NEVADA SAGE-GROUSE CONSERVATION PROJECT

Nevada Department of Wildlife

Governor's Sage-grouse Conservation Team
Bi-State Local Area Conservation Planning Group
Elko County Sage Grouse POD
Lincoln County Technical Review Team
North Central Local Area Conservation Planning Group
South Central Local Area Conservation Planning Group
Washoe-Lassen-Modoc Local Area Conservation Planning Group
White Pine County Local Area Conservation Planning Group

Photo by: Kim Toulouse

Final Performance Report
FBMS Grant No.: F10AF00677

December 2011

Nevada's Sage-grouse Conservation Project is a collection of jobs ranging from survey and inventory to conservation planning, research and project coordination. This document reports on all elements of the project.

Table of Contents

SURVEY AND INVENTORY

Lek Monitoring

Report by: Shawn Espinosa, Curt Baughman, Tom Donham, Ken Gray, Chris Hampson, Kari Huebner, Matt Jeffress, Jeremy Lutz, Ed Partee, Mike Podborny and Mike Scott

OBJECTIVES

a) Determine population health and estimate the size of sage-grouse populations within distinct Population Management Units (PMUs) through lek counts and improved sampling schemes.
b) Determine age structure, sex ratios, and nest success of various sage-grouse populations through collection and analysis of wings from hunter harvested sage-grouse as well as potential DNA samples collected from fecal transects.
c) Determine genetic relationships or differences among various sage-grouse populations throughout Nevada.
d) Verify and/or refine PMU boundaries that were delineated (based on little information or biologist judgment) through radio marking investigations. Determine migratory nature of specific populations. Determine response of sage-grouse populations due to various treatments, conservation efforts or disturbances such as wildfire and energy development.
e) Maintain a comprehensive database for sage-grouse lek count, brood count and radio telemetry information.

SUMMARY

Lek counts are an important annual duty conducted by various personnel within the Nevada Department of Wildlife (NDOW). NDOW field biologists, Bureau of Land Management (BLM) and U.S. Forest Service (USFS) personnel, and volunteers collected data both from the ground (using accepted protocols) and air (using a helicopter). The following information was provided to report progress in achieving objective a) identified in the Grant Agreement, which states: “Determine population health and estimate the size of sage-grouse populations within distinct Population Management Units (PMUs) through lek counts and improved sampling schemes”.

In 2011, over 1,420 lek visits were made to 737 different leks, of which 427 were considered active. The peak male count was 8,424 resulting in an average of 19.7 males per active lek. This attendance rate represented a 12.6% increase over the 2010 average male attendance rate of 17.5 and was just slightly above the long-term average of 19.1 (2002-2010). 2011 was the second year in a row of elevated average male attendance rates (Figure 1). During the last ten year period, the highest attendance rate remains at 26.6 males per active lek observed in 2005 while the lowest was 15.5 observed in 2002 (see Table 1 for 2002-2011 lek count results). During the last ten years, an average of 738 leks was surveyed with the 2011 effort equaling that average. This represents a significant increase from previous decades where only between 50-100 leks were surveyed annually.

	# Males	Leks Surveyed	Active Leks	AVG/active lek
2002	5,198	648	335	15.5
2003	4,624	380	248	18.6
2004	6,813	487	309	22.1
2005	8,843	635	332	26.6
2006	9,580	881	448	21.4
2007	11,040	1,013	545	20.3
2008	7,671	923	483	15.9
2009	7,954	930	505	15.8
2010	7,399	742	420	17.5
2011	8,424	737	427	19.7
AVG.	*7,755*	*738*	*405*	*19.1*

Table 1. Lek count summary from 2002 – 2011.

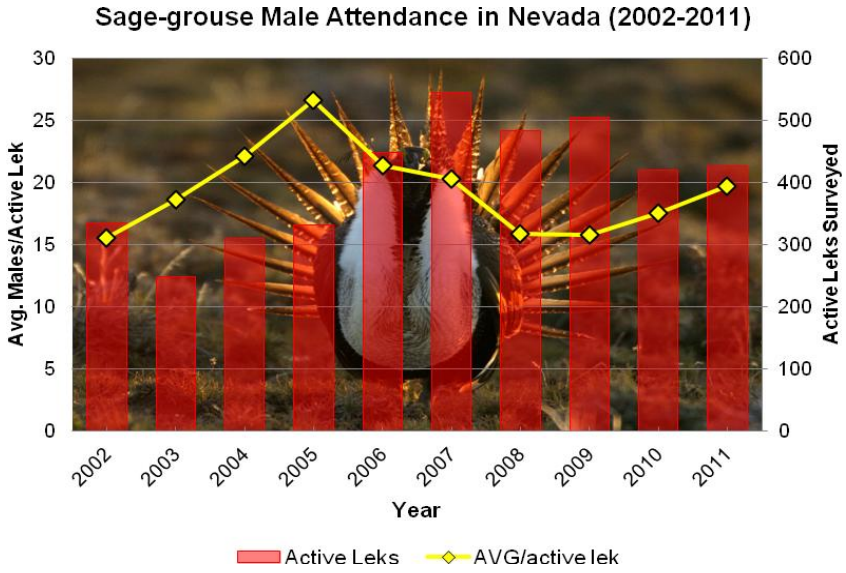

Figure 1. Lek count effort and average attendance from 2002-2011.

FINDINGS

WASHOE-LASSEN-MODOC

There are 5 PMUS within the Washoe-Lassen-Modoc planning area of which two are shared with California (Buffalo/Skedaddle and Vya). Sage-grouse utilize habitats in both states with some important migratory movements across state lines. Lek count data from both states are summarized here to provide a more accurate representation of the populations within the two PMUs that are shared between the two states.

The Buffalo/Skedaddle PMU is a large PMU (≈1.6 million acres) shared between Nevada and California and the California portion of the PMU is considered California's largest sage-grouse population. Lek count data from California were not available for this report. In Nevada, 12 leks were visited of which 10 were considered active. A peak total from each lek resulted in 184 males classified for an average of 18.4 males per active lek. The 2011 average is 32.4% lower than the previous year's average of 27.2 males per active lek. This could be a

result of not incorporating data from California, where some of the larger leks within the PMU are located.

Within the Massacre PMU a total of 41 lek site visits were made to 32 leks of which 23 were considered active. The peak count of males from each lek totaled 580 for an average of 25.2 males per active lek. This is virtually the same as last year's attendance rate of 25.5, suggesting a stable population in the short-term. The Massacre PMU contains the greatest amount of suitable sage-grouse habitat within the Nevada portion of the planning area at approximately 1.26 million acres. The population within this PMU is likely the largest within the planning area due in part to its size and the amount of suitable habitat within the PMU.

The Sheldon PMU is located within the Sheldon National Wildlife Refuge, but is not the entirety of the Refuge. There were 25 visits made to 19 lek sites of which 15 were active. A total of 428 males was counted resulting in an average of 28.5 males per active lek. This represents a slight increase (4%) from the 2010 male lek attendance rate of 27.4. Like the Massacre PMU, this population is also considered stable to slightly increasing in the short-term. Sage-grouse within this PMU utilize habitat within the Massacre PMU to the south as well as in Oregon to the north. No natural or manmade barriers exist in terms of movement between these areas; however, the recently constructed Ruby Pipeline (gas) has the potential to directly and indirectly affect sage-grouse habitat both within the Sheldon and Massacre PMUs.

The Vya PMU is located to the west of the Sheldon PMU and to the north of the Massacre PMU and there is likely interchange of individuals between these PMUs. A total of 47 lek visits were made to 21 leks during the spring 2011 breeding season. A peak total of 412 males was observed on 16 active leks resulting in an average of 25.8 males per active lek. The 2011 male attendance rate was 8.4% greater than the previous year's attendance rate. Lek monitoring is conducted by NDOW, volunteer and BLM – Surprise Valley Field Office personnel.

The Virginia/Pah Rah PMU is actually two PMUs combined. Collectively this PMU is 355,000 acres and is the smallest PMU in the planning area. Both of these PMUs are in proximity to the Reno/Sparks and North Valleys areas of southern Washoe County and thus are the most threatened to long term sustainability because of urbanization, roads, transmission lines, dispersed recreation, renewable energy development and wildfire. Cumulatively, these factors have diminished suitable sage-grouse habitats and sage-grouse population size. The 2011 average male lek attendance for the Virginia PMU was 27.0 males per active lek. This attendance rate is down marginally from the 2010 value of 27.7.

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks Surveyed	# of Birds Counted	Avg. # of Birds/Active Lek
Buffalo/Skedaddle	74	12	10	184	18.4
Massacre	72	32	23	580	25.2
Sheldon	75	19	15	428	28.5
Virginia/Pah Rah	6	2	2	54	27.0
Vya	37	21	16	412	25.8
TOTAL:	**264**	**86**	**66**	**1658**	**25.1**

Table 2. 2011 lek count effort for the Washoe-Lassen-Modoc local conservation planning area.

Within the Washoe-Lassen-Modoc planning area, 130 lek visits were made to 86 leks, of which 66 were considered active during the spring of 2011. A peak count total of 1,658 males was observed on these leks resulting in an average of 25.1 males per active lek. In comparison, the 2010 average male lek attendance was approximately 4% greater at 26 males per active lek. Population levels within the planning area are considered to be stable at moderate to moderately high levels.

BI-STATE PLANNING AREA

The Bi-State planning area, like Washoe-Lassen-Modoc, is also a region where population management units (PMUs) are shared between Nevada and California. Four of the PMUs in this region are shared between the two states while one is entirely within California (South Mono PMU). Movement of sage-grouse across state boundaries is known to occur within the Pine Nut, Desert Creek/Fales and Mount Grant/Bodie PMUs. Relatively little is known regarding movement of birds and population size within the White Mountains PMU at the southernmost end of the planning area.

Average male sage-grouse attendance rates obtained from peak counts increased from 2010 to 2011. A total of 1,105 males was observed on 36 active leks for an average of 30.7 males per active lek (See Table 3 for separate PMU results). The 2011 average attendance rate was 18% greater than the 2010 average of 26.0. Increases were observed within all PMUs where known leks are surveyed except for Mount Grant where a 13.7% decline was observed. Large increases were noted for the Desert Creek/Fales (82.4%) and South Mono PMUs (19.3%).

Within the Nevada portion of the Desert Creek/Fales PMU, average male lek attendance rates increased by 127% from just 10.2 males per active lek in 2010 to 23.2 in 2011. A total of 21 lek visits were conducted within the Nevada portion of this PMU during the 2011 spring breeding season by volunteers and NDOW personnel. Contrastingly, male lek attendance rates were down 13.7% in the Mount Grant PMU; however, more active leks were surveyed in 2011 (n=5) than in 2010 (n=2). The average male attendance rate was 22 in 2011 as opposed to 25.5 in 2010. A total of 19 lek visits were conducted within the Mount Grant PMU during the spring of 2011. In the Pine Nut PMU, male lek attendance continues to remain stable at low levels at the only known active lek (Mill Canyon Dry Lake Bed). The peak count during the spring of 2011 was 18 males and 4 females.

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks	# of Males Counted	Avg. # of Males/Active Lek
Desert Creek/Fales	26	9	7	152	21.7
NV Portion	(19)	(6)	(5)	(116)	(23.2)
CA Portion	(7)	(3)	(2)	(36)	(18)
Mt. Grant (NV)	12	11	5	110	22
Pine Nut (NV)	8	1	1	18	18
White Mountains	5	0	0	0	0
Bodie Hills (CA)	19	14	11	432	39.3
South Mono (CA)	27	24	12	393	32.8
TOTAL:	**97**	**59**	**36**	**1105**	**30.7**

Table 3. 2011 lek count effort for the Bi-State local conservation planning area.

NORTH CENTRAL PLANNING AREA

The North Central planning area is composed of Churchill, Pershing and Humboldt Counties with a total of 19 Population Management Units (PMUs). In Humboldt County, there are four main PMUs with sustainable populations of sage-grouse. These include the Santa Rosa, Lone Willow, Pine Forest and Black Rock PMUs. The largest populations occur in the Santa Rosa and Lone Willow PMUs. In Pershing County and Churchill Counties, the largest populations of sage-grouse are within the Sonoma PMU and Desatoya PMUs respectively.

A total of 254 leks were surveyed within the entire North Central Planning Area in 2011 with 106 leks considered active. These surveys resulted in 1,662 sage-grouse observed yielding an average of 15.7 birds/active lek. This is a 21.7% increase over the 2010 average of 12.9 birds/active lek.

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks Surveyed	# of Birds Counted	Avg. # of Birds/Active Lek
Santa Rosa	125	101	39	833	21.4
Lone Willow	93	79	40	395	10
Pine Forest	13	13	5	33	8.1
Black Rock	25	18	7	160	23
Jackson	7	0	0	0	0
TOTAL:	**263**	**211**	**91**	**1421**	**15.6**

Table 4. Results of Humboldt County lek counts conducted in 2011.

Within the Black Rock PMU, a total of 20 leks were surveyed via helicopter on two separate occasions. High counts for each lek totaled 252 sage-grouse on 7 active leks for an average of 36 birds/active lek. This represents a significant increase over the previous year's average of 13.9 birds per active lek; however, the 2010 figures were obtained from just one flight. Four of the seven leks were of significant size (>30 birds) with two of these leks having greater than 50 birds.

All 13 known leks were surveyed once in the Pine Forest PMU with the use of a helicopter. This flight was conducted during less than optimal conditions and lek activity was documented on just four leks. A total of 33 birds was observed for an average of 8.1 birds per active lek. This represents a 43% decrease from 2010 where an average of 14.2 birds per active lek was observed. The apparent trend in the Pine Forest PMU is declining. This may be partially due to inadequate sampling effort during the spring; however, the overall numbers are somewhat concerning. Hunting seasons have remained closed since 2009 in this PMU.

The Santa Rosa PMU is the largest PMU within the North Central planning area (≈940,000) and likely harbors the largest population of sage-grouse in Humboldt County. The population is connected with the Desert PMU to the east and Oregon (Owyhee Uplands) populations to the north. A total of 101 leks were surveyed, largely through the use of a helicopter, of which 39 were considered active. A total of 833 sage-grouse was observed on these leks resulting in an average of 21.4 birds per active leks. The attendance rate represents a 91% increase over the previous year's average of 11.2. This population has been affected on its periphery by wildfire, particularly at lower elevations; however, the core sagebrush habitats within the upper elevation of the Santa Rosa Range, Owyhee Desert and Martin Creek Basin remain intact and in relatively good condition.

The Lone Willow PMU, which includes the Montana Mountains, Bilk Creek Range and Double H mountains, also harbors a significant population of sage-grouse. In 2011, 79 leks were surveyed by helicopter of which 40 were considered active. A total of 395 grouse was observed resulting in an average of 9.9 birds per active lek. Little to no survey efforts were conducted in 2010 due to lack of funding so an annual comparison to the previous year is not feasible.

The Pershing County portion of this planning unit has suffered tremendous losses of sagebrush habitats due to wildfire over the last decade with some mountain ranges burning almost completely (e.g. Eugene Mountains). The most viable population within the county is the Sonoma PMU. Twenty-four leks were surveyed in this PMU in 2011 with only 6 being active. A peak total of 52 males were observed resulting in an average of 8.7 males per active lek. This is

a 7% decline from the previous year where the average attendance was 9.4 males. The long-term viability of PMUs such as the Eugene, Majuba, East Range and Humboldt PMUs is considered very low, with some of these populations potentially extirpated already.

Within Churchill County, Two PMUs (Desatoya and Clan Alpine) were surveyed during the spring of 2011. A total of 28 lek visits were conducted to 11 known leks during the spring of 2011. Eight leks were found to be active with a total of 187 male sage-grouse observed resulting in an average of 23.4 males per active lek. In comparison to 2010 figures, this figure represents an 18.2% increase in male attendance and more comparable with the 2009 average of 25 males per active lek. There is only one known active lek in the Clan Alpine PMU that continues to remain stable at low levels (# of males = 16). The population is susceptible to poor habitat conditions or potential stochastic events such as wildfire. Hunting seasons have been closed in this PMU for over a decade. There are 7 known active leks in the Desatoya PMU and peak counts resulted in a total of 171 males observed during 2011. A two day hunting season has been held in this PMU for the last five years.

SOUTH CENTRAL PLANNING AREA

The South Central planning area consists of Lander, Eureka, and Nye Counties and includes 10 Population Management Units (PMUs). A peak count total of 1,562 males was observed on 62 active leks surveyed resulting in an average of 25.2 males per active lek (see Table 5). There were 311 visits made to 99 leks within the entire planning area. The average male attendance rate of 25.2 males per active lek represents a 20% increase over the previous year's average of 21.0.

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks Surveyed	# of males Counted	Avg. # of males/Active Lek
Battle Mountain	7	0	0	0	0.0
Fish Creek	6	0	0	0	0.0
Shoshone	15	6	5	104	20.8
Cortez	28	4	4	76	19.0
Three Bar	51	15	15	214	14.3
Diamond	35	10	4	58	14.5
Toiyabe	68	28	16	393	24.6
Reese River	44	8	5	218	43.6
Monitor	69	28	13	499	38.4
Kawich	0	0	0	N/A	N/A
TOTAL:	**323**	**99**	**62**	**1,562**	**25.2**

Table 5. 2011 lek count effort within the South Central local conservation planning area.

In Eureka County, 148 lek visits were made to 29 leks within the Cortez, Diamond and Three Bars PMUs in 2011. Of these, 23 were considered active with a peak male count of 348 resulting in an average of 15.1 males/active lek. This average was 15.1% below the previous year's average of 17.9. Many of the trend leks in these three PMUs are intensively monitored as part of a larger, ongoing research project being conducted by the University of Nevada, Reno (Falcon to Gonder Transmission Line Study). In contrast, trend lek counts resulted in 207 males observed on 10 comparable leks in 2011 for an average of 21 males per ground which represented a 21% increase from 2010 when 170 males were counted on those same leks.

There are four PMUs within Lander County with the two largest being the Toiyabe and Shoshone. The Battle Mountain and Fish Creek PMUs are the smallest of the four and were not surveyed in 2011. Lek counts conducted in the Toiyabe PMU yielded 393 males observed on 16 active leks for an average of 24.6 males per active lek. This represented a 5% increase over the 2010 average male attendance rate of 23.4. Likewise, a 6% increase was observed in the Shoshone PMU where an average of 20.8 males per active lek was found compared to 19.6 in 2010. Four out of five trend leks were monitored and 138 males were observed in 2011 for an average of 35 males/lek compared to 31 males/lek in 2010. This represents an 11% increase compared to the 2010 counts.

In Nye County, two PMUs constitute the majority of the sage-grouse population in the county. The Reese River and Monitor PMUs both contain moderately sized to large sage-grouse populations. Within the Monitor PMU, 77 lek visits were made to 28 different leks, of which 13 were considered active. A peak total of 499 males was observed resulting in an average of 39.8 males per active lek. This represents an 85% over the 2010 average male attendance of 21.5. In the Reese River PMU, 21 lek visits were made to 8 different leks. Of those, 5 were considered active and a peak count total of 218 males were observed resulting in an average of 43.6 males per active lek. This is a 28.2% increase over the 2010 average attendance rate of 34.0. Population trends for Nye County appear to be increasing over the last three years.

ELKO COUNTY

Even though a significant portion of Elko County has burned from 1999-2007, this planning unit continues to harbor some of the largest and most contiguous sage-grouse population in Nevada. There are 10 PMUs within Elko County with three having between 65 and 86 active leks each, the most of any PMU in the state. Personnel from various agencies including NDOW, USFS, and BLM field offices, as well as volunteers, assist with lek monitoring efforts each year. NDOW personnel normally focus on trend ground counts and ground-truthing of existing leks in the database while accompanying BLM personnel with directed efforts towards checking leks for activity associated with burned areas or in areas that have little historic data available. A continued effort will be made in Elko County to ground truth questionable leks and leks where surrounding habitat has burned over the last decade.

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks Surveyed	# of males Counted	Avg. # of males/Active Lek
Desert	46	2	2	97	48.5*
East Valley	15	5	5	27	5.4
Gollaher	123	33	6	65	10.8
North Fork	127	42	35	633	18.1
O'Neil Basin	157	43	15	274	18.3
Ruby Valley	79	24	9	250	27.8
Snake	61	9	6	104	17.3
South Fork	65	19	16	238	14.9
Tuscarora	75	21	16	548	34.3
Islands	24	0	0	0	0.0
TOTAL:	**772**	**198**	**110**	**2,236**	**20.3**

Table 6. Lek count effort and results from the 2011 spring breeding season in Elko County.
*** since just two active leks were surveys, this average is not relevant or comparable.**

During the 2011 spring breeding season, a total of 198 lek sites were visited 385 times. A peak male attendance of 2,236 males was observed on 110 active leks for an average of 20.3 males per active lek (see Table 6 for results by PMU). This represents a 23.8% increase over the 2010 average of 16.4. The 2011 average represents the third consecutive year in which attendance rates have increased. Additionally NDOW personnel monitored 17 trend leks and counted 736 males with an average of 43 males/lek. This represented a 4% increase from 2010 when 706 birds were counted on trend leks. Increases in lek attendance rates from the previous year were observed within 7 out of the 9 PMUs monitored. Some of the more significant increases were found within the Ruby Valley and Tuscarora PMUs at 76% and 28% respectively.

LINCOLN COUNTY TECHNICAL REVIEW TEAM

The Lincoln County LACP consists of three separate PMUs: Lincoln, Steptoe/Cave, and the Quinn. The Quinn PMU is mostly within Nye County, but planning and implementation activities rest with this local working group. Very little data currently exists regarding recent sage-grouse activity within the Quinn PMU. On the other hand, intensive efforts to survey leks and the use of radio-marked sage-grouse in the Lincoln PMU has greatly contributed to a useful dataset and allowed the documentation of previously undiscovered lek locations.

A total of 19 lek visits were conducted during the spring of 2011 within the Lincoln and Steptoe/Cave (south portion) PMUs. Lek visits were reduced in 2011 because of above average snowpack and very limited access to leks. The total of peak counts from each active lek counted resulted in 159 male sage-grouse classified during the 2011 spring breeding season. The average male attendance across all active leks was 13.3 and reflected a 29% increase over the 2010 value of 10.3 and a 15% increase over the 2009 value of 11.5. Improved production in 2010 likely contributed to this observed increase and moderate production in 2011 will contribute to a stable trend within Lincoln County for the short term (3-5 year period).

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks Surveyed	# of Birds Counted	Avg. # of Birds/Active Lek
Lincoln	23	10	7	92	13.1
Steptoe/Cave (south)	7	5	5	67	13.4
TOTAL:	**30**	**15**	**12**	**159**	**13.3**

Table 7. 2011 lek count effort and results within the Lincoln LACP.

WHITE PINE COUNTY LACP

The White Pine planning area mainly resides within the confines of White Pine County, with some minor exceptions. The majority of three PMUs (Butte/Buck/White Pine, Schell/Antelope, and Snake Valley) are within White Pine County. Two other PMUs (Diamond and Steptoe/Cave) are partially within White Pine County.

In White Pine County, an excellent effort by many cooperators resulted in 104 leks checked in 2011 compared to 67 in 2010. A total of 1,068 males was observed for an average of 15.5 males/active lek. Sage-grouse were not observed on 40 of the leks checked. In the second year of a long-term study along the SWIP corridor, USGS gathered trend-level data on 24 leks within the Schell/Antelope and Butte/Buck/White Pine PMUs. Data from a few of these leks was included in this year's trend assessment to fill some geographical holes in trend lek distribution. Overall, 34 comparable leks were monitored in 2011 with 554 males observed for

16.3 males/lek. The attendance rate essentially equaled the 2010 results where 561 males was counted on those same leks for an average of 16.5 males per lek. Lek trend increased in some southern portions of the county while the biggest decreases occurred in northern areas. Bright spots included south Spring Valley and Snake Valley where increases were observed after several years of low numbers.

PMU	Total Known Leks	# of Leks Surveyed	# of Active Leks Surveyed	# of Birds Counted	Avg. # of Birds/Active Lek
Butte/Buck/WP	88	50	33	655	19.8
Schell/Antelope	32	19	14	154	11.0
Steptoe/Cave	21	21	13	197	15.2
Spring/Snake	15	14	9	62	7.2
TOTAL:	**156**	**104**	**69**	**1,068**	**15.5**

Table 8. Lek count effort for White Pine County in 2011

Population Demography

OBJECTIVES

This section describes work conducted to achieve objective) stated in the Grant Agreement for Sub-grant I, Project #1 which states, "Determine age structure, sex ratios, and nest success values for various sage-grouse populations through collection and analysis of wings from hunter harvested sage-grouse…"

METHODS

Sage-grouse demographic parameters can be reasonably estimated by analyzing wings collected from hunter harvested sage-grouse. The Nevada Department of Wildlife deploys modified barrels (approximately 75) placed at strategic locations and encourages hunters to deposit one wing into the barrel or bring them to a regional office. The information gained from the collection of wings, as well as upland game questionnaire data, help determine if hunting season strategies meet the guidelines suggested by the Western Association of Fish and Wildlife Agencies (Connelly et al. 2000) for sage-grouse.

Wing barrels are equipped with large envelopes with questionnaire labels affixed to them. Questionnaires ask several questions relative to each person's hunting experience, but the most important information gained from these envelopes is the location of harvest. This allows biologists to organize wings by Population Management Unit. After the hunting season, wings are analyzed at an annual Wing Bee where biologists gather from around the state to classify wings. The Braun (1970) wing key for age and sex classification of sage-grouse is utilized for proper identification.

RESULTS

A total of 2,201 sage-grouse wings were collected during the 2010 hunting season (or shortly thereafter), which was 18% less than the 2009 collection of 2,680 wings. The sample size was also 5% less than the 10-year average of 2,323. The complete results of the 2010 Wing Bee are provided in Table 9.

2010 SAGE-GROUSE DEMOGRAPHY
ESTIMATED VIA HUNTER HARVESTED WINGS

AREA (PMU)	ADULTS		JUVENILES		TOTAL SAMPLE	CHICKS /HEN
	Males	Females	Males	Females		
Western Region						
Sheldon NWR	15	28	36	50	129	3.07
Buffalo/Skedaddle	6	11	4	7	28	1.00
Massacre	12	60	42	55	169	1.62
Vya	4	5	7	4	20	2.20
Santa Rosa	29	60	29	41	159	1.17
Lone Willow	53	105	153	132	443	2.71
Desatoya*	30	31	32	35	128	2.16
Black Rock	10	4	7	6	27	3.25

2010 SAGE-GROUSE DEMOGRAPHY ESTIMATED VIA HUNTER HARVESTED WINGS (continued)						
AREA	ADULTS		JUVENILES		TOTAL SAMPLE	CHICKS /HEN
	Males	Females	Males	Females		
Eastern Region						
Desert	7	6	2	4	19	1.00
Tuscarora	16	21	16	23	76	1.86
Northfork	22	61	80	61	224	2.31
Island	2	2	1	1	6	1.00
O'Neil	0	14	6	11	31	1.21
Snake	0	6	4	6	16	1.67
Gollaher	5	11	9	14	39	2.09
Ruby Valley	2	5	5	3	15	1.60
Southfork	11	37	16	30	94	1.24
Diamond	6	4	0	7	17	1.75
Cortez	6	10	3	3	22	0.60
Three Bar	24	53	35	32	144	1.26
Shoshone	2	5	3	1	11	0.80
Toiyabe	12	30	18	45	105	2.10
Butte/Buck/WP	7	35	22	29	93	1.46
Schell/Antelope	1	6	2	3	12	0.83
Steptoe/Cave	3	1	0	0	4	0.00
Southern Region						
Monitor	9	33	24	25	91	1.48
Reese River	4	12	11	24	51	2.92
Other Central NV	12	5	3	4	24	1.40
Totals:	**310**	**663**	**571**	**657**	**2,201**	**1.85**

Table 9. Wing-Bee Results from the 2010 Nevada sage-grouse hunt.
*** The Desatoya PMU currently has a two day season, whereas other hunt units currently have a 15 day season.**

Estimated sage-grouse production in Nevada was 1.85 chicks per hen for 2010, which is less than required to maintain a slightly increasing population. According to Connelly et al. (2000), ≥2.25 chicks per hen are necessary to maintain an increasing population. However, it is felt that the 2010 value is adequate to maintain a stable population across the state. The 2010 estimate was 12% less than the 2009 estimate of 2.10 chicks per hen, but is almost 16% greater than the 10-year average production value of 1.60 chicks per hen. Table 10 displays production values for various regions throughout Nevada.

One of the other important values that wings allow biologists to estimate is nest success. Over the last two years relatively high nest success values have been observed. The number of hens that likely had a nest that produced at least one chick was estimated to be 362 or 54% of the adult hens analyzed. In 2009, nest success was estimated at almost 58%. Both the 2009 and 2010 values are well above the 2002-2009 average of 42.6%.

SAGE-GROUSE PRODUCTION (chicks per hen) LAST FIVE YEARS						
AREA	**2006**	**2007**	**2008**	**2009**	**2010**	**AVERAGE**
Sheldon PMU	2.82	0.38	3.26	2.45	3.07	2.40 (high)
Massacre PMU	1.27	0.57	2.21	2.16	1.62	1.57
Vya PMU*	0.25	2.00	N/A*	2.50	2.20	1.74
Santa Rosa PMU	0.67	0.39	1.85	1.37	1.17	1.10
Lone Willow PMU	0.90	0.81	2.11	2.93	2.71	1.89
Snake PMU*	1.21	0.49	0.74	0.70	1.67	0.96 (low)
Elko County	1.61	0.67	1.28	1.90	1.79	1.45
Eureka County	1.21	0.55	1.55	2.28	1.19	1.36
Lander County	1.25	0.32	1.58	1.54	1.91	1.32
White Pine LACP	1.92	0.67	1.52	1.96	1.33	1.48
Nye County	2.18	0.67	1.42	1.56	1.82	1.53
Statewide Average	1.13	0.58	1.69	2.10	1.85	1.47
Sample Size	2,813	1,496	1,662	2,680	2,201	2,170
Statewide Harvest	**3,710**	**4,897**	**5,775**	**8,944**	**7,355**	**4,665**
% of Harvest in Sample	76%	31%	29%	30%	30%	39%

Table 10. Five-year production values for sage-grouse via analysis of wings.
*** Indicates inadequate sample size to calculate a reasonable estimate for this year.**

DISCUSSION

The most important parameter estimate obtained through wing analysis is production. Because overwinter mortality is inherently low within sage-grouse populations, production values provide one of the most reliable indicators regarding population trends for the next year. Overall, production values were mixed across the state, which may have been reflective of some odd weather patterns experienced during the spring of 2010. Some areas experienced very cold, wet and windy conditions late into the spring of 2010, whereas others where more moderate. The Sheldon National Wildlife Refuge continues to show relatively high production values (2.40 chicks per hen average) and the Lone Willow PMU (Montana Mountains) also shows relatively strong production values (1.89 chicks per hen average). However, some areas such as the Santa Rosa PMU and Lander County region regularly show relatively low production values (1.10 and 1.32 chicks per hen average respectively).

Consistent with higher production values observed over the last two years are the estimated nest success values. From the data collected since 2002 regarding nest success, production is highly correlated with nest success (Figure 2). Nest success values that approach 50% will likely result in positive production values that will maintain or increase population levels. However, with nest success over the last two years of 58% (2009) and 54% (2010) it is somewhat surprising that production values have not been higher. With increased nest success and production over the last two years, sage-grouse populations are expected to show a moderate increase in 2011 with potential carry-over into 2012.

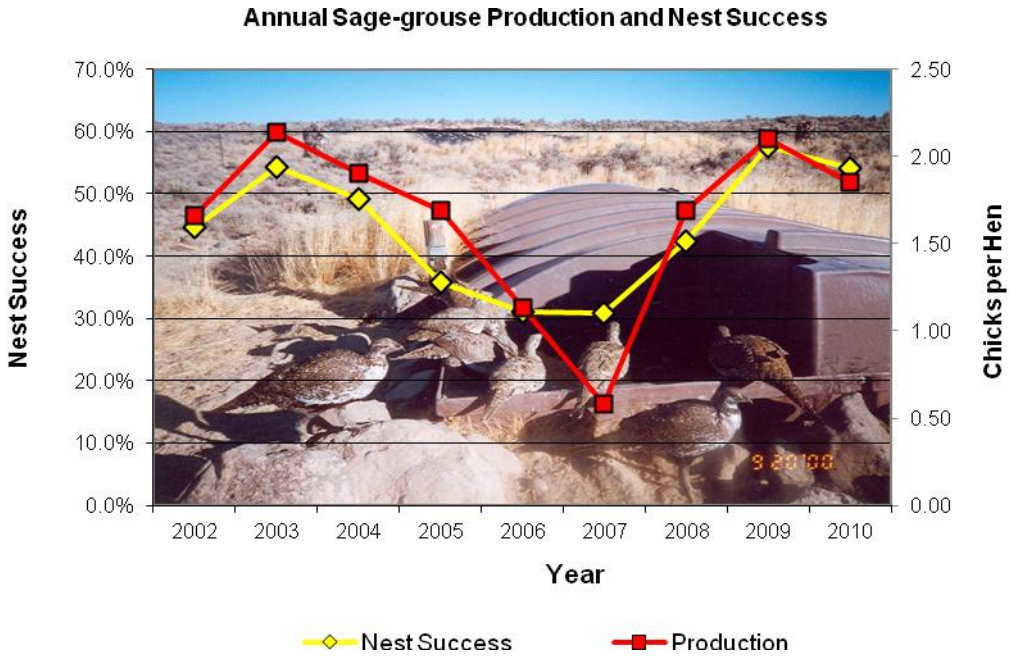

Figure 2. Sage-grouse production and nest success values estimated from wing analysis from 2002 through 2010.

Population Delineation

Reports by: Shawn Espinosa, Ken Gray, Kari Huebner, Matt Jeffress, and Jeremy Lutz

OBJECTIVES

This section describes the work conducted to help achieve objective d) identified in the Grant Agreement for Sub-grant I, Project #1. The statement basically identified three different objectives related to radio marking efforts and includes the following:

- Verify and/or refine population management unit boundaries that were delineated based on little information or biologist judgment;
- Determine migratory nature of specific populations; and
- Determine response of sage-grouse populations to various treatments or conservation efforts or disturbances such as wildfire and energy development...

SUMMARY

The attachment of radio transmitters to sage-grouse is a technique widely used to delineate a population's seasonal distribution and movement corridors. Standard (VHF) transmitters require regular ground and aerial follow-up, which is labor and equipment intensive.

Fewer radio-marking projects were conducted specifically by NDOW personnel in state fiscal year 2011 than in previous years. This can partially be attributed to the amount of other radio-marking efforts being conducted by other entities such as the USGS or University of Nevada, Reno through contract with NDOW. Much of the work associated with this project was conducted to monitor sage-grouse captured in previous fiscal years; however, there were 48 sage-grouse captured consisting of 32 females and 16 males. The majority of these birds were radio-marked and leg banded. Follow-up surveys were conducted throughout the year from ground and aerial surveys.

Elko County

Willow Creek Reservoir Lek #06

Two radio-marked sage-grouse remained alive as of July 1, 2011 from capture operations conducted in the spring months of 2011. Trapping operations focused on capturing females to document use of seedings following the devastating fires of 2005 and 2006. Two females were collared. Since May 2, 2011 a total of 4 surveys have been directed at monitoring these sage-grouse. Survey efforts include 2 ground surveys and 2 fixed-wing aerial surveys.

Hen 159.245 was captured on 5/2/2011. This hen nested in a small island of sagebrush 3.4 miles southeast of her capture site. The nest, consisting of 5 eggs, was found in a small island of sagebrush within the 2005 Esmeralda Burn. A follow-up survey on 6/22/2011 found the hen was located 3.3 miles southeast of her nest site with 3 hens and no chicks.

Hen 159.265 was captured on 5/3/2011. Her nest, consisting of 2 eggs, was found 0.5 miles from her capture location in a small island of sagebrush. Aerial survey on 6/14/2011 located the hen in a 10 acre island of sagebrush approximately 5 miles northeast of her nest site, within the 2006 Winters Creek Fire. Nesting success was not determined prior to 7/1/2011.

Midas Creek Lek

One radio-marked sage-grouse remained alive as of July 1, 2011 from capture operations conducted in the spring months of 2011. Trapping operations focused on males around the Midas Creek Lek. Declining numbers of males attending the lek coincide with new vents installed at a nearby underground mine. These vents create a noticeable amount of noise that may have disturbed birds utilizing this lek. Over 30 males were observed near the lek during the winter of 2010-2011, however only 6 males were counted on the Midas Creek Lek during 2011. This is down from 18 in 2006, prior to the installation of the vents. NDOW is interested in delineating movements of male sage-grouse near the Midas Creek Lek throughout the year. One male was collared on 5/6/2011. A ground survey on 5/30/2011 found the male within 0.5 miles of the collaring site with 6 other males.

Hot Springs Complex: Hot Springs 16NW Lek and Hot Springs Lek

Five radio-marked sage-grouse remained alive as of July 1, 2011 from capture operations conducted in the spring months of 2011. Two males and 1 female from each lek were collared for a total of 6 birds. Sage-grouse were collared in an effort to monitor movements of birds associated with the construction of a geothermal power plant. A total of 4 surveys have been directed at monitoring these sage-grouse. Survey efforts include 2 ground surveys and 2 fixed-wing aerial surveys. Hen 159.286 was collared on 5/6/2011 near Hot Springs 16NW and a mortality signal was obtained on 5/24/2011. The cause of death was not determined. Hen 159.256 was collared on 5/6/2011 near Hot Springs. No nest or nesting attempts were documented and this hen stayed within 2 miles of the capture site. All 4 males remained within 3.5 miles of their respective capture sites.

Flat Creek Sage Grouse Collaring Project

A sage-grouse trapping effort was conducted in the Flat Creek area north and east of the Jarbidge Wilderness area. The area has always been important habitat for summering and brood rearing sage-grouse. In 2008 the East Slide Rock Ridge fire burned through this area eliminating most of the sagebrush habitat. The intent of this collaring effort was to obtain a better understanding as to how sage-grouse would use the habitat post-burn. Specifically, the main objective of the project was to gain knowledge regarding the use of leks as well as where the birds would attempt to winter.

Three males and 2 hens were captured in efforts in August and September of 2009. Eight telemetry flights were conducted and several ground follow-ups were made. Unfortunately as of July 1, 2010 only 1 of the 5 collared birds remain alive. She was located 2 more times, but could not be found after September 30, 2010. She summered in the same general area as the previous year on Flat Creek Bench. Two males died on winter range in December 2009 on the lower reaches of Deer Creek in Idaho. This area was part of a previous burn. The third male died close to a lek near Devils Table. This male was the only sage-grouse of the 5 that moved south from the original capture location. He spent time in Camp Creek before he went to Devils Table for the lekking season. A ground follow-up was conducted but cause of death could not be determined. One of the 2 remaining hens died in June 2010 within the Cherry Creek drainage. She had spent most of her time on the Flat Creek Bench where she was collared.

No new leks were documented through following these bird's movements. The male that made it through the spring was associated with lek NW Devils Table and the 2 hens were associated with lek Pole Creek #9. It is not clear if the other males that died in the winter succumbed to conditions brought on from lack of sagebrush due to fire. Other than the 1 male that went south of the project area, it appears these birds rely on habitat in Idaho for much of the year.

Lander County

Bates Mountain

Wind energy exploration was initiated on Bates Mountain (Simpson Park Range, Lander County) in 2008 with the erection of 1 meteorological (Met) tower and the clearance of 3 other sites. Two Met towers have been erected to gather wind data, but both towers have failed and have fallen down during the winters of 2008 and 2009. In order to obtain some baseline information on the high density sage-grouse population that inhabits this mountain, a radio-marking project was initiated. This is the third year of this effort, which was initially designed to show sage-grouse distribution on Bates Mountain in relation to Met-Tower sites. This study was redesigned in 2009 and 2010 with the same intention of learning about distribution but was expanded in order to document seasonal movements and limiting factors for sage-grouse in this PMU.

In September 2010, a 1-night trapping effort resulted in the capture of 35 sage-grouse. All 35 grouse were caught on top of Bates Mountain, located on the south end of the Simpson Park Mountains within the Toiyabe PMU. Each sage-grouse was leg banded and 10 adult hens were outfitted with VHF radio transmitters that last up to 18 months. The captured grouse consisted of 11 adult females, 4 adult males, 15 juvenile females and 5 juvenile males. During the one night capture event over 200 sage grouse were seen throughout Bates Mountain. Following capture, 9 aerial telemetry flights were conducted by Owyhee Air.

Sage-grouse on Bates Mountain start to migrate off the top in September and concentrate on lower elevations around the McGinness Hills area and to the south around Dry Creek and Ackerman Canyons. A few collared birds continued to the south in Monitor Valley around Hickison Summit and around the Grimes Hills. In January more than half of the collared hens had moved from the Dry Creek area to the south ~15 miles around the Grimes Hills. The remaining birds were found in and around the McGinness Hills area. By April and May the majority of the collared hens started moving back to the north around known lekking areas around Dry Creek and Ackerman Canyon. The hens around McGinness Hills never moved out of the area and again were found concentrated around known leks.

Very little mortality occurred in FY10 with the highest number (n=3) documented in October. It is believed that sage-grouse from Bates are more vulnerable to predation as they migrate from summer elevations to lower wintering elevations.

Over the last 3 years, a total of 90 sage-grouse have been caught and banded on Bates Mountain. A letter was placed inside wing collection envelopes at the Grass Valley and Hwy 50 exit wing barrel in 2009, 2010 and 2011 to inform sage-grouse hunters of this project as well as ask for their cooperation to identify general locations of where birds were harvested and obtain band numbers if present. Since 2008 only 1 banded bird has been recorded. This bird was harvested in 2011 and was banded in October of 2010.

CONSERVATION PLANNING

Governor's Strategic Planning

Report by: Shawn Espinosa

OBJECTIVES

The major objective of the Nevada Governor's Sage-grouse Conservation Team (SGCT) is to address threats or develop guidance at a statewide level and to assist local working groups with the implementation of prioritized projects. Other objectives include completing the Second Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California and developing semi-annual workshops.

SUMMARY

The Nevada Governor's Sage-grouse Conservation Team (SGCT) held a total of 7 meetings in fiscal year 2011. A moderate amount of staff personnel time was spent developing agendas, coordinating meeting dates and facilitating meetings. Minutes, taken by an Administrative Assistant, are also developed for each meeting. The following topics were the focus of several meetings:

- Restoration Value Mapping of Sage-grouse Habitats within Nevada
- Candidate Conservation Agreements with Assurances
- Ruby Pipeline Mitigation Funding and Projects
- NRCS Sage-grouse Initiative (implementation)
- Local Working Group (facilitation and re-invigoration)
- Wild Horse Management (appropriate management levels)
- BLM Fuels Management Program (fire readiness)
- BLM National Sage-grouse Conservation Plan (Instruction Memorandum and Conservation Measures)

One of the most time consuming, but important tasks was completing a statewide standardized Restoration Value (or R-value) map for the state of Nevada that rated the overall quality of sagebrush habitats in Nevada. This task was a joint effort between the BLM Nevada State Office, Districts and the Nevada Department of Wildlife. This was an essential accomplishment and precursor to the Nevada Sage-grouse Habitat Categorization mapping which will be accomplished in fiscal year 2012. The R-value map acts as a base layer upon which all available sage-grouse data is overlaid. This information, coupled with biologist knowledge of specific areas allowed us to rate vegetative polygons from Category 1 through 5 with lower values being the most important and higher values being the least.

Sage and Columbian Sharp-tailed grouse Technical Committee

Report by: Shawn Espinosa

SUMMARY

The Western States Sage and Columbian Sharp-tailed Grouse Technical Committee (Tech Committee) has required a moderate amount of staff time over the last decade due to the status of Greater Sage-grouse. The Upland Game Staff Specialist devoted considerable time to several tasks including the following:

- Rangewide Energy Guidelines for Greater Sage-grouse
- Guidelines for Managing Columbian Sharp-tailed Grouse Populations and Their Habitats
- Decision Support Tool for Managing Sagebrush Habitats for Greater Sage-grouse

These documents are in various stages of completion as of this writing. Development of the Rangewide Energy Guidelines for Greater Sage-grouse was assigned to a subcommittee of the Tech Committee which included the Department's Upland Game Staff Specialist. An initial draft of the document was completed prior to the end of the fiscal year (June 30, 2011) and a second draft is currently being reviewed. A third draft will be available to the entirety of the Tech Committee during state fiscal year 2012.

A complete review was provided of the Guidelines for Managing Columbian Sharp-tailed Grouse Populations and their Habitats by the Upland Game Staff Specialist. This document was created through a contract between the Colorado Division of Wildlife and Parks and one of the leading experts on the species. This product is expected to be completed by the end of fiscal year 2012.

The Decision Support Tool for Managing Sagebrush Habitats for Greater Sage-grouse is a product that has been discussed for some time to address management actions that may alter sagebrush communities that support sage-grouse. These management actions need to consider the habitat requisites for sage-grouse at multiple scales. Sage-grouse are a landscape scale species requiring extensive, interconnected sagebrush habitats. Within this landscape they select seasonal habitats defined by specific biotic and abiotic features. Management activities in these habitats that alter characteristics at either fine or coarse scales can have serious implications to the persistence of populations. Management decision support tools have been developed for other restoration actions. In 2007 and 2009, decision support tools were provided for assessing appropriate management actions in pinyon and juniper communities. A similar tool for management of sage-grouse habitats within sagebrush communities would benefit managers that are contemplating management and restoration actions to benefit the species.

The Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee are continuing the pursuit of funding partners to assist with the development of a sagebrush community management support tool. The support tool would be developed by sagebrush ecology and management professionals/experts working in close cooperation with the Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee.

Local Area Conservation Planning & Implementation

Report by: Shawn Espinosa, Ken Wilkinson, Chris Jamison and Scott Soletti

OBJECTIVES

The following objectives were identified in the W-64-R-11 Grant Agreement for this particular job:

- Complete any unfinished population management unit plans, revise existing plans and refine projects identified within those plans; and
- Assist with and/or conduct implementation of suggested projects within completed plans.

The following summaries describe the work accomplished during state fiscal year 2009 including project implementation, population management unit planning and major habitat issues.

Elko County LACP

SUMMARY

The Elko County planning area harbors the largest, most contiguous population of sage-grouse in Nevada and is considered a high priority area. The Northeastern Nevada Stewardship Group and its Sage-grouse POD subcommittee as well as various agency representatives all play a role for planning and implementation of projects to conserve and improve sage-grouse and sagebrush habitats.

The majority of "on the ground" work in this planning area centered on restoring and stabilizing areas burned in 2010. Many of these fires were not significantly large, relatively, but were in need of attention via seeding and other treatments. Table 11 provides a summary of the fires that occurred and their size:

Fire Name	Location (Range)	Size	Restoration Costs (BLM)
Bailey Fire	Sulpher Springs	2,686	$284,700
Fox Springs Fire	South Independence	690	$240,000
Chicken Springs Fire	Granite Springs	268	$97,000

Table 11. 2010 Elko County fire restoration efforts.

The majority of fire rehabilitation efforts often involved seeding, noxious weed treatment and reconstruction of fences. Seeding is conducted either by drill seeding or aerial broadcast. Wyoming big sagebrush and western yarrow were commonly used on these fires to restore these sites to their native state and to benefit sage-grouse as well as other sagebrush obligate species. Other seed used included antelope bitterbrush, Snake River wheatgrass, thickspike wheatgrass, Sherman bluegrass and Great Basin wild rye.

In addition to, but separate from these fire restoration efforts, four springs and associated wet meadow habitats were enhanced by the installation of fencing and offsite water development located in the Snake PMU. The springs are considered important brood rearing

habitat for sage-grouse. The springs and meadows are now expected to hold water later in the year and sustain longer plant productivity. This should enhance the habitat value to late summer use by sage-grouse and other native wildlife.

Within the O'Neil PMU, three miles of perennial stream were fenced off into a riparian pasture. This fencing will allow for control of grazing along the stream and ensure that the stream system and water table continue to function and supply the 750+ acres of associated meadow with constant ground water. This project is expected to benefit sage-grouse by allowing better management of the stream system, meadows, and the habitat that is associated with them.

Finally, within the Tuscarora PMU, there were approximately 500 acres of fuel breaks and noxious weed control efforts completed. These treatments consisted of spraying and then reseeding areas that were invaded with cheatgrass. The herbicides used varied by site, but were being used to control both cheatgrass and purple mustard. Native and non-native plants were used as follow up treatments in the herbicide treated areas. Although only 500 acres were completed, the benefit of the firebreaks is the protection of thousands of acres of prime sage-grouse habitat.

There was much work completed behind the scenes in Elko County in setting up a local working group of the Nevada Partners for Conservation and Development. This effort was spearheaded by the USFWS, NDOW, and NRCS. Although the LWG is not yet completely up and running, several meetings were held and the PCD process is expected to be moving forward in early 2012 with project funding and implementation.

Lincoln LACP

SUMMARY

The Lincoln LACP consists of the Lincoln PMU, the southern portion of the Steptoe/Cave PMU and the Quinn PMU. Populations of sage-grouse in the Lincoln and Steptoe/Cave PMU are considered small to moderately sized, but are considered stable to slightly increasing over the last ten year period. However, little information exists for the Quinn PMU and population size is not well understood.

The working group associated with these PMUs has focused the majority of their efforts on preventing utility scale wind development within priority sage-grouse habitat in the Lincoln PMU. For several years now, a utility scale wind development has been proposed for Table, Wilson and White Rock Mountains, which comprise a majority of nesting and brood rearing habitat for sage-grouse within the PMU and the County. The Lincoln County Board of Commissioners adopted three separate resolutions opposing wind development on Table, Wilson and White Rock Mountains, but sought to identify alternative sites for energy development within the County that would be compatible with other uses. In 2011, Lincoln County introduced a Senate Bill (287) that would express opposition to wind development within the areas identified above. The Bill became a Concurrent Resolution, but was never actually passed even though it received support from both the Senate and Assembly Committee on Natural Resources. Nevertheless, the efforts of the local working group and the County have been recognized by the Bureau of Land Management and will be considered during the development of the Environmental Impact Statement.

In addition to these efforts, members of the local working group have also obtained funding through the Wildlife Heritage Trust Account program to conduct pinyon and juniper removal work within the Lincoln PMU. The majority of this work will be conducted by hand crews in the vicinity of active leks and will expand upon previous work completed in 2006 and 2007. The available funding will allow for the treatment of up to 400 acres of pinyon and juniper encroached sagebrush shrub lands.

White Pine LACP

SUMMARY

The White Pine local conservation planning area includes four main PMU groups including the Butte/Buck/White Pine, Schell/Antelope, Spring/Snake Valley and the Steptoe/Cave PMUs. This planning area harbors a moderate to large sized sage-grouse population relative to the other six planning areas in Nevada. To a degree, this is a result of the size of the planning area more than bird density. Of the PMU groupings, the Butte/Buck/White Pine PMU group is the largest in terms of area and also harbors the most significant sage-grouse population within the White Pine LACP at 6,579 sage-grouse (2010 minimum spring breeding population estimate).

Projects involving sage-grouse within the planning area include intensive lek monitoring and habitat improvement projects. Considerable effort has been aimed at refining the lek database and resolving the status of longstanding but rarely monitored lek sites. Some of the lek monitoring and telemetry work has been conducted to monitor the effects of different infrastructure projects involving White Pine County including the Southwest Intertie Project (transmission line), Southern Nevada Water Authority groundwater pipeline to Las Vegas and several proposed wind energy facilities. These projects have the potential to negatively affect sage-grouse populations within this planning area.

Several sage-grouse habitat improvement projects have taken place within this planning area with some of these projects continuing for the immediate future. Projects have been initiated by several agencies including the Bureau of Land Management – Ely District (BLM), U.S. Forest Service – Ely Ranger District (USFS), the Nevada Department of Wildlife (NDOW), the Natural Resource Conservation Service (NRCS) and the Eastern Nevada Landscape Coalition (ENLC) in conjunction with private landowners. The following is a brief summary of project work taking place in White Pine County.

White Pine Range:

The White Pine Range Sage-grouse Habitat Enhancement Project continued in FY 2011. Work took place between Copper Creek on the south and Stone Cabin Spring on the north. This work again involved the removal of smaller pinyon and juniper trees from sagebrush and mountain brush habitats utilized by sage-grouse as breeding, brood rearing and fall habitat. The project represented a cooperative effort between the U.S. Forest Service, Rocky Mountain Elk Foundation (RMEF) and NDOW. Treatment was conducted by hand (chainsaw crew) utilizing the Great Basin Institute – Nevada Conservation Corps. Trees selected for removal are young trees that have established within the mountain and Basin big sagebrush habitat. On an average there are about 10-50 trees/acre. Approximately 1,750 acres were treated in 2011. The total project area involves approximately 12,000 acres and treatment will occur over several years. The USFS, NDOW and RMEF provided funds for this project.

White Pine Sagebrush Restoration Project:

Located on the southeast side of the White Pine Range, this USFS project continued FY11. Pinyon and juniper trees were removed from approximately 800 acres including 450 acres by Nevada Division of Forestry crews and 350 acres by a private contractor. This project is taking place on bench areas where pinyon/juniper encroachment is advanced. All trees are being removed regardless of size and age. Pretreatment use by sage-grouse was thought to be minimal. However, with active leks, nesting, early brood rearing and winter habitats occurring a short distance to the north, this project should provide some expanded habitat values for sage grouse in the longer term. To date, trees have been removed from approximately 2,000 acres with plans for an additional 1,000 acres to be treated next year. This project is being funded through SNPLMA dollars.

North Antelope Range:

This project area is approximately 10-12 miles east of Lages Station and involves the hand removal of pinyon and juniper trees utilizing chainsaws and medium-weight equipment. All trees are being removed. The north Antelope Range contains key summer/late brood rearing habitat and a significant sage-grouse resource. The project areas are on the lower elevation benches surrounding the summer range, and are considered to be sage-grouse winter, breeding and potentially nesting and early brood rearing habitat. Two active leks are located within three miles of the project areas. During this FY, 800 acres were treated under a stewardship contract paid for under the American Recovery and Reinvestment Act and Renewable Energy (Biomass) Authorizations. The total acreage target for this project is 2,200 acres. Biomass is being removed for use as firewood as well as biomass burning for heat at the local school district.

Stonehouse:

This project involves chaining on the east bench of the Schell Creek Range and hand removal of pinyon and juniper trees on the west bench of the Antelope Range, both within the north Spring Valley watershed. The presence of leks as well as telemetry data and other observations suggest that these benches are utilized as winter, breeding, nesting and early brood rearing habitat. The two large leks which are located within the project area (Stonehouse and Stage Canyon East) supported 40 and 24 males respectively in 2007. These grouse are thought to utilize summer habitats at higher elevations in the nearby Antelope and Schell Creek Ranges. During this FY, first-pass chaining was completed on 3,200 acres of sagebrush bench that was lightly to moderately encroached with pinyon and juniper trees. In FY12, first pass chaining will be completed, bringing the total acres chained to 3,200 acres, as well as seeding and second pass chaining. Hand cutting of scattered trees in the vicinity of the two large leks will also be accomplished.

North Creek:

The Rocky Mountain Elk Foundation provided $15,000 to fund the removal of encroaching pinyon and juniper trees from 350 acres of a mountain sagebrush community in the North Creek drainage which is in the northern portion of Duck Creek Basin in Schell Creek Range. This work should improve the value of the area as potential nesting, early brood-rearing and winter habitat on USFS land

Bi-State LACP

SUMMARY

There are portions of 4 PMUs within the Bi-State area that are within Nevada and include the Pine Nut, Desert Creek/Fales, Mount Grant/Bodie and White Mountains PMUs. The largest populations of sage-grouse within the Nevada portion of the Bi-State area reside in the Desert Creek and Mount Grant PMUs. The major threats to the Bi-State population of sage-grouse are pinyon and juniper encroachment into sagebrush and meadow habitats and suburban development.

In fiscal year 2011, implementation of the China Camp Sage-grouse Habitat Enhancement project continued within the Mount Grant PMU. This project involves the restoration and enhancement of important sage-grouse nesting and brood-rearing habitat. Although this project is specifically targeting the improvement of sage-grouse habitat, it will also include reduction of fuels within pinyon pine stands surrounding suitable sage-grouse habitat. The reduction of fuels is important to forest health within the area. The total size of the project area is approximately 700 acres.

The USFS – Bridgeport Ranger District completed planning and scoping of the Long Doctor Spring habitat restoration project. This project is within the Nevada portion of the Desert Creek/Fales PMU. The project area will be treated through the use of a hand crew utilizing chainsaws. This project will enlarge and improve brood rearing habitat for sage-grouse.

Planning is nearly completed for a long-term habitat improvement project in the Pine Nut PMU. The Buckskin Valley Vegetation Treatment Project would be implemented over a 10-year period to improve the health of sagebrush plant communities that provide important habitat for sage-grouse and other wildlife species. The total project area is approximately 7,000 acres and the proposed vegetation treatments include thinning of conifers and seeding of native plants. A majority of the acreage to be treated is sagebrush and associated herbaceous species that has been invaded by young pinyon pines and juniper trees.

Staff and field time have also been used to identify important brood rearing habitats on private lands and work with private landowners to potentially develop Candidate Conservation Agreements with Assurances or conservation easements to maintain large blocks of private land suitable for brood rearing habitat. One of the main concerns or threats identified within the Nevada portion of the Bi-State population was urbanization or subdivision, especially within the Pine Nut and Desert Creek PMUs. Conservation easements would be especially important within the Desert Creek and Mount Grant PMUs. Some progress has been made in this arena to date; however, final agreements are not in place.

North Central LACP

SUMMARY

The North Central planning area consists of 19 different PMUs. The largest populations are located within the Lone Willow and Santa Rosa PMUs followed by moderately sized populations within the Black Rock, Sonoma and Pine Forest PMUs. Currently, restoration or habitat improvement work for sage-grouse are generally located within these PMUs, mainly due to labor and funding resources.

During fiscal year 2011, funding proposals were established and approved for the Stocks Creek/Holloway Meadow Restoration project within the Santa Rosa PMU. Subsequent to this, a contract was developed with the USFS – Santa Rosa Ranger District to complete the work. This project will restore and improve existing late brood rearing habitat for sage-grouse within the upper reaches of the North Fork of the Little Humboldt watershed in the northern portion of the Santa Rosa Range located in Humboldt County. Stocks Creek has been head cut, largely due to road and culvert placement as well as some overutilization by livestock. Subsequently, the water table is lowered causing

Holloway Meadow looking northwest. Notice desiccated condition.

early drying of the meadow, which allows upland species to encroach into the meadow. Restoring the base level of the stream channel through grade control structures and improving the culvert crossing will improve the condition of the meadow over time. The total project area encompasses approximately 50 acres that will benefit from the restoration efforts. The project is on schedule to be completed in fiscal year 2012.

In addition to the Stocks Creek/Holloway Meadow project, planning and scoping was also completed for a meadow restoration project within the Lone Willow PMU. Restoration of the Fourth of July Meadow area will require the completion of the following tasks:

- Phase 1 of exclosure fencing.
- Culvert removal and water crossing improvement on Pole Creek Road.
- Meadow restoration:
  - Downstream grade control rock riffle.
  - Stream bank terracing/re-sloping.
  - Revegetation
- Phase 2 of exclosure fencing.
- Pre- and Post- construction monitoring.
- Completion of required NEPA analysis and documentation

Funding for this project was proposed and approved through the Ruby Pipeline Mitigation Fund. Phase 1 of the exclosure fencing is expected to be completed in fiscal year 2012 with the remainder of restoration work likely to be completed in early fiscal year 2013. The total project area is approximately 171 acres (Figure 3).

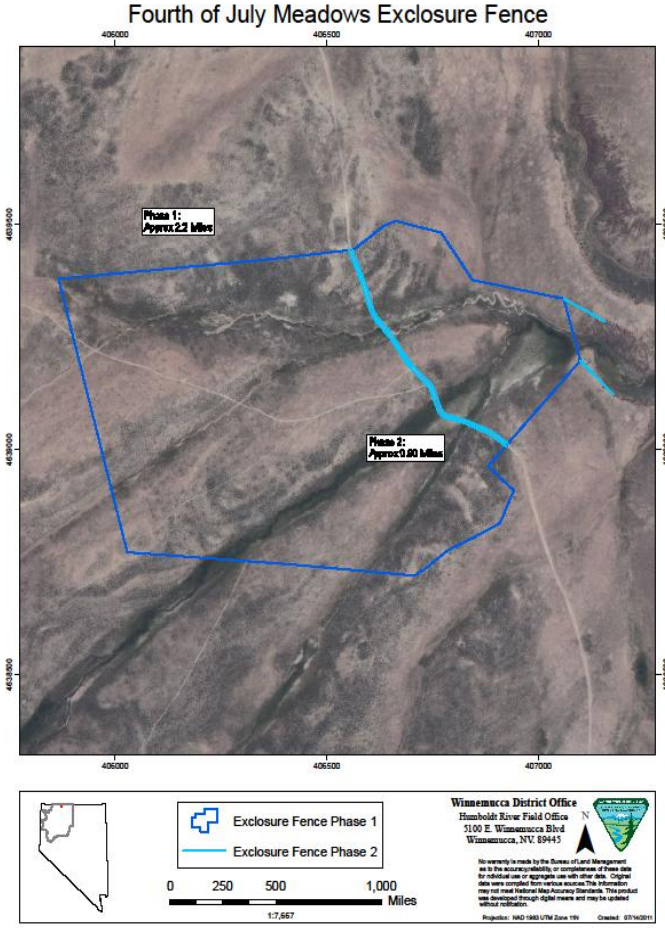

Figure 3. Fourth of July Meadow exclosure.

In the southern portion of this planning area, the BLM is in the process of completing an Environmental Assessment for the Desatoya Mountains Habitat Resiliency, Health and Restoration Project. This is a landscape scale project that involves approximately 32,000 acres of direct treatment within a 230,000 acre project area. There are multiple partners involved with the project including USGS, NDOW, Great Basin Bird Observatory, University of Nevada, Reno, Smith Creek Ranch and the USDA - ARS and NRCS. The goals and objectives of this project include the following:

- Enhance sagebrush and degraded wet meadow habitat for sage-grouse and other sagebrush dependent species
- Enhance P/J woodland habitat for declining P/J dependent bird species and mule deer
- Protect or enhance riparian habitat that supports aspen, cottonwood and diversity of bird and mammal species
- Reduce fuel loads and catastrophic fire risk

Proposed treatments include the following:

- Up to 100% P/J removal on up to ≈18,000 acres
- 20 to 75% P/J removal on up to ≈14, 000 acres
- 8 miles of meadow/riparian fencing
- Several pipelines and troughs
- Mowing/herbicide treatment of decadent rabbit brush/sagebrush
- Hydrological assessment in Porter and Dalton Canyons.
- Water/bait trapping of free-roaming horses (includes birth control)

Washoe-Lassen-Modoc LACP

SUMMARY

The Washoe/Lassen/Modoc LACP is made up of six Population Management Units (PMUs) including the Vya, Massacre, Sheldon, Buffalo/Skedaddle, Virginia and Pah-Rah PMUs. The majority of these PMUs are in Nevada; however, a significant portion of the Buffalo/Skedaddle PMU is in California and is considered a priority PMU from California's standpoint.

Within the Vya PMU, the BLM – Surprise Field Office implemented several projects to both improve and restore riparian habitat and also alleviate juniper encroachment into existing sagebrush habitats. Two exclosures (Smiling Dog and Antelope Spring) were constructed in the Calcutta Allotment within the Vya PMU to improve existing spring conditions and brood rearing habitat for sage-grouse. The Antelope Spring exclosure is approximately 20 acres in size with new troughs located outside of the exclosure and riparian area for livestock use. The Smiling Dog exclosure is 12.5 acres. Two juniper thinning projects were also implemented within this PMU. Encroaching juniper was removed in and around Smiling Dog spring and totaled approximately 20 acres. The other project (26 acres) was cutting, piling, and burning juniper on the Cowhead project. The BLM is finishing Scoping for four riparian exclosures in the Nut Mountain allotment which lies within both the Vya and Massacre PMU's. These exclosures are slated for completion in 2011 and will protect important water sources and improve brood rearing habitat that has been impacted by heavy livestock and wild horse utilization.

Two juniper reduction projects were also implemented in the Buffalo/Skedaddle PMU. Approximately 190 acres of new juniper cutting was conducted in the Coppersmith Hills (near Bud Brown) within two miles of an existing lek location with unknown status. The goal of this project is to improve and protect nesting and brood rearing habitat within this portion of the PMU. Approximately 130 acres of juniper removal was also conducted at the Dodge bitterbrush project to improve sage-grouse summer habitat. This project was a cooperative project between a livestock permitee, NRCS, and BLM.

The Ruby pipeline project was completed in 2011 and passes through the Vya and Massacre PMU's. Ruby worked cooperatively with BLM and NDOW to develop a mitigation funding source to fund wildlife habitat projects to offset impacts to wildlife that resulted from installation of the pipeline. The Surprise-Field Office BLM and NDOW have worked cooperatively to develop, review, and approve sage-grouse habitat projects to fund through this funding program. In addition to wildlife habitat projects, BLM and NDOW are working with the University of Nevada, Reno on a proposal to conduct sage-grouse research within the Massacre, Sheldon and Vya PMU's.

Approximately 2,500 acres burned within the Vya PMU in California near Fort Bidwell, along Lake Annie. Summer sage-grouse and brooding rearing habitat were affected by the fire. The lower elevation sites within the fire had a cheatgrass and medusahead rye component and will likely not recover to pre-fire conditions. The majority of the fire occurred on private lands. No other large fires (greater than 5 acres) occurred within the Surprise Field Office area of responsibility.

South Central LACP

SUMMARY

The South Central Planning area consists of 10 PMUs within Eureka, Lander and Nye Counties. PMU sizes vary from some of the smallest in the state (Battle Mountain and Fish Creek) to the very largest (Monitor). The majority of this area is very remote with only a few small towns near PMU edges. Project work was focused on sage-grouse habitat improvements within the Toiyabe PMU in Lander County in fiscal year 2011.

Treatment within the Toiyabe PMU was concentrated around the north end of the PMU near Bald Mountain. Approximately 800 to 1,000 acres of pinyon and juniper trees were removed along the northern flanks of Bald Mountain. Work was conducted utilizing hand crews through the UNR Cooperative Extension's Bootstraps program. This project will aid in improving brood rearing and winter habitat.

RESEARCH

Habitat Relationships

Report by: Peter S. Coates, Zachary B. Lockyer, Michael L. Casazza, & David J. Delehanty

OBJECTIVES

This project is intended to better understand habitat utilization, identify key habitats and determine movement patterns of sage-grouse between these areas within the Virginia Mountains. Several threats have been realized with regard to this population and more are on the horizon, emphasizing the timing of this project. Research efforts are expected to lead to identification of factors limiting this population and habitat associations including:

1) determine seasonal movement patterns of radio marked birds;
2) identification of nest sites and nest initiation rates;
3) determination of nest site vegetative characteristics including overstory and understory and determine if difference exist between successful and unsuccessful nest sites;
4) determination of predation rates of sage-grouse nests and identification of predatory species responsible (through use of videography);
5) determination of survival rates of adults and juveniles; and
6) determine recruitment rates.

This project may have statewide application in terms of assessing the effects of utility lines and other structures being placed within sage-grouse breeding and nesting habitat.

SUMMARY

Examining Greater Sage-grouse Nest Predators, Nest Survival, and Habitat Features at Multiple Spatial Scales

Zachary B. Lockyer[1], Peter S. Coates[2], Michael L. Casazza[2], & David J. Delehanty[3]
[1]Idaho State University, Pocatello, ID lockzach@isu.edu, [2]United States Geological Survey, Dixon, CA, [3]Idaho State University, Pocatello, ID

Population vital rates of Greater sage-grouse (*Centrocercus urophasianus*), recently designated as a candidate species under the Endangered Species Act, within the Great Basin are not well-understood. The growing development of renewable energy infrastructure within areas inhabited by sage-grouse is thought to influence predator and vegetation communities. For example, common ravens (*Corvus corax*), a synanthropic sage-grouse nest predator, are increasing range-wide and select transmission lines and other tall structures for nesting and perching. This study is intended to better understand nest survival and habitat selection of sage-grouse within the Virginia Mountains of northwestern Nevada. Several threats have been identified with regard to this population, emphasizing the importance in timing of this research. These research efforts are expected to provide important information regarding the following:

1. seasonal movement patterns of radio marked birds;
2. identification of nest sites and nest initiation rates;
3. selection of microhabitat and macrohabitat nest site characteristics;

4. estimation of predation rates of sage-grouse nests and identification of predatory species;
5. estimation of survival rates of broods and adults;
6. selection of microhabitat and macrohabitat brood site characteristics; and
7. recruitment rates.

Sage-grouse nest survival was monitored relative to multi-scale habitat features and nest predators during 2009 – 2011. In preliminary analyses, predator indices and habitat features were included as explanatory variables in a three-step modeling approach using maximum likelihood estimation. Additionally, videography at nest sites (n = 38) revealed that ravens were the most common nest predator. We estimated nest survival at 19.8% (CI, 10.6 – 31.1%), which was substantially lower than other derived likelihood values across sage-grouse range. The most parsimonious model for nest survival consisted of an additive effect between ordinal date and number of active sage-grouse nests (w = 0.64). Estimated odds of survival increased by 17.6% (CI, 1.9 – 35.6%) with an additional 10% increase in number of active nests. A second model with support from the data included an additive effect between ordinal date and raven indices. An estimated one additional raven averaged per nest (159-ha scale), increased the probability of nest failure by 66.8%. One mechanism contributing to the ordinal date effect appeared to be explained by raven foraging behavior based on our videography at sage-grouse nests.

These preliminary results are timely because raven populations are expanding within the sagebrush ecosystem, which is thought to be a result of increased energy-related anthropogenic subsidies. We require additional years of study to contribute to sample sizes and substantiate these findings. This research project has already provided NDOW with useful information regarding predation, sage-grouse seasonal habitat and nest site selection. Lack of appropriate habitat, because of recent wildfire, and predation appear to be key factors limiting the potential of this small sage-grouse population. In addition to this information, sage-grouse were found to be utilizing areas not previously identified as use areas. This project is expected to continue for the next two years.

Mortality Relationships

Effects of Utility Scale Transmission Line on Sage-grouse Population Dynamics

Report by: Dan Nonne, Erik Blomberg and Jim Sedinger

OBJECTIVES

The goal of this study is to assess impacts of the FG line on the dynamics of the population of Greater Sage-grouse in the region.

a) The basic study design calls for estimation of key demographic parameters as a function of distance from the line. Under the hypothesis that the line negatively affects local sage grouse, we expect that demographic responses to the line will be greatest for leks nearest the line.
b) Distance from the line will be directly incorporated into models of demographic parameters to assess this hypothesis.
c) For parameters for which we hypothesize a time delayed response (e.g., adult survival following an increase in raptors) the appropriate analysis includes a time by distance interaction.

SUMMARY

Greater sage-grouse (*Centrocercus urophasianus*) associated with13 breeding leks were monitored to characterize demographic processes in a ~6500 km^2 area in Eureka County, Nevada. The long-term goal of this ten-year study is to assess the impact of NV Energy's Falcon-Gondor transmission line on sage grouse population dynamics. Mark-recapture, lek observations, nest & brood monitoring, vegetation sampling, and radio telemetry were used to estimate key demographic parameters. A total of 1287 unique sage grouse have been banded during the nine years of the study. Additionally, 199 female and 61 male sage-grouse have been radio-marked during this time. A total of 373 nests, of which 119 were successful, have also been monitored. From 2009-2011, we captured and marked 352 chicks at hatch and recaptured 67 of the marked chicks at approximately one month of age. From 2003-2007, counts of common ravens along the transmission line corridor and raven-associated disturbances at leks increased dramatically, however, in 2008 raven counts declined to levels observed immediately following line construction. Raven counts have since rebounded and in 2011 counts approached 2007 levels.

Male banding data was used to evaluate the relative importance of annual variation in resource availability, as indexed by normalized difference vegetation indices (NDVI), to sage-grouse population dynamics. Annual variation in NDVI had a strong positive influence on per-capita recruitment ($\beta = 0.78$; 95% CI = 0.37 to 1.19), and recruitment was over 9-times greater following the year of highest NDVI ($f = 0.77 \pm 0.18$ SE) compared to the year of lowest NDVI ($f = 0.08 \pm 0.03$ SE). We found a similar positive influence on male survival, but the effect was not as strong ($\beta = 0.28$; 95% CI = -0.07 to 0.62) as for recruitment. Using this analysis we also demonstrated negative effects of exotic grassland footprint on lek-level recruitment ($\beta = -0.62$; 95% CI = -0.82 to -0.41) and annual survival ($\beta = -0.29$; 95% CI = -0.55 to -0.03).

Male banding data was also used to estimate differences in lek attendance and survival between males with radio-collars and banded-only males. Model average results indicate radio-collared male sage-grouse were less likely to attend a lek in a given year ($\gamma = 0.702 \pm 0.201$ SE) or less likely to be detected on a lek ($P^* = 0.332 \pm 0.153$ SE) if present than banded-only males

(γ=0.275 ± 0.219 SE; P*= 0.615 ± 0.155 SE). Although results suggested a significant impact of radio-collars on male breeding behavior, no substantial support for an influence of radio-collars on male survival was found.

The utility of lek counts was evaluated for estimating annual and long term population trends, using our male banding data to generate independent estimates of population growth (λ) and male breeding propensity. A linear regression comparing annual lek count trends to realized λ, annual variation in breeding propensity, and unexplained error, showed that lek counts produced a good fit to realized λ (R^2 = 0.760). However, the remaining error was sufficient to cause discrepancies between lek counts and realized λ in 4 of 7 intervals. For this reason, we caution use of lek counts for making inferences regarding short-term changes in sage-grouse populations.

Female survival showed strong seasonal variation, with the lowest monthly survival occurring during the spring breeding season (March-May; Φ_B = 0.947 ± 0.007) and during the fall (August-October; Φ_F = 0.922 ± 0.009). We detected a substantial cost of reproduction on survival, where females that successfully raised ≥ 1 chick to 45 days of age had lower annual survival (Φ_A = 0.498 ± 0.057) than unsuccessful females (Φ_A = 0.610 ± 0.026). NDVI had an overall positive association with female survival; survival during the spring breeding season increased in years with higher plant production (β = 0.513; 95% CI = 0.096 to 0.930).

Factors influencing female reproductive success were evaluated using a multi-state model, where female success was modeled as a function of previous year's reproductive state and NDVI. Females who were previously successful had a higher overall probability of success (Ψ_S = 0.277 ± 0.089) compared to previously unsuccessful hens (Ψ_U = 0.094 ± 0.025). NDVI had a strong positive influence on female success (β = 1.336; 95% CI = 0.142 to 2.529), and we detected a more than 4-fold increase in success between the years of highest and lowest NDVI.

Estimated nest survival has remained relatively constant over the course of this study. Using data from 2005-2011, model averaged daily nest survival was 0.950 (± 0.009 SE) resulting in an overall probability of nest survival for a 37-day nest period of 0.149 (± 0.007 SE). Model results suggested a lower daily survival rate for the day following flushing a hen from a nest (0.908 ± 0.029 SE) compared to the day a hen was not flushed (0.950 ± 0.009 SE). However, there was not a substantial difference between overall nest survival probabilities from a nest that was flushed once (0.152 ±0.007 SE) compared with a nest that was not flushed (0.160 ±0.006 SE). We continue to find no convincing support for a meaningful impact of the Falcon-Gondor line on nest survival.

Overall, an important association between annual plant production (indexed by NDVI) and sage-grouse survival (males and females), reproductive success (females), recruitment (males), and population growth (males) has been demonstrated. These results highlight the important association between sage-grouse populations and climatic processes in our arid study system. Identification and quantification of potential sources of bias associated with monitoring sage-grouse by modeling observer impacts on nest survival, impacts of radio-collar transmitters on male survival and behavior, and error associated with count-based indices was presented.

Harvest Impacts: Eureka County

Report by: Erik Blomberg and Shawn Espinosa

OBJECTIVES

The objective for this particular job is to better determine harvest rates for certain areas distributed across Nevada to ensure that they are within acceptable levels according to Western Association of Fish and Wildlife Agency (WAFWA) guidelines (Connelly et al. 2000). These efforts will also help determine more appropriate population estimate parameters.

SUMMARY

Determining harvest rates for a particular population can be difficult without long-term and intensive capture and marking of individuals. Research being conducted in central Nevada's Eureka County by the University of Nevada, Reno (UNR) is allowing the Nevada Department of Wildlife (NDOW) an excellent opportunity to gain this type of information. The intent of the research is to determine the effects of a utility scale transmission line (345 kV), constructed in 2005, on sage-grouse demographic parameters and vital rates as a function of distance from the line. UNR captures and marks sage-grouse in both the spring and the fall and NDOW has assisted with each fall capture. All birds are marked with leg bands and a proportion of birds are radio-marked with VHF telemetry devices. This opportunity lends itself to a mark-recapture effort with regard to determining a population estimate for this area, mainly because of the fall hunting season, and presents an opportunity to determine harvest rates. The Guidelines to Manage Sage-grouse Populations and Their Habitats (WAFWA Guidelines) (Connelly et al. 2000) suggest that harvest rates should not exceed 10% of the estimated fall population and that populations should not be hunted where ≤300 birds comprise the breeding population (i.e., ≤100 males are counted on leks) [C.E. Braun, Colorado Division of Wildlife, unpublished report].

In September of 2010, a total of 5 nights were spent capturing sage-grouse in study areas associated with the Falcon to Gonder Transmission Line research effort. A total of 33 sage-grouse were captured consisting of 6 adult males, 6 juvenile males, 9 adult hens and 12 juvenile hens. Twenty-two radio transmitters were placed on 21 females and 1 juvenile male. Colored leg bands and a metal leg band were attached to all of the adult and juvenile hens. Information gained from radio-marked individuals has allowed researchers to estimate nest initiation rates, nest fate, survival rates and vegetative characteristics associated with the nest along with general habitat usage and movement patterns.

Mark-recapture techniques have allowed researchers to determine a population estimate for the male segment of the population for the last 8 years (see Table 11). Since the inception of the study (2003), the male segment of the sage-grouse population has decreased by 66% and the 2011 estimate of 187 males is 61% below the long term average of 479. The 2010 harvest of 19% represents the first year that harvest was greater than 11% of the estimated male population (n=187).

It is important to note that the male population estimate is derived from 11 different leks within the study area and the number of active leks within all three PMUs where wings are gathered is much greater than that (n=42); therefore, the actual male population is much higher than that reflected in Table 1. Using the wing data and population estimates demonstrate that actual harvest removes less than 6% of the adult males each year on average, which is within accepted guidelines. However, the figures likely represent an overestimate of harvest.

Year	Male Population Estimate	Standard Error	Adult Male Harvest	% of Adult Males Harvested
2003	556	103	36	6.48%
2004	516	86	29	5.62%
2005	601	85	24	3.99%
2006	725	130	36	4.96%
2007	610	113	41	6.72%
2008	390	81	41	10.52%
2009	243	56	22	9.05%
2010	187	48	36	19.23%
Averages	**479**	**88**	**32.7**	**5.75%**

Table 12. Annual estimates of the male population of sage-grouse within the Falcon to Gonder Transmission Line Study area.

Actual band recovery from hunter harvested birds provides a more reliable approach to estimating harvest rates. Cumulatively, over the course of the study, if we assume that reported recovery is at or near 100%, harvest of male sage-grouse is less than 1% of the estimated population and female harvest is less than 2% of the actual population (Figure 6). This provides some evidence that the effects of hunting are minimal to larger, contiguous populations. It is interesting to note that while the male population is declining, the harvest of males has remained relatively constant (≈33 males/year).

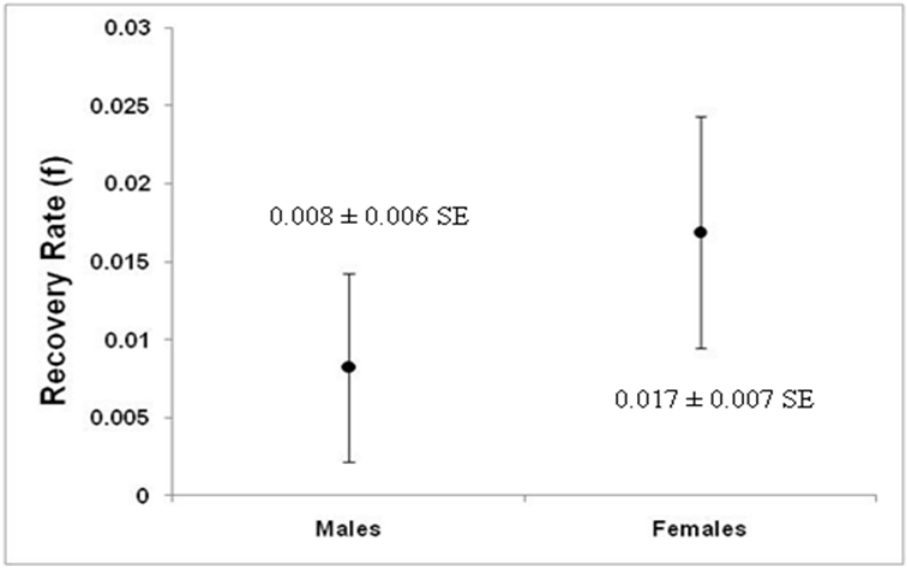

Figure 4. Estimates of average recovery rates for male and female sage-grouse in Eureka Co., Nevada, derived from combined live-dead analysis of banding (male) and radio-telemetry (female) data collected from 2003-2010.

COORDINATION

OBJECTIVES

The objective of this particular job is to ensure consistent monitoring efforts for the species across agencies and keep personnel abreast of pertinent planning and implementation efforts by coordinating within and amongst state and federal agencies.

SUMMARY

During state fiscal year 2011, an extensive amount of time was spent coordinating with federal land management agencies and staff from the Nevada Department of Wildlife to develop consistent methods to map and classify sagebrush and other habitats within Sage-grouse Population Management Units (PMUs) in Nevada. This effort was conducted to provide a base layer from which to develop a Sage-grouse Habitat Categorization map that depicts priority and lesser value sage-grouse habitats.

The Bureau of Land Management developed a product, based on an amalgamation of vegetation layers known as SynthMap that displayed restoration values (R-values) for sagebrush habitats within sage-grouse PMUs. The restoration values depicted quality sagebrush habitats and those that were in need of improvement due to things such as pinyon and juniper encroachment, annual grassland invasion and understory depletion. This map was delivered to NDOW in June of 2011. This is an important product and is the precursor to the Sage-grouse Habitat Categorization map that is currently being developed.

ADMINISTRATION

OBJECTIVES

This project provides oversight regarding personnel assignments, proper tracking of time spent on projects identified within the W-64-R-11 Grant Agreement and administrative issues regarding the development and implementation of contracts or agreements.

SUMMARY

The majority of tasks associated with “administration” involve grant preparation, final performance report writing and working with NDOW’s Fiscal Service Section to develop required work programs to acquire legislative spending authority, especially for certain projects or research efforts. Other miscellaneous items such as budget development, tracking, and cost accounting are responsibilities associated with this job title.

PROJECT VEHICLE

OBJECTIVES

Purchase a light duty pick-up truck to assist with conducting sage-grouse survey and inventory work, local conservation planning and implementation, and research work.

SUMMARY

A 2011 Toyota Tacoma Double Cab 4X4 V6 Pick-up truck was purchased and delivered on December 31, 2010. Uses include lek surveys; travel to and from local working group meetings and habitat improvement project site visits and field trips.