# Tools for Optimizing Cattle Grazing Distribution

Livestock distribution, over both space and during specific time periods, is one of the most significant challenges faced by ranchers and land managers responsible for vast grazed landscapes. Although there are many tools and strategies available that have been shown to augment cattle distribution, their cost effectiveness are often not known prior to implementation.

The goals of this project are focused on providing ranchers and land mangers with a comprehensive toolbox of available techniques to sustainably improve cattle distribution on rangelands by:
1. Increase forage utilization and/or stocking rates and thereby profitability;
2. Reduce grazing pressure on critical habitats to improve ecological health;
3. Safeguard animal health and performance; and
4. Quantify the benefits and costs associated with the available tools.

This project has two phases:
1. Survey the existing scientific literature on both traditional management practices as well as behavioral interventions that influence distributional patterns; and
2. Based on the qualitative and quantitative data collected in phase 1 and the analysis of case studies (see page 2), we will develop a framework that can be utilized by ranchers and land managers to determine the efficacy of various tools used to augment cattle distribution as well as the cost associated with each practice.
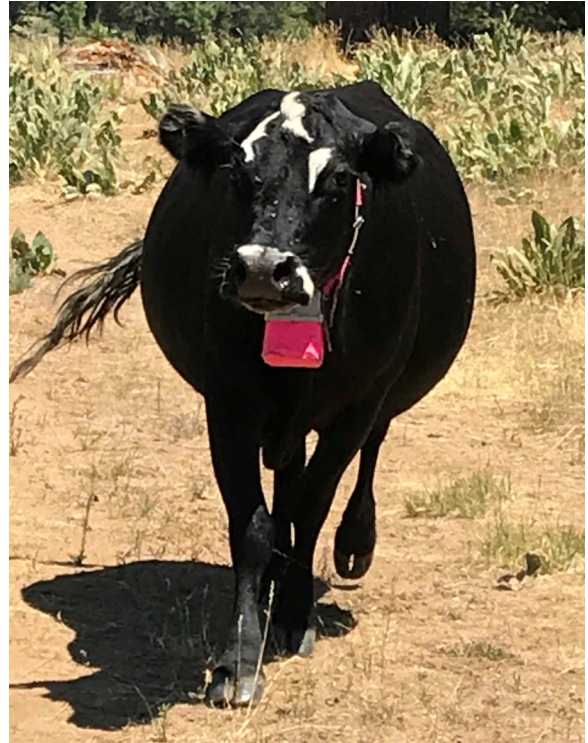
Cow with GPS collar grazing on Plumas National Forest.

Preliminary results from phase 1 (Figure 1, page 2) show a disconnect between authors that are scientists in different disciplines (i.e., have different subject matter affiliations.)

- "**Environmental Manipulation**" strategies are what most would consider traditional methods of augmenting distribution (e.g., fencing, rotational grazing, herding, etc.).
- "**Animal Manipulation**" strategies that consider individual animal behavior and herd dynamics to improve distribution. This category considers genetics, visual cues to create attraction or aversion to certain areas, virtual fencing, etc.
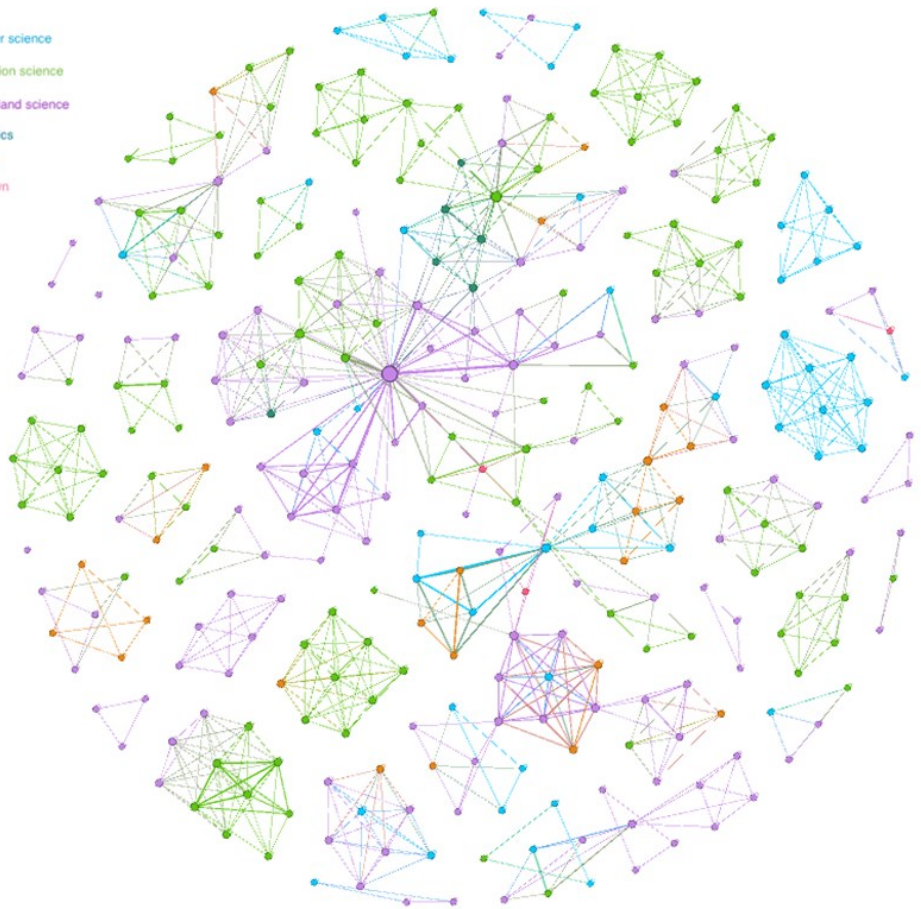
Further, there is virtually no economic data

Figure 1. Co-Authorship Network

The colored dots, or nodes, represent each individual author and the color variation delineates author subject matter affiliations. The sizes of the author nodes indicate the degree, or measure of connectedness, of the author. The lines connecting the authors, called edges, represent co-authorship of a given article.

available about the tools and techniques that have been shown to be effective at augmenting distribution.

With the help of collaborators throughout the State, we have identified 6 case studies that we will use to provide on-the-ground efficacy and cost estimates associated with achieving a wide variety of goals that are influenced by cattle distribution, including:

- Increased forage utilization
- Threatened species conservation
- Improved water quality
- Enhanced riparian meadow health

Ultimately, results from phases 1 & 2 will be made available to ranchers, land managers, and agency staff using an online information hub (housed at rangelands.ucdavis.edu). This will include a synthesis of the efficacy and cost of each of the distribution augmentation tools analyzed as well as rankings and recommendations for the spatial and/or temporal scale for which specific tools are appropriate.

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