

**2016**

**Gunnison Sage-Grouse Lek Count Summary**

**And**

**Population Estimate**

**For the Crawford Population**

**Final Report**

**1 April – 10 May Lek Season**

**Crawford, Colorado**

**Colorado Parks and Wildlife**



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***“The physics of beauty is one department of natural science still in the Dark Ages. Not even the manipulators of bent space have tried to solve its equations. Everyone knows, for example, that the autumn landscape in the north woods is the land, plus a red maple, plus a ruffed grouse. In terms of conventional physics, the grouse represents only a millionth of either the mass or the energy of an acre. Yet subtract the grouse and the whole thing is dead. An enormous amount of some kind of motive power has been lost.” Aldo Leopold***

## Summary

Many people were involved in the 2016 Gunnison sage-grouse lek counts. These individuals represented four government agencies, local citizens and private landowners, and the local Gunnison sage-grouse working group.

Gunnison sage-grouse leks were counted using a modified version of the protocol established in 1996. All known leks were counted at least once during each of four 10-day periods beginning April 1 and ending May 10. Coordinated counts were used to avoid disturbance to grouse from a single lek counter driving from lek to lek and to avoid double counting of birds where movement between leks could occur. All lek counters used a standardized data form and were asked to record the number of males, females, and unknown Gunnison sage-grouse present at the lek at five minute intervals. Counters also recorded weather conditions, disturbances to grouse, grouse behavior, and movements to and from the lek.

These data were analyzed to determine the high male count (HMC) and high female count (HFC), the estimated male and female populations, an overall population estimate for the Crawford area, peak dates of lek attendance, and a three-year moving average of HMCs. A population estimate for the Crawford area was calculated using the Gunnison Sage-grouse Rangewide Conservation Plan (RCP, 2005) population formula.

In 2016, 6 leks were visited, resulting in a HMC of 30, down from the 31 males counted in 2015. The HFC was 17, up from the 10 females in 2015. Male and female lek attendance peaked during the fourth and second counts, respectively. The Crawford area population estimate is 148 birds, a decrease of 5 birds from 2015. The three-year moving average HMC for 2014–2016 is 31, a 10.7% increase from the 2013–2015 HMC average of 28. The current 10-year average (2007–2016) population estimate is 104 birds which is below the 275 long term population target set in the RCP and the Crawford Area Gunnison Sage-Grouse Conservation Plan (2011).

Colorado Parks and Wildlife (CPW) translocated 72 radio-collared Gunnison sage-grouse to Crawford in the springs of 2011, 2012, and 2013 to augment the population and study seasonal grouse movements. No new transplants have occurred since 2013. A summary of transplanted bird fates is provided. Ongoing research led by the United States Geological Survey in collaboration with the Bureau of Land Management, National Park Service, and Colorado Parks and Wildlife is investigating the seasonal habitat use and movements of Gunnison sage-grouse in the Crawford population. To date this collaborative effort has collected over 50,000 global position system (GPS) locations from 12 Gunnison sage-grouse (9 females and 3 males).

## Acknowledgments

The 2016 Gunnison sage-grouse lek counting season for the Crawford population was made possible by the combined efforts of numerous individuals (Appendix A). We would like to thank everyone that dedicated their time, energy, and early mornings to count grouse. Colorado Parks and Wildlife coordinated the effort and received help from the Bureau of Land Management (BLM), U.S. Forest Service (USFS), National Park Service (NPS), U.S. Geological Survey (USGS), Black Canyon Audubon Society, and volunteers from the Crawford Area Gunnison Sage-grouse Working Group (CWG). Thank you for your support and contribution to Gunnison sage-grouse conservation.



Strutting male Gunnison sage-grouse. Photo courtesy of Missy Siders, BLM

## **Introduction**

The Gunnison sage-grouse (*Centrocercus minimus*) is a unique species of sage-grouse found only in portions of southwestern Colorado and southeastern Utah (Young et al. 2000). There are nine distinct sub-populations occurring within their range, with the largest inhabiting the Gunnison Basin (Gunnison Sage-grouse Rangewide Conservation Plan 2005). The Gunnison sage-grouse received species status in January of 2000 from the American Ornithologist's Union based on long-term studies by grouse researchers Jessica Young and Clait Braun, among others. Shortly thereafter, a coalition of environmental groups petitioned the U.S. Fish and Wildlife Service (FWS) to emergency list the Gunnison sage-grouse under the Endangered Species Act (ESA). After review, the FWS designated the bird as a "priority 5" candidate species under the ESA, and precluded listing at that time. However, after re-evaluation in 2004, the FWS designated the species as a "priority 2" candidate species, which shifted the grouse into a higher priority status for listing. Principal areas of concern for Gunnison sage-grouse include overall population declines and reductions in the quantity and quality of their sagebrush habitats. On April 18, 2006, the FWS posted their final listing determination for the Gunnison sage-grouse. In the ruling, the FWS determined that based on the best scientific and commercial information, that listing under the ESA was not warranted. This ruling has since been revisited. On September 27, 2010, the FWS determined that the Gunnison sage-grouse warrants protection under the ESA, but that proposing the species for protection will be delayed while the Service addresses the needs of other higher priority species. Then in January 2013, the FWS proposed to list the species for federal protection as "endangered." A final listing decision was published on November 22, 2014 that announced the Service had determined the Gunnison sage-grouse required protection of the Endangered Species Act as a "threatened" species.

Annual Gunnison sage-grouse lek surveys provide key information used by officials and interested parties for decisions pertaining to land management practices and regulations, population management actions, and federal ESA listing actions. Lek counts have been standardized over the past twenty years and represent an objective method of projecting annual spring population size and assessing population trends. This report details the results of the 2016 lek count season, including counts of total number of males and females, estimated population size, changes in lek status, and includes information on projects that were conducted during the 2016 lek season and recommendations for future counting efforts.

### ***Lek Counts as an index to population trend***

Lek count data often generates considerable discussion and sometimes controversy. Lek count methodologies were developed many years ago, based on the premise that counts could aid in assessing grouse population trends. Research has demonstrated that male sage-grouse do not attend leks every day, and male attendance is variable depending on many factors including weather, social dynamics (such as male dominance or the presence of a receptive hen), time of day, predator disturbance, etc. From a lek counter standpoint, number of birds observed may vary depending on factors such as observer experience, quality of optics, distance to lek, weather, access, vegetation composition of a particular lek, and vantage point.

Changes in the number of grouse counted should not be interpreted as an exact measurement of annual population variability, nor should they be construed as the actual number of grouse in the population. Standardized lek counts should allow managers to evaluate population trends over time. Lek counts presently provide the most efficient, low-impact means for acquiring meaningful data on local grouse population trends.

## Count Methodology

Gunnison sage-grouse leks were counted using a slightly modified version of the protocol established in 1996. Each lek should be counted once during each of four 10-day periods beginning on 1 April and ending on 10 May during the current season. Coordinated counts were used with lek counters camping overnight on site to avoid disturbance to adjacent leks. The Crawford leks are strung out along a road making access to individual leks without disturbing birds difficult. All counts were conducted around sunrise. All lek count personnel used a standardized data form and were asked to count the number of males, females, and unknown sex of Gunnison sage-grouse present at the lek at five minute intervals. If grouse flushed off of a lek, the total number of birds in flight was recorded as “unknown”, and not used to calculate high counts. Counters also recorded weather conditions, disturbances to grouse, grouse behavior, and movements to and from the lek. Lek counters were also asked to indicate any activity on brushbeats or other use areas associated with their lek.

## Data Analysis

Information from each data sheet was entered into a database. Subsequent analyses provided the total number of individual males and females observed for each lek, the estimated male and female populations, the population estimate based on known leks counted, peak dates of attendance, and a three-year moving average of HMCs.

**Population Estimate:** In 2005, the Rangewide Steering Committee completed the RCP, which in many ways is a continuation of the local Conservation Plans adopted throughout the species’ range. As the title implies, this plan attempts to offer a broader, rangewide perspective and is intended to supplement local plans, “so as to ensure that the cumulative result of conserving local populations is conservation of the species” (Gunnison Sage-grouse Rangewide Conservation Plan 2005). With regard to this annual report, it is important to mention that the RCP addresses various issues surrounding population estimation for Gunnison sage-grouse. After review of the most current Gunnison sage-grouse research and scientific literature, the RCP recommends using an updated formula for calculating a population estimate based on lek count data. The key assumptions for the formula are:

High male count represents 53% of the male sage-grouse in the population  
There are 1.6 females in the population for every male

**Peak Lek Attendance:** The peak period of lek attendance was determined by comparing the four periods to determine when individual leks had their highest count of males and females. Whichever period had the highest number of leks with high counts was deemed the peak period of attendance for both sexes. It also determined which period had the highest total number of males/females observed regardless of gender specific lek peaks.

**Lek Status:** The revised status for each lek was determined based on the standard definitions, both for the 2016 season as well as the cumulative Official Status.

**Active Lek:** To be considered Active for a given season, a lek must have at least two males in attendance during two count periods. Active leks need to be counted at least once each 10-day count period.

**Inactive Lek:** To be considered Inactive for a given season, a lek must have zero males in attendance for at least two count periods (i.e., not meet the active definition). If, however, birds are observed during either count period, at least one additional count period should be counted. For the Official Status of a lek to be considered Inactive, a lek needs to be seasonally Inactive for five consecutive years.

**Unknown Lek:** A lek is considered Unknown for a given season if it did not meet the requirements for Active or Inactive during a given season or was not counted the appropriate number of count periods to determine its status. For example, a lek that had five males on one count and only one male on the other counts would be Unknown, as would a lek that was only counted once with no males observed, or an Active lek that was only counted twice with zero birds observed. A lek that is Active in one season and Inactive during the next season would have an Official Status of Unknown.

**Historic Lek:** A Historic lek is one that has been Inactive for 10 consecutive years.

**Official Status:** The Official Status of a lek is given as a cumulative status and designated as Active, Historic, Inactive, or Unknown. To be Officially Active, a lek only needs to be designated as Active in the current year. A lek cannot be considered Officially Inactive unless it has been seasonally Inactive for five consecutive years. Thus, a lek might not have any birds for a given season, but its Official Status may be Unknown because the lek had not been Inactive all of the past five years. Historical lek status is not given until a lek has been Inactive for 10 consecutive years.

**3-Year Moving HMC Average:** The three-year moving average was calculated by averaging the high male count from the current season with the high male counts from the previous two seasons.

**10-Year Moving Population Average:** The ten-year moving average is calculated by averaging the current season population estimate with the population estimates from the previous nine seasons.

**Results**

**Weather and Access:** The Crawford area had a much cooler winter during 2015/2016 than in 2014/2015. Temperatures were lower than the 10-year average highs and higher than the 10-year average lows as recorded at the Black Canyon Gunnison National Weather Service weather station. The average high temperature was below the ten year average in November, December, January, and April. The average low temperatures were warmer in all months except November and December.

**Table 1.** Crawford area 10-year average monthly temperatures (°F) versus Winter 2015/16 and 2014/15 monthly average temperatures, courtesy of Black Canyon Gunnison NWS weather station (<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?co0754>).

Month	High 24 Hr. Temperature °F	Low 24 Hr. Temperature °F
November 2015	45.1	19.9
November 2014	47.0	21.2
10 yr. avg.*	47.7	20.2
December 2015	33.6	10.4
December 2014	37.7	17.1
10 yr. avg.	35.5	10.9
January 2016	33.6	9.7
January 2015	40.0	15.1
10 yr. avg.	36.2	9.5
February 2016	42.4	14.9
February 2015	45.5	19.9
10 yr. avg.	40.1	12.5

Month	High 24 Hr. Temperature °F	Low 24 Hr. Temperature °F
March 2016	49.8	21.0
March 2015	53.6	25.4
10 yr. avg.	49.3	19.7
April 2016	55.5	29.3
April 2015	57.0	29.9
10 yr. avg.	55.9	26.4

\*monthly data from winter 2006/2007 – 2015/16

**Table 2.** Weather summary from 1 April–10 May 2016 in comparison to 2015, courtesy of Black Canyon Gunnison NWS weather station (<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?co0754>).

	1–10 April		11–20 April		21–30 April		1–10 May	
	2015	2016	2015	2016	2015	2016	2015	2016
Avg. High (°F)	56.4	56.3	51.01	51.3	56.7	58.5	57.5	60.5
Avg. Low (°F)	33.2	27.5	31.6	28.9	38.7	31.6	38.9	35.4
# Nights < 32°F	3	7	4	6	1	7	2	3
# Days w/ Precipitation	1	1	5	4	4	4	6	4
Total Water (in.)	0.01	0.22	0.69	0.80	0.27	0.59	1.35	0.58

Weather conditions had little impact on access and birds observed during the 2016 count season. Counts were completed as scheduled on April 6, 15, 25, and May 5.

**Crawford Area Use:** There were six lek areas scheduled to be counted in 2016. (Summit lek) was discovered in 2012. There has been some discussion as to whether Summit was actually a satellite use area of the Section 35 lek. It was decided to count Summit as a separate lek because of its distance from the Section 35 lek.

No birds were observed on **Middle Lek** in 2015 or 2016. The lek was not counted because no birds have been seen there and it was originally an experimental area to see if treatment on a non-lek site would bring in grouse. Since no counts were completed, Middle Lek's status is annually and officially "unknown". **Fruitland Mesa #1** had six males and ten females the first count, six males and one female the second count, seven males and two females the third count, and seven males and no females during the fourth count. A raven flyby during the second count and two deer on the lek during the third count had no grouse response noted. A northern harrier flushed all birds during the third count. **Dam Lek** had five males and one female counted during the first count, five males during the second count, four males and one female during the third count, and six males and one female during the fourth count. Several deer and elk during the first count apparently flushed the birds away from lek temporarily. Coyotes on or near the lek during the third count and a raven flyby during the fourth count had no apparent impact. Three males, one female, and several deer were seen on **Fruitland Mesa #4** during the first count. Apparently the deer had no impact on the grouse. Two males and no female were seen on the lek during the second count. A northern harrier flyby had no impact as no grouse were on lek at the time. Three males and no females were seen during the third count. Seven males and no females were observed during the fourth count. **Range Cone Lek** had the greatest number of birds during all count periods with a HMC of 9 and one female during the second count. Two males were observed on a "Grassy Knoll" close by the Range Cone lek during this count. They are likely sub-dominant males that want to participate in breeding, but aren't dominant enough to challenge the patriarch male(s) on Range Cone, so

they displayed immediately adjacent (250-400m) from the edge and center of Range Cone lek polygon, respectively - maybe there was a hen in the area as well.... they are included in the Range Cone count. This may be another case of a satellite use area, adjacent to the main lek. Seven males and three female grouse were observed during the first count. Four males were observed during the third and fourth counts. One female was seen during the fourth count as well. Ravens apparently flushed a single grouse during the first count. Ravens were seen at the grassy knoll site during the second count with no apparent impact on grouse. A jackrabbit flushed three males during the third count and deer on the lek during the fourth count had no apparent impact. One female was observed during the first and third counts on **Section 35 Lek**. The **Summit** area of Section 35 lek had one female during the first count and one male during the third count. Deer, elk, ravens, and ducks were heard or seen in the lek area with no apparent impact to grouse during counts this year.

**Peak Lek Attendance:** The total number of males observed on all leks visited during each count period peaked at 24 during the fourth count period; the total number of females peaked at 17 during the first count period (Table 3).

**Table 3.** Number of individual Gunnison sage-grouse observed on leks of the Crawford population from 1 April–10 May 2016.

	1–10 April	11–20 April	21–30 April	1–10 May
Males	21	22	19	24
Females	17	2	4	2

**Table 4.** 2016 high male count by lek and count period for the Crawford population.

LEK	1–10 April	11–20 April	21–30 April	1–10 May	HMC	Count Period
Fruitland Mesa 1	6	6	7	7	7	3 <sup>rd</sup> , 4 <sup>th</sup>
Dam Lek	5	5	4	6	6	4 <sup>th</sup>
Middle Lek	nc	nc	nc	nc	nc	no count
Fruitland Mesa 4	3	2	3	7	7	4 <sup>th</sup>
Range Cone Lek	7	9	4	4	9	2 <sup>nd</sup>
Section 35 Lek	0	0	0	0	0	no males
Summit Lek*	0	0	1	0	1	3 <sup>rd</sup>
Totals	21	22	19	24	30	

nc – not counted, \*potential new lek

**Table 5.** 2016 high female count by lek and count period for the Crawford population.

LEK	1–10 April	11–20 April	21–30 April	1–10 May	HFC	Count Period
Fruitland Mesa 1	10	1	2	0	10	1 <sup>st</sup>
Dam Lek	1	0	1	1	1	1 <sup>st</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup>
Middle Lek	nc	nc	nc	nc	nc	no count
Fruitland Mesa 4	1	0	0	0	1	1 <sup>st</sup>

Range Cone Lek	3	1	0	1	3	1 <sup>st</sup>
Section 35 Lek	1	0	1	0	1	1 <sup>st</sup> , 3 <sup>rd</sup>
Summit Lek*	1	0	0	0	1	1 <sup>st</sup>
Totals	17	2	2	2	17	

nc – not counted, \*potential new lek

**Table 6.** 2016 Lek status – Crawford population.

LEK	2015 Status	2015 HMC	2016 # Counts	2016 HMC	2016 HFC	2016 Status	Official Status
Fruitland Mesa 1	A	4	4	7	10	A	A
Dam Lek	A	9	4	6	1	A	A
Middle Lek	U	nc	0	nc	nc	U	U
Fruitland Mesa 4	A	6	4	7	1	A	A
Range Cone Lek	A	12	4	9	3	A	A
Section 35 Lek	I	0	4	0	1	I	U
Summit Lek*	I	0	4	1	1	I	U

A = Active, I = Inactive, U = Unknown, \*potential new lek

**Population Estimate and Trend:**

**2005 Gunnison Sage-grouse Rangewide Conservation Plan Model**

The Crawford area population, calculated using known lek counts, is 148 birds, a decrease of 5 birds from 2015 (Table 7). The population target for the Crawford population identified in the 2005 Gunnison Sage-grouse RCP as well as in the Crawford Area Gunnison Sage-grouse Conservation Plan is set at a long-term (10-year) average of 275 birds. The current 10-year average (2007–2016) population estimate is 104 birds, below the 275 population target.

Three-year moving averages of HMCs are used to assess the recent trend of Gunnison sage-grouse in the Crawford area. The three-year average for 2014–2016 is 31 males, which represents a 10.7% increase from the 2013–2015 average of 28 (Table 7).

**Table 7.** Summary of population data from Gunnison sage-grouse lek counts of the Crawford population, 1978–2016. HMC = high male count, male population estimate = HMC/.53, female population estimate = (male population estimate) x (1.6), population estimate = male + female population estimates.

Year	HMC	% Δ in Males	3-Year Average	% Δ	Est. Male Population*	Est. Female Population	Population Estimate	Relationship to Target Level (275)**
1978	41	n/a			77	123	200	below
1979	31	24.4			58	93	151	below
1980	29	6.5	34		55	88	143	below
1981	38	31.0	33	-2.9	72	115	187	below
1982	20	-47.4	29	-1.2	38	61	99	below

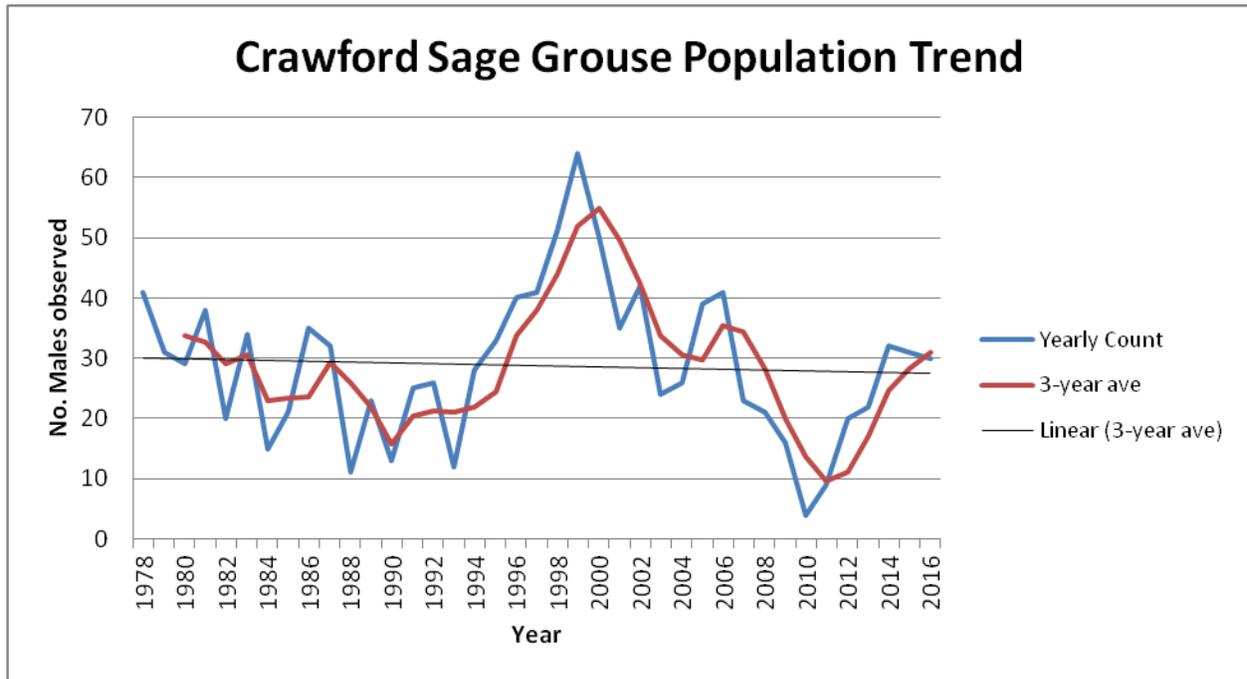
Year	HMC	% Δ in Males	3-Year Average	% Δ	Est. Male Population*	Est. Female Population	Population Estimate	Relationship to Target Level (275)**
1983	34	70.0	31	6.9	64	102	166	below
1984	15	-55.9	23	-25.8	28	45	73	below
1985	21	40.0	23	0	40	64	104	below
1986	35	66.7	24	4.3	66	106	172	below
1987	32	-8.6	29	20.8	60	96	156	below
1988	11	-65.6	26	-10.3	21	34	55	below
1989	22	100.0	22	-15.4	42	67	109	below
1990	13	-43.5	16	-27.3	25	40	65	below
1991	25	92.3	20	25.0	47	75	122	below
1992	26	4.0	21	5.0	49	78	127	below
1993	12	-53.8	21	0	23	37	60	below
1994	28	133.3	22	4.8	53	85	138	below
1995	33	17.9	24	9.1	62	99	161	below
1996	40	21.2	34	41.7	75	120	195	below
1997	41	2.5	38	11.8	77	123	200	below
1998	51	24.4	44	15.8	96	154	260	below
1999	64	25.5	52	18.2	121	194	315	above
2000	50	-21.9	55	5.8	94	150	244	below
2001	35	-30.0	50	-9.1	66	106	172	below
2002	42	20.0	42	-16.0	79	126	205	below
2003	24	-42.9	34	-19.0	45	72	117	below
2004	26	8.3	31	-8.8	49	78	127	below
2005	39	50.0	30	-3.2	74	118	192	below
2006	41	5.1	35	16.7	77	123	200	below
2007	23	-43.9	34	-2.9	43	69	112	below
2008	21	-8.7	28	-17.6	40	64	104	below
2009	16	-23.8	20	-28.6	30	48	78	below
2010	4	-75.0	14	-30.0	8	13	31	below
2011	9	125.0	10	-28.6	17	27	44	below
2012 <sup>+</sup>	20	122.2	11	10.0	38	61	99	below
2013 <sup>+</sup>	22	10.0	17	54.5	42	67	109	below
2014 <sup>+</sup>	32	45.5	25	47.1	60	97	157	below
2015 <sup>+</sup>	31	-3.1	28	12.0	59	94	153	below
2016 <sup>+</sup>	30	-3.2	31	10.7	57	91	148	below

\*Rounded prior to determining female population estimate.

\*\*Target level is the long term (10-year) average population estimate for the Crawford area from the 2005 Gunnison Sage-grouse Rangewide Conservation Plan and the 2011 Crawford Area Gunnison Sage-grouse Conservation Plan.

<sup>+</sup> Coordinated count

**Figure 1:** Yearly high male count and 3-year average for the Crawford area Gunnison sage-grouse population, 1978–2016



**Research and Monitoring**

Colorado Parks and Wildlife has transplanted a total of 72 Gunnison sage-grouse from the Gunnison Basin population to Crawford during the springs of 2011, 2012, and 2013 (Appendix B). All transplanted grouse were instrumented with VHF transmitters to monitor movements and survival. Fifteen (9 male, 6 female) were released in the spring of 2011. Thirty (10 male, 20 female) were released in the spring of 2012. Twenty-seven (12 male, 15 female) were released in the spring 2013. As of May 2015, 14 transplanted grouse were still alive with operational radio-collars in the Crawford area. Another 12 transplanted grouse may still be alive, but batteries on their radio-collars died so current status is unknown. Twenty-six translocated grouse were confirmed mortalities with cause of death ranging from canid to raptor predation. Two translocated grouse are missing; signals were never heard again after release. Two additional grouse are considered unknown because one was unrecoverable on private land and the second signal stopped shortly after hearing in mortality mode. Sixteen grouse, mostly males, slipped their collars. Five birds left the Crawford population and returned to the Gunnison Basin. No additional grouse were transplanted to Crawford in 2016. All radio-transmitters have exhausted their batteries, so monitoring birds via radio-telemetry is not possible. However occasional observations of transplanted grouse with transmitters occur demonstrating that transplanted birds are still alive. Since 2011, the BLM has extended the winter road closure an extra 15 days (until May 15<sup>th</sup>) to provide protection to transplanted grouse during their acclimation period.

An on-going research project led by the USGS in collaboration with the BLM, NPS and CPW is investigating the seasonal habitat use and movements by the Crawford population of Gunnison sage-grouse (GUSG). To date this collaborative effort has collected over 50,000 GPS locations from 12 GUSG (9 females and 3 males) using Microwave Telemetries PTT-100, 22 gram, Solar Argos/GPS PTT's. These transmitters attempt to log locations hourly from 6am to 6pm and once at midnight. In addition, this

project has developed a multiple site motorized monitoring network that has been in operation since 2009. This motorized monitoring network provides researchers and land managers with insight into timing and intensity of motorized use throughout GUSG habitat. This location data is being used to develop spatially explicit models to develop a more complete understanding of the effects of a suite of potential impacts on GUSG habitat conservation including spatial and temporal landscape fragmentation, meteorological variability, grazing and intensity of motorized use. Preliminary results from these modeling efforts will be available soon. In addition to the model development efforts the USGS has developed a lek site probability model for the identification of currently unknown GUSG lek sites more details for this effort can be found at (<https://www.fort.usgs.gov/products/23626>). To date this modeling effort has helped identify previously unknown active lekking sites. Other related research efforts include utilizing camera traps to inventory and monitor GUSG predators and to assist in the validation of GUSG lek counts. Future research efforts include additional data analysis and proposed work to evaluate the potential use of methods, including various types of snow fencing, to increase soil moisture and in turn increase the production of herbaceous vegetation which is an important component of GUSG habitat conservation.

### **Recommendations**

Coordinated lek counts should continue with lek counters camping overnight. An evaluation of effectiveness and results as compared to previous count methodology should occur.

Counting of the potential new leks, Summit Lek and Grassy Knoll, and any additional potential areas should continue to identify and verify new lek sites.

Although no new leks were identified during USGS and BLM searches this spring, surveys for new leks should continue to help validate the USGS's Lek Site Probability Model map and population monitoring efforts.

### **Literature Cited**

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**Appendices**

**Appendix A:** Individuals involved with Gunnison sage-grouse counts in the Crawford area in 2016.

Name	Affiliation	Contribution
Amanda Clements	BLM	Lek Counter
Marcella Fremgen	Bird Conservancy of the Rockies	Lek Counter
Dennis Garrison	USFS	Lek Counter
Daniel Gray	USFS	Lek Counter
Ken Holsinger	BLM	Lek Counter
Doug Homan	CWG	Lek Counter – CWG Coordinator
Mike Jackson	CPW	Lek Count Coordinator
Scott Johnson	USFS	Lek Counter
Elizabeth Kaufman	BLM	Lek Counter
Chris Lazo	CWG	Lek Counter
Wanda Lassiter	BLM	Lek Counter
Robyn Oster	BLM	Lek Counter
Doug Ouren	USGS	Lek Counter
Mikele Painter	BLM	Lek Counter
Lynae Rogers	BLM	Lek Counter
Nathan Seward	CPW	Lead Biologist
Melissa Siders	BLM	Lek Counter
Stuart Sinclair	CPW	Lek Counter
Jedd Sondergard	BLM	Lek Counter

**Appendix B:** Status of transplanted Gunnison sage-grouse in the Crawford population.

#	Date Trapped	Bird ID	Sex	Age Trapped	Freq	Band	Status
1	4/11/2011	CM1101	Male	Juvenile	164.465	1776	Dead
2	4/11/2011	CM1102	Male	Juvenile	164.035	1775	Alive/Battery Died
3	4/11/2011	CM1103	Male	Juvenile	164.563	1774	Dead
4	4/13/2011	CM1104	Male	Juvenile	164.284	1790	Slipped collar
5	4/13/2011	CM1105	Male	Adult	164.094	1789	Slipped collar
6	4/13/2011	CM1106	Male	Juvenile	164.374	1788	Slipped collar
7	4/13/2011	CM1107	Male	Unknown	164.054	1787	Dead
8	4/20/2011	CF1108	Female	Juvenile	164.516	551	Alive/Battery Died
9	4/21/2011	CF1109	Female	Adult	164.075	550	Alive/Battery Died
10	4/28/2011	CF1110	Female	Adult	164.164	549	Dead
11	4/28/2011	CF1111	Female	Juvenile	164.315	548	Alive/Battery Died
12	4/28/2011	CF1112	Female	Juvenile	164.252	547	Dead
13	4/29/2011	CF1113	Female	Juvenile	164.222	2918	Unknown
14	4/30/2011	CM1114	Male	Adult	164.014	1786	Slipped collar
#	Date Trapped	Bird ID	Sex	Age Trapped	Freq	Band	Status

15	4/30/2011	CM1115	Male	Adult	164.491	1784	Dead/Unknown
16	3/25/2012	CM1201	Male	Juvenile	164.145	1719	Slipped collar
17	3/25/2012	CM1202	Male	Juvenile	164.416	1721	Slipped collar
18	3/26/2012	CF1203	Female	Juvenile	164.114	524	Alive/Battery Died
19	3/27/2012	CF1204	Female	Juvenile	165.083	529	Slipped collar
20	3/28/2012	CF1205	Female	Juvenile	164.344	521	Alive/Tranx Replaced
21	3/28/2012	CM1206	Male	Juvenile	164.194	1723	Slipped collar
22	3/28/2012	CF1207	Female	Juvenile	165.442	526	Alive/Battery Died
23	3/29/2012	CF1208	Female	Juvenile	165.271	528	Alive/Battery Died
24	3/29/2012	CF1209	Female	Juvenile	165.761	527	Dead/ Unknown
25	3/29/2012	CF1210	Female	Juvenile	165.196	522	Dead/ Unknown
26	4/2/2012	CF1211	Female	Juvenile	165.964	525	Dead
27	4/3/2012	CF1212	Female	Adult	165.694	523	Dead
28	4/3/2012	CF1213	Female	Adult	165.303	536	Dead
29	4/3/2012	CM1214	Male	Adult	164.704	1720	Slipped collar
30	4/4/2012	CF1215	Female	Adult	164.245		MIA
31	4/5/2012	CF1216	Female	Juvenile	164.304	520	Dead
32	4/9/2012	CM1217	Male	Juvenile	164.554	1724	Dead
33	4/10/2012	CM1218	Male	Juvenile	164.682	1717	Dead
34	4/10/2012	CF1219	Female	Juvenile	165.383	535	Dead
35	4/11/2012	CF1220	Female	Adult	165.546	534	Dead
36	4/11/2012	CF1221	Female	Adult	165.661	533	Alive/Battery Died
37	4/11/2012	CF1222	Female	Juvenile	165.483	532	Alive/Battery Died
38	4/11/2012	CF1223	Female	Adult	164.636	531	Alive/Battery Died
39	4/12/2012	CM1224	Male	Adult	164.604	1716	Slipped collar
40	4/12/2012	CM1225	Male	Juvenile	164.214	1722	Slipped collar
41	4/12/2012	CF1226	Female	Juvenile	164.584	530	Dead
42	4/13/2012	CF1227	Female	Juvenile	164.164	518	Dead
43	4/13/2012	CF1228	Female	Juvenile	164.434	519	Dead
44	4/17/2012	CM1229	Male	Juvenile	164.535	1725	Alive/Battery Died
45	4/17/2012	CM1230	Male	Adult	164.485	1718	Dead
46	4/2/2013	CF1301	Female	Adult	164.393	768	MIA
47	4/4/2013	CF1302	Female	Juvenile	165.683	677	Dead
48	4/5/2013	CM1303	Male	Adult	164.425	1762	Slipped collar
49	4/5/2013	CM1304	Male	Adult	165.570	1761	Slipped collar
50	4/5/2013	CM1305	Male	Adult	166.992	1756	Slipped collar
#	Date Trapped	Bird ID	Sex	Age Trapped	Freq	Band	Status

51	4/15/2013	CF1317	Female	Juvenile	165.747	674	Dead
52	4/16/2013	CM1318	Male	Adult	166.993	1765	Dead
53	4/17/2013	CF1319	Female	Adult	164.365	686	Alive
54	4/17/2013	CF1320	Female	Juvenile	165.141	685	Alive
55	4/17/2013	CM1321	Male	Adult	166.765	1764	Alive
56	4/17/2013	CF1322	Female	Juvenile	167.000	684	Slipped collar
57	4/17/2013	CF1323	Female	Juvenile	164.193	670	Alive
58	4/18/2013	CF1324	Female	Adult	165.532	671	Alive
59	4/18/2013	CM1325	Male	Juvenile	166.842	1729	Alive
60	4/19/2013	CF1326	Female	Juvenile	165.107	643	Alive
61	4/19/2013	CF1327	Female	Juvenile	165.646	646	Alive
62	4/18/2013	CF1328	Female	Juvenile	164.704	683	Alive
63	4/18/2013	CM1329	Male	Juvenile	167.570	2704	Alive
64	4/19/2013	CF1330	Female	Juvenile	165.523	682	Dead
65	4/19/2013	CF1331	Female	Adult	164.335	681	Dead
66	4/29/2013	CF1352	Female	Juvenile	165.021	679	Dead
67	4/28/2013	CM1353	Male	Adult	167.530	1769	Alive
68	4/29/2013	CM1354	Male	Juvenile	167.520	1704	Alive
69	4/30/2013	CM1355	Male	Juvenile	167.480	1791	Alive
70	4/30/2013	CF1356	Female	Juvenile	165.779	693	Alive
71	4/30/2013	CM1357	Male	Adult	166.868	1795	Unknown
72	5/1/2013	CM1358	Male	Adult	164.793	1794	Slipped collar