

Greater Sage-grouse Responses to Livestock Grazing in Semi-Arid Sagebrush Rangelands

2020 Final Field Update

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Introduction

This is the final field report for the 2020 season for this project. Hailey will complete and defend her thesis in early 2021. This will be the final project report for the period of her field study (2018-2020).

We anticipate completing two additional field seasons which will give us a 10-year data set for this research. This will be one of the longest data sets dedicated to monitoring sage-grouse responses to livestock grazing. We anticipate bringing on another MS student to complete the field work, and a Post-Doctoral Fellow to analyze the entire 10-year data set. We anticipate this research effort will provide some definitive answers regarding sage-grouse responses to livestock grazing for the systems studied.

Background

Grazing by domestic livestock remains the predominant anthropogenic land-use across the sagebrush ecosystem in North America, occurring on 87% of remaining greater sage-grouse (*Centrocercus urophasianus*) habitat. However, little research has been published that reports sage-grouse responses to grazing in the diverse western landscapes inhabited by the species. Both sage-grouse and livestock consume forbs during spring, but the question remains as to how grazing as a dominant land-use affects sage-grouse vital rates and habitat selection. Our working hypothesis is that the effects are contingent on grazing management. This study is being conducted on Desert Land and Livestock (DLL), and the Three-Creeks Grazing Allotments (3C), in Rich County, Utah, where we are comparing radio-marked sage-grouse responses under different grazing management practices.

Most of the peer-reviewed literature reports the potential for negative impacts of sagebrush reduction treatments, to increase livestock forage, on sage-grouse habitat. However, few studies have linked livestock grazing at the landscape level to vital rates for ground-nesting birds such as sage-grouse. So, in addition to evaluating the response of sage-grouse broods to livestock grazing, we are studying the relationship of historic sagebrush treatment areas on DLL to sage-grouse brood use and success.

Evaluation of our hypothesis depends on the ability to monitor phenological phases of herbaceous (green) vegetation across large landscapes. To do this, we are measuring changes in plant phenology in response to season and livestock grazing at the scale of the pasture using the Normalized Difference Vegetation Index (NDVI). The NDVI is a satellite-derived index of photosynthetic biomass that is used to map plant phenology across climatic regimes, track avian

migration, and to index forage quality for ungulates. We will access NDVI data for the study area to compare differences in green-up rates on each study area relative to grazing management and annual climatic conditions. Changes in the study area NDVI will be correlated with livestock stocking rates, frequency of use, rest periods, temperature, precipitation, sage-grouse nest initiation rates, nest hatch dates, brood movements, and brood success rates. We will then evaluate the relationship between observed differences in NDVI on each study area and sage-grouse vital rates and daily/seasonal movements.

COVID-19 mitigation

We have all been affected by the COVID-19 crisis in some way or another and starting this field season was no exception. Prior to conducting field work, we filed a travel/research plan with Utah State University that embraced the Utah Governor's and Utah State University's directives. The research plan accommodated research schedules and included mitigation plans for reducing the spread of COVID-19 via social distancing, strict personal hygiene, and handwashing. This plan has been updated and revised due to the recent outbreak in Cache County. Travel to Logan from the field site was limited to only necessary travel.

Sage-grouse captures and radio-marking

The 2020 season started off slow with few females attending the leks. Each night we struggled to catch just one female and spent countless hours and miles searching the study areas to locate bird concentrations. It appears peak female attendance occurred the second week in April which follows last year's trend. Late spring storms impeded consistent trapping and by the second to last week in April few males were observed on leks. We suspended our trapping this year on April 18th. In 2019, we didn't start our trapping efforts until April 17th. Despite these challenges, we captured and radio-marked 22 new females (11 birds on each of the two study sites). For DLL we deployed 6 VHF and 5 GPS transmitters. On 3C we deployed 10 VHF and 1 GPS transmitter. With the remaining birds from last year the totals are: 20 VHF and 8 GPS birds on DLL and 17 VHF and 3 GPS birds on 3C. In total, we have 37 VHF and 11 GPS birds equaling 48 birds.

Nesting and Brooding

We monitored 30 radio-marked female sage-grouse in 2020. On DLL we had 7 nests initiated (41.2%); two were depredated early. The remaining 5 nests successfully hatched (71.4%) with 4 of the broods surviving past 50 days (80.0%). We followed 9 additional females on DLL that never initiated nests. On the 3C study area we had 5 hens initiate nests (50.0%), one was depredated leaving 4 successful nests (80.0%). All 4 of those broods survived (100%). There were 3 females that never initiated nests in this study area.

Off both study areas we had two females initiate nests (100%) with 1 nest being depredated (50.0%) and the remaining brood being successful (100%). The two unsuccessful nests on DLL were depredated by ravens, and what we believe to be a badger. The unsuccessful nest on 3C was depredated by a coyote. Table 1 and Figure 1 below visualize these current statistics.

Table 1. Female greater sage-grouse nest initiation and hatching rates for the 2020 field season, Rich County, Utah.

	Nests Initiated	Nesting Rate	Nests Hatched	Hatching Rate	Successful Broods	Brood Success Rate
DLL	7	41.2%	5	71.4%	4	80.0%
3C	5	50.0%	4	80.0%	4	100%
Off Site	2	100.0%	1	50.0%	1	100%
Total	14	48.3%	10	71.4%	9	90%

Mortalities

Early in the season we had a very high mortality rate on DLL totaling 5 mortalities, and 1 mortality off site. The 3C has seemed to have fared better with 1 mortality mid-season. Each of these mortalities seem to be a result of mammalian depredation.

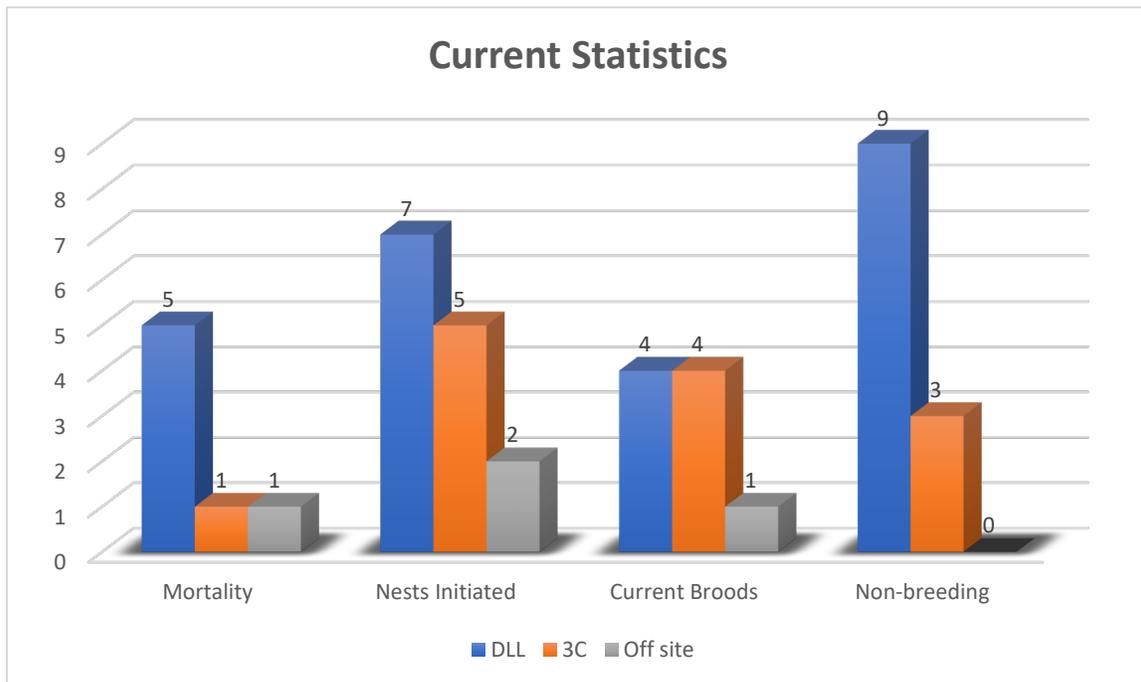


Figure 1. Graph showing the current status of female sage-grouse monitored in Rich County, 2020.

Rich County Collaborators

We are extremely appreciative of the continued investment in this research. We would like to thank all the landowners who have allowed us access onto their property time and time again without complaint. We would also like to thank the communities of Randolph and Woodruff for their support and their timely help in equipment repair, housing needs, etc. Deseret Land and Livestock has been a great supporter in allowing us a place to stay as well as paying for the radio-telemetry flights. To all others who have contributed to this project and lent your support and help please know that we appreciate everything you have done to move this project forward.