

Crawford Area

Gunnison Sage-grouse

Conservation Plan



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March 28, 2011

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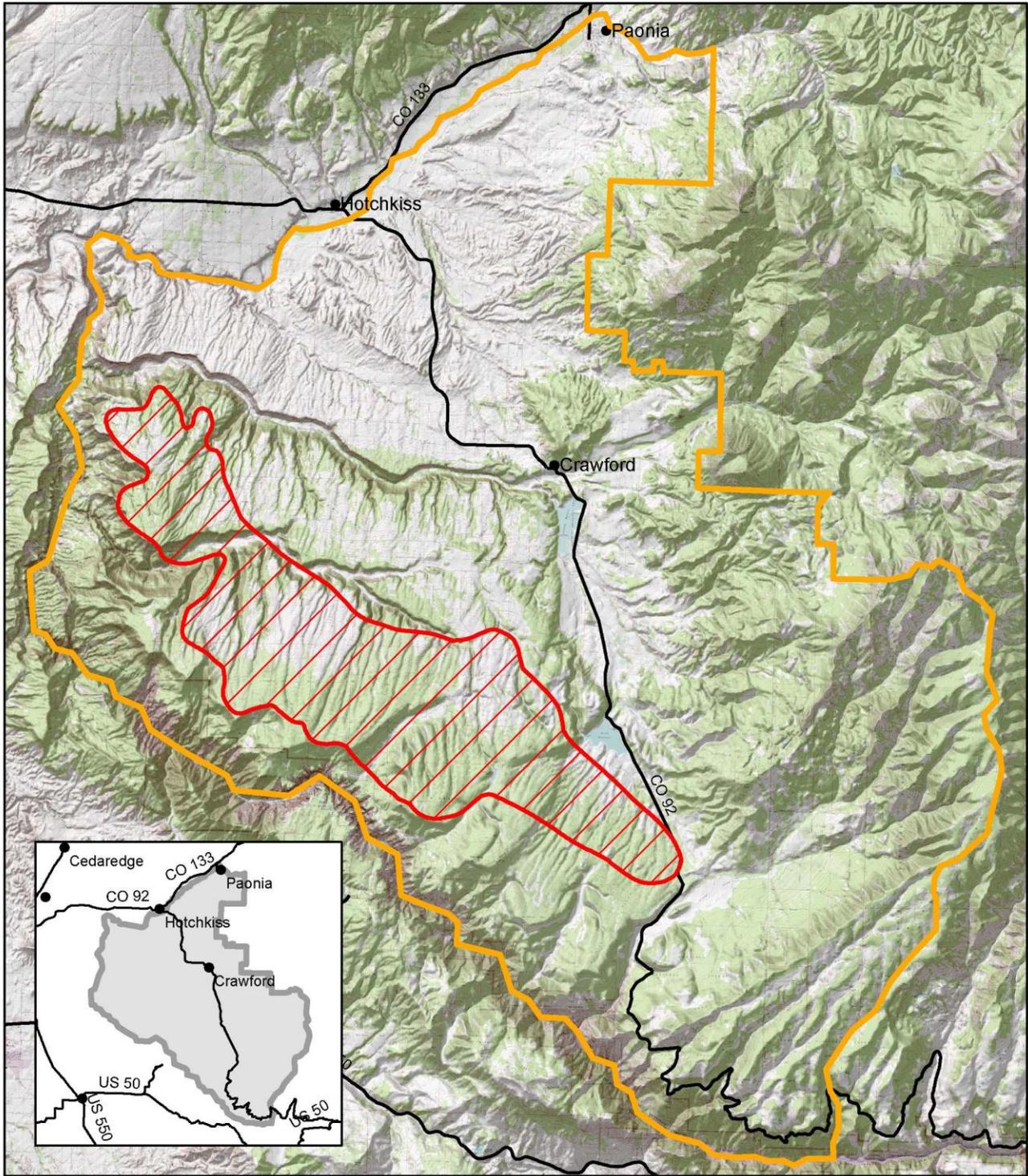
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NOTE: Much of the format and some of the text for this plan have been copied from the San Miguel Basin Working Group Conservation Plan with their permission.

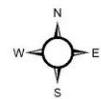
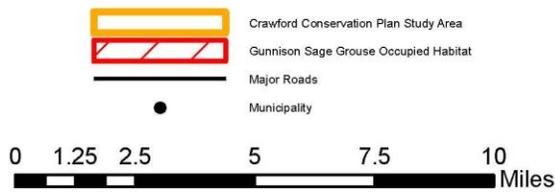
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Crawford Gunnison Sage Grouse Conservation Plan Study Area



Colorado Division of Wildlife
 300 W. New York Ave.
 Gunnison, CO 81230
 Mapped November 10, 2010

Figure 1. Map of Conservation Plan Boundary

I. PREAMBLE

Before the 1970s, there was thought to be one species of sage-grouse in the United States. In the late 1970s, researchers became aware that sage-grouse in the Gunnison Basin of Colorado were unique from sage-grouse found elsewhere in the country. They realized this grouse was smaller than the Greater sage-grouse (GRSG; *Centrocercus urophasianus*), had different plumage, and made different mating vocalizations. In 1995, Drs. Clait Braun and Jessica Young proposed that the Gunnison sage-grouse (GUSG; *Centrocercus minimus*) was a distinct species. Along with Drs. Jerry Hupp, Sara Oyler-McCance and Tom Quinn, they published their findings in the scientific journal, the *Wilson Bulletin* (Young et al., 2000). The American Ornithological Union recognized the Gunnison sage-grouse as a newly named species in 2000.

Today, GUSG are found only south of the Colorado River in southwestern Colorado and southeastern Utah. They occur in seven highly fragmented populations scattered in eight different counties in Colorado. Currently, there are less than 4,400 birds in Colorado (based on estimates from Colorado Division of Wildlife [CDOW] 2009 lek counts).

Local working groups help to coordinate efforts within and among populations. The Crawford area Gunnison Sage-grouse Working Group is composed of landowners, sportsmen, interested citizens, and representatives from non-governmental organizations, land management agencies, and local government. The group's mission is to address the decline of GUSG numbers in the Crawford population and the long term security and sustainability by maintaining a healthy landscape for the species plus other resource values and uses in the Crawford area GUSG habitat (Figure 2, page 11). Other important resource values and uses that occur in this area are: 1) major deer and elk range; 2) livestock grazing, both cattle and sheep; 3) recreation which is fairly high due to the proximity of the Black Canyon of the Gunnison National Park and Gunnison Gorge National Conservation Area; and 4) big game hunting and shed antler collecting in the late fall and spring, respectively.

This conservation plan addresses the five listing factors (Appendix A) considered by the U.S. Fish and Wildlife Service (USFWS) in evaluating possible action under the Endangered Species Act. The plan describes and sets forth a management strategy for the next 10 years for the Crawford population in concert with other resource values and land uses at a landscape scale. It is the intent of the Crawford area GUSG Partnership to frequently communicate with other GUSG working groups to seek and exchange information as progress is made on implementing the conservation actions. Participation by private landowners and citizens in this conservation plan is completely voluntary.

Although the GUSG is a common factor, each member of the Working Group has their own concerns and beliefs about what is best for the grouse and the community. Some members put a higher value on maintaining a healthy economy and lifestyle, while others are more concerned with preserving a viable population of sage-grouse in a healthy functioning ecosystem. Through responsible planning, the Working Group intends to balance the needs of the GUSG and local citizens.

What can make this a difficult proposition is the fact that there are many unknowns. Our knowledge of where grouse are located, how they use the habitat, and what affects their numbers

is limited. This plan was based on current scientific information and experts' best judgment. As biologists and landowners learn more, it's important to incorporate new information from scientific studies, observations, and on-the-ground experience. This can be integrated through a timely review of proposed projects by local biologists and periodic updates of the plan.

II. INTRODUCTION

Gunnison sage-grouse are native to the Crawford area. Although there is no quantified long term population information available, it is generally believed by the CDOW and longtime residents of the area that GUSG numbers have declined substantially from historic levels.

The Crawford population of GUSG is located in Montrose County and Delta County, Colorado about 8 miles southwest of the town of Crawford and north of the Gunnison River (Figure 2, page 11). The Crawford area landscape concerning this plan ranges in elevation from 5,084 feet at the Gunnison River to 9,020 feet near Cathedral Peak on the east side. The landscape is characterized by diverse topography including rocky drainages covered by pinyon-juniper (*Pinus edulis-Juniper osteosperma*) woodlands, rolling uplands dominated by black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*Artemisia tridentata* subsp. *wyomingensis*), mountain big sagebrush (*Artemisia tridentata* var. *pauciflora*) (Winward 2004), oak brush (*Quercus gambelii*), and serviceberry (*Amelanchier spp.*), and gentle slopes with primarily hay meadows, saltbush (*Atriplex spp.*), and wheatgrass (*Agropyron spp.*). Other grasses and forbs include sheep fescue (*Festuca ovina*), needle and thread (*Hesperostipa comata*), junegrass (*Koeleria macrantha*), squirreltail (*Elymus elymoides*), Nevada/sandberg bluegrass (*Poa secunda*), muttongrass (*Poa fendleriana*), mountain muhly (*Muhlenbergia montana*), western wheatgrass (*Pascopyrum smithii*), Arizona fescue (*Festuca arizonica*), phlox (*Phlox spp.*), lupine (*Lupinus spp.*), low larkspur (*Delphinium nuttallianum*), scarlet globemallow (*Sphaeralcea coccinea*), yarrow (*Achillea spp.*), wild onion (*Allium ascalonicum*), and Indian paintbrush (*Castilleja mutis*). The region is semi-arid, with approximately 14 inches of annual precipitation on Fruitland Mesa. About 50% of this moisture occurs as winter snowfall. Basin big sagebrush (*Artemisia tridentata* subsp. *tridentata*) (Winward 2004) is found in the drainages in the area and is thought to be hybridizing with mountain big sagebrush. Gunnison sage-grouse usually inhabit the sagebrush flats dominated by mountain big sagebrush and black sagebrush

In 1995, to address rising concerns about the long term status of the sage-grouse in the Crawford area, the CDOW, federal land management agencies, local landowners, permittees, and interested individuals and groups formed the Crawford Area Gunnison Sage-grouse Working Group. A Conservation Plan was developed and completed by that group in 1998 and updated in 2011.

Conservation plan boundary

The Crawford area Conservation Plan (CACP) boundary includes current, probable and historic range of GUSG in the North Fork portion of Montrose, Delta and Gunnison Counties. The area includes rural housing and town sites as well as agricultural developments. The historic range designations are based on known historic use sites and sage-grouse observations, as well as the location of sagebrush habitat and suitable soil types for sagebrush. Approximately 39,970 acres

of habitat are currently occupied by GUSG. Of the land in that habitat, 63% is managed by the Bureau of Land Management (BLM), 13% is managed by the National Park Service (NPS) and 24% is privately owned. While it was necessary to include all areas with potential for habitat development to benefit an expanded GUSG population, no assumptions on future changes in present land uses are inferred by the boundary delineated.

The CACP boundary (Figure 1, page 4) follows the Gunnison River on the west from its confluence with the North Fork, south and southeast to Mesa Creek, up Mesa Creek to the top of Black Mesa following the head of the Crystal Creek-Dyer Creeks drainages to the juncture of Mendicant Ridge and the Gunnison National Forest boundary then north and west following the Gunnison National Forest boundary to Minnesota Creek and then west along Minnesota Creek to the North Fork and southwest along the North Fork until it joins with the Gunnison River.

III. THE PLAN AND ITS PURPOSE

This Conservation Plan establishes a process and a framework that will guide a coordinated management effort at a landscape scale directed at improving sage-grouse habitat and reversing the long term decline of the Crawford population, while continuing to optimize management for the other resources. Central to this process is citizen, community and agency involvement in determining appropriate management activities designed to meet jointly developed goals and objectives.

The purpose of the CACP (the plan) is to provide for coordinated management across jurisdictional/ownership boundaries and to develop wide community support that is necessary to assure the security and survival of GUSG. The plan is designed to be dynamic and flexible, allowing new information and issues, as well as results from previous conservation efforts to be incorporated. It is also designed to answer questions and collect data necessary for future resource management decision making.

IV. GUIDING PRINCIPLES

This process is designed to guide sage-grouse and other resource management efforts, particularly developing goals, objectives, and the selection of conservation actions and the way in which they are implemented across jurisdictional/ownership boundaries. They are:

1. Promote public involvement in planning and decision making.
2. Maintain an atmosphere of cooperation and participation among land managers, private land owners, and other stakeholders.
3. Implement conservation actions in ways that meets the needs of sage-grouse and other resources, are least disruptive to, and encourages the development of a stable and diverse economic base in the North Fork (Crawford) area.

4. Respect individual views and values and implement conservation actions on a collaborative basis in ways that have broad community support. Observations and historical perspectives are part of the on-going effort to restore the GUSG.

5. Make every effort among partners to seek efficiency and integration of efforts, and to select conservation actions that also promote other land health or resource management objectives whenever possible, especially among agencies in the implementation of conservation actions.

V. DESCRIPTION OF THE GUNNISON SAGE-GROUSE

Gunnison sage-grouse are mottled brown and white, chicken-like birds. Males are 3.5 to 5.0 lbs; females are 2.4 to 3.1 lbs. They have black bellies and yellow-green eye combs. Males have distinct white barring on their long, pointed tail feathers. During breeding season males have long, dense filoplumes on the back of the neck. In the spring, males puff out their white chest feathers and make a vocalization with yellow air sacs. Gunnison sage-grouse have a dissimilar genetic profile and less genetic diversity than GRSG (Quinn et al. 1997, Oyler-McCance et al. 1999).

For many years it was believed that all sage-grouse were a single species, known as the sage-grouse. In 2000, Young et al. (2000) identified GUSG as a distinct species. Geographic isolation, distinct genetic differences (Kahn et al. 1999, Oyler-McCance et al. 1999) and behavioral differences in strutting display separate GUSG from other sage-grouse, which are now called GRSG (Barber 1991, Young 1994, Young et al. 2000). The current ranges of the two species are not overlapping or adjacent (Schroeder et al. 2004). Gunnison sage-grouse are also significantly smaller than GRSG in size of culmen, carpal, and tarsus, and they weigh approximately 1/3 less (Hupp and Braun 1991, Young et al. 2000).

VI. HABITAT REQUIREMENTS OF GUSG IN THE CRAWFORD AREA

Habitat needs for GUSG in the Crawford area relate to survival over winter (Nov–Mar), escape cover adjacent to lek sites (Mar–May), nesting cover (Apr–Jun), early brood-rearing habitat (May–Jun), late brood-rearing habitat (Jul–Aug), and fall habitat (Aug–Oct). Of these habitats, winter, nesting, and early brood-rearing are most important with suitable escape cover near leks of near equal importance.

Winter Habitat: As documented by pellet surveys, sage-grouse extensively use mountain big sagebrush in the current primary use area between Poison Spring Gulch and Green Mountain and black sagebrush interspersed with mountain big sagebrush on Black Ridge. Adequate winter habitat may be unavailable in some years in the current primary use area because of snow depth displacing birds to lower areas. Winter habitat generally does not appear to be limiting in the Crawford area. Foods eaten in winter are primarily black, mountain and basin big sagebrush.

Lek Habitat: Some known, formerly active, leks are no longer occupied, possibly because of recreational activity, lack of livestock impact or other changes in the structure of the sagebrush community. Sites presently used for display are those that were brushbeat in 1994 and 1996, with taller (> 8 in.) sagebrush immediately adjacent (< 200 yds.) to the display sites. Also, some areas

around stock ponds that have been worn down by livestock use are being used as lek sites. Presence of taller sagebrush (mountain big sagebrush) with a lack of taller coniferous shrubs/trees and other obstructions appears to be critical for continued use of these sites by displaying male sage-grouse. There have been no strutting males seen on the Middle lek since its creation. This is probably due to the attempt to create a new lek that hadn't seen past activity between the far eastern leks and far western leks.

Nesting Habitat: Sage-grouse hens (small sample sizes) in the Crawford area select sites for nesting with taller, denser sagebrush (> 18 in., > 25% canopy cover) with scattered deciduous shrubs such as Gambel oak and serviceberry. These sites are frequently at slightly higher elevations (upper edge of the occupied habitat) where moisture allows greater and more robust grass and forb cover (> 25 and 8% respectively, > 6–8 in. total herbaceous height). Nests are typically at the base of taller (> 18 in.) sagebrush plants. Young (1994) reported nest locations averaged 2.6 +/- 2.2 miles from the nearest lek in the Gunnison Basin. This distance may be reduced considering the narrow band of suitable habitat in the Crawford population area.

Early Brood Habitat: The description of this habitat at hatch is identical to nesting with hens moving their young chicks (< 5–10 days of age) into areas dominated by forbs and grasses with 10-15% live sagebrush canopy cover. Hens select sites in the sagebrush type that have abundant forbs and insects, often in moist areas. High plant species diversity is typical habitat with a definite preference for adjacent live sagebrush escape cover (6–23 in. height, RCP 2005).

Late Brood Habitat: Hens with older broods prefer moist sites near stockponds, upper drainages, and on north slopes depending upon elevation and site. Forbs and grasses dominate at preferred use sites with some live sagebrush and other deciduous shrubs such as snowberry (*Symphoricarpos spp.*), serviceberry and Gambel oak. Shrub cover is important for escape while most foraging is on forbs.

Fall Habitat: Sage-grouse of all ages and gender continue to use habitats identical to those used by broods in July and August until plants become desiccated (several successive killing frosts) or heavily grazed. Then taller sagebrush (> 20 in.) with more canopy cover (> 20%) becomes more important. Use increases on north and west facing slopes and diets change gradually from a high proportion of forbs to a high proportion of sagebrush. During extensive snow cover, in late fall and early winter, use of black, mountain and basin big sagebrush stands is extensive.

VII. SPECIES STATUS AND DISTRIBUTION

A. Geographic Distribution

The present distribution of the GUSG is south of the Colorado and Eagle Rivers in Colorado extending east to the San Luis Valley. They also occur east of the Colorado River in southeastern Utah (GUSG Rangewide Steering Committee, 2005). While the Gunnison Basin population is the largest, there are 5 other smaller populations in southwestern Colorado including the Crawford population.

B. Historic Status of the Gunnison Sage-grouse

Rogers (1964) compiled a summary of "Sage Grouse Investigations in Colorado" that included

distribution reports from the early 1940s through the early 1960s. These early mapping initiatives were based on the statewide efforts of a few avian researchers and local Warden Reports. Maps (5" x 6.5") of *statewide* estimated sage-grouse distributions were reproduced in the report for each of the survey years (1942, 1945, and 1961). The 1942 and 1945 maps from warden reports did not indicate any sage-grouse occurrence in the Crawford area, which may have been from the lack of knowledge. In 1961 Glenn Rogers, in the above noted publication "Sage Grouse Investigations in Colorado," did not mention or include any data about leks in the Crawford area. However, he did recognize that sage-grouse were present stating there was a "light" population in the Smith Fork drainage and around Gould Reservoir. He estimated there were less than 10 birds per square mile. It is believed that historically GUSG occurred in all suitable sagebrush habitats in the Crawford area. Thus, based on the existing location of sagebrush, suitable soil types that may have supported sagebrush in the past, and the knowledge of present sage-grouse use areas, the probable historic and present distribution of GUSG in the Crawford area is shown on the map in Figure 2, page 11.

C. Recent and Current Population Status

Low numbers of GUSG prompted the USFWS to classify the bird as a candidate for protection under the Threatened and Endangered Species act in 2000. On April 18, 2006 the USFWS made a determination that the GUSG was not-warranted to be listed as a threatened or endangered species. A number of organizations claimed the USFWS decision was inconsistent with the five factor analysis required by the Endangered Species Act.

In March 2008, the Department of the Interior and USFWS concluded that it was appropriate to seek a remand of the not-warranted finding. The USFWS performed a review of the data and made a new determination in September of 2010. The USFWS declared the GUSG to be warranted for listing as a threatened or endangered species, but was precluded due to higher priorities and lack of funding available within the USFWS budget. The species was given a Priority Listing Number of 2 (numbers run from 1–12, with lower numbers indicating a higher priority). That determination can be found at www.regulations.gov @ Docket Number FWS-R6-ES-2009-0080.

Currently, the BLM and U.S. Forest Service (USFS) consider the GUSG a sensitive species. The CDOW classifies the bird as a species of special concern. The International Union for Conservation of Nature and BirdLife International list GUSG as endangered, and Audubon considers it as one of the top ten endangered bird species in North America.

In the Crawford area, the primary GUSG use area is west of Poison Spring Gulch to Green Mountain, and between the Gunnison River on the south and Red Canyon on the north. Elevation of this area ranges between 6560–8200 feet. All known, active leks are on BLM land within this area. Most of the sage-grouse activity, strutting, breeding, nesting, and wintering occur within the first seven miles of this area west of the Black Canyon road. This strip is the largest contiguous sagebrush dominated site within the Crawford area (Figure 5). Vegetation in this strip blends from sagebrush in the middle to invading pinyon and juniper on the north edge at lower elevations near Red Canyon, and to mountain shrubs on the south edge of the sagebrush strip at higher elevations toward the Black Canyon.

Gunnison sage-grouse use is also known to occur outside this area, as far east as Hwy. 92 south of Gould Reservoir to the southeast, and on Black Ridge to the northwest. Also, GUSG sightings have been reported recently in other locations within the Crawford area and North Fork Valley; however, there is no evidence of long-term occupation in those locations.

Lek counts were first conducted in this area in 1978, and have continued annually. The number of leks has fluctuated between three and seven. The annual lek attendance remained at around 30 males until the mid-80s, and then it declined through 1993 to a low count when 12 males were observed. In 1994, three new leks sites were developed by brush beating (mowing vegetation with a brush-hog). Lek attendance returned to 30+ males in 1997 with a high count of 64 in 1999. Since then there has been a steady decline in the lek count numbers through 2010. The 2010 count of four is the lowest ever recorded, resulting in the three year average in 2009 at an all-time low. A graph of the lek counts since 1978 is shown in Figure 3, page 12.

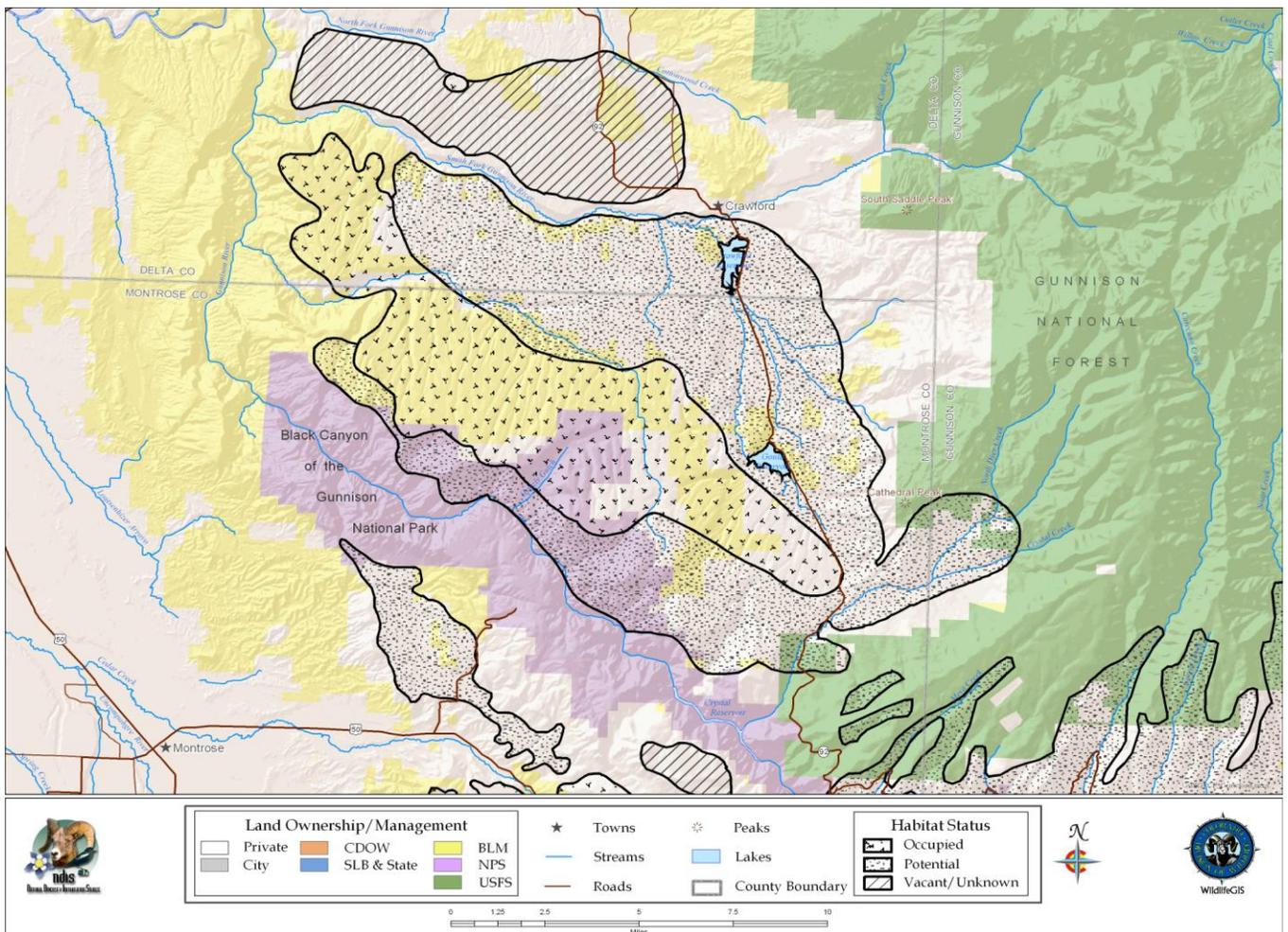


Figure 2. Map of population status and location of Crawford GUSG population

In the Crawford area there are currently five known active leks. These leks have been monitored by the CDOW for the past 27 years. Some have been monitored for as many as 32 years. During the last several years the population trend appears to be declining.

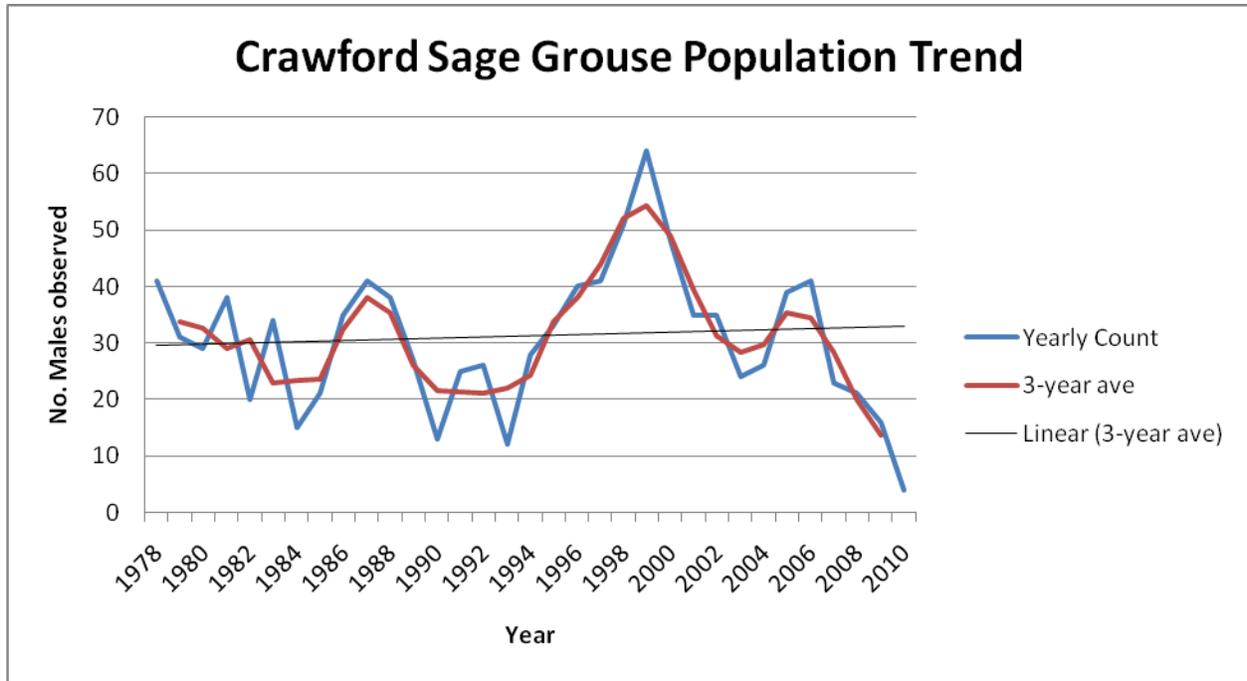


Figure 3. Crawford area Gunnison sage-grouse lek counts 1978–2010

The present (2009–10) size of the breeding population of sage-grouse in the Crawford Area is estimated between 21 and 69 birds based on four males counted in 2010 and 14 males as a three year average counted on active leks in 2008, 2009, and 2010, respectively. This estimate is based on a repeated demonstration that not all males are on leks at one time to be counted and, also, that locations of all active leks may not be known. Given the terrain and early spring access in this area, it is probable that not all active lek areas are known and were counted in 2008, 2009 and 2010. If we assume that locations of 90% of all leks were known, there could be 1 unknown active lek (if 5 active leks = 90%, then $5 \div 0.90 = 5.55$ active leks would constitute 100% of all active leks). To reach an upper estimate of population size, the 5.55 calculated active leks was rounded to 6.

Given a total of 4 males counted on 5 active known leks, there would be 5 males on 6 active leks ($4 \div 5 = .8$ males/active known lek \times 6 assumed leks, $6 \times .8 = 4.8$ rounded to 5). Further, given that not all males associated with a lek are counted on one count day, it is reasonable to assume the actual number, based on data from radio-marked males, lies between 50 and 100%. Assuming this percentage to be 75, there would be 7 males (5 males [on 6 possible leks] \div 0.75 present during the high count = 6.66 rounded to 7). Thus, if there are 2 hens/male in the spring population, the upper estimate for the population would be 21 (7 males + 14 hens = 21). If the three year average of males counted on the leks (14) is used, the population estimate becomes 69.

The formula used above is derived from the 1998 plan and is based on the best information available at that time. It is included to show a consistent relationship between the 1998 plan and the 2011 revision.

The rangewide conservation plan (RCP) for GUSG criticizes the lek count as a means for acquiring a statistically reliable population estimate. However, it has been accepted as the only method for monitoring trends in GUSG populations. The RCP uses the following assumptions in estimating population sizes:

- 1) All leks are known and counted (estimate is thus conservative if some leks are unknown).
- 2) The maximum of 3–4 counts represents 53% of males in each population (Stiver, unpublished data).
- 3) There are 1.6 females (yearling and adult) per male (yearling and adult) in the population. This is the long-term average estimated from wing data collected in the Gunnison Basin (CDOW, unpublished report).

The formula that incorporates these assumptions follows:

$C = \text{maximum male count on lek}$

$\text{Population Estimate} = C/.53 + (C/.53 \times 1.6)$

Using the RCP formula, the 2010 population estimate is 20 (19.6 rounded to 20) birds and the three year average estimate is 69 grouse. A comparison of the 1998 plan formula and the RCP formula shows little difference in population numbers, especially when lek counts are low. Either way the greatest value of the lek counts is the long term trend indication of the population since the counts have been done consistently from 1983 to 2010. That trend shows a declining population over the last four years with 2010 being the lowest count during the 32 years that the population has been monitored. Over the past 32 years lek count numbers have oscillated demonstrating the amount of annual fluctuation in lek count monitoring and likely population size.

D. Habitat Status

Assessment of the potential natural disturbances in the area indicates that the plant communities and grouse evolved under a system of fairly frequent, low intensity fire, grazing and browsing by native ungulates. This would have led to a highly patch landscape with many different age groups of vegetation and herbaceous growth and ground cover. Sage grouse habitat objectives represent small steps back toward this more functional landscape pattern while improving landscape health and meeting existing BLM Resource Management Plan (RMP) guidelines.

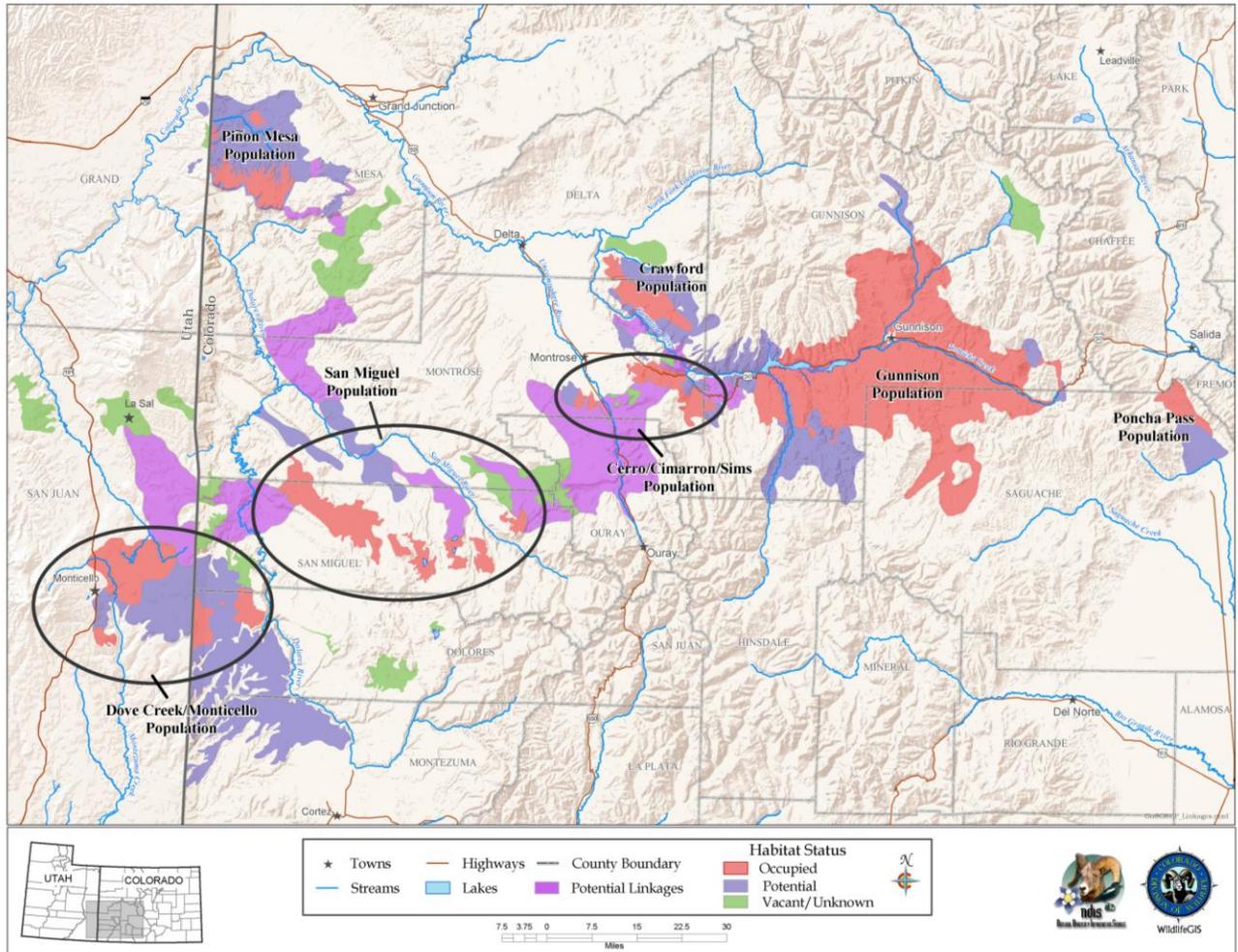
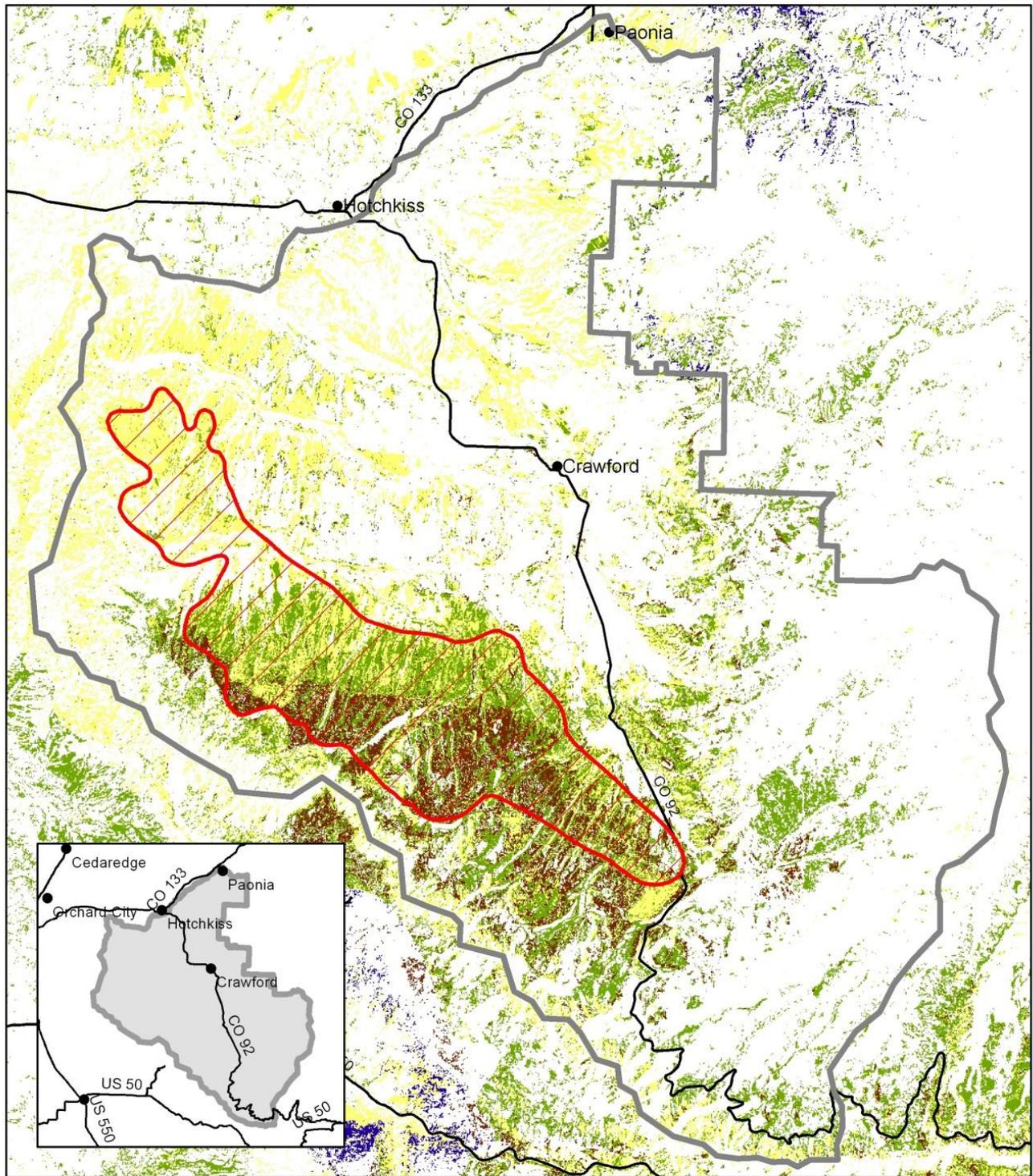


Figure 4. Map of potential linkages in Gunnison sage-grouse habitat

Past specific habitat problems identified by the Working group in 1998 are:

- 1) fragmentation of habitat components, ie., too much distance between nesting and brooding areas, and wet areas;
- 2) invasion of pinyon and juniper into the sagebrush areas throughout most of the area;
- 3) not enough grass and forbs in the sagebrush understory in certain areas;
- 4) low vegetative age class diversity throughout the area (a homogeneous old age stand exists);
- 5) low vegetative vigor in certain areas;
- 6) poor vegetative conditions on leks (too much vegetation > 8" high)
- 7) a short supply of wet areas and water sites.



Sagebrush Landcover Classes for Crawford Gunnison Sage Grouse Population



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 Mapped January 17, 2011

Figure 5. Sagebrush distribution in the Crawford area

VIII. THREATS TO GUNNISON SAGE-GROUSE

In December 2006, the Working Group met to rank the top needs and threats to the grouse in the Crawford area. This was part of a rangewide effort to prioritize threats to the grouse and strategies to address these threats in order to meet objectives laid out in the GUSG RCP. The group discussed and voted on the following as the top threats to our local population.

Very High

No threats were identified for this ranking

High (in no particular order)

- Risk of genetic problems
- Lack of habitat protection from permanent loss
- Risk from noxious and invasive weeds
- Risk from predation
- Risk from recreational activities
- Lack of research
- Risk from impacts of weather/drought

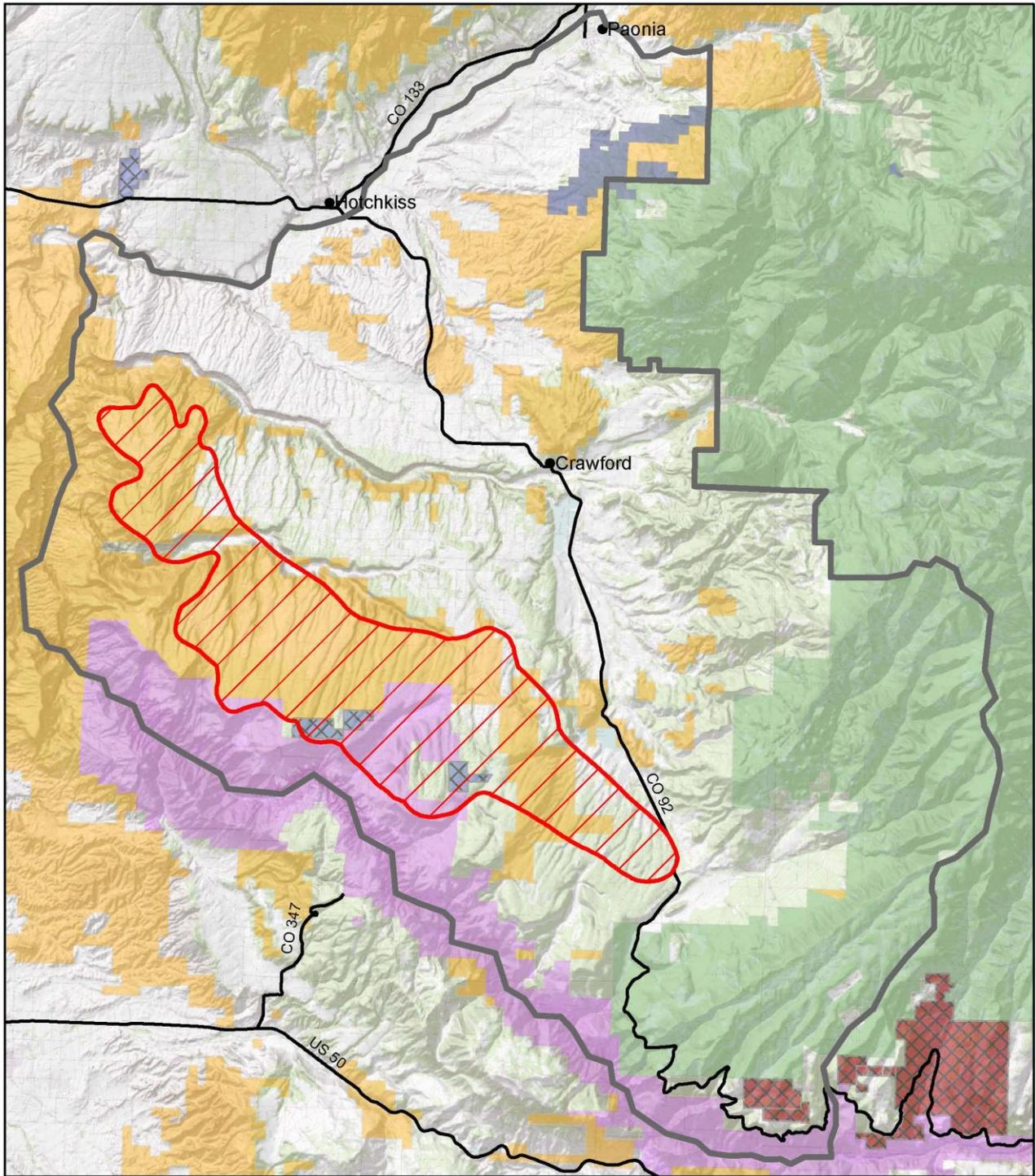
The following threats were listed as medium or low but when taken together, the cumulative of these threats when combined or linked to high threats may warrant a higher ranking.

Medium (again in no particular order)

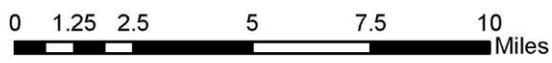
- Risk of disease and parasites
- Risk of wildfire
- Lack of proper grazing management
- Lack of habitat enhancement/restoration
- Lack of management of human infrastructure
- Lack of information and education
- Lack of management of lek viewing
- Lack of population augmentation
- Lack of population monitoring

Low (no order)

- Lack of development of habitat linkages among populations
- Lack of habitat monitoring
- Lack of management of hunting
- Risk from oil and gas development and mining
- Risk from pesticide use



Crawford GUSG Conservation Plan Land Ownership and Conservation Easements



Colorado Division of Wildlife
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 Mapped November 10, 2010

Figure 6. Map of CDOW sage-grouse easements, Crawford area

IX. GOALS, OBJECTIVES, STRATEGIES AND TACTICS

The backbone of the CACP is its goals and objectives which together establish a framework for developing conservation strategies. Due to the interrelationship of the habitat components, resources values, and issues, some strategies may apply to more than one objective. These actions have been listed under the objective where the link is most direct.

Background information, goals, objectives, strategies, and tactics have been grouped into several areas. These include:

- Population Management
- Habitat Protection
- Habitat Improvement
- Information, Education and Publicity
- Land Use
- Research and Monitoring
- Coordination and Program Support

Having various agencies and individuals own parcels of sage-grouse habitat can make planning and management complicated. For example, the BLM, NPS, and USFS must follow their Land Management Plans. Private landowners have greater flexibility.

Given these various mandates, the question was, “How can the Working Group come up with specific guidelines?” What seemed appropriate was to look at the latest scientific studies on the most pressing issues facing GUSG in the Crawford area. Our recommendations in the plan and appendices were based on the latest research.

These recommendations can serve as a guide when the Working Group Coordinator, land managers, and/or wildlife biologists are asked to comment on habitat treatments, land use, land management or provide suggestions to private landowners. The Working Group realizes that land management agencies must follow their own plans but the hope is that these recommendations and current scientific research would be reviewed when management plans are being revised.

The Working Group also understands that what is best for sage-grouse must be balanced with the needs of the community. Therefore, if in a particular situation the proposed guidelines cannot be followed, we recommend appropriate mitigation.

A. Population Management

The current estimated breeding population of grouse in the Crawford area based on the five-year average is 103 birds. In keeping with the GUSG RCP, we set our long-term population target at an average of 275 birds in currently-mapped occupied habitat. A population that averages 275 birds (over approximately 10 years) would be expected to fluctuate between 159 and 484 birds, since populations of gallinaceous birds tend to vary greatly (GUSG Rangewide Steering Committee, 2005 p.264). Maintaining this long-term average will be a challenge given that the trend counts have continued to decline for unknown reasons. Since 2000 when the estimated Crawford population was at an all time high of 239, the 5 year average has steadily declined. A

population viability model in the RCP estimated the relative risk of extinction over a 50 year period for a population of 275 sage-grouse with stable growth rates was 9% without intervention. Populations of sage-grouse tend to vary widely which make predictions of long-term trends difficult.

A breeding population with a long-term average of 275 would require about 55,000 acres of quality habitat. This is slightly more than the 39,970 acres of currently mapped occupied habitat. However, there is enough potentially suitable habitat to accommodate 275 birds given that habitat improvement is accomplished on those potential acres.

Theoretical models have demonstrated that small populations are vulnerable to inbreeding depression and loss of evolutionary adaptive potential. Stiver et al. (2008) observed that some of the assumptions of these models (e.g., large variance in reproductive rates and nest failure) may be true for GUSG.

In 2007, the CDOW initiated a demographic study of GUSG in the San Miguel Basin which is scheduled to be completed in 2010. They have observed 6 out of 12 nesting females successfully hatched young. All other nests were destroyed by predation. Four of the successful nests were re-nesting attempts after the initial nesting attempts failed due to severe weather. Twelve juveniles were radio marked from the six clutches. None of the chicks survived beyond two weeks and all were killed by predators. In contrast, approximately 20% of marked chicks survived their first year in the Gunnison Basin. There is concern in the Crawford area that ravens may be a significant predator on GUSG. A study in Idaho by Coates et al. (2008) showed common ravens (*Corvus corax*) predated GUSG eggs while in the nest. There has been a perceived increase in raven numbers in the Crawford area in the last several years. The CDOW is proposing a baseline study to further investigate and quantify the number of corvids in the area. This examination may provide insight on whether a high number of corvids may be adversely impacting nesting and chick survival of GUSG.

Overall Goal: Increase GUSG numbers and distribution to ensure a healthy and sustainable GUSG population in the Crawford area while maintaining current uses and a healthy landscape.

Objective 1: To assess grouse population size and trends and provide for the long-term monitoring of GUSG.

Strategies and Tactics	Who	When
1. To continue spring lek counts on active and recently active leks.	CDOW, Coordinator	Late Mar – mid May each year
a. To assist the CDOW with spring lek counts as needed.	WG members, volunteers,	Late Mar – mid May each year
2. To survey historic, vacant, potential and linkage habitat for the presence of GUSG.		
a. To look for displaying grouse in the spring.	CDOW, WG volunteers, Coordinator	Late March-mid May each year

b. Look for pellets and other grouse sign	CDOW, WG members, volunteers, Coordinator, USGS	Year round
3. To locate new and undiscovered leks		
a. Develop and evaluate landscape level lek site probability map	USGS, Working Group Coordinator	Late March – mid May each year
i. Plan areas to survey and get landowner permission.	Coordinator	Jan. – Feb. each year

Objective 2: To reduce the probability of extinction to less than 1% in 50 years through augmentation with wild-trapped or captive produced birds.

Strategies and Tactics	Who	When
1. The Coordinator will draft a transplant request for the Gunnison terrestrial biologist to submit to the region for prioritization	Coordinator	Done
a. Provide people to help get the birds to the release location and release the birds.	CDOW, Working Group, Coordinator	As necessary

Objective 3: Determine range, seasonal habitat use and human disturbance factors through research on transmitter-marked sage-grouse in the Crawford area as population size allows.

Strategies and Tactics	Who	When
1. Capture grouse over the next 10 year period and fit them with tracking devices	CDOW, USGS, Coordinator,	Ongoing
a. Monitor motorized use in sage grouse habitat	USGS	Ongoing

Objective 4: Recommend and review projects and research on factors that influence GUSG population viability.

Strategies and Tactics	Who	When
1. Recommend research on demographic trends in the Crawford area and factors that can potentially affect trends (e.g., predation and predator control).	Working Group, CDOW, Coordinator,	Ongoing
2. Meet yearly to recommend and review research, projects, and plan a funding strategy (e.g., writing grants, working with other groups and agencies).	Working Group	Once a year

Objective 5: Protect GUSG from excessive predation when populations (3-year average) fall below 25 birds or to 25% of the long-term average goal (RCP) or where deemed necessary in conjunction with release of translocated sage-grouse.

Strategies and Tactics	Who	When
1. If research establishes that predator control is likely to be effective, then develop and implement predator management strategies designed for specific sage-grouse subpopulations that are in accordance with CDOW and Federal regulations and policies.	BLM, CDOW, USDA, USFWS, Coordinator.	As appropriate
a. Develop monitoring strategy to determine the impacts of nest depredation and associated predators	USGS, CDOW, BLM	As appropriate
2. Implement predator control measures as part of transplant efforts to increase survival of translocated GUSG. It is expected that this predator control will be done on a short-term basis.	CDOW, USDA	In coordination with GUSG translocations

Objective 6: Investigate the effects of variable climatic conditions on GUSG.

Strategies and Tactics	Who	When
1. Compare trends in climate data with GUSG lek count data.	CDOW, and/or Researcher	As time and funds allow
2. Share this data with the agencies as appropriate, e.g., its effects on stocking rates for grazing.	CDOW, and/or Researcher	As appropriate

Objective 7: Institute recreational harvest of grouse when and if populations can sustain it.

Strategies and Tactics	Who	When
1. Consider, with appropriate public input, opening hunting seasons if current population trends indicate it is feasible. If the decision is made to allow hunting, develop season structures and other regulations to restrict harvest to 5–10% of the fall population, and to shift harvest away from adult females.	CDOW, Working Group	As appropriate

B. Habitat Protection

The majority of the Crawford area GUSG habitat (76%) exists on public land between the BLM and Black Canyon National Park (BCNP). However, the rest is on key pieces of private land used mostly for livestock grazing and hunting recreation. A small percentage (9%) of that private land has been entered into a conservation easement with the CDOW on two parcels of the LeValley ranch north and east of the BCNP, respectively.

Goal: To protect habitat of sufficient size, quality and juxtaposition so that the long-term future of the GUSG is ensured.

Objective 1: To maintain all of the vegetation communities likely used by GUSG within occupied habitats (on both public and private lands) by protecting the necessary proportion of those lands that are at risk from uses that are incompatible with a sustainable GUSG population.

Strategies and Tactics	Who	When
1. Promote perpetual Conservation Easements on private land in and near occupied GUSG habitat.	Coordinator, WG, partners	Ongoing
a. Educate landowners about financial and other benefits, and impacts of conservation easements.	"	"
b. Work with Land Trusts regarding need for easements, potential areas for easements, and habitat requirements for GUSG.	"	"
c. Work with other existing groups (such as CDOW, USFWS, NRLS, potential funding sources) to promote easements and secure funding for easements or transaction fees.	"	"
2. Obtain conservation easements or fee title acquisitions and implement management plans through the Colorado Wildlife Habitat Protection Program (CWHPP).	CDOW, landowners, WG, & other partners	
a. Help landowners apply to the CWHPP program.	Coordinator	As Needed
i. Inform other landowners about the CWHPP and help them with applications.	Coordinator, CDOW	Yearly and as needed
b. The Working Group will meet yearly to prioritize parcels for submission.	Working Group	Yearly
3. Obtain conservation easements or fee title acquisitions and implement management plans through other programs and by using grants. (e.g. Partner for Fish & Wildlife, National Wild Turkey Federation)	Coordinator, WG members and agencies	As appropriate
4. Develop and implement Candidate Conservation Agreements with Assurances (CCAAs) with private landowners.	CDOW, USFWS, contractors	As appropriate
a. Complete agreements now under negotiation.	CDOW, USFWS	Underway
b. Continue adaptive management and monitoring of enrolled private lands	CDOW, USFWS	Underway
c. Implement habitat improvement projects if warranted	CDOW, USFWS	Underway
5. Obtain fee title acquisitions of important habitats through purchase, land exchanges or mineral rights acquisition.	Working Group CDOW, BLM, NPS	As appropriate
6. Enroll important habitats in conservation programs with incentive payments to landowners under the Farm Bill (e.g., EQIP, WHIP, SGI, Grassland Reserve).	NRCS, WG, Landowners	As appropriate
7. Work with county governments to discourage interference of urban development with Objective 1. Provide information to county governments on status, location, and possible effects of different land uses on sage-grouse in their county. Provide examples of policy language used by other counties.	Coordinator	As needed

a. Discuss with Montrose and Delta County the possibility of developing land use regulations for property on or near lek sites.	Coordinator	2011–2012
b. Make contact with Montrose and Delta County regarding ways we can work together.	Coordinator	2011–2012
8. Establish GIS data layer of conservation easements and protected habitat that have sage-grouse considerations, using common attributes among populations and agencies.		
a. Discuss whether we want to do this on our own for the Crawford area or just use the rangewide database.	Working Group	2011–2012
9. Develop better predictive models to identify areas at high risk of permanent habitat loss and of high value to grouse in order to assist with prioritization of habitat protection efforts.	CDOW	As funds allow
10. Incorporate sage-grouse considerations into management agreements as opportunities arise and innovative ideas become available.	Working Group	Discuss at least once a year
11. Monitor protected lands to ensure compliance with their management plans.	CDOW, Land Trusts	As stipulated in agreement or C.E.
12. Have grass banks available for use by ranchers as an alternative grazing site when habitat treatments require a rest period.	CDOW, BLM	Ongoing

C. Habitat Improvement

1. Background and Limiting Factors

Crawford area GUSG require a diversity of habitats in order to persist on the landscape. During various times of the year, habitat needs will shift from open stands of scattered sagebrush (lekking), to mature stands of sagebrush with abundant ground cover (nesting), to early seral grass/forb communities (brood rearing) within mountain shrub communities, to mature sagebrush stands that may lack ground cover completely (winter). A monotypic sagebrush community cannot meet these diverse needs and providing the necessary mosaic in the plant community will be a high priority for the Working Group. To the extent possible, our goal will be to restore communities using native plant materials and minimally invasive techniques.

With the goal of natural restoration as a priority, the group also acknowledges that some plant communities have been so altered that restoration to a native/natural state is not a viable option due to cost or time constraints. There may also be instances where a landowner/manager may have additional goals in mind for the property such as livestock grazing. In these instances the use of non-native plant materials or high impact techniques may be employed. It should also be noted that in our attempt to provide optimum habitat conditions for GUSG, it may be necessary at times to alter plant communities in a manner that interferes with natural succession.

In the Crawford area, a number of habitat-related factors are likely contributing to the long-term population decline of GUSG. These factors may be interacting and influencing one another, so it is difficult to isolate and treat them individually.

Even though the available seasonal distribution and habitat use data is incomplete, an effort was made to infer those factors which are contributing to the population decline. As more data becomes available, the factors we identify as limiting may change.

While there is a general lack of knowledge about GUSG habitat use and movements in the Crawford area, the Working Group believes the following:

- Monitoring data indicates that the landscape within the Crawford area is meeting the GUSG habitat guidelines as outlined in the GUSG State Range wide Plan, however there are certain areas where there is cover and diversity of native forbs and grasses along with stands of sagebrush that don't meet the percentage of canopy cover required by GUSG. Appropriate nesting and brood-rearing habitat are particularly lacking in both quantity and quality. An increase in residual grass cover height (for nesting) and forb availability (for brood-rearing) are needed throughout the Crawford habitat area.
- Wet meadow and riparian habitats are critical to grouse for successful brood-rearing. These areas are relatively rare in the Crawford habitat area. Water structures have been developed off of the existing domestic water line south of C-77 road. However, these earlier (prior to 2009) developed structures don't seem to be creating wet meadow areas and may need to be modified. In addition, these areas have been fenced to keep domestic livestock from damaging the structure. However, the fence posts create raptor perches which limit their effectiveness. The posts need to be modified to discourage perching possibly by placing anti-perch devices on the posts. The scarcity and generally poor condition of these wet meadow habitats is probably having negative effects on the grouse population. Actions that create new wet meadow water structures or modify existing ones are needed and should be given a high priority.
- The Working Group feels that pinyon and juniper (P/J) encroachment is slowly reducing available grouse habitat in the Crawford area. To preserve sagebrush parks for sage-grouse, P/J removal around the edges of existing parks may be needed or large scale P/J removal may be desired landscape wide.

2. Types of Treatments

a. Understory Improvements

In order to insure the long-term health of local grouse populations, the grass and forb component must be restored in the sagebrush understory. Ideally, this would be done with native species whenever possible. Manipulating sagebrush stands to meet grouse canopy cover requirements and restoring the grass/forb understory will be the highest priority for habitat treatment projects.

Wildfire has always occurred naturally in the sagebrush ecosystems of the Crawford Area. Prior to the arrival of European man, fire was the main factor that set succession back in these ecosystems. After years of fire suppression, the use of prescribed fire has gained popularity as a tool to manipulate sagebrush ecosystems for various purposes including forage for livestock and

habitat for various species of wildlife, including grouse. Of the many tools available for manipulating sagebrush habitat, fire will generally have the longest lasting effect on suppression of the sagebrush. Factors such as size and shape of treatment are also more difficult to control with fire. Because grouse depend on sagebrush for food and cover, fire may not always be the best choice for improving grouse habitat. Also, prescribed fire is generally best suited for use in more mesic sites which have enough fine fuels (i.e. understory vegetation) to carry the fire. It should also be noted that fire has been applied to small areas of sagebrush within BCNP.

Tebuthiuron (Spike) is a granular herbicide that is used to control various brush species. For control to occur, the herbicide must first move into the soil where it is taken up by the roots and then translocated to aerial portions of the plant. When applied at low rates, it can have a thinning effect on sagebrush communities. Some plants will be totally killed while others will only be partially killed or left undamaged. Work completed in the Gunnison Basin show favorable results with Spike when applied at the rate of 0.2 lbs a.i./acre. No statistical difference was noted in grass species, cover or forb composition at this lower rate. Thus, Spike applied at 0.2 lbs a.i./acre is capable of thinning the sagebrush cover on these xeric sites without requiring an unreasonable amount of time for the plants to reestablish and/or recover to the point of meeting minimum standards.

b. Mechanical treatments

Treatment areas will be identified by the following criteria:

i. Either no cover of invasive weeds (such as cheatgrass – *Bromus tectorum*), or if there is cheatgrass in the area to be treated or nearby, the cheatgrass will be controlled before the mechanical treatment. Past mechanical treatments in the core habitat have been successful with no invasive species establishing, however there is potential for invasive species establishment on the edges of the occupied habitat.

ii. A location at the margins of suitable habitat, but outside known occupied habitat for experimental treatments, or an area located in suitable/occupied habitat if using a method with proven results for that specific area or habitat type. Ideally, the stand to be treated should be producing reasonable amounts of sagebrush seed.

iii. Soils in the treatment area have sufficient depth and fertility to support vigorous plant growth.

iv. Future management of the treated area will be conducted in a manner that is not detrimental to the establishment and persistence of the desired vegetation community.

v. There has not been excessive thinning of adjacent sagebrush stands, and sufficient nearby stands exist to serve the needs of GUSG, wintering mule deer, and/or other wildlife.

The best type of treatment would have to be determined after evaluating conditions on the site. This may vary from place to place based on cultural resources, topography, existing vegetation, and other factors. Because of the threat of cheatgrass, the best type of treatment is likely one that reduces the sagebrush canopy to a minimum extent (as reduced sagebrush canopy appears to favor cheatgrass), while simultaneously allowing native grasses and forbs to be drill seeded with minimum disturbance to the soil. Research on how to effectively restore native grasses and forbs without increasing cheatgrass is ongoing and should be further encouraged.

c. Wet Meadow Improvements

Natural flowing surface water is limited in the Crawford habitat area; however, surface waters are probably more important to sage-grouse for the micro-habitats they create. These areas generally provide a wetland type of vegetative component that yields more succulent forbs and attracts large numbers of insects. As these micro-habitats are probably a key factor in successful sage-grouse brood-rearing, efforts should be directed to creating more of these sites throughout the area.

i. Seeps: Create seep areas using spurs off of existing waterline that runs west through BLM lands north and south of C-77 road. Construct underground holding tanks to store water when available in spring for use in the seeps in late spring/early summer during brood rearing season. Modify existing water structures to create better seeps instead of drinking troughs.

ii. Stock ponds: Encourage and facilitate the creation and filling of stock ponds within the BLM sage-grouse habitat particularly in the Black Ridge area with the possibility of allowing some seepage below the ponds. Recommend that all stock tanks be fitted with an escape structure as detailed in Best Management Practices.

d. Pinyon Juniper (P/J) Encroachment

Sage-grouse are typically found in low shrub habitats and generally maintain a 300-500 foot buffer between themselves and a stand of trees. It is generally felt that P/J encroachment is having a negative effect on the GUSG habitat in the Crawford area. Steve Monsen, a noted shrubland restoration expert (USFS, retired) stated that Crawford is the most recoverable GUSG habitat that he observed on his tour of GUSG population areas. He said that Crawford was the most productive and favorable for sagebrush restoration through P/J removal.

Some experts believe that prescribed fire may be too risky for use in sage-grouse management (Baker 2006), primarily because prescribed fire is often not precise in extent or readily controlled and larger areas of sagebrush could be impacted than is beneficial for the species. Two previous efforts using prescribed fire in occupied sage-grouse habitats locally have shown that there may be opportunity to be successful in both obtaining benefits as well as in protecting adjacent sagebrush. In May 2009, prescribed fire was applied to a small area within Black Canyon of the Gunnison National Park. The target species for this burn were primarily Gambel oak, serviceberry, and encroaching pinyon and juniper trees that were located in sagebrush dominated areas, and sagebrush was not a target species. These target species were consumed at an acceptable level due to the dry litter that was located beneath them. This fire was prescribed during the time when the grasses and forbs between the clumps of target species and in the sagebrush areas were green so that fire would not easily carry through the sagebrush. Under this

specific prescription the invading target species were impacted to some degree while there was very little negative impact to the sagebrush. The BLM Gunnison Field Office utilized prescribed fire in sage-grouse habitats for several years in the late 1990s to create small openings (3-10 acres in size) that would quickly become dominated by vigorous grasses and forbs. These burns were done in the early spring with numerous patches of snow and moisture present to limit fire spread. Both of these prescribed burns show that there are prescriptive windows in which benefits can be obtained through prescribed fire in sage-grouse areas while maintaining appropriate sagebrush cover.

Further research is needed to determine whether P/J encroachment has been extensive, and if it has, then what the potential causes are. Researchers may also want to look at the various soil types to see if there is a correlation. If the causes cannot be controlled, and treatments to remove P/J would have to be done repeatedly, the cost may be prohibitive to maintain sagebrush habitat. A solution that is more sustainable than repetitive treatment such as fire may be preferred.

At a landscape level it is likely that past fires had some role in maintaining the ecotone between the P/J, sagebrush, and grass/forb vegetation types and that these ecotones naturally shifted on the local landscape both as occasional fires removed the denser woody species in some locations and as the resulting grass/forb areas succeeded to sagebrush and then again to P/J over a century or more. In consideration of long-term grouse habitat management, it may be appropriate to consider reintroducing this kind of fire regime back into the P/J dominated portions of this ecotone with the objective of regenerating vigorous, early seral grass/forb/sagebrush habitats. This approach may be particularly applicable in areas that are not presently occupied by sage-grouse or when/where sage-grouse numbers are sufficient to remain viable through that kind of disturbance in a portion of their habitat. Specifically, areas that are currently dominated by P/J but with a decadent sagebrush understory indicate that the P/J is a relatively recent, though natural addition to the plant community. These types of communities can be wholly or partially susceptible to burning. Burning would remove the woody species over several hundred acres and with post-burn seeding of grasses, forbs, and sagebrush, these burned areas could rapidly recover (over 10-15 years) to a vigorous grass/forb/young sagebrush vegetation type that would remain on the landscape for an additional 20-50 years before substantial P/J began to reinvade. During this time these treated areas could provide both vigorous and valuable habitat for sage-grouse. On a landscape scale, these types of prescribed burns could be planned in different P/J stands at the ecotone every 5-15 years, creating a diversity of grass/forb/sagebrush age classes across the landscape and subsequently creating and maintaining sage-grouse habitats over the long-term. This strategy could be particularly valuable in improving currently unoccupied sage-grouse habitat for future sage-grouse use. This process might also have better applicability, lower cost, and be more appropriate ecologically over repetitious mechanical treatments to remove encroaching P/J from aging sagebrush areas. Whatever the cause, the movement of P/J into sagebrush areas has effectively reduced the amount of available sage-grouse habitat. Removing large areas of P/J will be at least a temporary measure to maintain, and possibly increase, the areas used by GUSG.

i. P/J Removal: Some members of the Working Group believe that hydro-ax or roller chopping are appropriate to remove P/J from sagebrush areas. There have been past successes using this technique in the Crawford area to improve sage-grouse habitat. The National Wild

Turkey Federation has applied to NFWF for funds to do GUSG habitat improvements in the Crawford area and is concentrating on P/J removal on BLM land. The NRCS through their grouse initiative is looking to do P/J removal on adjacent private lands.

e. Experimental treatments

The use of experimental habitat treatments will primarily be restricted to those areas of either unsuitable or unoccupied habitat. These treatments however, should be encouraged in order to build a dataset of vegetative response.

i. Restoring native plants while limiting cheatgrass: Small-scale, intensively-monitored experiments remain essential to improve the possibility of successful restoration. They should be designed to allow comparison between different treatment methods. Experimental planting should focus on key species of native grasses, e.g., needle and thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*) and a few native forbs that most belong on the sagebrush sites and were likely historically most abundant on these sites. These species have the greatest potential for restoration.

ii. Chemical thinning of sagebrush: Some members of the Working Group believe it may be appropriate to evaluate the vegetative response to Spike applications in the habitat area. Radio telemetry and habitat use data will eventually answer whether grouse respond to this treatment. In the meantime, some small scale experimentation could be conducted in order to determine the feasibility of meeting grouse canopy cover requirements in the black/low sage areas by thinning and introducing more grasses and forbs.

iii. Test Plots: Set up a series of small plots (1–2 acres) and test the response of low sage to treatment by Dixie harrow, Spike, and brush mowing.

3. Goals of treatments: To maintain and improve the quality of sage-grouse habitat.

Objective 1: To utilize Monsen (2005) to select and implement appropriate treatment options suitable for the site characteristics and treatment objective when planning for vegetation restoration/improvement projects that provide the structural habitat required for breeding, summer-fall, and winter GUSG habitats.

Strategies and Tactics	Who	When
1. Remove P/J in a way that minimizes disturbance and the spread of weeds in places where P/J has been determined to be reducing usable GUSG habitat.	CDOW, BLM, NRCS	ASAP
a. On BLM at the edges of occupied habitat	BLM, NWTF	2011
b. On private lands adjacent to occupied BLM habitat	NRCS	2011
2. Develop wet meadow habitat where appropriate.	BLM, NWTF	2012
a. Develop seep areas off of existing waterline to run water on the surface, seed with grasses and forbs, and fence if needed.	BLM, NWTF	2012

Objective 2: To utilize new research and the best judgment of Working Group members to select and implement appropriate treatment options suitable for the site characteristics and treatment objectives when planning for vegetation restoration/improvement projects that provide the structural habitat required for breeding, summer-fall, and winter GUSG habitats.

Strategies and Tactics	Who	When
1. Meet at least once a year to discuss new research and techniques for habitat improvement.	Working Group	Yearly
2. Adjust plans for habitat improvement projects as needed to reflect new information.	Working Group	As needed

In addition to the above habitat improvement plans, there are several other plans that include habitat management proposals for the Crawford area GUSG habitats. These plans include the North Rim Landscape Strategy plan (<http://www.northrimlandscapestrategy.org>); the Gunnison Gorge National Conservation Area-Area of Critical Environmental Concern (ACEC) (<http://www.blm.gov/co/st/en/nca/ggnca.html>); the BLM Uncompahgre Field Office Resource Management Plan (RMP) (http://www.blm.gov/co/st/en/fo/ufo/uncompahgre_rmp.html); and the Black Canyon National Park plan (<http://www.nps.gov/blca/parkmgmt/index.htm>).

D. Information, Education, and Publicity

One of the primary functions of the Working Group involves the sharing of information and coordination of efforts. The Coordinator serves as the hub for distribution of information provided by Working Group members. The Coordinator is also responsible for keeping abreast of news about grouse and sharing with members, the media, school children, and the general public.

In addition to emails, letters and phone calls; regular meetings of the Working Group and its committees foster coordination of efforts. This helps to avoid duplication of efforts or operating at cross purposes. It also provides a forum for agencies and organizations to bring their expertise and funds together for projects that benefit the grouse and its habitat.

Goal: To inform and educate people about GUSG and the Working Group in order to gain their support and assistance in conservation of grouse and their habitat and to facilitate communication between individuals and organizations involved in GUSG conservation.

Objective 1: Distribute information and publicity on GUSG and the Working Group.

Strategies and Tactics	Who	When
1. To maintain a website that is updated at least quarterly with current information on GUSG and the Working Group.	Coordinator	Quarterly
2. To send out press releases or do TV and radio interviews as appropriate.	Coordinator	As needed

Objective 2: To continue to serve as a clearinghouse and hub in the Crawford area for GUSG information.

Strategies and Tactics	Who	When
1. Keep the Working Group members informed of GUSG news, meetings, and projects via email and/or regular mail.	Coordinator	As needed
2. To meet to share information and make decisions.	Coordinator	As needed
a. Have Working Group meetings at least 4 times per year.	Coordinator	At least 4 times per year

Objective 3: To coordinate efforts between agencies and Working Groups.

Strategies and Tactics	Who	When
1. Gather information from Working Group member agencies and organizations by December of each year for the rangewide database of GUSG projects.	Coordinator	December of each year
2. Work with other agencies and Working Groups on projects such as grant writing, habitat improvement, habitat protection, and education as appropriate.	Coordinator	As needed
a. Work with the San Miguel Basin Working Group (and any other interested GUSG Working Groups) to plan and produce an educational DVD on GUSG and conservation efforts.	Coordinator, Other WG members and agencies, contractors	Start in 2011
b. Work with other Working Groups and the Rangewide Steering Committee to plan the next GUSG Summit.	Coordinator, Working Group members	As appropriate

Objective 4: To provide educational events or programs to the general public, school children and/or groups each year.

Strategies and Tactics	Who	When
1. Include Crawford in an educational DVD on GUSG and conservation efforts produced by San Miguel Basin working group.	Coordinator	Contact SM WG in 2011
2. Work with NPS to design GUSG educational program for Delta County schools.	Coordinator, NPS	Start in 2011
3. Continue to provide programs to the public, school groups, and other interested parties	Coordinator, CDOW	As requested or as time permits

E. Land Use and Human-caused Disturbances

Gunnison sage-grouse require large areas of sagebrush, and anything that destroys or fragments that habitat is likely to negatively impact the grouse. In addition, various human activities have been shown to have an adverse effect on GUSG. These disturbances can be either indirect (e.g., nearby human activity increases predator populations) or direct—see below.

1. Physical Disturbance to Populations

This refers to the physical disturbance to sage-grouse. Physical disturbance can result in death or exert stress, particularly if disturbance occurs during biologically critical periods. Continued stress over time can lead to death.

Issues that affect sage-grouse populations and their habitat:

Vegetative Habitat

- poor habitat quality and quantity
- lack of grasses and forbs
- condition of winter habitat
- same age class distribution of sagebrush species

Land Planning/Mitigation

- fragmentation
- changes in land uses (e.g., to crops or housing/commercial development)

Land Treatments

- adverse effects of land treatments on habitat, including loss of sagebrush cover
- poor management of land treatments
- lack of habitat management/need for habitat management

Utilities

- power lines (not currently a factor in Crawford)
- roads
- pipelines
- wind turbines (not currently a factor in Crawford)

Loss of Topsoil & Productivity

Timing, Intensity and Duration of Livestock/Big Game Grazing

Predators [Coyotes (*Canis latrans*), foxes (*Vulpes vulpes*), badgers (*Taxidea taxus*), crows (*Corvus brachyrhynchos*), ravens, eagles (*Haliaeetus* spp. and *Aquila* spp.) , or other raptors]

Stress Due to Scientific Study

Conflicting Uses during Critical Biological Activity Periods (e.g., activities that cause excess noise near leks in the spring)

Fences, especially sheep fencing or new, unmarked fences

Reservoirs Flooding Leks and Habitat

Recreation

2. New Science on Oil & Gas Development's Impacts to Sage-grouse

In recent years, a number of scientific studies have been published on the effects of oil and gas development on sage-grouse. While the studies have primarily focused on GRS, we feel that with the lack of specific data on GUSG, the studies on GRS provide the best available science.

In 2008, the Wyoming Game and Fish Department published a document, *Using the best available science to coordinate conservation actions that benefit GRS across states affected by*

oil & gas development. It was developed by science and management advisors from state fish and wildlife agencies and was based on studying recent journal articles and presentations by researchers of their findings.

The studies quoted in the Wyoming report make different recommendations based on whether seasonal grouse habitats are mapped or not. In the Crawford area, seasonal grouse habitats are not mapped out separately. In great part, this is because there has not been enough evaluation of habitat use by grouse using radio-telemetry. This should change in the future with the USGS study currently underway. Based on past information, it is felt that the core, or occupied, habitat is primarily used year-round.

While the Working Group feels that the human disturbance objectives in the RCP (2005) should be followed, the Working group also adds the following recommendations based on the Wyoming report are:

- i. Because breeding, summer, and winter habitats are essential to populations, developments within these areas should be avoided. If development cannot be avoided within core areas, infrastructure should be minimized and the area should be managed in a manner that effectively conserves sagebrush habitats within that area. Information provided in Walker et al. (2007) allows managers and policy makers to estimate trade-offs associated with allowing development within a range of different distance from leks.
- ii. Since impacts to leks from energy development are discernable out to a minimum of four miles, and a four-mile buffer is needed to encompass 74-80% of sage-grouse nests (Moynahan 2004, Holloran and Anderson 2005, Colorado GRSG Conservation Plan Steering Committee 2008), we recommend no surface occupancy within a four-mile radius of leks.
- iii. Timing stipulations to protect nesting hens and their habitat should be in place from approximately March 1 through June 30 within four miles of active lek sites. Ideally, local biologists can give more exact dates each year based on weather and predictions.
- iv. No surface occupancy should also be applied to important wintering habitats (Doherty et al. 2008), but if development occurs, impacts would be reduced if development activities were avoided between approximately December 1 and March 15 (plus through the end of the strutting period–May 15 as determined by a local biologist) and disturbance to sagebrush was minimized.
- v. New roads should not be allowed within 0.8 miles of a lek, since traffic during the strutting period when males are on a lek results in declines in male attendance when road-related disturbance is within 0.8 miles.
- vi. Seed mixes for restoration should be determined by a local biologist, e.g., to include local sagebrush species. A field should not be considered restored until the native plant species have been reestablished.
- vii. The above recommendations represent what is ideal for the grouse, but it makes sense to have review of planned developments by a local biologist (CDOW, BLM, or USFWS). For example, in some cases a four-mile buffer may extend out of occupied sage-grouse habitat and into vegetation that is unsuitable for grouse. This certainly is the case with the Crawford habitat considering it is a long narrow strip not more than

four miles wide at its widest point. If there are natural barriers, such as a hill, that block sound and sight of possible raptor perching sites, biologists may feel comfortable with a smaller buffer distance.

3. New Science on Utilities and Power Lines' Impacts to Sage-grouse

The placement and existence of power lines in sage-grouse habitat are of concern for several reasons. A primary factor is that they provide perching and nesting sites for avian predators of sage-grouse. According to Williams and Colson (1989), there is a strong association between raptor activity and utility rights-of-way. Following the 1974 construction of a 230-kV transmission line in Colorado, raptor density near the line increased from 4–13 raptors per square kilometer (10–34 per square mile) to 21–32 raptors/km² (54–83/mi²) after construction (Stahlecker 1978).

Predators of sage-grouse nests and chicks, such as ravens and crows also use power lines for nesting and perching sites. In a Nevada study, common raven counts increased by ~200% along the transmission line corridor and there was a dramatic increase in the number of disturbance events at leks involving common ravens (Atamain et al. 2007). While not scientifically counted, there is much anecdotal evidence from biologists working in the Crawford area that ravens have increased significantly in the Crawford sage-grouse habitat.

Researchers have reported that leks have been abandoned after the placement of power lines within sight of a lek (Ellis 1985, Clait Braun personal communication). This seemed to be due to increased interactions between raptors and sage-grouse.

One potential way to help lessen the problem of raptors and corvids perching on power lines is to install perch deterrents. Currently, the most effective devices studied seem to be long, flexible neoprene spikes (HawkWatch 2008). Since these devices are not 100% effective, some people have suggested providing perching poles for raptors out of the line-of-sight of leks.

Additional concerns include sage-grouse flying into power lines and telephone lines (J. Stiver, personal communication, Borell 1939, Ligon 1951), lekking birds avoiding tall structures (Robel et al. 2004), and the human disturbances caused by the installation of power lines (e.g., noise, disturbance of habitat, and introduction of weeds).

Researchers have suggested a buffer distance of anywhere from 0.5 km to 8 km between power lines and occupied sage-grouse habitat. Keeping power lines out of the line-of-sight of leks has also been recommended.

Other factors need to be considered, as well as the fact that more information is needed regarding sage-grouse and utility line interactions. The following points have been discussed regarding sage-grouse and power lines:

- That very few scientific studies have been conducted on sage-grouse in the proximity of electric power lines in order to determine the effective distance from aboveground structures to sage-grouse use areas. This buffer area is presently unknown and to date, there has been no evidence of population-level impacts to grouse from power lines.
- Preliminary study results from Sierra Pacific Power's and the University of Nevada's

10-year study in Nevada on effects to grouse and raptors from power lines show the numbers of raptors documented during surveys did not change significantly or concentrate near active lek sites after construction of the new power line, as was expected. Additionally, there was no correlation between the annual number of lek visits by raptors and the distance of the leks from the transmission line both before and after line construction (Collopy and Lammers 2003; Lammers and Collopy 2005).

- The California Department of Fish and Game (Hall and Haney 1997) examined potential effects to sage-grouse from power lines in northern California. Although Hall and Haney (1997) showed a lower attendance at lek sites closer to power line ROWs, they could not account for other confounding factors that may have influenced utility line placement and/or sage-grouse populations (Atamian et al. 2005).
- The Avian Power Line Interaction Committee's (APLIC's) most recent, Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006, acknowledges that perch discouragers should only be used in certain situations, since if a bird wants to defeat them, they often can.

Given the difference in suggested buffers and the fact that scientific knowledge changes over time, we recommend the following:

- i. Prior to the design and placement of new power lines, other above-ground facilities, or replacement of existing structures in occupied GUSG habitat (and within line-of sight of occupied habitat), consultation based on the best available science as well as information on applicable and effective mitigation measures should occur between local CDOW biologists and applicable electric utilities or private owners to avoid or minimize impacts to GUSG.
- ii. If possible, above-ground power lines should not be located in occupied GUSG habitat or within line-of-sight of GUSG habitat. Exceptions may be allowed based on topography, line-of-sight (viewshed analysis), type of power line, and whether effective perch deterrents are used.
- iii. Transmission lines should not be constructed within 1.5 km of a lek (Ellis 1985).
- iv. If power lines must be constructed (or are to be removed) within occupied GUSG habitat, this should not take place during the breeding period (generally mid-March through late May). Precise dates should be obtained from a local biologist (Gunnison Sage-grouse Rangewide Steering Committee 2005). In addition, revegetation with local, native species and weed control (if necessary) should take place to restore the original vegetation community.
- v. Where possible and practical, unused power lines within GUSG habitat should be removed.
- vi. Further research involving the CDOW, BLM, other partners, and utility companies should be encouraged to aid in answering outstanding questions and resolving concerns. Some examples of potential studies include extensive under-line prey remains searches and subsequent lab identification of remains and/or the use of motion-activated video equipment (e.g., Bird Activity Monitor) to understand how raptor size and behavior influence the effectiveness of perch deterrents. (HawkWatch 2008).

4. Current Conditions and Trends in Land Use

The Office of Colorado State Demographer expects the population of Delta and Montrose counties to rise significantly faster than the statewide average over the next 25 years. This results in an increase in development; however, since 76% of the occupied and potential grouse habitat is on public land the threat is not as great as it is on private lands. Conversely, the use of that public land is expected to increase significantly.

The potential for development in the Delta County portion of the grouse habitat is limited to Fruitland Mesa and Scenic & Grandview Mesas north of the Smith Fork. That development is due mainly to the subdividing of larger ranches into home sites. Delta County is not zoned; however subdivisions cannot occur on parcels of 20 acres or less. Because of the past conversion of the landscape to agricultural practices (mainly hay fields) the habitat was of limited value to sage-grouse before increased development.

There is no commercial development anticipated in the Montrose County portion of the Crawford area GUSG habitat which is the major area of occupied habitat. Development density requirements in Montrose County are currently at a 3 acre minimum. No water is available in this area, making subdivisions less desirable due to the fact that the county will not entertain subdivision applications without road and water plans. The current density across the landscape is low; with development only in isolated locations (the existing elk ranch had been subdivided and sold off in smaller parcels). No major infrastructures (water/roads) exist and the county has no plans for future development projects, particularly for water.

5. Mitigation

When looking at the possible consequences of development in sage-grouse habitat, the following steps illustrate a recommended order of actions for mitigating impacts (Note: more than one step may be used):

1. Avoid development in sage-grouse habitat
2. Minimize impacts of development (with stipulations as to placement, timing, etc.)
3. Reclaim areas affected by development
4. Offset impacts that are unavoidable (e.g., protect, or improve GUSG habitat off site).

Goal: To prevent, minimize, and/or mitigate the potential negative impacts from human activities on GUSG and its habitat.

Objective 1: To work with county governments to discourage interference of development with sage-grouse habitat requirements.

Strategies and Tactics	Who	When
1. Provide written comments on land uses in GUSG habitat to county governments.	Coordinator	As needed
a. If possible, work with Montrose County to develop a method to comment on impacts to GUSG.	Coordinator in conjunction w/ San Miguel WG	2011–12

Objective 2: To provide information to county governments on status, location, and possible effects of different land uses on sage-grouse in their county, and to provide examples of policy language used by other counties.

Strategies and Tactics	Who	When
1. Make specific recommendations regarding land uses where appropriate.	Coordinator, CDOW	As needed
2. Discuss with the county governments other ways the Working Group can provide information or help with land use issues.	Coordinator, CDOW	2011 on

Objective 3: Educate and encourage landowners to avoid practices that would harm sage-grouse.

Strategies and Tactics	Who	When
1. Encourage the removal or modification of fencing harmful to grouse (e.g., water structure fences) and encourage grouse-friendly fences.	Coordinator, Working Group Members, Agencies and Organizations	2011 on
2. Provide information to landowners through the website, DVD, printed material, etc.	Coordinator	2011 on

Objective 4: Work with developers (e.g., subdivision, energy) in early stages of planning to map out strategies to avoid or minimize development in critical sage-grouse habitat and plan for reclamation and mitigation.

Strategies and Tactics	Who	When
1. If possible, initiate meetings with developers to discuss impacts to sage-grouse and various options.	Coordinator, Working Group Member Agencies and Organizations	2011 on as needed
a. Consider using The Nature Conservancy's models: Energy by Design and the Offsite Mitigation Design Project (used in the Jonah Natural Gas Field in WY).	Coordinator, Working Group Members et.al.	2011 on as needed

F. Research and Monitoring

There are many unanswered questions when it comes to grouse biology and human impacts on the bird and its habitat. Much of the research is currently being done by the CDOW and USGS/NPS plus the BLM in the Crawford area, but the Working Group can recommend research projects and conduct grant writing to help make more research possible.

Monitoring of projects is critical to ensure that goals and objectives are being met. Data from monitoring adds to our knowledge base and allows the Working Group to adjust plans and make better decisions in the future. Monitoring will be coordinated to insure that data collected will

provide the needed information to assess on-the-ground management actions and to measure progress in resolving resource problems and conflicts. This coordination will include appropriate consultation and cooperation with rangeland users, landowners, academia, private organizations, and governmental agencies. Direct involvement by interested parties in the collection of data and in the subsequent evaluations based on these data will add to the credibility of monitoring results.

It is important that all monitoring information be easily accessed by those interested in reviewing the data. Monitoring the response of the GUSG population to conservation actions will, in part, be measured by total number of active leks and the total number of males counted on the various leks in the Crawford area. The number of active leks and total males reflects survival. Chick production and recruitment are more reliable measurements, but collecting the data is labor intensive and will depend on available funding. Changes in habitat quality which result from the implementation of planned actions will be monitored using techniques applicable to the specific project or action.

Monitoring is essential to all aspects of management of sage-grouse and their habitat and to successful collaboration to protect grouse. Sufficient funding for monitoring should be included in all projects, and monitoring data and results should be shared via the Working Group’s website and other forums. Monitoring can vary from something very simple (e.g., permanent photo points) to more complex, formal experimental methods (replicates, permanent transects, controls).

Goal: To conduct research and monitor projects to determine the most effective ways to ensure a healthy GUSG population and habitat. (Some monitoring and research activities are listed here, but they may also appear in other sections.)

Strategies and Tactics	Who	When
1. Conduct a yearly field trip to review habitat treatments, view recently protected land, and discuss future plans.	Coordinator, Working Group	Once per year (e.g. late April, early May)
2. Recommend research projects to the Rangewide Steering Committee	Coordinator, Working Group	Winter each year
3. Conduct research projects to gain info. for making effective decisions regarding GUSG, their habitat, and other species that are a part of the sagebrush ecosystem.	W G Member Agencies (e.g. CDOW, BLM)	
a. Conduct GPS radio-collar research on grouse to determine habitat use and human interaction	USGS, NPS, coordinator	2010 on
b. Develop and implement methods to monitor and evaluate grouse response to habitat treatments, or in unoccupied areas, to monitor key habitat elements (e.g., insect and forb diversity) critical to sage-grouse.	CDOW, USGS, coordinator	TBD
4. Monitor habitat treatments and other projects to determine their effectiveness and the effects on GUSG.	Working Group Members and Agencies	As needed

G. Coordination and Program Support

Different kinds of support are needed to enable the Working Group to implement its various projects. This can include grant writing, keeping track of finances, writing reports, attending training, planning, and other administrative duties. Currently, the Coordinator performs many of these tasks under the supervision of the Working Group's Steering Committee.

Goal: Provide support services to enable the Working Group to reach its goals and objectives.

Strategies and Tactics	Who	When
1. Write and administer grants to provide finances for the Working Group's projects.	Coordinator	As needed
3. Attend training sessions to gain information and skills that will support the Working Groups' efforts.	Coordinator	As needed
4. Update plans to reflect current conditions and update strategies and tactics.	Coordinator, Committees, Working Group	As needed, review yearly

IX. IMPLEMENTATION

Plan implementation will be priority-based starting with those actions the Working Group believes to be most effective at accomplishing their goals. This group recognizes the need to be opportunistic and carry out specific conservation actions as situations present themselves. For example, a particular conservation action might be implemented sooner than scheduled if funding became available or a group or individual came forward to help with completing a task. Some actions have already begun or are ongoing. Other actions would need to be done continually throughout the plan.

The adoption of these strategies and tactics will be the responsibility of the Working Group. Additional steps or tasks needed to carry out a conservation action will be developed as the implementation proceeds. Cost estimates, including those for monitoring and evaluation will be identified. Every effort to leverage money and resources will be made. Many actions, such as vegetation treatments are costly, and will be dependent on seeking cooperative funding from many partners.

Because plan accomplishment will require time to complete, it is important to track progress at meeting our goals. At least yearly, the Working Group will convene a meeting to examine accomplishments and keep the plan on track. Completed actions will become part of the yearly progress report and will be entered into the rangewide database. The public will be invited to attend the annual meeting and copies of the progress report will be available to those interested. An important part of the yearly progress report and meeting will be to discuss and document any exceptions or deviations to planned accomplishments. Adjustment to the implementation sequence may be needed. It is important to show continual progress toward accomplishing the plan's goals.

X. PLAN EVALUATION & UPDATES

Evaluations may be conducted anytime during the implementation of this plan. The goal of evaluation is to determine whether progress is occurring and, if not, to identify adjustments. Each year we will review whether this plan (or parts of the plan) needs to be updated based on new science, monitoring of activities, and other influencing factors.

Appendix A: Listing factors considered by the U.S. Fish and Wildlife Service in evaluating possible action under the Endangered Species Act. These factors can be found at www.fws.gov/endangered/laws-policies/section-4

Factor 1. Present or threatened destruction, modification, or curtailment of its habitat or range.

The range of the GUSG in the Crawford Area has been greatly reduced in size and quality through habitat loss caused by plowing, spraying, road construction, and powerlines; habitat fragmentation caused by the same factors, and habitat degradation caused by the same factors as well as inappropriate livestock management. Total range reduction is estimated at greater than 50%.

This Conservation Plan will reduce destruction, modification, or curtailment of the GUSG's range through implementing the following management actions: Eliminating major land disturbances by housing developments and industrial uses (other than farming and ranching); by reducing unnecessary roads; reducing or eliminating disturbed land by livestock operations; using mechanical means for habitat improvement; reducing unnecessary utility lines/ and improving vegetative habitat and soil conditions by reseeding with forbs, by using proper grazing and hay mowing management, by managing noxious weeds, by appropriate big game management, and by appropriate herbicide use.

Factor 2. Overutilization for commercial, recreational, scientific, or educational purposes.

No overuse of GUSG in the Crawford Area is apparent as hunting is not permitted, there is no commercial or recreational use, and scientific study (banding, radio marking) only affected a few birds in 1995-96, <10 birds in 2000-2001 and is projected to mark only 10 birds in 2011. Educational field trips may occur but are not likely to cause disturbance to the GUSG if proper viewing protocols are followed.

Factor 3. Disease or predation.

No disease/parasite problems have been identified in GUSG in the Crawford Area though West Nile virus is suspected to be possibly affecting sage grouse rangewide. Predation is a natural event and a significant number of the total population disappears (dies) each year. Major identified predators of adults include golden eagles, goshawks, ravens, peregrine falcons, bobcats, and coyotes. Most loss of potential productivity is through nest failure caused by ground predators such as ground squirrels and/or egg predation by ravens. Some accidental loss due to livestock management and road maintenance has been documented.

Factor 4. Authorities and existing regulatory mechanisms.

Members of the Crawford area Gunnison sage-grouse Working Group are committed to improving conditions for sage grouse in the Crawford Area. While landowner adoption of the proposed conservation actions is voluntary, the Conservation Plan was developed with the spirit of cooperation and there is broad support for the goals and objectives contained in the Conservation Plan. The Working Group believes existing regulatory mechanisms are adequate to achieve these goals and objectives.

The Colorado Division of Wildlife, a branch of the Colorado Department of Natural Resources, has responsibility for the management and conservation of wildlife resources as defined and directed by state laws. The Division also has enforcement authority for poaching and harassment.

The Boards of County Commissioners of Montrose and Delta Counties, Colorado have authority to regulate land use, land planning, and protection of the environment in these Counties. Montrose and Delta Counties have regulations to exercise such authorities including the review, approval or denial of proposed activities and uses of land.

The USDA Forest Service (USFS) has direction and authority for the maintenance of biological diversity on National Forests and for the protection and management of wildlife species and habitats as defined and directed by various Federal Laws and Regulations.

The USDA Natural Resources Conservation Service (NRCS) also has authority for conservation of the GUSG through various Federal Laws.

The USDI Bureau of Land Management (BLM) has authority for conservation of the GUSG and the management of natural resources and land uses on Public Lands through a number of Federal Laws and Regulations.

The USDI Fish and Wildlife Service (USFWS) has authority for conservation of the GUSG through the Endangered Species Act of 1973 and other Federal Laws.

Two other authorities for agencies working on GUSG conservation include a Memorandum of Understanding and a Memorandum of Agreement. In 1994, several federal agencies, including those listed here, signed a Memorandum of Understanding to establish a general framework for better cooperation and participation among these agencies in the management and conservation of species at risk, which are tending towards federal listing as threatened or endangered. In 1995, the state of Colorado and the U.S. Department of Interior entered into a Memorandum of Agreement which committed agencies in the Department of Interior and the state to collaborate and cooperate in management and conservation of declining populations of fish and wildlife and their habitat. This agreement has two important tasks: "The state and the Department agree to develop and implement programs to determine and monitor the status of species at risk;" and "The state and the Department will encourage partners and stake holders to take a leadership role in working with the state and the Department to develop and implement conservation actions through Conservation Agreements and Recovery Agreements." A list of species for which the Department and the state would initially focus conservation actions on was written. This list specifically mentioned declining populations of sage grouse. Several Candidate Conservation Agreements with Assurances (CCAA) are in the development stage in the Crawford area.

Factor 5. Other natural or manmade factors affecting its continued existence.

Natural factors affecting the continued existence of GUSG in the Crawford Area include natural fragmentation and severe weather conditions during the nesting and early brood periods. Fire suppression is a manmade threat leading to changes in habitat through invasion of pinyon-juniper and allowing sagebrush habitat types to become decadent. Other manmade factors that affect sage grouse include continuous noise that impairs the acoustical components of males on leks; disturbance from construction or other projects; harassment from pets; and disturbance, death, or habitat degradation from use of off-highway-vehicles (OHV's)

To address these threats, fire or other habitat management may be prescribed for areas in the Crawford Area population range to remove invasive trees and restore native plants and vitality to the sagebrush habitats used by sage grouse. Additionally, noise ordinances or restrictions during critical periods near leks may be enforced, construction start up dates may be delayed or modified, pets may be encouraged to be controlled or limited, and OHV use areas and other travel management in key sage grouse areas may be enforced. There is currently a closure of C-77 road which goes right through the middle of the main grouse habitat. That closure is in effect from December 1 to April 30. However, there may be new access through private land that could negate that closure.

Appendix B: Lists of participants

List of participants 2011 plan

Jim Ayer, rancher
James Ayer, rancher
Kyle Banks, Colorado Division of Wildlife
Tanya Banulis, Natural Resource Conservation Service
John Barcus, Black Canyon Audubon Society
Danguole Bockus, National Park Service
Theresa Childers, National Park Service
Guy Clark, citizen
Bill Day, Black Canyon Audubon Society
Cheryl Day, Black Canyon Audubon Society
Brandon Diamond, Colorado Division of Wildlife
Amanda Ewing, Natural Resource Conservation Service
Dennis Garrison, US Forest Service
Jerilee Gibbs, citizen
Shana Harness, Natural Resource Conservation Service
Doug Homan, Crawford area Gunnison sage-grouse working group coordinator
Dan Huisjen, Bureau of Land Management
Ken Hulsinger, BLM
Lynn Keith, citizen
Charles Klaseen, rancher
Larry Kontour, citizen, retired Division of Parks & Outdoor Recreation
Chris Lazo, citizen
Robbie LeValley, CSU Extension, rancher
Hank LeValley, rancher and permittee
Pam Motley, UP Project
Frank Newcomb, citizen
Joe Oglesby, citizen
Doug Ouren, US Geological Survey
Jaylene Park, citizen
Leigh Robertson, San Miguel Basin Gunnison sage-grouse working group coordinator
Andrea Robinsong, Western Slope Environmental Resource Council
Nathan Seward, Colorado Division of Wildlife
Charlie Sharp, Bureau of Land Management
Missy Siders, Bureau of Land Management
Karen Tucker, Bureau of Land Management
J Wenum, Colorado Division of Wildlife

List of participants 1998 plan

Larry Allen, Rancher
Ross Allen, Rancher
John Barcus, Black Canyon Audubon
Clait Braun, Colorado Division of Wildlife
Myron Chase, National Park Service
Amanda Clements, Bureau of Land Management
Doug Homan, Colorado Division of Wildlife
Terry Ireland, US Fish and Wildlife Service
Larry Jensen, Rancher
Tom Jones, Natural Resource Conservation Service
Charlie Klaseen, Rancher
Mark LeValley, Rancher
Hank LeValley, Rancher
Don Masden, Colorado Division of Wildlife
Paul Obert, Natural Resource Conservation Service
Jim Sazama, Bureau of Land Management
Danny Todd, Rancher
Tom Ware, Landowner
Bob Welch, Bureau of Land Management

Appendix C: High male Gunnison sage-grouse counts by lek, Crawford area, 1978–2010

Year	F #1	F #2	F #3	F #4	F #5	F #6	F #7	F #8	F #1-Sat.	Dam	Middle	Poison Spring	Range Cone	Sec. 35	Sec. 35-Sat.	Total/yr.
1978	31	10														41
1979	31	0														31
1980	23	nc	6													29
1981	23	0	15													38
1982	13	nc	6													19
1983	20	nc	nc	14												34
1984	12	nc	nc	3												15
1985	13	nc	nc	8												21
1986	16	nc	nc	7	0	0	4	8								35
1987	12	nc	nc	11	0	0	2	7								32
1988	8	nc	nc	nc	nc	nc	nc	3								11
1989	23	nc	nc	(4)	nc	nc	nc	0								23
1990	13	0	nc	0	0	0	0	0								13
1991	25	0	nc	0	0	0	0	0								25
1992	18	0	0	0	3	5	0	0								26
1993	9	0	nc	3	0	0	0	0								12
1994	0	0	0	3	0	0	3	0		3			11	8		28
1995	0	0	nc	7	0	0	0	0		6			9	6	5	33
1996	0	0	nc	0	0	0	0	0		18			15	7		40
1997	0	0	nc	0	0	0	0	0		13			20	8		41
1998	0								6	13		+	28	4		51
1999	10								+	8	0		40	6		64
2000	7									8			29	6		50
2001	6									0			22	0		28
2002	11									8	1		20	2		42
2003	12									3	0		8	1		24
2004	7									6	0		9	4		26
2005	6									8	0		17	8		39
2006	8			10						4	1		16	2		41
2007	5			nc						5	2		9	2		23
2008	4			2						1	nc		11	2		20
2009	0			5						0	nc		10	1		16
2010	0			0						0	0		4	0		4

F in the lek designations means Fruitland as in Fruitland #1, Fruitland #2, etc.

Numbers in () means a flush count.

+ indicates that birds were seen but gender was not identified.

Note: During the 1994 count season, a temporary was employed to make counts every other morning which revealed areas where males were strutting but not identified in previous years. As a result of those counts, new leks were brush beat and therefore, counts in subsequent years were focused on those leks as the birds began using those leks instead of some of the old leks designated as Fruitland #'s 2, 3, 5, 6, 7 and 8.

Appendix D: Issue descriptions

The following issue descriptions are from the 1998 plan. The working group felt that most of the issues were still valid and didn't spend much time updating the issues. Rather they deferred to the Rangewide plan which can be found at the following location on the internet:

<http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/Birds/GunnisonConsPlan.htm>

The working group also felt that issues laid out in the North Rim Landscape Strategy document were relevant to the Crawford area population. That document can be found on the internet at:

<http://www.northrimlandscapestrategy.org>.

Vegetative Habitat:

Poor habitat quality and quantity---The major factors that drive sage grouse populations are quality and extent of habitat. No other bird is so habitat specific to one particular plant type (sagebrush) in meeting its annual life requirements. Size of habitat is important because sage grouse move seasonally between suitable habitat types. Sage grouse are unable to adjust their life processes to fit a pattern of land use that eliminates or adversely disturbs large tracts of sagebrush.

Lack of grasses and forbs---The quality and quantity of residual herbaceous cover have important roles in sage grouse production and survival. Residual herbaceous vegetation (grasses and forbs) in sagebrush areas which provide adequate cover, both horizontal and vertical, is necessary to hide nests and nesting hens, and broods, as well as provide habitat for insects upon which chicks depend. The number and distribution of high quality nesting and early brood-rearing areas appear to be a limiting factor for sage grouse in the Crawford area.

Condition of winter habitat---Winter habitat is most critical to Crawford sage grouse because without sufficient areas of exposed sagebrush they cannot survive the winter to reproduce in spring. Although sage grouse are widely distributed in winter, suitable winter feeding sites do not constitute a large proportion of the available land area. Despite improvements made to other habitat types, sage grouse will not survive unless their wintering areas are protected from fragmentation or factors that destroy or degrade them.

Land Treatments:

Land treatments include such projects as: plowing and seeding, prescribed burning, herbicide, and chaining/cabling. The effects of land treatments on sage grouse populations can be either positive or negative, depending upon location, method, objective of the treatment, and follow-up management. Some historic land treatments conducted in the Crawford area have not benefited sage grouse. Effects of poorly designed treatments on sage grouse include reduction of brood carrying capacity of an area, loss of escape cover around leks making birds more vulnerable to predators, elimination of nesting habitat, and loss of winter habitat.

Effects of land treatments on winter habitat---Some land treatments which attempt to remove sagebrush to increase livestock and/or big game forage in sage grouse wintering areas, can have a detrimental impact on sage grouse. As snow begins to accumulate, sage grouse winter use areas become limited and are restricted to areas that support taller, dense sagebrush stands. Removal of sagebrush at those sites would force sage grouse to use other terrains where sagebrush forage could be buried by snow. This would reduce survival due to greater exposure to winter weather, predators and starvation. As a result, treatment of sagebrush in critical areas has a disproportionate detrimental effect on winter habitat availability.

Poor management of land treatments---A major problem resulting from historic land treatments in the Crawford area involves alteration of plant community structure in each of the sage grouse habitat types. The increases in alterations combined with a lack of subsequent management needed to maintain the health of plants, resulted in treated areas often being overgrazed and invaded with sagebrush with little herbaceous understory, especially forbs and native grasses.

Fire suppression---Wildfires are natural with effects that vary depending upon size of burned areas and the intensity and severity of the fire. In the past, natural fires were not a problem because they burned relatively small areas and burned areas did not have large numbers of confined grazing animals using them afterwards. For the past several decades, public land management agency policy was to suppress all natural fires. Controlling and preventing fires may have resulted in degraded habitat conditions for sage grouse.

Land Planning/Mitigation:

Fragmentation---Habitat fragmentation occurs when areas of suitable habitat are fragmented and divided into smaller areas due to such processes as physical destruction or degradation. Any patch of habitat isolated from similar habitat or by different habitats and/or unsuitable terrain may be considered fragmented. As habitat becomes increasingly fragmented, fewer individual birds exist. Sage grouse are especially sensitive to fragmentation because of their fidelity to lek, nest, winter, and brood-rearing sites. Even when their habitat is absent or degraded, they will continue to attempt to use these areas and will subsequently be exposed to higher mortality risks further reducing their population size.

Changes in land uses---Sage grouse require habitats dominated by sagebrush from October through April. During May through September they prefer habitats with abundant forbs (food) and grasses (cover plus habitat for insects used as food) with some live sagebrush or adjacent to live sagebrush which is used as escape cover. Removal of sagebrush cover to benefit livestock grazing and development of hay production areas have changed land uses (in some cases positively or negatively) in the Crawford Area.

Utilities:

Powerlines---The effects of powerlines on sage grouse are severe. Powerlines have been documented to serve as predator perches in Utah and Colorado with subsequent loss of all leks visible to raptors (primarily golden eagles) from perches on powerline poles. Further, counts of sage grouse pellets near powerlines decrease as distance to powerlines decrease up to one-half mile. Thus, a strip about one-half mile on each side of powerlines is generally avoided by sage grouse. These observations are supported by measurement of distances to powerlines of radio-marked sage grouse throughout sage grouse habitats in Colorado. Clearly, sage grouse avoid powerlines when possible.

Pipelines---Development of pipelines is becoming more common in sage grouse habitats. Pipeline development (construction) can be negative if not properly managed to avoid adverse effects to breeding (March-mid May), nesting (mid April-early July), and early brood rearing (mid May-mid July). However, reseeding of areas disturbed by pipelines with desirable forbs and taller grasses can be beneficial to sage grouse especially if the width of the area disturbed is minimal (<100 yards) and roads/trails used during construction are closed and reseeded after completion of the pipeline construction interval.

Roads---Roads can be classified as primary, secondary, and as trails. Primary roads are those that are classified as state and federal highways. These roads are generally high speed and are paved. Secondary roads generally have county designations although some BLM and USFS roads can fit in this category. Some of these roads may be paved but most are generally gravel or dirt. These roads have moderate to low speed ratings. Trails generally are unsurfaced, lack formal designation, and have low speed ratings. Sage grouse prefer to walk to reach useable habitats throughout the year except when snow cover increases their conspicuousness. Sage grouse that walk across primary and secondary roads are at great risk of death from moving vehicles. The end result of all primary roads and many secondary roads is reduction in the size of the sage grouse population as those birds adjacent to the road are killed by road traffic. Because young sage grouse learn from older sage grouse, populations that traditionally used areas prior to road establishment or improvement become smaller over time as the older (and young) birds become fewer in number due to road disturbance (and death). Thus, traditional movements are often eliminated. Trails have less impact, depending upon vehicle speed.

Fence designs---Fences are necessary for livestock management. However, wood fence posts can provide perches for predators of sage grouse. Also, sage grouse have been observed flying into fence wires, especially near preferred use areas such as leks. Fence management that reduces potential perch sites (metal posts) and allows

larger spacing between wires (2 or 3 vs. 4 or 5) could be less negative for sage grouse.

Loss of Topsoil & Productivity:

Soil is the primary factor determining the potential for vegetation production of a given site. With reduction of the herbaceous understory cover in sagebrush ecosystems, soils have become more vulnerable to wind and water erosion. Accelerated soil erosion has altered soil characteristics and quality by decreasing soil fertility due to loss of plant cover, reduction of organic matter and moisture retention and increased soil compaction. The loss of topsoil reduces the vegetation production on many sites impacting critical nesting and brooding areas through reduced herbaceous plant production.

Poor Nest and Brood Survival:

Poor nest and brood survival has been attributed to the lack of herbaceous understory within the sagebrush community. This lack of herbaceous cover in sagebrush stands also negatively affects the survival of young sage grouse and nests. Since grouse initiate nesting prior to spring herbaceous vegetation growth, it is important that sufficient herbaceous residue remains from previous years. Such residual cover is lacking in some sites in the Crawford area.

Timing, Intensity, and Duration of Livestock/Big Game Grazing:

Potentially timing and intensity of livestock/big game grazing may affect sage grouse nesting and brood rearing success. The peak of sage grouse hatch is the last week in May and the first week in June, depending on weather conditions. Concerns are that livestock/big game grazing would directly compete with sage grouse for food (forbs and insects) and nesting cover during this time, or would physically disturb the nests. Fall grazing would remove residual cover needed the following spring for nest and brood cover. Also, persistent early spring and summer grazing would reduce plant vigor of herbaceous species causing undesirable long-term changes in the vegetative composition.

In some areas existing grazing, timing and duration may be having a negative affect on nesting and early brood habitat quantity, especially near and around the water sites. Winter grazing by sheep on lek sites may be beneficial by keeping them free of thick shrubby vegetation, and stimulating grass and forb growth.

The distribution and potential overbrowsing by deer and elk on big game winter ranges have had significant effects on important forage shrubs and associated plant communities which may have influenced sage grouse habitat quality. The large deer herds and resultant overbrowsing between 1940 and the mid 1970's is well documented. Overbrowsing of forage shrubs on the winter range by elk has generally occurred only during winters of heavy snowfall. In some areas shrub canopy and height has been reduced to less than what is desired, and may not be sustainable. Also, heavy winter and early spring grazing by elk has reduced cover, probably affecting nest and brood cover, and possibly influenced long-term vegetative composition too.

Drought:

Sage grouse production is indirectly affected by drought. While sage grouse are not limited by water in most cases, they are limited by the vegetative growth and insects lost during drought conditions. In the Crawford area, nesting success of females and brood survival declined severely during years with low soil moisture as calculated by the Palmer Drought Index. This effect is probably compounded if land management practices remain unchanged during years with low soil moisture. However, drought does not appear to impact lek attendance of males.

Predators (coyotes, ground squirrels, badgers, eagles, hawks):

Losses of sage grouse nests and young to predation are often high and can, in some locations, be the most significant factor in determining annual recruitment to the population. Studies have shown that ground squirrels and badgers can destroy up to 50% of the current year's nest and egg production. There is also a concern over coyote populations, which appear to be increasing, and the effects they may have on sage grouse population. Eagles and hawks can be effective predators on sage grouse and some feel that eagle predation is increasing. A difficult issue faces the BLM in trying to manage for Bald eagles (Federally Threatened) and managing for the Gunnison sage-grouse, in which they are trying to protect. The quality and quantity of grasses and forbs and other vegetation cover may influence the rates of predation. Predation is reduced when there is sufficient vegetation to conceal the nests. Predation of males on leks was documented to be a serious problem in the Crawford area in 1994. Removal of

pinyon and juniper trees and tall shrubs starting in 1994 in conjunction with brush beating existing and new lek sites was effective in reducing predation risk of sage grouse.

Scientific Lek Harassment (i.e., Physical Disturbance Resulting From Scientific Studies):

Research on sage grouse frequently requires capture and marking (bands, radios) of individual grouse. Capture of grouse is usually most easily accomplished when birds are concentrated on or near leks for the purpose of display and mating. Methods used range from spotlighting to locate grouse that are then captured using long-handled nets to walk-in traps placed on or near leks. Repeated disturbance of sage grouse on leks has been demonstrated to make individuals more wary and flush more readily. Yearling males may change leks following marking but the available data suggest that this age/gender class commonly investigates a series of leks in their first year of life. Studies of radio-marked male and female sage grouse demonstrate strong attachment to the lek of capture despite repeated trapping activities.

Conflicting Uses During Critical Biological Activity Periods:

The critical biological activity periods for sage grouse are during winter, breeding, nesting, and early brood rearing (December-mid July). Conflicting uses during this period are those that physically prevent sage grouse from using preferred habitats. These uses range from human disturbance (including pets), motorized vehicles, to herding of livestock and heavy grazing/browsing by deer and elk and by domestic livestock.

Recognition of Private Landowners Rights:

Most landowners are willing to work collectively toward a goal, as long as the recommendations or actions concerning sage grouse do not impact their efforts to make a living. However, most private landowners are environmentally concerned and appreciate wildlife and try not to negatively affect habitat useful to wildlife. These landowners do good things for the land without having to be forced by an endangered species.

Monitoring/Research:

Monitoring of sage grouse populations through use of counts of males on leks has been used to estimate trends in population size. This effort requires vehicle access via roads and trail during the late March-mid May interval. Properly conducted, spring counts are not known to affect sage grouse. Research on sage grouse is periodically needed to learn more about specific requirements and responses to habitat treatments. The need for monitoring and periodic research will continue. Monitoring of vegetation in relation to grazing by domestic livestock and big game, especially in response to vegetation treatments, will continue on public lands.

Reservoirs:

Construction of Gould Reservoir is known to have inundated brood habitat and reduced total sage grouse habitat. However, as the result of the reservoir additional brood habitat was created on the south edge. Reservoirs that flood > 100 acres have been documented to have negative effects on sage grouse. Construction of smaller ponds/reservoirs/irrigation ditches may benefit sage grouse through creation of wet meadows sites and provision of open water.

National Park Service Conservation Easements:

The Secretary of the Interior is authorized to acquire lands or interests in land within the authorized boundaries of Black Canyon of the Gunnison National Park. Conservation Easements are purchased from willing sellers as a perpetual and assignable right deeded to the United States of America, Department of the Interior, National Park Service. Black Canyon of the Gunnison National Park has approximately 2,000 acres under Conservation Easements. The Terms and Conditions of a Conservation Easement impose restrictions, some of which are as follows:

- _ the land shall be used and maintained as open grazing land only, and grazing of livestock may continue,
- _ hunting, trapping or other means of taking wildlife is prohibited,
- _ no pesticides shall be used, or other practices followed, which would significantly injure or destroy the relatively natural ecosystem,

- the land shall not be used for any mining, quarrying, sand and gravel removal, industrial or commercial activity, nor can there be any change in the character, use of topography of the land which would alter the scenic character of the property, affect the scenic enjoyment of the property by the general public or cause permanent destruction of any significant conservation interest in the land, unless such change is previously approved in writing by the National Park Service,
- commonly accepted operation and maintenance practices supporting livestock grazing may continue, including the maintenance of existing domestic, livestock or agricultural water conveyance systems, and the construction and maintenance of required fencing and stock ponds; plans for new fencing or stock ponds must be approved by the Secretary of the Interior or his authorized representative; water impoundments shall not exceed one acre in size and shall be located so as to minimize visual impact; fences shall be of standard four or five strand barbed wire or sheep wire only and shall in no case exceed four feet in height,
- all regular and ordinary maintenance to all existing structures, buildings, ground and access roads may be done; replacement of existing structures with another of the same size and in the same location may be done; and repair, or rebuilding to no greater than former size, and existing buildings or structures which are damaged by fire, storm or other casualty is allowed;
- selective cutting, trimming, destroying or removal of trees, grasses, brush, or shrubbery on scattered units, shall be permitted on the land, in accordance with sound range management practice provided that individual areas so cleared shall not exceed one acre in size, nor be closer than 300 feet from other areas so cleared during a 10-year cutting interval; and the Secretary or authorized representative shall be notified in writing and provided with a clearing plan at least thirty days prior to initiation of such clearing.

Recreational Uses:

Sage grouse have been hunted and their mating rituals observed since prior to European settlement based on native American artifacts and ceremonies. Sage grouse are not presently hunted at Crawford and there is no organized watchable wildlife viewing for the species within the boundary of the area. Other recreational use of the area such as big game hunting, blue grouse hunting, and predator hunting are not thought to be negative although accidental take may occur. Use of all terrain vehicles has the potential to negatively impact sage grouse, especially in winter. However, much of the area is seasonally closed to all terrain vehicles, primarily to preclude disturbance of big game.

Hunting:

Sage grouse hunting in the Crawford area was closed prior to 1953 when the area was opened (2-day season, bag/possession limits of 2/2 for any grouse). The season remained open with limited take (2/2, 3/3, 2/4, 3/6) and short seasons (2-4 days) until 1973 when it was closed until 1989 when it reopened for 30 days with a bag and possession limit of 3/6. The season remained open through 1993 with bag/possession limits of 3/6 or 3/9 and season lengths of 30-45 days. The season was closed in 1994 and has been closed through 2010 as the population does not meet the standard (100 cocks counted in spring for 3 consecutive years) required to be open to hunting. Hunting of sage grouse in this area is not contemplated for the foreseeable future. No information on annual harvest is available for this population for any year. Table 1 shows the Crawford Area sage grouse hunting regulations, 1946-2010.

Table 1. Crawford Area sage grouse hunting regulations, 1946-2010

Year	Length (Days)	Bag/Possession Limits	Year	Length (Days)	Bag/Possession
1946-52	Season Closed		1965	2	2/2
1953	1	2/2	1966-67	2	2/4
1954-57	2	2/2	1968	3	2/4
1958	3	2/2	1969	4	3/6
1959	3	3/3	1970-72	3	2/4
1960	4	3/3	1973-88	Season Closed	
1961	3	3/3	1989-91	30	3/6
1962	3	2/4	1992	34	3/9
1963	3	3/6	1993	33	3/9
1964	3	2/4	1994-2010	Season Closed	

Game management unit designations:

1953-57, Statewide or area specified by highways, drainages, etc.; 1958-73, Unit 19
1974-86, Unit 64; 1987-2010, Units 53 and 63

Appendix E: References

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