



The David Little Livestock Range Management Endowment

AT THE UNIVERSITY OF IDAHO

2018 Project Progress Report:

Livestock management to facilitate sage-grouse habitat in wet meadows: effects of grazing intensity on preferred forbs

PERSONNEL:

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PRELIMINARY RESULTS for 2018:

BACKGROUND:

In the Rocky Mountain West, meadow and riparian pastures are an important component of ranching operations and are also used by many species of wildlife because of the high forage production and access to water. Management of meadow and riparian pastures has been a topic of interest to the livestock industry, public lands agencies, and conservationists because of the need to understand how to best accommodate both livestock and wildlife. One species that commonly co-occurs with livestock in riparian and meadow pastures are Greater sage-grouse (*Centrocercus urophasianus*). Sage-grouse often use riparian and meadow pastures as late brood-rearing habitat because of the availability of forbs and insects that provide important dietary resources for chicks (Schreiber et al. 2015). The availability of suitable habitat during the juvenile growth period is critically important to juvenile sage-grouse survival and population recruitment. If well-managed, sustainable livestock grazing can be a compatible land use with the habitat and dietary needs of sage-grouse (Sage Grouse Initiative 2017).

This research addressed the question of whether and how livestock grazing influences habitat conditions in meadow pastures that are potential brood-rearing habitat for sage-grouse. In their review paper, Pennington et al. (2016) highlight the need for better understanding regarding forb diversity in big sagebrush communities and call specifically for experimental research to investigate the effects of grazing on forbs. Studies linking sage-grouse conservation to grazing management practices are often site-specific; therefore, implementing management practices focused on fundamental rangeland health principles that promote resilient and diverse plant communities may be more important than one single grazing strategy (Smith et al. 2017). We collected data to evaluate how moderate and high levels of grazing utilization affect important sage-grouse brood-rearing habitat characteristics such as foliar cover, abundance of forbs, canopy cover and vegetation structure. This work will yield information about the expected benefits of recently amended public lands sage-grouse habitat management guidelines. It will also advance the understanding of how livestock grazing may mediate the availability of food resources for sage-grouse in a sustainable way that achieves benefits for both wildlife and the livestock industry.

HYPOTHESIS or OBJECTIVES:

Managed livestock grazing was used to evaluate how the intensity of herbivory can influence Greater sage-grouse resources in brood-rearing habitat. Yearling heifer and steer cattle were stratified by body weight into six (2017) and ten (2018) mesic meadow pastures, and the number of cattle was adjusted to meet moderate (30% - 50%) utilization and high (60% - 80%) utilization rates. During data analysis, we will investigate the effects of grazing utilization on abundance of preferred forbs, vegetation structure and canopy cover, and cattle performance.

The objectives of this research were to determine how increased stocking rates and utilization (which result in decreased stubble heights) affect:

1. Short-term changes in species composition of food resources;
2. Cover, biomass, horizontal and vertical structure, and regrowth of grasses and forbs;
3. Changes in available brood-rearing habitat within and among years;
4. Changes in composition of palatable and unpalatable forbs; and
5. Treatment effect on cattle weight and performance.

We predict that cattle grazing in high desert ecosystems will have species-specific effects on brood-rearing habitat vegetation, particularly forbs consumed by Greater sage grouse broods. We predict that moderate and high levels of grazing will affect foliar cover, height, and biomass of some forbs preferred by Greater sage-grouse, and that these responses will be species specific based on individual species traits. We also predict that treatment will not have an effect on cattle performance.

PROCEDURES:

This trial took place at Rinker Rock Creek Ranch in Blaine County, Idaho in 2017 and 2018, and is scheduled to continue in 2019. The ranch is encumbered by Grassland Reserve Program conservation easements held by the Natural Resources Conservation Service, and is the site for a number of restoration, conservation, and educational activities.

Bred heifers (n = 75) were shipped from the University of Idaho's Nancy M. Cummings Research, Extension, and Education Center to the ranch (both years), and yearling steers (n = 62) were included for the grazing trial in 2018. An early July start date in both years was chosen because of plant phenology and approximate timing of when producers in this region would begin utilizing public lands grazing allotments that have meadow pastures as a component. In 2017, five pastures of approximately 5.5 acres each were marked with fiberglass posts and electric polywire fence. A sixth pasture of the same size and fencing created an ungrazed control to provide a measurement of herbivory by wildlife. In 2017, we created an experimental gradient of increased stocking rate, and therefore grazing utilization levels, by grazing pastures with 0,5,10,15,20, and 25 cattle. In 2018, four more pastures of approximately 5.5 acres were added and all cattle were stratified by body weight into one of four pastures grazed to a moderate utilization rate (30% - 50%) or one of four pastures grazed to a high utilization rate (60% - 80%). The remaining two pastures served as ungrazed controls. The experimental pastures were located in irrigated meadows on the southern part of the ranch that is approximately two miles from known sage-grouse leks. Stockwater was provided by the irrigation ditch that runs through all six pastures.

Each year, cattle body weights were collected at the beginning and the end of the grazing period, and grazed for 25 and 21 days in 2017 and 2018, respectively. All cattle were removed on the same day. Vegetation and biomass data were collected along six 150-ft transects per pasture prior to grazing (within three weeks before grazing), post-grazing (within one week after cattle were removed), and re-growth (eight weeks after cattle were removed) in both years. Transect locations were spatially balanced by establishing them at systematic intervals equidistant along each pasture boundary and marked for replication during each sampling period. Biomass data collected before and during the trial, as well as utilization data collected during the trial, were used to estimate an experiment duration necessary to achieve target utilization rates.

ACCOMPLISHMENTS or RESULTS:

In 2017, cattle grazed from July 5 – July 30 and in 2018 from July 3 – July 24 to reach target utilization rates. A significant positive correlation was observed between percent change in perennial grass biomass and grazing utilization (Fig. 1). Grazing utilization results from 2017 were used to assign treatments to pastures. Data from 2017 were classified into control (0 and 5 cattle), moderate utilization (10 and 15 cattle), and high utilization (20 and 25 cattle) to increase sample size per utilization treatment, and because utilization results were less linear than categorical upon inspection.

In this grazing trial, cover of perennial forbs was adequate for brood-rearing habitat (>4%; Casazza et al. 2011, Pennington et al. 2016) during pre-grazing and post-grazing in control pastures and pre-grazing and after regrowth in moderate utilization pastures (Fig. 2). Trends in percent foliar cover for three forbs preferred by Greater sage-grouse varied among species and over sampling periods (Fig. 3).

PUBLICATIONS or OUTPUTS:

This research has resulted in six oral and poster presentations:

1. University of Idaho Sagebrush Saturday presentations at Rock Creek Ranch July, 2017 and August 2018. Sagebrush Saturdays are aimed at public audiences and advertised throughout Southern Idaho.
2. Rock Creek Ranch Research Symposium presentation November, 2017.
3. Poster presentations at the 2018 Pacific Northwest Animal Nutrition Conference, 2018 Society for Range Management Conference, the Idaho Chapter of The Wildlife Society, and the 14th International Grouse Symposium.

Articles were submitted by Melinda Ellison to the Idaho Cattle Association's Line Rider Magazine for the December 2017 edition and by Tracey Johnson to the University of Idaho Alumni Magazine detailing the progress of this trial. We also expect to present at the Idaho Chapter of the Wildlife Society in March 2019. Additional outputs are expected upon completion of the second year of this project (2018), including scientific oral and poster presentations, extension talks, peer-reviewed journal articles, magazine and extension articles, and Keri York's Master's Thesis. In 2019, oral presentations are planned for the Idaho Chapter of The Wildlife Society and the Western Section of the American Society of Animal Science.

LITERATURE CITED:

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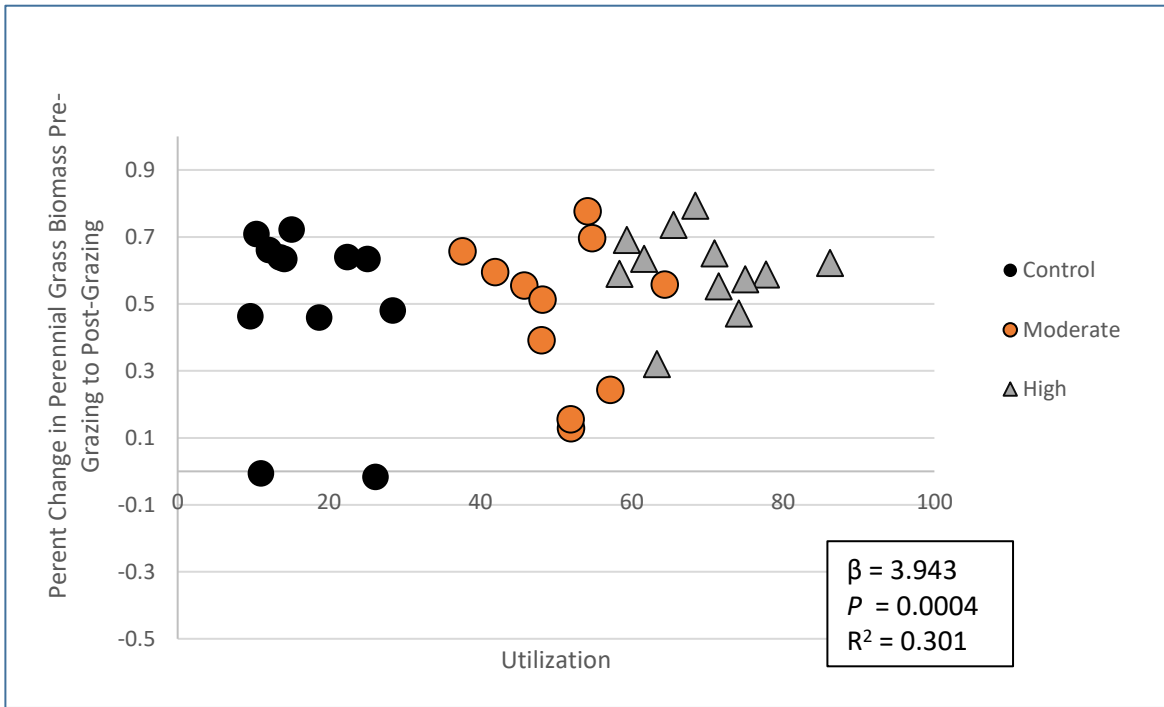


Fig. 1. Percent change in perennial grass biomass from pre-grazing to post-grazing as a function of utilization treatment during July 2017 at Rock Creek Ranch, central Idaho. Positive y-axis values represent a decrease in biomass, and negative values represent a positive increase in biomass.

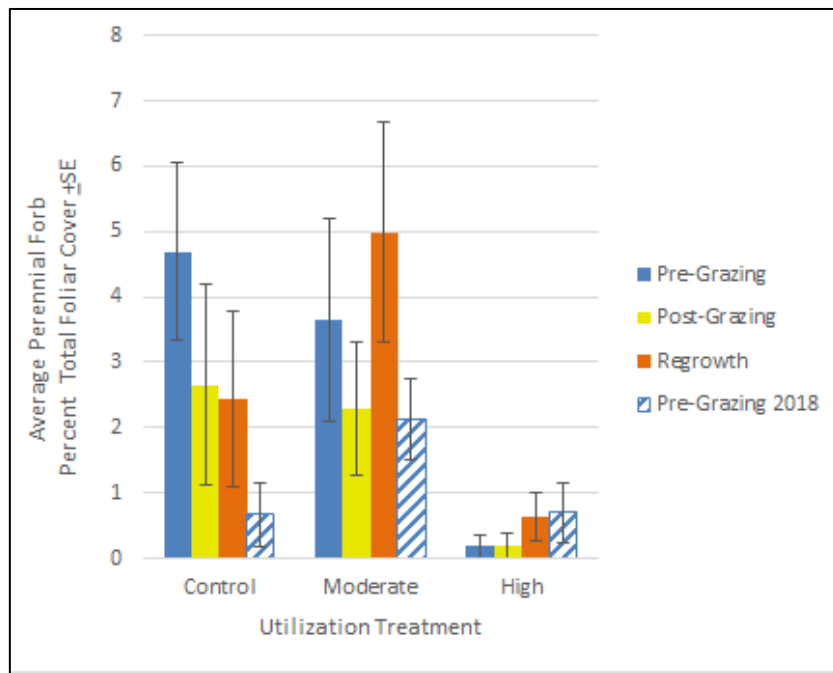
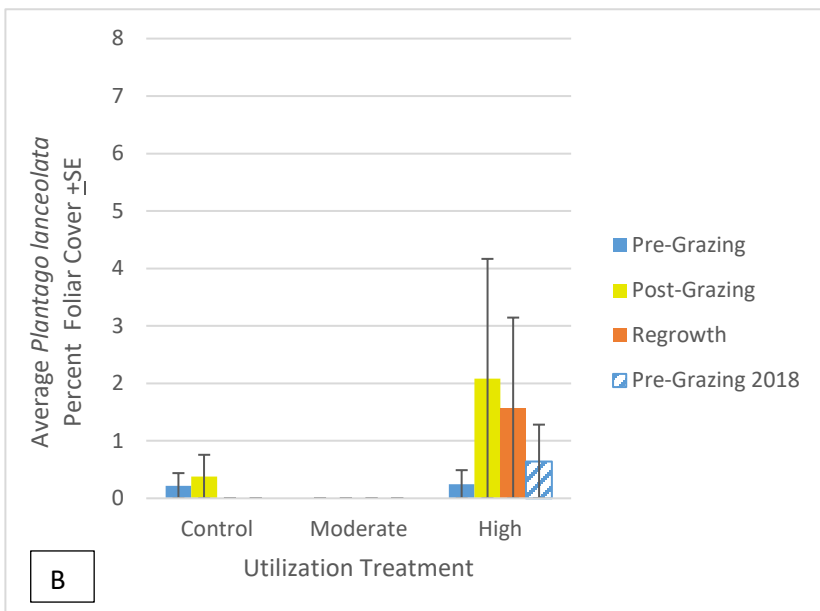
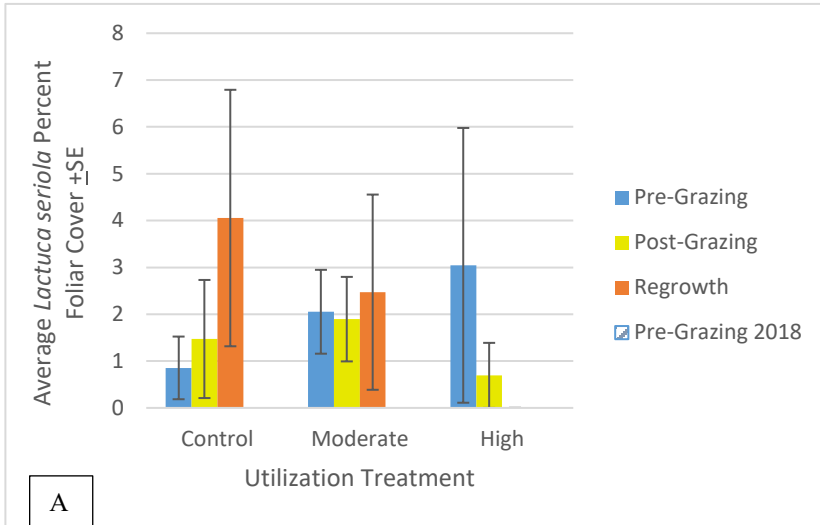


Fig. 2. Average foliar cover (%) of perennial forbs over all sampling periods in 2017 and pre-grazing sampling period in 2018. All data from the pre-grazing period in 2017 and 2018 include six pastures with two of each treatment type.



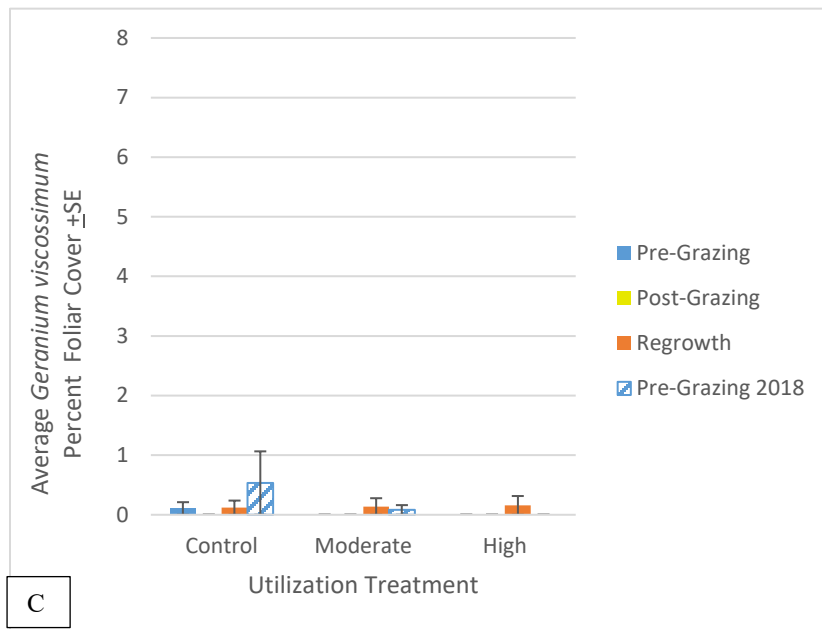


Fig. 3. Average percent foliar cover (\pm SE) for three forbs preferred by Greater sage-grouse: A.) *Lactuca seriola*, B.) *Plantago lanceolata*, and C.) *Geranium viscosissimum*. All data from 2017 and 2018 pre-grazing include six pastures with two of each treatment type.