

Factors Influencing the Ecology of Greater Sage-Grouse Inhabiting the Bear Lake
Plateau and Valley, Idaho-Utah

2011 Progress Report



Casey J. Cardinal
Graduate Research Assistant
Department of Wildland Resources
Utah State University, Logan UT 84322-5320

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East Idaho Uplands Sage-grouse Local Working Group

Rich County Coordinated Resources Management Working Group

Wyoming Department of Game and Fish

Southwest Wyoming Sage-grouse Local Working Group

By

Casey J. Cardinal
Graduate Research Assistant
Department of Wildland Resources
Utah State University, Logan UT 83322-5320

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INTRODUCTION

Greater sage-grouse (*Centrocercus urophasianus*; hereafter sage-grouse), the largest grouse species in North America, was designated as a candidate species in March 2010 by the U.S. Fish and Wildlife Service (USFWS) for protection under the Endangered Species Act (ESA) of 1973 (USFWS 2010). In the 12-month finding, the USFWS determined that sage-grouse range wide warranted protection under the ESA but their listing was precluded because of higher conservation priorities.

Sage-grouse occupy sagebrush-steppe (*Artemisia* spp.) ecosystems throughout their current range (Patterson 1952, Connelly and Braun 1997). Sagebrush is important as both a source of food and cover (Patterson 1952, Connelly et al. 2000). To complete their annual life cycle they require a large expanses of sagebrush habitat (Dalke et al. 1963, Connelly et al. 1988, Leonard et al. 2000, Connelly et al. 2000). Schroeder et al. (2004) estimated that sage-grouse currently occupy about 668,412 km², < 60% of the presettlement range, which includes 11 states and 2 Canadian Provinces. Declines in sage-grouse populations have mainly been attributed to habitat loss and degradation of the sagebrush-steppe ecosystem (Braun 1998, Connelly et al. 2004, Knick and Connelly 2011).

Sage-grouse populations inhabiting in the Bear Lake Plateau and Valley of Idaho and Utah are included in the Wyoming Basin sage-grouse population (Connelly et al. 2004). The southwestern subpopulation includes southwestern Wyoming, northwestern Colorado, northeastern Utah, and southeastern Idaho (Miller and Eddleman 2001, Connelly et al. 2004). The Bear Lake Plateau and Valley population occurs at the edge of the Wyoming Basin in the southeastern subpopulation. Populations of sage-grouse at the edge of the range-wide distribution, such as the Bear Lake Plateau and Valley population, often depend on dispersal from connecting leks to sustain the genetic variation of these populations (Knick and Hanser 2011).

Because sage-grouse are capable of migrating considerable distances (Patterson 1952, Connelly et al. 1988), the sage-grouse inhabiting the Bear Lake Plateau and Valley are believed to use habitats in three states. Pilot research conducted in 2010 confirmed that the population uses seasonal habitats in three states, however the magnitude and importance of the interchange is uncertain (C.J. Cardinal, Utah State University, unpublished data). Obtaining this information could be paramount to the conservation of the Bear Lake Plateau and Valley sage-grouse population if the seasonal movements include multiple states where they are subjected to the jurisdiction of different state laws and management plans.

Purpose and Study Objectives

Little is known about the ecology, seasonal movements, and habitat-use patterns of the sage-grouse populations that inhabit the Bear Lake Plateau and Valley relative to existing or potential land uses for application to management. Migration information is important to delineate population dynamics (e.g., a meta-population, source-sink, and other spatial complications), identify essential habitats, and determine the potential effects of land-use on species conservation.

The purpose of this research is to describe the ecology, seasonal movements, and habitat-use patterns of sage-grouse that inhabit the Bear Lake Plateau and Valley relative to existing land-uses. Because the Bear Lake Plateau and Valley is subject to both natural and anthropogenic barriers and fragmentation, defining population vital rates, seasonal movement and habitat-use relative to land use and jurisdictional boundaries of this population will be important as the basis for management cooperation between Idaho, Utah, and Wyoming. Sage-grouse land use research will also define the core use areas of important seasonal and temporal habitats in the Bear Lake Plateau and Valley. This could be important for targeted conservation efforts in the future.

The objectives of this study are to:

1. Document population(s) vital rates of sage-grouse that inhabit the Bear Lake Plateau and Valley, in Idaho, Utah, and Wyoming.
2. Document sage-grouse seasonal distribution and habitat-use patterns in the Bear Lake Plateau and Valley.
3. Determine if any differences observed in movement and habitat-use patterns are related to sex, age class, or land-use patterns.
4. Document how natural and anthropogenic land-use patterns and activities may contribute to habitat loss by fragmentation of sage-grouse habitats in the Bear Lake Plateau and Valley.

STUDY AREA

The Bear Lake Plateau and Valley Study Area (BLPV) consists of 207,500 ha in Bear Lake County, Idaho; Rich County, Utah; and Lincoln County, Wyoming. The elevation of the study area ranges from 1800 m to 2500 m above mean sea level. The BLPV is comprised of many different land ownership and management entities. This area is comprised mostly of private land, with some patches of public (i.e., U. S. Forest Service, USFWS, Bureau of Land Management) and state-owned land.

Vegetation is dominated by sagebrush (*Artemisia* spp.) grassland plant communities. The main vegetation includes shrubs: *Artemisia* spp. *Chrysothamnus* spp.; grasses such as: crested wheatgrass (*Agropyron cristatum*), cheatgrass (*bromus tectorum*), *Poa* spp.; and forbs such as: *Pholx* spp., pale agoseris (*Agoseris glauca*), tapertip hawksbeard (*Crepis acuminata*), willow baccharis (*Baccharis salicina*), rosy pussytoes (*Antennaria rosea*). The climate of the study area is typical of intermountain highlands by cold winters and hot summers. Temperatures ranged

from lows of about 14°F in January, and highs of 85°F in July. The average precipitation is 14.2 inches, and the average annual snowfall is 41.1 inches (Western Regional Climate Center).

The primary land use is for grazing by domestic livestock. Though, because of the presence of Bear Lake, the BLPV is a major seasonally recreation area, with most of the use occurring in the summer. Additional residential development is occurring at the base of Bear Lake on both the east and west sides of the study area.

METHODS

Sage-grouse were trapped on and near leks beginning in March 2010. I will continue to trap additional birds through spring of 2012. Spotlights were used to locate roosting grouse, and they were captured using a dip net, and fitted with radio-collars (Connelly et al. 2003). I plan to capture and collar up to 40 male and 40 females annually. Half the collars will be deployed in Utah and half in Idaho. I will attempt to distribute them evenly on yearling and adults using size and plumage to classify grouse (Dalke 1963). Radio-collared grouse were located using telemetry at least once a week from 1 June to 1 November and once a month from 1 November to 15 March 2011.

Radio-collared females were located on nests by approaching and observing them under the same bush for several days. Nest success was measured by monitoring nest incubation time, and locating nest remains after success or failure. Brood success was determined by walking up females and counting the number of chicks, or by using night spotlighting.

Nest and brood vegetation was recorded beginning in 2011. A Robel pole was used to measure visual cover at nests, and four 15 meter line intercept transects at 90 degree angles from the nest were used to measure vegetation cover. Along these transects herbaceous cover was measured using Daubenmire frames. The aspect and the slope of the nest location were also

recorded. Brood sites were measured using the line-intercept method at four 30 meter transects at 90 degree to measure shrub cover, and Daubenmire Frames were used to measure ground cover (grass, forb, bare ground, litter, rock) at four locations along these transects. Random vegetation points were taken for each nest and brood discovered to compare selected habitats to habitat points in the study area (Connelly et al. 2003).

Habitat fragmentation will be measured using GIS and remote sensing technology. Sage-grouse habitat use, production, and seasonal movements will be plotted relative to anthropogenic landscape features (Connelly et al. 2011). These metrics will be used to develop indices of habitat fragmentation to determine if the fragmentation observed constitutes functional habitat loss (USFWS 2010). Sage-grouse movements will also be plotted relative to natural landscape barriers to determine how habitat-use is affected in this area.

RESULTS

2011 Research Progress

Captures

In spring 2011, we trapped three leks in Idaho (2B025, 2B032, and 2B043) and two in Utah. (2B014 and 2B015). In 2011, 35 males were captured (25 adults and 10 yearlings) and 17 females (7 adults and 10 yearlings) were captured and radio-collared. In the fall of 2011, an additional 18 birds were captured and in North Eden along the Idaho-Utah Border. This included 7 females: 5 adults, 2 yearlings, and 11 males: 8 adults and 3 juveniles (Table 1).

Locations

During 2011, 461 female telemetry locations were recorded among from 33 females. We also documented 529 male locations for 49 males. Over 300 unmarked sage-grouse were observed around the site during routine monitoring (Figure 2).

Small scale lek monitoring was conducted during the spring of 2011. On several mornings in April and May leks were visited and counted using standard protocols (Table 2).

Twelve hens were located on nests during 2011. Of these, 8 were unsuccessful (3 mammal depredation, 2 avian depredation, and 3 undetermined). Four hens successfully hatched nests, but only one was observed with a brood 2 weeks after hatching. Fifteen unmarked broods also were observed on the site this summer.

Mortalities

There were twelve recorded mortalities during 2011 (Table 3). In the Indian Creek area (2B043) mortalities were attributed to: 2 mammalian and 2 avian. The Eden area (2B014 and 2B015) mortalities were attributed to: 2 mammalian and 4 avian. The Bloomington area (2B025) mortalities were attributed to: 1 fence collision and 1 avian. In addition, 3 dropped collars were recovered in the Bloomington area. These were assumed to be dropped due to collaring error because there was no indication of mortality.

Future Work Plan

During Fall 2011 and Spring 2012, I will attempt to deploy 60 additional radio collars. I will continue to locate the birds two times per week in the spring and summer, once a week in the fall, and at least once a month in the winter. In spring 2012, I will attempt to determine which historical leks are still active and if there are any leks that have been undiscovered in the study area. During the spring and summer 2012, I will focus on finding nests and recording success or failure. I will take vegetation measurements for nests and brood locations. I will also take vegetation measurements at random locations to assess site selection based on vegetation structure or composition components. Finally, I will start to create a habitat fragmentation index to determine if the fragmentation observed constitutes functional habitat loss. I will use remote

sensing to assess land use change over the last 30 years and classify habitat and non-habitat in the Bear Lake Plateau and Valley study area. I will use these maps along with bird locations to determine if land use may be affecting habitat use and vital rates.

MANAGEMENT IMPLICATIONS

If sage-grouse in the Bear Lake Plateau and Valley Study Area do use habitat in all three states, this study will be useful for management cooperation between Idaho, Utah, and Wyoming. If birds are documented using habitat in the three states, a conservation plan similar to the California-Nevada border plan could be constructed. This research will also be important to define the core use areas of valuable habitat for sage-grouse on the BLPV. This could be important for targeted conservation efforts in the future. If possible human impact could be reduced in vital breeding or wintering habitat, to promote sustainable populations in this area. Observing birds in this area will help define timing of migration. In future monitoring, this will aid in tracking birds, and studying habitat selection at different times of the year.

LITERATURE CITED

- Braun, C.E. 1998. Sage grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139-156.
- Connelly, J.W., H.W. Browsers, and R.J. Gates. 1988. Seasonal movements of sage grouse in southeastern Idaho. The Journal of Wildlife Management 52:116-122.
- Connelly, J.W., and C.E. Braun. 1997. A review of long-term changes in sage grouse *Centrocercus urophasianus* populations in western North America. Wildlife Biology 3:123-128.
- Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.
- Connelly, J.W., K.P. Reese, M.A. Schroeder. 2003. Monitoring of Greater Sage-grouse habitats and populations. Station Bulletin 80. University of Idaho College of Natural Resources Experiment Station, Moscow, USA.

- Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.
- Connelly, J.W., S.T. Knick, C.E. Braun, W.L. Baker, E.A. Beever, T.Christiansen, K.E. Doherty, E.O. Garton, C.A. Hagen, S.E. Hanser, D.H. Johnson, M. Leu, R.F. Miller, D.E. Naugle, S.J. Oyler-McCance, D.A. Pyke, K.P. Reese, M.A. Schroeder, S.J. Stiver, B. L. Walker, and M.J. Wisdom. 2011. Conservation of Greater sage-grouse: A synthesis of current trends and future managmentn. Habitat. Cooper Ornithological Society scientific series: Studies in Avian Biology 38:549-564.
- Dalke, P.D., D.B. Pyrah, D.C. Stanton, J.E. Crawford, and E.F. Schlatterer. 1963. Ecology, productivity, and management of sage-grouse in Idaho. Journal of Wildlife Management 27:810-841.
- Department of the Interior- U.S. Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. Federal Register.
- Knick, S.T., and J.W. Connelly. 2011. Greater Sage-grouse and sagebrush: An introduction to the landscape. In Knick, S.T. and J.W. Connelly (editors). Cooper Ornithological Society scientific series: Studies in Avian Biology 38:1-9.
- Knick, S.T., and S.E. Hanser. 2011. Connecting pattern and process in Greater sage-grouse populations and sagebrush landscapes. In Knick, S.T. and J.W. Connelly (editors). Cooper Ornithological Society scientific series: Studies in Avian Biology 38:383-406.
- Leonard, K.M., K.P. Reese, J.W. Connelly. 2000. Distribution, movements and habitats of sage grouse *Centrocercus urophasianus* on the Upper Snake River Plain of Idaho: changes from the 1950s to the 1990s. Wildlife Biology 6:265-207.
- Miller, R.F., and L.L. Eddleman. 2001. Spatial and temporal changes of sage grouse habitat in the sagebrush biome. Oregon State University, Agricultural Experiment Station, Technical Bulletin 151, Corvallis, Oregon.
- Patterson, R.L. 1952. The Sage Grouse in Wyoming. Sage Books, Inc. Denver, Co.
- Schroeder, M.A., C.L. Aldridge, A.D. Apa, J.R. Bohne, C.E. Braun, S.D. Bunnell, J.W. Connelly, P.A. Deibert, S.C. Gardner, M.A. Hilliard, G.D. Kobriger, S.M. McAdam, C.W. McCarthy, J.J. McCarthy, D.L. Mitchell, E.V. Rickerson, and S.J. Stiver. 2004. Distribution of Sage-Grouse in North America. The Condor 106:363-376.

Tables and Figures

Table 1. The distribution of radio-collars deployed on greater sage-grouse in the Bear Lake Study Area during 2011.

SPRING CAPTURES						
Capture Location	Adult Male	Yearling Male	Adult Female	Yearling Female		
Idaho- 2B043 Lek	7	1	5	5		
Idaho- 2B025 Lek	3	4	0	2		
Idaho- 2B032 Lek	6	0	0	1		
Utah- 2B014 &2B015 leks	12	2	2	2		
FALL CAPTURES						
Capture Location	Adult Male	Yearling Male	Juvenile Males	Adult Female	Yearling Female	Juvenile Females
IDAHO/UTAH BORDER	8	0	3	5	2	0
TOTAL CAPTURES FOR 2011						
Capture Location	Adult Male	Yearling Male	Juvenile Males	Adult Female	Yearling Female	Juvenile Females
Total for 2011=	36	7	3	12	12	0

Table 2. 2011 Lek Observations for the Bear Lake Valley and Plateau Study Area

LEK	YEAR	MONTH	DAY	TIME	MALES	FEMALES
2B025	2011	4	22	6:15	14	13
2B007	2011	4	22	7:45	0	0
2B025	2011	4	25	6:15	8	1
2B014	2011	5	6	5:45	42	3
2B015	2011	5	6	5:30	40	0
2B014	2011	5	12	6:05	33	7
2B006	2011	5	11	6:20	0	0
2B005	2011	5	11	6:29	0	0
2B012	2011	5	11	6:34	6	0
2B013	2011	5	11	6:57	0	0
2B032	2011	5	11	8:00	42	0
2B043	2011	5	18	5:45	38	3
2B025	2011	5	18	6:38	5	1

Table 3. 2011 Mortality records for recovered sage-grouse collars on the Bear Lake Valley and Plateau Study Area.

Area	Sex	Cause	Date
Bloomington	M	Fence	04/23/2011
Bloomington	F	Dropped	04/25/2011
Bloomington	M	Dropped	04/27/2011
Eden	M	Avian	05/03/2011
Eden	M	Avian	05/05/2011
Bloomington	M	Dropped	05/17/2011
Eden	M	Mammal	05/19/2011
2B043	F	Mammal	05/24/2011
Eden	M	Mammal	06/01/2011
Bloomington	M	Avian	06/28/2011
2B043	M	Mammal	07/20/2011
2B043	F	Avian	08/09/2011
2B043	M	Avian	08/11/2011
Eden	F	Avian	10/01/2011
Eden	M	Avian	10/01/2011

Figure 1. Distribution of sage-grouse locations for 2011. Symbol shapes correlate to the area of capture. Colors correlate to season of location

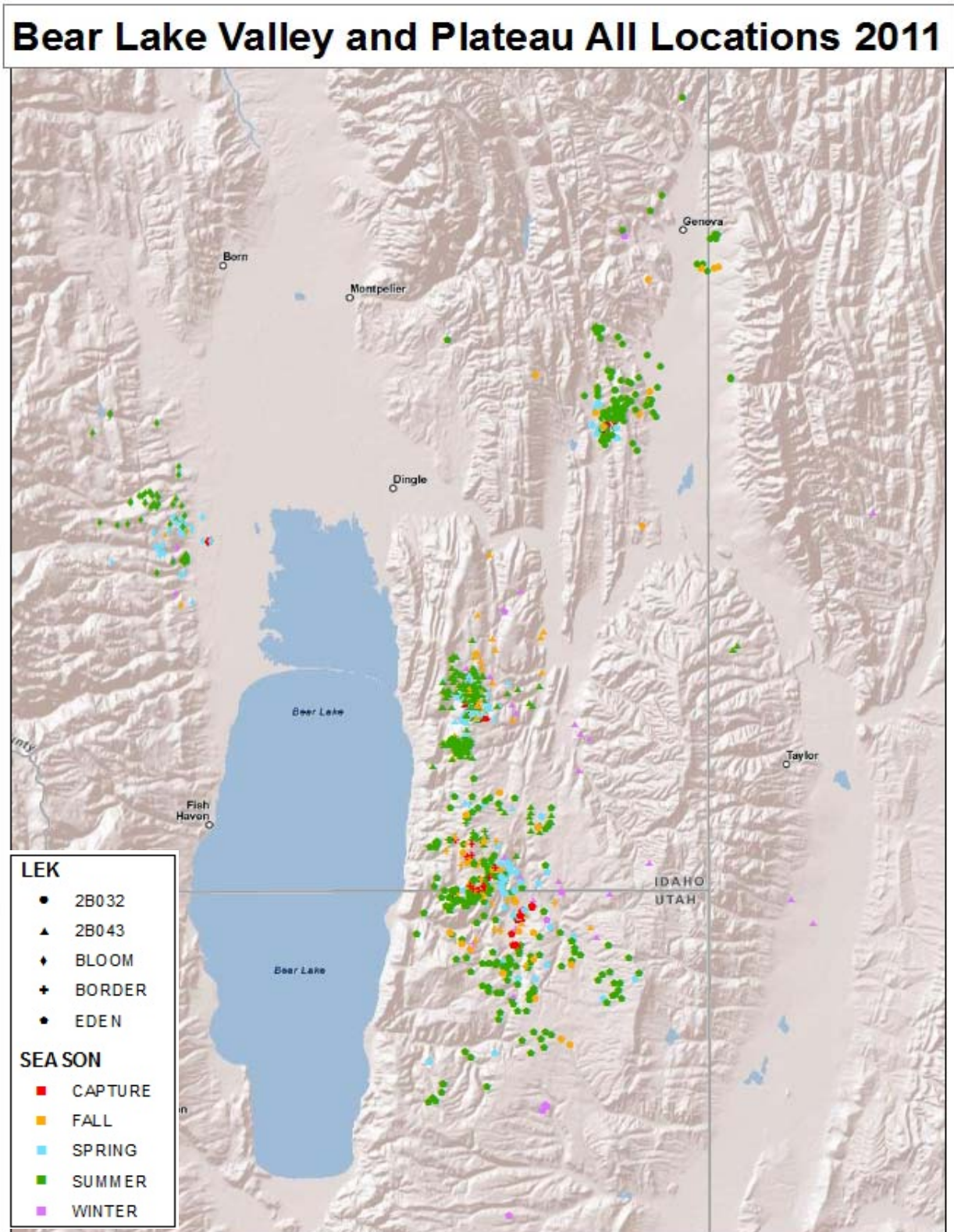


Figure 2. Recorded locations of unbanded sage-grouse for 2011.

