomas Fire, December 2017. Previously-grazed annual grassland in foreground that did not burn; coastal sage scrub vegetation type in background that burned at moderate to high intensities.

#### We'll draw from historic and current research...



Photo #1 July 1959

Typical stand of brush on Plot #1 prior to brush removal.

> Photo #3 October 1965

Same view as Photo #1 five years after reseeding.



John V. Stechman



Study area in October, 1977, depicting plot layout for study of four traments: G-grazed, D-disced, B-burned, M-mowed and C-controls.



- Burn/no-burn
- Rate of spread
- Flame height
- Fire intensity using temperature sensitive paints
- Impacts to soil seedbank
- Impacts to soil microbiology







Photo credit: Frank Davis

Coastal Californian Range Science

James Bartolome Range Ecology Lab - UC Berkeley

# Perennial-dominated Coastal Prairie at Point Molate



# Outline

- 1. Rangelands and range
- 2. Diversity in Mediterranean rangelands
- 3. Non-equilibrium systems and Ecological Site

Descriptions

4. Summary

# Drivers in Managed Rangelands

Spatial Scale	Area	Drivers
Ecological Site	10 <sup>4</sup> Acres	Geology and Soils, Land Conversions, Climate Change
Ranch	10 <sup>3</sup> Acres	Soils and Geology, Economics, Ecosystem Services, Weather, Land Conversions
Pasture	10 <sup>2</sup> Acres	Soils and Geology, Habitat Loss, Fire, Grazing practices, Invasives, RDM



# Summary Comments

- 1) Biological diversity and its potential drivers are dependent upon spatial and temporal scale.
- 2) Arid rangeland systems tend towards non-equilibrium types: only a limited set of drivers are subject to management intervention.
- Ecological Site Descriptions and associated State-Transition models are a useful framework for proposing, planning, and evaluating range monitoring.

# Grazing Management Planning Approach

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# **Literature Review**

- Review what is known about grazing impacts to vegetation and MSP species
- Identify gaps in scientific understanding
- Focus on San Diego Region



# **Pilot Study Design**

- Develop a grazing monitoring plan
- Design and lay out grazing study at project locations



# Pilot Study Implementation

Annual Evaluations of:

- Grassland species composition and cover
- Shrub composition, extent, cover
- Shrub recruitment
- Ecological site variables
  - Soils, topography
- Other habitat conditions:
  - Residual dry matter
  - Bare soil
  - Erosion



# **Conclusions and Recommendations**

- **1. Determine grazing impacts to:**
- Grassland/shrubland plants (native/exotic)
- Sage scrub habitat maintenance
- Wildlife and MSP species habitat
- Critical fuel loads
- 2. Role of ecological sites
- 3. Final grazing monitoring plan



