Adaptive Grazing Management for Weed Control

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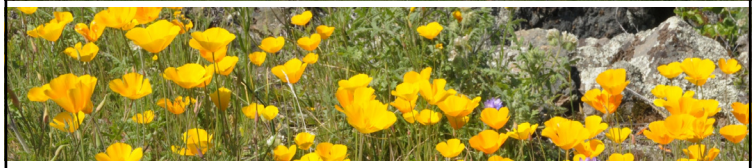
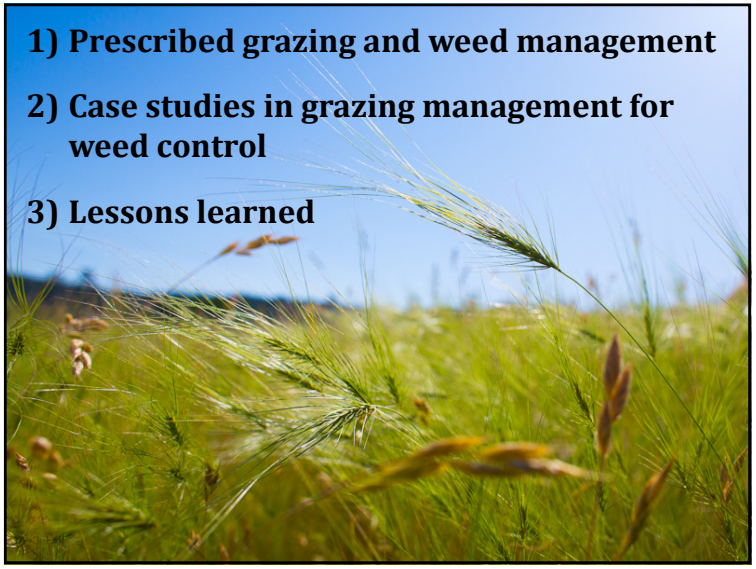


UC RANGELANDS *Supporting Working Landscapes*

1) Prescribed grazing and weed management
2) Case studies in grazing management for weed control
3) Lessons learned



Managing Weeds with Grazing

Prescribed grazing is the controlled implementation of the timing, frequency, and intensity of grazing to achieve specific goal(s)

The grazing manager can prescribe:

1. Type of livestock (*e.g., cattle, sheep, goats*)
2. Number of livestock (*stocking density – head/acre*)
3. Duration of grazing (*stocking rate – head/acre/year*)
4. Seasonal timing of grazing (*e.g., spring, summer, etc*)
5. Frequency of grazing (*e.g., 1X, 2X per growing season*)
6. Spatial distribution of grazing (*e.g., fences, water*)

Managing Weeds with Grazing

Infrastructure

- Fencing, drinking water, supplemental feeding, facilities needed to implement grazing prescription

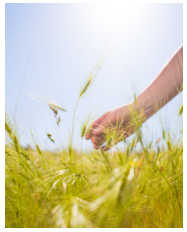
Key Considerations

- Nutritional requirements - vary annually (e.g., breeding, gestation, lactation, growth)
- Plant requirements to conduct critical functions (e.g., photosynthesis, reproduction)
- Mitigate potential negative impacts of animals on soils, riparian areas, non-target plant species, etc.

Managing Weeds with Grazing

Plot scale research (<5 acres) results: Timing and intensity shown to reduce cover of weedy species.

Yellow starthistle
Centaurea solstitialis
75-90% reduction in flower heads
(e.g., Thompson et al. 1993)



Medusahead
Taeniatherum caput-medusae
30-100% reduction in canopy cover
(e.g., DiTomaso et al. 2008)

Case Study: Cattle Grazing in a Noxious Weed-Dominated Rangeland

UC CE NRCS

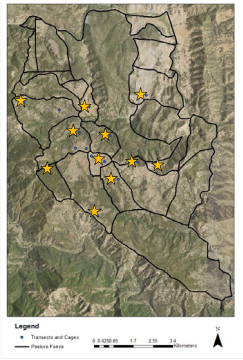
Bear Creek Management Unit

- 11,000 acres BLM-managed land
- 1999-2001 - Grazing terminated
  - **Goal**: Enhance native plant cover
  - **Outcome**: Enhanced invasive weed cover
- 2006 - Grazing re-introduced

Re-introducing Grazing…

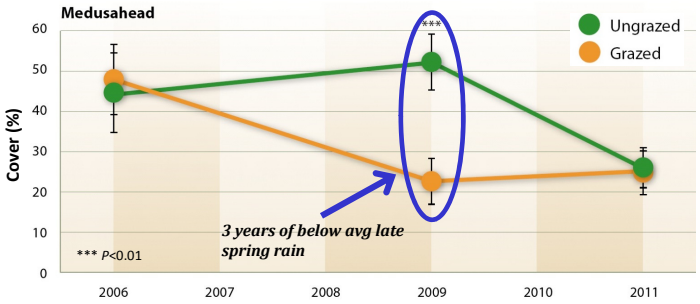
Rotational grazing system
- 80-600 ac paddocks
- ~400 cow-calf pairs
- Jan-May, 2006-2011

Grazed 2x
- *Winter* – Thatch
- *Spring* – Late-flowering invasives
- Cattle off end of May – *decided by manager*



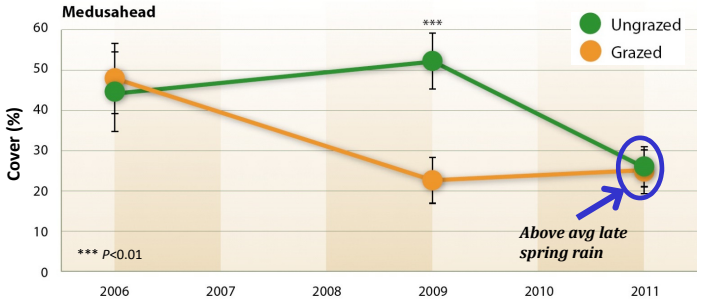
Plant Species Composition

Medusahead Response



- Medusahead reductions in dry springs

Medusahead Response



- Medusahead reductions in dry springs
- No further reductions in wet springs

Plant Community Response

- Ungrazed: Medusahead replaced by other undesirable plants (ripgut, red brome)

Plant Community Response

- Ungrazed: Medusahead replaced by other undesirable plants (ripgut, red brome)
- Grazed: Increases in desirable forage plants (slender oats, filaree)

What did we learn?

- Grazing more beneficial to management goals than grazing exclusion
- To be more effective – Late season grazing is key
  - Not staying long enough to impact MH in late wet springs
  - Not staying long enough to impact YST
- Challenges: Available drinking water and animal welfare/production concerns in late season

Davy et al. 2015. Calif. Agr.

Case Study: Collaborative Adaptive Grazing Management Project

UC CE · California Cattlemen's Association · NRCS · USDA Forest Service · California Farm Bureau Federation · California Fish & Wildlife · and more!...

National Park Service · California Rangeland Conservation Coalition · Audubon California · The Nature Conservancy · Defenders of Wildlife

Collaborative Adaptive Grazing Management Project

- Engage diverse stakeholder at the very beginning of research
- Stakeholders prescribed goals (monitoring metrics) and strategies (treatments)
- Implemented, monitored, and adapted with stakeholder input

Participants

- Ranchers
- Ranch Managers
- Audubon California
- Beale Air Force Base
- CA Department of Fish and Wildlife
- Center for Natural Lands Management
- City of Fairfield
- Contra Costa Water District
- Defenders of Wildlife
- East Bay Municipal Utility District
- East Bay Regional Parks
- Environmental Consultants
- Hedgerow Farms
- Natural Resource Conservation Service
- Nevada Irrigation District
- Placer Land Trust
- Point Reyes National Park
- Point Blue Conservation Science
- San Francisco Public Utilities Commission
- The Nature Conservancy
- UC Cooperative Extension
- UC Davis Natural Reserve System
- US Fish & Wildlife Service
- US Forest Service




Workshops

UC Research Center
8 pastures, 1200 acres

1) Primary natural resource and agricultural goals

2) Potential challenges and opportunities for goals

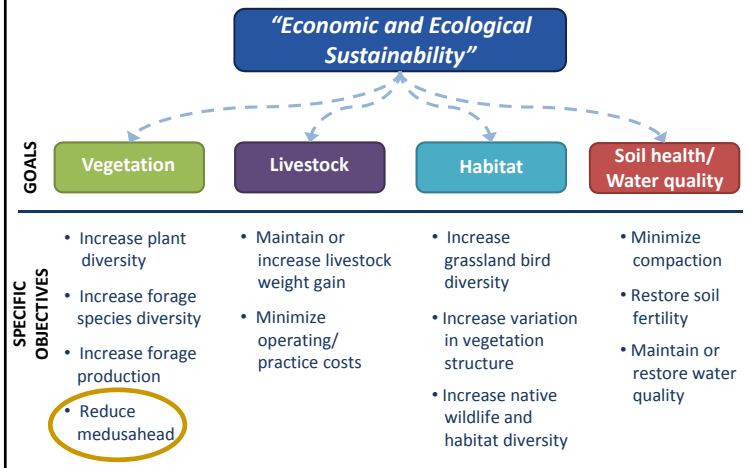
3) Adaptive management strategies to achieve goals

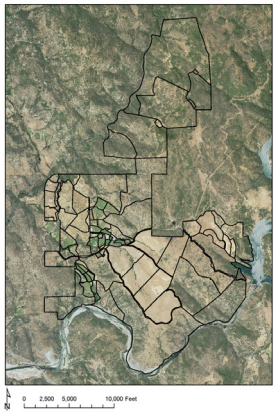



Field Visits and Group Discussions




Common Goals and Objectives





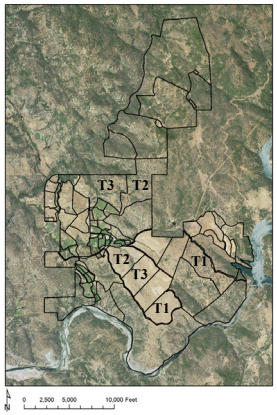
Computer Surveys

Group Discussions

Advisory Team meetings

3 prescribed grazing strategies recommended for study…

Prescribed Grazing Strategies



T1 Season-Long Grazing
(~6 months)

T2 Fall/Spring Grazing
(~3 months)

T3 Fall/Spring, Targeted Grazing
(~3 months)

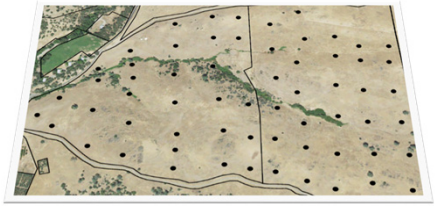
Grassland pastures ~ 3 head months/acre
Oak pastures ~ 1.2 head months/acre

Monitoring multiple outcomes

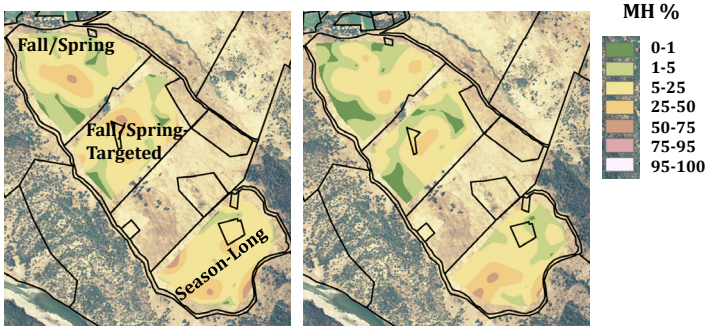
Goal	Monitoring
Livestock	Steer weight gains (ADG, gain/acre, etc.)
Vegetation	Diversity/richness/cover of invasive weeds and desirable forages, standing crop
Habitat	Ground bird hiding cover (veg structure)
Soil Health	Cover, RDM, fecal distribution

Monitoring multiple outcomes

Goal	Monitoring
Vegetation	
Habitat	
Soil Health	



Invasive Plant Response: Medusahead (MH)

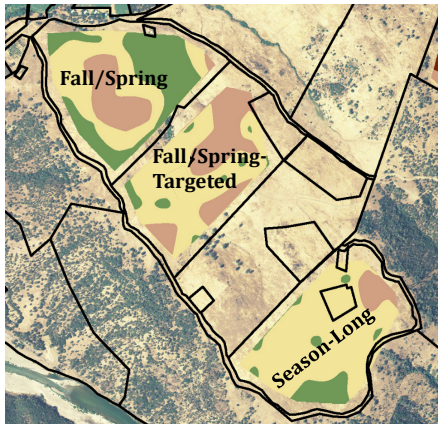


Animal Performance (steers)

Spring Average Daily Gain (lbs/day)

	2012-13	2013-14	2014-15
Season-Long (T1)	2.6	3.5	3.2
Fall-Spring (T2)	3.2	4.1	3.4
Fall Spring-Targeted (T3)	2.6	3.8	2.6

Forage Standing Crop



lbs/acre
200-500
500-1500
1500-2500
2500-3500

Year 3

Findings after 3 years of extreme drought…

- MH decreased ~15 to 25% across all treatments
  - Greater reduction of MH dominated sites in fall/spring targeted treatments
- Intensive rotational grazing ↓ individual animal spring ADG
  - Still observed 2.5-4 lbs/day across MH-invaded pastures
- Capacity to adapt to drought greatest in intensive rotational grazing treatments

Take Home Points…

- **High weed invasion/pressure – grazing shown to be more effective than exclusion**
- **Grazing timing and intensity are key to success**
- **Management context: real world constraints**
- **Prescribed grazing should be considered as part of an integrated pest management program**

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