

GROUSE FOOD, POLLINATOR, AND DUNG BEETLE ECOLOGY

PROJECT PI: Hayes B. Goosey, Montana State University

Co-PIs: Dr. Lorelle Berkeley, Montana Fish, Wildlife, and Parks

Marni Rolston, Montana State University

COOPERATORS: John Ensign (MT FWP), Melissa Foster (MT FWP), Justin Gude (MT FWP), Ray Mule (MT FWP)

A brief recap of the project:

SUMMARY

Livestock grazing is a dominant pressure on the majority of the range and prairie lands in Montana and is capable of modifying wildlife habitat in either positive or negative directions. It is vitally important for rangeland health to understand how arthropod food webs are influenced by these dominant pressures. It is becoming clear that arthropods alone can successfully drive ecosystems and that they are vital to the survival of many other species including game and non-game birds. Therefore, it is vital to know, from the bottom up, how various grazing systems alter plant community structure which in turn alters the food resources and thermoregulation sites of arthropods. It is also of equal importance to know, from the top down, how grazing influences different predatory guilds of arthropods (i.e., spiders/carabid beetles) which, through hunting strategy alone, can produce a trophic cascade thus altering populations of beneficial insects, such as pollinators. Arthropods, such as dung beetles, affect the detritus which in turn influences soil nutrients, which affects the vegetation, which impacts wildlife and their habitats. Our project is based on gathering data on a structural foundation of how, with in grazing systems, arthropods influence wildlife habitat.

We have implemented two intertwined projects which investigate how livestock grazing influences arthropods important to both sharp-tailed grouse and sage-grouse survival. Project 1 investigates the MT FWP recommended three-pasture rest-rotation grazing program as implemented on the Buxbaum ranch in eastern MT near Sidney. Project 2 investigates the Sage-Grouse Initiative (SGI) rest-rotation grazing program as implemented on multiple ranches in central MT near Roundup. Project 1 began in spring 2016 and Project 2 began in 2012. Both projects will continue through 2021.

OBJECTIVES

PROJECT 1: SHARP-TAILED GROUSE

1. Quantify the influence of the MT FWP three pasture rest-rotation grazing, deferred grazing, and season-long grazing on:
 - a. the relative abundance and diversity of ground-dwelling arthropods serving as food items for sharp-tailed grouse and other grassland associated avifauna,
 - b. the relative abundance and diversity of above ground and plant-dwelling arthropods serving as food items for sharp-tailed grouse and other grassland associated avifauna,
 - c. the relative abundance and diversity of wild pollinators,
 - d. the relative abundance and diversity of dung beetles, and
 - e. the vegetative community biomass and diversity and percent bare ground (so that we have vegetative data specific to our sampling locations which will complement other veg data).

PROJECT 2: SAGE-GROUSE

Sampling during 2012 – 2015 focused on the impact of grazing on food insects of sage-grouse. We sampled insect diversity and abundance and community structure randomly in grazed and rested pastures. Future sampling will focus more specifically on insect food availability at nest/early-brood rearing pastures of sage-grouse and songbird survey sampling sites.

1. Quantify the influence of the NRCS SGI rest-rotation grazing and non-SGI season long grazing on:
 - a. the relative abundance and diversity of ground-dwelling food arthropods at sage-grouse nesting and songbird survey locations,
 - b. the relative abundance and diversity of above ground and plant-dwelling arthropods at sage-grouse nesting and songbird survey locations,
 - c. the relative abundance and diversity of wild pollinators (which were not sampled in the 1st study),
 - d. the relative abundance and diversity of dung beetles (which were not sampled in the 1st study), and
 - e. the vegetative community biomass and diversity and percent bare ground (so that we have vegetative data specific to our sampling locations which will complement other veg data).

2016 ACCOMPLISHMENTS AND MILESTONES

Project 1 was successfully implemented on the Buxbaum ranch south-east of Sidney, MT. At this location, we deployed pitfall, pan, and baited traps targeting food insects, rangeland pollinators, and dung beetle species, respectively. Traps were deployed on the Buxbaum grazing lease and on neighboring properties which use more traditional, season long cattle grazing

strategies. Here, 150 pitfall traps (7,350 trap days) and 135 pan traps (6,615 trap days) were deployed for a period of seven weeks. Pitfall traps target ground dwelling arthropods while pan traps target wild (i.e., non-domestic such as honey bees) and native arthropod pollinators. We also deployed 36 baited dung beetle traps (1,764 trap days) and collected 8,400 sweeps of foliar insects which served as food items of migratory song birds as well as beneficial and pest species of rangeland vegetation. Samples are currently being processed.

Project 2 was successfully implemented on SGI enrolled properties, non-SGI properties, and the Lake Mason National Wildlife Refuge (LMWR) in the sage-grouse core area of central Montana. Here, 90 pitfall traps and 81 pan traps were deployed for a total of 4,410 and 3,969 trap days, respectively. Twenty-seven baited dung beetle traps (1,323 trap days) were deployed and 6,300 foliar insect sweeps were also collected. Project 2 samples are currently being processed.

Our team was successfully awarded additional grant funds from the NRCS Conservation Effects Assessment Project (CEAP). These funds will be used to add a MS level graduate student to the sage-grouse core area research program. The selected student will be responsible for spatial collections of sage-grouse food arthropod on SGI, non-SGI, and LMWR properties. Our team here at MSU will work cooperatively with key sage-grouse researchers and leadership from MT FWP, the University of Montana, and the Sage-Grouse Initiative to develop a predictive spatial layer for food arthropod abundance generated from rangeland vegetative metrics. We are currently advertising at the National level to recruit a student into the position which is slated to begin in January, 2017.

We will continue to seek additional grant funds to add supplemental projects to the existing research programs of Projects 1 and 2. We anticipate having specimen identification completed by April 2017 on all samples collected for Projects 1 and 2, in preparation for our second, 2017, field season. I would like to extend an invite to anyone interested in a guided tour of our facilities here on the MSU campus or to accompany our team in the field for specimen collections.