APPENDIX C: OSC Project Reports

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2009-04: Impacts of West Nile Virus on Sage-grouse in Owyhee County

2012 Sage-grouse/West Nile Virus Year-End Report

Owyhee County, Idaho

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12/29/2012

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INTRODUCTION

Greater sage-grouse populations across their range have experienced wide range and sometimes rapid declines since the middle 1960's. Habitat loss caused by wildfire, agricultural development, land-type conversions, and energy and infrastructure development were the major causes of declines (Connelly et al. 2012). More recently, disease, specifically West Nile Virus (WNV) has played a role in local population declines and near extirpation (Naugle 2004). West Nile Virus is a mosquito-borne flavivirus that can be fatal to wild birds. Sage-grouse are highly susceptible to the virus. Laboratory trials were conducted to test the susceptibility of sage-grouse to WNV and no sage-grouse survived (Clark et al. 2006).

Since the emergence of West Nile virus (WNV) in sage-grouse during late July 2002 in the Power River Basin of Wyoming, management biologists have been concerned about the affects of the virus on local grouse populations. During 2003, late-summer survival of females among 4 radio-marked populations in Wyoming with confirmed WNV decreased by 25% (Naugle et al. 2004).

The first confirmed sage-grouse infected with WNV in Idaho was found on Duck Valley Indian Reservation on 24 July 2006. Between mid- and late July, reports of sick sage-grouse near Big Springs Ranch (Owyhee Country) and Jordan Valley, Oregon also came in. From late July through early September, sage-grouse tested positive for WNV at Duck Valley Indian Reservation, Big Springs Ranch, Jordan Valley, Brown's Bench (Twin Falls County), and the West Central Highlands (Washington County). Because sage-grouse are highly susceptible to WNV and Biologist were not able to fully assess the impacts of the disease on local populations, the Idaho Department of Fish and Game initiated an emergency closure of sage-grouse hunting in Owyhee County west of the Bruneau River during fall 2006.

Between spring 2007 and fall 2008 the Idaho Department of Fish and Game (IDFG) captured and radio-marked 51 sage-grouse (28 males and 23 females) on 4 leks and summer range scattered across southwestern Idaho. The Owyhee County Sage-grouse Local Working Group (OCSGLWG), Bureau of Land Management, and Idaho Department of Fish and Game were concerned about the future of sage-grouse in this relatively primitive area with mostly in-tact sagebrush habitat. Telemetry flights were conducted monthly from October through June and bi-weekly during peak WNV season. Four sage-grouse were found dead during WNV season (1 July-30 September), but none were testable. However, because of the low overall mortality of the radio-marked birds during WNV season, it was determined that WNV was not wide-spread during 2007 and 2008.

Lek counts during spring 2008 showed a 31% decline compared to 2006 and a 52% decline compared to 2006 (pre-WNV). Spring and summer precipitation during 2007 was the lowest it had been in over 60 years and sage-grouse recruitment was only 50 juveniles per 100 hens, the lowest ever recorded. Between 2008 and 2011 the population increased back to 2007 levels but dropped again during spring 2012. The decline of this population continues to be a concern among all stakeholders. Our objectives were to continue to monitor radio-marked birds to monitor for the presence of WNV and to supplement our knowledge of greater sage-grouse survival, seasonal habitat use and movements in this area.

Funding for the original project was limited to 2 years (2007 and 2008) and by late spring 2009 none of the radio collars were functioning and/or some birds died during the breeding season. As a result, no birds were followed during summer 2009. However, the OCSGLWG approved a proposal to mark additional birds during 2010-2011 to continue to monitor for WNV and gather more information on seasonal habitat use and movements. During spring 2012 additional sage-grouse were marked east of Riddle as part of a larger study to determine the impacts of energy development on sage-grouse. Because birds were marked in the same general area as birds for the WNV study, we used those birds to continue our overall WNV monitoring efforts.

STUDY AREA

Capture for this portion of the study occurred east/northeast of Riddle, Idaho in Owyhee County. The area can be described as the southern edge of the Bruneau escarpment, a long series of tables dominated by low sagebrush (*Artemisia arbuscula*) that runs from the northwest to the southeast, and is surrounded by wet meadow complexes either converted to alfalfa or dominated by native forb and grass species, and in-tact stands of Wyoming big sagebrush (*A t. wyomingensis*). Birds were located in areas dominated by either Wyoming big sage or mountain big sage (*A. t. vaseyana*) during the breeding period. The area east of Riddle is dominated by Wyoming big sagebrush in the lower elevations and mountain shrub, low sage, and aspen (*Populus tremuloides*) in the upper elevations southeast of Riddle.

METHODS

Sage-grouse were captured at night using spotlights and long-handled nets (Wakkinen et al. 1992) and fitted with aluminum leg bands and 16 gram necklace style radio-transmitters. Sage-grouse were captured on leks beginning in February. Blood was taken for DNA sampling only because no birds ever tested positive for WNV antibodies, and it was not the right season for WNV to be present. Some ground telemetry was conducted to ascertain nest success and survival. Aerial telemetry flights were conducted monthly for all other birds. Seasonal locations were obtained from Garmin™ GPS units and mapped using ArcGIS© software. The Kaplan-Meier staggered entry method (Pollock et al. 1989) was used to produce annual survival estimates of adult sage-grouse.

RESULTS

Twenty females and 28 males were captured on leks during spring 2012. All hens and 26 of the males were banded and received either a VHF necklace style transmitter or a GPS backpack mounted transmitter. An additional 6 females and 2 males captured during 2010 and 2011 were also monitored. Three females and 1 male from 2012 capture were censored due to loss of frequency or capture myopathy.

Survival

Annual survival of all birds followed between 2011 and 2012 (January-December) was 56% (n=45). Of the birds captured in 2012, 7 females and 2 males died during the breeding season (Mar-Jun). Three males and 2 females died during summer (Jul-Sep). None of the birds were testable for WNV. One male was found depredated during fall (Oct-Nov) and 1 hen was found depredated during winter (Dec 2012).

Of the 2010-2011 birds 3 hens were last heard alive in May, 1 hen was last heard alive in June and 2 hens were last heard alive in October. All lost birds were presumed to be radio failures. One male was found depredated in July approximately 100 yards above a perennial spring in low sagebrush. The bird was not testable for the presence of WNV. However, 10 additional birds flushed within 100 yards of his locations so WNV was not presumed to be a factor. The other male was found depredated in November on winter range. Three males flushed within 100 yards of depredation site and 2 additional males were observed approximately .25 miles away.

Movements

Birds captured south and east of Highway 51 generally moved south to higher elevations both within and east of Duck Valley Indian Reservation and into Nevada as the summer progressed. Birds captured north and west of Highway 51 generally moved south towards Riddle (Figure 2). One male moved west of Riddle and remained there through fall. One hen captured near Rattlesnake Creek east of Highway 51 moved west across Highway 51 to summer. Another hen captured near the Air Force Emitter site north of Rattlesnake creek spent her summer south of Highway 51 at Rattlesnake Creek, and a third hen captured in Riddle during 2011 used the plateau north of Rattlesnake Creek and south of Highway 51 during winter and breeding period.

SUMMARY

Annual survival of radio-marked birds was similar to that found in the literature. Average annual survival rate of all birds combined (adult males, yearling males, adult females, and yearling females) in Colorado was 59% (Zablan et al. 2003). Similar survival rates were reported in other studies in Idaho (58-60%) (Connelly et al. 1994, Wik 2002) and Wyoming (59%) (Holloran 2005). We combined our age and sex classes due to small sample size. Further, there did not appear to be different survival rates between the sex classes.

Six birds died during summer or the typical West Nile virus season. By the time observers were able to retrieve the radios, they were all too desiccated to obtain samples to test for WNV. However, all radios were retrieved in the vicinity of live birds and no other remains were found at or near depredation sites. During 2006 birds 6 birds tested positive for WNV on Duck Valley Indian Reservation and at least 30 additional dead birds were found but could not be tested. Because no one reported sick and/or dying birds and only six of the 40+ marked birds died during WNV season, it is presumed that WNV did not affect sage-grouse in Owyhee County in 2012.

Following radio-marked birds provides valuable information on seasonal use sites. Birds used wet meadows and high elevation plateaus adjacent to aspen stands during late summer and fall, wintered on plateaus dominated by low sage, and bred near in-tact stands of Wyoming or mountain big sagebrush. They moved back to mesic sties the following year. Birds in the Riddle area generally moved either north to Little blue Table and Wild Horse Table or east towards Sheep Creek. The area north of Riddle is a large series of tables stretching towards the Owyhee Mountains to the northwest (Bruneau Escarpment). This area has a very high density of sage-grouse leks and large expanses of in-tact sagebrush habitat. The area to the east of Riddle is generally lower in elevation and the majority of

habitat occurs west of the Bruneau River. Many of the birds associated with these leks moved south to higher elevations on Duck valley Indian Reservation and into Nevada.

Although WNV has not been prevalent in Owyhee County since 2006, continuing to monitor populations has provided valuable information on survival, movements, and seasonal use areas. The information gathered helps land management agencies make appropriate decisions regarding land-use in Owyhee County. Sage-grouse populations in Owyhee County will continue to be monitored closely. Future telemetry studies will allow us to continue to monitor for the presence of WNV antibodies and continue to fill in gaps in our knowledge of seasonal use areas and how sage-grouse move across Owyhee County.

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Figure 1. Greater Sage-grouse, West Nile Virus Project Area, Owyhee County, Idaho, 2012.

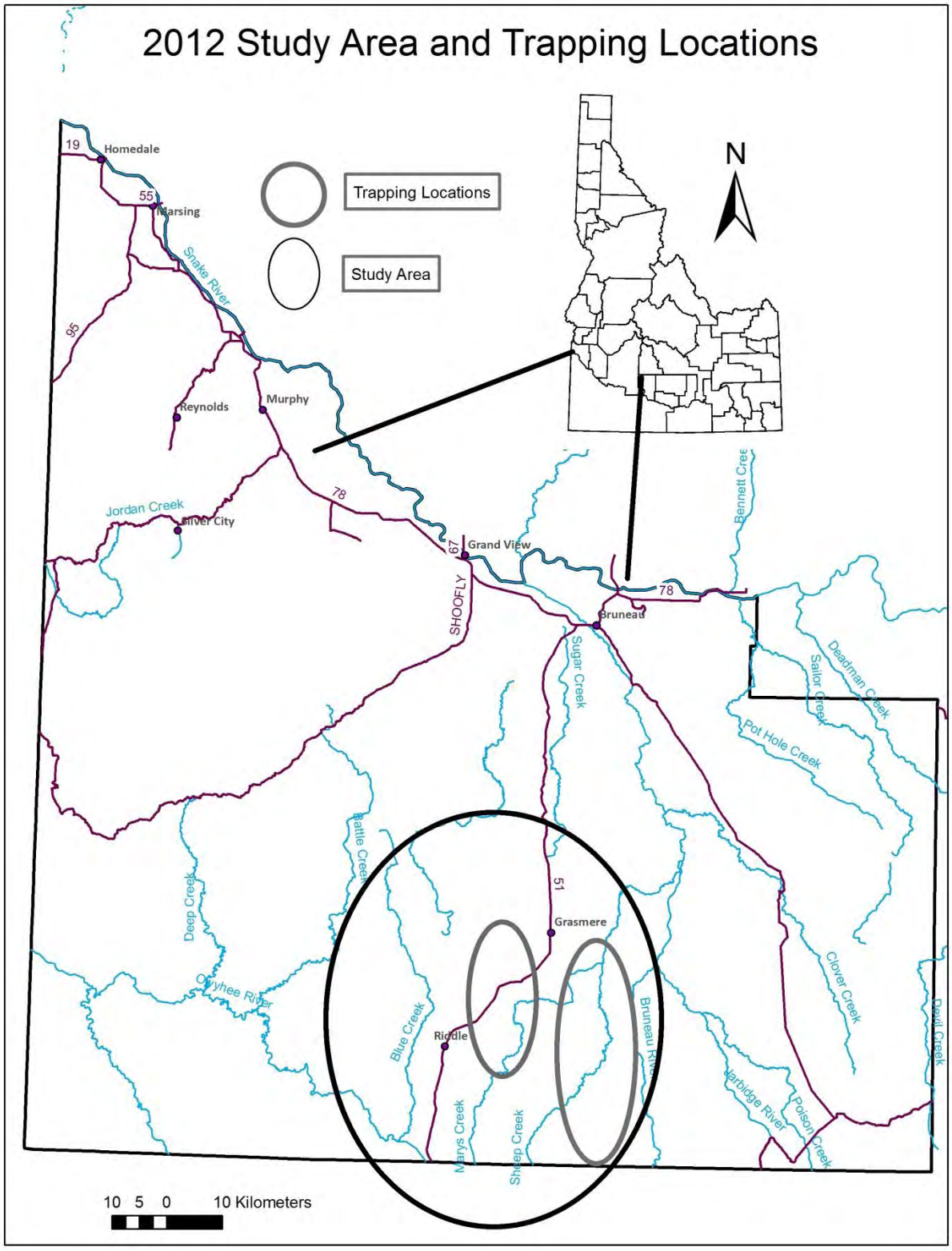


Table 1. Banding information for greater sage-grouse captured in SW Idaho 2010-2011.

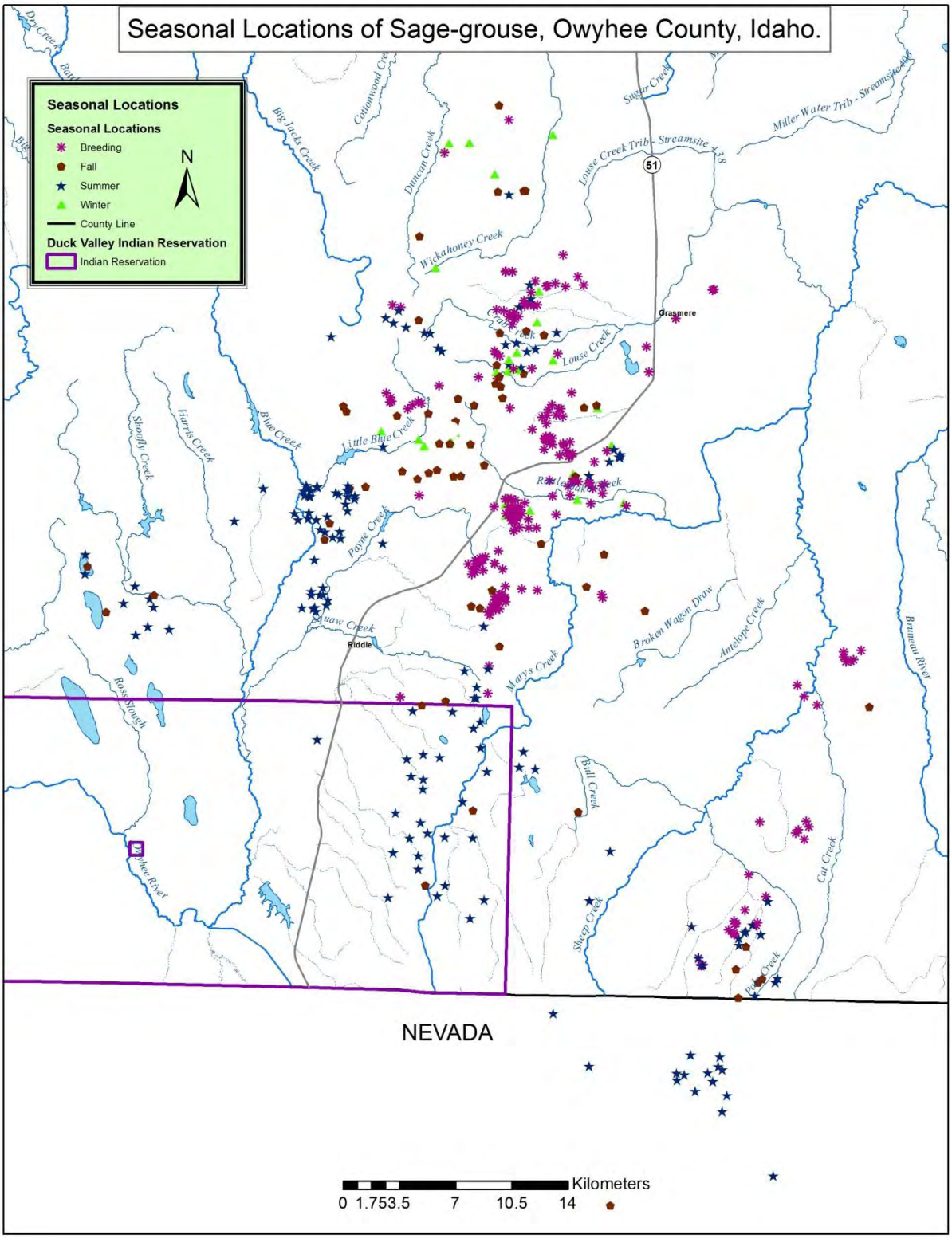
Band #	Radio	Date	SEX	AGE	lat	long	Location/Lek
SGF1322	150.792	3/27/2012	F	A	42.21521	-115.99979	5-Year
SGF1323	150.512	3/27/2012	F	Y	42.21732	-115.99857	5-Year
SGF1324	150.652	3/27/2012	F	A	42.21732	-115.99857	5-Year
SGF1325	150.193	3/27/2012	F	A	42.2205	-115.99574	5-Year
SGF1326	150.503	3/27/2012	F	A	42.2205	-115.99574	5-Year
SGF1327	150.724	3/27/2012	F	A	42.2205	-115.99574	5-Year
SGF4051	150.002	2/17/2012	F	A	42.26735	-115.98902	
SGF4052	150.282	2/17/2012	F	A	42.26496	-115.99217	
SGF4053	150.781	2/23/2012	F	Y	42.27143	-115.99078	
SGF4054	150.702	2/17/2012	F	Y	42.26479	-115.99433	
SGF4055	150.141	2/27/2012	F	Y	42.27455	-115.99355	
SGF4056	412.750	3/28/2012	F	A	42.03185	-115.81491	Rattlesnake
SGF4057	412.850	3/21/2012	F	A	42.26257	-115.98724	Rocky Knoll
SGF4058	412.875	3/21/2012	F	Y	42.26257	-115.98724	Rocky Knoll
SGF4060	412.600	4/10/2012	F	Y	42.21804	-116.0023	5-Year
SGF4081	412.625	4/11/2012	F	Y	42.26548	-115.99374	Rocky Knoll
SGF4082	150.692	3/15/2012	F	Y	42.27341	-115.99104	Rocky Knoll
SGF4083	150.672	5/22/2012	F	Y	42.37471	-115.99084	
SGF4100	150.262	5/18/2012	F	Y	42.38243	-115.98318	
SGF4102	412.765	4/12/2012	F	Y	42.03557	-115.81586	Rattlesnake
SGM3955	150.162	2/24/2012	M	A	42.26782	-115.97575	
SGM3998	150.393	3/21/2012	M	A	42.033830	-115.815290	Rattlesnake
SGM4451	150.753	2/23/2012	M	A	42.27091	-115.99451	
SGM4452	150.823	2/23/2012	M	A	42.27289	-115.99212	
SGM4453	150.743	3/13/2012	M	Y	42.26811	-115.98843	
SGM4454	150.842	3/13/2012	M	A	42.27392	-115.99436	
SGM4455	150.452	3/13/2012	M	A	42.27392	-115.99436	
SGM4456	150.823	3/13/2012	M	Y	42.27368	-115.99245	
SGM4481	150.183	3/15/2012	M	A	42.26597	-115.99402	Rocky Knoll
SGM4482	150.632	3/25/2012	M	A	42.18723	-115.73142	Motherlode
SGM4483	150.592	3/21/2012	M	Y	42.3094	-115.96174	Emitter site
SGM4484	150.832	3/15/2012	M	Y	42.26524	-115.98388	Rocky Knoll
SGM4485	150.640	3/23/2012	M	A	42.24136	-116.00838	Punkin Center
SGM4486	150.683	3/15/2012	M	A	42.26524	-115.98388	Rocky Knoll
SGM4487	NONE	3/26/2012	M	Y	42.30965	-115.96346	Emitter site
SGM4488	150.732	3/28/2012	M	A	42.08707	-115.76378	Roland Road Lek
SGM4489	150.772	3/28/2012	M	A	42.03187	-115.81599	Rattlesnake
SGM4490	150.601	3/28/2012	M	A	42.03292	-115.81464	Rattlesnake
SGM4491	150.312	4/13/2012	M	Y	42.18829	-115.72943	Motherlode

Band #	Radio	Date	SEX	AGE	lat	long	Location/Lek
SGM4492	150.563	4/12/2012	M	Y	42.18829	-115.72943	Motherlode
SGM4493	150.713	4/13/2012	M	A	42.18829	-115.72943	Motherlode
SGM4495	412.650	5/16/2012	M	Y	42.26569	-115.9901	Rocky Knoll
SGM4496	412.775	5/16/2012	M	Y	42.26579	-115.98737	Rocky Knoll
SGM4498	150.613	3/30/2012	M	Y	42.28361	-115.91998	NFI
SGM4506	NONE	3/15/2012	M	Y	42.26408	-115.98203	Rocky Knoll
SGM4508	150.581	3/26/2012	M	A	42.30914	-115.96267	Emitter site

Table 2. Additional sage-grouse previously banded and followed during 2012.

Band #	Radio	Date	SEX	AGE	lat	long	Location/Lek
SGF 1339	149.4228	9/20/2011	F	JUV	42.26663	-116.12862	Riddle
SGF 1340	149.514	9/20/2011	F	Juv	42.26668	-116.12954	Riddle
SGF 1342	149.534	9/22/2011	F	AD	42.27723	-116.11375	Riddle
SGF 1343	149.454	9/22/2011	F	AD	42.27723	-116.11375	Riddle
SGF 1309	149.433	9/1/2010	F	JUV	42.25028	-116.12375	RIDDLE
SGF 1321	149.343	9/10/2010	F	AD	42.25372	-116.11865	RIDDLE
SGM 3991	149.523	9/22/2011	M	AD	42.27723	-116.11375	Riddle
SGM 3993	149.153	9/22/2011	M	AD	42.27723	-116.11375	Riddle

Figure 2. Sage-grouse seasonal locations, Owyhee County, Idaho, 2010-2011.



2011-11: Urquidi-Jacks Creek Basin Brood Rearing Wet Meadow Restoration, Bruneau, Idaho, Owyhee County

2012 COMPLETION REPORT

COOPERATIVE SAGE GROUSE PROJECT

Urquidi – Jacks Creek Basin Brood Rearing Wet Meadow Restoration

Bruneau, Idaho, Owyhee County

1. Name of Applicant: John Urquidi, landowner, rancher and permittee
In cooperation with the Owyhee County Sage Grouse Local Working Group.

2. Contact Information: John Urquidi, 34276 Hot Creek Road, Bruneau Idaho 83604
208-845-2554, ajurquidi@msn.com and
Cell number 599-0979
Art Talsma, The Nature Conservancy, atalsma@tnc.org
208-350-2204 Home 467-2349 and
Jason Pyron with USFWS 208-5595604

3. Proposed Project:

- Objective: The primary objective is to increase brood rearing habitat for sage grouse, waterfowl and other nesting birds along Little Jacks Creek basin by restoring a wet meadow to its natural function. Project funding will be used to increase the size of the meadow and abundance of native forbs and grasses as well as riparian shrubs in an area that is lacking this key sage grouse habitat type. The project will reduce soil erosion and capture surface and subsoil moisture and thereby increase the wet meadow habitat. The project area will also be fenced to protect the brood rearing habitat by new fence in with an older ex-closer. The project is expected to triple the size of the protected meadow on private lands. It will increase the availability of forbs, grasses and associated insect population to benefit sage hens with broods and increase recruitment. One existing earthen dike will be enhanced and 6 additional sediment retention dikes will retard soil erosion and capture water that is coming down a washout to sub-irrigate and expand the meadow complex. Funding is urgent because late summer and early fall would be the best time to do the earthwork and seeding. This time-period allows for natural vegetation and any reseeding in the spring so grouse can use the habitat type for brood rearing in 2012. Once the meadow is enhanced it is expected to be productive brood rearing habitat for 15-20 years.

- Implementation in 2012: Three existing dikes were repaired as well as an old surface water irrigation ditch to catches soil and water to sub-irrigate the meadow. This approach has already proven successful in retarding soil erosion with significant increase in the meadow at the Crab Creek project we did with sage-grouse funding on John Urquidi's private land near Grasmere. We repaired and enhance the low-profile earthen silt retention dikes so they grade up in the center and then disperse water laterally to increase the meadow size and life of the project. Based on our earlier success on Crab Creek we expect the restored meadow to expand and plant diversity and abundance of native forbs and grasses up-slope of the structures. Ashby Construction was not available to construct the project in 2011 so in 2012 we met with the landowner on site and decided to employ Branch Enterprises owned by Dave and

Tonya Bunker. Dave Bunker then met us on site to lay-out the restoration earth work per GPS coordinates the Jason and Art prepared for the design specifications. With experienced restoration contractors this successful design-build approach for erosion control and increasing this needed habitat type for the birds can be very efficient and successful within the allocated budget. Art and Jason led the project with 4 onsite inspections and volunteers like Ken Miracle and Herb Meyer helped in design and seeding the project too. The watershed is primarily sage country so there is a healthy seed source of native forbs and grasses upstream of the project and we only needed to seed native bunch grasses on the exposed soil which was minimal. Using funding provided by USFWS we were able to repair all exterior fences to wildlife friendly specifications. We removed old hog-wire and fence material and protected the largest downstream wetland with an additional cross fence to control grazing impact. The addition of fencing and on-going meetings with BLM and USFWS to control cattle trespass and enhance nesting habitat in adjacent allotments greatly expands the benefit to sage grouse, antelope and BHS.

- Results and Benefits: The wet meadow was greatly increase in size and in 2013 there will be a shift in vegetation to more forbs and grasses with increase in associated insect populations. These changes can be monitored in a number of ways. The Nature Conservancy and USWS will work with the landowner to document these positive shifts in vegetation that will benefit sage grouse. TNC, USFWS, CWMA and the local SAC will host a tour of the restoration project in 2013. IDFG has wing collection barrels nearby to collect information from hunter harvested birds. Brood counts could be made in the area as the site has good access and is near several active sage grouse leks. TNC and the landowner are willing to monitor and treat any noxious weeds on the site while the natural meadow and riparian vegetation is being restored. The abundance of native willows and wild rose will increase. This will also benefit species like mule deer and Brewer's sparrow. Puddle duck nesting success should increase as will brood rearing in the small ponds. The site is currently grazed on a seasonal basis and is relatively weed free and distant from noxious weed sources. Photographs are available that were taken before and after the project completion. The restored meadow is now protected from cattle grazing with new fence on private land that will tie-in and expands an existing ex-closure benefiting sage grouse in an estimated 4 square mile area around the site. There is high use by antelope and sage grouse were sighted on each visit so we will monitor brood activity in 2013. We feel the project was especially beneficial to this area because of nearby historical leks and because the 2012 Jack Creek Fire burned approximately 40,000 acres of sage immediately east of the site.

- Scale and Ownership of Project: Currently the site is an grazed meadow and creek bed area about 320 acres in size however the area of impact to grouse recruitment is significant because this is the primary wet meadow area within 4 sections (2,560 acres) that are dominated by sage. The Urquidi family owns the site and the surrounding sage country is public land managed by the BLM in a shared allotment grazing system that is under review by BLM and USFWS regarding sage grouse listing.

- Endorsement: Site inspections of the project area were conducted with John Urquidi and TNC and USFWS in 2011 and 2012. Two more follow-up tours will be conducted to assure the area is protected and the wet meadow system is functioning as designed. Any necessary additional weed control or seeding on the project area will be completed in 2013. The Owyhee Sage-grouse Working Group reviewed the project and site selection in April 2011. We feel that this site was the best area to invest in restoration of sage grouse habitat in a CORE area for sage-grouse. We are confident the project has already gained water since construction in September 2012 and will be key nesting and brood rearing habitat for many years given good cattle management on the BLM allotments.
- The area is known as the Owens Allotment Pastures 15 and 10 and the meadow is primarily located in sections 33 on the north and 4 on the south side of a joint grazing area. All of the project funds will be expended on fee title - private lands owned by the Urquidi family for which they the primarily and proven water rights.
- See attached map and photos of the project and many more are in TNC and USFWS files of the area.

Jacks sage grouse in flight next to the restoration project. Many more photographs are on file with TNC as taken by Ken Miracle and Art Talsma.

2010-11: Owyhee Uplands Sage-grouse Habitat Enhancement: Controlling Western Juniper Encroachment in Brood Rearing Habitat

Wildfires and Wildlife: by Art Talsma

Wildfires have certainly been in the news every evening this summer. In North America TNC is actively communicating both *good fire and bad fire outcomes* of controlled burns and wildfires. In June the LWG hosted a rangeland fire tour with our partners in the Owyhee's. The 40 people on the tour first observed a recovered 6,500 acre wildfire site that was restored by seeding native plants including sage, wheatgrass and yarrow by helicopter with sage grouse funds. We observed the following good aspects of this past wildfire.

- It recovered quickly with our seeding help and weed control efforts.
- Juniper were burned so sage, bitterbrush, and coke cherry were back.
- Rangeland productivity improved for the rancher.
- Sage grouse and deer were back in the improved habitat.

On the bad fire side we also observed that especially at lower elevations there remains a threat from encroaching cheatgrass and medusahead. Rangeland fires are becoming larger in Idaho and testing our capacity to contain them. Restoring large fires is very expensive and often not as successful as the example above. We are working on this complex wildfire dynamic with our partners to protect remaining sage grouse *Core Areas* in the West. One example is we are working with the Oregon chapter to test innovative seed coatings that we hope will make seeding projects more successful following wildfires. Another example is we are prescribing juniper mastication near sage grouse leks to improve nesting and brood rearing habitat plus it reduces wildfire risk.

Josephine Creek juniper mastication

Star Ranch mastication

Pete ranch near Star ranch mastication

Note good mastication of the entire tree and stump with the new cutting teeth designed by Dave Bunker.

2010-07: Antelope Pocket Dixie Harrow (Part II)

Antelope Pocket Dixie Harrow (Part II): Final Report (OSC Project Number: 2010-07)

OVERVIEW

In an effort to continually support the Jarbidge Sage-grouse Local Working Group's mission, the group constantly looks for areas where sage-grouse habitat can be improved. One such area was identified on a section of land (T. 12 S., R. 14 E., Section 16) administered by Idaho Department of Lands approximately 5 miles east of Roseworth, ID that had historic sage-grouse (*Centrocercus urophasianus*) use. In fact, the section had an active sage-grouse lek on which 15 birds were last observed in 1971. Subsequent attempts to find birds in 1982, 1992, and 1995 were unsuccessful. The density of Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), specifically dead shrubs, in the area likely affected the area's ability to provide suitable lekking areas and eventually led to a reduction in forb and grass diversity that adversely affected other seasonal use. When assessed in 2004, the understory consisted predominantly of Sandberg's bluegrass (*Poa secunda*) and cheatgrass (*Bromus tectorum*) with fleabane (*Erigeron pumilus*) and long-leaf phlox (*Phlox longifolia*) also present. In an attempt to open the canopy, and thereby increase the grass and forb community, the eastern half of this section was treated with a Dixie harrow mounted with a broadcast seeder in fall 2004 (Figure 1). The seed mix used for this treatment included: bluebunch wheatgrass (*Pseudoroegneria spicata*), basin wildrye (*Leymus cinereus*), western yarrow (*Achillea millefolium*), cicer milkvetch (*Astragalus cicer*), fourwing saltbush (*Atriplex canescens*), and Appar blue flax (*Linum perenne*). The Dixie harrow and seeding effort in 2004 was successful in increasing abundance and diversity of grasses and forbs with all of the planted species becoming established, but also increasing the abundance of Indian ricegrass (*Achnatherum hymenoides*) and bottlebrush squirreltail (*Elymus elymoides*). More importantly, sage-grouse were observed using the eastern half of this section in years following treatment. These results are consistent with work conducted in Utah where a Dixie harrow was used to improve sage-grouse habitat (Dahlgren et al. 2006).

Figure 1. Dixie harrow used in 2004.

Conditions observed in early 2004 were consistent with conditions observed on the western portion of section 16 in fall 2010. Because of the observed success of the 2004 efforts, the Jarbidge Sage-grouse Local Working Group proposed treating the western half of section 16 with a similar treatment (Figure 2). Funding was received from the Idaho Governor's Office of Species Conservation with in-kind funding from Idaho Department of Fish and Game, Antelope Springs Ranch, Idaho

Department of Lands, the Jarbidge Sage-grouse Local Working Group, and the 71 Livestock Association. The area was treated in fall 2011.

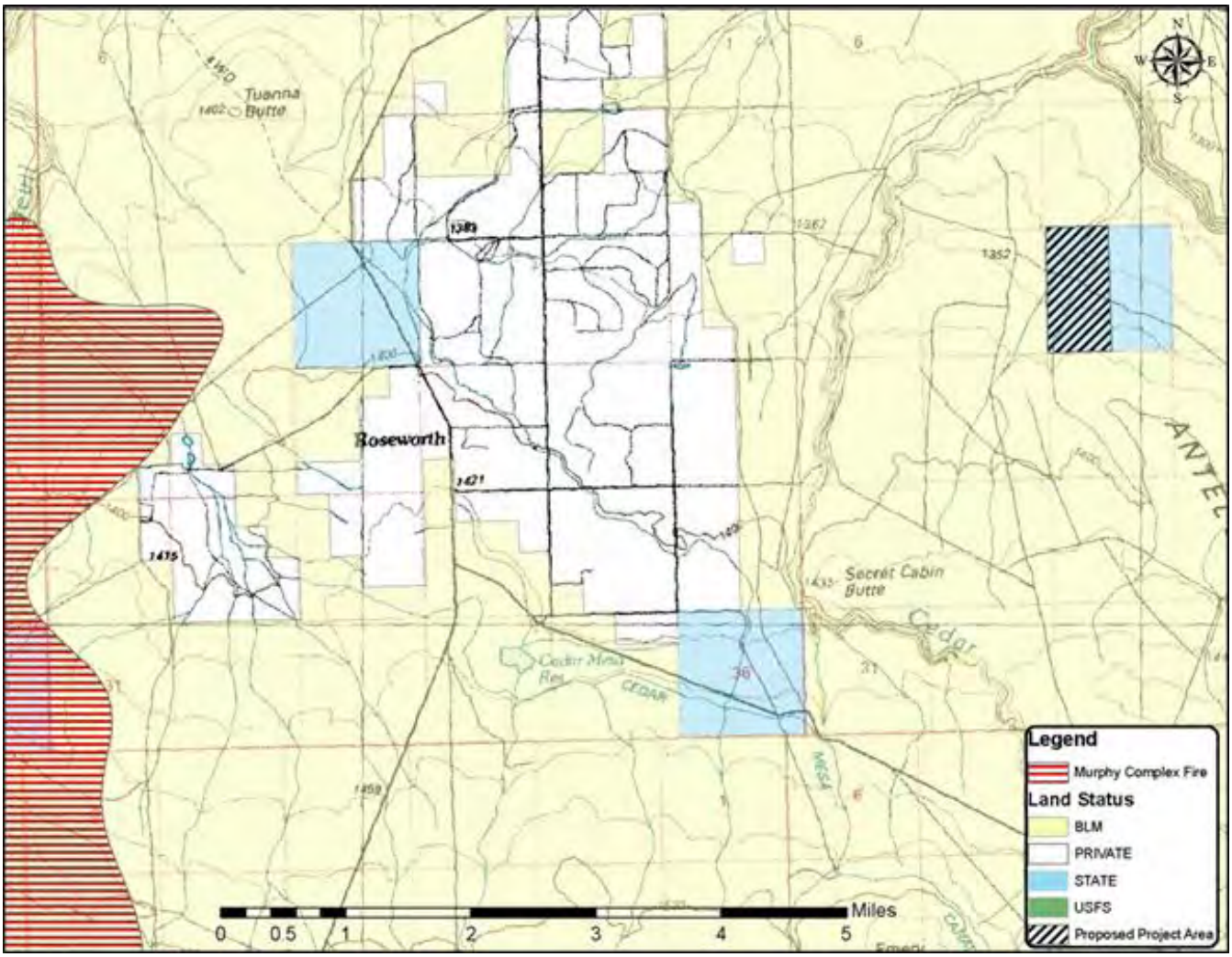


Figure 2. Area proposed for treatment with Dixie harrow in 2010.

METHODS

Prior to treatment, measurements of vegetation characteristics were made on 30 June 2010 at 8 randomly selected sites; 4 sites within the 2004 treatment area and 4 sites within the proposed treatment area (Figure 3). Line-point intercept was used to measure canopy cover by species and cover of other key indicators such as bare soil, litter, and biological crusts.

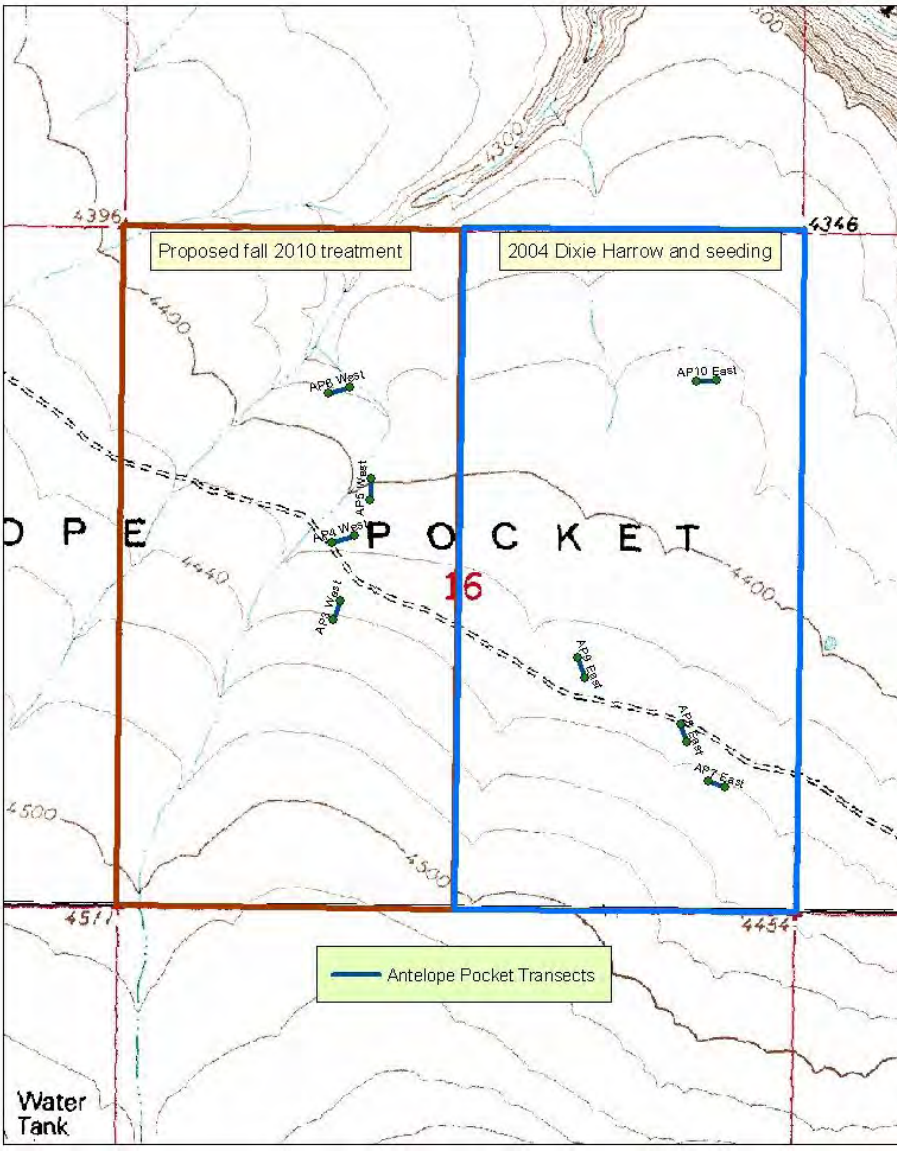


Figure 3. Random vegetation transects located in the 2004 treatment area and the area proposed for treatment in 2010.

The original intent was to conduct the treatment in fall 2010. However, early snow delayed treatment until October 2011. The Dixie harrow was operated from 25 October through 4 November 2011. To reduce soil compaction and operating costs, a Dixie harrow was pulled with a rubber-tired tractor behind which was mounted a broadcast seeder. The seed mix was delivered at 15lbs/acre and consisted of: bluebunch wheatgrass at 5.3 lbs/acre, basin wildrye at 2.3 lbs/acre, Siberian wheatgrass (*Agropyron fragile*) at 0.4 lbs/acre, small burnet (*Sanuisorba minor*) at 1.9 lbs/acre, western yarrow at 0.3 lbs/acre, cicer milkvetch at 0.4 lbs/acre, alfalfa (*Medicago sativa*) at 0.9 lbs/acre, sainfoin (*Onobrychis viciifolia*) at 0.4 lbs/acre, Appar blue flax at 1.2 lbs/acre, and fourwing saltbush at 1.9 lbs/acre.

To provide a mosaic pattern throughout the treatment area, as well as a necessity to avoid rougher terrain, the intensity of treatment varied throughout the project area (Figure 4).

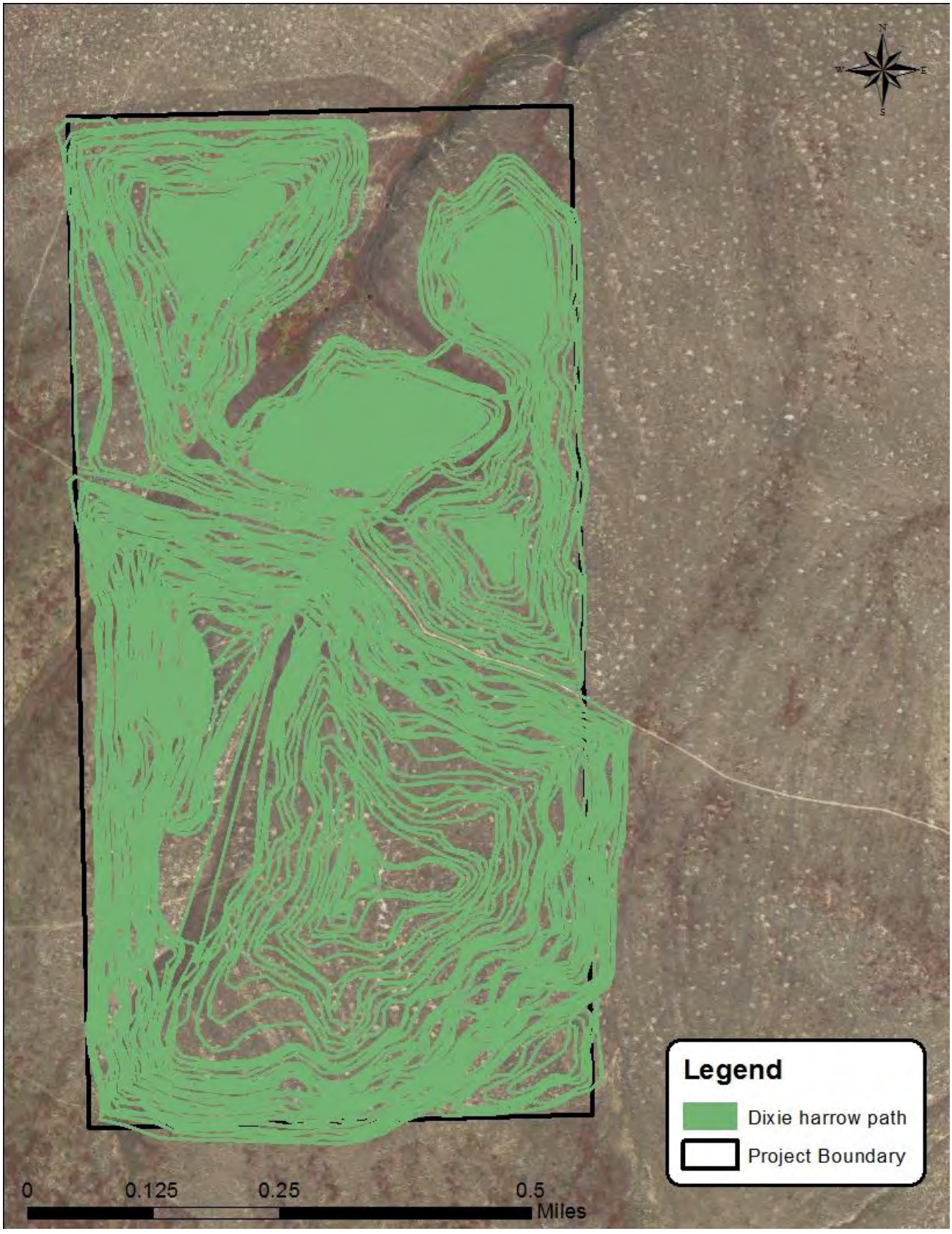


Figure 4. Path treated by Dixie harrow, T. 12 S., R. 14 E., Section 16 in 2011.

RESULTS/ DISCUSSION

Prior to the 2011 treatment, there was no difference in sagebrush canopy cover between the eastern half of section 16 (area treated in 2004) and the western half (area treated in 2011); however, there were more dead shrubs in the western half (Figure 5). Though there was no difference in the overall cover of grasses and forbs, the eastern half showed a large improvement in the quality of cover, with an

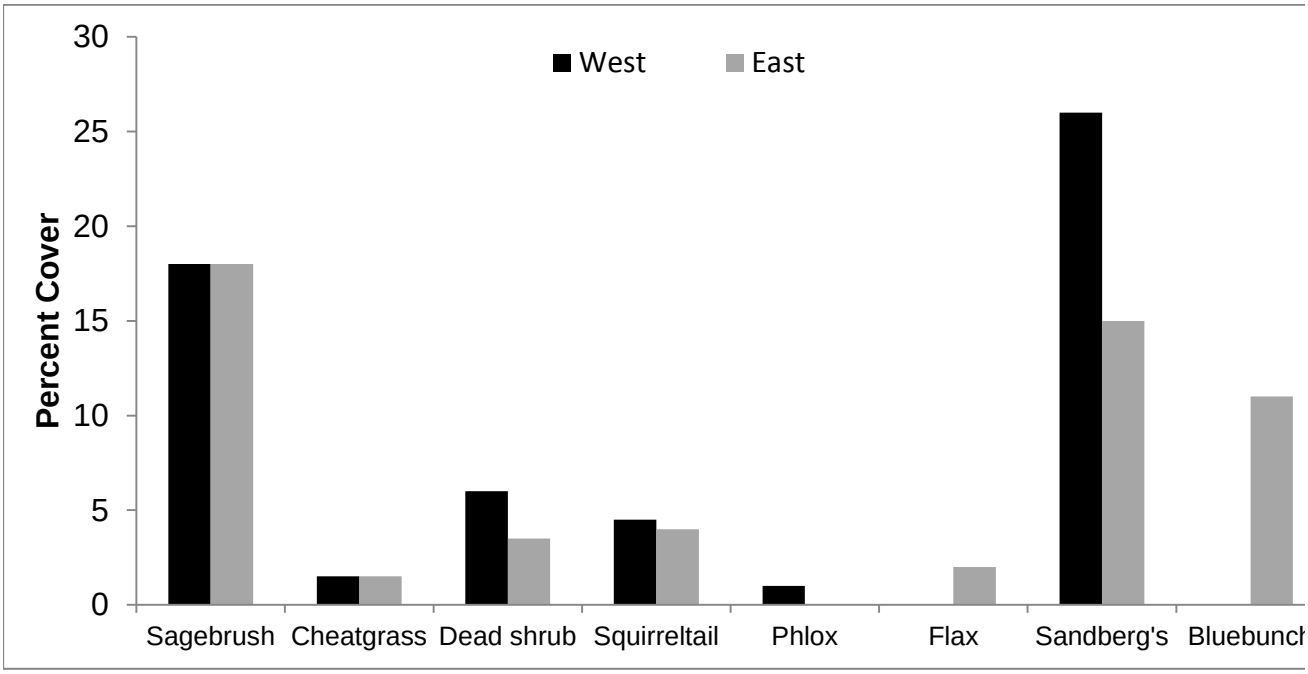


Figure 5. Average percent canopy cover by species, T. 12 S., R. 14 E., Section 16 on 30 June 2010.

average of 11% cover of bluebunch wheatgrass, 2% cover of Appar blue flax, and less abundant Sandberg bluegrass. Though average percent cover of biological soil crusts were 7 percent higher in the untreated, western half, crusts on the eastern half remained relatively intact despite having been treated by the Dixie harrow in 2004 (Figure 6).

It is the intent of the Jarbidge Sage-grouse Local Working Group to monitor conditions at this site annually in conjunction with monitoring of prior habitat projects. This monitoring will largely consist of photo plots with physical measurements of vegetation characteristics being made when personnel are available. Unfortunately, weather conditions in spring 2012 were incredibly dry. In fact, annual precipitation in 2012 was 4.9 inches; 44% below the 10 year average of 8.8 inches as measured at the nearest RAWS station, Horse Butte. As a result of these conditions, the Jarbidge Sage-grouse Local Working Group opted to forego their annual monitoring efforts in 2012. Therefore,

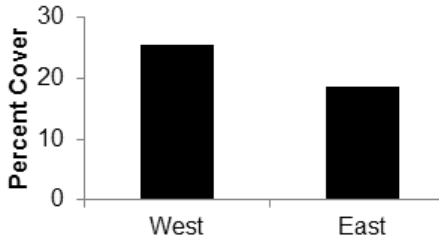


Figure 6. Average percent canopy cover of biological soil crusts, 30 June 2010.

neither photo documentation nor physical measurements are available. However, the site was visited in July 2012 and a variety of grasses and Appar blue flax were observed.

Though the dry conditions this past spring may give invasive species, like cheatgrass, some advantage, opening up the understory is expected to have the effect of increasing grass and forb diversity and abundance similar to what was observed following the 2004 treatment (Figure 7). The expected new sagebrush growth will increase the quality of sage-grouse nesting and late brood-rearing habitat.

A **B**

Figure 7. Eastern (A) and western (B) halves of section 16 demonstrating improved understory with bluebunch wheatgrass and Appar blue flax versus a high amount of dead shrubs and a depleted

understory, respectively, 30 June 2010.

LITERATURE CITED

Dahlgren, D. K., R. Chi, and T. A. Messmer. 2006. Greater sage-grouse response to sagebrush

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2008-19: Post Murphy Fire Sage-grouse Investigations

Raptor and Sage-grouse Study at Mountain Home Range Complex (MHRC) Sites FY2010

Task 2: Track sage-grouse movements in Southwest Idaho in association with MHRC components

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Introduction

Greater sage-grouse (*Centrocercus urophasianus*) rely on sagebrush (*Artemisia* spp.) for many aspects of their life. This reliance on sagebrush makes sage-grouse populations vulnerable to alterations in sagebrush-steppe communities. Extensive population declines of sage-grouse throughout the past century (Hornaday 1916, Patterson 1952, Autenrieth 1981, Connelly and Braun 1997) are a reflection of the diminished or degraded sagebrush-steppe throughout the West due to a variety of anthropogenic influences (Knick and Connelly 2011). However, there is, perhaps, no greater current threat to sage-grouse persistence in the Bruneau River area than fire.

Effects of fire on sage-grouse habitat and population dynamics are of particular interest because fire frequency is increasing within sagebrush-steppe communities (Morgan et al. 1996, Baker 2011). Fire, although a natural process, can result in broad-scale disturbances that are detrimental to sage-grouse through the destruction of sagebrush stands and loss or alteration of the non-woody vegetation community used by sage-grouse during many life stages (Connelly et al. 2000*a*, Pedersen et al. 2003). Not only does fire pose a threat due to loss of habitat, but fire can result in long-term changes to plant and animal species composition resulting in long-term negative impacts. For instance, invasion by non-native species such as cheatgrass (*Bromus tectorum*) can eliminate or reduce the quality of sage-grouse habitat and continue to increase fire frequency.

Though sage-grouse may have some ability to alter their seasonal habitat use following disturbance (Schroeder and Robb 2003), their strong fidelity to seasonal use areas makes them particularly susceptible to large-scale disturbances. Several studies have failed to show a negative response by sage-grouse following fire (Martin 1990, Bensen et al. 1991, Fischer 1994). However, these studies failed to account for the fidelity of sage-grouse to an area, thereby delaying the response. Studies that have taken into account a delayed response or size of burn have demonstrated the impacts that fires can impose on sage-grouse populations (Connelly et al. 2000*a*, Johnson et al. 2011).

On 16 July 2007, numerous lightening strikes caused 4 wildfires in south-central Idaho. The fires converged to create the Murphy Complex Fire and burned a total of 653,000 acres; 483,000 acres of which were in Idaho. The fire burned through important wildlife habitat including habitat of greater sage-grouse. With the high number of relatively large fires throughout the area and the current status of sage-grouse, it is becoming more important to understand seasonal use patterns of sage-grouse to better direct management and rehabilitation efforts. Work to develop predictive models of sage-grouse nesting and brood rearing habitat use in isolated versus contiguous habitat in this area was conducted from 1999-2003 and involved radio-marking grouse near Juniper Butte Training Range (Shepherd 2006). However, birds were not followed with enough consistency to identify seasonal movements and habitats within the area.

This project was a collaborative effort between Idaho Department of Fish and Game, U.S. Air Force, and the Idaho Governor's Office of Species Conservation with endorsement from the Owyhee and Jarbidge Sage-grouse Local Working Groups. It was intended to increase our knowledge of sage-grouse behavior near the Mountain Home Range Complex (MHRC) sites, including the Juniper Butte and Saylor Creek Training Ranges and emitter sites. A more specific objective was to better understand sage-grouse seasonal movements and habitat use associated with the 2007 Murphy Complex Fire.

Methods/Study Area

Sage-grouse were captured at night on roost sites or leks on or adjacent to Saylor Creek and Juniper Butte Training Ranges using spotlights and nets (Giesen et al. 1982, Wakkinen et al. 1992, Figure 1). Captured birds were fitted with an aluminum leg band and a 16g radio transmitter (Riley and Fistler 1992). Radio-marked grouse were located using fixed-wing aircraft approximately once per month from 18 May 2009 through 22 March 2010 and twice per month from 20 April 2010 through 28 January 2012. Field crews attempted to locate grouse from the ground during May and June to positively identify nest locations. An effort was made to recover radio transmitters quickly after receiving a mortality signal to more accurately determine cause-specific mortality. Unfortunately, this was only effective during the initial field season in 2009. As radio transmitters began losing battery power they began emitting mortality signals despite those individuals being alive, thus it was not cost effective to send ground crews in to investigate mortality signals received from the aircraft. As a result, no estimates of mortality are provided. Two radio transmitters were placed at known locations to provide an estimate of location error for aerial locations from 4 April 2011 through 12 August 2011.

Dispersal was calculated as the distance of each location from the location of capture. Comparisons were made between dispersal distances of males and females using a *t*-test. Comparisons amongst capture areas were made using a Kruskal-Wallis one-way analysis of variance. To test for uniformity in the directional movements of sage-grouse, a Rayleigh test was conducted using Oriana 4.01 software (Kovach 2012). However, to compare directional movements among seasons, a Watson's U^2 test was used also using Oriana 4.01 software.

Telemetry data collected in 2002 and 2003 was used to compare locations of grouse captured in 2009, 2010, and 2011 relative to the Murphy Complex Fire. Birds captured in 2002 and 2003 were captured within 11 km of the Juniper Butte Training Range using similar techniques and telemetry equipment to those captured from 2009-2011. For these comparisons, only those locations obtained from grouse that were captured within 11 km of Juniper Butte Training Range from 2009 to 2011 were used.

Estimates of homerange were conducted using a Brownian bridge movement model (Horne et al. 2007). Only those birds with more than 10 locations were used for this analysis and descriptions of homeranges use the 95% probability isopleths. Hawth's Analysis Tools extension for ArcGIS (ESRI) was used to provide information about sage-grouse movements (Beyer 2004). A t-test was used to compare movements between males and females. For the Brownian bridge movement model and movement analyses, locations of birds known to be dead were not used as predators or scavengers may have affected the final location.

To determine habitat use by radio-marked birds, NW ReGAP and SW ReGAP data were used (USGS 2007, USGS 2004) to spatially join vegetation classifications to sage-grouse locations using ArcGIS. Corrections were made to include

burns from 2009 through 2012. Though other fires have occurred in the area since these data were collected, the actual status of the vegetation is not known such that corrections could be made with any confidence.

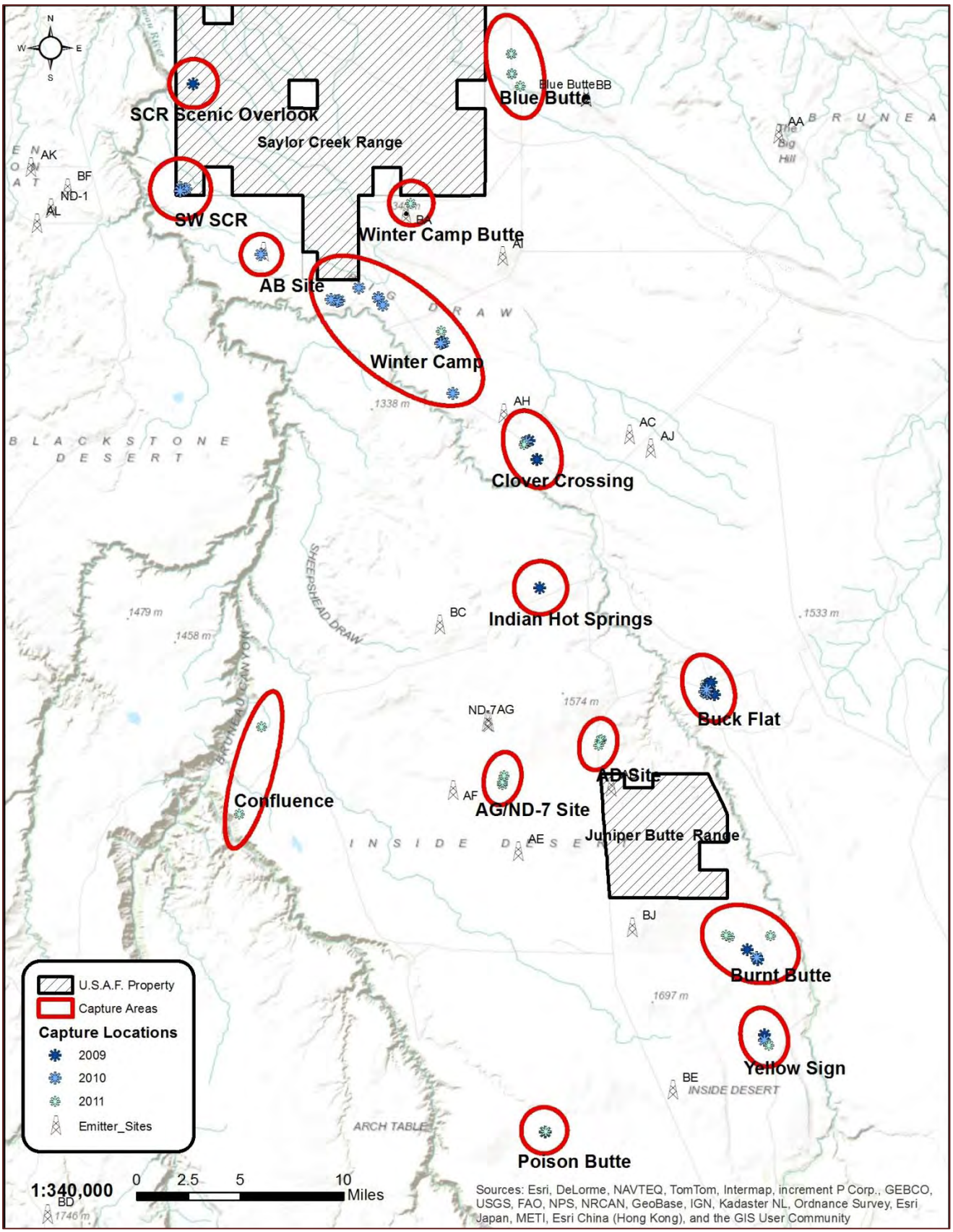


Figure 1. Sage-grouse capture locations in the vicinity of Juniper Butte and Saylor Creek Training Ranges in spring 2009, 2010 and 2011.

Results

Twenty-one male and 1 female sage-grouse were captured on leks in and adjacent to the Saylor Creek and Juniper Butte Training Ranges from 23 March through 1 April, 2009 (Table 1). In 2010, 10 females and 19 males were captured from 3 February through 19 March. In 2011, 5 females and 22 males were captured from 1 February through 1 April. Nine males and 1 female that were captured in 2009 were followed through 2010. Similarly, 8 males and 3 females were captured in 2010 and followed through 2011. Six individuals were not located again or were found dead on their first location after capture.

Table 1. Number of male and female sage-grouse captured and the number of known mortalities near the Saylor Creek and Juniper Butte Training Ranges, 2009-2011.

	# Captured		# Known Mortalities	
Year	Males	Females	Males	Females
2009	21	1	4	0
2010	19	10	7	3
2011	22	5	1	1
Total	62	16	12	4

Nine locations were obtained to estimate location error. Error associated with aerial telemetry locations were approximately 0.6 km (±0.2 SE). However, a new pilot began flying in July 2011 and estimates increased substantially. Mean error prior to July 2011 was 0.3 km (±.09 SE, n = 6) and 1.2 km (±0.4 SE, n = 3) thereafter.

Attempts were made to locate nesting hens in all years, but nests were only identified in 2011 (Figure 2). The only hen with a radio collar in 2009 went missing during the nesting period and a lack of personnel in 2010 made it infeasible to find nests. Five hens were observed on nests in 2011. Of those, 1 nest hatched 5 eggs, 1 nest was abandoned, and the other 3 were depredated. Despite 1 hen successfully hatching a brood, no chicks were found with her 8 days after hatch. The nests observed were located near the confluence of Clover Creek and the Bruneau River and just west of Blue Butte. Four other hens (SGF1108, SGF1106, SGF1110, and SGF4041) were found to centralize on particular areas and were thought to be nesting. These other hens were found near Brown's Creek in the northeastern corner of the Saylor Creek Training Range, near Buck Flat on the west side of Clover Creek, east of the scenic overlook in the Saylor Creek Training Range, and in the northeastern corner of the Juniper Butte Training Range, respectively.

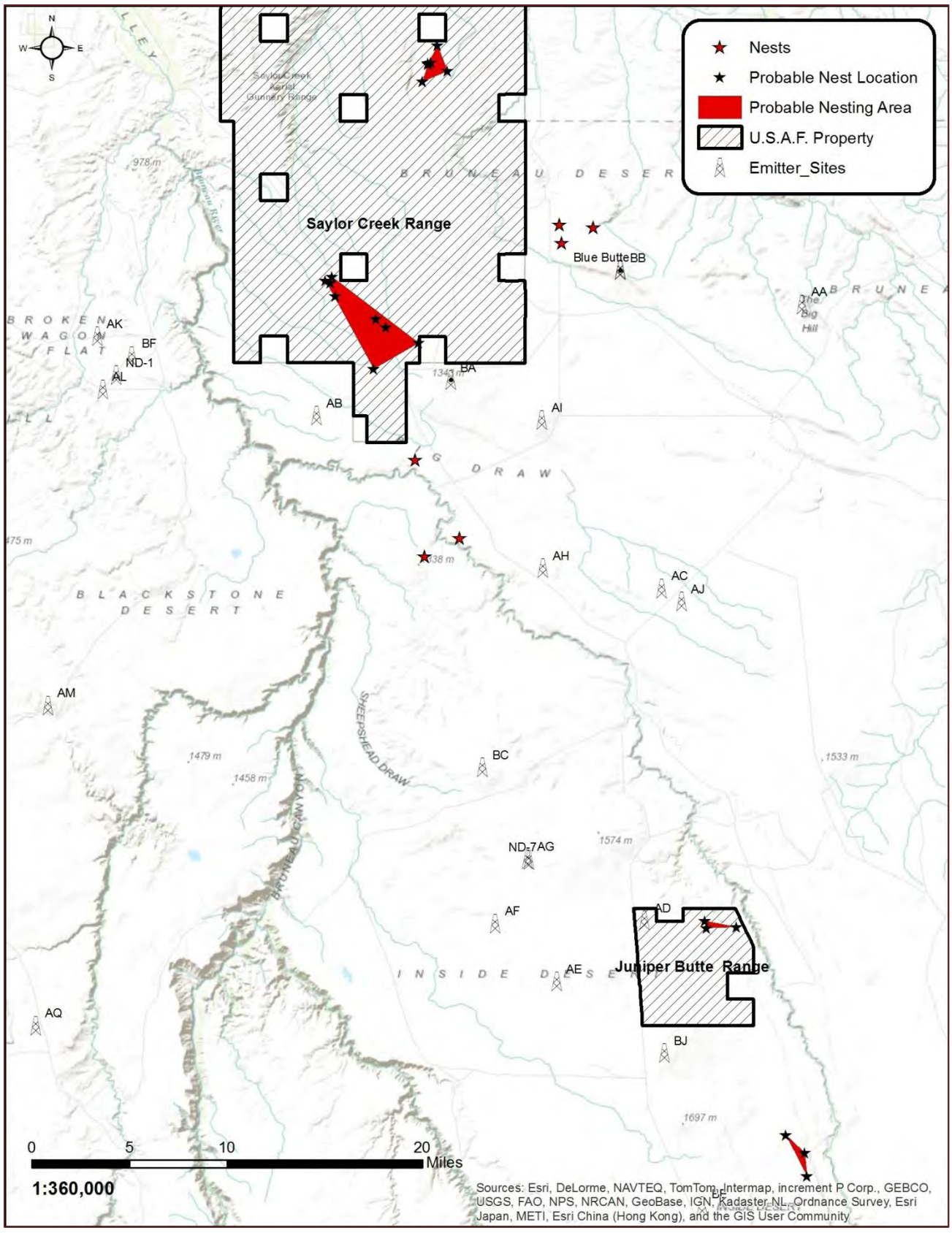
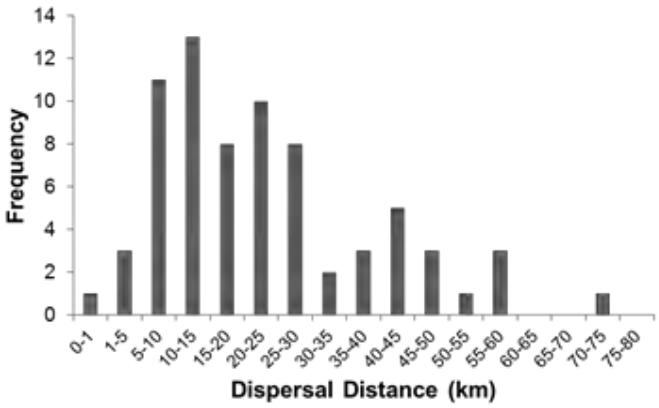


Figure 2.Known nest locations and minimum convex polygons depicting probable nesting areas based on four hens (SGF1108, SGF1106, SGF1110, and SGF4041) that began localizing near Saylor Creek and Juniper Butte Training Ranges, 2010-2011.

Though an estimate of mortality is not possible, in 2009, 32% (*n* = 22) of the radio-marked grouse had either removed their collar or had died. Most of these occurrences (57%) were documented between capture and the first aerial flight in May. Activation of the mortality sensor was more evenly distributed throughout the year in 2010. Thirty percent (*n* = 10) of known mortalities occurred in April and May. These early mortalities were all males. Annual mortality was not less than 26% (*n* = 39) in 2010. Though many collars began emitting a mortality signal in 2011, only 2 birds (5%, *n* = 38) had known mortalities.



Movements

Sage-grouse used a variety of seasonal movement strategies with some birds using distinct seasonal ranges and others more stationary. The mean distance traveled from the location of capture was 13.8 km (±0.5 SE, *n* = 1048) and ranged from 0.0 km to 72.7 km. Females dispersed an average of 12.0 km (±0.9 SE, *n* = 265) from the location of capture which was significantly different (*P* = 0.02) from mean dispersal by males at 14.5 km (±0.5 SE, *n* = 783). Most individuals (94.4%, *n* = 72) dispersed greater than 5 km with 25.0% traveling greater than 30 km (Figure 3).

Where a grouse was captured had significant bearing on dispersal distances (*P* <0.01). Birds captured in portions of the center of the study area moved significantly farther than birds captured elsewhere (Figure 4).

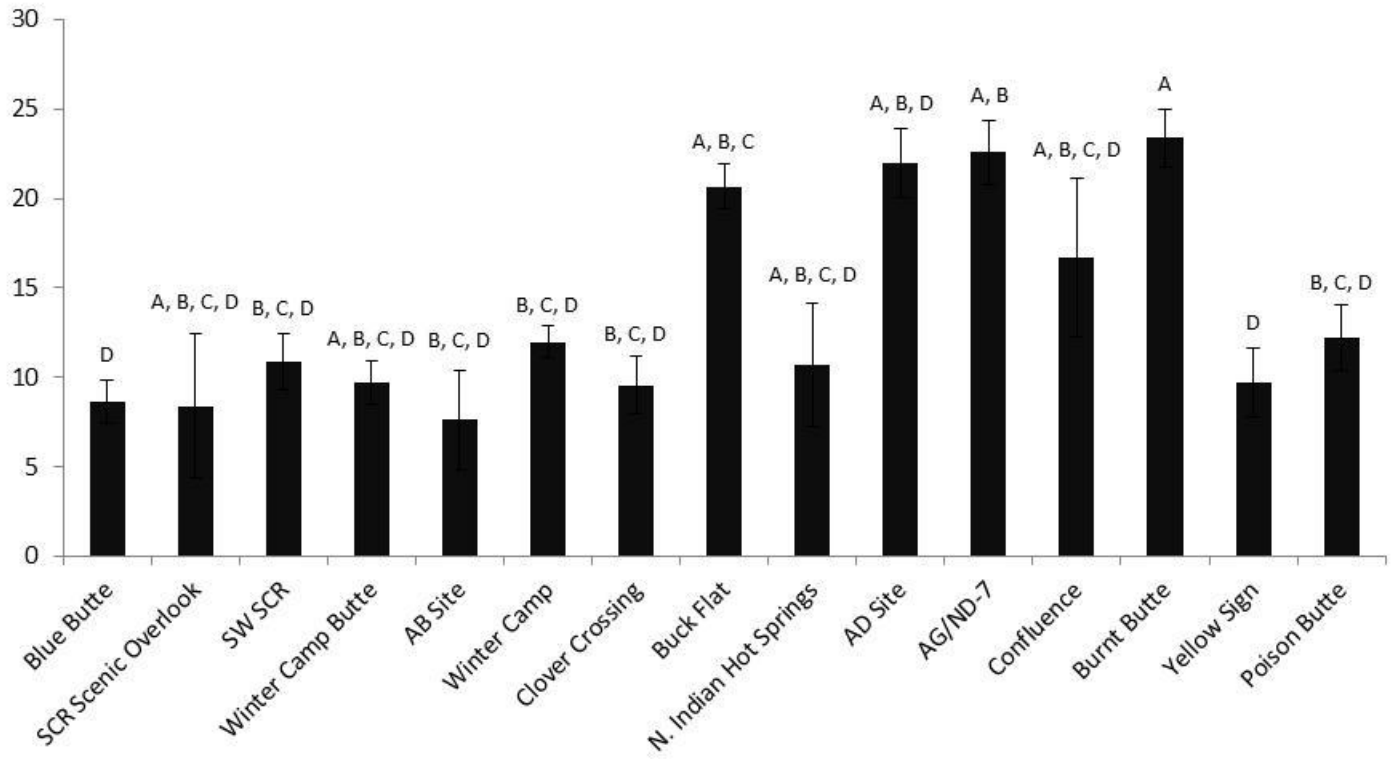


Figure 4. Dispersal distance by area of capture for sage-grouse in southwestern Idaho, 2009-2012. Data are means ±SE. Letters above bars indicate significant differences calculated by Kruskal-Wallis one-way analysis of variance. Capture areas are arranged from north to south with Blue Butte being the farthest north.

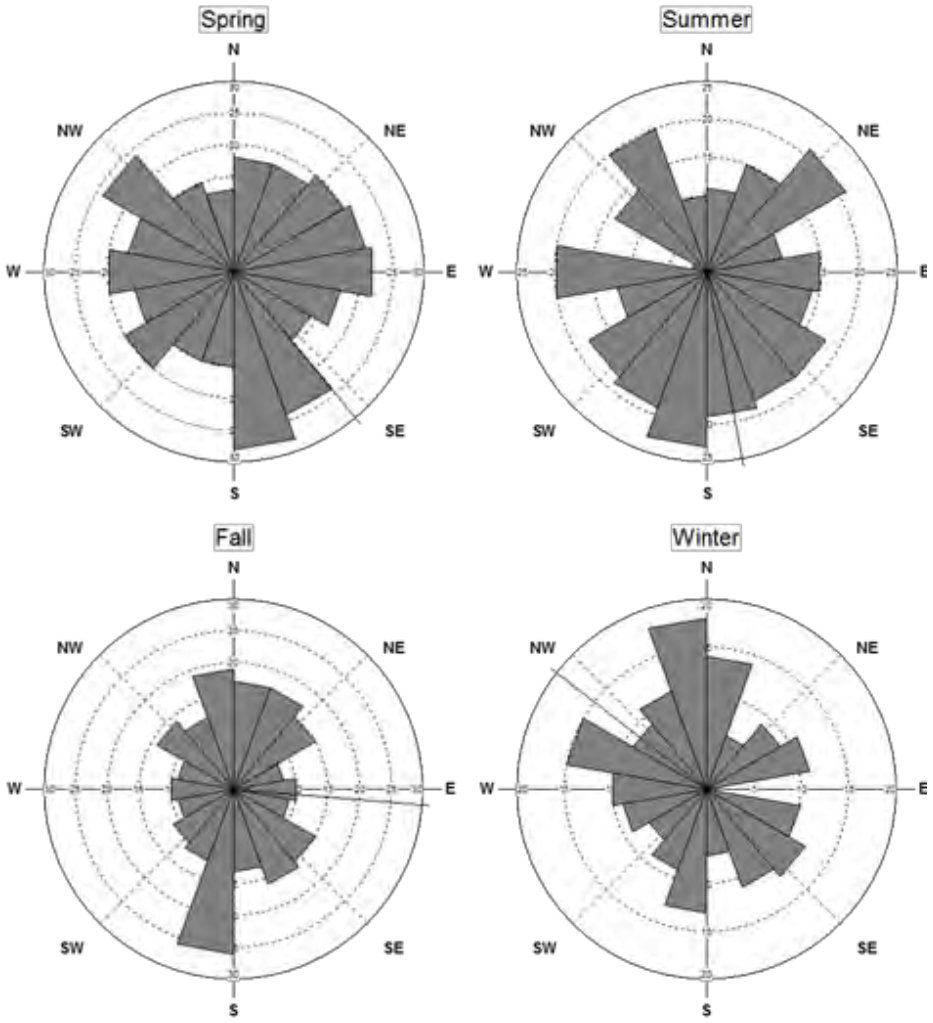


Figure 5. Frequency of directional movements by season (Spring = 1 March - 30 June, Summer = 1 July - 31 August, Fall = 1 September - 31 November, Winter = 1 December - 28 February) for sage-grouse in southwestern Idaho, 2009-2012.

The greatest dispersal distance was made by a bird, SGM4228, captured in the Buck Flat area that spent late summer months in Nevada near Merritt Mountain in The Mahoganies then spent winter months near Mary's Creek approximately 10 miles east of Riddle, ID. Many birds traveling relatively long distances between seasonal use areas spent the winter and spring near their location of capture and traveled south to higher elevations. Direction of movement appeared to be uniformly distributed ($P = 0.4$) when looking at all locations. However, pairwise comparisons between seasons indicate a significant difference between summer and winter movements ($P < 0.05$, Figure 5). In general, sage-grouse began a southwestern movement beginning in June and returned in November (Figure 6).

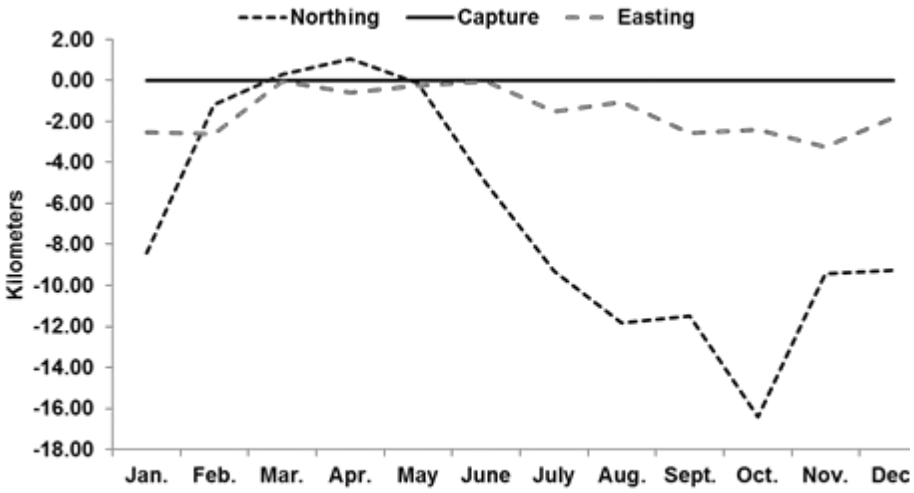


Figure 6. Mean distance north and east relative to the location of capture for sage-grouse in southwestern Idaho, 2009-2012.

Use of MHRC Emitter Sites

When looking only at the nearest emitter site to a given location, sage-grouse locations ranged from 0.2 m to 38.0 km from the nearest emitter site with a mean of 8.8 km (*n* = 1120). Twenty emitter sites were located within the estimated home range of the radio-marked sage-grouse population. Only 6 sites (AB, AH, AI, AM, BA, and BC) had sage-grouse locations within 1 km (Figure 7). Of the 1,120 locations obtained, 14.1% were within the Saylor Creek or Juniper Butte Training Ranges. In addition, 21.4% of the movement paths (*n* = 1093) crossed the boundary of Saylor Creek or Juniper Butte Training Ranges. The two training ranges were likely crossed or used at some point by 39.7% (*n* = 78) of the radio-marked sage-grouse.

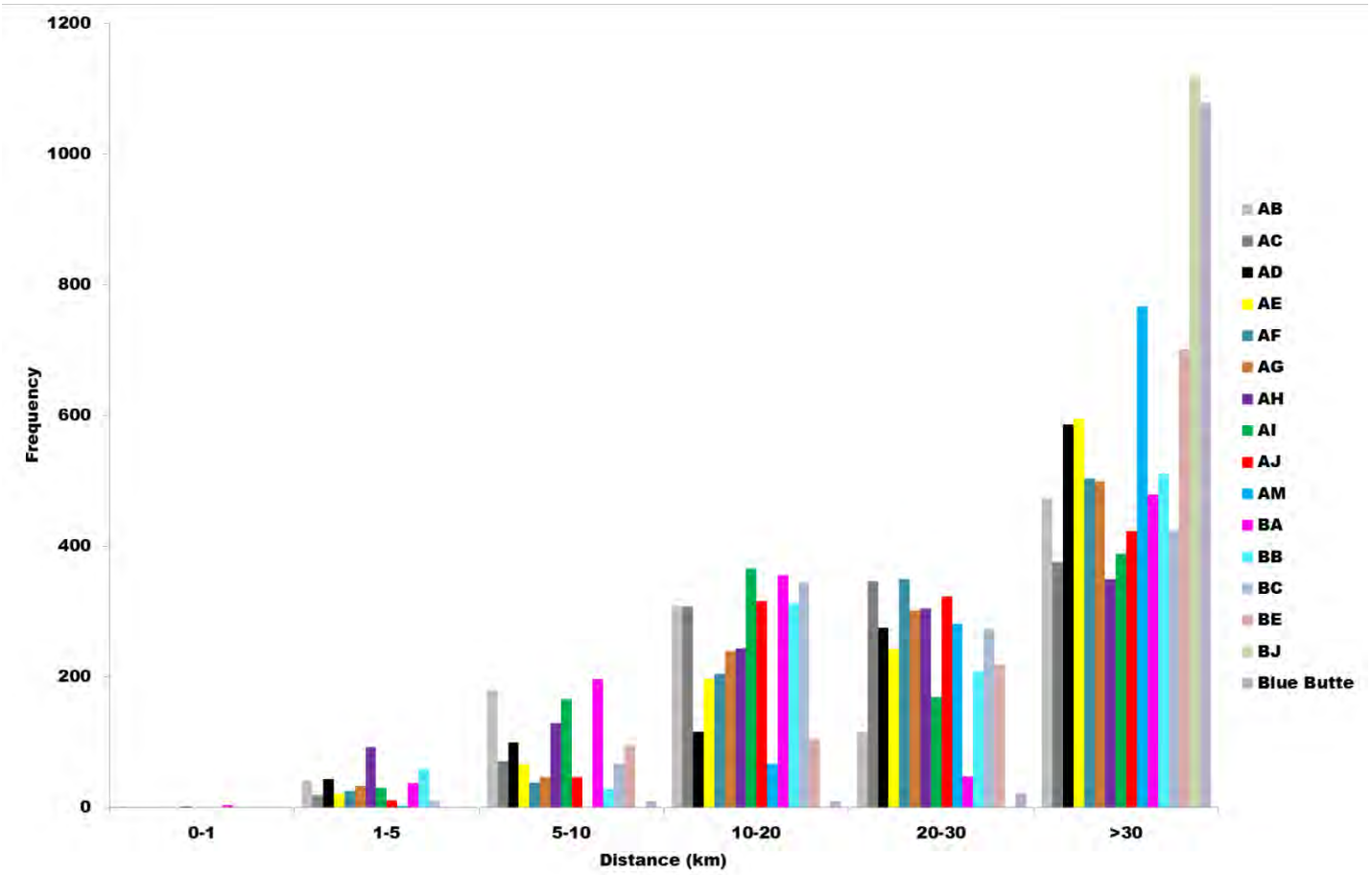


Figure 7. Frequency of distances between MHRC emitter sites and sage-grouse locations, 2009-2012.

Response To Fires

Because of multiple confounding factors (e.g., small sample sizes, weather, landscape-level habitat conditions, capture locations, etc.), statistical comparisons between grouse captured from 2002-2003 and 2009-2012 are not possible. However, it is interesting to note that 44.3% (*n* = 61) of the 2002-2003 locations were within the Murphy Complex Fire perimeter, whereas 22.4% (*n* = 384) of the 2009-2012 locations were within the fire perimeter (Figure 8).

Several fires in 2010 and 2011 burned areas actively being used by radio-marked sage-grouse. In 2010, the Black Butte, Crowbar, Blacksheep, Long Butte, Big Draw, Big Draw #2, and Sailor Creek fires collectively burned 380,417 acres in the northern portion of the study area. In 2011, the Grindstone, Big Hill, and Pole Creek fires burned 89,978 acres also

in the northern portion of the study area. The fires burned areas being used by 39.7% (*n* = 78) of the sage-grouse captured. Many of the birds were impacted by multiple fires with 22.6% (*n* = 31) of the impacted birds using areas that burned as many as 3 times. Of those birds located within areas that burned, 80.1% (*n* = 31) were found in the area prior to the burn. Some birds (8.8%) used these areas before and after the burns, but 50% used these areas prior to the burns and never returned. As evidenced by, what appeared to be, melted feathers and other indicators of microsite activity, one bird likely died as a direct result of the Black Butte Fire (*see photo*).

Radio transmitter from SGM4232 located immediately after Black Butte Fire in 2010.

Space Use

Home range size for individual grouse varied from 39.2 km^2 to 1,904.5 km^2 (*n* = 55) with a mean of 641.2 km^2 (±55.8 SE, Appendix A). The modeled 95% probability of occurrence using the cumulative probability encompassed 5,796.3 km^2 (Figure 9). A substantial amount of use occurred south and east of the Saylor Creek Training Range, along the northern and southern boundaries of Juniper Butte Training Range, and several areas along the east fork of the Bruneau River.

Sage-grouse spent time in a variety of vegetation classes, but spent most of their time in shrub-dominated habitats (Table 2). Specifically, 75.1% of sage-grouse locations were within predominately big sagebrush habitats.

Table 2. Number of sage-grouse locations by vegetation class and the proportion of use in each class in south-central Idaho, 2009-2012.

Vegetation Class	Count	Percent of Total
Inter-Mountain Basins Big Sagebrush Shrubland	399	35.5%
Inter-Mountain Basins Big Sagebrush Steppe	325	28.9%
Inter-Mountain Basins Mixed Salt Desert Scrub	95	8.5%
Recently burned grassland	85	7.6%
Inter-Mountain Basins Montane Sagebrush Steppe	79	7.0%
Introduced Upland Vegetation - Annual Grassland	70	6.2%
Inter-Mountain Basins Semi-Desert Grassland	17	1.5%
Columbia Plateau Low Sagebrush Steppe	13	1.2%
Great Basin Xeric Mixed Sagebrush Shrubland	13	1.2%
Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe	10	0.9%
Inter-Mountain Basins Semi-Desert Shrub-Steppe	4	0.4%
Rocky Mountain Aspen Forest and Woodland	4	0.4%
Cultivated Cropland	3	0.3%
Developed, Open Space	2	0.2%
Inter-Mountain Basins Cliff and Canyon	2	0.2%
Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland	1	0.1%
Great Basin Pinyon-Juniper Woodland	1	0.1%

Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	1	0.1%

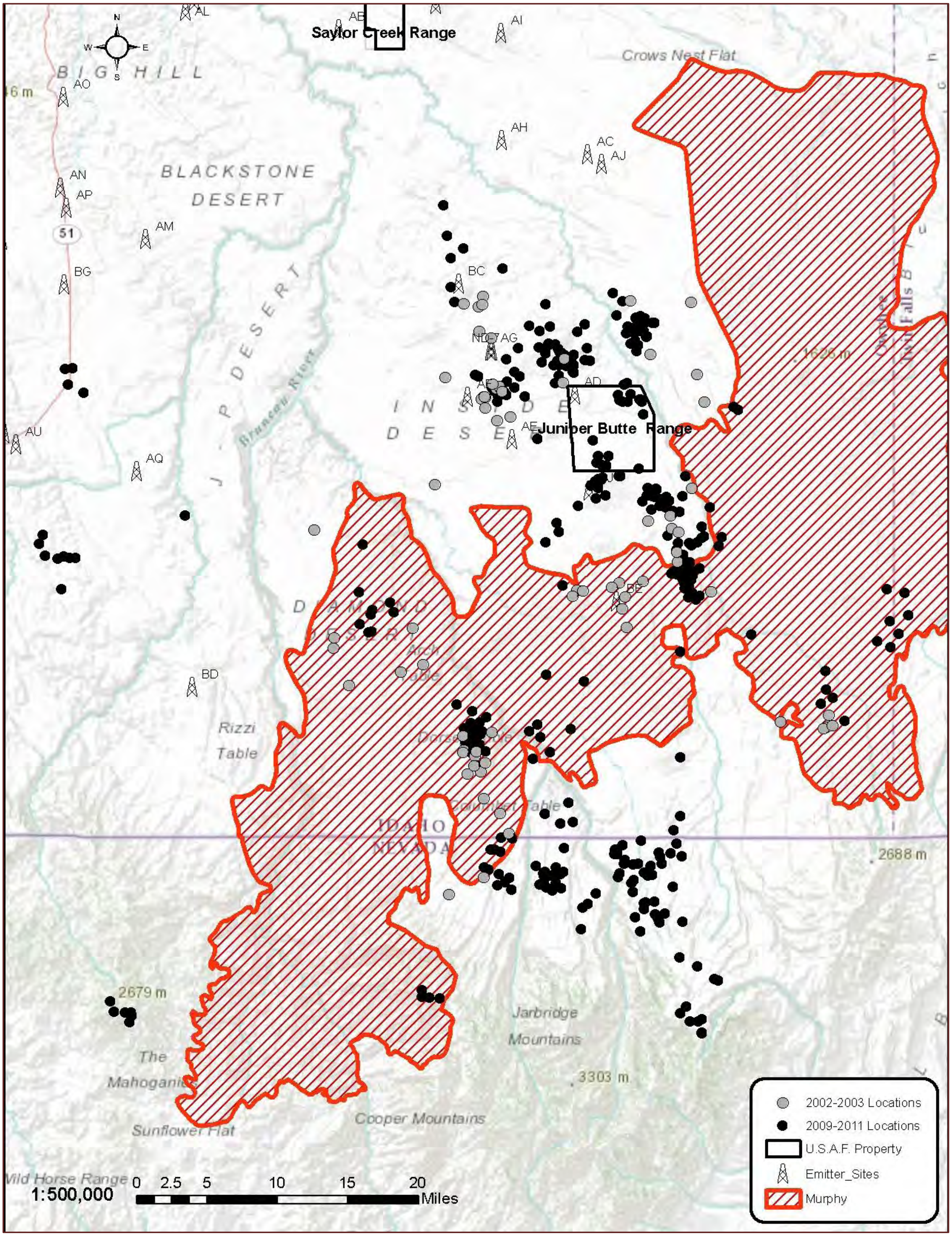


Figure 8. Sage-grouse locations from grouse captured in 2002-2003 and 2009-2012 relative to the Murphy Complex Fire that burned in fall 2007, south-central Idaho.

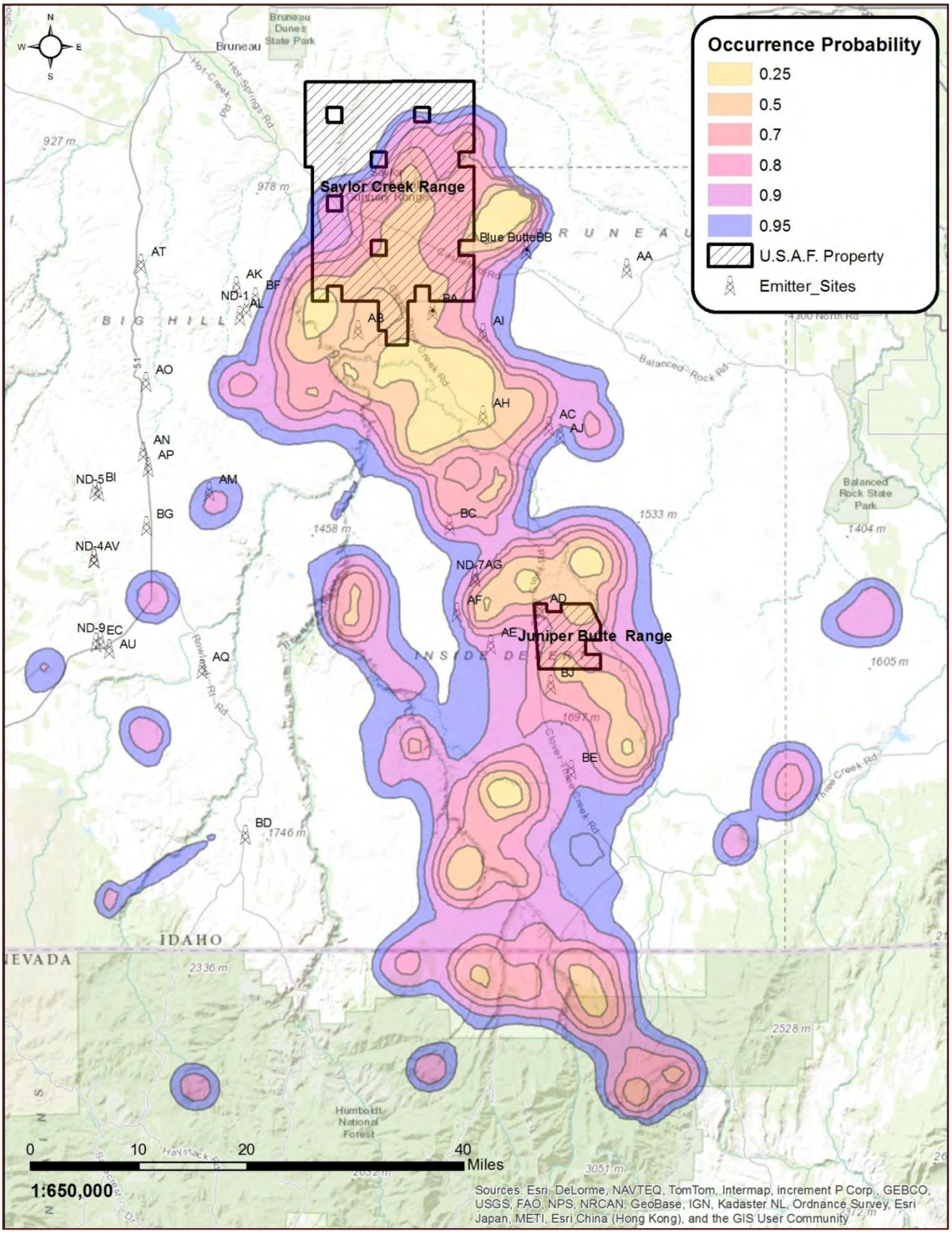


Figure 9. Estimated sage-grouse use areas in south-central Idaho, 2009-2012. Probability of occurrence was estimated using the cumulative probability contour derived using the Brownian bridge movement model.

Discussion

It was the intent of this study to gain a broader understanding of sage-grouse movements and use in proximity to Saylor Creek and Juniper Butte Training Ranges. Despite a limited number of observations in any given season, the collective information obtained helped identify several important use areas and provided useful information about the direction and distance of seasonal movements. Both the Saylor Creek and Juniper Butte Training Ranges provide important habitat for sage-grouse including providing likely nesting habitat.

Unfortunately, females proved difficult to capture and the sample size of nesting females was too small to make reference to areas important to nesting females on a broad scale. Nonetheless, many of the nests that were located were relatively close to more mesic areas which may indicate a desire to nest near wet meadows or near areas with adequate insect abundance for early brood rearing. All of the nests that were located were in big sagebrush (*Artemisia tridentata*) vegetation classes.

Most of the known mortality occurred during the spring which is not uncommon in greater sage-grouse (Connelly et al. 2000*b*). Males displaying on leks are often more vulnerable and typically have lower survival than females (Connelly et al. 1994, Wik 2002). Similarly, 68% and 74% survival estimated in 2009 and 2010, respectively, is within the range reported for adult sage-grouse (Connelly et al. 1994, Bunnell 2000, Wik 2002).

A mean dispersal from the lek of capture of 13.8 km suggests this population of sage-grouse is migratory (Connelly et al. 2000*b*). However, migratory sage-grouse often display long distance movements to relatively distinct seasonal ranges (Berry and Eng 1985, Connelly et al. 2000*b*, Leonard et al. 2000). That was not always the case for this population. Many individuals demonstrated a one-stage migration from winter/spring habitats to distinct late summer/fall habitats, but a number of individuals remained non-migratory (moved <10 km). Shorter dispersal distances were more common for birds captured on either the northern or southern portions of the study area. Causal relationships for this variety of behaviors is beyond the scope of the data collected during this study, but it seems likely that it may be a response to a highly fragmented and xeric landscape. Those individuals that did migrate, generally, travelled south into higher elevations and, consequently, more mesic areas.

Though a mean difference of only 2.5 km, the difference in dispersal between males and females observed in this study is consistent with other research in Idaho (Connelly et al. 1988, Beck et al. 2006). The range of dispersal distances is also similar to other studies conducted in Idaho. Connelly and Markham (1983) reported a range of 0.2 km – 81 km and Leonard et al. (2000) observed a range of 3.5 km – 27.7 km. When analyzing the direction of movements, annual movements were uniformly distributed which simply reflects the site fidelity and annual migratory behavior exhibited by sage-grouse. This is further described by the significant difference in directional movements between summer and winter as grouse are actively moving to and from seasonal habitats during these periods. Movements southward to summer ranges began in May with return movements beginning in October. Timing of these movements is likely associated with desiccation of vegetation and the onset of winter weather (Fischer et al. 1996, Dalke et al. 1963).

Sage-grouse used MHRC facilities extensively and were located relatively close to emitter sites, but not frequently. The southern portion of Saylor Creek Training Range and all of the Juniper Butte Training Range appeared to be important habitat for sage-grouse, representing 6% of the estimated home range of the population and 10% of that area within the 50% probability of occurrence contour. Using straight-line paths, nearly 40% of sage-grouse likely traversed Saylor Creek and Juniper Butte Training Ranges. However, caution should be used in drawing conclusions about the movement paths actually taken by radio-marked birds in this study as the lack of continuity in the data does not allow for that level of detail. While sage-grouse actively used areas immediately adjacent to emitter sites, the frequency of use in proximity (<1 km) to emitter sites was low and the mean distance between sage-grouse locations and emitter sites was relatively distant (8 km) with most exceeding 30 km. This may be an indication of avoidance or sites being located in less suitable sage-grouse habitat. The latter is likely more explanatory as many emitter sites are only used occasionally and are often without elevated structures. Sites AH and BB had the highest frequency of proximal use with 8% and 5%, respectively, of the locations being within 5 km. Both of these sites are located on the northern portions of the study area. Considering the shorter dispersal distances for birds captured farther north, the higher frequency of use may be a function of the number of non-migratory individuals using those areas.

Data suggest that sage-grouse may be using areas burned by the Murphy Fire less than had occurred prior to the fire. In fact, the data may be underestimating the degree of avoidance as sage-grouse may be using unburned islands within the fire perimeter. Our ability to detect an accurate immediate response of sage-grouse following fires in 2010 and 2011 is limited by the location error associated with the data, but sage-grouse certainly used areas that had burned. In some cases, birds used areas that had burned as quickly as 16 days following the fire. Though use of burns did occur, it was more typical for birds to avoid these areas.

Mean home range was slightly larger than has been identified in other studies, but within the range of values observed in those studies (Hagen 1999, Hausleitner 2003). Interestingly, many of the home ranges and movement data made evident a decision point just north of the convergence of the east and west forks of the Jarbidge River on the southern end of the study area. Birds traveled on either side of the divide, but did not appear to travel across this area directly into the Wilkins Island area. These relatively large home ranges further expand on the fact that sage-grouse are a landscape-scale species requiring vast expanses of sagebrush.

Though no minimum number of locations has been identified or recommended for using Brownian bridge movement models, Horne et al. (2007) caution the use of this model when the time interval between locations increases as this may increase the likelihood of violating the assumption of a random walk. However, the tendency toward relatively long distance movements for sage-grouse populations in Idaho and the use of separate seasonal use areas lends some justification to the use of this model with our dataset as the movements are less likely to result in a biased random walk. Nonetheless, the results of this model are likely overestimates considering the number of locations obtained and the length of time between points. Considering the current lack of knowledge about seasonal use patterns for this population and the descriptive, rather than analytical, nature of this project, the generalized data obtained from the Brownian bridge movement models are informative.

Sage-grouse are a sagebrush obligate species, relying on sagebrush for nesting cover and forage (Connelly et al. 2000*b*). As such, the substantial use of sagebrush habitats reported here was expected. Perhaps more interesting, is the use of recently burned areas. Because the vegetation classification is based on data obtained from 1999-2001, sage-grouse use of the recently burned grassland classification is likely underestimated since fires such as the Saylor Cap Fire in 2006 and the Clover Fire in 2005 were not included. Corrections were not made to these areas as their current condition is not known. It is possible that sage-grouse are limited in their ability to find adequate sagebrush stands and

are subsequently forced into marginal habitats. This would partially explain the inconsistency in sage-grouse movements, particularly throughout the summer months.

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2011-08: Jarbidge Field Office Fence Marking

Jarbidge Fence Marking: Final Report

(OSC Project Number: 2011-08)

OVERVIEW

Fence collisions accounted for 40% of the annual mortality to lesser prairie chickens observed by Wolfe et al. (2007) in portions of Oklahoma and New Mexico. In Idaho, 86 sage-grouse collisions were observed along 129.5km of fence being surveyed in 2009 and 2010 (Stevens et al. 2012*a*). Recent research in Idaho indicates that sage-grouse collisions with fences within 2km of a lek can be reduced substantially (83%) by using fence markers (Stevens et al. 2012*b*). Similar findings were obtained from Christiansen (2009), in Wyoming, that identified a 70% reduction in sage-grouse collisions, and Wolfe et al. (2009) found a 100% reduction in lesser prairie chicken fence collisions when markers were installed near leks.

A substantial number of active leks within the BLM's (BLM) Jarbidge Field Office are within 2km of fences. As of 2011, no effort had been undertaken to identify the level of fence collision mortality occurring within the Jarbidge Field Office. However, lek counts in this area have declined since 2006, and contrary to other areas in south-central Idaho, lek counts have failed to increase substantially. Much of the decline is likely attributable to a lack of suitable habitat resulting from the Murphy Complex Fire that burned in 2007. However, it is prudent to undertake any effort to reduce impediments to reestablishing populations in these disturbed areas. Applying fence markers is a simple and relatively cost effective way to reduce, what has the potential to be, a substantial source of mortality. As such, the Jarbidge Sage-grouse Local Working Group identified fences to be marked and began marking fences in 2011.

METHODOLOGY

Stretches of fence within 1km of active sage-grouse leks in 2010 were identified using the "Buffer" tool in ArcGIS (ESRI). Once identified, selections of sites to mark were based on the amount of fence adjacent to the lek in addition to the number of males observed on those leks.

Markers were made by cutting 12 ft. strips of vinyl siding undersill into 3 in. sections using a chop saw. Markers were then installed along the top strand of barbed wire at 3 ft. intervals throughout summer and fall 2011.

As suggested by Stevens et al. (2011), each section of marked fence was monitored weekly from 23 March 2012 through 19 May 2012 to detect fence collisions. Monitoring was accomplished by, simply, walking the marked fence and documenting evidence of sage-grouse collisions (e.g., feathers, flesh, or carcass attached or in proximity to fence).

RESULTS

A total of 13.7 miles of fence were identified to be marked (Appendix A). Three areas were identified with clusters of leks that were substantially surrounded by fences. These included the Buck Flat, Cedar Creek, and Juniper Butte areas. Two other sites, Saylor Creek and Winter Camp, were selected based on lek size.

No evidence of sage-grouse fence collision was observed at any location.

DISCUSSION

Though no documentation of sage-grouse fence collisions prior to 2011 exists for the sections of fence marked in 2011, fence collisions in the Browns Bench area have been documented and recent research on sage-grouse and lesser prairie chickens suggests a high probability that mortality is occurring. Fence marking has demonstrated the ability to reduce these mortalities and our monitoring efforts failed to identify mortality following installation.

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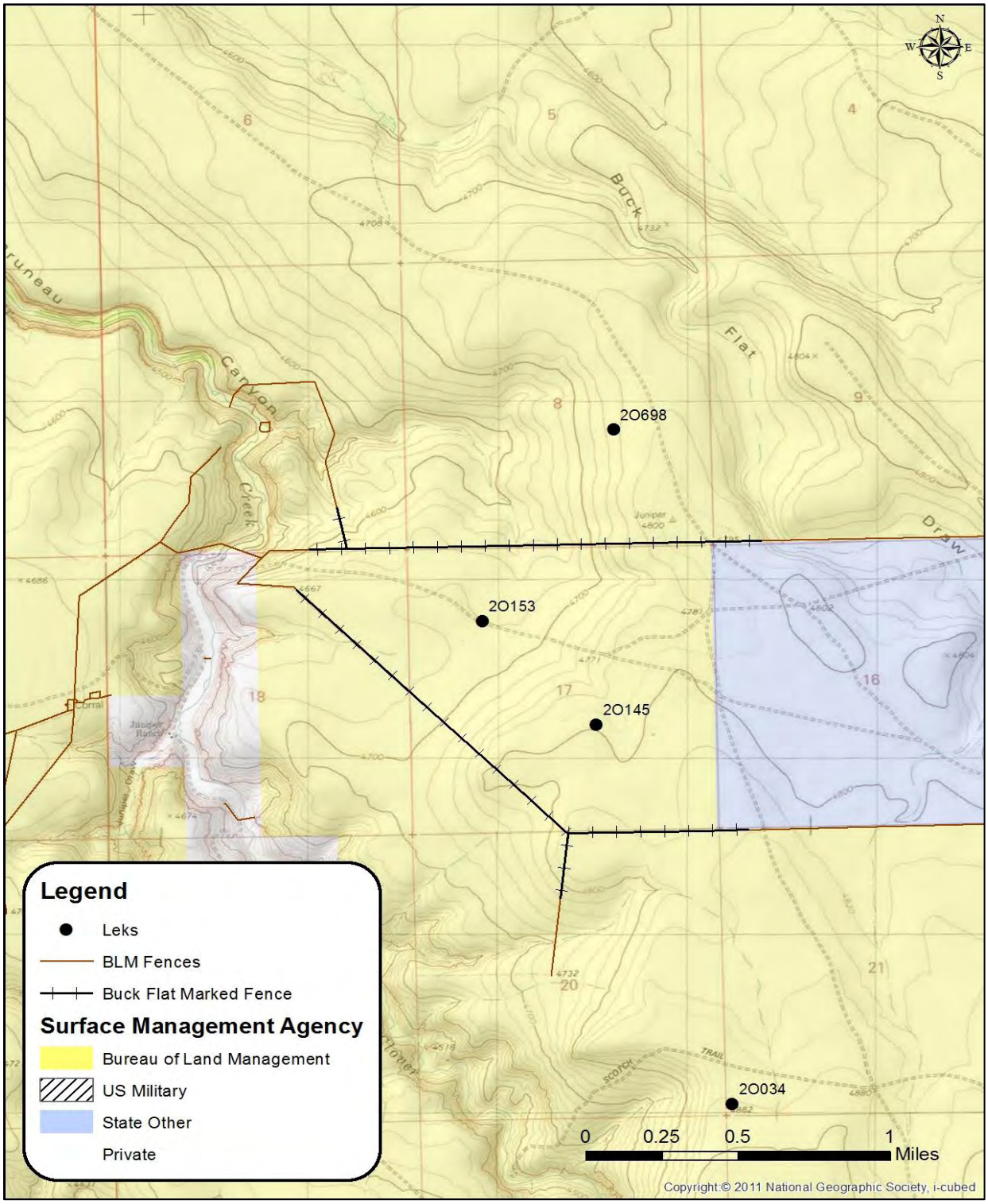
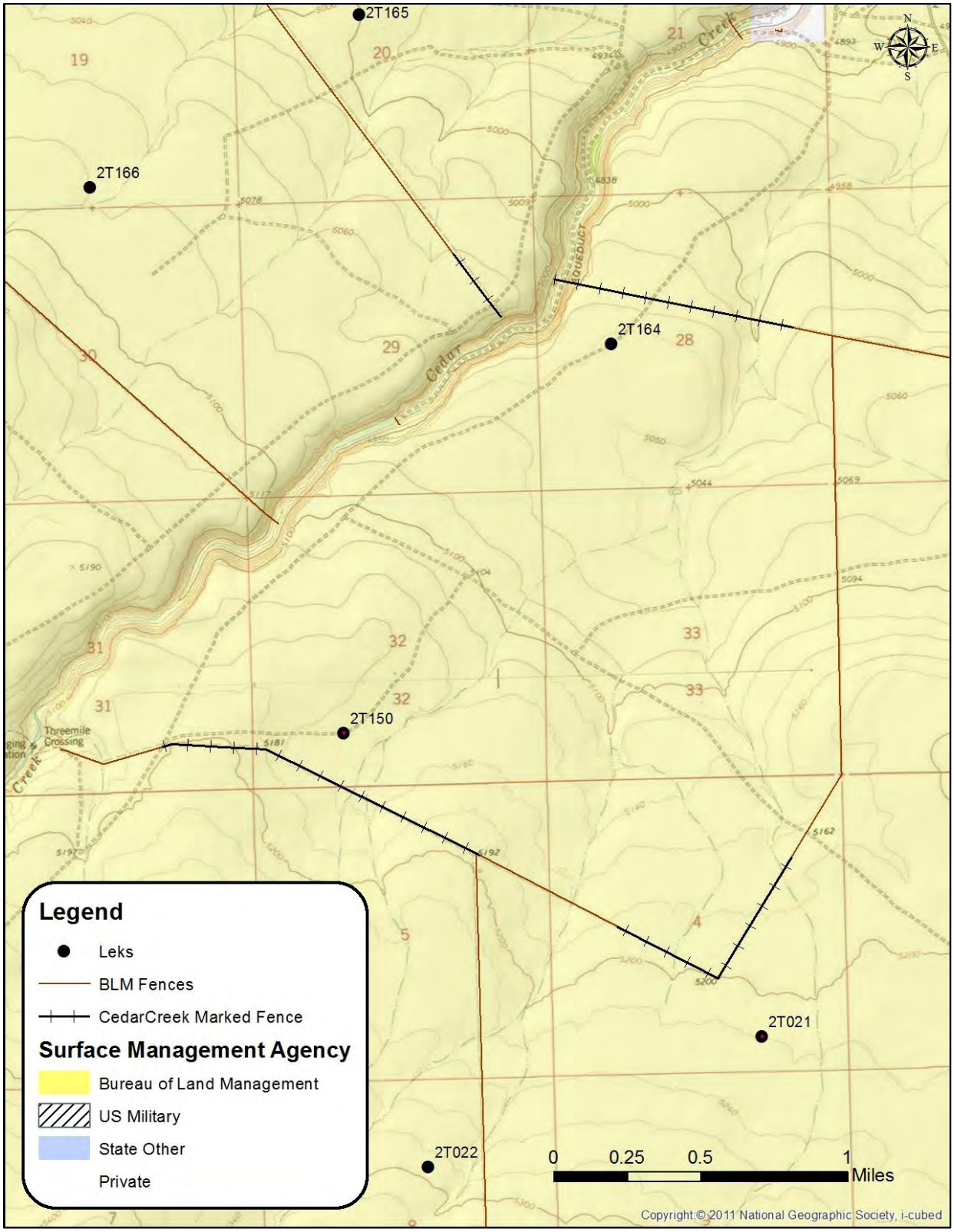
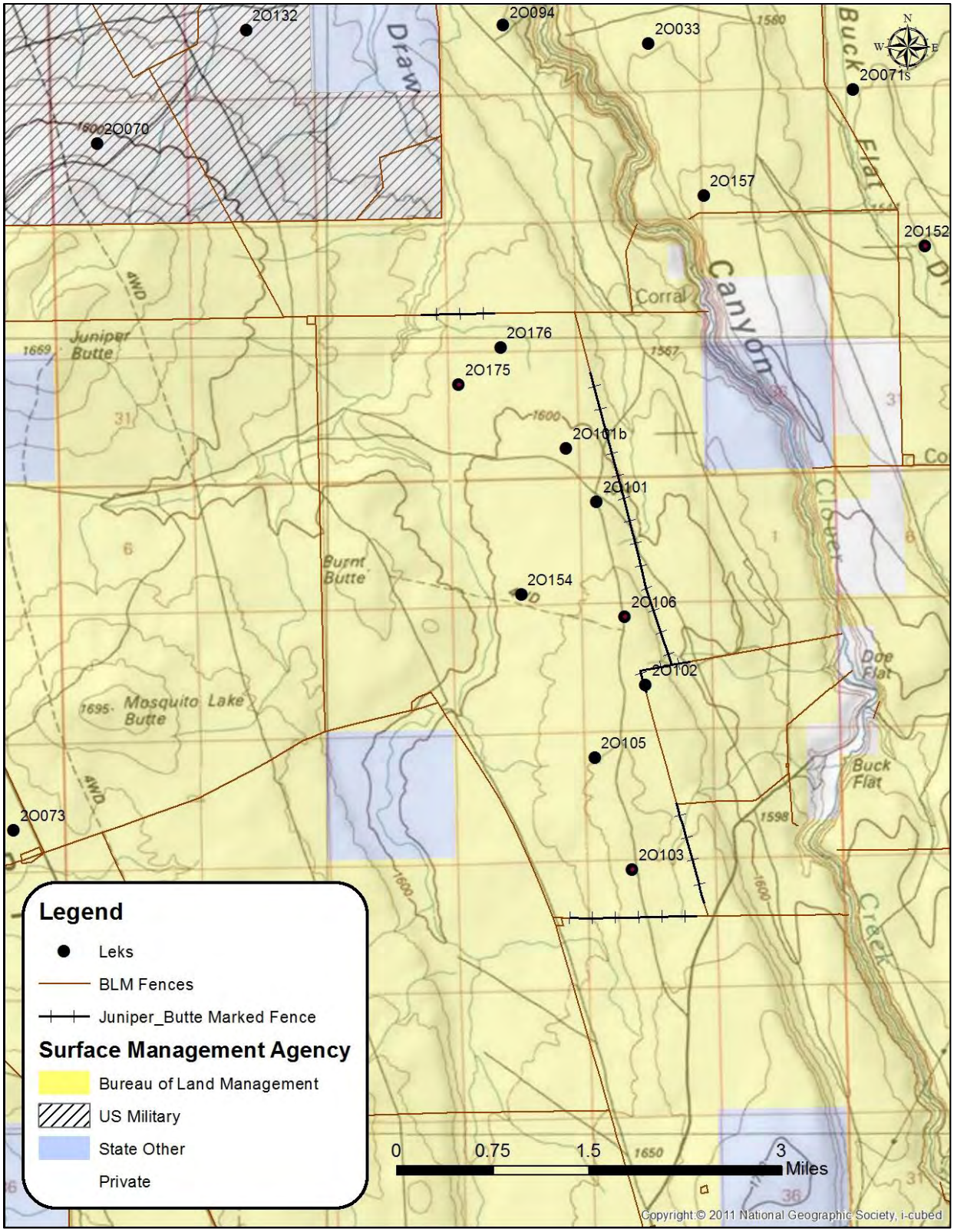
Appendix A. Location of fences marked near Buck Flat (A), Cedar Creek (B), Juniper Butte, (C), Saylor Creek (D), and Winter Camp (E) within the BLM's Jarbidge Field Office in 2011.



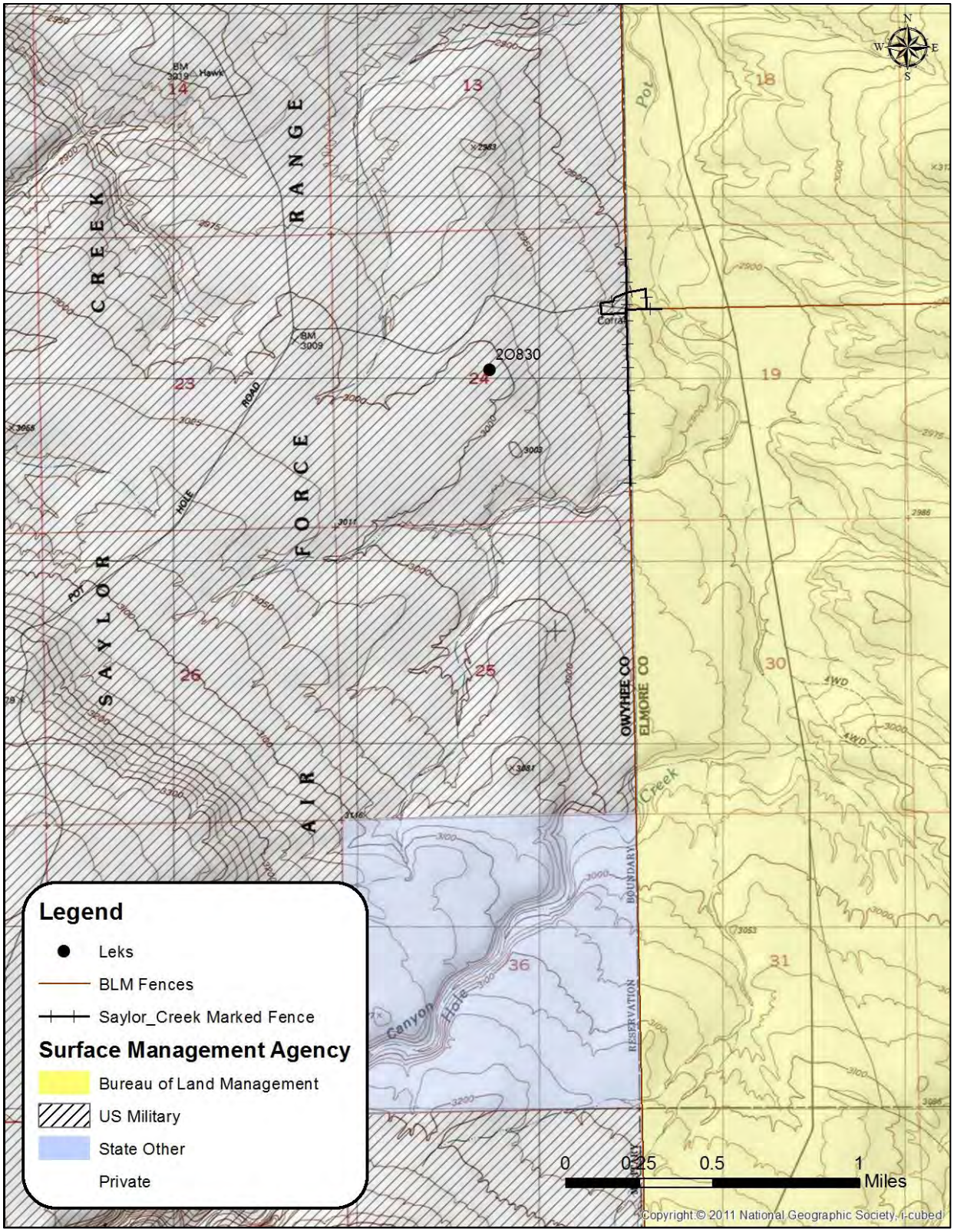
A


2T165
2T166
2T164
2T150
2T021
2T022
Cedar Creek
Threemile Crossing
Legend
Leks
BLM Fences
CedarCreek Marked Fence
Surface Management Agency
Bureau of Land Management
US Military
State Other
Private
0 0.25 0.5 1
Miles
Copyright © 2011 National Geographic Society, i-cubed

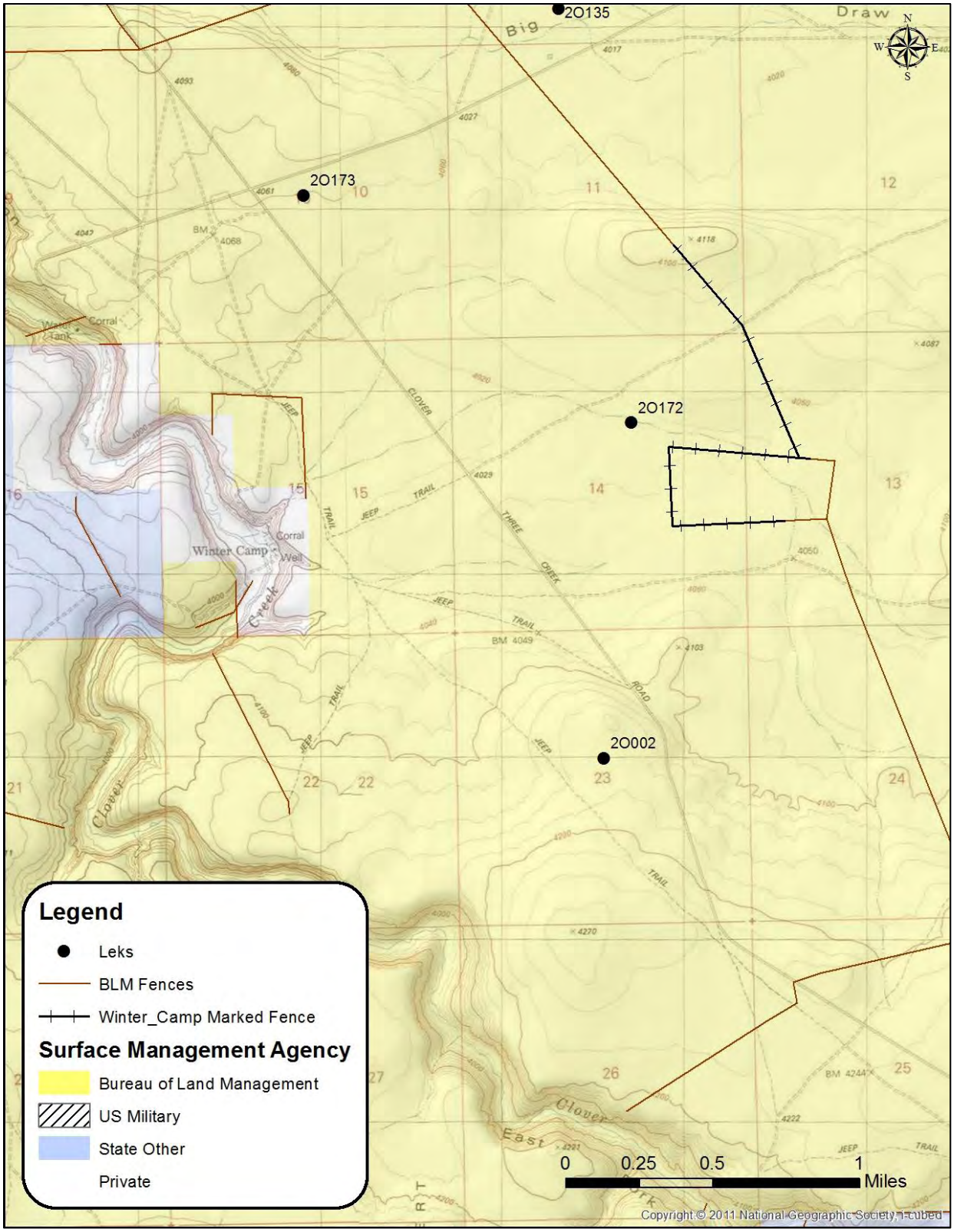
B


2O132
2O094
2O033
2O071S
2O070
2O157
2O152
2O176
2O175
2O161b
2O101
2O154
2O106
2O102
2O105
2O103
2O073
Draw
Buck Flat
Corral Canyon
Juniper Butte
Burnt Butte
Mosquito Lake Butte
Doe Flat
Buck Flat
Creek
4WD
1669
1695
1600
1598
1650
Legend
Leks
BLM Fences
Juniper_Butte Marked Fence
Surface Management Agency
Bureau of Land Management
US Military
State Other
Private
0
0.75
1.5
3
Miles
Copyright © 2011 National Geographic Society, i-cubed

C


SAYLOR CREEK AIR FORCE RANGE
2O830
OWYHEE CO
ELMORE CO
Legend
Leks
BLM Fences
Saylor_Creek Marked Fence
Surface Management Agency
Bureau of Land Management
US Military
State Other
Private
0 0.25 0.5 1 Miles
Copyright © 2011 National Geographic Society, i-cubed

D


2O135
Big Draw
2O173
2O172
2O002
Winter Camp
Corral
Well
Creek
Clover
East
Legend
Leks
BLM Fences
Winter_Camp Marked Fence
Surface Management Agency
Bureau of Land Management
US Military
State Other
Private
0 0.25 0.5 1
Miles
Copyright © 2011 National Geographic Society, i-cubed

E

2009-12: Sage-grouse Movements and Home Range Delineation in East Idaho Uplands Planning Area

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

2012 Progress Report

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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 km^2, < 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

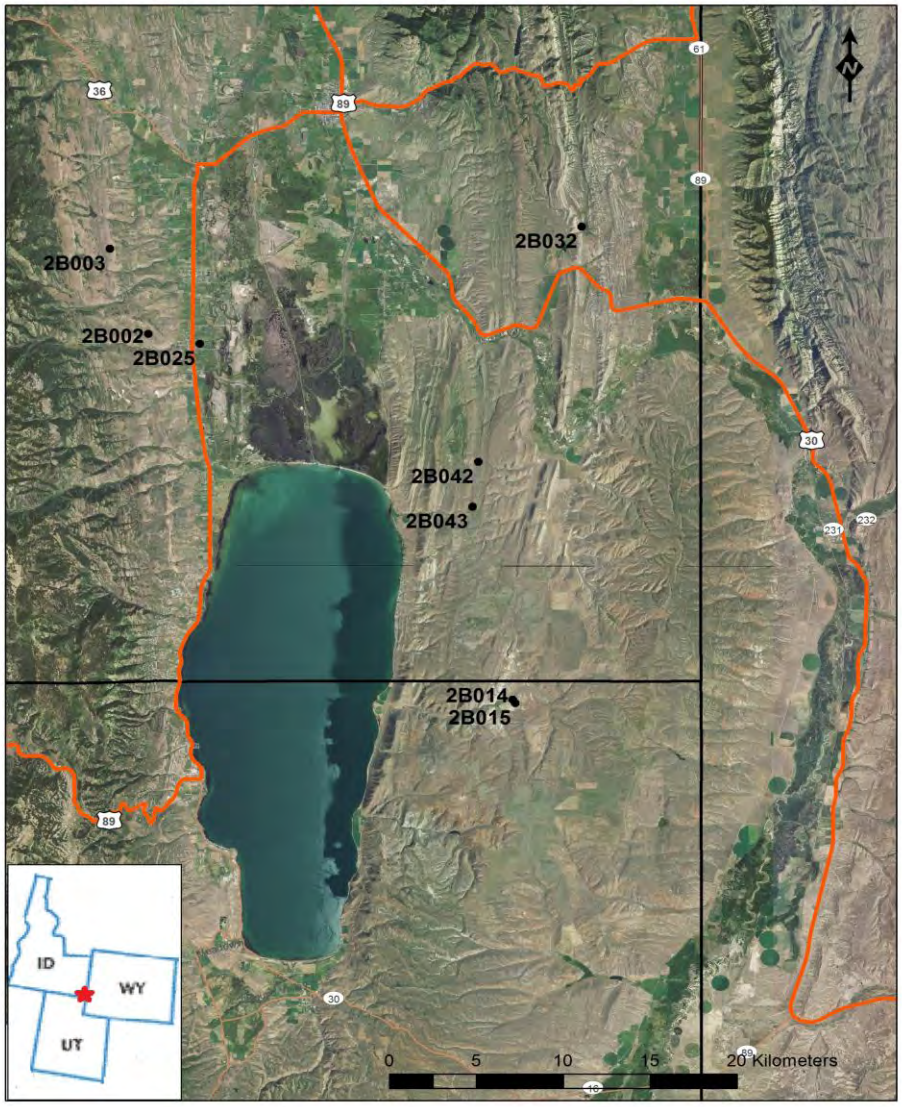
Little is known about the ecology, seasonal movements, and habitat-use patterns of the sage-grouse populations that inhabit the Bear Lake Plateau and Valley relative to existing or potential land uses for application to management. Migration information is important to delineate population dynamics (e.g., 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.

STUDY AREA

The Bear Lake Plateau and Valley Study Area consists of over 400,000 acres in Bear Lake County, Idaho, Rich County, Utah, and Lincoln County, Wyoming. The elevation of the study area ranges from 5900-8200 feet. The BLPV is comprised of many different land ownership and management entities. This area is mostly of private land, with some patches of public Forest Service, U.S. Fish and Wildlife, Bureau of Land Management, and state-owned land. Vegetation is dominated by sagebrush (*Artemisia* spp.)-grassland plant communities.

Figure 1. Bear Lake Plateau and Valley Study Area



METHODS

Sage-grouse were trapped on and near leks during the 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). Radio-collared grouse were located using telemetry at least once a week from 1 June to 1 November and once a month from 1 April to 10 August. 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 were also recorded. Brood sites were measured using the line-intercept method at four 10 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 theses transects. Random vegetation points were measured 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

Captures

The 2012 snow melt came much earlier this year than the previous year. We were able to get into the study site at the beginning of March to start trapping. The capture distribution from the 2012 trapping season can be found in Table 1. We captured 37 new birds- 13 females and 24 males. In addition, we captured 4 males with dead collars and recollared these as well. With the collars deployed, the season started with 47 cocks and 30 hens on air. By October there were 30 cocks and 18 hens on air.

Table 1. Distribution of sage-grouse captured Spring 2012 in the Bear Lake Plateau and Valley.

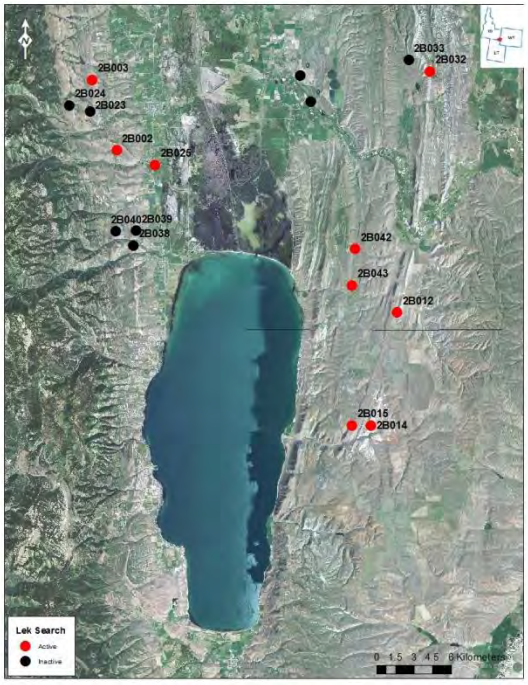
	Adult	**Yearling**
Bloomington (2B025) / Paris (2B003)		
Female	1	0
Male	5	4
Eden (2B014 and 2B015)		
Male	5	1
Indian Creek (2B042 and 2B043)		
Female	6	1
Male	3	2
Sheep Creek (2B032)		
Female	4	1
Male	7	1
TOTAL		
Female- 13	11	2
Male- 28	20	8

Lek Count

This spring we assisted Idaho Dept. of Fish and Game in their lek routes. We also investigated some leks that have not been observed in recent years. High lek counts can be found in Table 2.

Table 2. Lek counts for the Bear Lake Valley and Plateau.

Lek	Date	Males	Females
2B002	04/07/2012	10	2
2B003	04/21/2012	23	0
2B012	03/29/2012	6	9
2B014	04/28/2012	43	7
2B015	04/28/2012	38	5
2B023	04/04//2012	0	0
2B024	04/04//2012	0	0
2B025	03/05/2012	39	2
2B032	03/29/2012	34	41
2B033	04/04/2012	0	0
2B038	04/25/2012	0	0
2B039	04/25/2012	0	0
2B040	04/25/2012	0	0
2B042	04/04/2012	16	6
2B043	03/29/2012	33	45



Nesting

A total of 17 nests were found during the 2012 spring and summer. Of the 17 completed nests, 7 were successful hatches and 12 were failures. Of the 7 hen mortalities, 4 were killed on nest, and 3 were killed post- nest failure. Of the nest failures it appeared that 5 depredations resulted from avian predators, and 7 depredations resulted from mammalian predators.

Broods

Of the 7 successful nesting hens, 5 were observed to have chicks up to 50 days old. These broods ranged from 2-4 chicks. Twenty-eight unbanded hens were also observed to have broods around the study area this summer and fall.

Mortalities

During 2012, there have been 22 mortalities- 13 cocks and 9 hens. The majority of the male mortalities happened during April and May when the cocks were in their breeding plumage. The hen mortalities

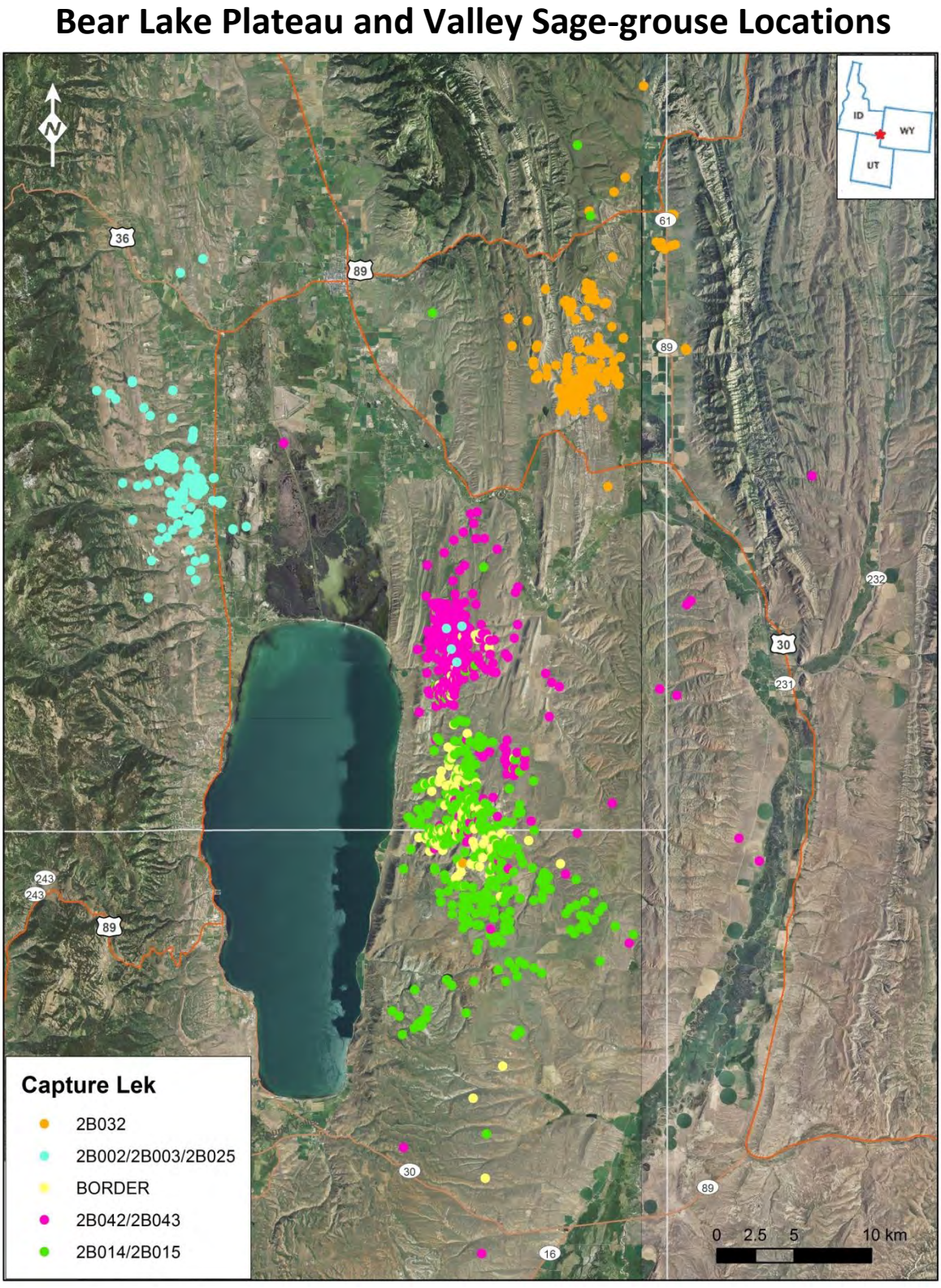
occurred from May to August, and of the 9 hens killed, 4 mortalities occurred on nests. In addition to the mortalities, two collars were slipped by males during the spring.

Locations

During 2012, 312 female telemetry locations were recorded amongst 30 female individuals. Also during 2012,189 male locations were recorded amongst 53 male individuals. Over 250 unmarked sage-grouse were observed around the site during routine monitoring.

As during previous years, sage-grouse were found to move between states to different leks. This is mostly observed in males and females on the east side of the lake moving between Idaho and Utah. During 2012, sage-grouse were found to cross natural and anthropogenic barriers including Bear Lake, Bear River, highways, and residential areas. This spring, we observed our first sage-grouse to move across Bear Lake.

Figure 2. Sage grouse locations collected from March 2010 to June 2012 on the Bear Lake Plateau and Valley study area.



WORK SCHEDULE

For the remainder of the study, I will analyze my data and prepare my thesis. I will create a habitat fragmentation index to determine if the fragmentation observed constitutes functional habitat loss. I will use remote sensing to look at land use change over the last 30 years and classify habitat and non-habitat in the Bear Lake Plateau and Valley Study Area. These areas will be compared to location and presence/absence data. I plan to defend my thesis in the spring.

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2011-06: Lek Search and Documentation in Less Studied Portions of the East Idaho Uplands

Greater Sage-grouse (*Centrocercus urophasianus*) Lek Search and Documentation in Less Studied Portions of the East Idaho Uplands 2012

State of Idaho
Cooperative Sage-grouse Project
East Idaho Uplands Sage-grouse Local Working Group
Idaho Department of Fish and Game
Idaho Office of Species Conservation

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Introduction

The Idaho Sage-Grouse Conservation Plan (Idaho Sage-grouse Advisory Committee 2006) directed the state to develop local working groups to address local conditions, threats, and opportunities for conservation. The East Idaho Uplands local working group (EIULWG) identified lack of data as a high risk threat to greater sage-grouse in the planning area. To help address this threat, grant funding was obtained from the Idaho Office of Species Conservation (OSC) to conduct aerial lek surveys during the spring of 2012 in a portion of the EIULWG planning area.

Study Area and Methods

The focal areas for the 2012 survey were in the western portions of the planning area in Bingham, Bannock, Franklin and Caribou counties. It was also decided that left over funding from the 2011 effort in the vicinity of Grays Lake Outlet would be combined with this effort and that finalizing the unfinished 2011 survey would be a priority. Locations occupied by birds during the aerial survey were not ground-truthed during the 2012 lek season; however, one new lek was observed active in successive flights and therefore confirmed.

Surveys were conducted using the Idaho Department of Fish and Game's *Aerial Lek Survey Protocol*. Observation of a displaying male was recorded as a lek, but a GPS location was taken for all sage-grouse and sharp-tailed grouse (*Tympanuchus phasianellus*) observed, and the behavior recorded as displaying, sitting or flushing. Aerial survey flights were conducted on 27, 28, 30 and 31 March and 2, 3, 4 and 7 April of 2012 (weather conditions precluded flights on some dates). Aerial surveys were conducted using a Bell 47 Soloy helicopter flying approximately 100 feet above ground level with the pilot and two trained observers. Surveys started ½ hour before sunrise and continued until two hours after sunrise. Transects were flown over likely sage-grouse habitat within the designated survey area at ½ mile intervals. All historic sage-grouse and sharp-tailed grouse leks within a designated search area (base topographic or aerial photos carried on board) were visited in addition to searching for new leks. Also, an attempt was made to follow recommendations from the 2011 aerial lek search report (Roberts, 2012) and investigate areas of likely activity. Locations and flight tracks were recorded using a handheld DeLorme PN-40 GPS unit or equivalent, and mapped using DeLorme Shapefile Writer software and ArcGIS 9.3 (Figure 1).

Results and Discussion

Searches were timed so that generally the lowest elevations were searched first. Flights were conducted in three general locations including, in order of timing: two flights in the foothills east of Blackfoot/Fort Hall, three flights north of Preston and finally three flights in the vicinity of Grays Lake Outlet. Spring conditions developed earlier in 2012. Conditions for all search areas were considered to be good (snow pack receded). Sage-grouse were observed during five of the eight flights. Twenty-one groups of sage-grouse were observed in at least four broadly separated areas. Sharp-tailed grouse were observed on all but one flight.

East of Blackfoot/Fort Hall – Two groups were observed in the foothills, both with displaying males. On the second day of flying (3/28) one group was observed a second time from the air, which by IDFG protocol confirmed the lek as "active" annual status and was therefore added to the statewide database (4B028).

North of Preston – Three flights were conducted (3/30, 3/31 and 4/2) and included visits to three historic leks and other areas where sightings had been reported. Although there were numerous observations of sharp-tailed grouse, no sage-grouse observations were made.

Grays Lake Outlet – Three flights were conducted (4/3, 4/4 and 4/7) including visits to three historic leks (8B004, 8B006 and 4B020). Five males were observed displaying at 8B004. Though no activity was observed at 4B020, 12 males were observed displaying 1.4 km southwest, directly across the Grays Lake Outlet drainage. Ten other groups were observed within 5 km of 4B020 though none were observed displaying. Seven groups of sage-grouse were observed slightly further west of 4B020 and southwest of 8B009, all within 4 km of one another. Seven groups were observed south of and within 6 km of 8B006. One group of 4 males and 6 unknown was observed within 1.6 km, but no displaying was observed. This is the first activity observed in the vicinity of 8B006 since an aerial observation in 2004 (See Table 1). The final flight on 4/7 included a concerted foray into the Caribou Basin area where winter observations have occurred and historic records indicate lekking activity. Only two sharp-tailed grouse were observed.

Though no ground-truthing was accomplished subsequent to the 2012 flights, there were several observations of grouse incidental to other activities in the EIUPA worth noting. A worker reported to USFS personnel sage-grouse lekking in the Tygee Ridge area along the Wyoming border (3C030). An

IDFG biologist attempting to ground truth 4B018 near Poison Creek came upon lekking birds (10 males displaying) along Shortcut Road approximately 2.5 km southwest of 4B018.

Recommendations

All sage-grouse and sharp-tailed grouse observations collected during the 2011 and 2012 aerial surveys should be ground-truthed to confirm lekking activity.

In the statewide lek database (2012), 4B020 should be listed as "Last Count" - 2012. "Max of 2012" should be listed as 0 or 12, depending on whether the group sighted 1.4 km southwest of 4B020 is considered to be representative of that lek or a new lek. If the sighting is considered representative of 4B020, "2012 Status" should be listed as "Active". If it is not considered representative of 4B020, ground-truthing should be a priority to confirm the "new" lek.

In the statewide lek database (2012), 8B006 should be listed as "Last Count" -2012. The concentration of groups sighted south of 8B006 should be revisited as soon as possible to verify that 8B006 is "Management Status" -Occupied (currently "not verified") or to possibly confirm a "new" lek.

In the statewide database (2012), 4B018 should have the record deleted indicating a check in 2010. Due to conditions the lek was never reached in 2010. This lek was checked one time in 2012, which was the first return visit since it was originally observed from the air in 2009. In 2012 only tracks were observed (See following discussion regarding the new lek southwest of 4B018).

In the statewide database (2012), the new lek sighted 2.5 km southwest of 4B018 (WGS 84 decimal degrees, 43.05126-111.77512), should be listed as a new lek that is "Active" and "Occupied". Or the lek should be considered representative of 4B018. The "Max of 2012" for either a new lek or 4B018 should be listed as 10.

The unconfirmed lek east of Blackfoot/Fort Hall should be revisited to possibly confirm a "new" lek.

Additional aerial surveys are needed to confirm the status of leks observed from the air in 2000/2001 but not revisited (especially in the area from southwest of Blackfoot Reservoir to west of Chesterfield Reservoir). Contemporary searches are also desirable in the middle Bear River valley, upper Trail Ceek/Slug Creek, and along the Wyoming border from upper Crow Creek to Stump Creek.

Some areas flown in 2012 where sage-grouse activity was not observed from the aerial search should still be revisited from the ground to monitor the possibility of remnant populations (upper Marsh

Creek/Cottonwood Creek, Caribou Basin). Other areas of historic lek activity (Deep Creek/Weston Creek divide) should also be visited as possible.

All leks ultimately confirmed (through ground-truthing or additional aerial surveys) should be either included into new lek routes if appropriate, or scheduled to be revisited at least every five years.

Acknowledgements

The funding for this project was obtained from a grant submitted by the East Idaho Uplands Local Working Group membership to the Idaho Office of Species Conservation. Pilot Brent Wood (Helo-Wood Helicopters, Inc.) provided aerial survey expertise. Jake Leal, Zach Lockyer, Matt Proett and Shane Roberts conducted the surveys and collected/compiled the data.

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Date	Time	Waypoint	Latitude	Longitude	Species	Males	Females	Unknown	Behavior	Comments
3/27/2012	745	22	43.225420	-112.100330	SAGR	4	0	6	1, 3	Count on unknowns approximate
3/27/2012	851	25	43.138380	-112.201540	SAGR	1	0	2	1, 3	
4/3/2012	838	Wpt 002	43.284479	-111.730306	SAGR	0	0	1	3	Flushed
4/3/2012	842	Wpt 003	43.283655	-111.714765	SAGR	4	0	0	2	Grouped, but not displaying
4/3/2012	847	Wpt 004	43.297375	-111.706704	SAGR	0	0	2	3	Flushed
4/3/2012	900	Wpt 005	43.255011	-111.738623	SAGR	0	0	1	3	Flushed
4/3/2012	910	Wpt 006	43.249372	-111.724008	SAGR	0	0	1	3	Flushed
4/3/2012	916	Wpt 007	43.253080	-111.708197	SAGR	0	0	2	3	Flushed
4/3/2012	719	Wpt 001	43.396819	-111.778421	SAGR	5	0	8	1	5 displaying, known Kepp's Crossing Lek
4/4/2012	732	Wpt 001	43.245937	-111.682640	SAGR	0	0	1	3	Flushed
4/4/2012	745	Wpt 003	43.217158	-111.663434	SAGR	0	0	1	2	Standing then flushed
4/4/2012	753	Wpt 004	43.272727	-111.656069	SAGR	0	0	1	3	Flushed
4/4/2012	758	Wpt 005	43.246022	-111.645455	SAGR	12	9	0	1	Lek
4/4/2012	816	Wpt 006	43.229778	-111.616977	SAGR	0	0	1	3	Flushed
4/4/2012	821	Wpt 007	43.262642	-111.622845	SAGR	0	0	1	3	Flushed
4/4/2012	854	Wpt 010	43.245039	-111.588872	SAGR	0	0	1	3	Flushed
4/7/2012	835	5	43.114620	-111.531210	SAGR	0	0	7		
4/7/2012	841	6	43.127400	-111.538530	SAGR	0	1	0	3	One lone female flushed
4/7/2012	852	7	43.162270	-111.559240	SAGR	0	0	1	3	One lone unknown sex flushed
4/7/2012	902	8	43.147680	-111.564710	SAGR	4	0	6		
4/7/2012	904	9	43.152050	-111.562760	SAGR	0	0	11	3	Flushed from area that previous group flew towards, possibly same birds
4/7/2012	908	10	43.139250	-111.562120	SAGR	0	0	1	3	One lone unknown sex flushed
4/7/2012	914	11	43.113530	-111.521240	SAGR	0	0	6		Possibly same group as waypoint 5 that were flushed earlier
				Total		**30**	**10**	**61**		

Table 1. Sage-grouse observations from aerial surveys conducted from 27 March to 7 April, 2012. Datum-WGS84. Behaviors, 1- displaying, 2- sitting (no display), 3 –flying (flushed).

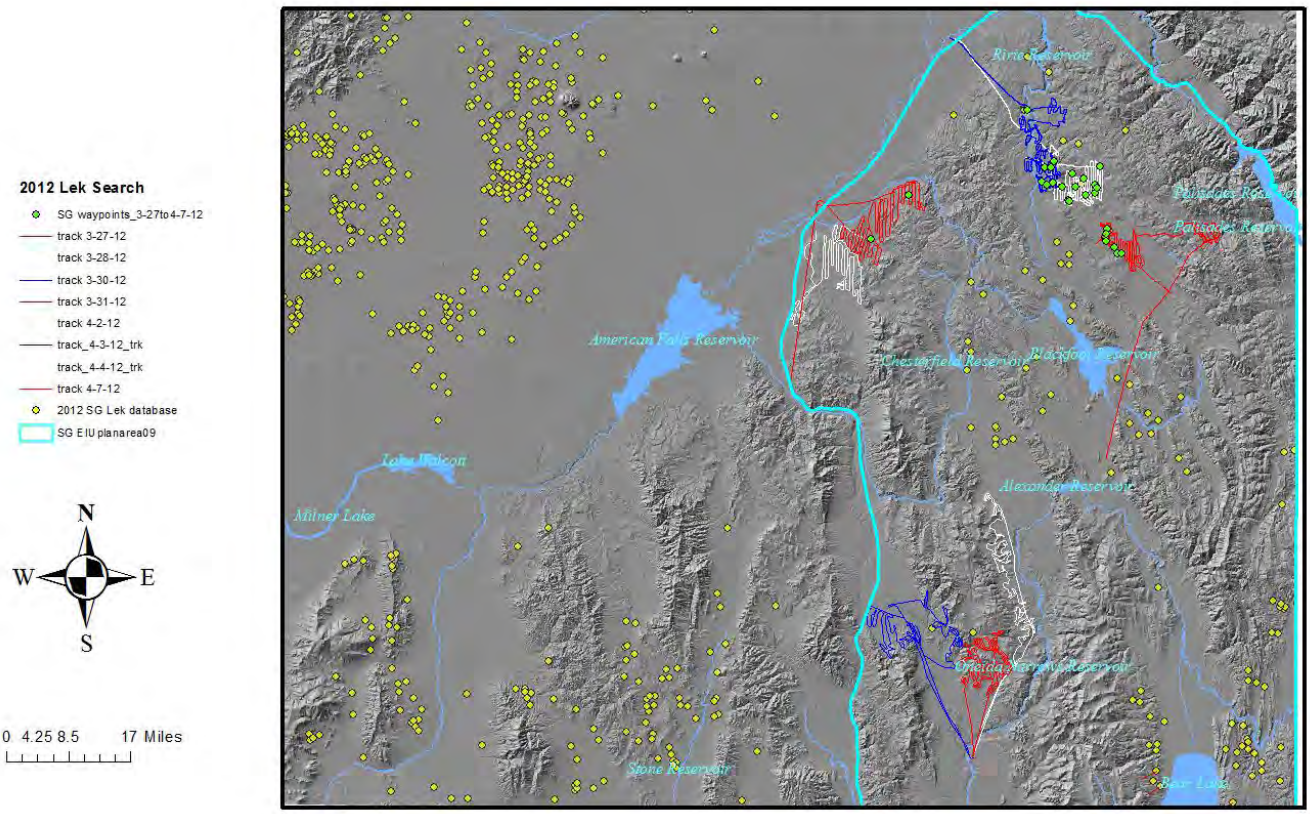

Figure 1. Flight paths and sage-grouse sighting waypoints from 2012 EIUPA aerial lek search conducted from 27 March to 7 April.

2010-18: Sage-grouse Habitat Use and Movements in the Mountain Home Sage-grouse Planning Area

Sage-grouse Habitat Use and Movements in the Mountain Home Sage-grouse Planning Area

Annual Report

OSC grant 2010-18

Prepared by:

Ann Moser, Wildlife Biologist, Idaho Department of Fish and Game

Neil Hillesland, Reservist, Idaho Department of Fish and Game, and co-chairman of the Mountain Home Sage-grouse Local Working Group

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August 27, 2012

Introduction

The Mountain Home Sage-grouse Local Working Group (MHLWG) began meeting in spring 2010. Because little is known about the sage-grouse in this area, the MHLWG submitted a proposal for cooperative sage-grouse funds to radio-collar and monitor sage-grouse. The proposal was approved and funded in July 2010; project work began in spring 2011.

The objectives of this project are to:

- Continue to monitor the occupied leks in the Mountain Home Sage-grouse Planning Area (SGPA)
- Capture and radio-collar up to 20 sage-grouse in the Mountain Home SGPA
- Monitor and document sage-grouse survival during the study, including nest and brood success
- Identify and delineate key breeding, late brood-rearing, and winter use areas
- Document seasonal movements.

Study Area

The Mountain Home Sage-grouse Planning Area (SGPA) encompasses about 286,000 acres in Elmore County (Figure 1). Of this 27% is private land. Elevation ranges from 850 m near Hammett to 2100 m on Bennett Mountain. Excluding Bennett Mountain, in 2006 70% of the SGPA was classified as key habitat, 10% was dominated by perennial grasslands (R1), and 20% was annual grasslands (R2) (Idaho Sage-grouse Advisory Committee 2006). Key habitat is defined as, "Areas of generally intact sagebrush that provide sage-grouse habitat during some portion of the year" (Idaho Sage-grouse Advisory Committee 2006). Since 2006, additional key and R1 habitat has been added around the SGPA boundary (BLM 2011) (Figure 2).

We focused our study on the northern portion of the SGPA, where there are 6 known occupied sage-grouse leks. The other known occupied lek in the SGPA is near Blair Trail Reservoir in the southeast portion of the SGPA, but there have been no males in attendance since 2009. The study area ranges from Wyoming big sagebrush in the foothills to mountain big sagebrush at the western edge of the Camas Prairie.

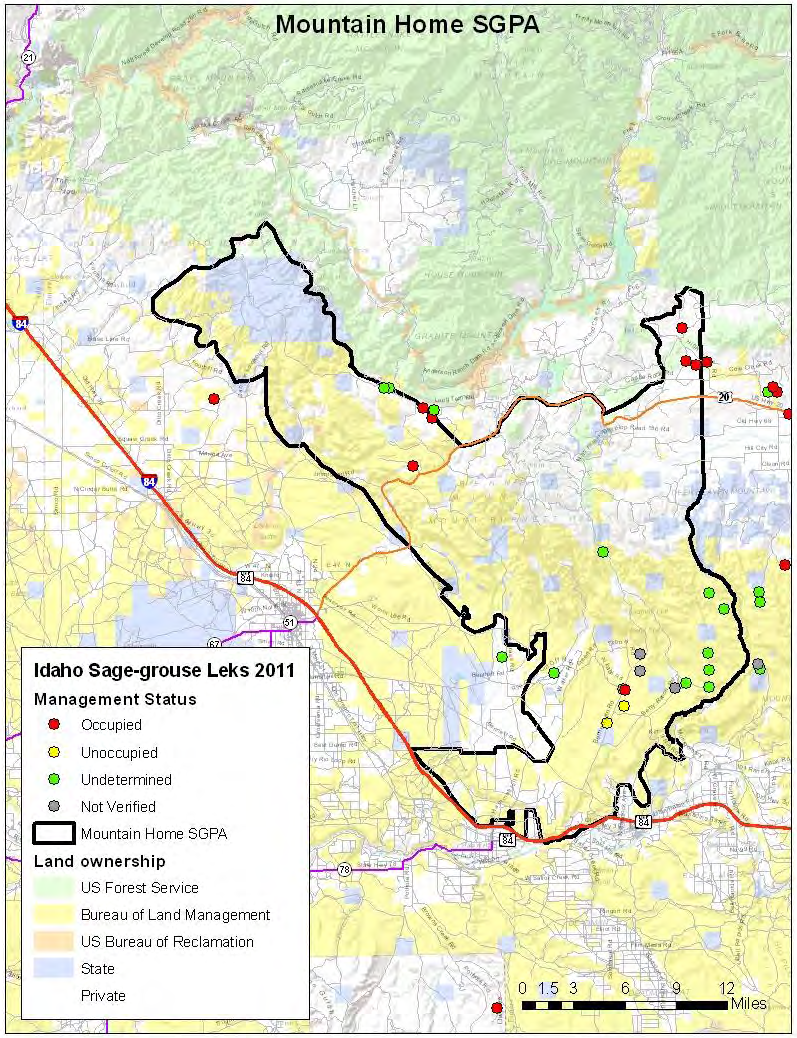

Figure 1. Location of Mountain Home Sage-grouse Planning Area (SGPA), sage-grouse leks, and land ownership.

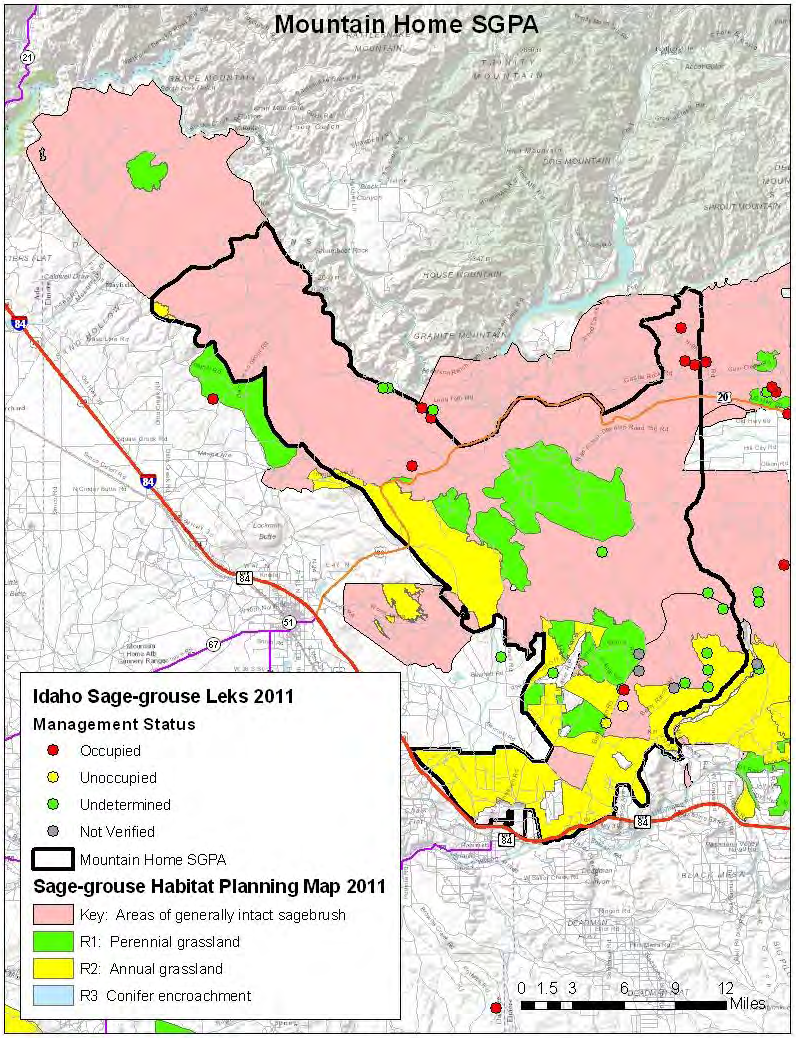

Figure 2. Sage-grouse habitat in the Mountain Home Sage-grouse Planning Area, 2011.

Methods

Lek Monitoring

Sage-grouse breeding populations are monitored by counts of males at leks each spring. A lek route is a count of male sage-grouse on a group of leks that are relatively close and represent part or all of a single breeding population. The following summarizes the standardized procedures for lek routes (Connelly et al. 2003):

- All leks within a lek route should be counted on the same day within 1.5 hours.
- Lek routes should be run from 0.5 hours before sunrise to 1 hour after sunrise.
- Each route should be run 4 times during the spring lekking season (generally late March to mid-April, depending on elevation).
- Lek routes should not be conducted under poor weather conditions (rain or snow or winds >15 mph).

Lek route results are reported as the peak male attendance on one day for all leks in the route. Lek route data that have been correctly collected through time are the most appropriate data for assessing population trends. Leks in the Mountain Home SGPA have been irregularly counted in the past, but increased focus in the area has resulted in standardized counts since 2009.

Radio-telemetry Monitoring

We used standard spot-lighting and netting techniques to capture sage-grouse at night primarily around leks in the spring (Connelly et al. 2003). Captured sage-grouse were fitted with 18-gm necklace-style radio-transmitters and banded with aluminum leg bands. All transmitters were equipped with mortality sensors to enable rapid investigation of mortalities or slipped collars.

Radio-collared sage-grouse were monitored at least once weekly during the breeding season and summer, and at least once monthly during the fall and winter. We followed sage-grouse primarily on the ground, but fixed-wing aircraft was used approximately monthly.

Female sage-grouse were monitored closely during the nesting season to determine nest location and hatch success. We assumed a hen was on a nest when she was consistently found in the same area, but we did not approach the nest area. Hens were monitored twice weekly to determine nest success and approximate hatch dates. When the hen was consistently away from the nest, we approached the nest area and located the nest. Hens were flushed approximately 4 weeks post-hatch and every 4 weeks thereafter to determine brood success.

For birds captured in 2011, we used Hawth's Tools in ArcGIS™ 9.3 to draw straight-line paths between successive locations to approximate bird movements. We also used all locations 6 April 2011–12 July 2012 to draft an estimate of sage-grouse seasonal ranges in the Mountain Home SGPA. Seasonal ranges were (Idaho Sage-grouse Advisory Committee 2006):

- Breeding: 1 March–30 June
- Summer/late brood-rearing: 1 July–31 August

- Fall: 1 September–30 November
- Winter: 1 December–28 February

Telemetry locations were pooled and separated by season. We modeled seasonal ranges with a kernel density estimator with likelihood cross validation smoothing in Geospatial Modeling Environment©. Seasonal ranges were presented in 50%, 80%, 90% and 95% density contours. We also categorized locations by aspect and calculated the average slope and elevation within each season.

Nest-site Assessments

Following Connelly et al. (2003), we conducted a nest site assessment for each nest after the nest was hatched or depredated. Four 10-m transects were place 90° apart from the center of the nest bowl, oriented in the cardinal directions. We used the line-intercept technique (Canfield 1941) to measure canopy cover of shrubs by species along each transect. We estimated cover of grasses and forbs in cover classes within 12 0.5 x 0.2 m frames (Daubenmire 1959) per site, placed at 1 m, 3 m, and 5 m along each transect. Shrub and grass heights for each species were measured within 1 meter of the tape at 1 m, 3 m, and 5 m along each transect. We also recorded the plant species immediately over the nest bowl and its height. Slope, aspect, and elevation were also recorded.

Results and Discussion

Lek Monitoring

Idaho Department of Fish and Game (IDFG) reservists and volunteers conducted standardized lek counts in the Mountain Home SGPA 2010–2012. In addition, several leks with “undetermined” status were re-visited. The work of this group resulted in:

- 1 new lek was confirmed on private land outside of the designated SGPA boundary
- The Dixie lek was confirmed as occupied in 2010; no formal survey of the area had been conducted since 1979
- 3 lek locations clustered around the High Prairie and Wildhorse roads in the northeast corner of the SGPA are actually 1 large lek
- Confirmed from radio-telemetry studies that sage-grouse can move between the Dixie and Little Sagehen Flat leks; these leks are now counted on the same day
- The West Dixie location is a satellite lek that may be active during years of high populations.
- Verified that there are no known occupied leks near Blair Trail Reservoir

There are now 3 standardized lek routes in the SGPA: Dry Creek, Little Sagehen Flat, and Moore’s Flat. The Blair Trail lek will also continued to be surveyed.

Table 1. Summary of lek counts in the Mountain Home SGPA 2005–2012.

Lek Name	Lek Route	2005	2006	2007	2008	2009	2010	2011	2012
Little Sagehen Flat	Little Sagehen Flat		23	19	7	8	12	12	6
West Dixie	Little Sagehen Flat						3		
Dixie	Little Sagehen Flat						10	8	7
Wildhorse	Moore's Flat	22	9	5	23	33	16	30	33
Moore's Flat	Moore's Flat	11	9	15	11	8		0	2
Dry Creek	Dry Creek							6	2
Blair Trail Reservoir	None		8	2	3	3	0	0	0
Total males		33	49	41	44	52	41	56	50
# leks counted		2	4	4	4	4	5	6	6
Average males/lek		17	12	10	11	13	8	9	8

Radio-telemetry Monitoring

We captured and monitored 11 sage-grouse in 2011; 1 adult female, 1 yearling female, 6 adult males, and 3 yearling males (Table 2). Ten birds were captured in spring 2012; 2 adult females, 1 yearling female, 6 adult males, and 1 yearling male. We trapped birds at the Little Sagehen Flat, Dixie, West Dixie, and Wildhorse leks. We attempted to trap birds at the Dry Creek lek, but could not locate roosting birds at night. We also attempted to trap near Blair Trail Reservoir in late winter, but were unsuccessful. We did not trap at the Moore's Flat lek.

We have obtained 325 locations on 22 birds through 12 July 2012. Of the 11 birds captured in 2011, only 2 remain alive; 1 slipped its radio collar shortly after capture, 3 died in 2011, and 5 died in 2012. Most mortality was assumed to be due to predation, although often there were few remains to examine. A recent mortality (SGM4249) was due to a fence strike near Little Camas Reservoir. Nine of the 10 birds captured in 2012 are currently known alive; 1 hen slipped her radio-collar in June. We are currently monitoring 11 birds.

Table 2. Capture information and current status of radio-collared sage-grouse in the Mountain Home SGPA, 6 April 2011 through 7 May 2012.

Band Number	Age at Capture	Sex	Lek of Capture	Capture Date	Current Status
SGF4037	Adult	Female	Dixie	4/6/2011	Mortality 9/22/2011
SGM4244	Yearling	Male	Dixie	4/6/2011	Mortality 3/31/2012
SGM4245	Adult	Male	Little Sagehen Flat	4/7/2011	Alive
SGM4246	Yearling	Male	Little Sagehen Flat	4/7/2011	Mortality 5/19/2011
SGM4247	Adult	Male	Little Sagehen Flat	4/8/2011	Mortality 3/31/2012
SGM4248	Adult	Male	Little Sagehen Flat	4/8/2011	Slipped collar 5/2/2011
SGM4249	Adult	Male	Dixie	4/9/2011	Mortality 5/3/2012
SGF4036	Yearling	Female	West Dixie	4/9/2011	Alive
SGM4458	Adult	Male	Wildhorse	4/29/2011	Mortality 5/7/2012
SGM4459	Adult	Male	Wildhorse	4/29/2011	Mortality 2/24/2012
SGM4457	Yearling	Male	Wildhorse	5/1/2011	Mortality 8/25/2011
SGF4201	Adult	Female	Dixie	4/12/2012	Slipped collar 6/27/2012
SGM4521	Adult	Male	Wildhorse	4/13/2012	Alive
SGM4522	Adult	Male	Wildhorse	4/13/2012	Alive
SGM4523	Adult	Male	Wildhorse	4/13/2012	Alive
SGM4524	Adult	Male	Wildhorse	4/13/2012	Alive
SGM4525	Adult	Male	Wildhorse	4/13/2012	Alive
SGF4206	Yearling	Female	Wildhorse	4/16/2012	Alive
SGF4203	Adult	Female	Wildhorse	4/16/2012	Alive
SGM4526	Adult	Male	Dixie	4/17/2012	Alive
SGM4527	Yearling	Male	Dixie	4/28/2012	Alive

The following is a summary of locations and movements for each bird captured. Birds are identified by their band numbers; band numbers beginning with SGF are females, SGM are males. Maps for each bird or grouping of birds are in Appendix A.

2011 Captures

SGF4036: SGF4036 was captured as a yearling near the West Dixie satellite lek. She likely bred at the Dixie lek, since there were no displaying males observed at West Dixie in 2011. She nested 2.4 km (1.5 miles) from the Dixie lek. Nest site characteristics are summarized below. We estimated that the nest of 8 eggs hatched on 4 June, but she appeared to have lost her brood rather quickly. This was confirmed when we flushed her alone on 14 July. She spent the summer on private land about 2.8 km (1.7 miles) north northwest of Windy Gap. We were not able to locate her after 30 October. The Owyhee Air pilot located her on 28 January and 24 February 2012, just east of the Elmore/Gooding county line, approximately 8 km (5 miles) east of where King Hill Creek is joined by its West Fork. This wintering area is 38 km (24 miles) from her previous location near Little Camas Reservoir on 30 October. She was found back in the study area by 31 March and was recorded at the Dixie lek on 10 April and 17 April.

She appeared to be nesting on 7 May, just 360 m east of last year's nest, but she returned to her 2011 summer range by 23 May without chicks.

SGF4037: SGF4037 was an adult hen captured 2.3 km (1.4 miles) west of the Dixie lek. She nested 2.2 km (1.4 miles) southeast of the Dixie lek near Timmons Field. We estimated the nest of 9 eggs hatched on 7 June. She stayed in the Timmons Field area through June, and then moved her brood to the meadows along the West Fork Long Tom Creek. We flushed her on 4 August with 3 young. She was there through 22 September when she was found dead.

SGM4244: SGM4244 was a yearling male captured 2.6 km (1.6 miles) west of the Dixie Lek, but 4 weeks later was found at the Little Sagehen Flat lek (4.8 km between the 2 leks). He moved to Bennett Creek behind Teapot Dome by 1 June. We lost him for 3 months, but was found again 10 September behind Teapot Dome. He remained there all winter. The Owyhee Air pilot picked him up as a mortality on 31 March 2012. His transmitter remains in a golden eagle nest in the cliffs downstream of Long Tom Reservoir.

SGM4245: SGM4245 was an adult captured at Little Sagehen Flat. He also was in Bennett Creek by 1 June. He was there most of the summer, then moved to the upper reaches of Syrup Creek for September and October. He was back in Bennett Creek for November and December. In January and February he was in Canyon Creek, about 6.6 km (4.1 miles) north of Lockman Butte. He returned to Little Sagehen Flat in March and remained there during the lekking season. He returned to Bennett Creek in late May, but has not been located since 31 May.

SGM4246: SGM4246 was a yearling male captured at Little Sagehen Flat. He was found dead 1.2 km (0.75 miles) northwest of the lek on 19 May 2011.

SGM4247: SGM4247 was an adult male captured at Little Sagehen Flat. Shortly after capture, he was found at the Dixie lek. He spent the summer and fall on the knoll above the Dixie lek. Over the winter he moved back and forth among Dixie, Little Sagehen Flat, Bennett Creek and Blair Trail Reservoir. On 15 January he was near Little Sagehen Flat and was found northeast of Blair Trail Reservoir 28 km (17 miles) away on 28 January. He returned to the Dixie lek in March, but was found dead there on 31 March 2012.

SGM4249: SGM4249 was an adult male captured 2.4 km (1.5 miles) west of the Dixie lek. He spent the summer and fall between Little Camas Reservoir and Anderson Ranch Reservoir. In December and January he was northwest of Dixie Summit. He was found on 28 January and 3 February near Hot Springs Creek Reservoir, then in Bennett Creek on 24 February. He returned to Little Camas Reservoir by 31 March, but was found as a mortality on 3 May. The appearance and location of the remains suggested that he had collided with a barbed-wire fence.

SGM4457: SGM4457 was captured as a yearling at the Wildhorse lek. He spent the summer in the vicinity of the Wildhorse and Moore's Flat leks. Males SGM4457, 4458, and 4459 were often found together throughout the summer. SGM4457 was found dead at Moore's Flat on 25 August 2011.

SGM4458: SGM4458 was an adult male captured at the Wildhorse lek. SGM4458 and 4459 spent much of the winter in the same area east of King Hill Creek, between Thorn Creek and Dempsey. The straight line distance was 20 km (12.4 miles) between his last location near Wildhorse on 30 Oct and his location in Thorn Creek on 3 December. He went missing for several months but was found alive at the Dixie lek 1 May. He was found dead near the Wildhorse lek on 7 May 2012.

SGM4459: SGM4459 was an adult male captured at the Wildhorse lek. His movements were similar to SGM4458. SGM4459 was found dead between King Hill Creek and its West Fork on 24 February 2012.

2012 Captures

SGF4201: SGF4201 was an adult hen captured at the Dixie Lek. She nested just 525 m (0.3 miles) uphill from the Dixie Lek. Nest site characteristics are summarized below. At least 4 eggs hatched on approximately June 6. Unfortunately, she slipped off here radio-collar between 23 June and 27 June. Her localized movements in and around the nest location suggests she may have still had chicks with her.

SGF4203 and SGF4206: These 2 hens were captured at the Wildhorse lek; SGF4203 was an adult and SGF4206 was a yearling. SGF4206 likely did not nest. SGF4203 settled in one area for several days, but we could not locate a nest. She appeared to have a brood patch when flushed on 23 May, so we suspect her nest was depredated.

SGM4521, SGM4522, SGM4523, SGM4524, and SGM4525. These males were captured at the Wildhorse lek. As of 12 July, SGM4523 and SGM4524 were still around the Wildhorse lek, and SGM4521 was near the Moore's Flat lek. SGM4522 moved to the summer area north of Little Camas Reservoir by 31 May. SGM4525 was summering about 4 km (2.5 miles) north of Hill City.

SGM4526 and SGM4527: These males were captured at the Dixie lek. SGM4527 was located on 12 July between the town of Dixie and Highway 21. SGM4526 was last located on 26 June near the Dixie lek.

Seasonal Ranges

We modeled seasonal ranges based on telemetry locations (Figures 3-6). Because of our small sample of radio-collared birds to date and that we did not capture birds at all leks in the planning area, we consider the modeled seasonal ranges to be preliminary. Seasonal range maps will be updated as more locations are gathered and more birds radio-collared in 2013.

There were 204 telemetry locations collected during the breeding season. The average slope of the locations was 11.8% and average elevation was 1568 m (5144 feet). Most locations were on north-facing slopes (43%), followed by south (26%), west (17%), and east (14%).

We collected fewer locations in summer (n = 35), fall (n = 35), and winter (n = 30). In summer, the average slope was 15.1% and average elevation 1560 m (5118 feet). In fall, the average slope was 16.6% and average elevation 1522 m (4993 feet). In winter, the average slope was 12.5% and average elevation 1418 m (4652 feet). Because of the smaller samples, locations were not categorized by aspect.

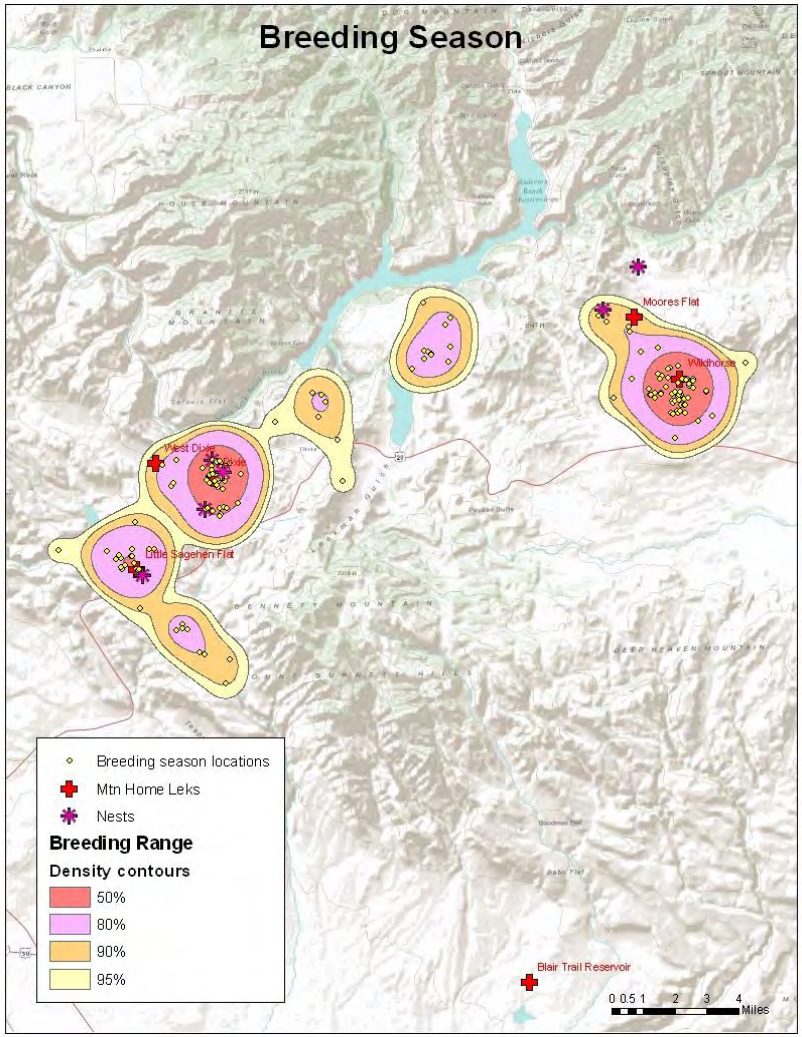

Figure 3. Draft modeled sage-grouse breeding season range, Mountain Home SGPA.

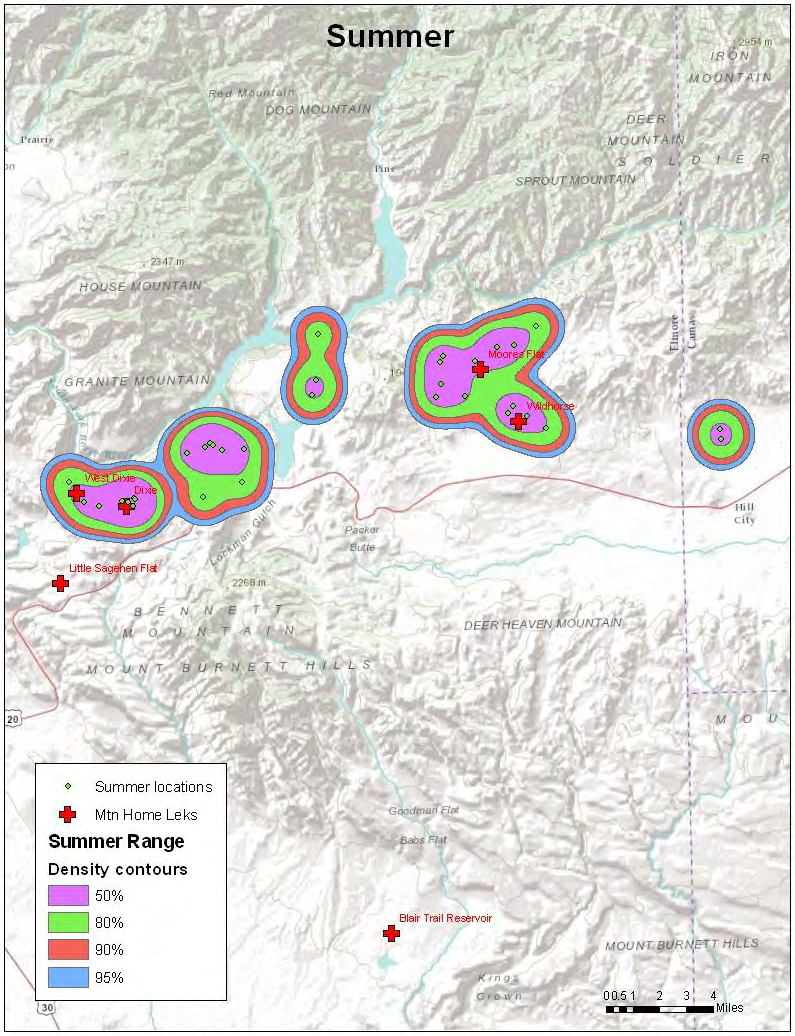

Figure 4. Draft modeled sage-grouse summer range, Mountain Home SGPA.

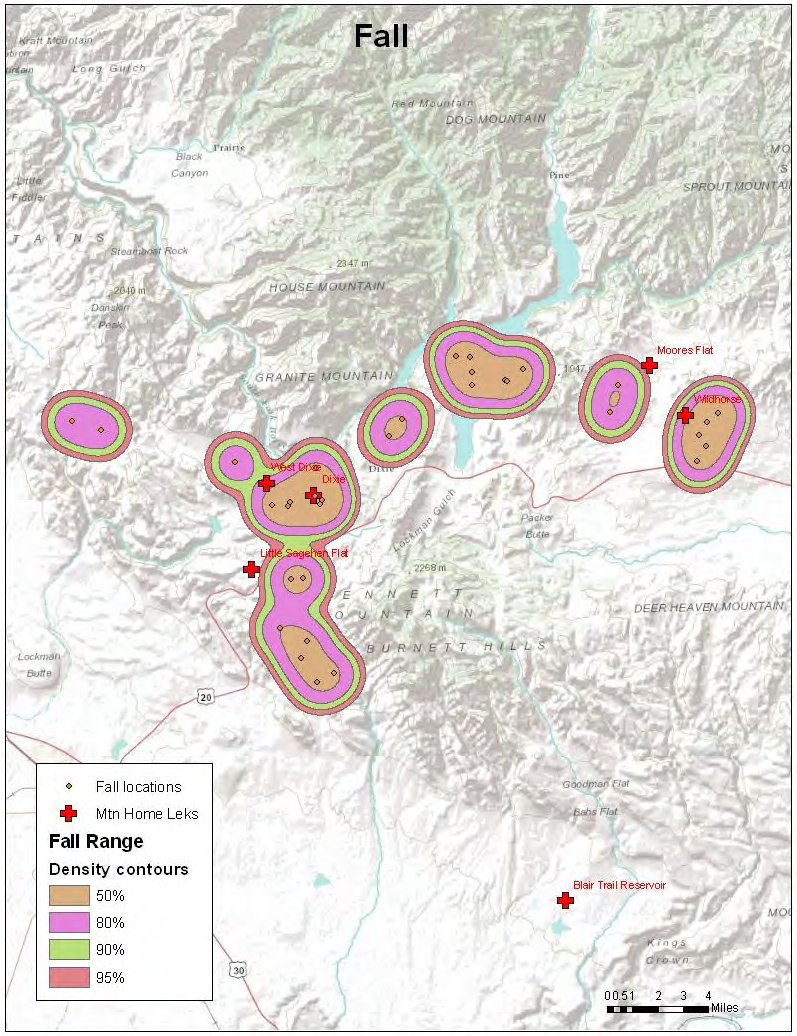

Figure 5. Draft modeled sage-grouse fall range, Mountain Home SGPA.

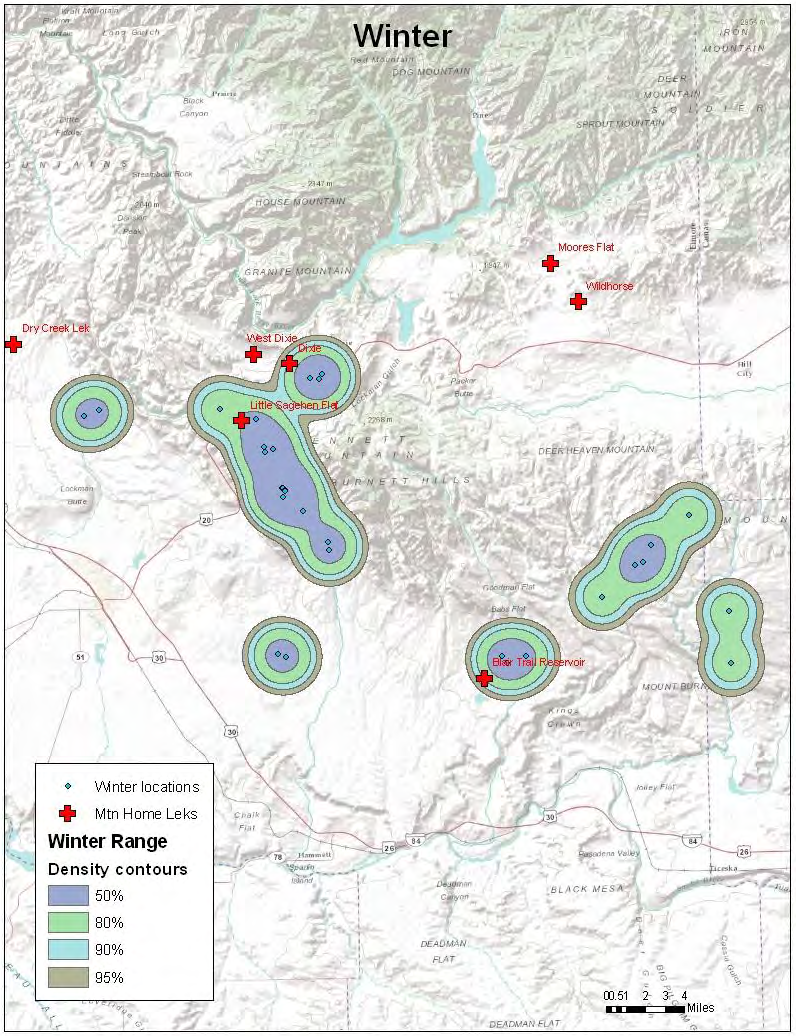

Figure 6. Draft modeled sage-grouse winter range, Mountain Home SGPA.

Nest-Site Assessments

We measured 5 nest sites in 2011 and 1 in 2012. Three nests were from radio-collared birds, while 3 of the 2011 nests were found by a local rancher. All 6 nests measured successfully hatched. We believe 2 other nests in 2012 were depredated based on hen behavior, but we were unable to locate the nests.

Figure 7. Sage-grouse nest in the Mountain Home SGPA, 2011.

Five of the 6 nests were under sagebrush (*Artemisia tridentata wyomingensis* and *A. T. vaseyana*); 2 of these also had bitterbrush (*Purshia tridentata*) over the nest. One nest was under buckbrush (*Ceanothus velutinus*). The average height of the nest shrub was 75 cm (29 inches). Average shrub canopy cover (all species) within 10 m of the nest was 34.9%, while sagebrush cover was 17.2%. The average height of all shrubs was 57.3 cm (22.5 inches) and average sagebrush height was 64.1 cm (25 inches). Other shrub species recorded included gray rabbitbrush (*Ericameria nauseosa*) and broom snakeweed (*Gutierrezia sarothrae*)

Average grass cover within 10 m of the nest was 27.7%, while forb cover was 10.3%. Fourteen species of grasses were recorded around nest sites, the most common of which were bluebunch wheatgrass (*Pseudoroegneria spicata*), Thurber's needlegrass (*Acnatherum thurberianum*), squirreltail (*Elymus elymoides*), bulbous bluegrass (*Poa bulbosa*), Sandberg bluegrass (*Poa secunda*), Kentucky bluegrass (*Poa pratensis*), and Idaho fescue (*Festuca idahoensis*). Average grass height was 21.6 cm (8.5 inches)

Table 3. Average cover and heights for vegetation variables within 10 m of 6 sage-grouse nests, Mountain Home SGPA 2011–2012.

Nest	% Grass Cover	% Forb Cover	% Shrub Cover	% Sage Cover	Avg. Grass Height (cm)	Avg. Shrub Height (cm)	Avg. Sage Height (cm)	Aspect	Elev. (m)	% Slope
Nest1	17.8	10.2	52.4	14.0	21.3	69.7	80.4	North, 345°	1501	6.9
SGF4037	25.3	8.9	49.1	1.3	26.1	41.3	32.0	South, 222°	1543	11.9
SGF4036	29.2	1.3	40.8	40.4	28.4	85.1	80.1	South, 178°	1469	13.8
Nest4	18.0	1.3	37.2	26.1	14.8	47.2	57.8	East, 63°	1639	8.3
Nest5	37.4	7.8	17.6	13.1	22.8	46.0	55.1	East, 116°	1661	3.7
SGF4201	38.8	32.1	12.2	8.4	16.3	54.8	79.2	West, 229°	1484	16.0
Average	**27.7**	**10.3**	**34.9**	**17.2**	**21.6**	**57.3**	**64.1**	**--**	**1550**	**10.1**

Future Work

We will continue to monitor radio-collared birds through the life of the radios. We also anticipate radio-collaring additional birds in spring 2013. Additional data from radio-collared birds will 1) allow us to calculate survival rates; 2) provide us with additional information on nest success and nest-site characteristics; and 3) provide additional information for refinement of seasonal ranges. In spring 2012 we initiated a study titled: *Measuring Habitat Quality in the Mountain Home Sage-grouse Planning Area*. Combining results from these 2 studies will help us understand sage-grouse habitat use and movements in the Mountain Home SGPA.

Acknowledgements

This study could not have been possible without dedication of the "Mountain Home Sage-hen Beepers" and the cooperation and commitment of local landowners.

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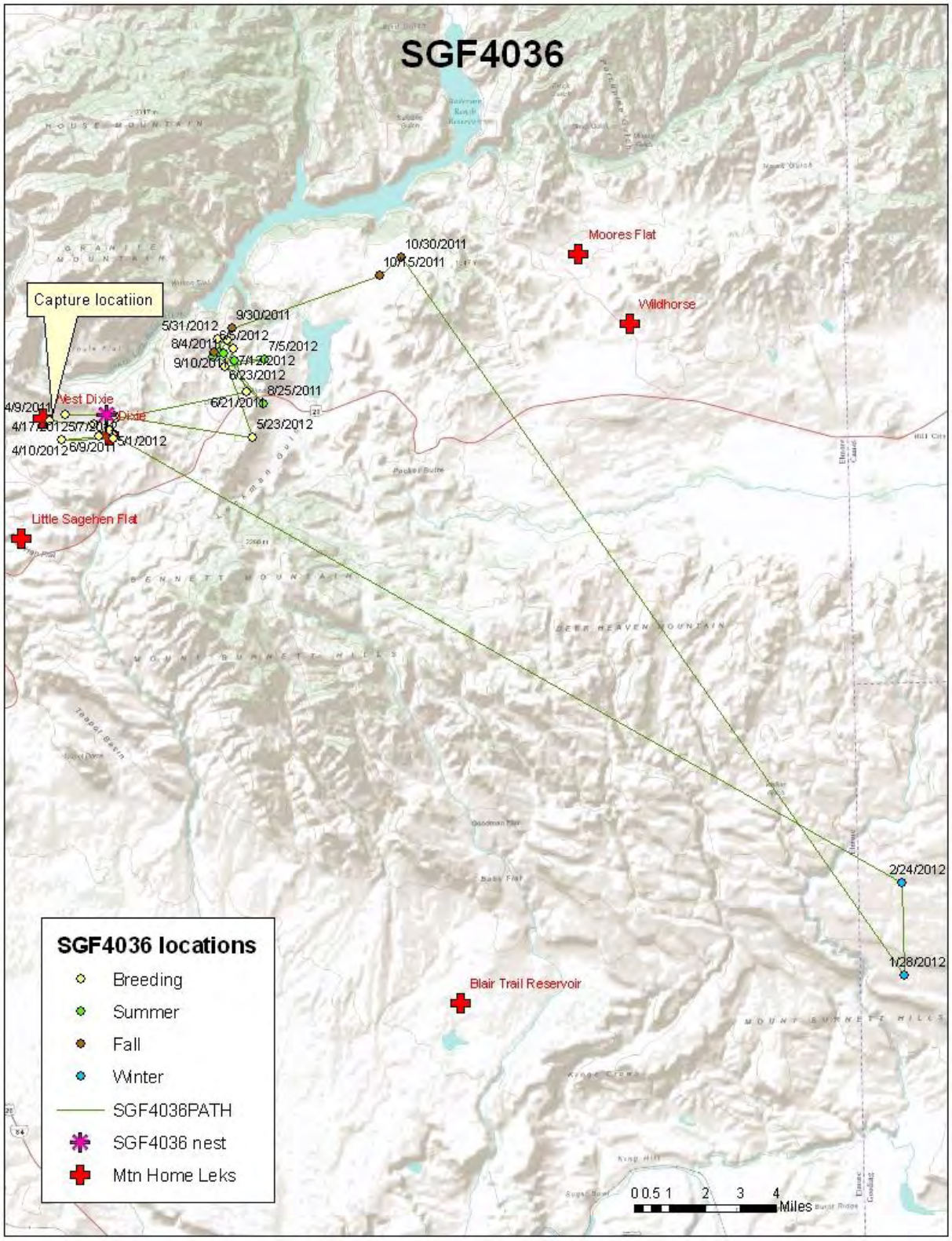
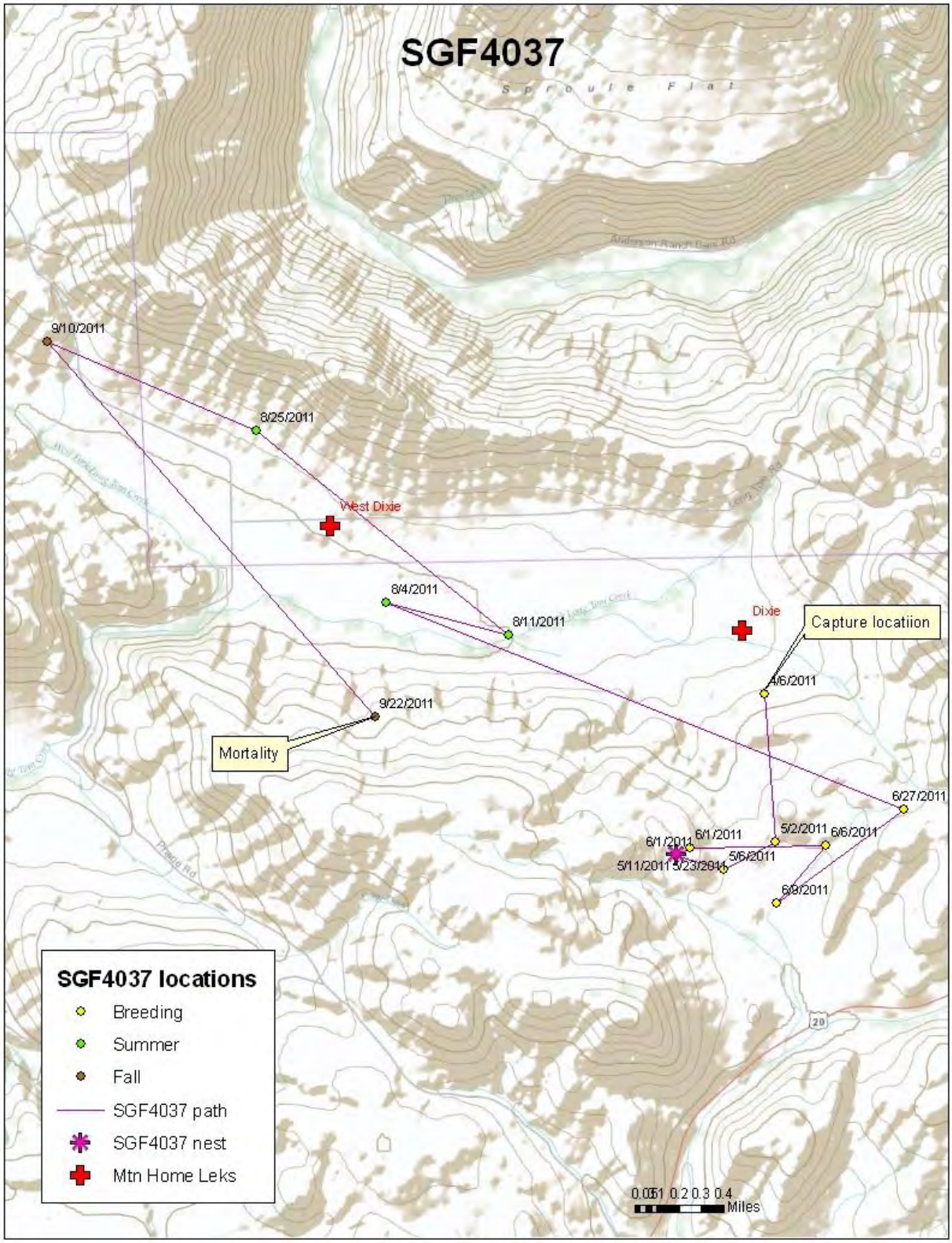
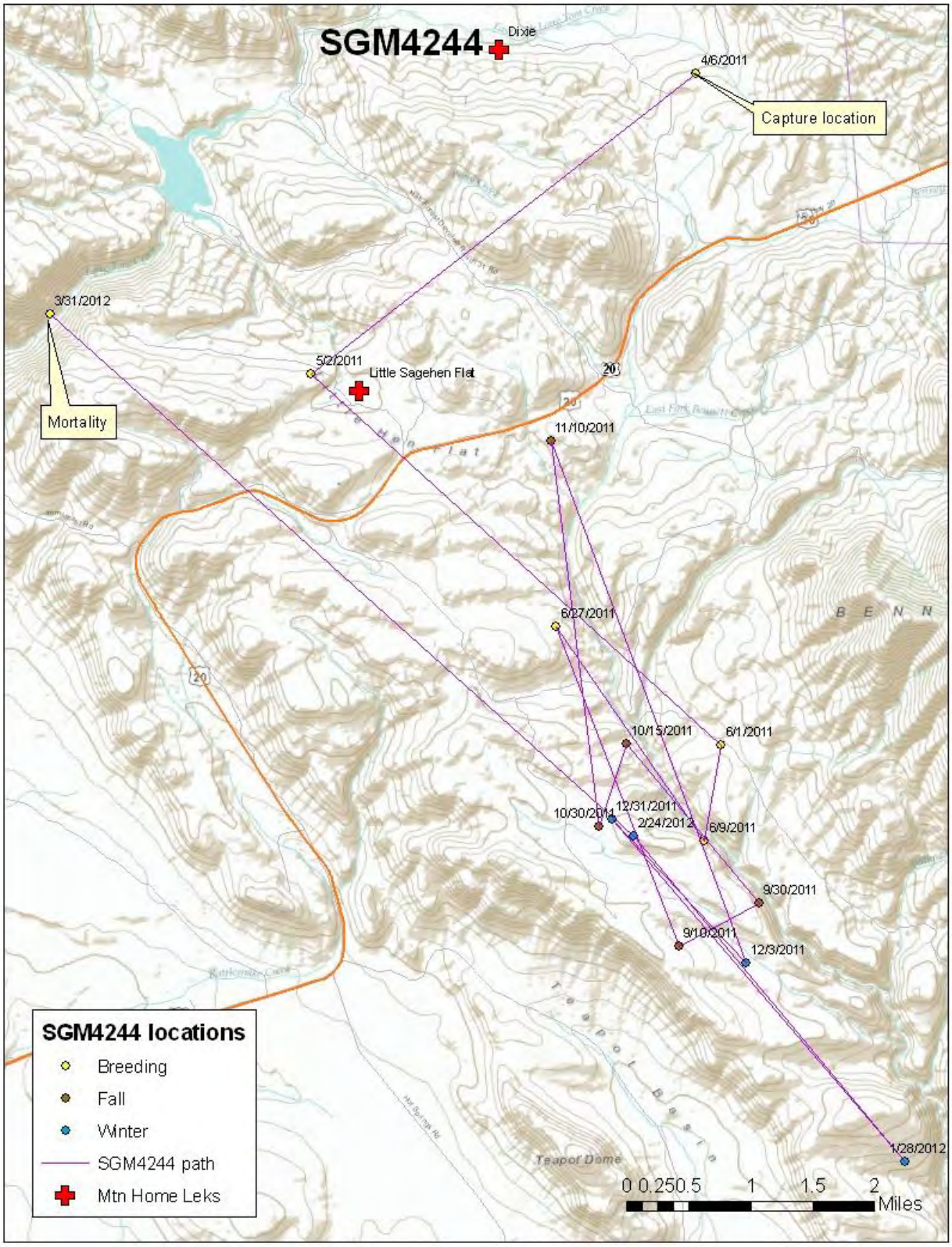
Appendix A. Radio-telemetry locations by individual bird or grouping of birds in the Mountain Home Sage-grouse Planning Area, April 2011–July 2012.



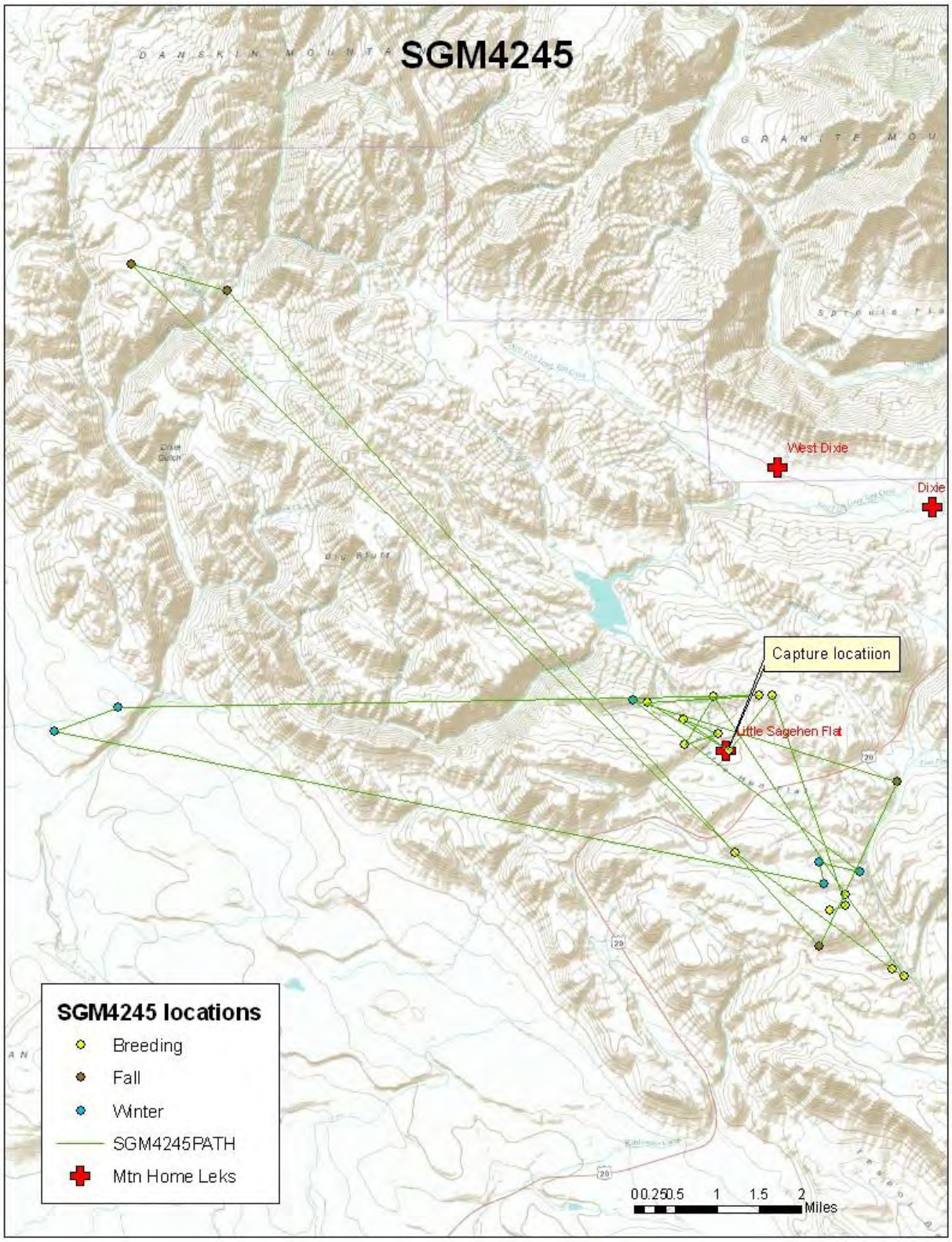
SGF4036 locations and straight-line paths between successive locations, Mountain Home SGPA, 9 April 2011–12 July 2012.



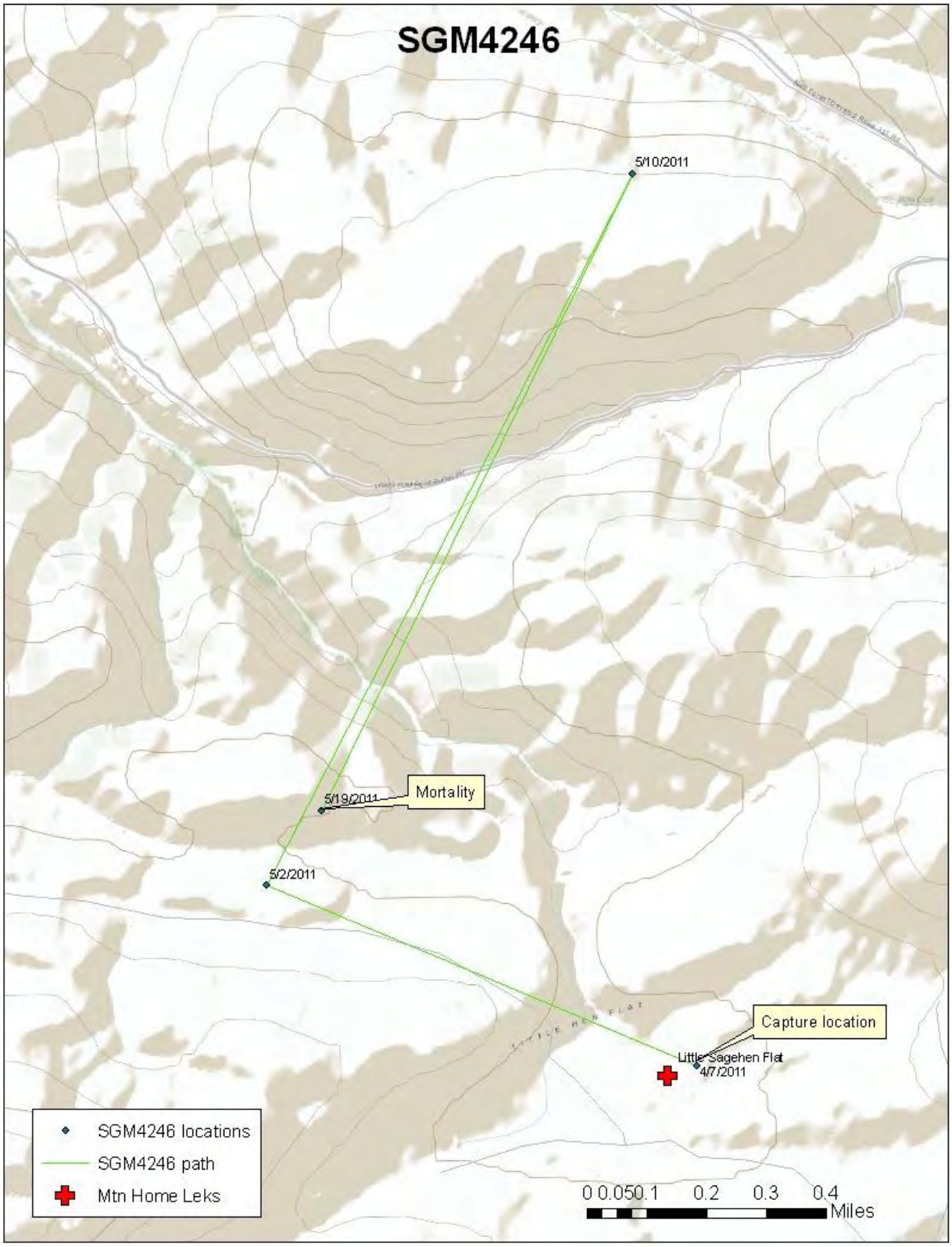
SGF4037 locations and straight-line paths between successive locations, Mountain Home SGPA, 6 April 2011–22 September 2011.



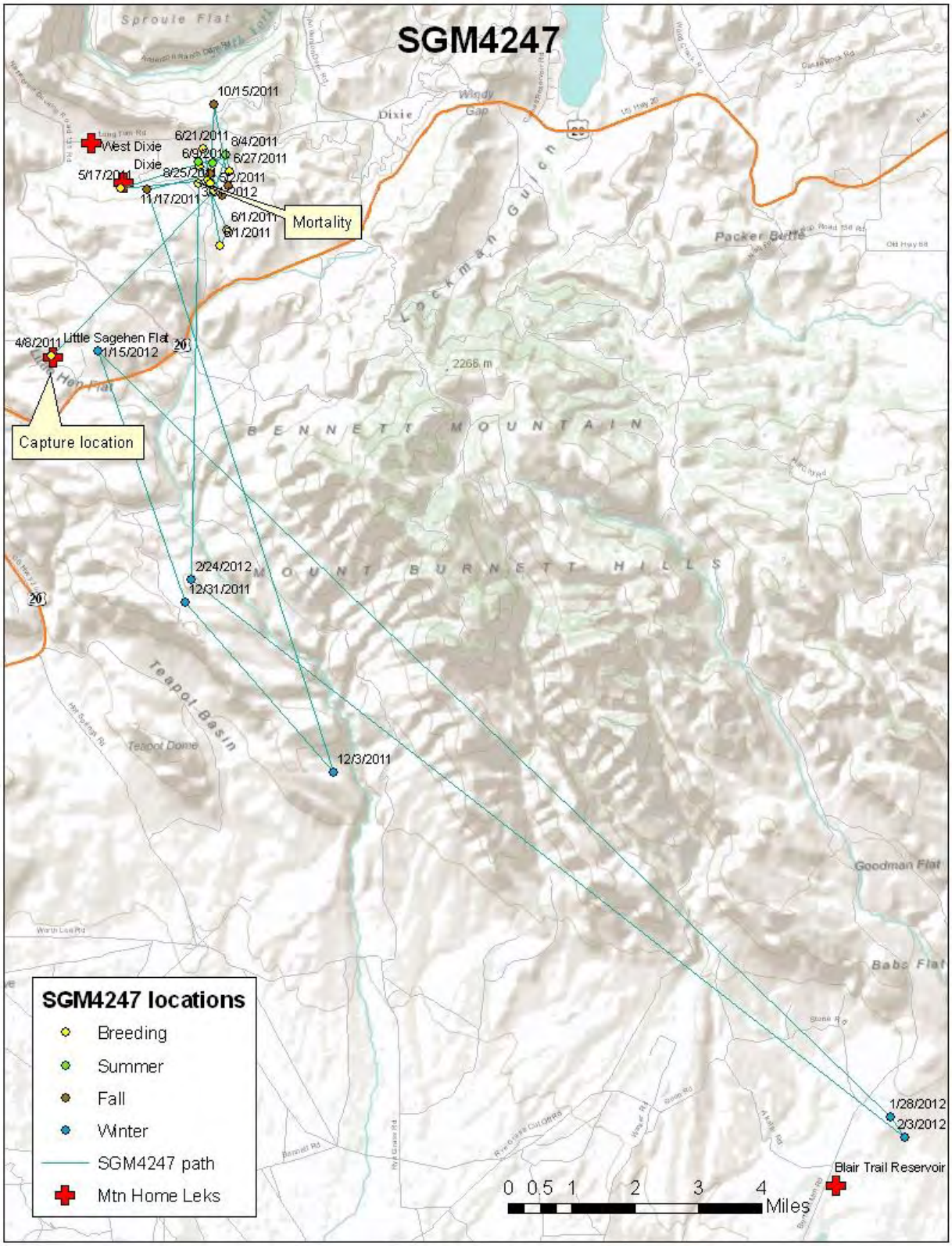
SGM4244 locations and straight-line paths between successive locations, 6 April 2011–31 March 2012.



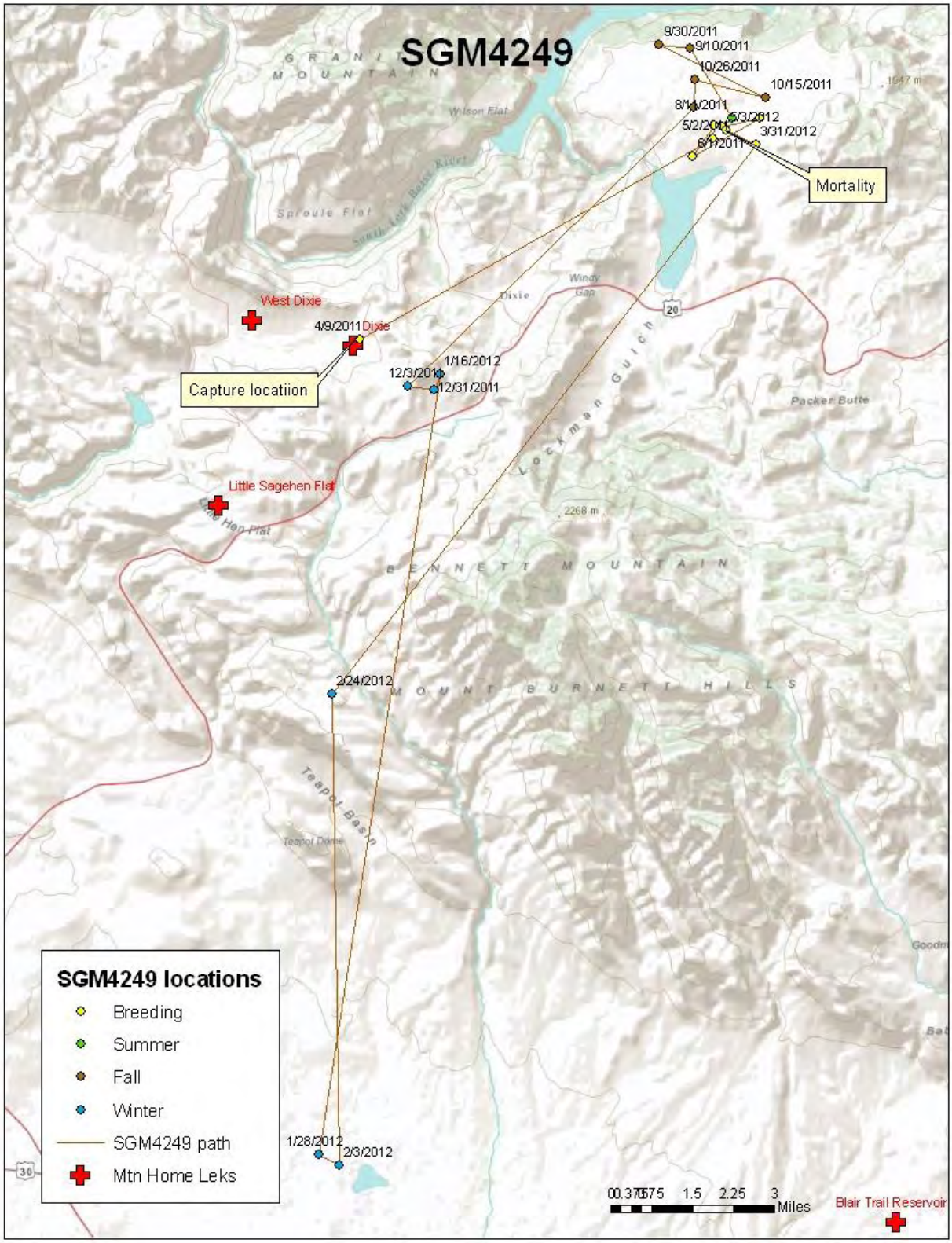
SGM4245 locations and straight-line paths between successive locations, 7 April 2011–31 May 2012.



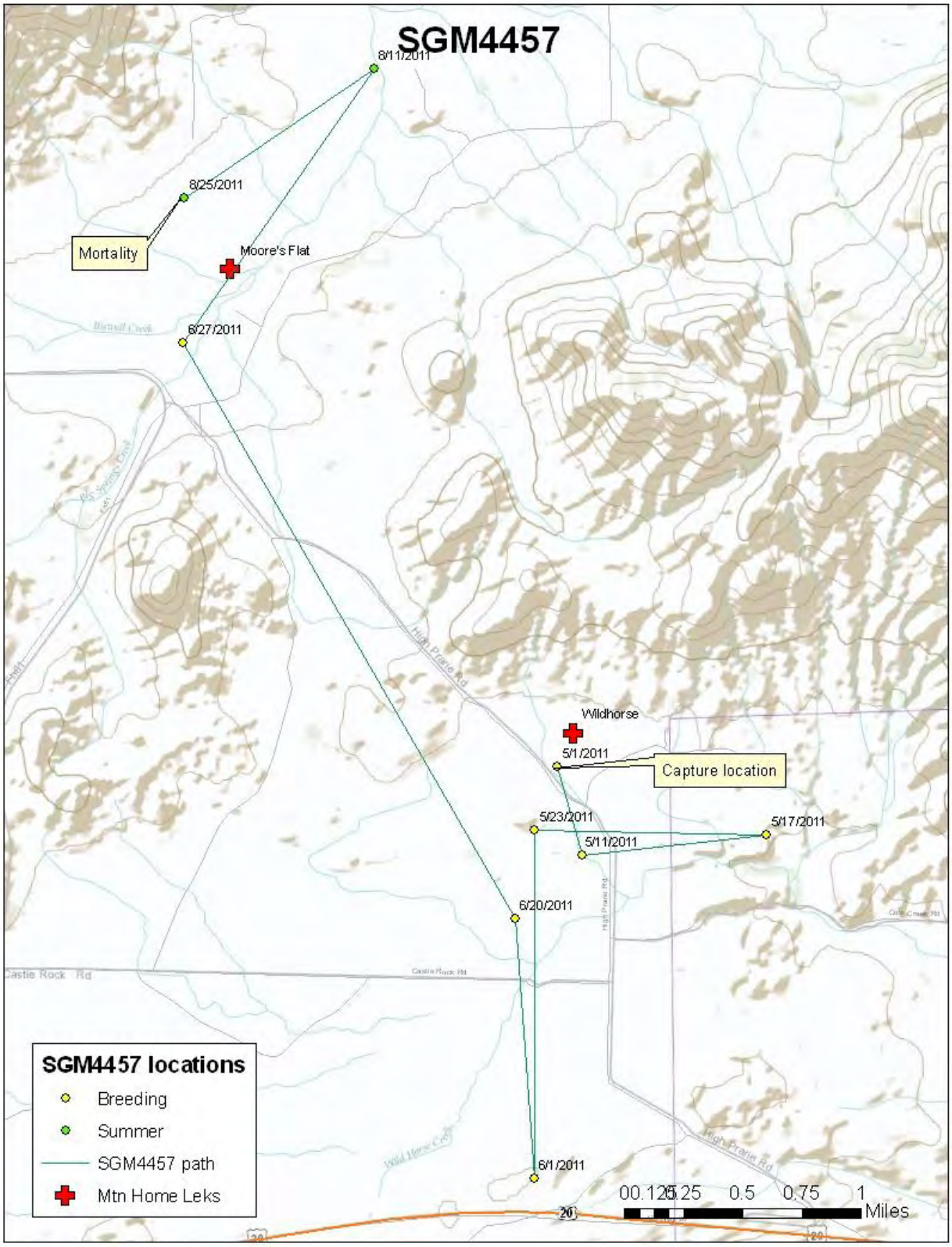
SGM4246 locations and straight-line paths between successive locations, 7 April 2011–19 April 2011.



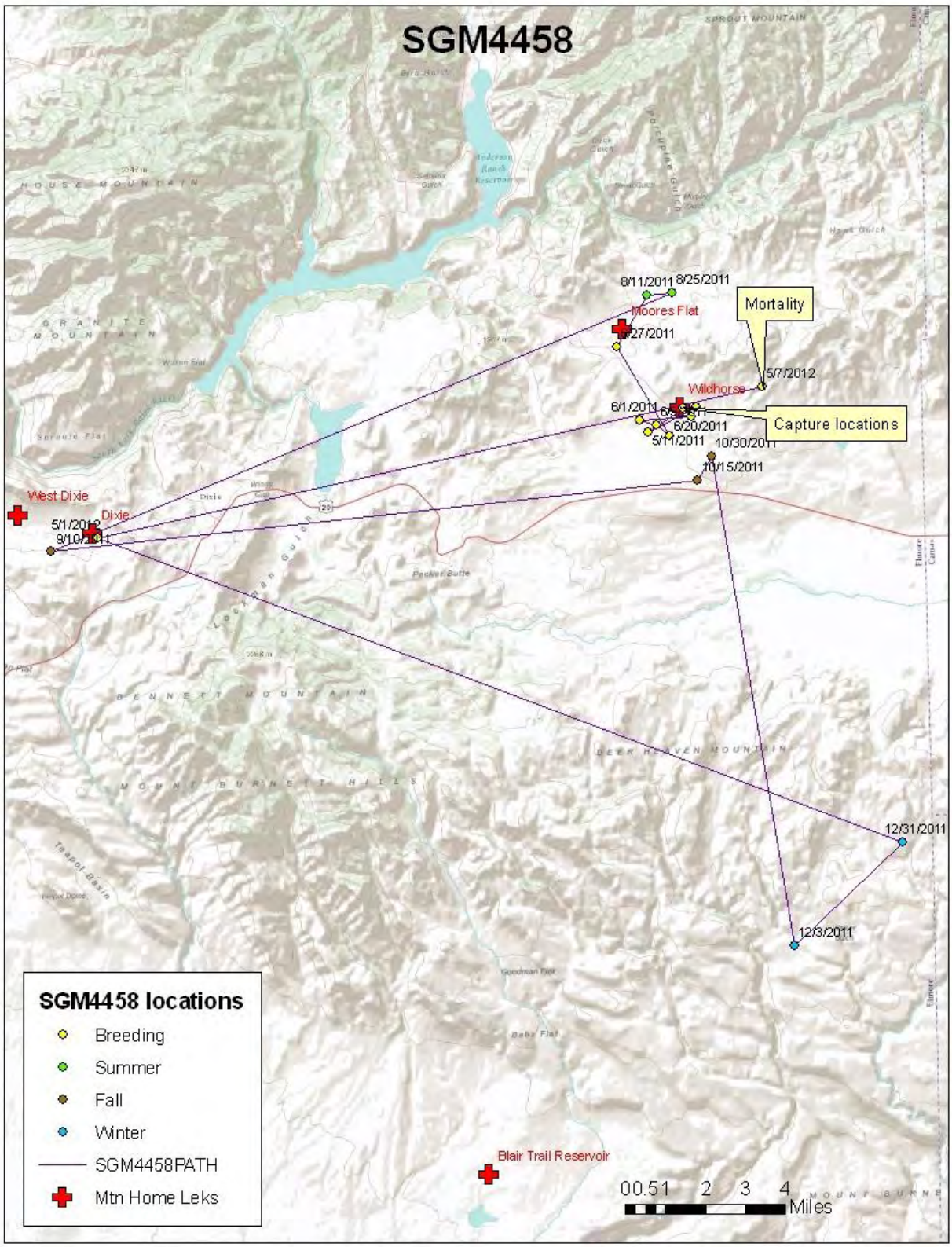
SGM4247 locations and straight-line paths between successive locations, 8 April 2011–21 March 2012.



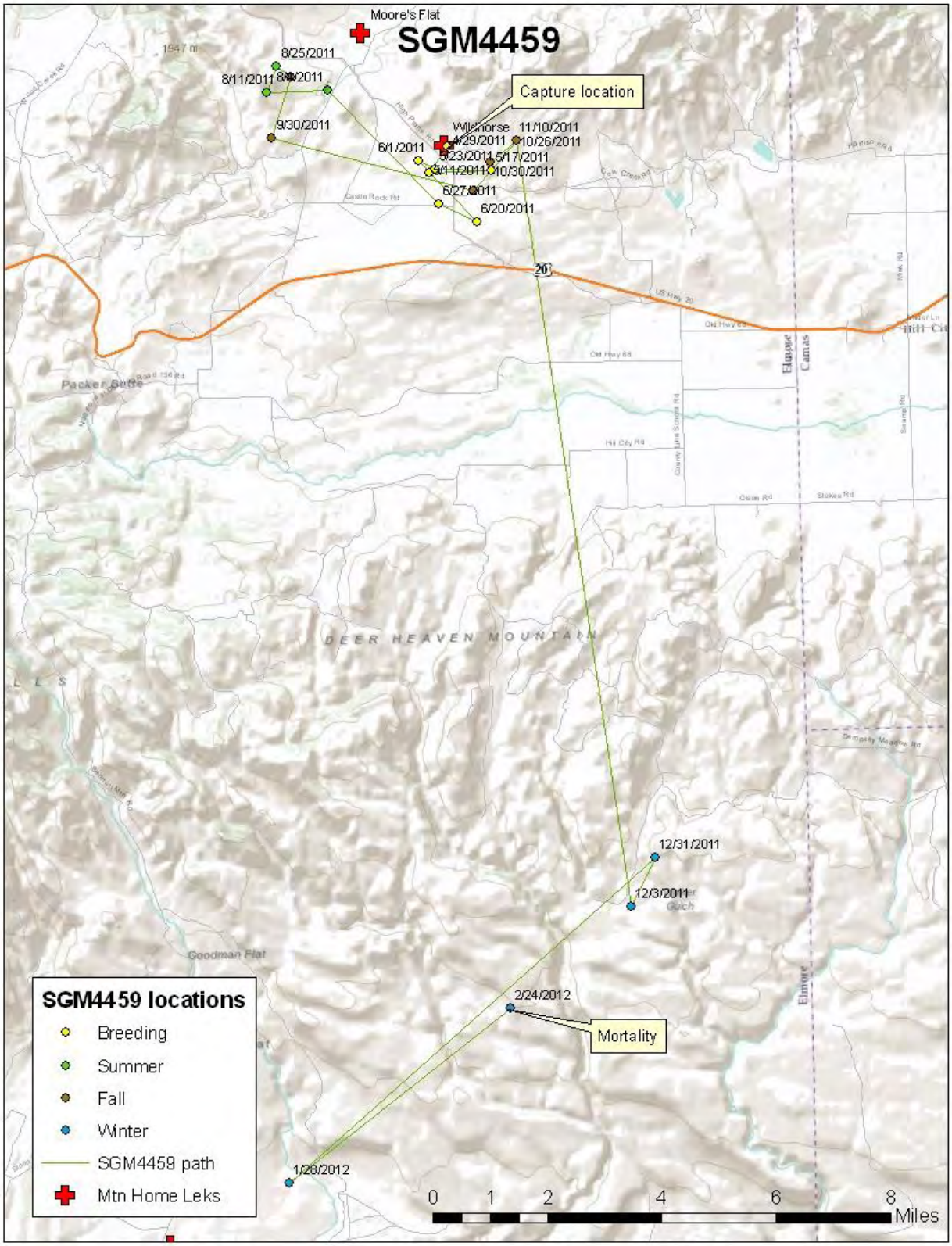
SGM4249 locations and straight-line paths between successive locations, 9 April 2011–7 May 2012.



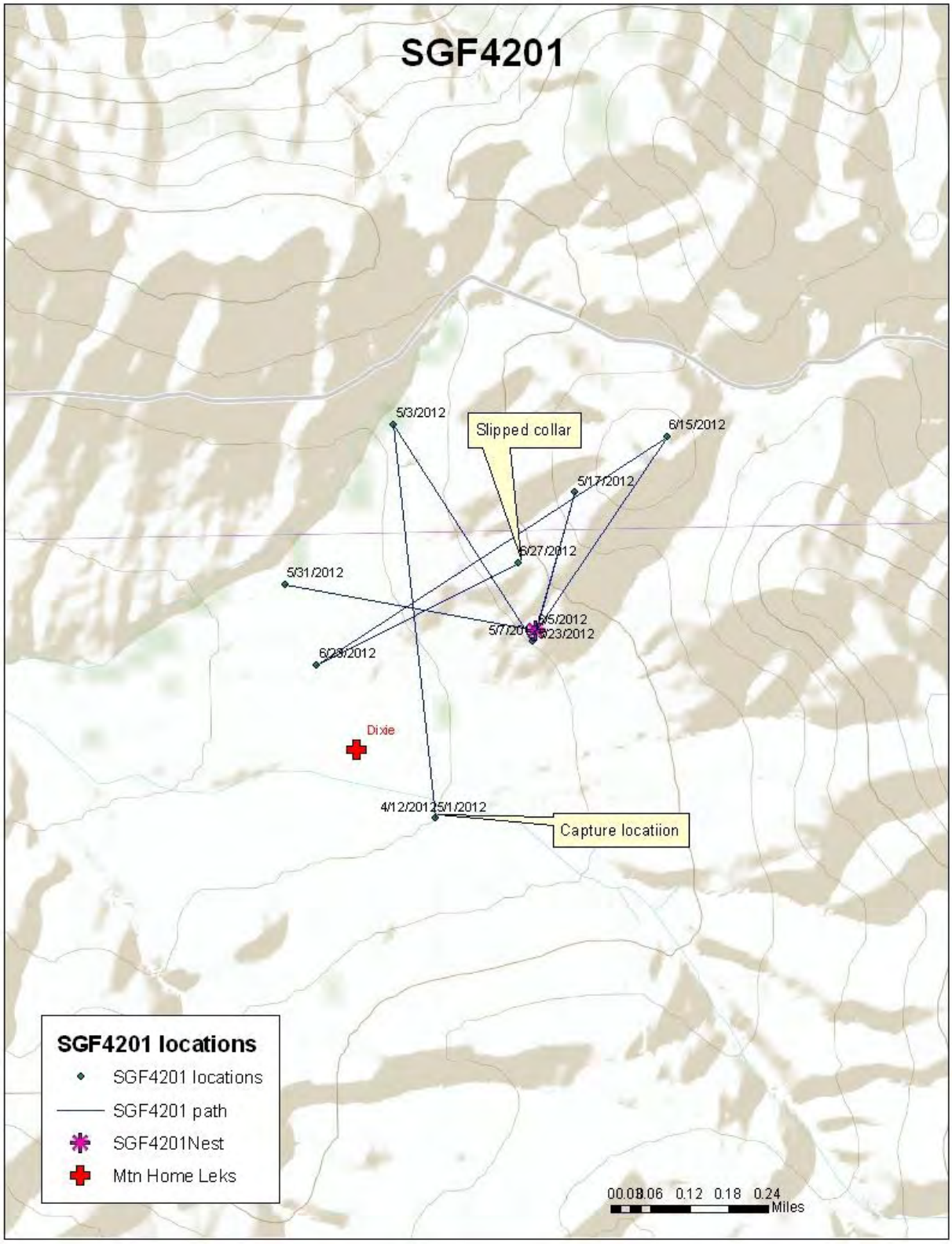
SGM4457 locations and straight-line paths between successive locations, 1 May 2011–25 August 2011.



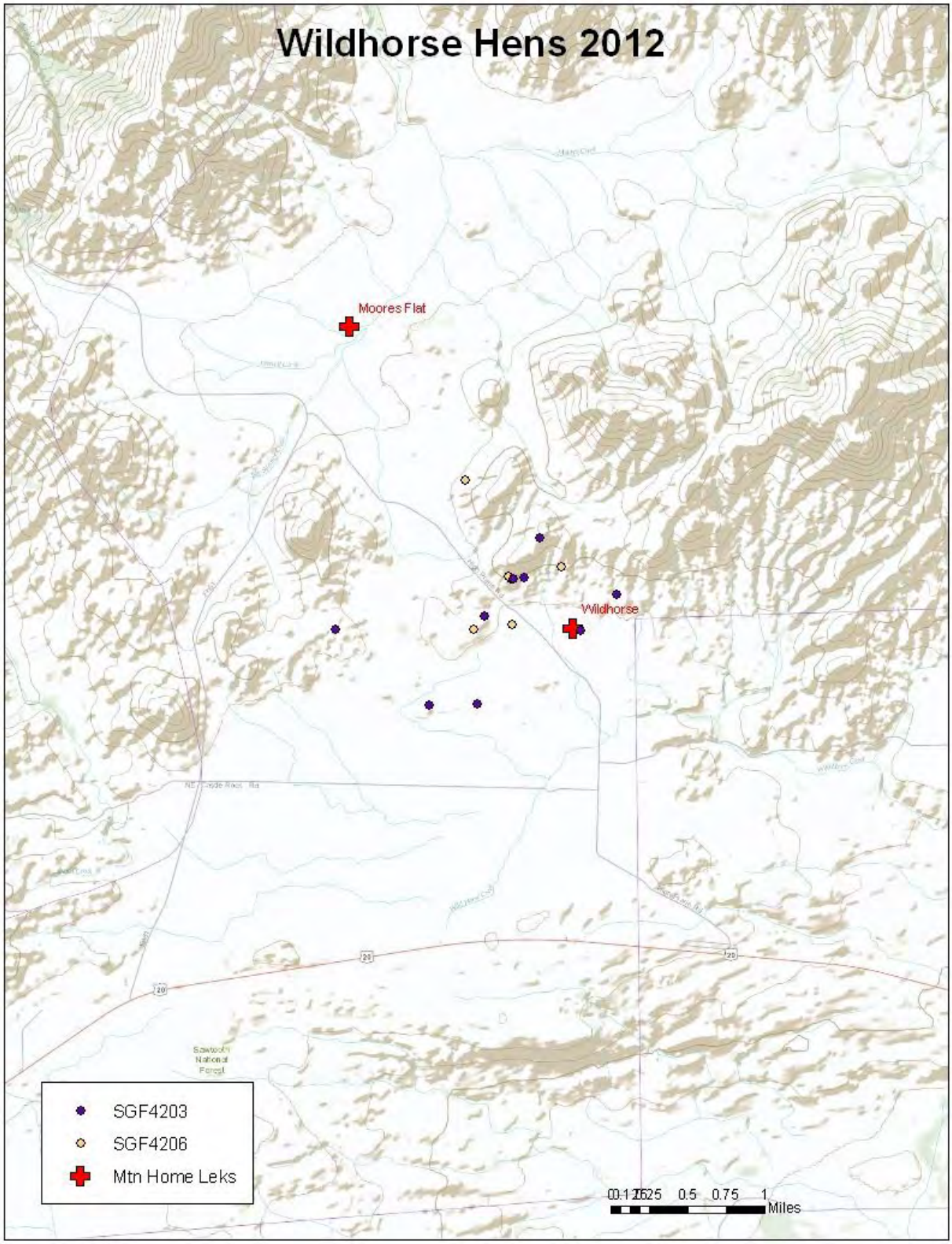
SGM4458 locations and straight-line paths between successive locations, 29 April 2011–7 May 2012.



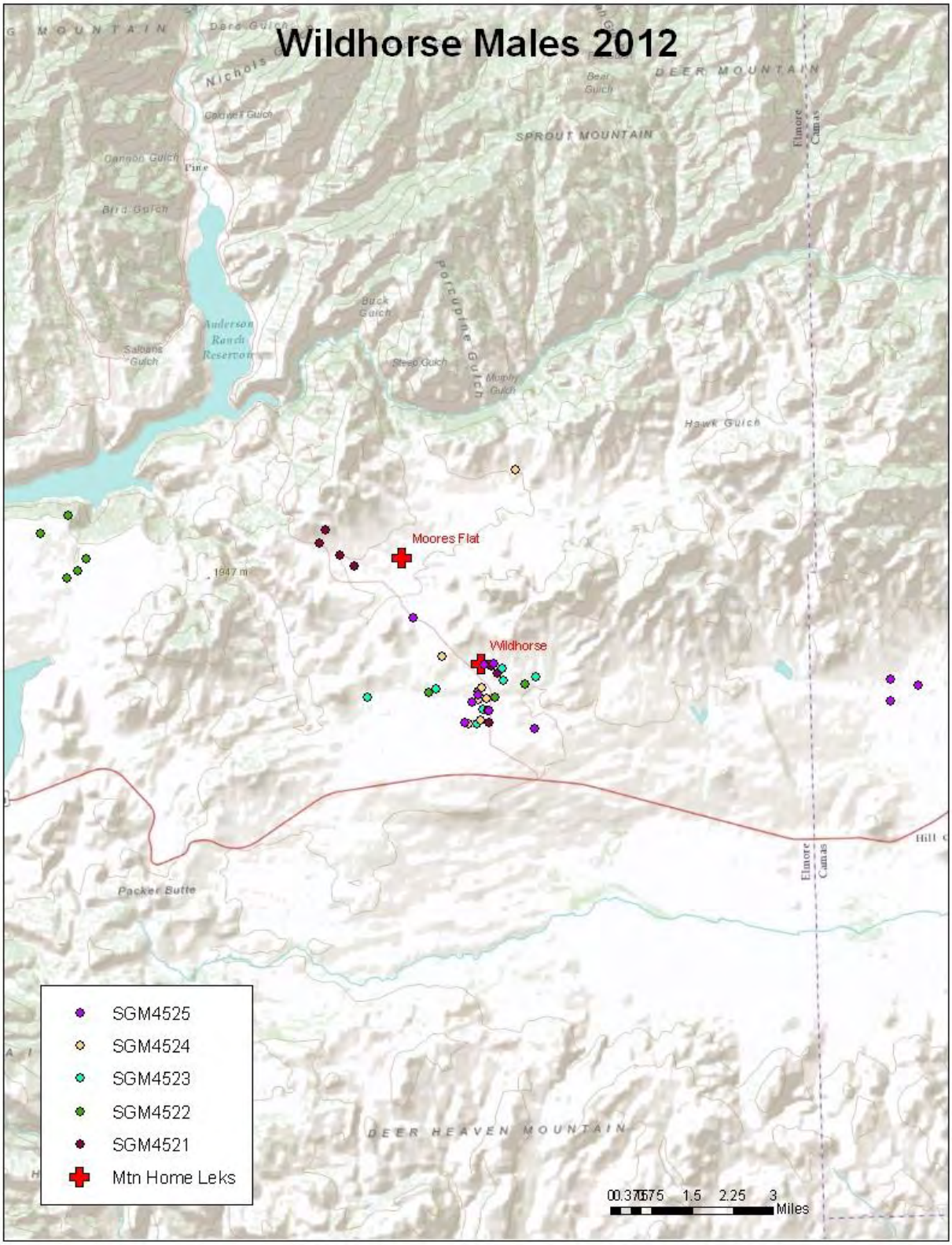
SGM4459 locations and straight-line paths between successive locations, 29 April 2011–24 February 2012.



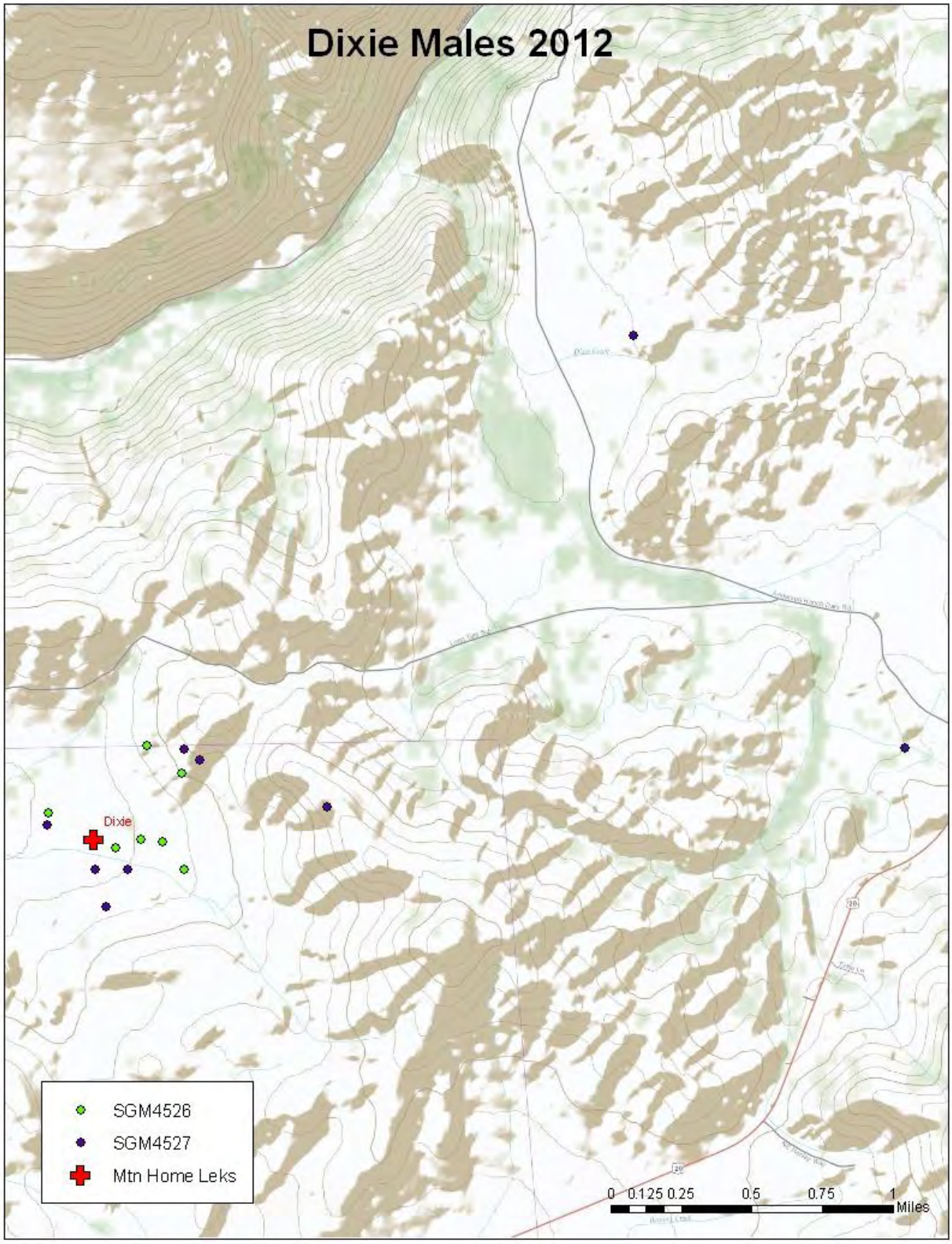
SGF4201 locations and straight-line paths between successive locations, 13 April 2012–27 June 2012.



Locations of 2 hen sage-grouse captured at the Wildhorse lek, 16 April 2012–12 July 2012.



Locations of 5 male sage-grouse captured at the Wildhorse lek, 13 April 2012–12 July 2012.



Locations of 2 males captured at the Dixie Lek, 17 April 2012–12 July 2012.

2011-04: Seasonal Habitat, Migration Corridor Delineation and Nesting Habitat Assessments

DRAFT REPORT ON

Sage-grouse Seasonal Habitat Use and Nesting Habitat Assessments in the Challis Sage-grouse Local Working Group Area, Idaho

2010-2012

Chris Gaughan
Regional Wildlife Biologist

December 2012

Idaho Department of Fish and Game
Salmon Region
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Virgil Moore, Director
Steve Schmidt, Regional Supervisor
Tom Keegan, Regional Wildlife Manager

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ABSTRACT

Greater sage-grouse (*Centrocercus urophasianus*) populations have declined across their range in western North America. In 2010, sage-grouse were determined to warrant protection, but were precluded from listing under the Endangered Species Act. From 2005-09, a radio-telemetry study in the Pahsimeroi Valley in Idaho was conducted to provide knowledge on sage-grouse movements, nesting and brood rearing habitat, nest success, and hen survival (Wolf 2010). This 2010-2012 study expands the geographic scope of the 2005-2009 study to include sage-grouse in the Round Valley, Copper Basin, Hat Creek, and Antelope Flats areas near Challis and Mackay, Idaho. During 2010-2012 sage-grouse were trapped and radio-collared to further the knowledge of sage-grouse movements and use of habitat within the Challis Sage-grouse Local Working Group boundary. Trapping was done through spotlighting and netting by personnel trained in approved capture techniques. Sage-grouse were monitored throughout the year to collect data points on nesting sites and seasonal ranges. Fifty-five sage-grouse (30 male, 25 female) were radio-collared and tracked to determine habitat use, nest site characteristics, survival, mortality sources, group size, and estimates of home-range with 1867 telemetry locations. Habitat maps were produced by biologists using collared bird locations and vegetation maps. Survival of radio-collared birds was lowest in spring and causes of mortality were heavily weighted toward coyotes and eagles. Common predators of nest sites were coyotes and ravens. Average group size for collared sage-grouse flushed was 9 with a high of 85. There was little difference between habitat conditions in successful versus unsuccessful nest sites.

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INTRODUCTION

Populations of greater sage-grouse (*Centrocercus urophasianus*, hereafter sage-grouse) and other species dependent on sagebrush (*Artemisia* spp.) communities have declined over large areas of the western United States (Connelly and Braun 1997). Sage-grouse were determined warranted, but precluded for protection under the Endangered Species Act by the U.S. Fish and Wildlife Service in April 2010. Understanding the survival rates, habitat use, and quality of nesting and brood-rearing habitats can help biologists make recommendations for sage-grouse management and habitat projects. Improved knowledge of areas used by sage-grouse throughout the year is necessary to implement appropriate planning and management systems. Beginning in 2010 and ongoing, the Idaho Department of Fish and Game (IDFG) with assistance from the Idaho

Governor's Office of Species Conservation, BLM, and USFS have investigated habitat use patterns of sage-grouse in the Challis area.

Our objectives were to:

1. Increase knowledge of seasonal survival rates and causes of mortality
2. Increase knowledge of seasonal habitat use including nesting and brood rearing habitat by sage-grouse in the Challis BLM Field Office area

STUDY AREA

We studied sage-grouse in the mountain-valley habitats of the Challis BLM Field Office and IDFG Game Management Units (GMU) 28, 36A, 36B, 37, and 50. The study area ranges in elevation from 5,000 to 9,500 feet and is vegetated with several varieties of big sagebrush: mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), Wyoming big sagebrush (*A. t.* ssp. *wyomingensis*), and threetip sagebrush (*A. tripartita*). Several shorter sagebrush species, low sagebrush (*A. arbuscula*) and black sagebrush (*A. nova*), are found throughout the valleys. Green rabbitbrush (*Chrysothamnus viscidiflorus)*, gray rabbitbrush (*Chrysothamnus nauseosus*), and shadscale saltbush (*Atriplex confertifolia*) are other shrub species which can be found in the study area. Grasses consist largely of bluegrass (*Poa* spp.), bluebunch wheatgrass (*Pseudoroegneria spicata*), fescue (*Festuca* spp.), needle and thread grass (*Stipa comata*), and Indian ricegrass (*Achnatherum hymenoides*). Cheatgrass (*Bromus tectorum*) was a small component of the study area, mainly found along roadways. Common forbs included milkvetch (*Astragalus* spp.), aster (*Aster* spp.), buckwheat (*Eriogonum* spp.), lupine (*Lupinus* spp.), and phlox (*Phlox* spp.).

Most of the sagebrush habitat is administered by the BLM Challis Field Office. Idaho state-owned lands are intermixed. The higher elevations are administered by the Salmon-Challis National Forest. The lowest elevations are in private ownership where agriculture is currently the predominant land use.

METHODS

Capture and Radio telemetry

Radio collars were used to locate sage-grouse and determine seasonal habitat use. We used spotlights and landing nets to capture sage-grouse (Giesen et al. 1982) on or near leks.

Additionally, 2 sage-grouse were opportunistically captured using CO_2 propelled net guns during sage-grouse telemetry routes. Sage-grouse were fitted with radio collars (ATS) in a necklace configuration with a 6-hour mortality sensor. All sage-grouse also received a numbered aluminum leg band (National Band and Tag, size 16). Radio collars had a battery life of 1-2 years. We attempted to locate radio-collared sage-grouse 1-2 times/week during nesting season and 1-3 times/month during the rest of the year using a 3-element Yagi antennae and Communication Specialists R-1000 handheld receiver. Most telemetry effort was ground-based, but occasionally sage-grouse were located from a fixed-wing aircraft. When a mortality signal was heard, we investigated the mortality site to determine cause of death when evidence on-site made it possible.

Nest and Brood Success and Vegetation Measurements

Nest and brood success was determined by visual inspection of nest sites from a distance during or immediately after nesting. Causes of nest failure were determined when possible. Nest locations were recorded and mapped and revisited to quantify vegetative characteristics after hens and broods dispersed. We quantified herbaceous plant and shrub characteristics at nests and brood sites (Connelly et al. 2003). Shrub cover by species (live and dead separately) was estimated using the line-intercept method (Canfield 1941) on 4 10-m transects originating at the nest and oriented along cardinal directions. For brood sites, 4 20-m transects originated at the brood location and were oriented along cardinal directions. We estimated ground cover (grass, forb, litter, rock) in 20x50-cm plots at 3 locations along transects (1, 3, 5 m from nests and 5, 10, 15 m from brood locations; Daubenmire 1959). We measured height of shrubs and grasses, by species, within 1 m of transects at 1, 3, and 5 m from nests and 5, 10, and 15 m from brood sites. For grasses, we recorded the following for the individual plant of each grass species closest to the transect height of tallest living and dead (residual from previous year) leaf blades and height of tallest flower (living or dead). Likewise, we measured height of the tallest dead branch, living leaf, and flower of the shrub of each species closest to the transect. At the nest bowl, we recorded plant species that provided cover and measured height of the tallest live portion of plants providing nest cover. Lastly, we recorded elevation at nest and brood sites.

Sage-grouse home-range and seasonal habitat use

Both male and female sage-grouse telemetry-based locations and incidental sightings were used to designate seasonal habitat in the Challis BLM Field Office. Spring, summer, and winter habitats were based on sage-grouse locations from 1 March – 30 June, 1 July – 15 November, and 16 November – 28 February respectively. Additionally, GIS-based vegetation and soils data was used to designate seasonal habitat instead of simply drawing buffers around known sage-grouse locations. Biologists from IDFG, BLM, and USFS collaborated to designate seasonal habitat. Seasonal habitat represents estimated sage-grouse use and additional sage-grouse habitat likely exists elsewhere. Seasonal habitat maps will be updated as further data is acquired.

Survival and causes of mortality

Survival of radio-collared sage-grouse in this study was calculated by dividing the number of birds alive at the end of a seasonal period by the number that started that season pooled over the 3-year period. Seasonal survival was categorized into Spring (March – May), Summer (June – August), Fall (September – November), and Winter (December – February). Causes of mortality were reported when evidence left in the field made it possible to determine likely cause of death.

RESULTS

Capture and Radio-telemetry

Sage-grouse were captured in the vicinity of Mackay, Challis, and Ellis, Idaho: Locations of sage-grouse captures and relocations are presented in Figure 1. Between April 2010 and November 2012, we equipped 25 sage-grouse hens and 30 sage-grouse males with radio-collars for a total of 13,622 radio-days (Table 1). The average number of days a bird was radio-collared was 248. The total number of relocations for all birds was 2,077 with an average of 37 locations per bird. Average group size for collared sage-grouse flushed was 9 with a high of 85.

Nest and Brood Success and Vegetation Measurements

Radio-collared sage-grouse hens were tracked during spring to evaluate for nesting and brood rearing success and the type of habitat used. Of 25 hens collared 3 did not nest during the spring monitoring period, 2 were missing during the spring monitoring period, and 3 were not collared during the spring nesting season. Of the remaining 17 radio-collared hens known to initiate nests

2 nested during both 2011 and 2012 (for a total of 19 nesting events). Of these 19 nesting events 9 were successful, 9 were unsuccessful, and 1 unknown. The earliest nest start was April 11 and the latest was May 31 with successful nesting events averaging 22 days. The earliest to hatch was May 21 and the latest June 14. The number of eggs per nest ranged from 2 to 9 with an average of 5. Predators of unsuccessful nests included 2 coyote (*Canis latrans*), 2 raven (*Corvus corax*), and one chipmunk (*Neotamias* sp.).

We completed vegetation plots at 34 nest and brood sites in 2011 and 2012 (Tables 2 and 3). There was little difference between habitat conditions in successful versus unsuccessful nest sites.

Sage-grouse home-range and seasonal habitat use

During 2010-2012 we recorded 2,077 locations for radio collared sage-grouse. Locations were entered into a GIS for analysis. Excluding birds with fewer than 5 relocations (N=6 male, 4 female), the average Minimum Convex Polygon (MCP) home range size for males was 46.5 square miles (N=15, range 12-100) and the average MCP home range for females was 17.3 (N=5, range 2.5-29). Relocations and MCP home ranges are presented in Figure 1. Direct line seasonal migrations for males averaged 13 miles (N=15, range 6-21). Direct line seasonal migrations for females were typically shorter with an average of 10 miles (N=5, range 3-18).

Survival

Fifty-five sage-grouse were monitored for survival via radio-telemetry. Of the 30 male birds monitored during 2010-2012, 17 died, 3 are missing, 2 outlived radio batteries, and 8 are currently alive (Table 1). Likely causes of mortality for male birds include 2 golden eagle (*Aquila chrysaetos*), 2 unknown avian predators, 8 coyote, 1 coyote or bobcat (*Lynx rufus*), and 4 unknown predations. Eleven of the 17 male mortalities occurred during March-May. Of the 25 females, 8 died, 2 outlived radio batteries, and 15 are currently alive. Likely causes of mortality among the females include 1 owl, 1 unknown avian predator, 4 coyote predations, 1 red fox (*Vulpe vulpes*) or coyote predation, and 1 female was harvested during the seven day sage-grouse hunting season. Of the 7 predations on females 4 occurred during the March-May time period.

DISCUSSION

Tracking radio-collared sage-grouse during 2010-2012 allowed us to further our understanding of the seasonal habitat use in the Challis Local Working Group Study Area. Seasonal habitat use

maps showed a fair amount of overlapping use for all seasons. As expected winter use tended to be lower in elevation in typical high structure sagebrush habitat types. Summer habitat use by radio-collared sage-grouse expanded the expected use areas to include higher elevations and remote sites on the Salmon-Challis National Forest (Figure 2).

Although sample sizes where low survival rates showed a similar trend to those seen in the Pahsimeroi Valley with the spring being the lowest especially among females (Table 4). During spring sage-grouse are prone to predation. Unlike other gallinaceous birds, winter survival of sage-grouse is typically higher due to the ability to find sage-brush above the snow.

Contrary to expectations, the average unsuccessful nest site had higher percent cover in all categories and a higher structure grass component than did successful nests (Table 2). However, in all categories the differences between successful and unsuccessful nest site selections were minimal. Results from the 2011 and 2012 nest site data suggests the characteristics set forth in Connelly et al. 2000 do not necessarily correlate with nest success in the Challis Sage-grouse Local Working Group Study Area. Of successful nests no nests met grass height, 6 of 10 met sage height, 7 of 10 met grass cover, and 6 of 10 met sage cover characteristics from Connelly et al. 2000. One successful nest met none of the four characteristics of sagebrush rangeland needs for breeding sage-grouse (Connelly et al. 2000). Of unsuccessful nest attempts 1 of 10 met grass height, 5 of 10 met sage height, 7 of 10 met grass cover, and 3 of 10 met sage cover characteristics from Connelly et al. 2000. All unsuccessful nesting attempt sites met at least one of the four characteristics from Connelly et al. 2000. Of brood sites 9 of 15 met characteristics for grass cover, 12 of 15 for shrub cover, and 3 of 15 for sage height characteristics from Connelly et al. 2000. No brood sites met the characteristics for grass height needs. However, all but one brood site met at least one characteristic for brood-rearing Brood rearing success was not recorded because of concerns about hens abandoning broods when approached. Therefore, no conclusions could be made concerning successful versus unsuccessful broods and vegetation types.

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Figure 1. Sage-grouse locations, 2011

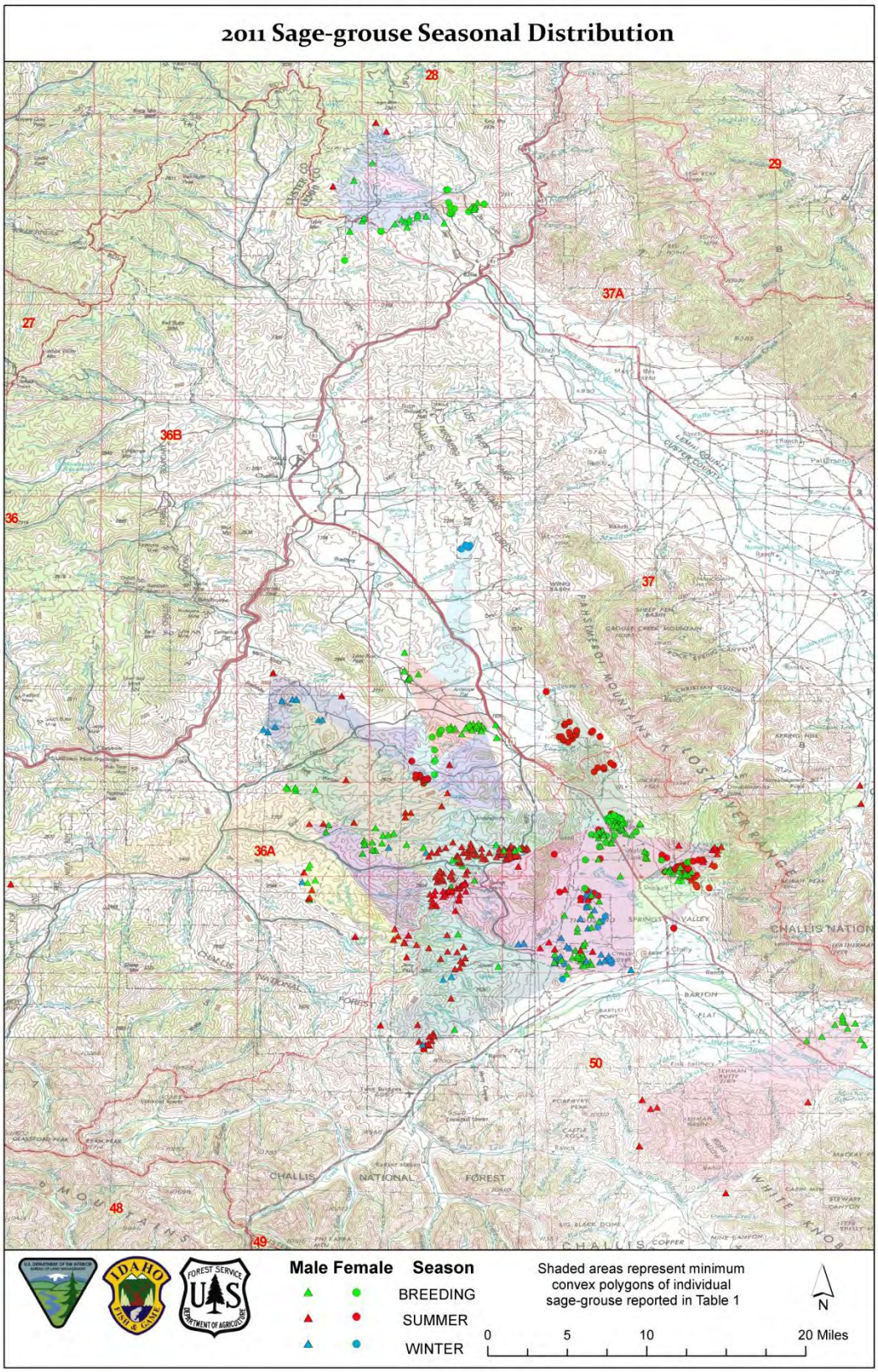


Figure 2. Seasonal Habitat Designations

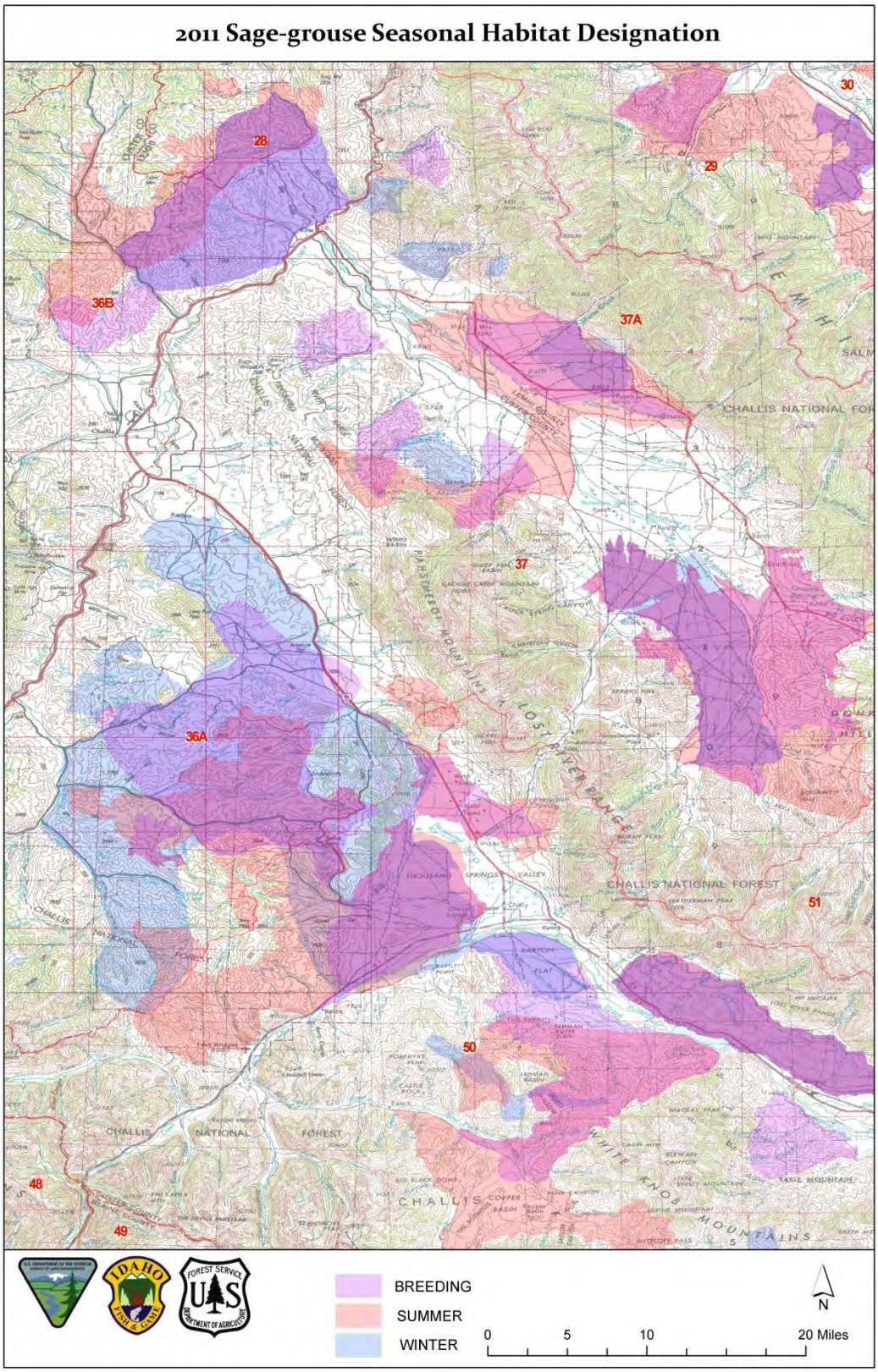


Table 1. Sage-grouse collared, 2010-2012

ID	Area	Capture date	Last date	Days	Number locations	Sex	Fate	Mortality type	Nest start date	Nest end date	Nest fate	Number of eggs	Nest predator
SGF 1800	Moyer Basin	7/21/2010	5/19/2011	298	16	F	Dead	Coyote	5/2/2011	5/13/2011	Fail	9	Raven
SGF 3406	Antelope	4/18/2011	5/1/2012	373	41	F	Dead	Coyote	5/31/2011	6/14/2011	Hatch	4 chicks	
SGF 3419	Arentson	5/2/2011	11/1/2011	179	41	F	Dead	Avian	5/23/2011	6/16/2011	Fail		Chipmonk
SGF 4062	Mackey Dump	3/28/2012	4/2/2012	4	2	F	Dead	Owl					
SGF 4063	Arentson Gulch	3/27/2012	06/14/12	77	26	F	Dead	Coyote	04/11/12	05/21/12	Hatch	4(2nd nest)	
SGF 4073	Mackey Dump	3/28/2012	4/5/2012	7	3	F	Dead	Coyote or Fox					
SGF 4075	Mackey Dump	3/28/2012	09/11/12	163	21	F	Dead	Harvested					
SGF 1775	Moyer Basin	7/21/2010	5/13/2011	292	1	F	Battery fail						
SGF 3410	Little Hat	4/7/2010	4/4/2011	357	2	F	Battery fail						
SGF 3405	Arentson	4/26/2011	11/29/12	573	150	F	Alive		05/11/11	05/31/11	Fail	5	
									04/25/12	05/03/12	Fail	6	Raven
SGF 3414	Arentson	5/3/2011	09/18/12	495	136	F	Dead	Coyote	05/17/11	06/13/11	Hatch	2	
									04/24/12	04/26/12	Fail	7	Coyote
SGF 3417	Fence on Butte	3/26/2012	11/30/12	244	68	F	Alive		05/02/12	06/01/12	Hatch	3	
SGF 3418	Antelope	3/28/2012	11/30/12	222	74	F	Alive		05/02/12	05/29/12	Hatch	3	
SGF 3420	Fence on Butte	3/27/2012	11/30/12	243	51	F	Alive						
SGF 3423	Fence on Butte	3/27/2012	11/28/12	241	47	F	Alive		04/24/12	05/09/12	Fail	6	Coyote
SGF 3425	Burma Road	4/24/2012	10/27/12	183	31	F	Alive		05/08/12	05/23/12	Hatch	7	
SGF 4064	Mackey Dump	3/28/2012	11/30/12	242	50	F	Alive						
SGF 4068	Arentson Gulch	3/27/2012	11/29/12	232	60	F	Alive		04/25/12	05/22/12	Fail		
SGF 4069	Pete Creek	3/28/2012	11/30/12	242	42	F	Alive		05/16/12	05/23/12	Fail		

ID	Area	Capture date	Last date	Days	Number locations	Sex	Fate	Mortality type	Nest start date	Nest end date	Nest fate	Number of eggs	Nest predator
SGF 4070	Pete Creek	3/27/2012	11/30/12	243	47	F	Alive		04/17/12	05/23/12	Fail		
SGF 4071	Fence on Butte	3/27/2012	11/20/12	233	58	F	Alive		04/30/12	05/22/12	Hatch	7	
SGF 4072	Pete Creek	3/28/2012	11/30/12	242	47	F	Alive		05/01/12	05/23/12	Hatch	5	
SGF 4074	Arentson	3/27/2012	11/30/12	243	67	F	Alive		04/26/12	05/21/12	Hatch	4	
SGF 4078	Pete Creek	3/27/2012	11/30/12	243	50	F	Alive		04/30/12	05/07/12	Unk	4	
SGF 3426	Fence on Butte	10/3/2012	11/30/12	57	25	F	Alive						
SGM 3384	Dry Gulch	4/7/2010	5/16/2011	399	3	M	Dead	Unknown					
SGM 3387	Fence on Butte	4/12/2011	11/4/2011	202	12	M	Dead	Unknown					
SG 3411	Anderson	4/13/2011	4/23/2012	370	23	M	Dead	Coyote					
SGM 3385	Antelope	4/7/2011	4/18/2011	11	4	M	Dead	Eagle					
SGM 3386	Antelope	3/29/2011	6/20/2011	81	7	M	Dead	Coyote					
SGM 3388	Fence on Butte	4/12/2011	5/9/2011	27	5	M	Dead	Coyote					
SGM 3390	Dry Gulch	4/19/2011	4/28/2011	9	3	M	Dead	Coyote					
SGM 3391	Fence on Butte	3/28/2012	4/16/12	18	5	M	Dead	Coyote					
SGM 4101	Arentson	4/23/2011	4/26/2011	3	2	M	Dead	Unknown					
SGM 4102	Fence on Butte	4/12/2011	1/17/2012	275	26	M	Dead	Avian					
SGM 4103	Corral Basin	4/20/2011	07/16/12	446	49	M	Dead	Avian					
SGM 4103a	Dry Gulch	4/8/2011	4/15/2011	7	3	M	Dead	Eagle					
SGM 4104a	Antelope	4/7/2011	4/18/2011	11	4	M	Dead	Coyote					
SGM 4105	Pete Creek	5/2/2011	9/21/2011	139	16	M	Dead	Coyote					
SGM 4107	Spar Canyon	4/25/2011	4/4/2012	339	45	M	Dead	Coyote					

ID	Area	Capture date	Last date	Days	Number locations	Sex	Fate	Mortality type	Nest start date	Nest end date	Nest fate	Number of eggs	Nest predator
SGM 4108	Corral basin	4/14/2011	4/12/2012	358	52	M	Dead	Unknown					
SGM 4113	Arentson	5/3/2011	8/1/2011	88	20	M	Dead	Coyote or Bobcat					
SGM 3379	Little Hat	4/13/2010	8/3/2011	470	18	M	Battery fail						
SG 3404	Antelope	4/7/2011	11/28/12	585	107	M	Alive						
SG 3407	Fence on Butte	11/21/2011	09/18/12	297	34	M	Missing						
SGM 3392	Corral basin	5/3/2012	10/17/12	164	36	M	Alive						
SGM 3394	Park Creek	4/19/2012	11/26/12	217	17	M	Alive						
SGM 3396	Copper Basin	5/8/2012	11/29/12	201	19	M	Alive						
SGM 3397	Copper Basin	5/8/2012	11/29/12	201	30	M	Alive						
SGM 4104	Corral Basin	4/20/2011	11/02/12	552	47	M	Alive						
SGM 4106	Arentson	4/23/2011	11/30/12	577	81	M	Alive						
SGM 4109	Arentson	4/26/2011	07/16/12	440	69	M	Missing						
SGM 4110	Arentson	5/3/2011	09/10/12	487	56	M	Missing						
SGM 4111	Little Hat	4/19/2012	09/24/12	155	11	M	Battery fail						
SGM 4112	Arentson	5/3/2011	11/28/12	565	117	M	Alive						

Table 2. Sage-grouse nesting habitat, 2011-2012

		% Cover					Height (cm)					
Year	**ID**	**Grass**	**Forbs**	**Rock**	**Shrub Live**	**Shrub Dead**	**Grass Dead**	**Grass Live**	**Grass Flower**	**Shrub Dead**	**Shrub Live**	**Shrub Flower**
2012	SGF4074	20.1*	3.96	9.38	17.1*	3	6.26	9.89	21.2	15.2	18.8	25.8
2012	SGF3425	44.7*	0.46	1	7.8	3.2	6.88	9.83	18.8	30.7*	31.3*	49.9
2012	SGF3418	7.5	0.46	3	6.2	0.7	6.67	10.23	13.7	17.9	20.7	35
2012	SGF4071	33.7*	4.75	0.75	16.8*	6	10.7	13.46	23.36	37.5*	42.7*	59.4
2012	SGF4072	8.25	0.75	1.5	17.4*	0.6	8.77	12.23	21.53	14.4	18.6	34.4
2012	SGF3417	15*	6	11.5	20*	12.4	11.96	16.4	46.63	29.5	36*	61.4
2011	SGF 1800	20*	5	37.2	5.8	4.4	12.92	14.58	25.67	37.6*	36*	42.3
2011	SGF 3418	10.3	4.88	13.1	18.3*	1.7	10.86	13.2	21.67	28	33.2*	40.7
2011	SGF 3405	16*	5	31	19*	1.2	9.6	13.17	32	25.3	29.1	36.1
2011	Unmarked	18.3*	6.25	15.4	14.5*	0.5	3.55	6.58	17.14	36.4*	36.6*	45.1
All Successful Nests		**19.4**	**3.8**	**12.4**	**14.3**	**3.4**	**8.8**	**12.0**	**24.2**	**27.3**	**30.3**	**43.0**
2012	SGF 4078	11	3.21	20.1	17.2*	9.7	10.41	12.63	13.88	29	30.8*	38.4
2012	SGF 4068	34.7*	10.3	0.75	9	2.7	7.3	11.65	21.89	27.5	34.7*	46.4
2012	SGF 3423	23.9*	0.71	45.6	3.8	3.9	14.61	14.79	29.33	28.3	32.1*	40.6
2012	SGF 4063	29.1*	4.21	1.75	12.5	4.5	9.12	9.51	27	21.4	22.3	24.5
2012	SGF 3405	22*	11.8	14.5	5.7	4.6	7.87	8.46	17.57	22.6	23.7	46
2012	SGF 3414	17.1*	7.71	17.3	19.9*	7.9	9.28	8.75	9.43	29.7	31.6*	28.3
2012	SGF 4078	28.2*	13.5	21	8.2	6.1	14.64	15.12	35.44	25.2	27	37.1
2012	SGF 4069	1.25	0.46	1.5	13.6	3.8	12.68	15.41	20.31	28.6	31.2*	34.3
2011	SGF 3414	12.5	3	7.75	20.5*	7.2	13.38	17.75	27.47	27	25.2	35.9
2011	SGF 3406	24.1*	12.3	8.63	10.6	2.4	18.33*	20.88	24	24.3	26.1	38.1
All unsuccessful nests		**20.4**	**6.7**	**13.9**	**12.1**	**5.3**	**11.8**	**13.5**	**22.6**	**26.4**	**28.5**	**37.0**
All nests		**21.2**	**4.9**	**10.7**	**12.5**	**4.9**	**9.8**	**12.0**	**22.9**	**25.5**	**28.7**	**40.1**

*Meets or exceeds recommendations made by Connelly et al. 2000

Table 3. Sage-grouse brood habitat, 2011-2012

		% Cover					Height (cm)					
Year	ID	Grass	Forbs	Rock	Shrub Live	Shrub Dead	Grass Dead	Grass Live	Grass Flower	Shrub Dead	Shrub Live	Shrub Flower
2011	SGF 4072	11.9	0.96	8.88	26.9*	5.9	10	11.39	18.33	23.5	26.5	32.4
2011	SGF 4063	5	3.5	4.5	29.4*	5.9	12.39	14.39	21.14	22.9	27.1	28.8
2011	SGF 4071	16.8*	6.75	5	31.2*	8	12.69	13.56	22.65	34.7	39.3	53.6
2012	SGF 3414	7	5.75	8	1.9	3.6	3.75	9.09	29.08	30.2	34.5	40.9
2012	SGF 3414	8.25	6.5	10.1	33.9*	2.7	7.9	10.74	25.2	11.5	16.7	20.4
2012	SGF 3414	10.4	4.5	14.4	66.2*	7	9	11.91	25.93	27.6	37.8	48.1
2012	SGF 3414	32.9*	20.1	12	5.7	2.3	3.95	13.7	35.15	23.2	25.8	23.8
2012	SGF 3414	32.6*	11.1	0.5	22.3*	2.5	4.58	7.76	6.36	27.9	34.6	46.6
2012	SGF 3414	24.8*	3.75	0.5	27.3*	2.5	4.65	9.84	27.75	18.9	29.5	47.2
2012	SGF 3414	28.8*	24.5	1.75	25.5*	2	10.44	20.39	48.47	53.3	51.5*	69.9
2012	SGF 3406	12.3	4.5	5	29.4*	4	13.54	15.85	27.92	20.8	22.6	31.3
2012	SGF 3406	29.7*	21	1.5	29.5*	17.8	16.65	21.6	34.43	100.1	91.6*	116.2
2012	SGF 3406	17.9*	13.8	0.75	32.8*	11.8	11.72	16.38	28.21	48.3	48.3	77.4
2012	SGF 3406	27.8*	6.88	0.75	32.9*	7.8	8.28	15.1	27.38	24.1	33.4	40.5
2012	SGF 3406	33.3*	13.6	1	1.2	6.4	3.8	14.82	33.63	61.1	64*	78.4
	Average	**22.1**	**11.3**	**4.7**	**25.7**	**5.9**	**8.2**	**13.9**	**29.1**	**37.3**	**40.9**	**53.4**

*Meets or exceeds recommendations made by Connelly et al. 2000

Table 4. Survival of radio-collared birds during 2010-2012

All birds				
Season	Alive at start	Died during season	Lived through season	Survival
Spring	69	17	52	0.75
Summer	54	5	49	0.91
Fall	49	6	43	0.88
Winter	19	1	18	0.95
Female				
Season	Alive at start	Died during season	Lived through season	Survival
Spring	29	6	23	0.79
Summer	25	1	24	0.96
Fall	24	3	21	0.88
Winter	6	0	6	1.00
Male				
Season	Alive at start	Died during season	Lived through season	Survival
Spring	43	11	32	0.74
Summer	32	4	28	0.88
Fall	28	3	25	0.89
Winter	14	1	13	0.93

2009-13: Sage-grouse Habitat Rehabilitation at Table Butte

This two year project was supposed be conducted between the years 2010 and 2011 and be completed in the fall of 2011. We provided seed for sagebrush to the Shoshone/Bannock Tribe in 2009. They failed to produce seedlings in 2010 and only produced 3,000 plants in 2011. We then purchased an additional 12,000 plants from Lucky Peak Nursery from locally collected seeds. We hand planted a total of 15,000 seedlings spread across six plots in the Table Butte area in the fall of 2011 (refer to map for plot locations and # of plants per plot). We also put in monitoring plots at four locations. Only two of the four plots were monitored in the spring of 2012 to record survival rates. One plot had a 7% survival rate and the other had a 10% survival rate.

We followed that up and purchased 17000 plugs from Lucky Peak Nursery in 2012. Seeds for these plugs were collected in the table area in the fall of 2011. Plugs were then hand planted in the fall of 2012. These plants were spread across 8 plots (refer to map for plot locations and # of plants per plot). An additional six study plots were also put in.

The project is now complete and follow up monitoring will take place over the next couple of years.

Upper Snake Sage-grouse

Local Working Group

Wing Barrel Kiosk Project

January 29, 2013

Report Prepared by:

Terry Thomas
Chair, Executive Committee
Upper Snake Sage-grouse LWG

INTRODUCTION

Acquisition of an adequate sample of wings to estimate production and nest success has consistently been a concern for upland game managers in Idaho. In recent years, the Upper Snake region has been able to collect an adequate sage-grouse wing sample due to the extended season (i.e., standard season, 2 bird bag, 23-day season). Due to lek count declines, and the potential future listing of the sage-grouse as threatened or endangered, the hunting season has been restrictive (1 bird bag, 7-day season) for the past two seasons, resulting in fewer wings collected at checkstations. It is important to collect a higher proportion of wings from the birds that are harvested to maintain an adequate sample size for production and nest success estimates. Distributing voluntary wing collection kiosks is one way to accomplish this objective.

PROJECT

Funding was applied for and granted from the Idaho Office of Species Conservation in 2010. This project provided funding for construction, installation, and the monitoring (bioaide salary to check wing barrels during the sage-grouse hunting season and properly store wings until annual wing bee) of 12 upland bird wing barrel kiosks throughout the Upper Snake Region. The kiosks were be comprised of an informative aluminum sign (sign asks hunters to leave a wing from each harvested upland game bird, directions on where to cut the wing, and information on why the wing data is important to upland game management in Idaho, see figure 1), a plastic barrel attached to the sign, and a mailbox containing wing envelopes and pencils. These kiosks are removable after the upland season concludes. Because the kiosk signage asks for wings from all upland game species, this project will enhance the data collection and management for all upland game birds in the Upper Snake Region, including Greater Sage-grouse.

The kiosks were built during the summer of 2011 and were deployed in the field for the first time in autumn 2011. Seven kiosks were placed west of Interstate 15 and five were placed east of Interstate 15 in the Sand Creek Desert.

The short hunting season and one bird bag limit the past two years has still resulted in a dramatic reduction in the number of wings collected despite the placement of the kiosks. Interest in hunting sage-grouse may be down because of the reduced season and bag limit. The anticipated result of a short season and one bird limit on number of birds harvested had the intended effect. However, having the kiosks in place maximizes the opportunity to collect what wings are available.

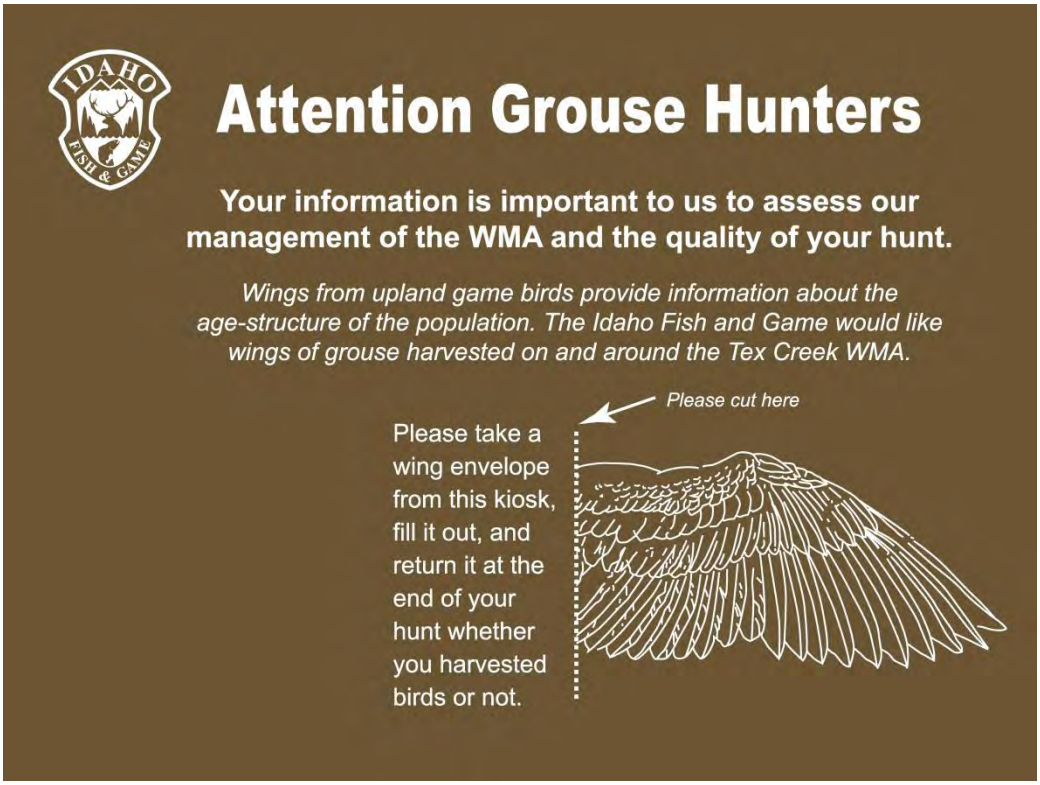


Figure 1. The sign attached to the kiosk directing hunters how to properly remove a wing.

2011-12: Jefferson Fire Sagebrush Seeding on Idaho Department of Lands

Jefferson Fire Sagebrush Seeding Project

Hendricks,Curtis

1/7/2013

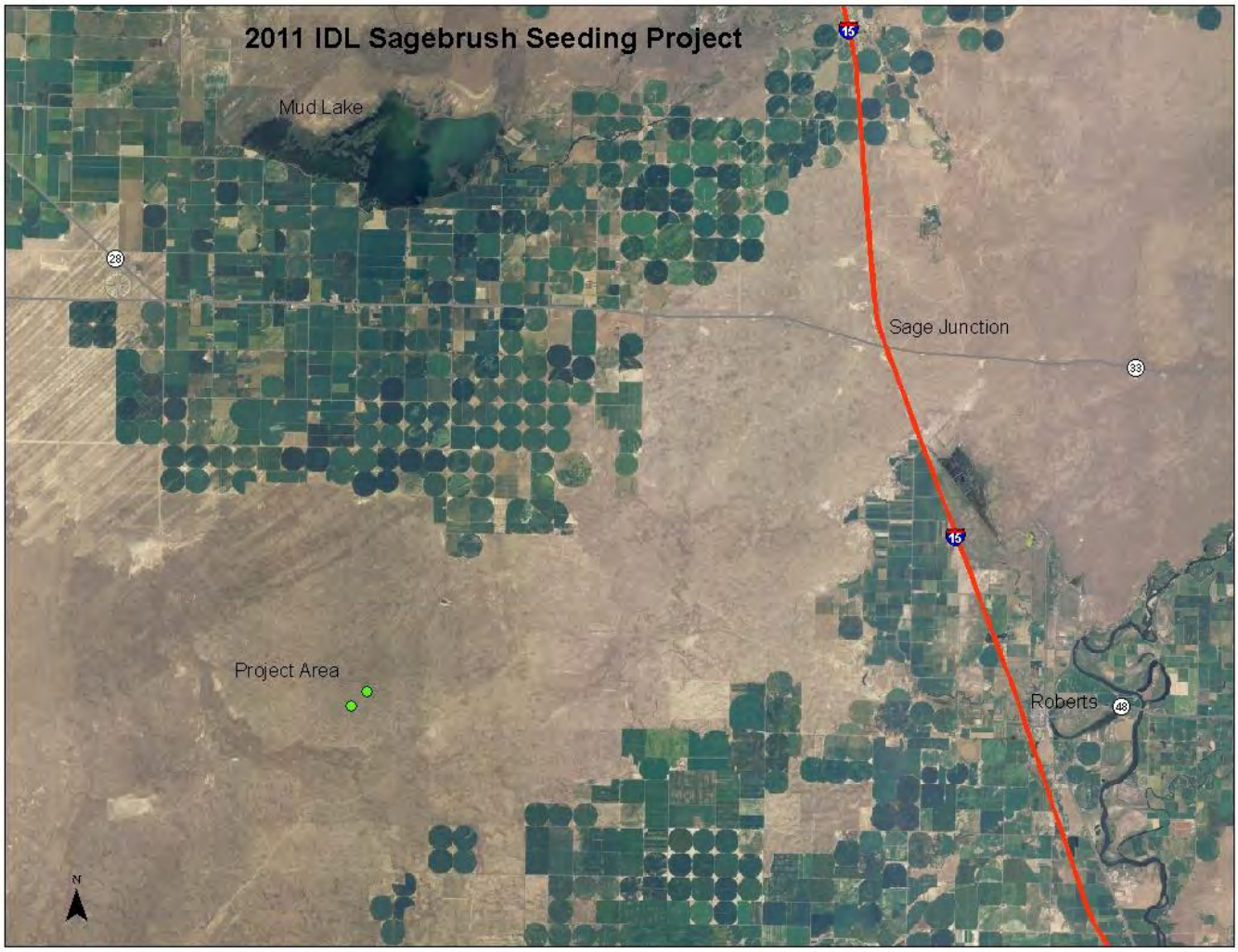
Project overview : The objective of this project was to establish a number of sagebrush stands in areas where the 2010 Jefferson burned across IDL property. This project attempted to establish sagebrush stands by hand planting 12,000 sagebrush plugs at selected sites on IDL lands. These stands will hopefully take root and serve as potential seed sources to adjacent burned areas.

Why was the project necessary?: The Jefferson Fire burned over 100,000 acres of sagebrush habitat in 2010. Over much of the area sagebrush stands were completely eliminated and depending on the intensity of the fire in many of these areas the sagebrush seed left on the ground could be nonviable. The objective of this project was to hand plant 12,000 sagebrush plugs. Hand planting plugs will hopefully increase survival and give these plants a head start as compared to plants that establish from native seed stores across the area. Hopefully the sagebrush patches established from these hand plantings would serve as seed sources for adjacent burned areas.

Was this project completed?: This project was completed in March of 2012. The St. Anthony work crew was hired to plant the 12,000 Wyoming big sagebrush plugs that were grown at Lucky Peak nursery. The planting took two days to complete.

Monitoring: This seeding project will be monitored over time to evaluate the survival of the hand planted sagebrush plugs. Monitoring will be done using photo plots are seeding locations and inspection of individual sagebrush seedlings. Monitoring will be conducted by IDFG personnel and continued for ten years.

Project location: Jefferson County, Upper Snake Local Working Group Area, for specific location see attached map. Three different planting locations have been identified these locations are at the following GPS locations and the locations are in Decimal Degrees, WGS 84: 43.72442, 112.40873 - 43.71991, 112,41520 - 43.72273, 112.41276



2011-13: Small Fence Strike Reduction

Small Fence Strike Reduction Project Completion Report

Hendricks,Curtis

1/7/2013

Idaho Department of Fish and Game

Project overview: There are 208 miles of fence line within 1000 meters of known sage-grouse leks within the BLMs Upper Snake Field Office. This project improved visibility of fences to sage-grouse by adding diverters between fence posts along an existing fence line that is within 1000 meters of three active sage-grouse leks. This project mimicked work that had been done in Oklahoma, Wyoming, and Idaho to reduce bird/fence collisions. Vinyl diverters and wooden fence stays were used to make the fence line identified in the project more visible. The vinyl diverters were 2.5" X 2" and were attached every 6' on the top strand along this fence line. The vinyl diverters were the same as those used by the BLM in other areas across the state. For more information I recommend reviewing the work done by Stevens 2011 and efforts by Bart Zwetzig of the Challis BLM office. The vinyl diverters were used on 8,500' of the fence the other 2,000' were made more visible by using wooden fence stays. The BLM had demonstrated a decline in sage-grouse collisions in this area by implementing wooden fence stays. The 2,000' feet of fence where the wooden stays were incorporated started at the north end of the fence line and continued south. This was done to facilitate maintaining the "viewshed" as requested by the USSGLWG.

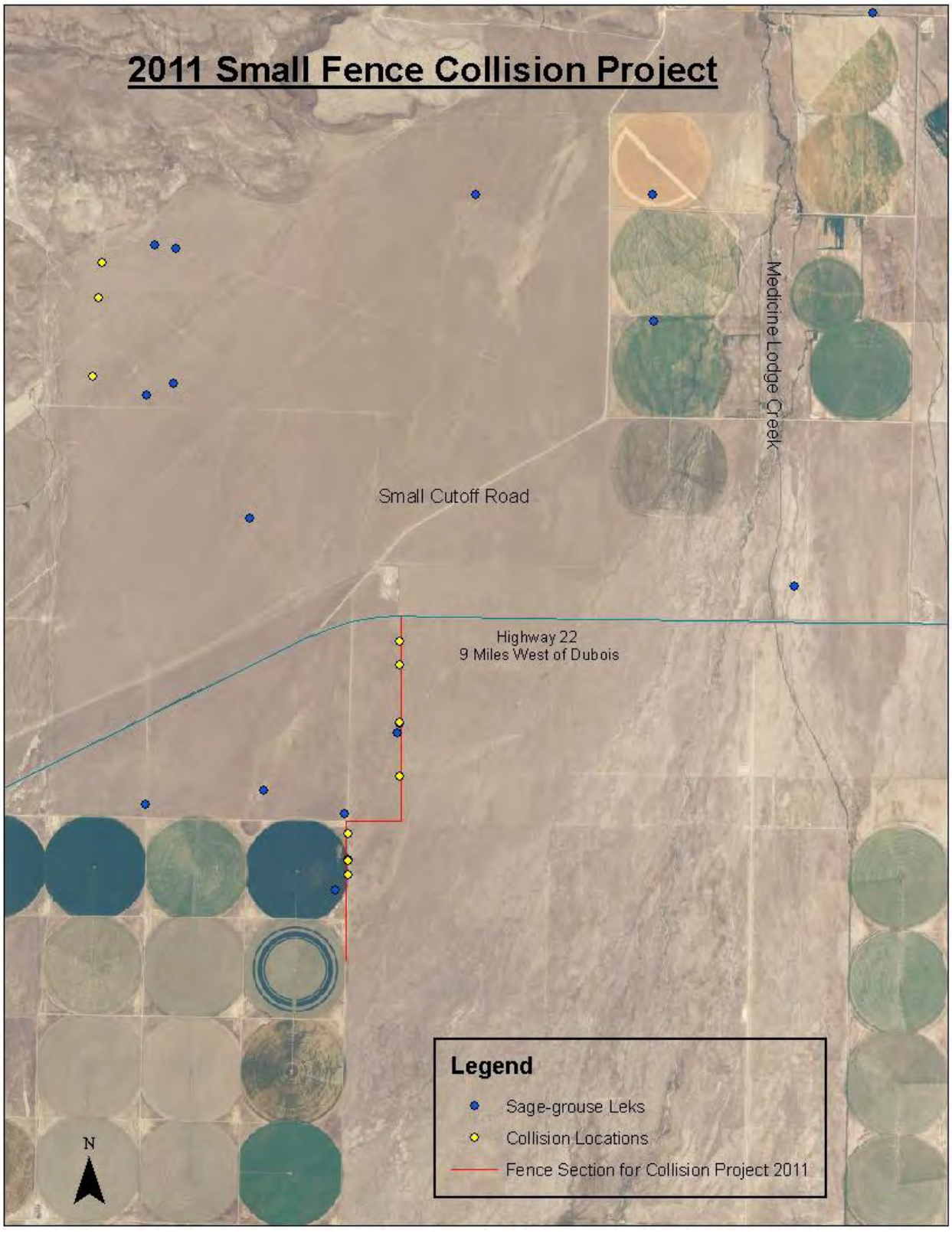
Need for proposed project

Why is the project necessary?:

Fences near sage-grouse leks are proving hazardous to sage-grouse. A single 2 mile long fence line in the Medicine Lodge area had resulted in the deaths of more than 25 birds for each of the last two years. A single survey along a fence in the Little Lost found an additional 2 grouse carcasses. The level of this threat is undetermined as the majority of fence lines near leks had not been monitored for carcasses. The fence line in this project was identified as a primary collision corridor during a research project conducted by Brian Stevens at the University of Idaho (2011). This research demonstrated that sage-grouse collisions are reduced by 80% with vinyl flashing fence diverters. This project will reduce sage-grouse mortality associated with the leks in this area.

Monitoring: As was identified in the proposal for this project, the Idaho Department of Fish and Game (the Department) will monitor the modified fence line related to this project for sage-grouse strikes for three years post project. The spring of 2012 was the first year for monitoring and Department personnel did not find evidence of any fence strikes during the breeding season. This monitoring will continue for two additional years.

Project location: Clark County, Township 10N Range 34 E Sections 25 and 36 – The project area lies about 9 miles west of Dubois and just south of Highway 22 *See attached map*


2011 Small Fence Collision Project
Medicine Lodge Creek
Small Cutoff Road
Highway 22
9 Miles West of Dubois
Legend
Sage-grouse Leks
Collision Locations
Fence Section for Collision Project 2011
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