Sage-grouse Geophagy and Movements in the Pinedale Region

2016 Annual Report

Chapter 33-613

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In 2014, we initiated a highly collaborative study on Greater Sage-grouse (*Centrocercus urophasianus*; hereafter sage-grouse) in western Wyoming involving federal, state, non-profit, and private sector stakeholders. This on-going project is multifaceted and maximizes information gathered from radio-marked sage-grouse. The principle investigators include the authors of this report, Dale Woolwine, David Dahlgren, and Matt Holloran but key collaborators include A. Roberts, K. Murphy, G. Hanvey and L. Yandow from Bridger-Teton National Forest, J. Dahlke and G. Shedd from Wyoming Wildlife Consultants, LLC, and D. Clause from Wyoming Game and Fish Department. Research during 2016 was conducted under WGFD chapter 33 permit 613. In 2016, new project partner David Dahlgren from Utah State University was engaged in the project. In 2017, the majority of data analysis and collection will become part of a Master's project through USU with Dave Dahlgren as the major advisor. J. Hemenway and B. Bedrosian will continue as co-PIs on the project with D. Dahlgren. Dale Woolwine will also remain involved but has since left BLM.

Data from sage-grouse marked as part of this research are being used in two different ways. First, GPS movement data are being compiled to investigate geophagy of sage-grouse on winter range in the Pinedale/Big Piney regions of the Upper Green River Drainage. Geophagy is a newly discovered phenomenon where sage-grouse congregate at specific locations on winter range for the purpose of soil ingestion. Long-term questions on this behavior include where these sites are, frequency of use, why the behavior occurs, and how it affects movements and fitness. GPS data collected from marked sage-grouse in 2014-2016 are helping locate these sites and determine the frequency of use as the first part of this investigation.

Secondly, location data from sage-grouse in this study are being used to help define occupied breeding and brood rearing habitat in the Hoback and Upper Green areas on the Bridger-Teton National Forest. These areas may be key connectivity corridors between the large core sage-grouse populations in the Pinedale region to the genetically-isolated core population in the Jackson Hole region. Entering 2016, we attempted to track and download data stored on GPS transmitters from 36 sage-grouse that were marked in previous years as part of this study. The majority of these transmitters were battery powered and were not expected to last past June 2016. We were able to gather location data from 23 individuals during 2016. In total, we gathered 65,673 locations from 36 individuals during the duration of this study (Figure 1). We documented migrations from all grouse outfitted on Forest Service Lands (Figure 2), including the longest known migration distance of any sage-grouse of ca. 95 miles (153km) one-way from the Upper

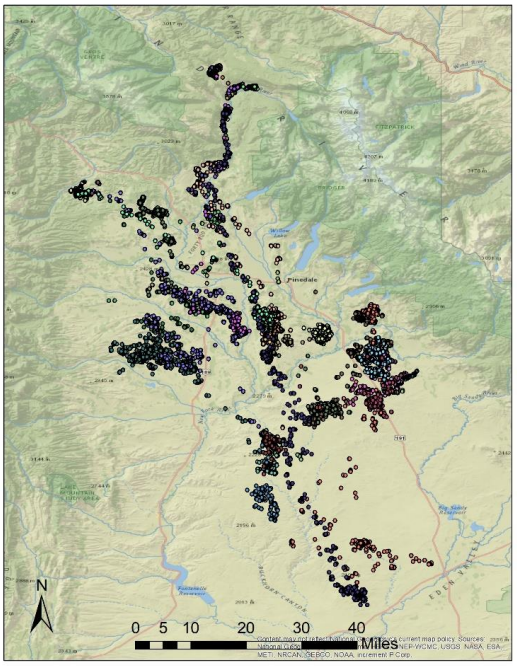

Figure 2. All GPS locations from marked sage-grouse in 2014-2016.

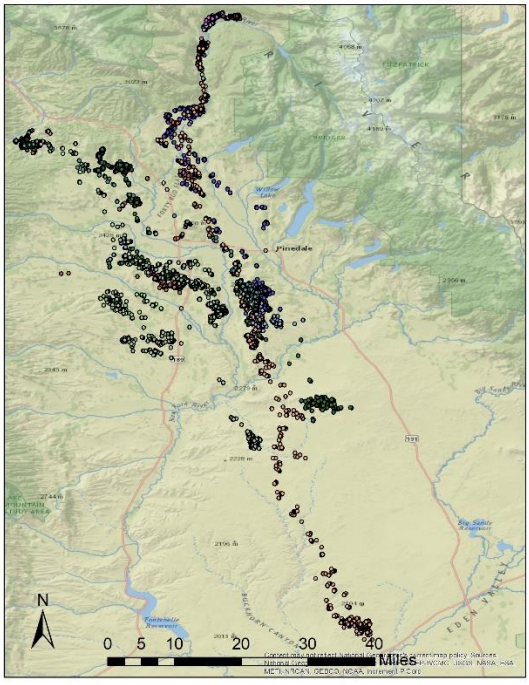

Figure 1. Migration data from sage-grouse marked on USFS lands in 2014-2015.

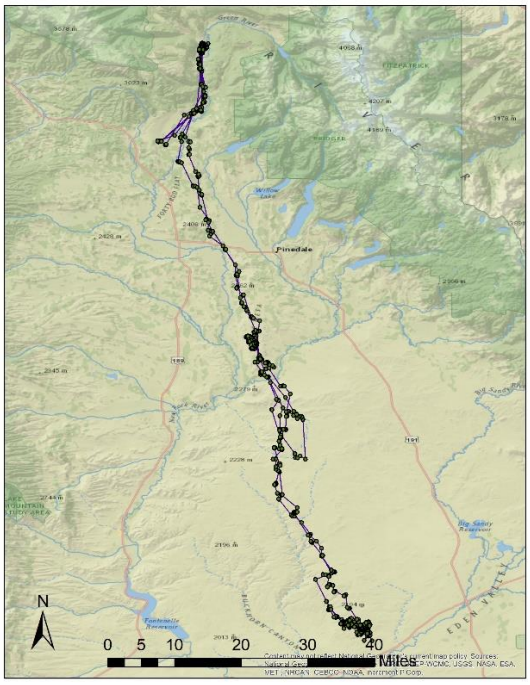

Figure 3. Longest known migration route from a female sage-grouse marked in the Upper Green.

Green to west of Farson, WY (Figure 3). There did not appear to be a pattern of wintering areas between Coyote Gulch and Upper Green grouse. Winter areas included Ryegrass, Soapholes, Mesa, Alkali Creek and south towards Farson.

We have been utilizing all locations to help define and document geophagy locations throughout the region. From the complete dataset, we have gathered 26,517 wintering locations (December – March), of which, 10,358 locations were gathered before 9am to help identify geophagy sites. These data will be analyzed as part of a MS program with partners at Utah State University in the coming years. Using a simple kernel analysis of wintering locations, we have identified several key wintering locations from our sample of marked sage-grouse (Figure 5). These areas include the Mesa, Alkali Creek, Boulder, and Ryegrass. More detailed analyses need to be conducted to account for individuals, capture locations, and sample sizes. To date, we have located 27 geophagy locations (Figure 6), many as a result of the GPS tracking data. We gathered a preliminary 22 soil samples from verified sites with paired samples 150m from the site in a random direction. We gathered random soil samples from around the entire study area.

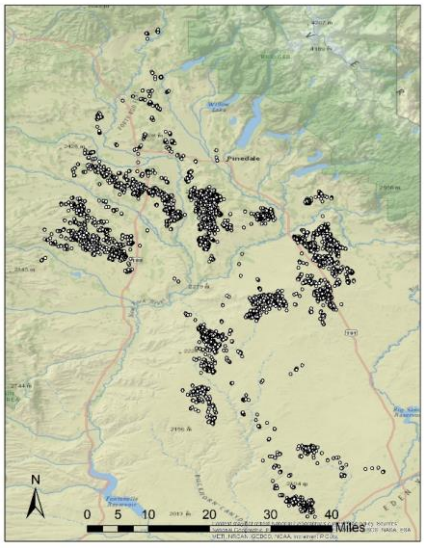

Figure 5. Winter locations from GPS marked sage-grouse in 2014-2016.

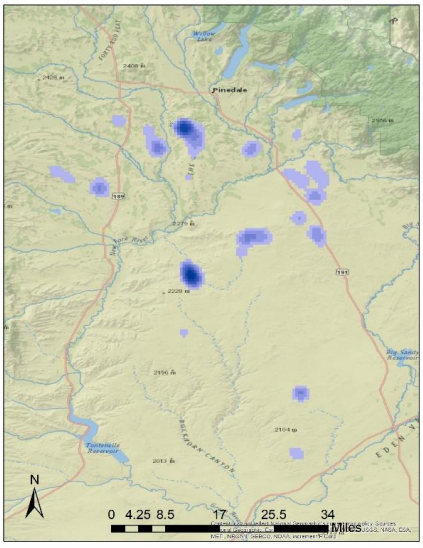

Figure 6. Population level kernel density analysis of wintering locations of sage-grouse from 2014-2016. Darker colors represent higher intensity of use.

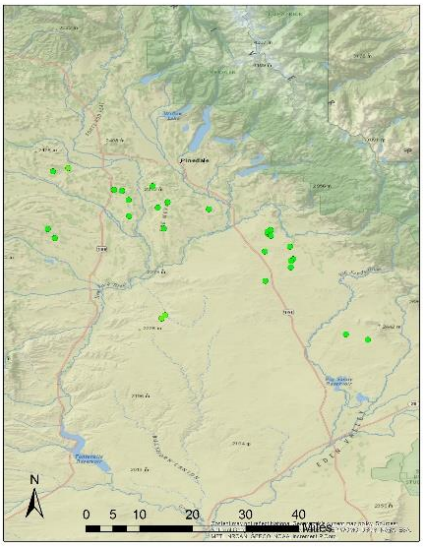

Figure 4. Sage-grouse geophagy locations 2014-2016.

Initial results from soil analysis indicates higher pH, electrical connectivity, sodium, and sodium absorption ratio at the use sites compared the paired random locations (Figure 6). Use sites compared the random sites from across the study area indicate higher pH, electrical connectivity, nitrates, phosphorous and potassium (Figure 7).

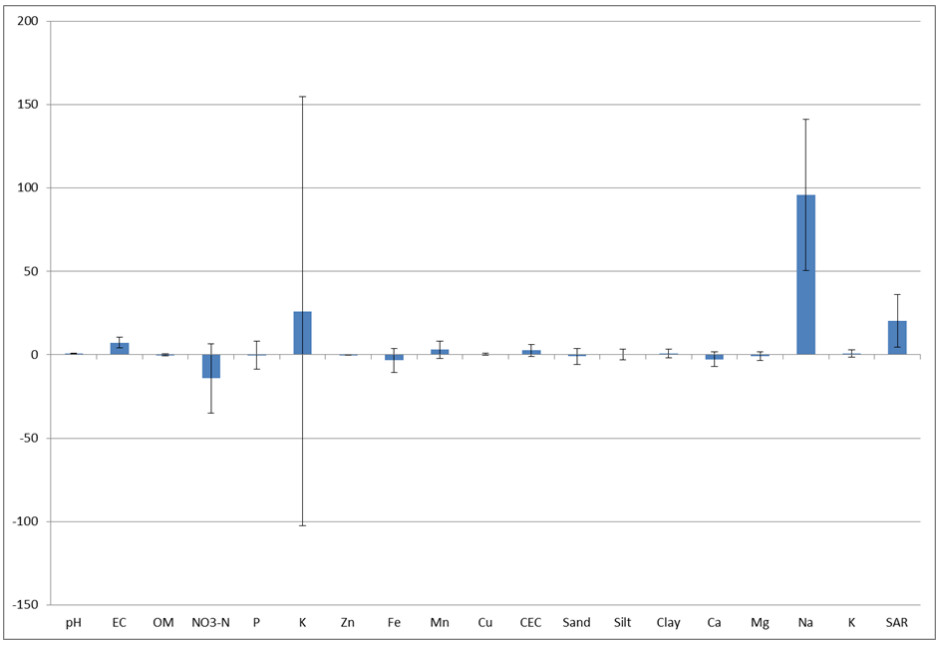

Figure 7. Soil analysis and chemistry at used geophagy vs paired, random sites. Error bars are 2 x SE.

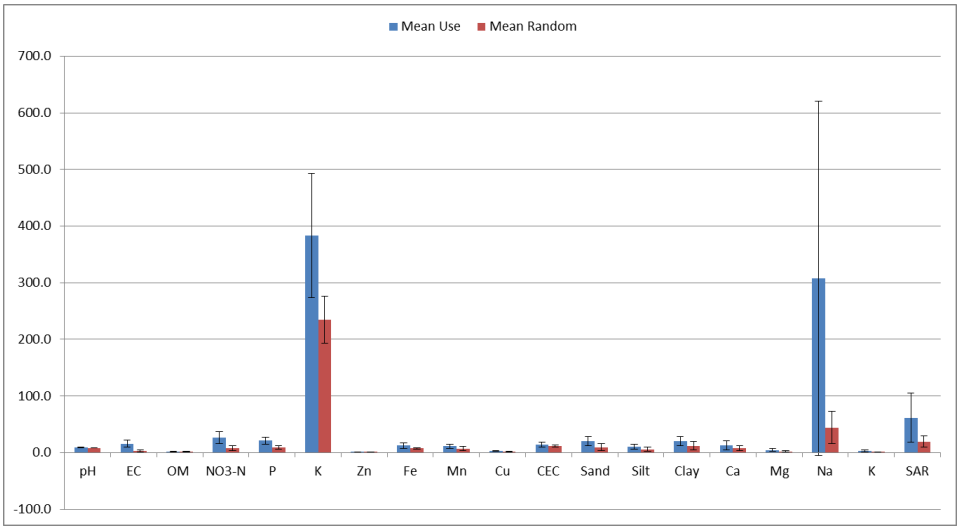

Figure 8. Soil analysis and chemistry of used geophagy locations and random sites across the study area. Error bars = 2 x SE

In late 2016, we captured an additional 11 sage-grouse to augment sample sizes (Table 1) and expanded the project to include more detailed analysis of soil content and how geophagy is affected by nutrition or selection of nutrients. This portion of the project will be continued through the aforementioned MS project with USU in 2017-2019. We captured six females and five males while on winter range in December 2016. We outfitted 10 grouse with VHF transmitters (collars for females and backpacks for males). One male received a GPS/GSM transmitter but that unit failed immediately after deployment.

Table 1. Capture information for grouse marked in 2016.

Date	Latitude	Longitude	Area	Unit type	Frequency	Age	Sex
12/12/2016	42.68017231	-109.9239518	Mesa	VHF backpack	**150.100**	Juvenile	Male
12/16/2016	42.78910405	-110.00957	Soapholes	VHF collar	**151.260**	Juvenile	Female
12/16/2016	42.62238	-109.55748	Boulder	VHF backpack	**151.569**	Adult	Male
12/16/2016	42.78170931	-110.0029666	Soapholes	VHF backpack	**151.552**	Yearling	Male
12/16/2016	42.78245467	-219.5648735	Soapholes	VHF collar	**151.509**	Juvenile	Female
12/16/2016	42.78774761	-110.0106952	Soapholes	VHF collar	**151.460**	Adult	Female
12/16/2016	42.78275681	-110.0080757	Soapholes	VHF collar	**150.339**	Juvenile	Female
12/14/2016	42.60498	-109.56672	Boulder	VHF backpack	**150.130**	Adult	Male
12/13/2016	42.7507374	-109.8927836	Mesa	GSM-GPS backpack	**150.861**	Adult	Male
12/13/2016	42.6128602	-109.5805974	Mesa	VHF collar	**151.470**	Adult	Female
12/12/2016	42.76504261	-109.8995507	Mesa	VHF backpack	**150.376**	Adult	Male