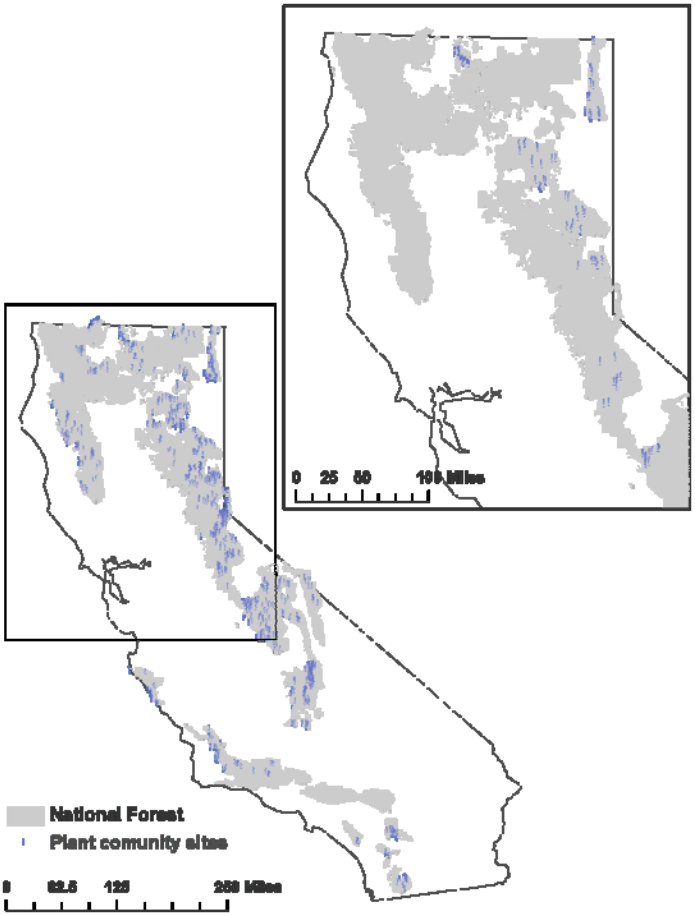
National Forest Meadow Monitoring Program

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

1) Restricted herbaceous biomass use
2) Minimum residual herbaceous height
3) Restricted browse on riparian willows
4) Restricted livestock hoof damage to streambanks



USFS Region 5 Range Program long-term meadow condition and trend monitoring sites. Inset map shows livestock use monitoring sites.

Cattle grazing a mountain meadow on the Plumas National Forest.

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

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

The program currently includes > 600 meadow vegetation monitoring sites across Region 5, with >300 sites with 10+ years of data (re-read at ~5 year intervals). UC Rangelands is collecting livestock utilization data at 75 of these sites (7 National Forests).

In 2012, USFS Region 5 and UC Rangelands established a partnership to conduct the first comprehensive analyses 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. For each enrolled meadow, permanent sample plots were installed at sites representative of the larger meadow community.

Meadow Plant Community

Rooted frequency data are used to calculate indicators of meadow condition and trend, including species richness, diversity, and ecological function (e.g., soil stabilizing capacity).

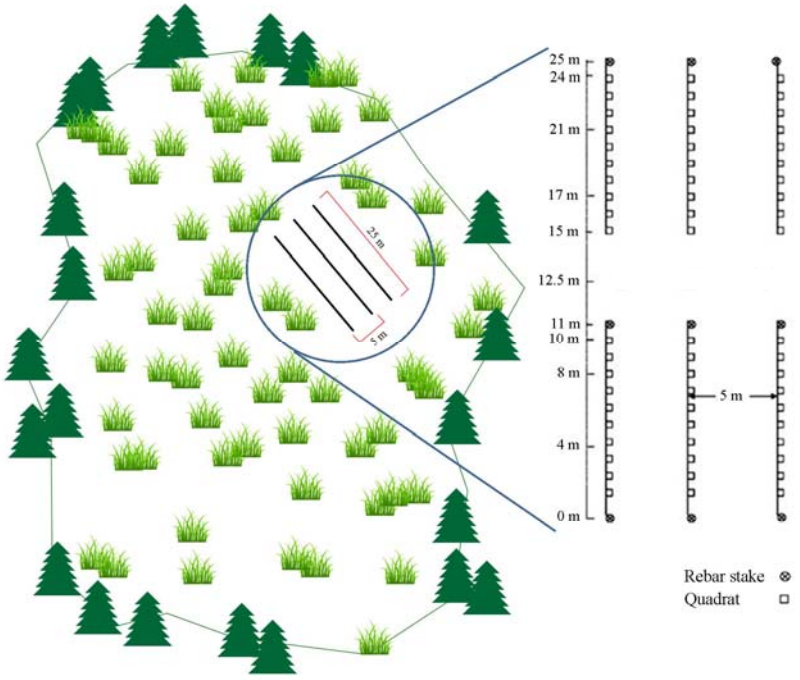
Environmental Variables

For each enrolled grazing allotment, we've acquired monthly climate data for Oct 1982 - Sept 2050 to examine potential correlations between meadow health indicators, historic climate conditions, and projected climate changes—as well as how these relationships interact with grazing management.

Grazing Management Variables

Beginning in the 1980s, there have been substantial reductions in livestock grazing pressure on national forests. We have compiled 102 years of USFS Region 5 grazing records at both the forest and allotment levels. Starting in 2015, we've also collected annual meadow-scale cattle utilization data across 75 plots in 7 National Forests. Utilization metrics include:

- Herbaceous use
- Fecal loading
- Streambank stubble height
- Streambank alteration
- Riparian woody plant use



Plant community monitoring. Each permanently marked plot consists of 3- 25 m parallel transects, established five m apart. Along each transect, twenty 0.01 m² quadrats were established at 1.0 m intervals to record frequency of all rooted plant species.

Results to Date

- Livestock grazing compliant with USFS riparian grazing standards did not degrade or hamper recovery of meadow plant communities (Freitas *et al.* 2014).
- Results suggest allotment-scale livestock grazing pressure (i.e., stocking rate) is currently at a level that balances production and conservation goals.
- Adaptive, meadow management strategies are required to meet grazing pressure limits and safeguard meadow health (Oles *et al.* 2017).

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