

Range Management and Conservation



Leslie Roche and Ken Tate
Rangeland Watershed Lab
University of California, Davis



Rangeland Management and...

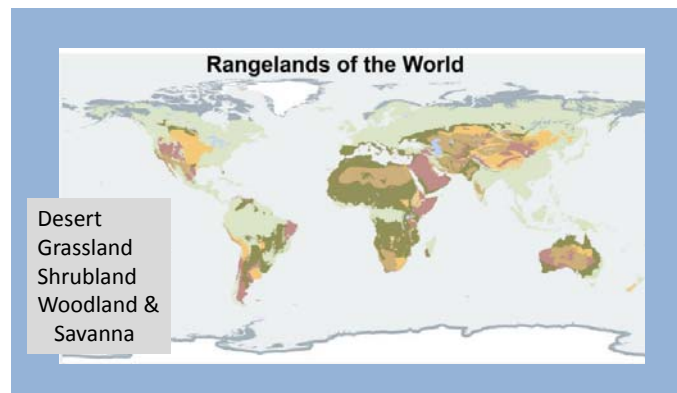
Water quality, species of concern, riparian and meadow health, soil quality, invasive plants, forage production, and livestock performance...



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

Range Management & Conservation “Road Map”

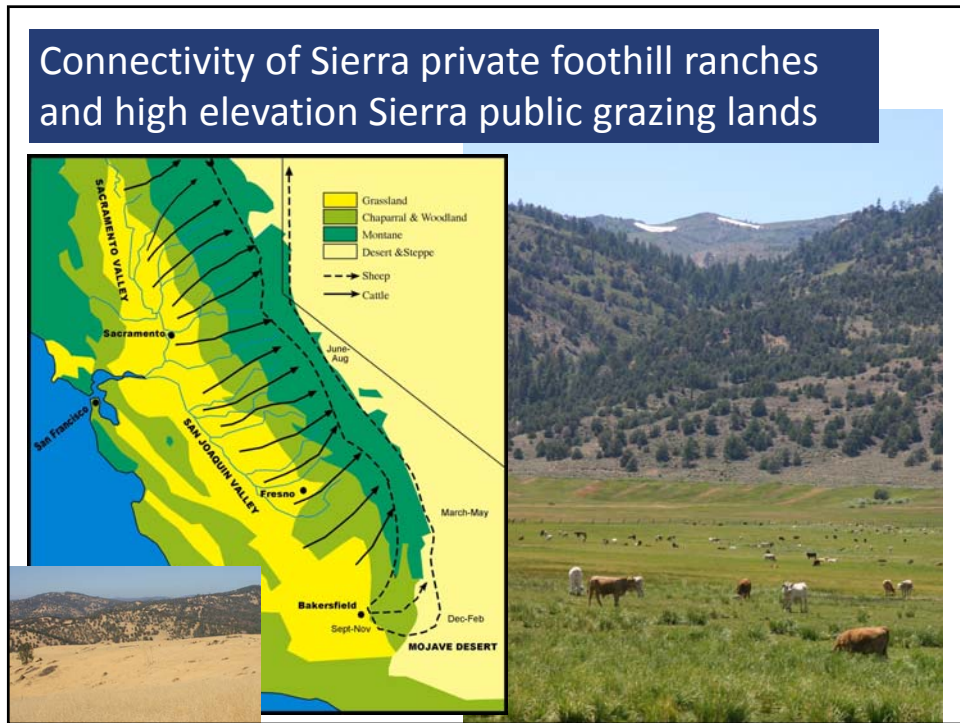
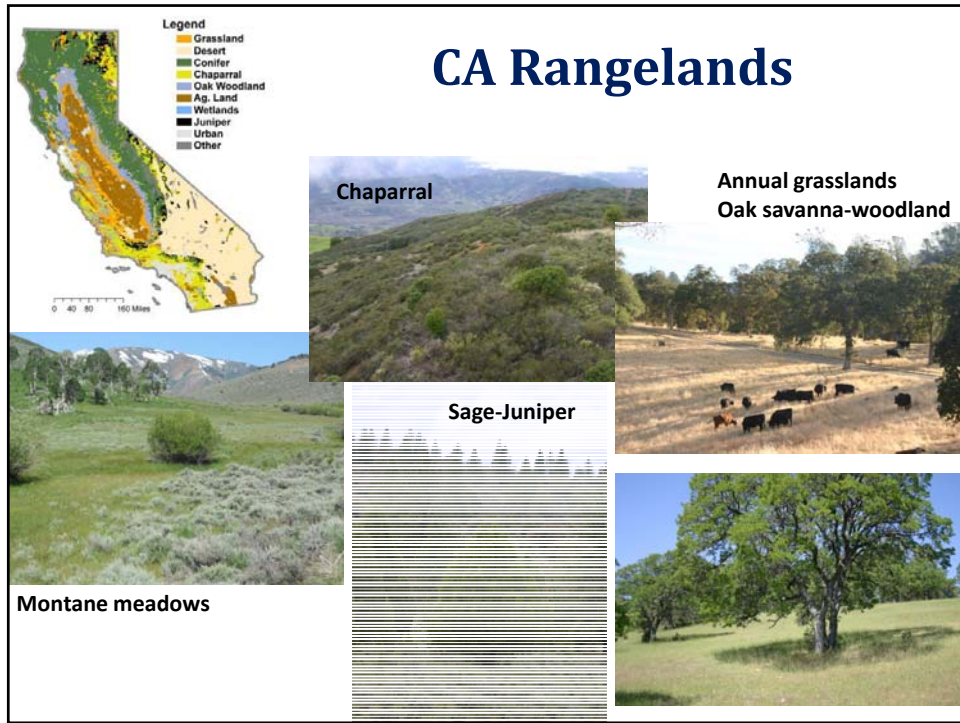
- Rangelands – what are they, what do they provide, how they are at risk?
- Balancing and achieving multiple ranch and conservation goals.
- Participatory research and conservation – what do ranchers value, what tools do they use, what drives decision-making?
- Agricultural – Conservation Win-Win Example
 - *Amphibian conservation in a grazed landscape*
- Agricultural – Conservation Tradeoff Example
 - *Oak thinning to increase forage and livestock production.*



46% of the **Earth's** land surface

“**Rangelands** are vast natural landscapes in the form of grasslands, shrublands, woodlands, and deserts. Rangelands are the ‘*Wild Open Spaces*’ that cover about half of the earth's land surface and half of western North America.” U of Idaho (2011)

Multiple-use landscapes supporting a suite of ecosystem goods and services including livestock forage, wildlife habitat, water, mineral resources, wood products, recreation and open space.



Annual Grasslands & Oak Woodland *“Winter Range”*

- ~16 million acres
- Non-native annuals
- Introduced 1700’s
 - Over-grazing
 - Drought
 - Cultivation
- “Naturalized” annuals



\$3B Annual CA Beef Industry



Biodiversity

- Hundreds of vertebrate species
- Thousands of invertebrate and plant species



CA tiger salamander



purple needle grass

Threats to Sustainability

Oak Thinning



Weed Invasion



Yellow starthistle



Barbed goatgrass



Medusahead

Development



Overgrazing



Threats to Sustainability

Oak Thinning



Weed Invasion




509 CA Ranchers' Perspectives on Threat to Sustainability

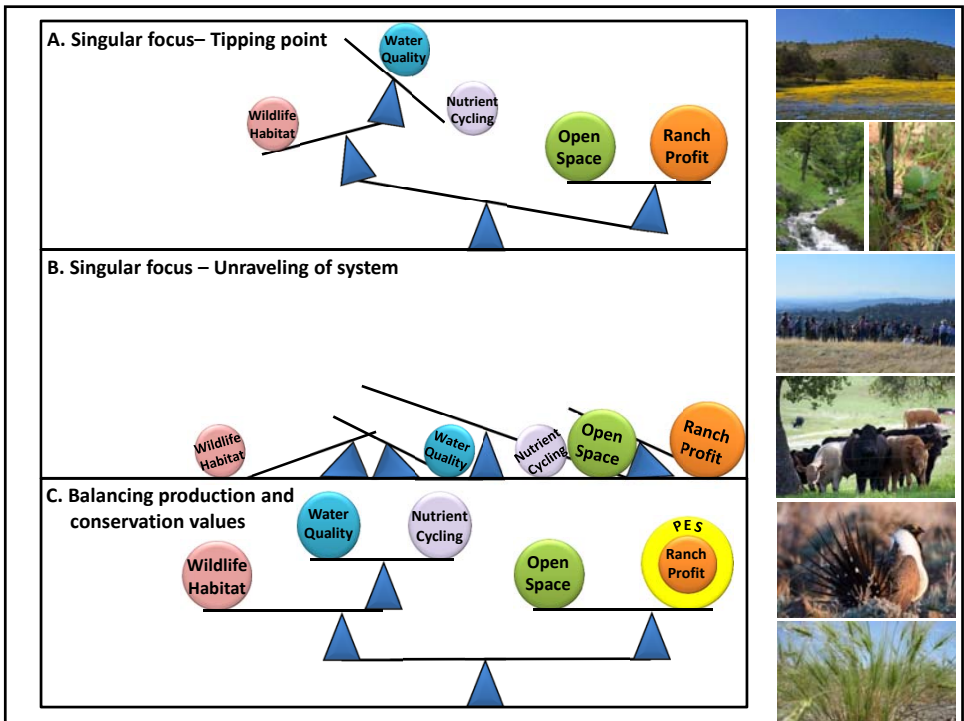
- 49% Government regulations and environmental policy
- 43% Economic viability
- 21% Succession planning
- 21% Water/rainfall/weather – security of water supply

Development



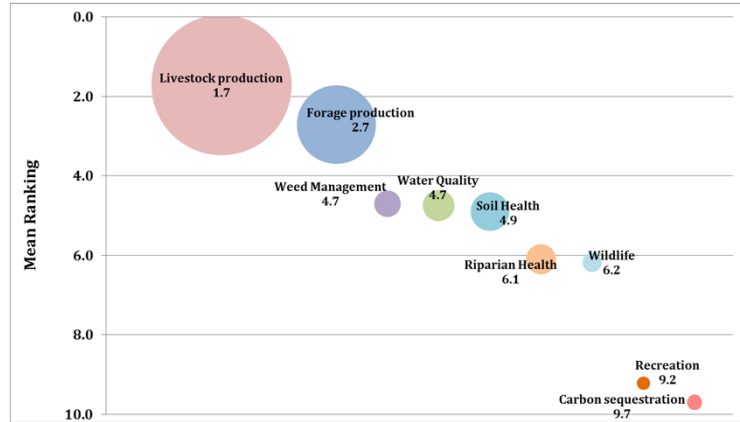
Overgrazing





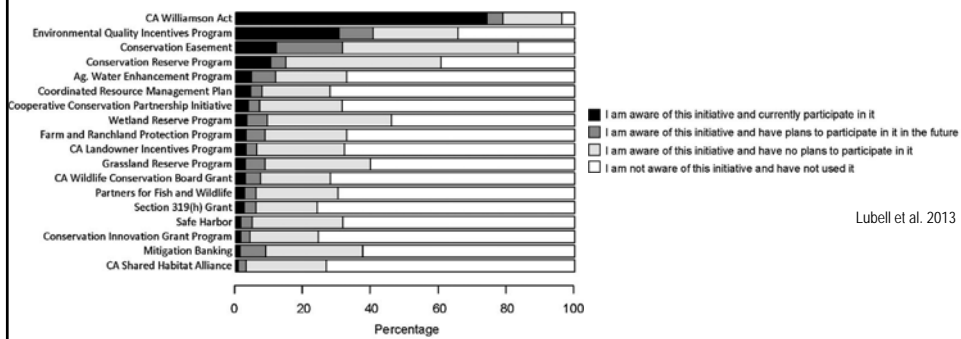
Rancher Decision-Making: Goal Setting

Conservation goals (i.e., supporting goals) must be balanced with economic realities of agricultural production.



Rancher Decision-Making: Management Strategies

Conservation programs – Use and Perspectives

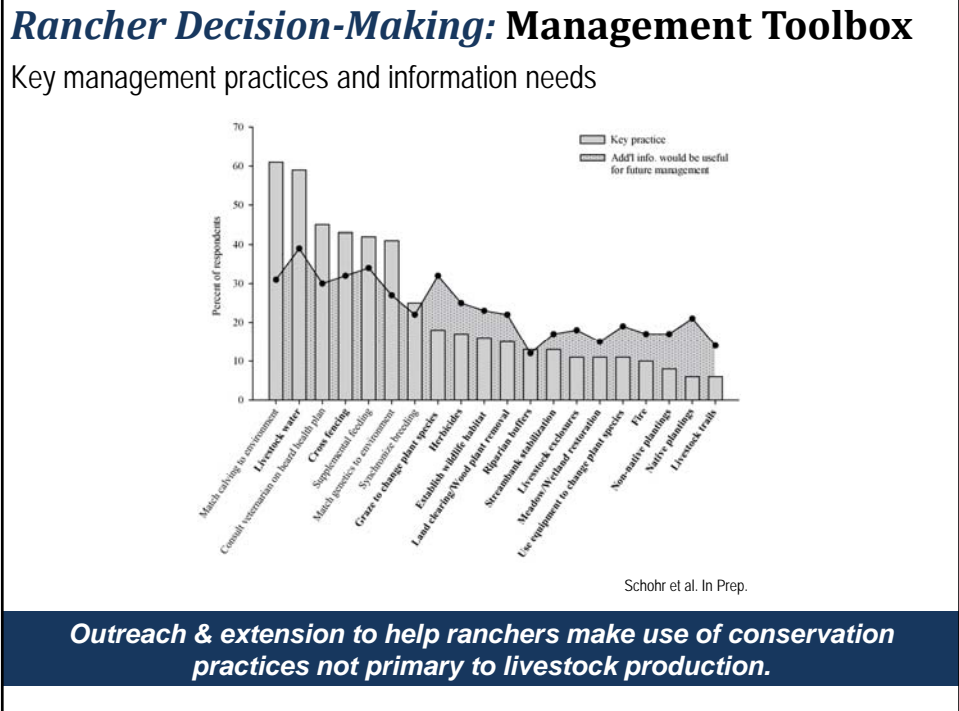


Lubell et al. 2013

Government investment in conservation has helped rancher: 33% disagree, 31% neutral, 36% agree

Government incentives will be the best way in the future to improve voluntary conservation on actively ranched lands: 36% disagree, 29% neutral and 35% agree

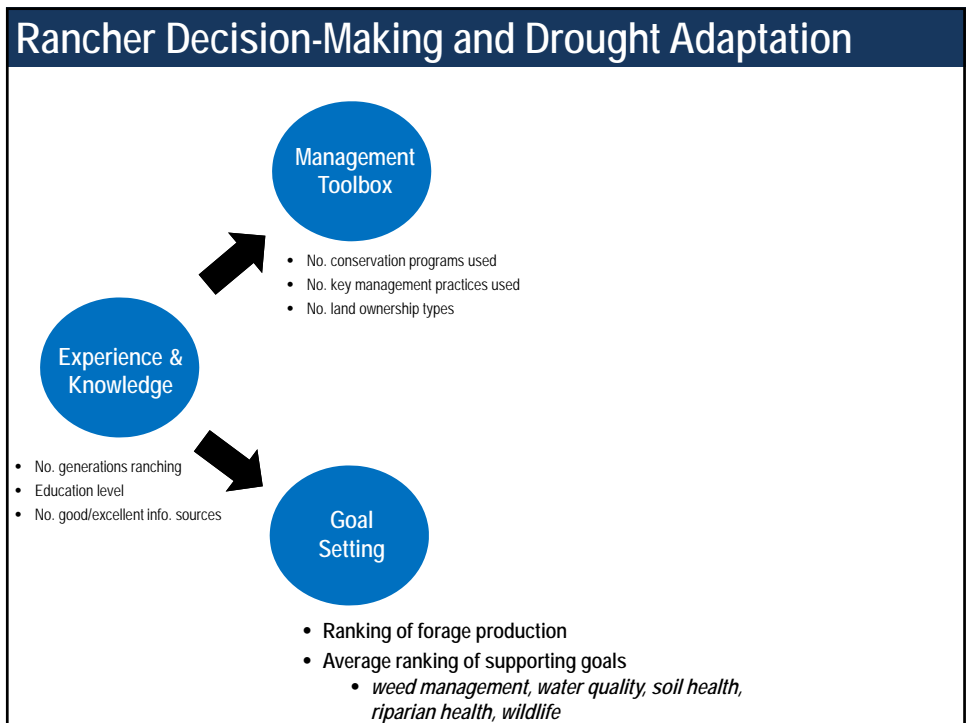
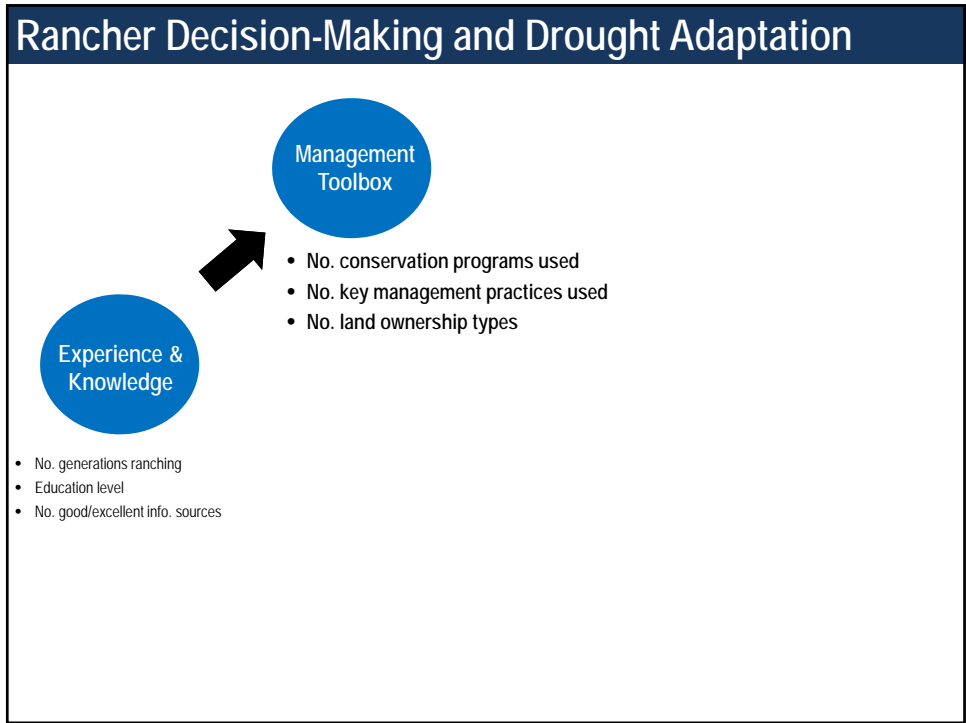
Finding win-wins and cost effective conservation practices to address tradeoffs.

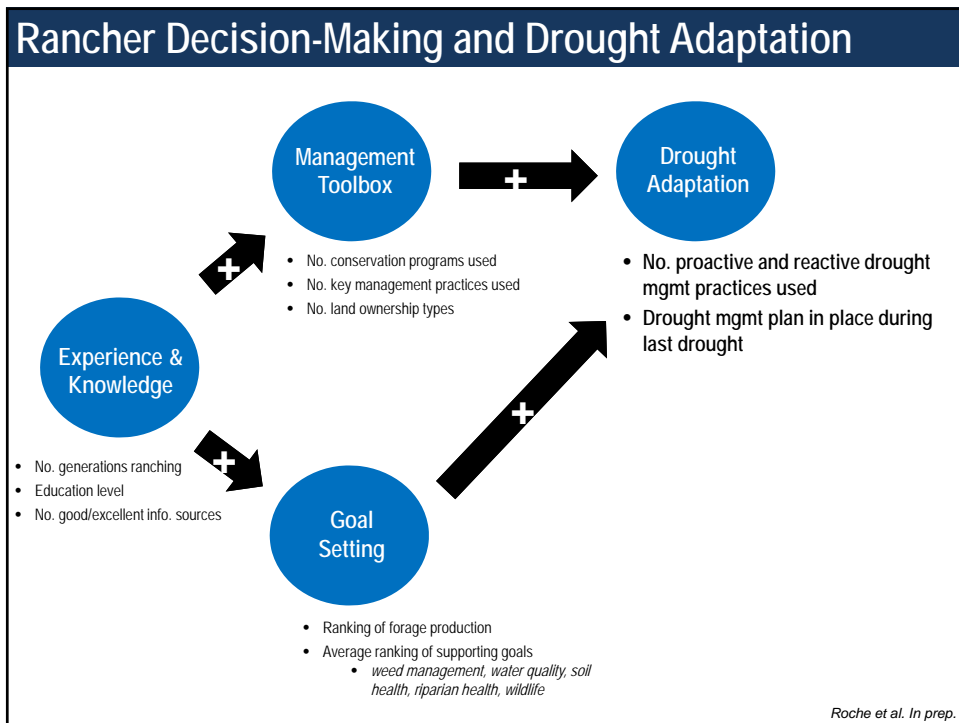
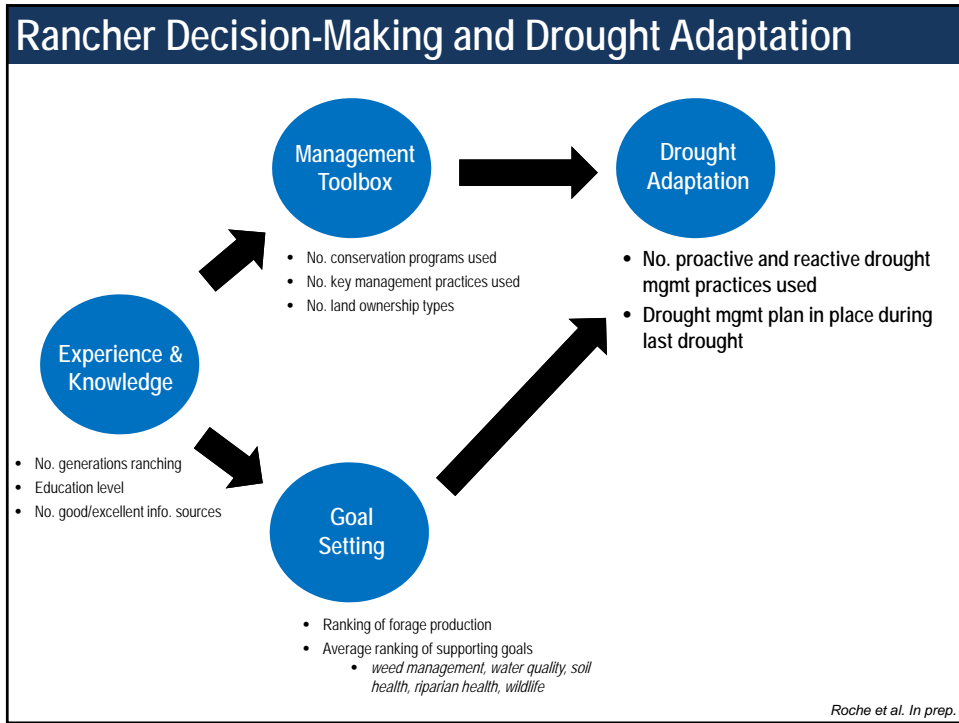


Rancher Decision-Making and Drought Adaptation

Experience & Knowledge

- No. of generations ranching
- Education level
- No. of good/excellent info. sources





Managing rangelands to balance conservation and production-based outcomes: Win-wins and Tradeoffs

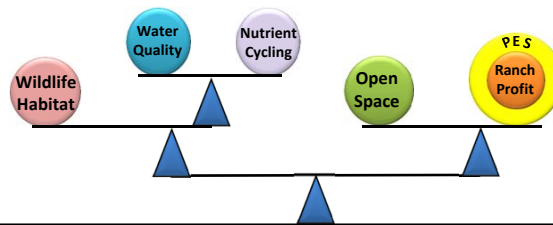
Cattle Grazing & Yosemite Toad

Win-win benefits for public lands grazing and sensitive species conservation.

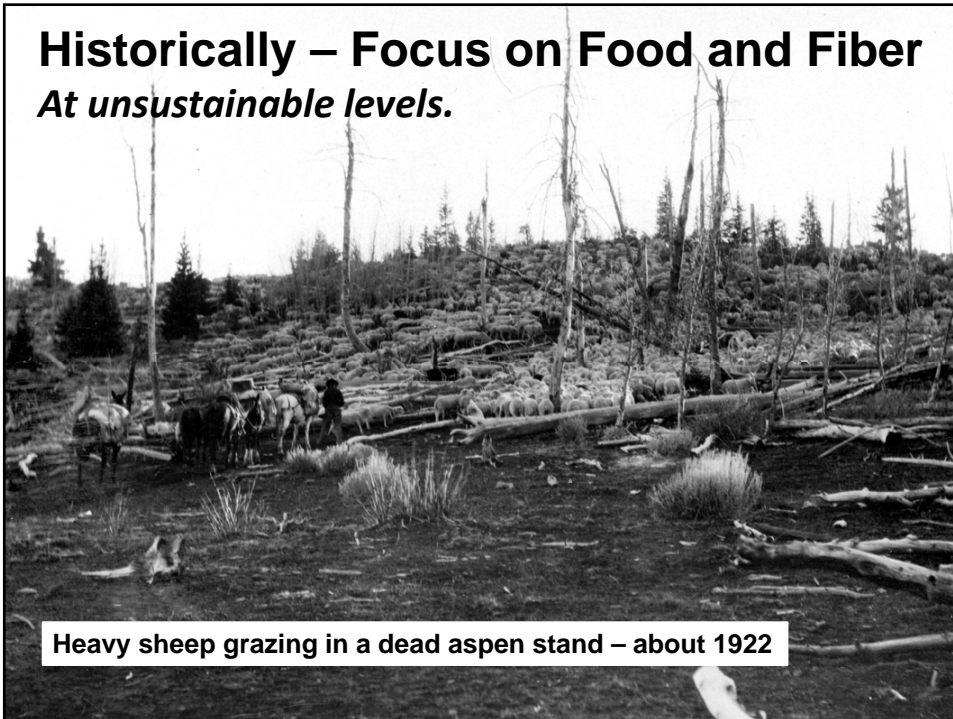


Woody Vegetation Management Strategies

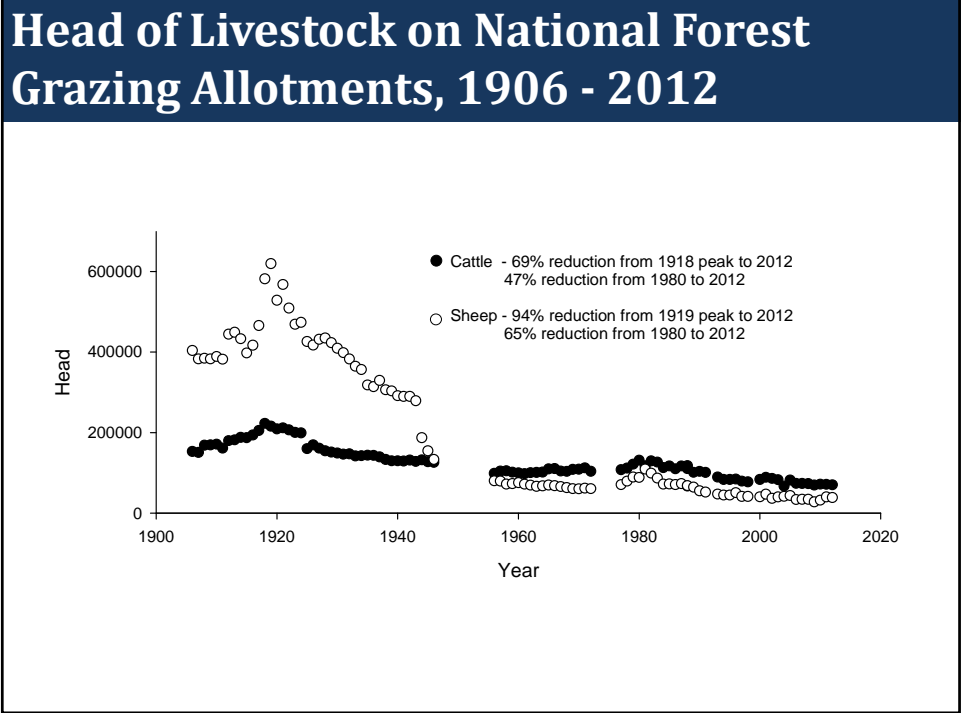
Agricultural production and conservation tradeoffs across oak management scenarios.



Historically – Focus on Food and Fiber *At unsustainable levels.*



Heavy sheep grazing in a dead aspen stand – about 1922



Modern Times – USFS Grazing Allotments

500 grazed allotments
8,000,000 acres
430,000 Animal Unit Months
~70,000 head of cattle

US Forest Service must manage for multiple economic, social, and conservation goals.

Rangeland Management Units (allotments)

Public Lands Grazing & Yosemite Toad

Multiple-Use Management on Public Lands

- Yosemite Toad - Proposed for listing under ESA
 - Mountain Meadows – Key breeding and rearing habitat
 - Believed to be declining
 - Livestock as a potential driver of decline?
- 2005-2010 Yosemite Toad Adaptive Management Project
 - *USFS, UC Davis, UC Berkeley, UCCE and range stakeholders.*



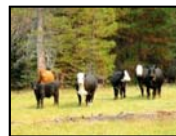
Public Lands Grazing & Yosemite Toad

Multi-Pronged Approach

Sierra and Stanislaus National Forest

Cattle Exclusion Experiments

- Breeding pool habitat response
 - Water quality
 - Vegetative Cover
- Tadpole and young of the year response



Results

- Observed nutrient concentrations ~ 1 order of magnitude below levels of ecological concern.
- Turbidity, temperature, depth, and cover not significantly different among treatments.
- No benefit to Yosemite toad presence or early life stages in fenced or partially fenced meadows compared to standard US Forest Service grazing levels.

Mellroy et al. 2013 PLOS ONE.
Roche et al. 2012. *Rangeland Ecology & Management*.

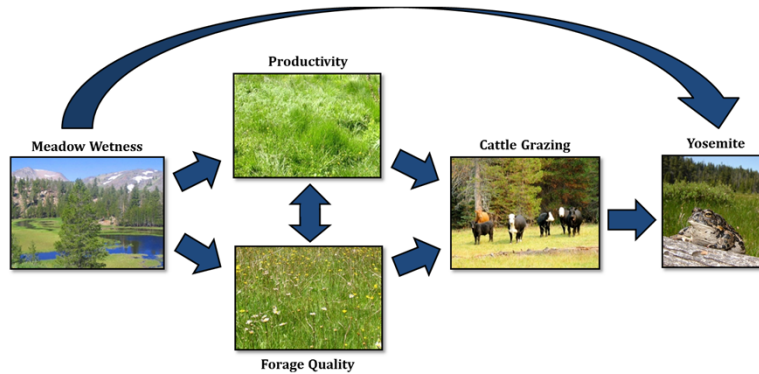
Public Lands Grazing & Yosemite Toad

Multi-Pronged Approach

Sierra National Forest

Cross-Sectional Survey

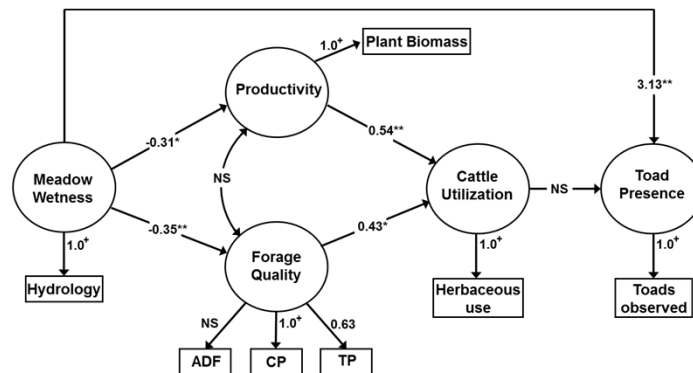
- Cross-Sectional, Longitudinal Gradient Analysis
 - Under standard USFS grazing management
 - Coarse-scale habitat overlap of cattle and toads



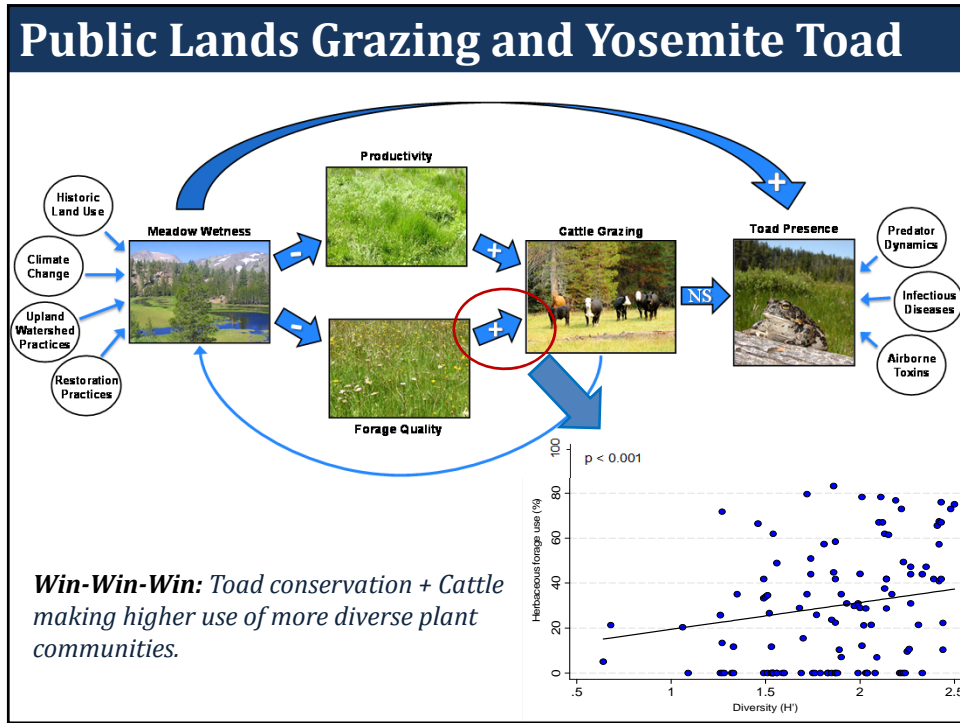
Public Lands Grazing & Yosemite Toad

RESULTS

- Cattle select for higher forage quality diets (relatively drier meadows)
- Toads more prevalent in wetter meadows.



Roche et al. 2012. PLOS ONE.



Cattle grazing and conservation of Yosemite toad can be compatible goals

Cattle Grazing and Yosemite Toad (*Bufo canorus* Camp) Breeding Habitat in Sierra Nevada Meadows
 L.M. Roche, B. Allen-Diaz, D.J. Eastburn, and K.W. Tate. 2012. Rangeland Ecology & Management.


Cattle grazing and conservation of a meadow-dependent amphibian species in the Sierra Nevada
 L.M. Roche, A.M. Latimer, D.J. Eastburn, and K.W. Tate. 2012. PLOS ONE.

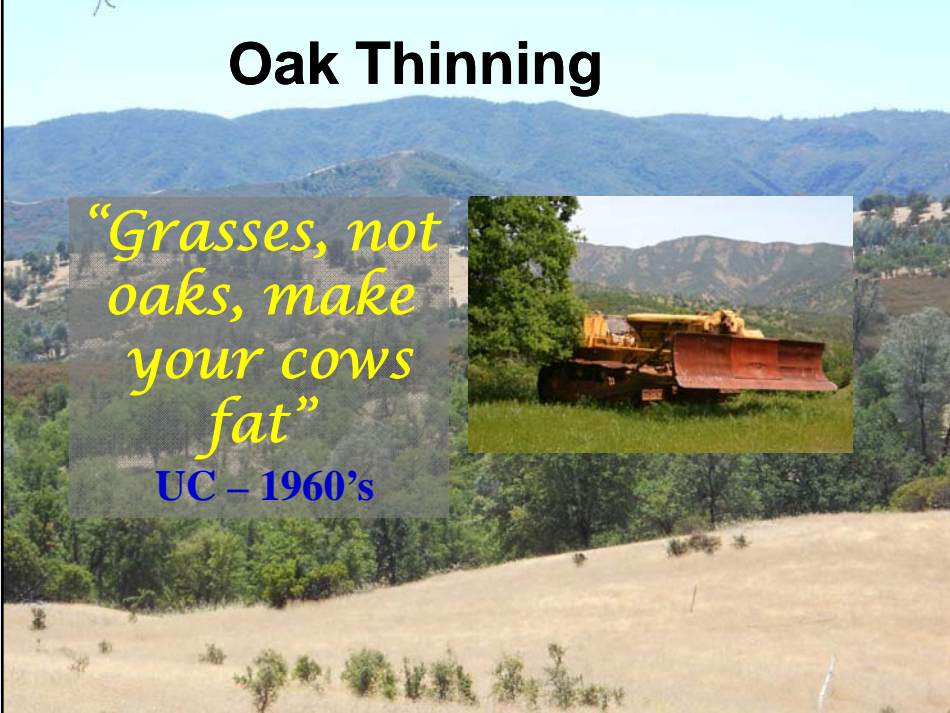
Determining the effects of cattle grazing treatments on Yosemite toads (*Anaxyrus canorus*) in montane meadows.
 S. McIlroy, A.J. Lind, B.H. Allen-Diaz, L.M. Roche, W.E. Frost, R.L. Grasso, and K.W. Tate. 2013. PLOS ONE.

Oak Thinning

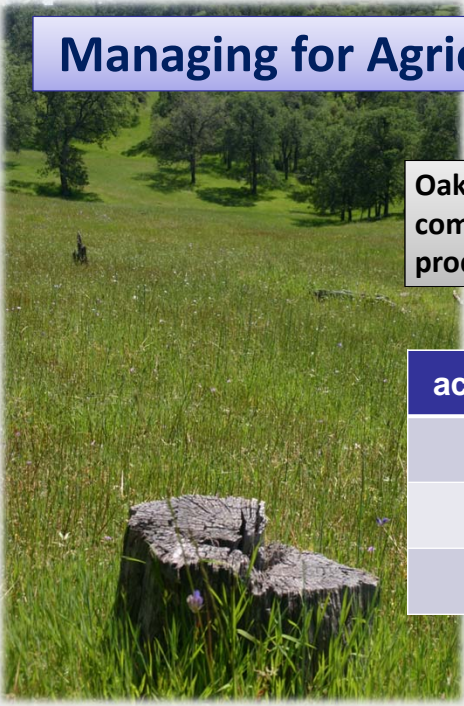
“Grasses, not oaks, make your cows fat”

UC – 1960’s





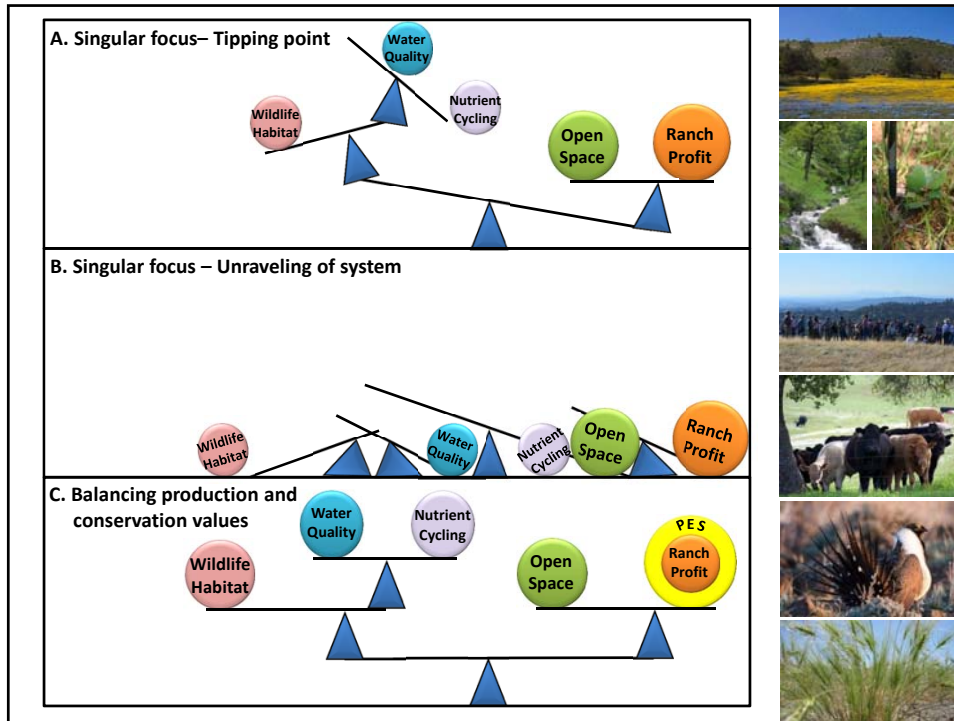
Managing for Agricultural Productivity



Oak and shrub thinning was, and is, a common practice to increase forage production.

| acre/AUY | oak thinning |
|----------|-----------------------|
| 26 | Intact oak woodland |
| 13 | thin to 30% oak cover |
| 7 | thin to 0% oak cover |

UC SFREC Stocking Records 1999-2009



Managing for Services

- Ecosystem services must be a goal.
- A big toolbox exists, no silver bullet.
- Site specific, adaptive management.
- Logistically and economically feasible.
- Partnership required.

rangelandwatersheds.ucdavis.edu



Adaptive Grazing Management Experiment

Win-win strategies to manage invasive weeds and support livestock production