

## Rangeland management for multiple ecosystem services



California Climate & Agriculture Summit  
*Carbon & Cattle: Climate Benefits of Rangeland Conservation*

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## California Oak Woodland

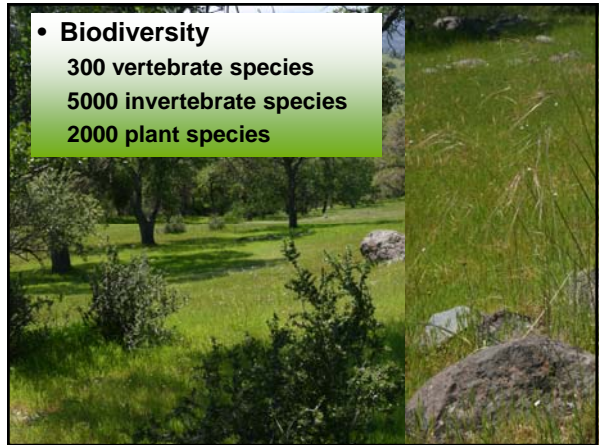
- 70% state's annual forage base
- \$3 B annual beef cattle industry



Rangeland watersheds supply 85% of California's drinking water



- Biodiversity
  - 300 vertebrate species
  - 5000 invertebrate species
  - 2000 plant species



## Threats to rangelands

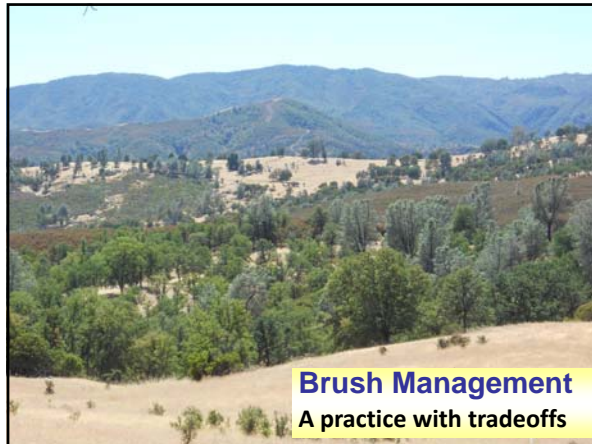


## Management Models and Past Policy

Historic clearing in mid 1950s and 1960s

Goal: Forage production





### Agricultural Benefits

Production data: UC SFREC 1998-2008

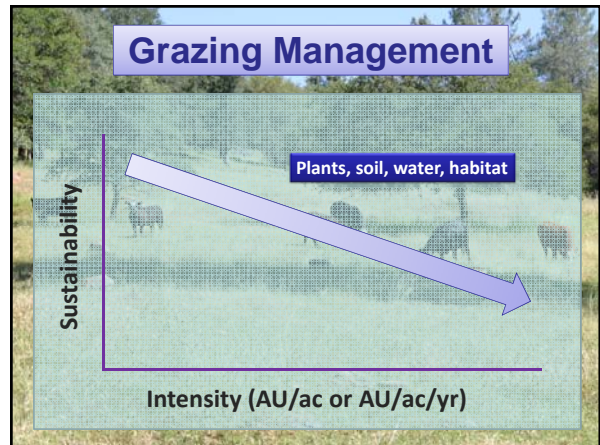
Stocking Rate acre/AUY	Oak thin/conversion
26	None – Oak woodland
13	Thin to 30% oak cover – Oak savanna
7	Thin to 10% oak cover
6	Clear to 0% oak cover – Open grassland

### Oaks, shrubs important to maintaining ecosystem services – balance forage increase w/ conservation

Metric	Oak Woodland	Grassland
Total N	3.6 g/kg	2.5 g/kg
Total C	52 g/kg	30 g/kg
Infiltration	218 cm/hr	20 cm/hr
Diversity	2.05	1.64

Oak recruitment

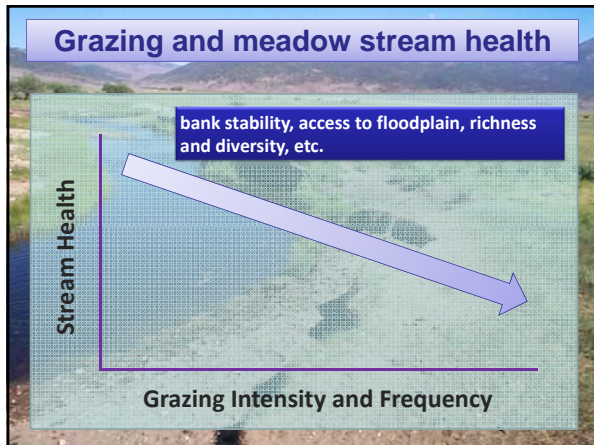
Distance from blue oak (dripline radius)	N. pulchra (plants/m²)
0	~5.5
1	~3.5
2	~3.0
3	~2.5



### Practices

- **Prescribed Grazing:** intensity, season, frequency of grazing
- **Grazing Facilities:** water, fencing
- **Rest from Grazing:** frequency, season, duration
- **Target or Precision Grazing:** precise implementation of the herbivore

### Restoration and grazing management on mountain meadows and streams



### Grazing and meadow stream health

Grazing Management Activity	Correlation to Health Score
Time maintaining off-stream attractants (days/yr)	Positive
Herding to reduce time near stream (days/yr)	Positive
Livestock density (AU/ac)	Negative
Frequency of grazing (times/yr)	Negative

### Managing for multiple outcomes and win-win solutions

- Forage and Livestock Production
- Weed Control – Diversity
- Wildlife and their Habitat
- Productive and Healthy Soils
- Water Quantity and Quality

### Managing for multiple outcomes and win-win solutions

- Interest in science-based support for conservation effectiveness
- Interdisciplinary research
- Incorporation of manager knowledge

**Prescribed Grazing to Restore Rangeland Soil Quality, Plant Diversity, Water Quality, and Agricultural Productivity**



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Mail survey to 2000 CA and WY ranchers about their perceptions, and use, of conservation practices

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Knowledge about grazing to achieve both agricultural and ecological goals

Information needed to manage for goals

Best way to provide information


Mail survey to 2000 CA and WY ranchers about their perceptions, and use, of conservation practices

On ranch survey of conservation practice implementation and rangeland health



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Ten year, 3000 acre adaptive grazing management experiment at UC SFREC



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Develop on-line grazing conservation effectiveness decision support and interactive learning tool



**California Rangeland Watershed Laboratory**  
<http://rangelandwatersheds.ucdavis.edu>