

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

## **Field Update**

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### **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 habitat. However, little research has been conducted to evaluate sage-grouse responses to grazing. Both sage-grouse and livestock consume grasses and forbs during spring, but the question remains as to how grazing affects sage-grouse vital rates and habitat selection. Our working hypothesis is that the effects are contingent on how grazing is managed. This study is being conducted on Deseret Land and Livestock (DLL) and the Three-Creeks Grazing Allotments, in Rich County, Utah.

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.

### **Technicians**

Four technicians have been hired to help with the field work. Courtney Check and Sydney Hersey will be working on the DLL study area. Brandon Cluff and John Pulliam will cover the Three Creeks study area. Courtney and Brandon started in late March to assist with our nightly trapping. The other two technicians are scheduled to start the first week in May as we transition

in to monitoring nests and eventually broods. Each technician will be responsible for locating and conducting surveys for their list of birds. Hailey will cover any birds that leave the study areas but stay relatively close and will help the technicians as needed with finding birds or doing vegetation surveys.

All technicians have been made aware of land use rules and understand that they are guests. The first two days after the technicians arrive, they are trained on telemetry use and practice by locating radio-collars previously hidden in bushes. By doing this they become familiar with the techniques used to locate sage-grouse and the best way to minimize flushing off the nest.

The second day of training is spent teaching operational protocol for trucks and ATV's. Safety is our utmost priority as well as proper use and maintenance of field vehicles. This safety training includes how to load and unload an ATV from the back of a truck safely, hill ascending and descending, rollover and approach angles, maneuverability and proper gear selection and speed.

### **COVID-19 Concerns**

We have all been affected by this COVID-19 crisis in some way or another and starting this field season was no exception. Challenges arose for Hailey in making the personal decision to travel to Utah earlier than anticipated from Washington, where her spouse is attending veterinarian school. Two technicians also ended their previous jobs early and raced to Utah from both Australia, and New York, arriving in Utah prior to major travel restrictions being put in place. Upon arrival at the study site, they stayed in self-isolation for two weeks.

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 accommodates research schedules and includes mitigation plans for reducing the spread of COVID-19 via social distancing, strict personal hygiene, and handwashing. Once at the field, all study personnel are maintaining social distance and have limited contact with others outside of the teams. Travel back and forth from Logan to the study sites has also been limited.

This has been a challenging time for all and we are grateful that the field work has been able to continue.

### **Trapping**

The 2020 season started off slow with very 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 hen attendance occurred the second week in April which follows previous trends. 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 18<sup>th</sup>. In 2019, we started our trapping efforts on April 17<sup>th</sup>. Despite these challenges 22 new females (11 birds on each of the two study sites) were captured and radio-marked. For DLL we deployed 6 VHF and 5 GPS transmitters. On Three Creeks 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**

Currently, we have not confirmed any females nesting but assume they are in the initiating period. We expect to document nesting radio-marked females in the next week.

### **Mortality**

Over the winter we had 8 sage-grouse marked with GPS transmitters die. Two occurred in the early fall, one in November, and the rest were all between January and March. Many of the 2019 VHF birds have an unknown fate as we are resuming our relocation efforts. A telemetry flight was done in late December we recorded 23 VHF radio-marked birds. As we transition from trapping mode, our focus will shift to locating each of our unknown birds.

### **Grouse Movements**

As far as winter movements, GPS radio-marked birds engaged in regular winter migration and movements. One bird known as TC-19a-167523-F (Figure 1) was captured and tagged on April 26, 2019 in the Otter Creek area. She raised 7 chicks. During this time, she stayed fairly local in the Otter Creek area. Around November 2019, she engaged in steady movements towards the south. She spent a few days at the north edge of DLL before crossing the length of DLL in a day and a half, and stopping on the south end of DLL around Christmas. She stayed for about a week made a small jump to the south landing on the DLL border and staying for another week and a half before she was predated.

### **Rich County Collaborators**

We are extremely appreciative of the continued investment in this research. I have really enjoyed getting to know many of you and am very grateful for the chance I get to work with such dedicated individuals. Please contact us if you have any questions concerning the work we are conducting, or anything you are observing that you think is interesting, we are always willing to come check things out.

## Movements of one female sage-grouse

This female sage-grouse was given the ID number of TC-19a-167523-F and was trapped on the Otter Creek lek located on the north end of the three creeks allotment, at the beginning of the 2019 season. These are her movement locations from November till her death in January.

— TC-19a-167523-F  
□ DeseretBoundary

0 2 4 8 Miles

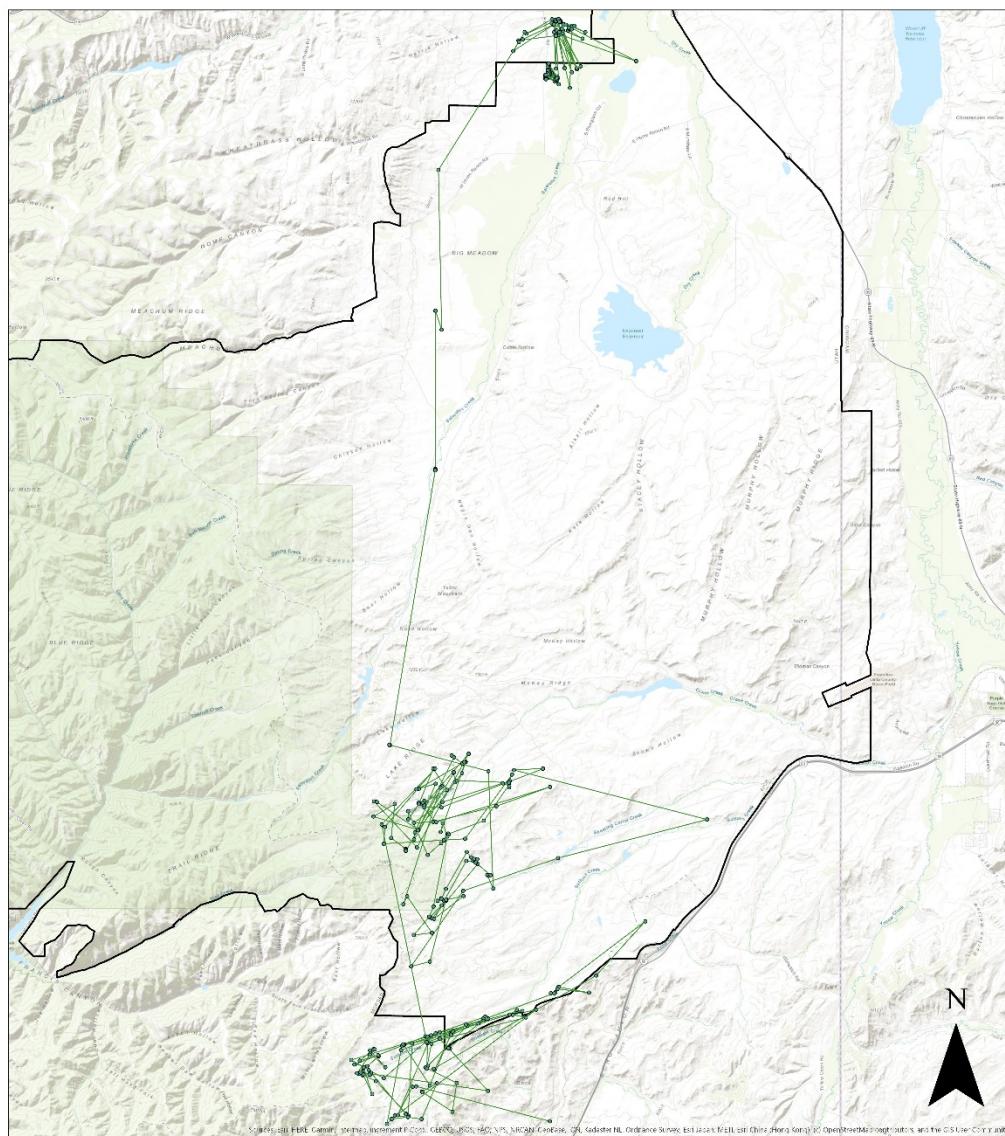


Figure 1. Movements of a female sage-grouse from November 2019 to January 2020. This female was captured in the Otter Creek area, successfully raised a brood and then began the migration displayed in this map.