



David Little Livestock Range Management Endowment

AT THE UNIVERSITY OF IDAHO

2021 Project Progress Report:

Grouse and Grazing: How Does Spring Livestock Grazing Influence Sage-Grouse Populations?

By Courtney J. Conway

PERSONNEL: *Courtney J. Conway (CNR - Director, Idaho Cooperative Fish & Wildlife Research Unit and Professor, Department of Fish & Wildlife Sciences); Cody Tisdale (CNR - Research Scientist, Department of Fish and Wildlife Sciences); Nolan Helmstetter (CNR - Graduate Research Assistant, Department of Fish and Wildlife Sciences); Ty Styhl (College of Science - Graduate Research Assistant, Department of Biology); Grace Overlie (College of Agricultural and Life Sciences - Graduate Research Assistant, Department of Entomology, Plant Pathology, and Nematology); and ~30 seasonal field technicians (CNR and Idaho Cattle Association) and numerous agency collaborators and ranchers.*

PRELIMINARY RESULTS for 2021:

BACKGROUND: The distribution of the greater sage-grouse (hereafter sage-grouse; *Centrocercus urophasianus*) has contracted (Schroeder et al. 2004) and abundance of males attending leks throughout the species' range has decreased substantially over the past 50 years (Garton et al. 2011, 2015; Western Association of Fish & Wildlife Agencies 2015). Livestock grazing is a common land use within sage-grouse habitat, and livestock grazing has been implicated as one of numerous factors contributing to sage-grouse population declines (Beck and Mitchell 2000, Schroeder et al. 2004). However, there are also numerous mechanisms by which livestock grazing might benefit sage-grouse (Beck and Michell 2000, Crawford et al. 2004). Livestock grazing on public lands is often restricted to try to minimize negative effects on populations of plants and animals (including sage-grouse), but we lack experimental studies that have explicitly examined the effects of livestock grazing on sage-grouse. The objective of the Grouse & Grazing Project is to document the relationship between cattle grazing and sage-grouse demographic traits, nest-site selection, and habitat features. We focus particularly on spring cattle grazing because spring is thought to be the time when livestock grazing is most likely to adversely affect sage-grouse (Neel 1980, Pedersen et al. 2003, Boyd et al. 2014). This project is a 10-year research study with replicated experimental grazing treatments at 5 study sites distributed throughout southern Idaho. The project is designed to evaluate the effects of spring cattle grazing on demographic traits of greater sage-grouse and sage-grouse habitat characteristics. The results will help guide management actions (and inform policy and litigation decisions) in sage-grouse habitat in southern Idaho and throughout the species' range in the western U.S. This work will also provide new insights into current habitat conditions for sage-grouse and identify management actions necessary for ensuring healthy sage-grouse populations on rangelands. Results will provide land managers and livestock operators with a credible answer to a oft-debated question and thereby inform the outcome of current and future lawsuits.

HYPOTHESIS or OBJECTIVES: Specific objectives include: 1) Document the effects of several cattle grazing regimes on sage-grouse demographic and behavioral traits; 2) Document the effects several cattle grazing regimes on density and diversity of insects (species common in sage-grouse diets) within sage-grouse breeding habitat; and 3) Document the extent to which several cattle grazing regimes affect nest concealment, sagebrush canopy cover, density and diversity of grasses and forbs, and other vegetation features that contribute to sage-grouse habitat suitability.

PROCEDURES: Our field work has occurred at 5 study sites in Idaho within Owyhee, Twin Falls, Cassia, Butte, Custer, and Bingham counties. All of these study sites are located in Sage-Grouse Management Zone IV: The Snake River Plain (Knick 2011). Elevations at the 5 study sites range from 1,400 m to 1,900 m and include: Jim Sage/Malta, Big Desert, Browns Bench, Sheep Creek/Grasmere, and Pahsimeroi/Challis. We are assessing the effects of cattle grazing on sage-grouse via two approaches: correlative and experimental. We are assessing the effects of spring cattle grazing on a suite of sage-grouse demographic and behavioral traits including: nesting propensity (likelihood that a radio-collared female initiates a nest), nest initiation date, daily nest survival, re-nesting rate (probability that a radio-collared hen whose nest fails initiates a new nest the same season within the same area), brood size, brood survival, post-fledging movements, breeding site fidelity, and hen survival (probability that a banded or radio-collared hen that nested in an area is detected the subsequent year). For the correlative approach, we are documenting the relationships between spatial foraging patterns of cattle and our suite of sage-grouse response variables (see list above). For the experimental approach, we are experimentally changing the extent of herbaceous offtake by cattle and assessing the effects of these experimental changes in grazing intensity on the same suite of sage-grouse metrics (see list above).

ACCOMPLISHMENTS or RESULTS: In 2021, we employed 37 staff and students who conducted field sampling at the 5 study sites. In addition to the 37 UI/ICA employees above, 2 IDFG biologists (S. Gennette, C. Henderson, and D. Musil) also worked on the project. Lynn Kinter and Jennifer Miller from IDFG provided field training on plant identification to all field personnel, along Karen Launchbaugh (UI) and Scott Sayer (BLM). In 2021, we deployed VHF radio transmitters on 160 previously unmarked female sage-grouse across 5 study sites in spring 2021. In addition to the 160 new females captured in 2021, we also monitored 83 females whose VHF collars were deployed in past years and had returned to the study sites in February 2021. Hence, we tracked 243 radio-marked hens in 2021. We produced a 40-page annual report that summarize our activities and results for 2021 (Conway et al. 2021).

PUBLICATIONS or OUTPUTS: The experiments began in 2016 at the first 2 study sites, and at the other 3 sites in 2017-2019 and are still ongoing. Hence, the results from the experiments are not available yet for publication but we have published 6 peer-reviewed papers that address related topics (see below). We also gave numerous presentations at conferences and meetings.

GRAD STUDENTS ON PROJECT

1. Janessa Julson, M.S. Student, Range Management, University of Idaho, Thesis Title: *Variation in perennial grass height within greater sage-grouse nesting habitat*. Jan 2015-2017.
2. Ian Riley, M.S. Student, Wildlife Sciences, University of Idaho, Thesis Title: *Sampling methods for lek and brood counts of greater sage-grouse: accounting for imperfect detection*. Aug 2015-2019.
3. Alex Laurence-Traynor, M.S. Student, Range Management, University of Idaho, Thesis Title: *Determining appropriate utilization measurements for multi-scale rangeland management*. Jan 2018-2019.
4. Taylor Fletcher, M.S. Student, Range Management, University of Idaho, Thesis Title: *Using global positioning system collars to assess the impact of livestock grazing on the greater sage-grouse*. Aug 2019-2021.

5. Ty Styhl, M.S. student, Biology, University of Idaho, Thesis Title: *Ontogenetic shifts in diet of sage-grouse chicks based on DNA metabarcoding*. May 2018-present.
6. Nolan Helmstetter, M.S. Student, Wildlife Sciences, University of Idaho, Thesis Title: *Effects of cattle grazing on sage-grouse nest predators*. Aug 2019-present.
7. Grace Overlie, M.S. student, Entomology, University of Idaho, preliminary Thesis Title: *Effects of cattle grazing on arthropod biomass*. Jun 2021-present.
8. JB Playfair, M.S. student, Range Management, University of Idaho, preliminary Thesis Title: *Effects of cattle grazing on fuels and fire risk*. Jun 2021-present.

PUBLICATIONS

1. Hohbein, R., and C. J. Conway. 2018. Pitfall traps: a review of methods for estimating arthropod abundance. *Wildlife Society Bulletin* 42:597-606.
2. Karl, J.W., and J.E. Sprinkle. 2019. Low-cost livestock global positioning system collar from commercial off-the-shelf parts. *Rangeland Ecology and Management* 72:954-958.
3. Riley, I. P., and C. J. Conway. 2020. Methods for estimating vital rates of greater sage-grouse broods: A review. *Wildlife Biology* 2020:wlb00700.
4. Riley, I. P., C. J. Conway, B. S. Stevens, and S. Roberts. In Press. Aural and visual detection of greater sage-grouse leks: Implications for population trend estimates. *Journal of Wildlife Management* 85:508-519.
5. Riley, I. P., C. J. Conway, B. S. Stevens, and S. Roberts. Survival of greater sage-grouse broods: survey method affects disturbance and age-specific detection probability. *Journal of Field Ornithology* 92:88-102.
6. Conway, C. J., C.A. Tisdale, K. Launchbaugh, D. Musil, P. Makela, and S. Roberts. 2021. The Grouse & Grazing Project: Effects of cattle grazing on sage-grouse demographic traits – 2021 Annual Report. College of Natural Resources, University of Idaho.

COMPLETED THESES

- Julson, J. 2017. Variation in perennial grass height within greater sage-grouse nesting habitat. M.S. Thesis, University of Idaho.
- Riley, I. 2019. Sampling methods for lek and brood counts of greater sage-grouse: accounting for imperfect detection. M.S. Thesis, University of Idaho.
- Laurence-Traynor, A.C.E. 2020. Evaluating field-based grazing intensity measurements for adaptive rangeland monitoring. M.S. Thesis, University of Idaho.
- Fletcher, T. 2021. Evaluating GPS-derived estimates of livestock use and their value in assessing impacts of spring cattle grazing on greater sage-grouse demographics. M.S. Thesis, University of Idaho.

PRESENTATIONS (2021 presentations only; see Conway et al. 2021 for full list throughout project)

- Launchbaugh, K., and C. J. Conway. 2021. Relationships between Livestock Grazing & Greater Sage-grouse: the Grouse & Grazing Project. Public Lands Council Executive Committee Annual Meeting. Virtual. 27 Sep 2021.
- Fletcher, T., J. Karl, C. J. Conway, V. Jansen and E. Strand. 2021. Assessing the impacts of scale on estimates of grazing intensity derived from livestock global positioning system collars. Society of Range Management, annual conference. Virtual. 17 Feb 2021.

Other project outputs include a project website, a white paper/brochure, and field tours with ranchers and BLM field staff.