

Trends in Livestock Use on Federal Grazing Lands

Mountain meadows and riparian areas on federal lands across the western United States constitute a unique and critical natural resource. California's federal public lands provide a multitude of ecosystem services, including flood water attenuation, forage for cattle and wildlife, and outdoor recreation for more than 26 million people each year.

The number of livestock animal unit months (AUMs) on USFS lands has decreased by approximately 50% since 1980. For the period 2000-2013, total AUMs declined 27% on National Forest Lands in California and declined 23% on Bureau of Land Management lands in California.

Area	Year	No. of Permits or Authorizations	AUMs			
			Cattle	Horse/Burro	Sheep	Total
USFS (R1-R6)	2000	7,256	7,136,180	40,398	720,737	7,897,315
	2013	5,988	5,833,612	40,086	548,726	6,422,424
	Change	-1,268	-1,302,568	-312	-172,011	-1,474,891
	% Change	-17	-18	-1	-24	-19
BLM	2000	18,211	8,890,057	55,253	892,278	9,837,588
	2013	17,332	7,815,981	51,574	645,716	8,513,271
	Change	-879	-1,074,076	-3,679	-246,562	-1,324,317
	% Change	-5	-12	-7	-28	-13
R5 USFS	2000	464	417,580	1,470	35,123	454,173
	2013	368	306,985	786	24,328	332,099
	Change	-96	-110,595	-684	-10,795	-122,074
	% Change	-21	-26	-47	-31	-27
CA BLM	2000	473	232,464	304	17,717	250,485
	2013	454	180,753	357	12,677	193,787
	Change	-19	-51,711	53	-5,040	-56,698
	% Change	-4	-22	17	-28	-23

Trends in livestock grazing on U.S. Forest Service and U.S. Bureau of Land Management administered public grazing lands from 2000 through 2013.



Meadow Conditions on National Forest Allotments

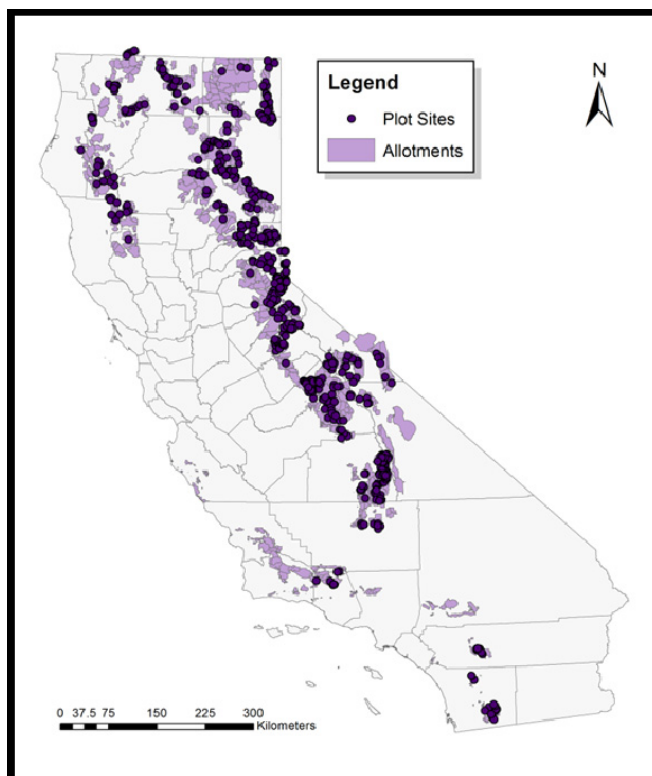
Many stakeholder groups have raised concerns about the potential negative impacts of cattle grazing on riparian habitat conservation. In 1990, as a result of these concerns, the USFS developed new annual livestock use standards and guidelines (S&Gs) for riparian areas. The resultant riparian S&Gs for Region 5 forests were:

- 1) restricted herbaceous vegetation biomass consumption
- 2) Minimum residual herbaceous vegetation height
- 3) Restricted browse on riparian willow species
- 4) Restricted livestock hoof damage to stream-banks

There was, and remains, substantial debate over the adequacy and efficacy of these S&Gs to balance riparian conservation and livestock production goals.



French Meadow on the Tahoe National Forest, Aug. 2015.



USFS Region 5 Range Program long-term meadow condition and trend monitoring sites and allotments.

In 1999, the USFS Region 5 Range Program initiated a region-wide, long-term meadow condition and trend monitoring program. The primary purpose of the program was to:

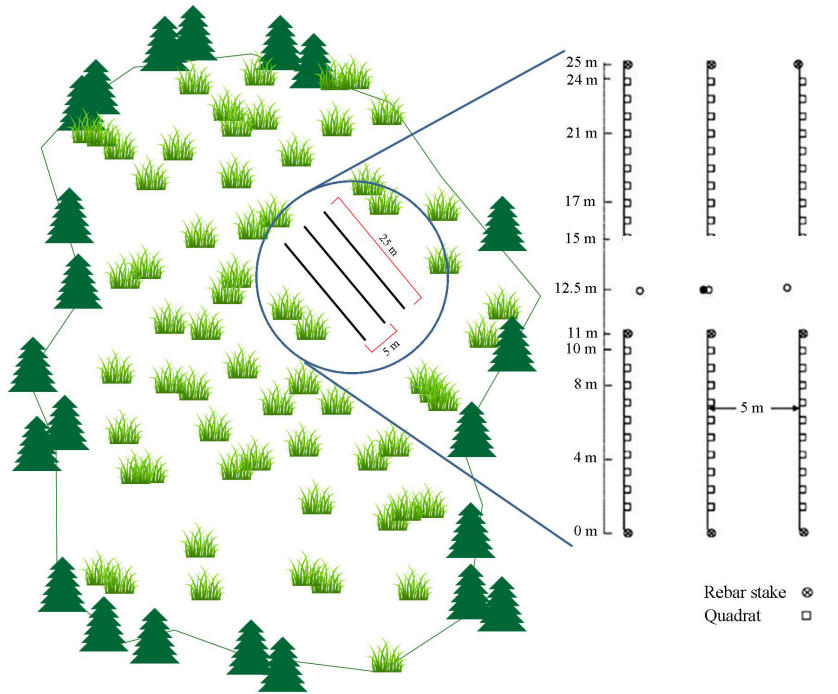
- 1) Document baseline meadow conditions as the new riparian standards and guidelines were coming into use
- 2) Examine long-term trends in meadow condition following implementation of riparian standards and guidelines

The program currently includes 618 permanent meadow vegetation monitoring sites established in key meadows across Region 5. More than 300 sites now have 10+ years of data.

In 2012, USFS Region 5 and UC Rangelands established a partnership to conduct the first comprehensive analysis of this unique dataset.

Sampling Design

Key areas—meadows preferentially grazed by cattle due to high forage quantity and quality and drinking water availability—were enrolled in the monitoring program. At each enrolled meadow, one to three sample plots were selected in a stratified random approach to obtain sites representative of the larger meadow vegetation complex.



Each permanently marked plot consists of **three 25 m parallel transects**, established five m apart.

Along each transect, **twenty 0.01 m² quadrats** were established at 1.0 m intervals.

Frequency of all plant species rooted within each 0.01 m² quadrat are recorded.

Following initial establishment and baseline readings, sites are **re-read at approximately 5 year intervals**.

Indicators of Meadow Health

Rooted frequency data will be used to calculate indicators of meadow condition and trend, including species richness, diversity and evenness. Soil stability scores will also be calculated from plant functional trait groups, which are based upon life-form, life-span, plant height, growth form, and nitrogen fixing ability.

Environmental Variables

For each grazing allotment in the study, we have monthly precipitation, temperature, and snow water equivalent data for October 1982-September 2012. These data will allow us to correlate indicators of meadow health to historic climatic changes, and predict changes in meadow health in response to projected climate changes.

Grazing Management Variables

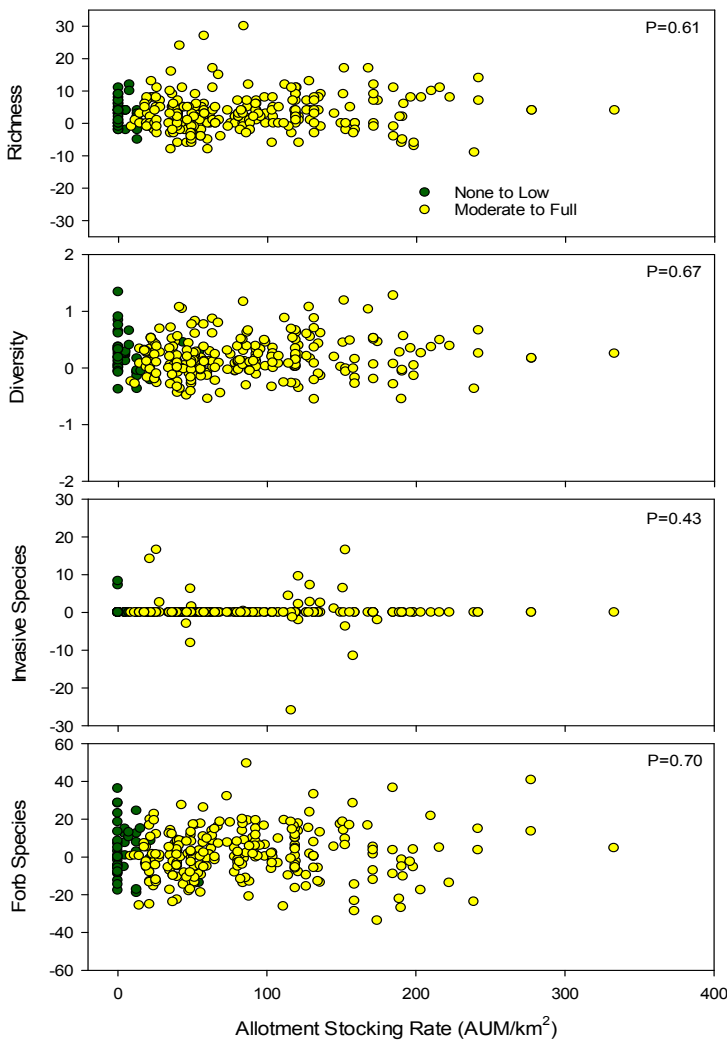
Beginning in the 1980s, there have been substantial reductions in livestock grazing pressure on California's national forests. Our team has worked to compile 102 years of annual USFS grazing records at both the forest and allotment levels across Region 5. These records will enable us to both characterize the types and trends in grazing regimes and link management changes to indicators of meadow health.

Initial Results

Mean change in plant community characteristics at 278 long-term (median of 10 years) meadow vegetation monitoring sites. Values in parentheses are one standard error. P-values are for test of differences between none-low use vs. moderate-full use sites.

	All Sites (n=278)	None-Low Use (n = 40)	Moderate-Full Use (n = 238)	P-Value
Δ Species Richness (S)	3.0 (0.31)	3.3 (0.5)	2.9 (0.4)	0.56
Δ Species Diversity (H')	0.18 (0.02)	0.23 (0.05)	0.17 (0.02)	0.24
Δ Relative Frequency of Highly Invasive Species	0.2 (0.2)	0.31 (0.22)	0.15 (0.17)	0.54
Δ Relative Frequency of Forb Species	1.8 (0.8)	3.1 (1.8)	1.5 (0.8)	0.44

Correlations between overall change in plant community characteristics and 10 year cumulative stocking rate for 278 long-term meadow vegetation monitoring sites.



Summary and Next Steps

A decade of change in meadow plant communities

1. Plant species richness and diversity increased.
2. Invasive species did not increase and were not prevalent (<1%).
3. Increased native forb component.
4. No significant relationships between allotment level grazing pressure and community trends.
5. Properly applied, current riparian grazing standards and policies appear compatible with meadow health.
6. Continued analysis of this unique dataset with additions of site level grazing management, hydrologic conditions, climate, and site characteristics.

