

# **Sustainable Public Lands Grazing**

## *Striking a Multiple Use Balance*



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*UC Davis, US Forest Service*

# Sustainable Public Lands Grazing

## Federal Public Grazing Lands



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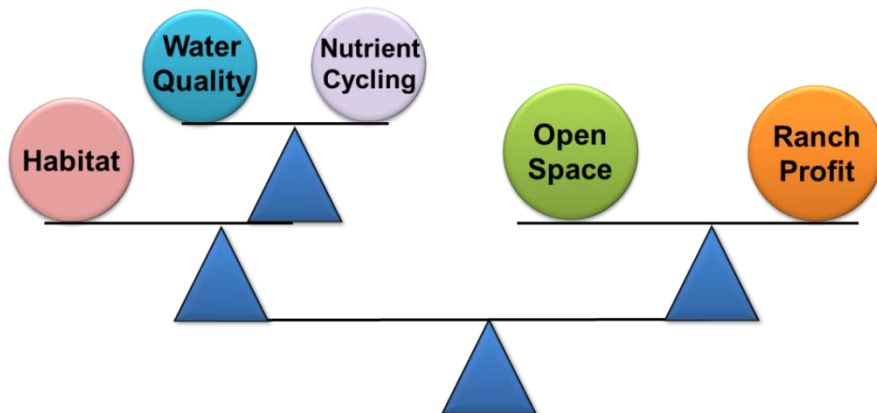
1) Reflect the global debate about the sustainability of livestock production.



# Sustainable Public Lands Grazing

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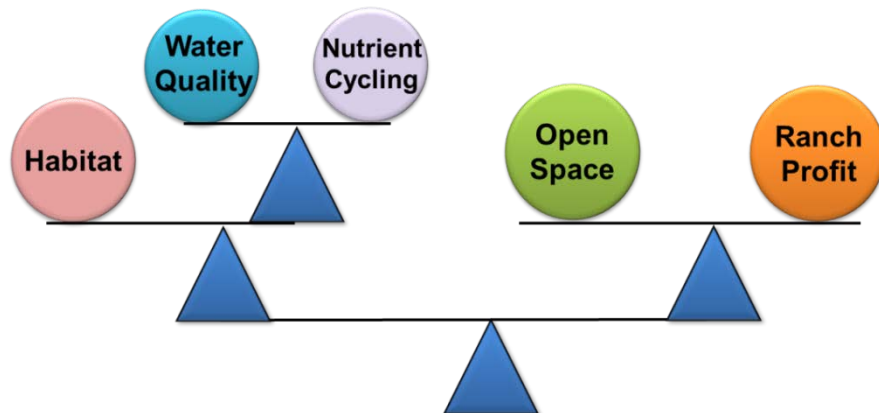
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- 2) Ground zero for multiple use policy and management to meet everyone's goals.



# Sustainable Public Lands Grazing

## Federal Public Grazing Lands

- 1) Reflect the global debate about the sustainability of livestock production.
- 2) Ground zero for multiple use policy and management to meet everyone's goals.
- 3) Perceptions of “conflicting” research conclusions.**



# **Sustainable Public Lands Grazing**

**Research and Management Eras**

# Sustainable Public Lands Grazing

## Research and Management Eras

- 1) A body of case studies & research from the 1970's through mid-1990's that demonstrates the negative outcomes of management to optimize meat and fiber.





# Sustainable Public Lands Grazing

1970s through mid-1990s research body

## *Examples*

Kauffman and Krueger. 1984. *Livestock impacts on riparian ecosystems and streamside management implications: a review*. Range Management.

Fleischner. 1994. *Ecological costs of livestock grazing in western North America*. Conservation Biology.

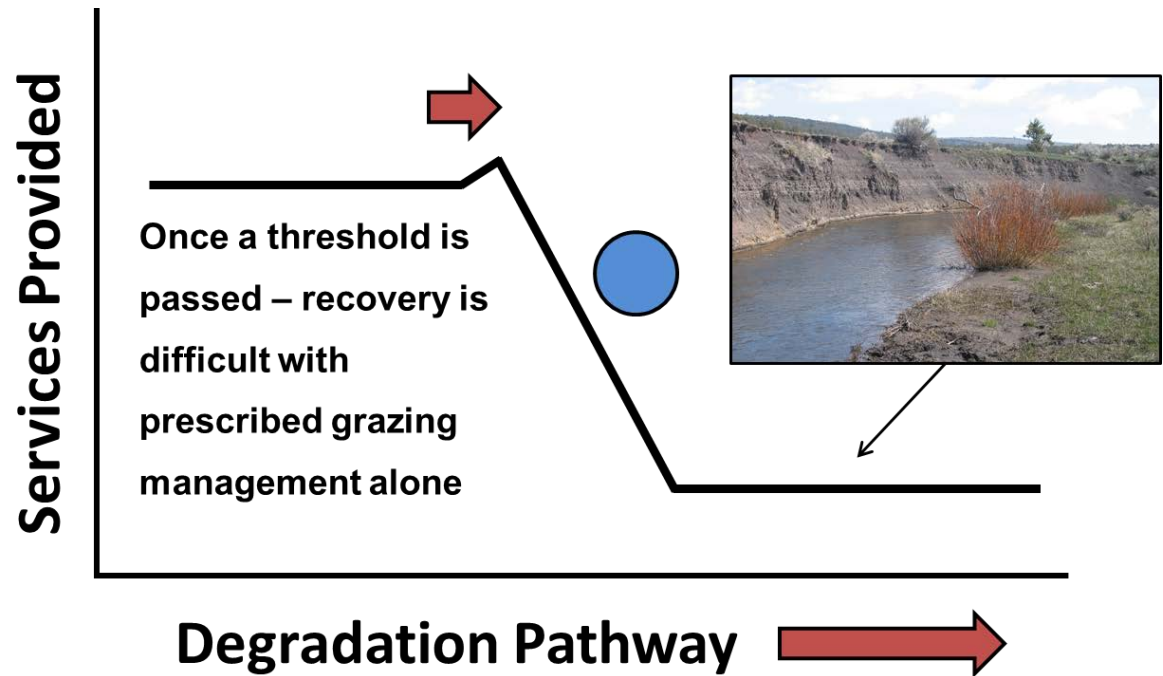
Belsky et al. 1999. *Survey of livestock influences on stream and riparian ecosystems in the western U.S.* Soil Water Conservation.



# Excessive Riparian Grazing



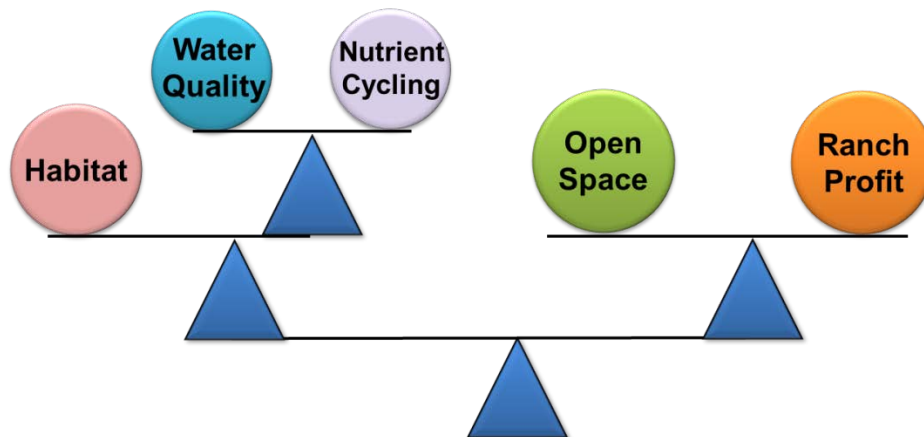
- damage to riparian vegetation → invasive plants
- loss of native riparian plants
- bare, unstable stream banks
- stream channel erosion
- loss of water table, habitat, and water quality



# Sustainable Public Lands Grazing

## Research and Management Eras

- 1) A body of case studies & research from the 1970's through mid-1990's that demonstrates the negative outcomes of management to optimize meat and fiber.
- 2) A contemporary body of research demonstrates the effectiveness of modern management for achieving multiple ecosystem services.



# Sustainable Public Lands Grazing

Contemporary research body

## *Examples*

Clary. 1999. *Stream channel and vegetation responses to late spring cattle grazing*. Range Management.

George et al. 2011. *A scientific assessment of the effectiveness of riparian management practices*. USDA Rangeland CEAP.

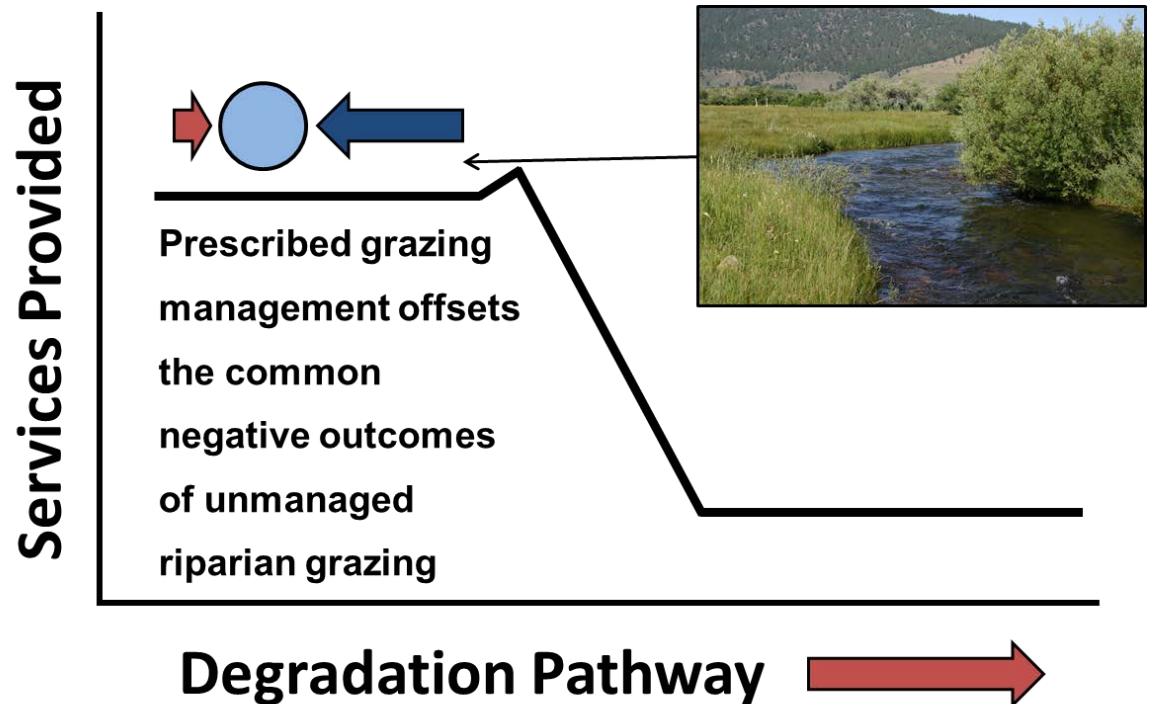
Freitas et al. 2014. *Montane meadow plant community response to grazing*. Environmental Management.



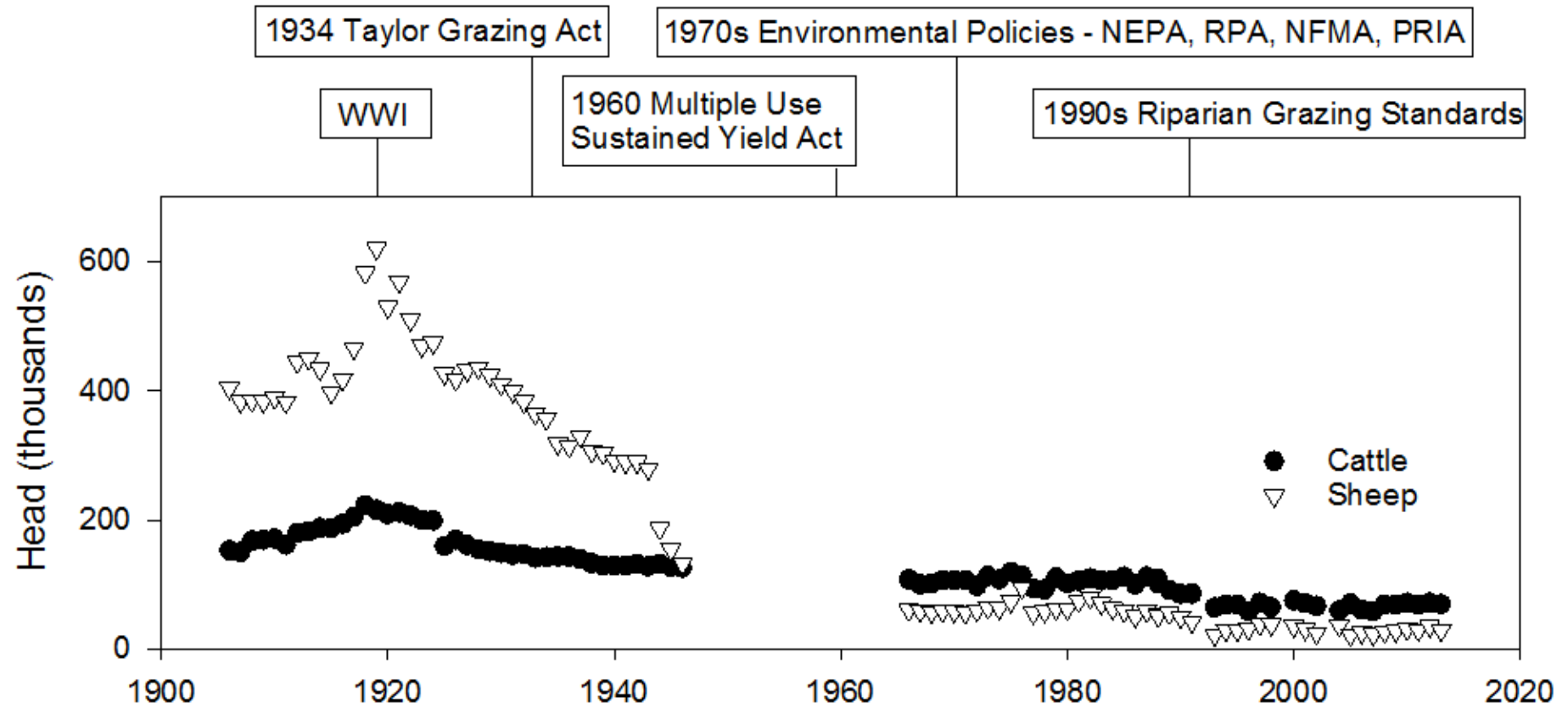
# Managed Riparian Grazing



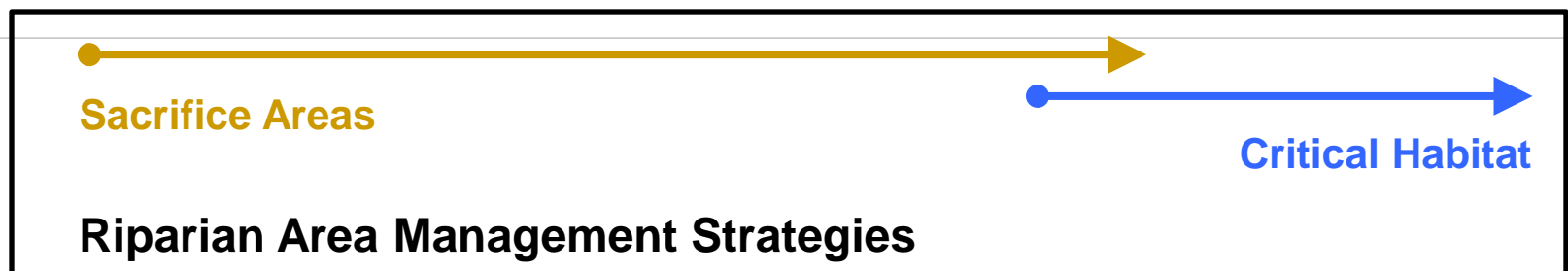
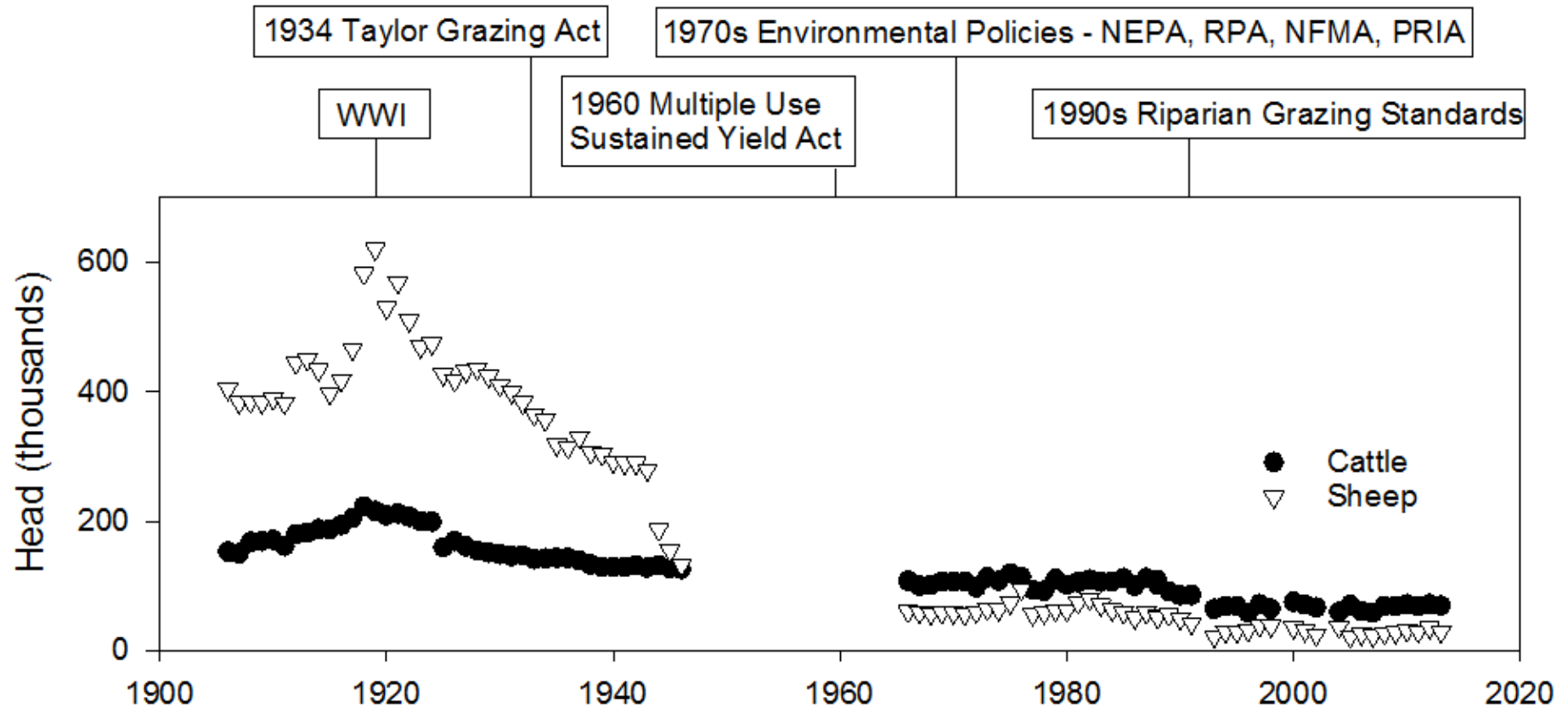
- set riparian enhancement goals
- set limits on livestock browse on desired plants, and disturbance to stream banks
- adaptive grazing management to meet these targets



# Policies and Trends in Livestock on USFS Lands in CA 1906 through 2013



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# Late 1990s – early 2000s

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# Late 1990s – early 2000s

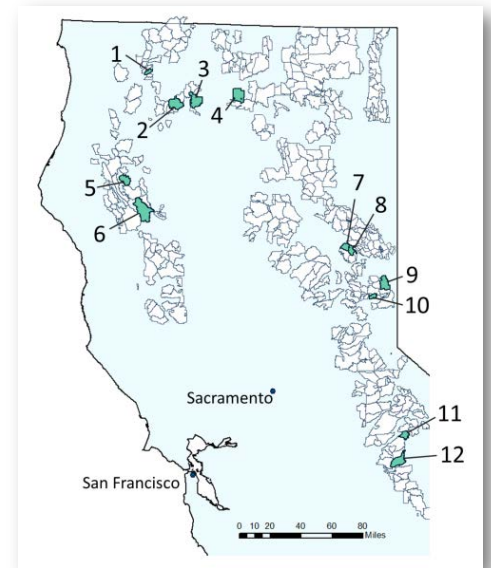
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- **Browse on Riparian Woody Plants** – Limits on the percentage of new year's leader growth which can be browsed on species such as aspen and willow (e.g., 20%).
- **Streambank Disturbance** – Limits the amount of livestock hoof damage or trampling on streambanks (e.g., 10%).

# Contemporary Management & Research

*“Cattle grazing, recreation, and clean water can be compatible goals across these national forest lands”*

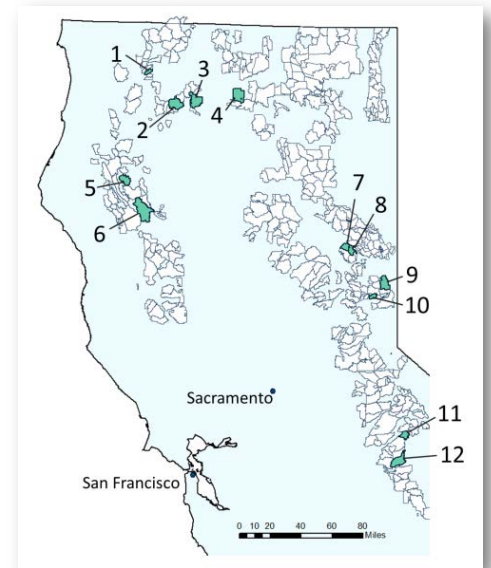
**Roche et al. 2013 PLOS ONE**



# Contemporary Management & Research

*“Cattle grazing, recreation, and clean water can be compatible goals across these national forest lands”*

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*“No benefit to Yosemite toad in fenced meadows compared to USFS riparian grazing standards and guidelines”*

**McIlroy et al. 2013 PLOS ONE**



# Contemporary Management & Research

*“Aspen w  $\leq 20\%$  of leader growth removed annually grow above the browse line within several years.”*

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*“Livestock grazing compliant with USFS riparian grazing standards did not degrade or hamper recovery of meadow plant communities”*  
**Freitas et al. 2014 Envir. Manage.**



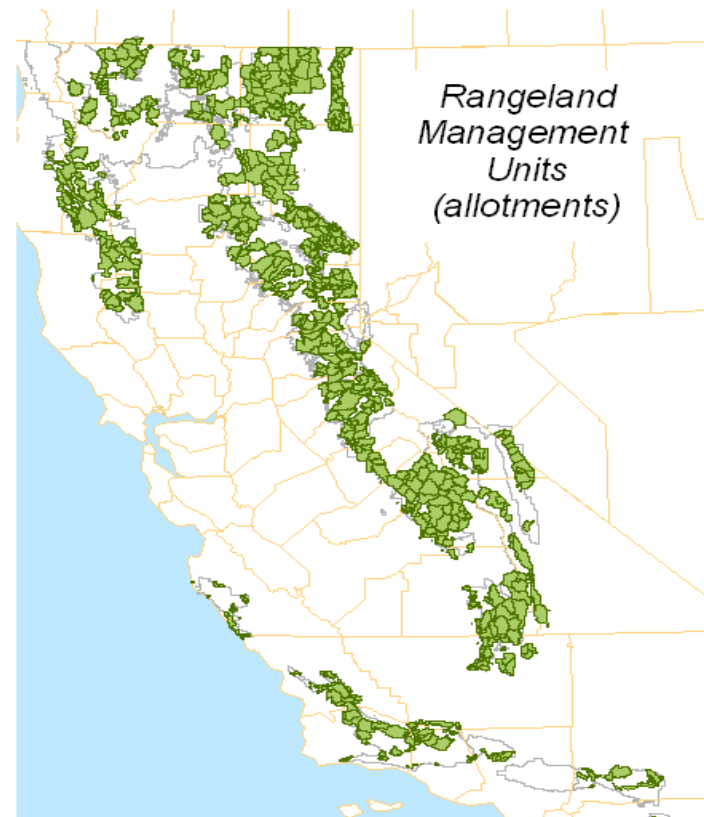


# Authorized Use Trends 2000 through 2013

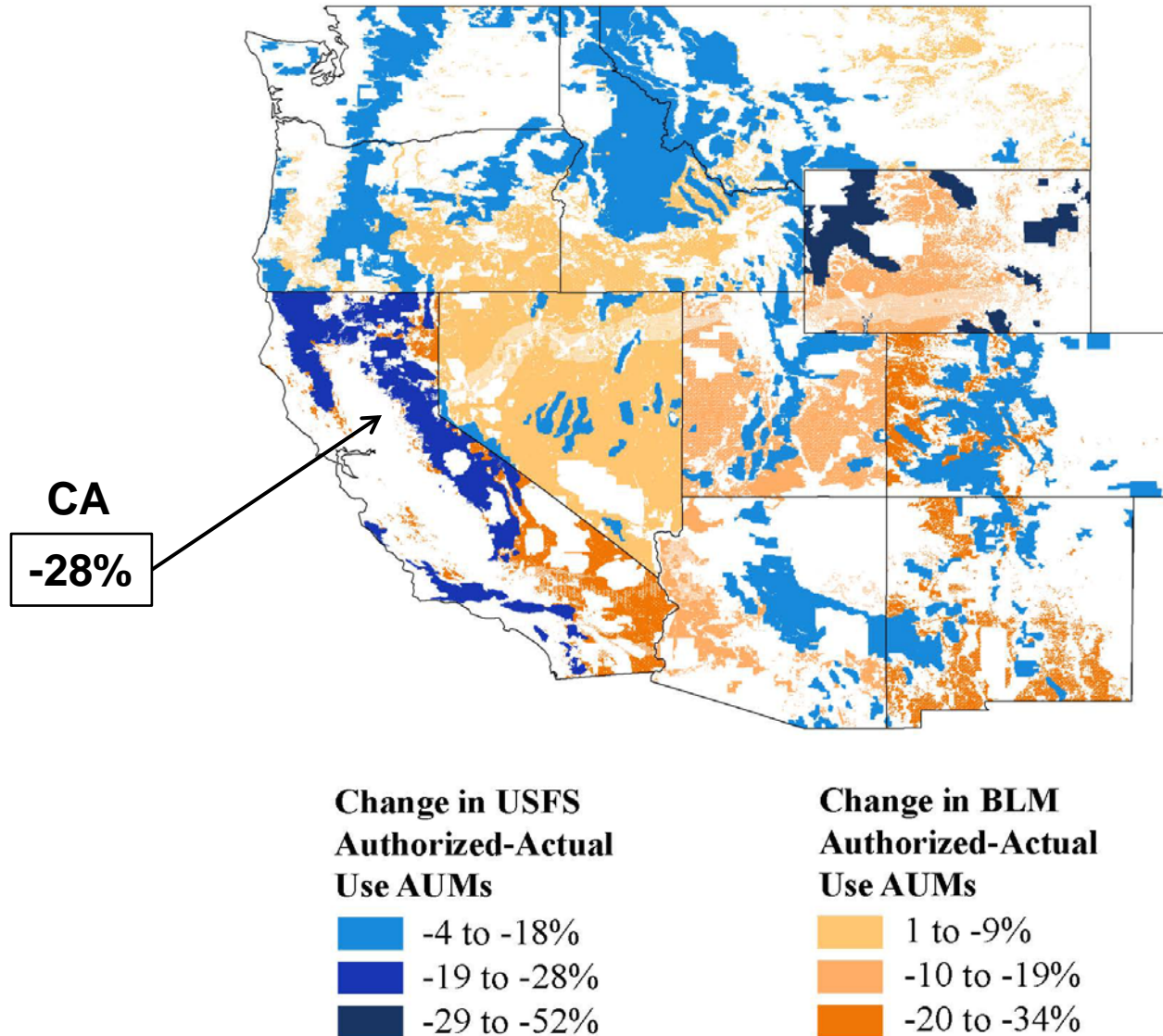
Year	Permittees		Livestock AUMs	
2000	464		452,712	
2013	368	<b>-21%</b>	332,099	<b>-28%</b>

**Use restrictions due for sensitive, threatened, and endangered species.**

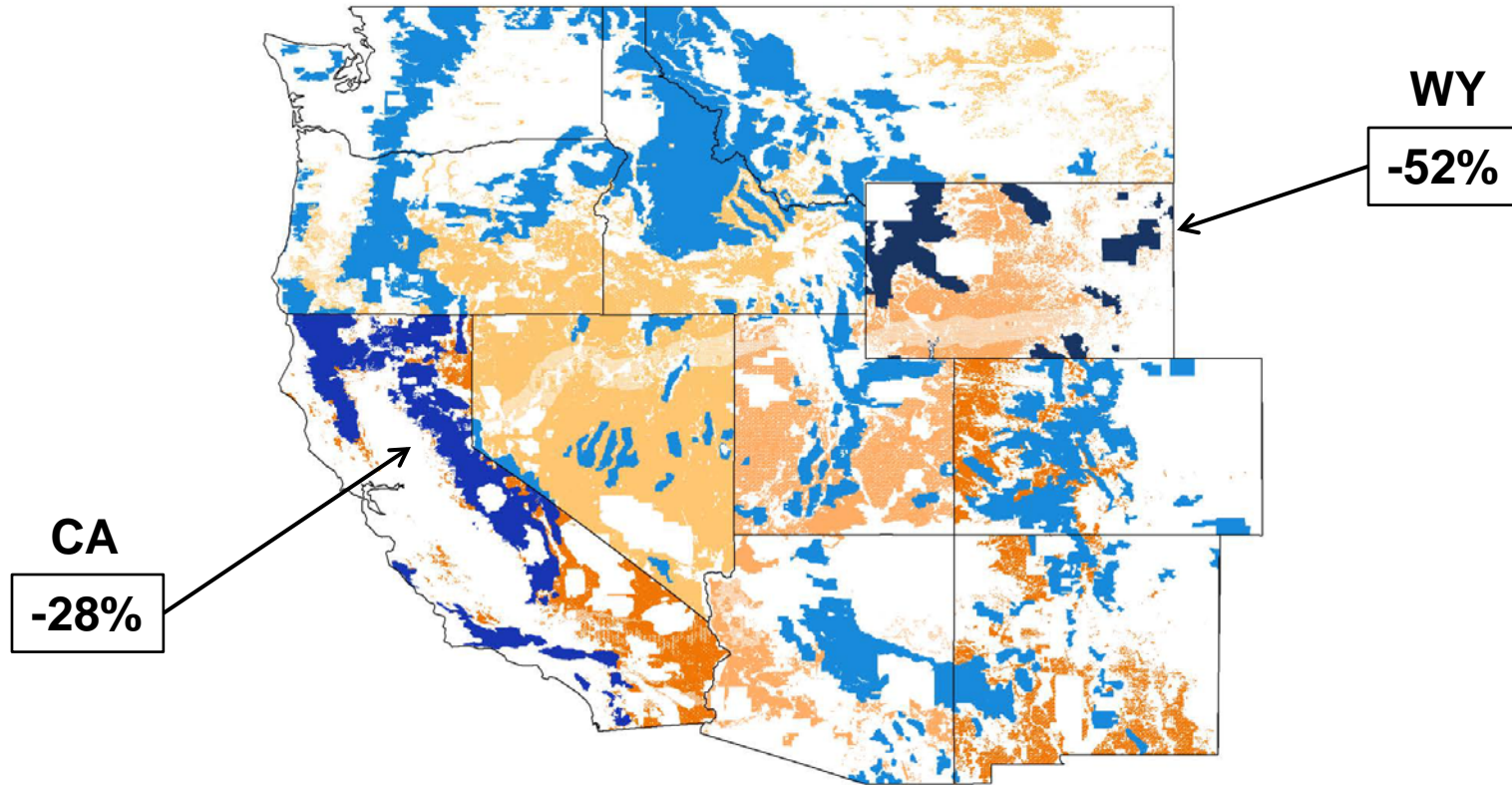
**In addition to riparian grazing standards and guidelines.**



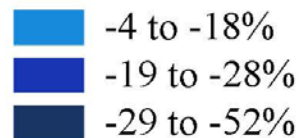
# Trends in livestock animal unit months (AUMs) on federal forest and rangelands – 2000 through 2013.



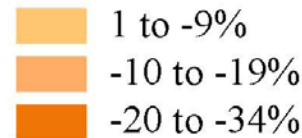
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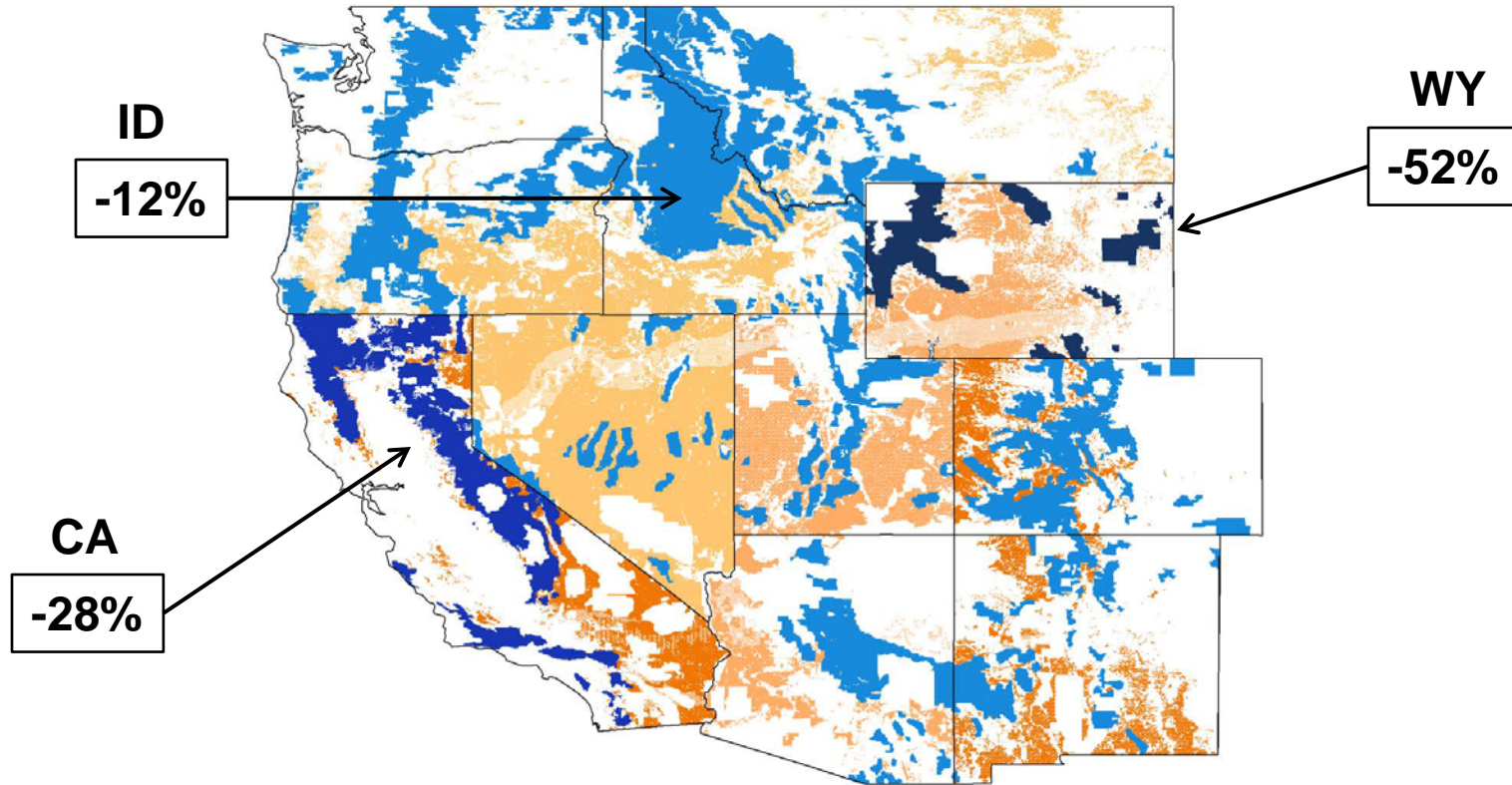
**Change in USFS  
Authorized-Actual  
Use AUMs**



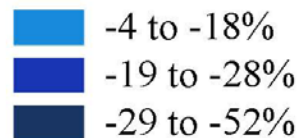
**Change in BLM  
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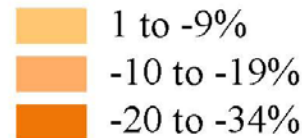
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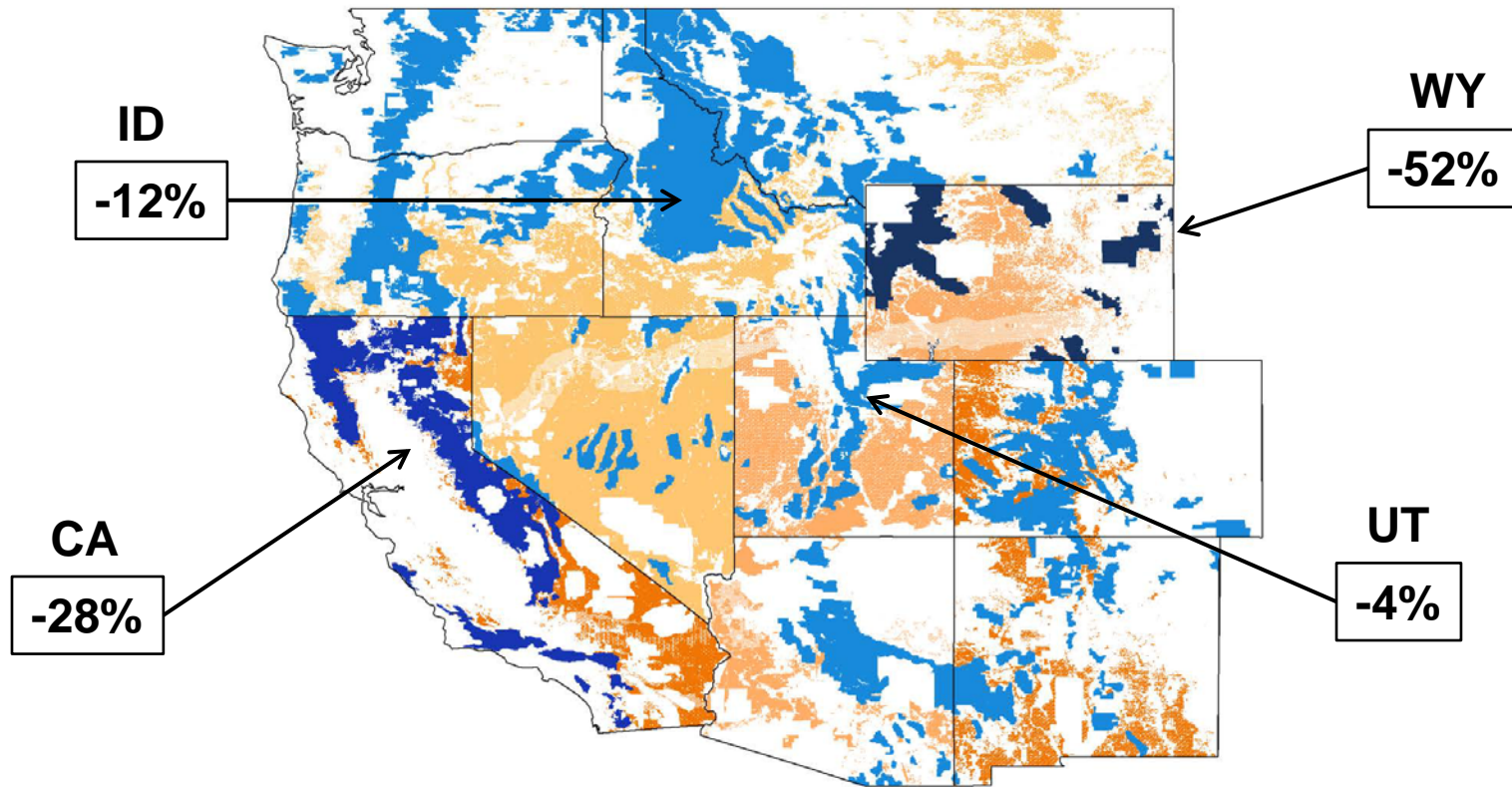


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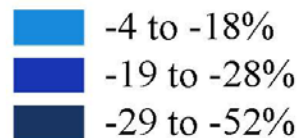




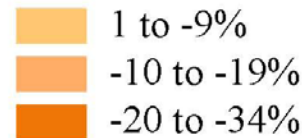
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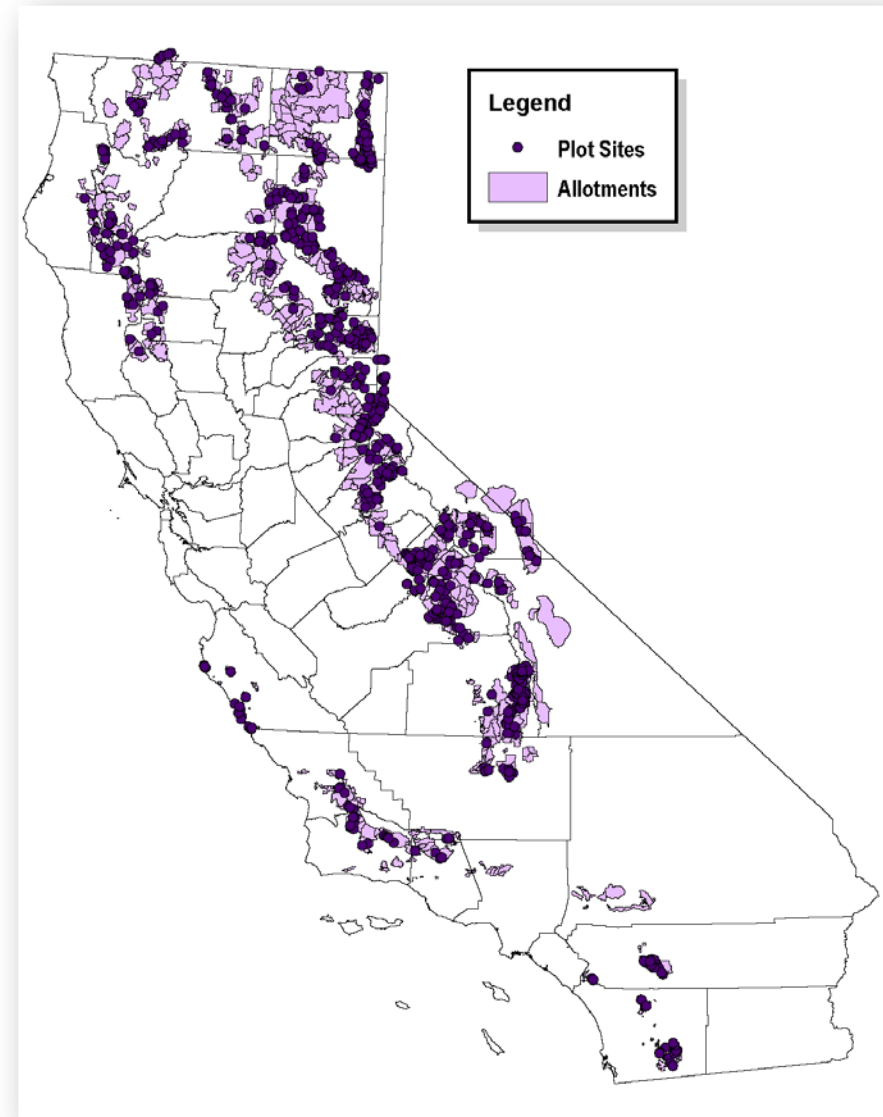


# USFS R5 LONG-TERM RANGE MONITORING

- **1997: Initiated long-term monitoring program.**
  1. Document baseline conditions as new standards and guidelines were coming into use.
  2. Examine long-term trends following implementation of standard and guidelines.
- **UCD partnering with USFS to analyze these data.**

# Range Condition Monitoring 1997-2014

- **Over 800 permanent plots**
  - Read every 5 years
  - 325 with 8+ years of data
- **Plant species composition**
  - Diversity
  - Richness
  - Ecological Functions
- **Current data analysis**
  - Range Condition
  - Trend in Condition
  - Initial Condition x Weather x Site Type x Management





# Meadows Conditions 1997-2014

Mean (s.e.) change in plant community metrics across all 325 monitoring sites (overall), 67 non-grazed sites, and 258 grazed sites.

Metric	Overall	Non-Grazed	Grazed
Richness (S)	3.1 (0.3)	3.1 (0.5)	3.1 (0.4)
Diversity (H') (log scale)	0.18 (0.02)	0.17 (0.04)	0.18 (0.02)

**1. Plant species richness and diversity increased.**

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- 1. Plant species richness and diversity increased.**
- 2. Invasive species did not increase (<1%).**

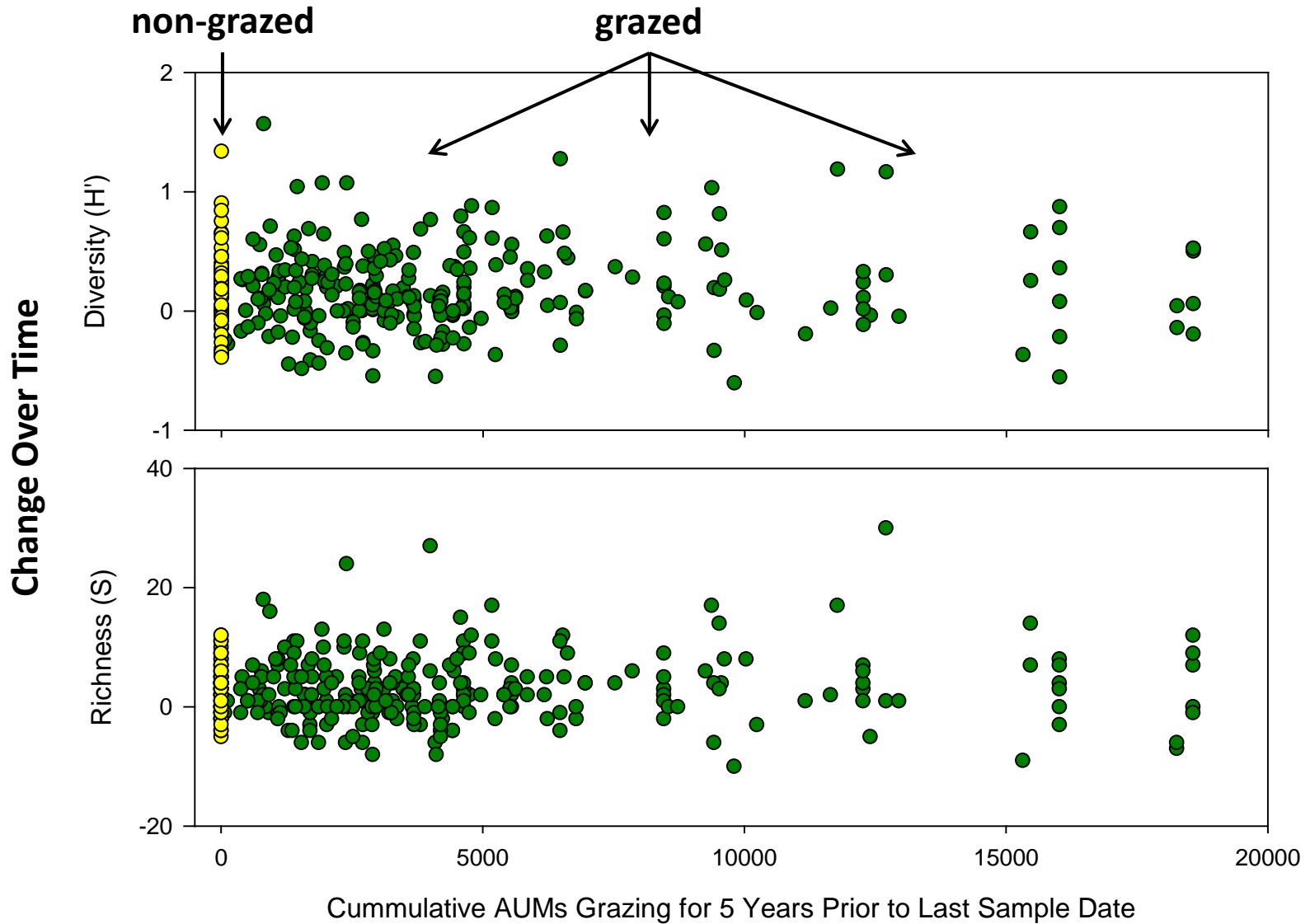
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Rel. Freq. Highly Invasive	0.2 (0.02)	0.2 (0.03)	0.2 (0.02)
Rel. Freq. Forbs	2.3 (0.7)	3.9 (1.5)	1.9 (0.8)

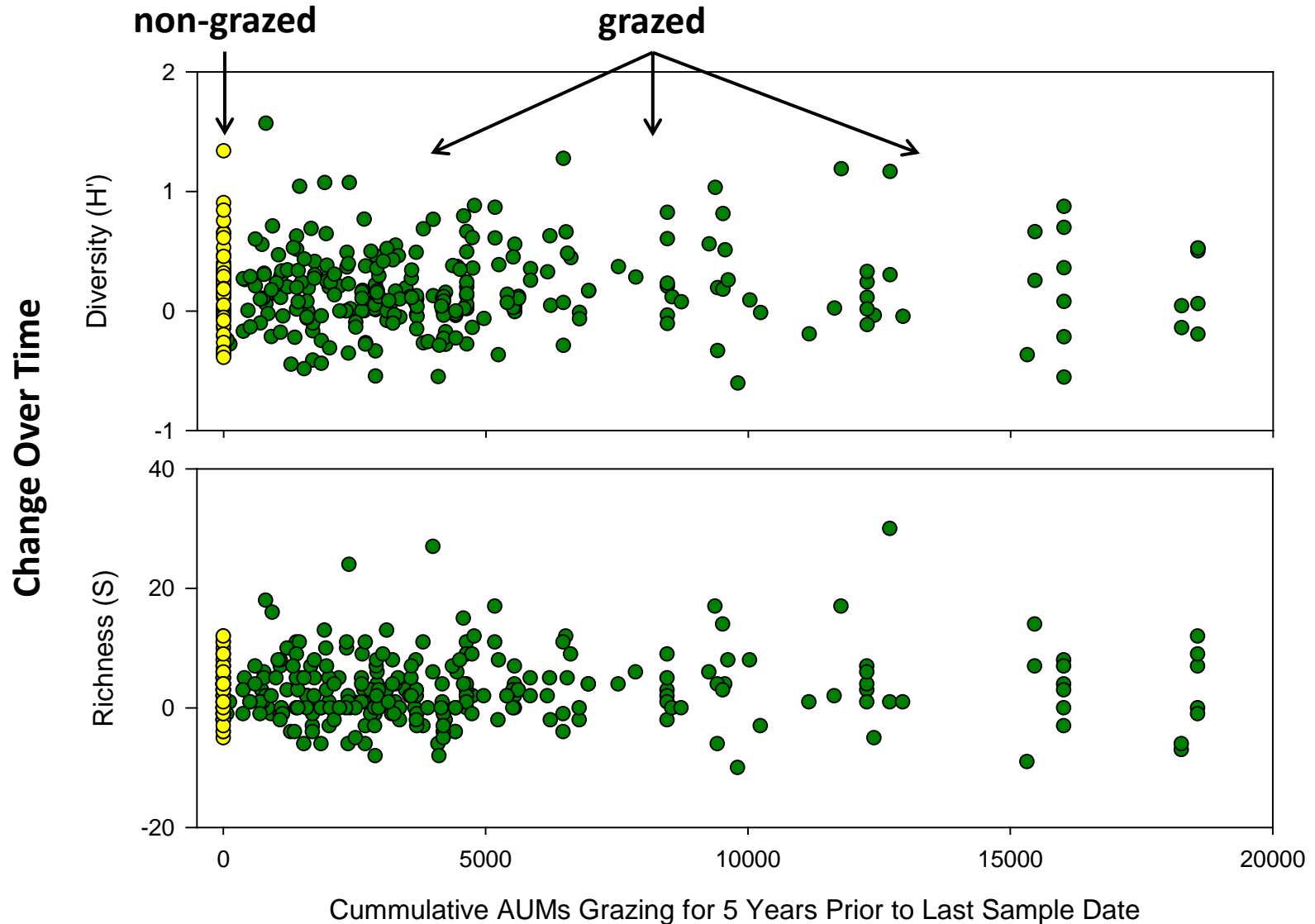
1. Plant species richness and diversity increased.
2. Invasive species did not increase (<1%).
3. Increased native forb component.

# Meadow Conditions 1997-2014

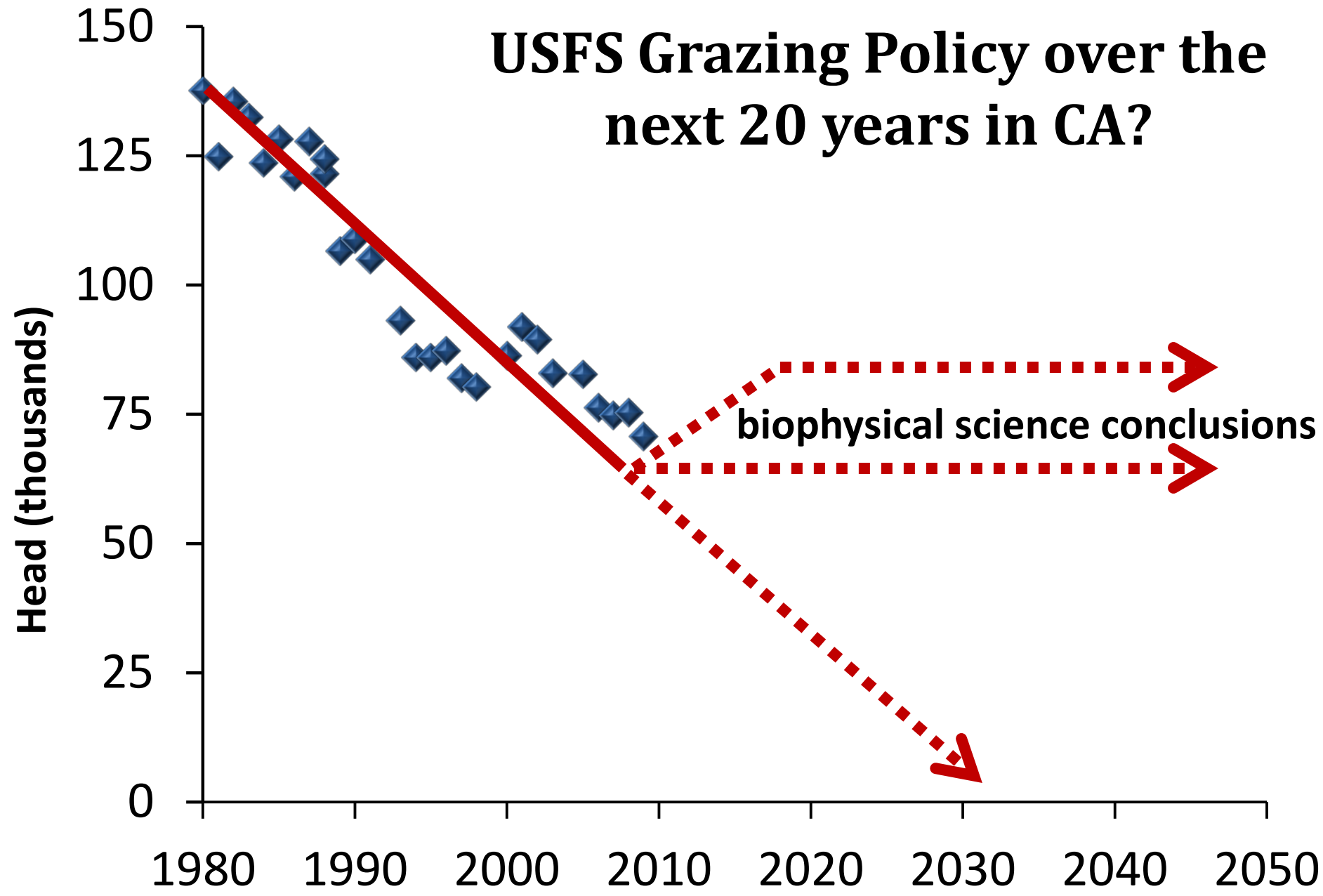


# Meadow Conditions 1997-2014

## Changes not correlated to grazing pressure



# USFS Grazing Policy over the next 20 years in CA?



# Sustainable Public Lands Grazing

## *Striking a Multiple Use Balance*



- **The biophysical science is clear**
  - Poor grazing management w/out conservation goals degrades resources.
  - Proper grazing management w/ conservation goals enhances-conserves multiple ecosystem services.



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- **The biophysical science is not conflicting**
  - Research conducted during the different “grazing eras” do accurately reflect the divergent outcomes of the policies and strategies of each era.

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**1985 ≠ 2015**

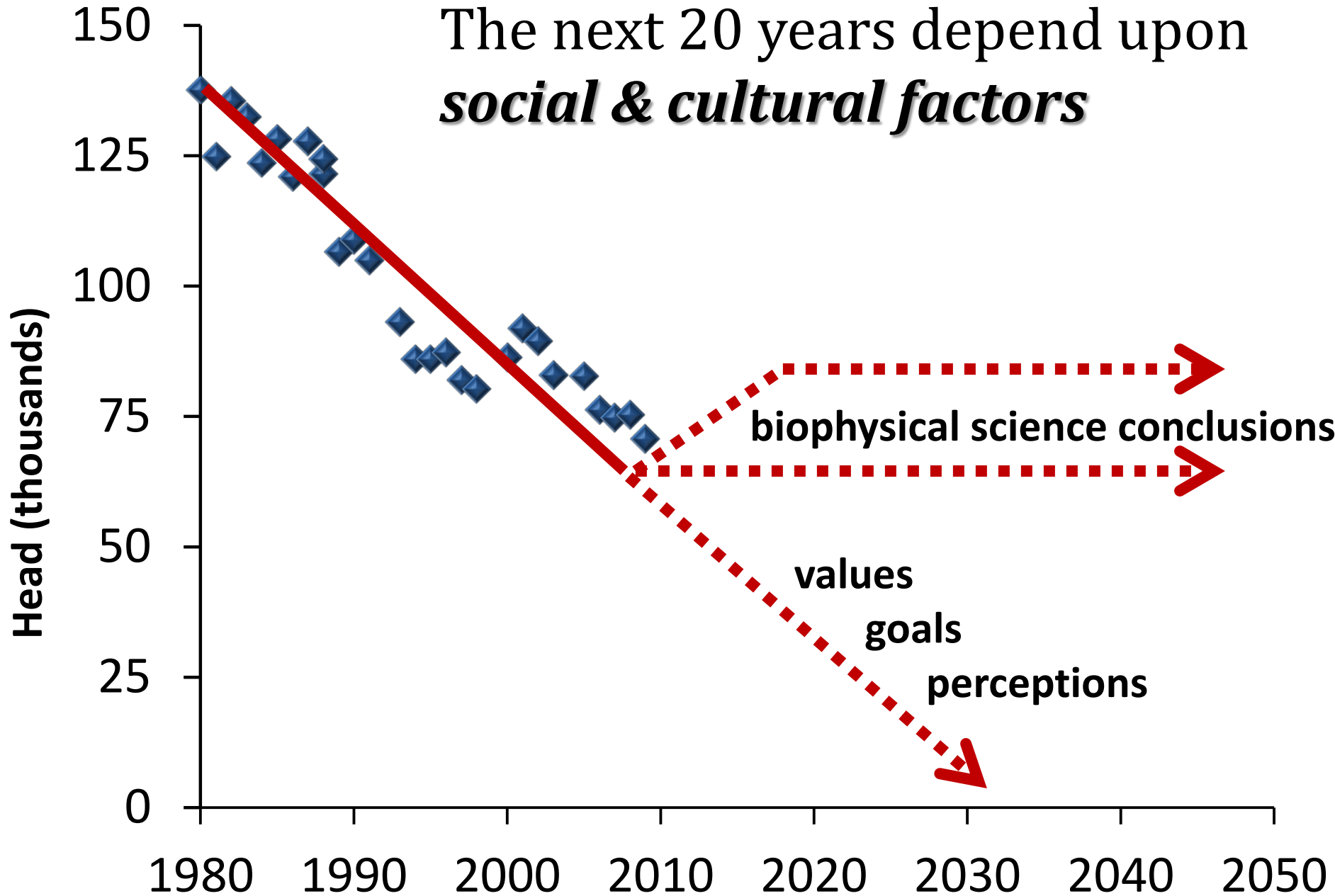
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- **Continued livestock reductions not broadly supported by science**
  - Recent studies showing no response to stocking rates – likely below a threshold.
  - **KEY** – Proper livestock distribution and attaining annual utilization standards on each allotment.

The next 20 years depend upon  
*social & cultural factors*





# Rangeland Watershed Laboratory

<http://rangelandwatersheds.ucdavis.edu>

