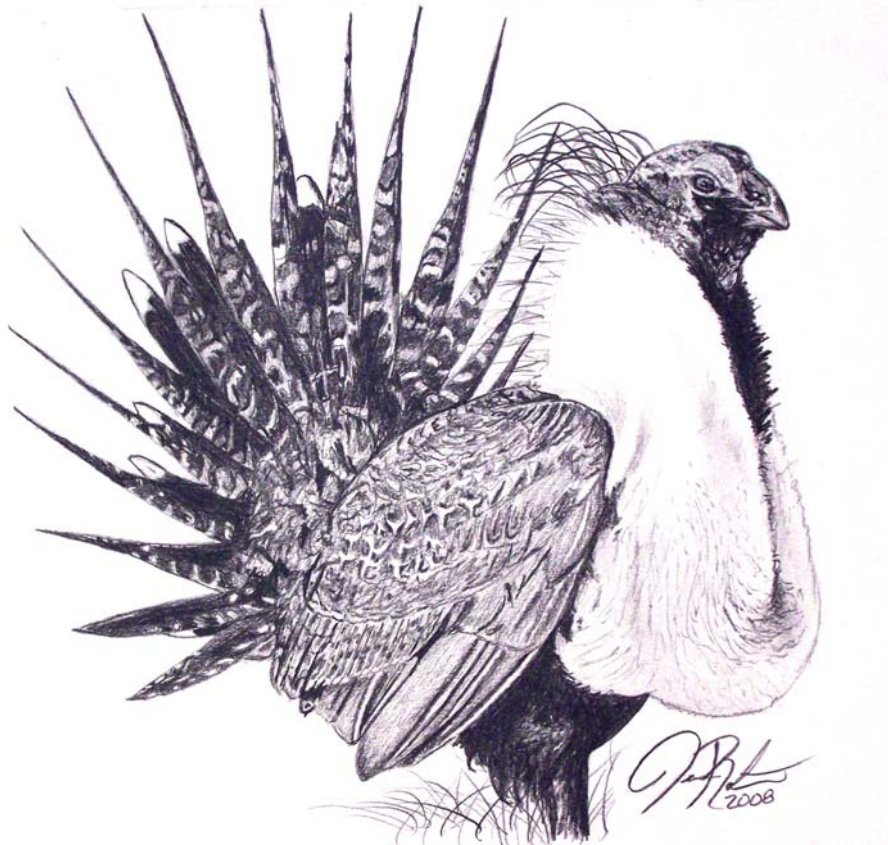


UTAH GREATER SAGE-GROUSE MANAGEMENT PLAN 2009



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Department of Natural Resources
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INTRODUCTION

Purpose

The purpose of the Utah Greater Sage-grouse Management Plan 2009 is to direct greater sage-grouse (*Centrocercus urophasianus*) management in Utah consistent with Utah Code Title 23 and the Mission and Goals of the Utah Division of Wildlife Resources (UDWR). Utah Code Title 23 establishes and defines the State's legal wildlife management authority within the UDWR. The UDWR Mission is to serve the people of Utah as trustee and guardian of the state's wildlife. Three identified goals associated with the mission focus upon the Resources, Constituency, and Agency. Specifically, the UDWR resource goal is to expand wildlife populations and conserve sensitive species by protecting and improving wildlife habitat. In fulfilling these mandates, the plan is to function as the over-arching document guiding management of greater sage-grouse within the state of Utah. Collectively, it should:

- guide UDWR general management and resource recommendations;
- serve as a reference document and guide for land managers, biologists, planners, private interest groups, and others to protect, maintain, and improve sage-grouse populations and habitats and balance their management with other resource uses;
- guide the direction of the 11 established Utah Local Working Groups (LWG).

This plan updates and revises the original Utah Strategic Management Plan for Sage-grouse (UDWR 2002). The Utah Greater Sage-grouse Management Plan 2009 was written in accordance with the Utah Comprehensive Wildlife Conservation Strategy (UDWR 2005), Utah Local Working Group Plans, and Range Wide Conservation Plans (Connelly et al. 2004, Stiver et al. 2006), and implements the BLM National Sage-grouse Habitat Conservation Strategy (USDI 2004). This plan revision was undertaken with participation and assistance of a specially chartered Utah Sage-grouse Plan Committee. Membership comprised representatives and stakeholders from state and federal natural resource agencies, universities, private landowners, industry, citizens, sportsmen and non-governmental organizations (Appendix 1). UDWR acknowledges and extends a warm thanks to this group for their sacrifices and devotion in attending meetings, working through documents, and providing valuable insight and guidance.

Upon approval, the Utah Greater Sage-grouse Management Plan 2009 is valid and in force until revisions or amendments are warranted. It will be formally reviewed and updated with chartered committee assistance. Should the greater sage-grouse become listed as either a threatened or endangered species, this plan will provide a framework for development of a recovery plan.

Background

Sage-grouse have declined throughout much of the western United States since Euroamerican settlement. Documented severe population declines (approximating 80%) occurred from the mid-1960s to mid-1980s. Research and conservation efforts in the last 20 years have helped stabilize and recover many populations. Still, sage-grouse experienced roughly a 6% range wide decline during this same 20-year period (Connelly et al. 2004). Populations appear to have taken a slight positive turn in recent years. Sage-grouse once inhabited sagebrush rangelands in 13 states and 3 Canadian Provinces. Currently, populations exist in 11 states and 2 Canadian

provinces (Schroeder et al. 2004). Motivated by this population trend and other factors, multiple organizations have petitioned the U.S. Fish and Wildlife Service (USFWS) to categorize greater sage-grouse a threatened or endangered species under the Federal Endangered Species Act (ESA). On April 21, 2004, the USFWS responded to a recent petition and announced a 90-day finding that substantial information indicated that the petitioned actions may be warranted. However, upon completing a full 12-month species status review, the USFWS announced on January 12, 2005 that a listing action was not warranted. On December 4, 2007, the U.S. District Court, District of Idaho reviewed a petition forwarded by a group identified as Western Watersheds Project (WWP). The court ruled the 2005 USFWS decision in error and remanded the case back to USFWS for further consideration. The USFWS determination was due to the court in December 2008 and is yet to be announced. A decision is now anticipated by February 2010. A ruling that substantially changes the species status under the umbrella of the ESA will significantly alter the progress of this plan and other associated resource management within the state.

Research conducted in the Gunnison Basin of southwestern Colorado and San Juan County in southeastern Utah found that two species of sage-grouse inhabit both states. Sage-grouse populations that occur south and east of the Colorado River in Utah (Grand and San Juan counties) constitute a recently described species of sage-grouse, known as the Gunnison sage-grouse (*C. minimus*) (Barber 1991, Young et al. 1994, Young et al. 2000). Greater sage-grouse are located throughout the rest of the state (Figures 1 and 2). A Gunnison sage-grouse Conservation Plan was completed in 2000 by the San Juan County Gunnison Sage-Grouse Working Group (SWOG). The Gunnison Sage-grouse Range Wide Conservation Plan was completed in April 2005, and is being implemented by state and federal natural resource agencies, private landowners, and local governments. It is the guiding document for management of Gunnison sage-grouse in Utah. Therefore, Gunnison sage-grouse management is not covered by this plan.

Sage-grouse are thought to have been historically distributed in all 29 Utah counties, based on sagebrush distribution (Figure 1), but are now found in 26 counties (Figure 2). It is estimated that Utah sage-grouse occupy only 41% of the historic habitats and are half as abundant as they were prior to 1850 (Beck and Mitchell 1997, Beck et al. 2003). Currently, the largest Utah sage-grouse populations are found in western Box Elder County, on Blue and Diamond Mountains in Uintah County in northeastern Utah, in Rich County, and on Parker Mountain in south central Utah. Smaller populations are found scattered throughout parts of the state (Figure 2). Utah law regulating sage-grouse hunting was enacted in 1951. Sage-grouse are classified as an upland game species by the Utah Legislature. The UDWR has management responsibility for sage-grouse populations, while habitats are the responsibility of the landowner. The greater sage-grouse is considered a sensitive species within Utah, and a Tier II species under the Utah Comprehensive Wildlife Conservation Strategy (UDWR 2005), also referred to as the State Wildlife Action Plan. Connelly et al. (2004) identified 10 sage-grouse populations within Utah. Floristic characteristics were used to organize seven sage-grouse management zones within the species rangewide distribution (Stiver et al. 2006) Utah is divided by 4 of the 7 zones (Figure 5; management zones II, III, IV, and VII).

Sage-grouse can be utilized as an indicator for sagebrush habitat (Young 1994), and may act as an “umbrella” species for conservation, in conjunction with other species and scale considerations (Rowland et al. 2006). Therefore, conservation of sagebrush ecosystems will not only benefit sage-grouse but a variety of migrating songbirds, including, sage sparrow (*Amphispiza belli*), Brewer’s sparrow (*Spizella breweri*), and sage thrasher (*Oreoscoptes montanus*), that are dependent upon extensive sagebrush habitat. Big game species, such as pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*) will also benefit from the conservation of this vegetation type, as well as pygmy rabbits (*Brachylagus idahoensis*), and the federally threatened Utah prairie dog (*Cynomys parvidens*).

Utah State University Extension was tasked with facilitating the development of sage-grouse local working groups (LWG) throughout Utah, with direction from the Strategic Management Plan for Sage-grouse (UDWR 2002). The Community Based Conservation Program (CBCP) (<http://utahcbcp.org>) was used to accomplish this task. The mission of CBCP is to: 1) implement a process that enhances coordination and communication between community-based adaptive resource management working groups, private, and public partners; and 2) develop “seamless” plans for designated Utah geographic areas that contribute to the conservation of sage-grouse and other wildlife species that inhabit Utah’s sagebrush-steppe ecosystems and enhance the economic sustainability of local communities. This revised plan will guide LWGs to continue area-specific management programs to maintain, improve, and restore local sage-grouse populations and their habitats. Eleven LWGs are established in Utah. All 11 LWG areas have developed and are functioning under local sage-grouse conservation plans (Appendix 2).

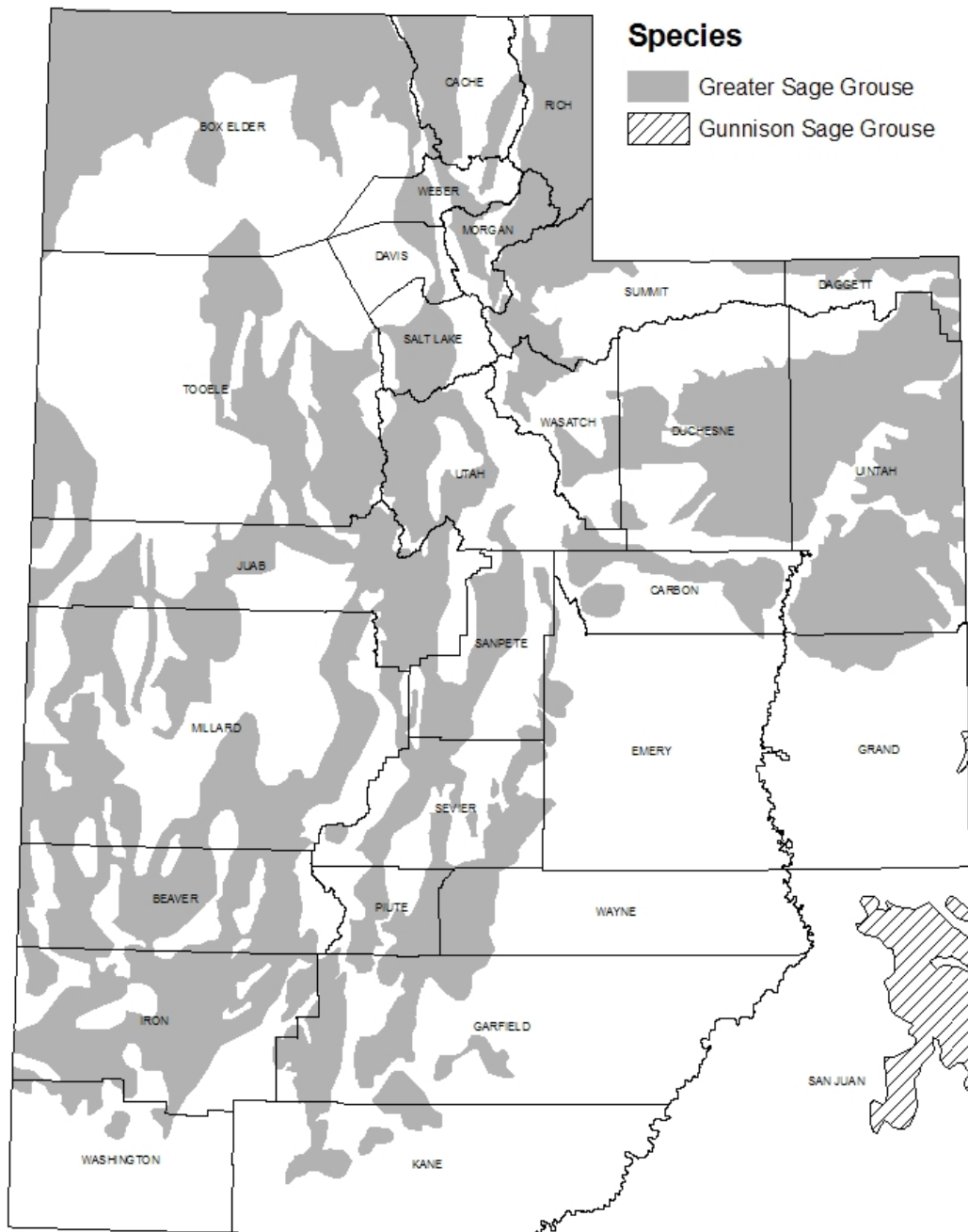


Figure 1. Historical distribution of sage-grouse in Utah.

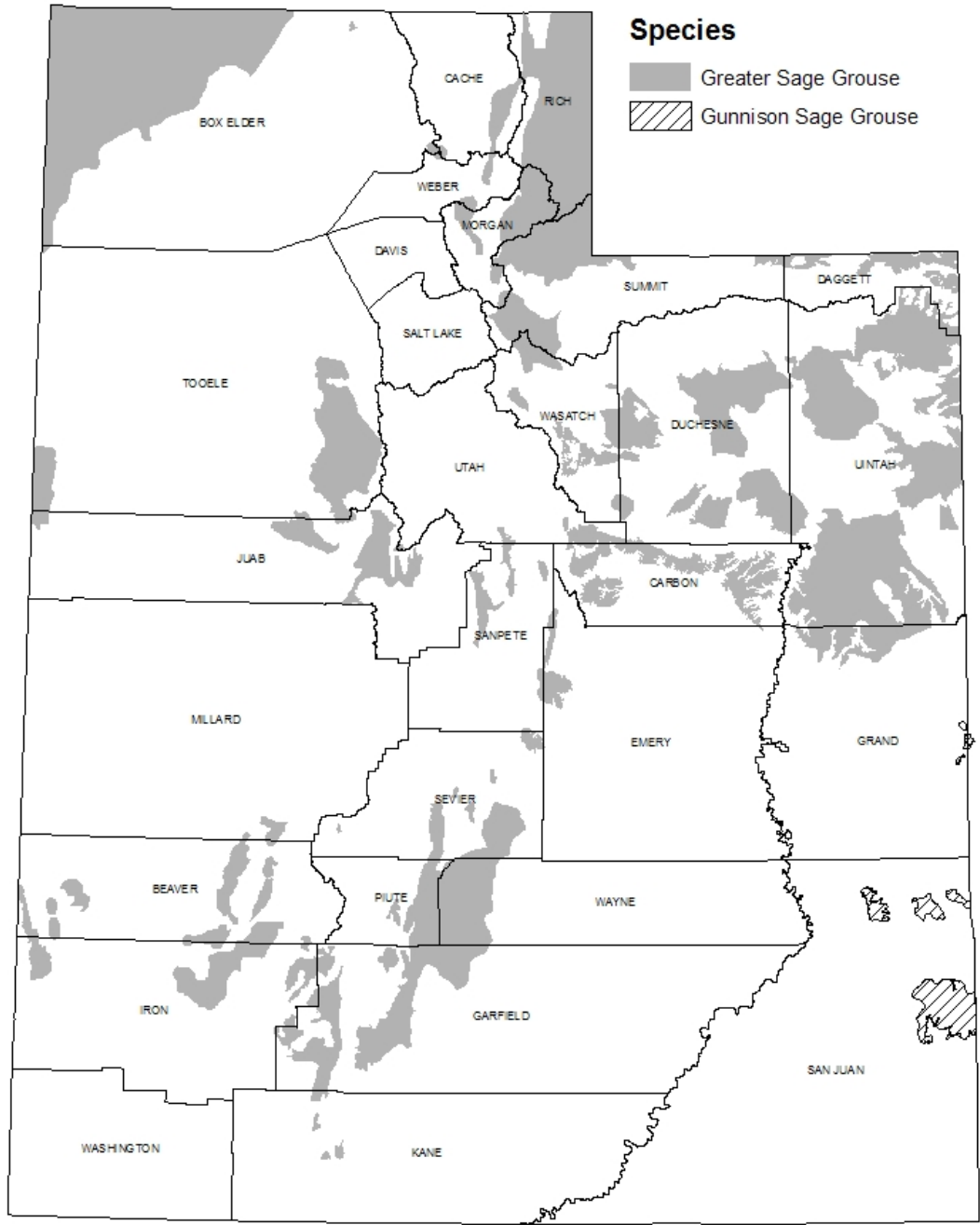


Figure 2. Current (2009) distribution of sage-grouse in Utah.

SAGE-GROUSE BIOLOGY AND POPULATION STATUS

Sage-grouse Biology/Ecology

Physical Description

The greater sage-grouse is the largest grouse species in North America. Adult males are larger than adult females. Adult males weigh 4-7 pounds (1.7-2.9 kg) and are 27-32 inches (65-75 cm) long compared to adult females weighing 2-4 pounds (1.0-1.8 kg) and measuring 20-25 inches (50-60 cm) long. Both sexes have narrow, pointed tails and a variegated pattern of grayish brown, buff, and black on the upper parts of the body and a diffuse black abdominal pattern. Males have blackish brown throats and a dark V-shaped pattern on the neck, and white breast feathers. When strutting during spring mating displays, males inflate two gular sacs of olive green skin and erect hair-like black feathers (filoplumes) on the back of the neck. Females lack the V-shaped pattern, their throats are buff and their lower throats and breasts are barred with blackish brown (Schroeder et al. 1999).

There are noticeable morphological differences between greater sage-grouse and Gunnison sage-grouse. Gunnison sage-grouse are two-thirds the size of greater sage-grouse. Gunnison sage-grouse tail feathers have horizontal white barring along their length compared to a variegated pattern found in greater sage-grouse. The filoplumes, found only on male sage-grouse, are much thicker and denser in Gunnison sage-grouse than in greater sage-grouse. There are also noticeable differences in the strutting behavior of the two sage-grouse species (Barber 1991, Young et al. 2000).

Seasonal Movements and Home Range

Sage-grouse populations can be defined as one of two broad categories: 1) non-migratory - grouse do not make long-distance movements between seasonal ranges; and 2) migratory - grouse make long-distance movements between distinct seasonal ranges. Sage-grouse may have 4 different types of annual migration and associated life-stage use patterns: 1) distinct winter, breeding and summering areas; 2) distinct summer areas and integrated winter and breeding areas; 3) distinct winter areas and integrated breeding and summering areas; 4) well-integrated seasonal habitats (non-migratory) (Connelly et al. 2000). Furthermore, populations can be classified as 3 types: 1) non-migratory; 2) 1-stage migratory; grouse move between 2 distinct seasonal ranges; and 3) 2-stage migratory; grouse move between 3 distinct seasonal ranges (Connelly et al. 2000). Seasonal movements between seasonal ranges can exceed 51 mi (82 km) (Connelly et al. 1988). Knerr (2007) tracked a male in northwest Box Elder County that moved 43 mi (69.3 km) between seasonal ranges.

Home range size for sage-grouse is difficult to measure and extremely variable; migratory sage-grouse populations can exceed 540 mi² (1,500 km²) (Hulet 1983). For non-migratory sage-grouse populations, home range size varies from 4-11 mi² (11 to 31 km²). Some of the variation is associated with habitat requirements and behavior. Sage-grouse exhibit high fidelity to seasonal ranges (Fischer et al. 1993, Schroeder and Robb 2004). Adult females return to the same area to nest each year and may nest near their previous year's nesting site (Gates 1983,

Bunnell et al. 2000, Robinson 2007). Current research (Thompson et al. 2007) has shown a recruitment rate of 98.3% of individuals back into the population where they were produced, and 66.7% (12/18) of yearling nests are < 3 km from their natal nest.

Breeding

The center of breeding activity for sage-grouse is the lek or strutting ground. Leks usually occur in open areas such as wind swept ridges, rocky knolls, low sagebrush, bare openings created by roads and fire, air strips, natural meadows, and dry lake beds. Male sage-grouse begin to congregate on leks in late February/early March and perform a ritualized courtship display. Courtship displays are strongly correlated to pre and early dawn hours and quickly wane within a couple of hours following sunrise. Females are attracted to leks by the male courtship displays and mating is thought to primarily occur on the lek. Lek attendance may continue as late as early June, but typically peaks during April in Utah. Fifty to ninety percent of males may utilize leks during the breeding season. As sage-grouse populations decline, the number of males attending leks may decline or the use of some leks may be discontinued. Likewise, as populations increase, male attendance may increase and/or new leks may be established or old leks reoccupied (Connelly et al. 1981). There is little or no evidence that suggests lek habitat is limiting (Schroeder et al. 1999). Additional lek habitat can be created if needed, but does not guarantee that sage-grouse males will utilize the created lek habitat.

Nesting

Nesting generally commences 1-2 weeks after mating and may continue as late as early June (Wallestad 1975). Sage-grouse generally nest under sagebrush (Patterson 1952, Wallestad and Pyrah 1974). Sage-grouse generally have lower reproductive rates and higher survival rates than other species of upland game birds (Connelly and Braun 1997). Nesting rates vary from year to year and from area to area (Bergerud 1988, Connelly et al. 1993, Schroeder 1997, Coggins 1998). Connelly et al. (1993) reported that in Idaho up to 45% of yearling and 22% of adult female sage-grouse do not nest each year. Schroeder (1997) found that essentially all female sage-grouse in Washington nested. Some of the variation is likely a result of the quality of nutrition available and the health of pre-laying females (Barnett and Crawford 1994). Renesting, following loss of original nest, by sage-grouse varies regionally from 20% (Hulet 1983, Connelly et al. 1993) to > 80% (Schroeder 1997). Sage-grouse hens show a high fidelity to nesting areas relative to leks, most (up to 80%) hens nest within 2 miles (3.2 km) of a lek (Connelly et al. 2004, Robinson 2007, Knerr 2007). In summary, sage-grouse have the lowest reproductive rate of any North American game bird. Hence, populations may be less able to recover from population declines as quickly as those of most other game birds.

Sage-grouse nest success varies from 12 to 86% (Trueblood 1954, Gregg 1991, Schroeder et al. 1999, Hagen et al. 2007). Adult females may experience higher nest success rates than yearling females (Wallestad and Pyrah 1974). However, differential nest success between age groups has not been observed in other studies (Connelly et al. 1993, Schroeder 1997, Baxter et al. 2008). Nest success may be dependent on vegetation cover type (Gregg 1991). Gregg (1991) reported that the highest nest success rate in his study occurred in a mountain big sagebrush (*A. t. vaseyana*) cover type. Greater cover of medium-height shrubs, with perennial grasses > 7 inches

(>18 cm) in height, increases sage-grouse nest success (Gregg et al. 1994). Robinson (2007) attributed higher nest success and chick survival in consecutive years to higher precipitation, which resulted in greater nesting cover, and increased forb and insect abundance.

Clutch sizes of sage-grouse are extremely variable and relatively low compared to other species of game birds (Schroeder 1997). Average clutch size for first nests varies from 6.0 to 9.5 throughout the species range (Schroeder 1997, Sveum 1998). These differences may be related to habitat quality and overall health of pre-laying females (Coggins 1998). Important dietary and structural components for brood-rearing include key forbs such as legumes and composites, insects, succulent mesic vegetation, and sagebrush (Crawford et al. 2004). Sage-grouse chicks must have insects to survive for the first 3 weeks after hatching (Johnson and Boyce 1990). Drut et al. (1994) showed sage-grouse consumed 122 different foods based on availability, which included 34 genera of forbs, 2 genera of shrubs, 1 genus of grass, and 41 families of invertebrates.

Survival Rates and Influencing Factors

Annual survival rates for yearling and adult female sage-grouse vary from 35% to 85%; adult male survival rates vary from 38% to 54% (Wallestad 1975, Zablan 1993, Connelly et al. 1994). Lower survival rates for males may be related to physiological demands of sexual dimorphism and higher predation rates on males during the breeding season (Swenson et al. 1987).

Sage-grouse predators include raptors, coyotes, corvids, badgers, foxes, bobcats, and skunks. The increase in urban development has resulted in the addition of non-native predators such as dogs, cats, and red foxes. Recent research (Coates et al. 2007), has shown that common ravens are significant nest predators, but can be temporally controlled with DRC 1339 (corvid specific avicide) treated eggs.

West Nile virus has been shown to have negative impacts on sage-grouse populations in Wyoming, Montana, South Dakota, and parts of Canada; with an average reduction in summer survival of 25%. Sage-grouse appear to have little resistance to the virus (Naugle et al. 2004, Naugle et al. 2005, Walker et al. 2004, Walker et al. 2007). Negative impacts at a population level in Utah have not yet been documented, but the threat is present. West Nile virus testing was conducted on 1,000 Utah birds, of which 28 were grouse, and 17 were sage-grouse. In 2004, one greater sage-grouse tested positive for the virus from Uintah County, and is the only known sage-grouse infective reactor to date.

Little information has been published on mortality of juvenile sage-grouse or the level of production necessary to maintain a stable population. Among western states, long-term juvenile to hen ratios have varied from 1.40 to 2.96 juveniles per hen in the fall. In recent years, this ratio has declined to 1.21 to 2.19 juveniles per hen (Connelly and Braun 1997). It is thought that at least 2.25 juveniles per hen should be present in the fall population to allow for stable to increasing sage-grouse populations (Connelly and Braun 1997, Edelman et al. 1998, Connelly et al. 2000). Recent research in Utah has shown chick survival to be higher than previously estimated (Crawford et al. 2004). Chick survival on Parker Mountain, Utah varied between research years and was reported at: 54.2% in 2005, 45% in 2006, and 27% in 2007 (Guttery et

al. 2007). Brood-mixing (chicks leaving natal brood to join with other non-natal broods) was documented on Parker Mountain and occurred within 25% of radio marked broods. Brood-mixing was documented as early as within the first week, with occurrences increasing as the brood got older. The influence of brood-mixing upon chick survival rates or estimates of survival are not well understood. Hennefer (2007) observed chick survival in Strawberry Valley, Utah to be 23% to 50 days. Measured brood success (≥ 1 chick of a brood surviving to ≥ 50 days) on Parker Mountain ranged from 54% to 81% from 2005-2007 (Guttery et al. 2007); however estimated brood success within the West Desert of Utah ranged from 27%-67% (Robinson 2007), and 44% in West Box Elder County, Utah (Knerr 2007). Robinson (2007) and Knerr (2007) were unable to account for brood-mixing, although it was observed.

For an extensive review of literature on population ecology readers are encouraged to reference the WAFWA document; Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats (Connelly et al. 2004).

Utah Sage-grouse Population Status, Trend and Management History

A rough estimate of breeding populations throughout the species range in 1998 indicated approximately 11% of all sage-grouse were found in Utah (Braun 1998). It is thought that sage-grouse were historically found in all 29 Utah counties. Today, sage-grouse are found in 26 of Utah's counties. An analysis indicated that 11,514 mi² (29,821 km²) (13.6%) of Utah currently provides habitat for sage-grouse, and they are thought to only occupy 41% of the habitat they once did (Beck et al. 2003). UDWR, other agencies, and University biologists have identified 11,864 mi² (30,730 km²) of current greater sage-grouse habitat in Utah, 11,594 mi² (30,028 km²) of which is considered brood-rearing habitat (Figure 3), and 7,323 mi² (18,966 km²) of crucial winter habitat (Figure 4).

Following Doherty's work in Wyoming, Montana, and Colorado (Doherty 2008), core Utah sage-grouse breeding habitats were mapped (Figure 5). The mapping is accomplished utilizing occupied lek densities and associated male sage-grouse maximum lek attendance data for the period 1999 – 2008 (10 years). Lek density circles were developed utilizing a 4 – mile radius from the center of the lek site. Population parameters (contours shown on the map as colored circular dots) progressively representing 25%, 50%, 75%, and 100% of the statewide breeding populations were constructed. The first parameter (red dots) represents areas where 25% of the state's total spring breeding populations of sage-grouse are found. Thus, the individual red dots on the map collectively represent 25% of Utah's sage-grouse population. These red dots therefore, symbolize the highest statewide density of breeding males. These can also be viewed as high priority leks or those leks and associated habitats that individually contribute most to the state's sage-grouse total population. The second parameter on the map (combined orange dots and red dots) cumulatively represents areas where 50% of the state's total breeding populations of sage-grouse are found. This is repeated successively in order of red, orange, yellow and green dots until cumulatively 100% of all occupied leks are represented. Viewed from the converse, the total known spring sage-grouse statewide population is shown by the combined area of all colored dots. If the green dots are removed, the remaining area would symbolize the habitat areas hosting 75% Utah's breeding sage-grouse. Caution is advised in the wholesale application of the map due to migratory status of some populations and their associated broader habitat

needs. The map however, does represent the relative contribution of leks and their associated habitats in maintaining the vigor of Utah's statewide sage-grouse resource. The four Western Association of Fish and Wildlife Agencies (WAFWA) identified Management Zones in Utah (MZ II, III, IV, and VII) are overlain for illustrative purpose. Also note that Gunnison sage-grouse are identified in San Juan County, all known Utah Gunnison sage-grouse leks are considered crucial.

Sage-grouse research has recently been, or is currently being, conducted in 12 sites in Utah, 11 on greater sage-grouse and 1 on Gunnison sage-grouse in San Juan County (Table 1). Research techniques are consistent with Connelly et al. (2003) and Reese and Bowyer (2007).

Utah has experimented with sage-grouse translocations intended as conservation efforts to establish and/or enhance existing populations. The population on Wildcat and Horn Mountains is an example of a successful translocation, from 1987-1990 15 males and 35 hens with juveniles were released in the area. Current research has shown the population still exists, with 27 strutting males observed in 2008. Strawberry Valley in central Utah is a dramatic example of the decline of sage-grouse in Utah. In the 1930s, Griner (1939) estimated that 3,000-4,000 sage-grouse inhabited this high mountain valley. Bunnell et al. (2000) estimated the population in the Strawberry Valley to be 250-350 grouse in 1999, representing a population decrease of 88-94%. Most of this decline can be attributed to anthropogenic causes (roads, Strawberry Reservoir, non-native predators, and reductions in habitat quantity and quality). The population in Strawberry Valley is now estimated at roughly 500 breeding adults, attributed to the success of translocation efforts, habitat improvements, and predator control (Bunnell 2000, Bambrough 2002, Baxter 2003, Baxter 2007).

The make-up and dynamics of LWGs are important factors in determining the success of sage-grouse conservation efforts. Belton (2008) conducted research on sage-grouse local working groups throughout the West, including Utah, to determine the importance of psychological ownership in working group dynamics. Her work identified specific needs reported by participants which affected their perceptions of success. She reported that the group's psychological ownership is a strong predictor of group success. Psychological ownership is positively related to the ability of the group to collectively learn about sage-grouse and implement conservation projects. The more effective these groups have been at learning about the sage-grouse populations and habitats in their area, the more likely they are to succeed at implementing actions and conservation strategies that may benefit the population.

Table 1. Recent (<10 years) research conducted on sage-grouse in Utah.

AREA	YEAR	TELEMETRY	GENERAL FOCUS OF STUDY	PUBLICATION
Strawberry Valley UMA ¹ 5 MZ ² 3	2000	Yes	Limiting factors for recovery of sage-grouse	Bunnell (2000)
	2002	Yes	Summer and winter habitat selection	Bambrough (2002)
	2003	Yes	Brood and female habitat selection	Baxter (2003)
	2007	Yes	Translocation of sage-grouse	Baxter (2007)
	2007	Yes	Chick survival and translocation release methods	Hennefer (2007)
Parker Mountain UMA 9 MZ 3	2002	Yes	General ecology and habitat use	Messmer & Flory 2002
	2004	Yes	Reproductive ecology and habitat treatments	Chi (2004)
	2006	Yes	Reproductive ecology and habitat treatments	Dahlgren (2006)
	2008	Yes	Brood dynamics and survival	Dahlgren (<i>in press</i>)
	On going	Yes	SAGR response to habitat treatments	Guttery et al. (2007)
On going	Yes	Late fall and winter movements and survival	Guttery et al. (2008)	
West Box Elder County UMA 1; MZ 4	2007	Yes	General ecology and habitat use	Knerr (2007)
	On going	Yes	Movements and winter ecology	Thacker et al. (2007)
West Desert UMA 6; MZ 3	2007	Yes	General ecology of two distinct populations	Robinson (2007)
Rich County UMA 2; MZ 2	2002	Yes	General ecology and management	Danvir (2002)
	On going	Yes	General ecology and habitat use	Stringham (2008)
Emma Park West Tavaputs Plateau UMA 7; MZ 3	2005	Yes	General ecology and habitat use in developed area	Crompton & Mitchell (2005)
	2008	Yes	General ecology and habitat use	Curtis & Crompton (2009)
Alton UMA 10; MZ 3	On going	Yes	General ecology and response to development	N/A
Southwest Desert UMA 11; MZ 3	On going	Yes	Effects of habitat manipulations and SAGR use	Boswell & Frey 2007a
	On going	Yes	Effects of habitat manipulations and SAGR use	Boswell & Frey 2007b
Anthro Mountain UMA 4; MZ 3	On going	Yes	General ecology and habitat use	Christensen (2003, 2005)
	On going	Yes	SAGR use of burned areas	Thacker et al. (2007)
Deadman Bench East Bench UMA 4; MZ 3	On going	Yes	General ecology and habitat use	UDWR
	2008	Yes	General ecology and habitat use in developed area	Smith & Messmer (2007)
Emery County UMA 7; MZ 3	On going	Yes	General ecology and habitat use	Perkins & Messmer (2008)
Western States	2008	No	Dynamics of sage-grouse LWG	Belton (2008)
San Juan County (Gunnison) UMA 8; MZ 7	2005	Yes	Summer ecology and habitat use	Lupis (2005)
	2007	Yes	Winter and summer ecology and habitat use	Ward (2007)
	On going	Yes	General ecology and habitat use	Pranther & Messmer (2007)

¹ Utah Management Area

² WAFWA Management Zone

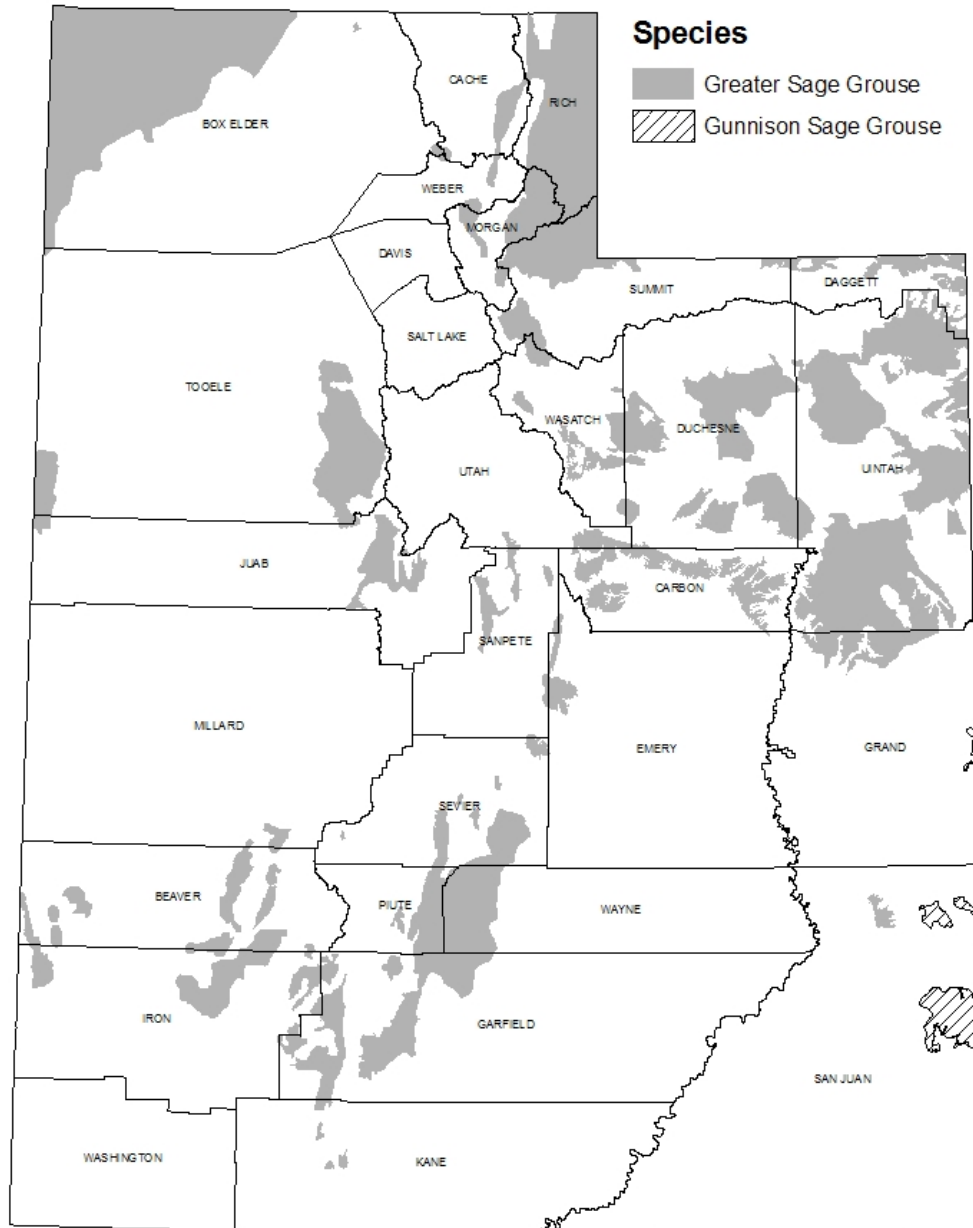


Figure 3. Current (2009) sage-grouse brood-rearing habitat in Utah.

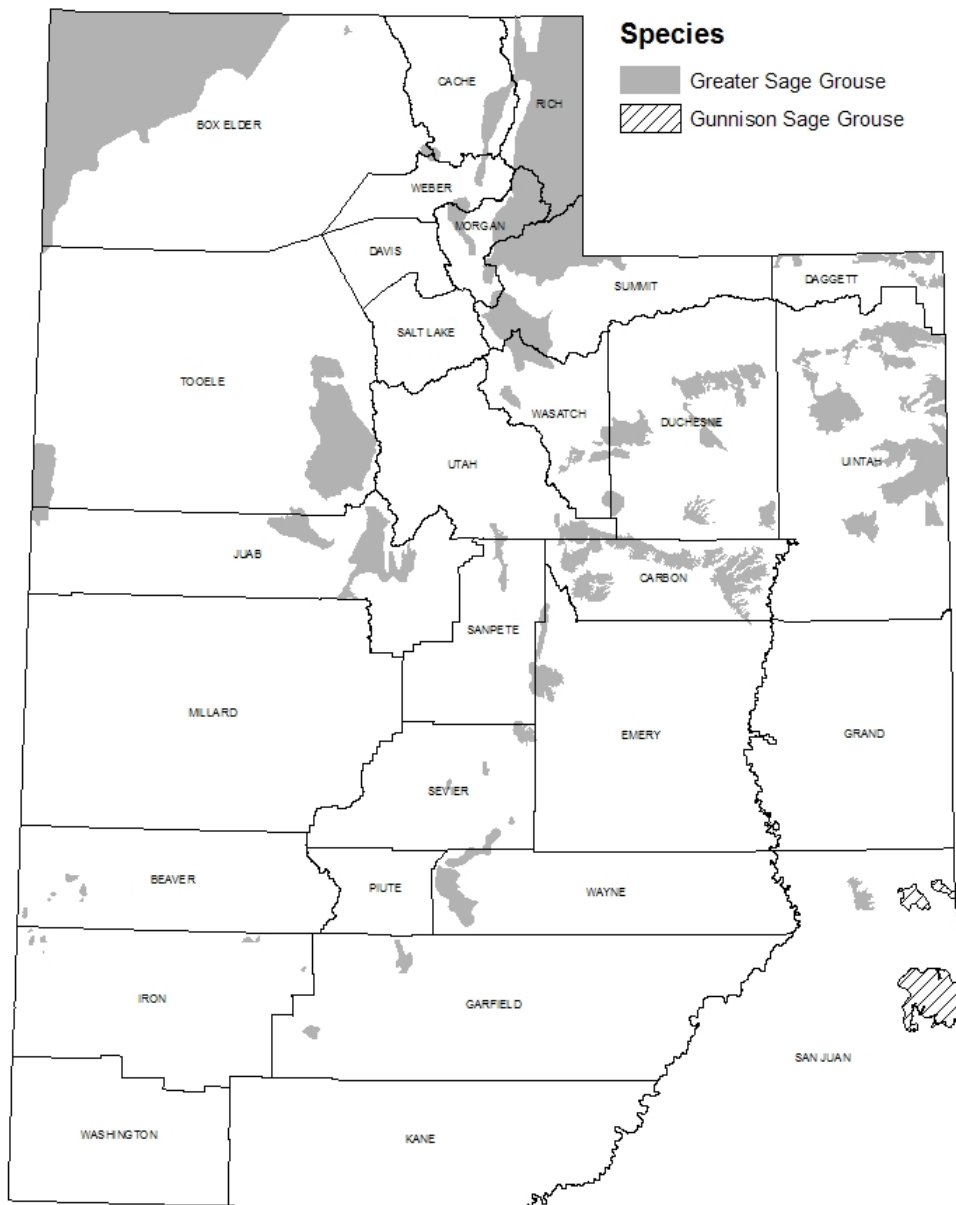


Figure 4. Current (2009) sage-grouse winter habitat in Utah.

Core Sage-grouse Breeding Areas in Utah

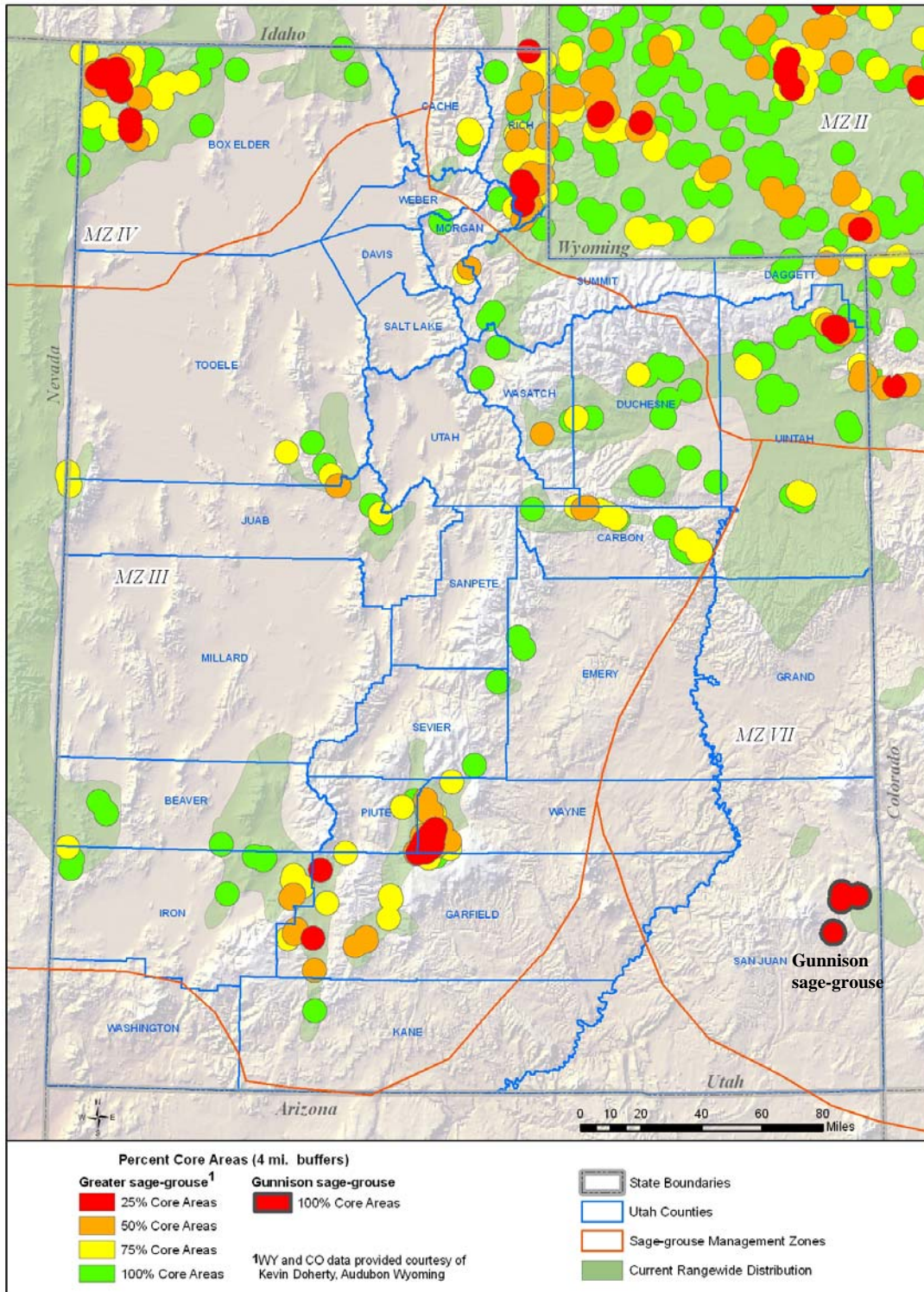


Figure 5. Core sage-grouse breeding areas for Utah.

Lek Monitoring

A **lek** is defined by this plan as having ≥ 2 strutting males attending the same location for ≥ 2 years; not necessarily 2 consecutive years. **Active leks** are any lek that has been attended by male sage-grouse during the annual strutting season. **Inactive leks** are those where it is documented that no strutting activity has occurred during the course of a strutting season, when the lek was visited at least 3 times during the strutting season under good survey conditions. Presence can be documented by observation of birds using the site or by signs of strutting activity. An **occupied lek** has been active during at least one strutting season within the last 10 years. An **unoccupied lek** is defined as having no males counted in > 10 years, and can be classified as either destroyed or abandoned. **Undetermined leks** are any leks for which lek activity has not been documented for > 10 years, but survey information is inadequate to designate the lek as unoccupied, or strutting males have only been observed on one occasion.

Lek counts have been conducted in Utah since 1959 as an index of sage-grouse population sizes and trends. Field survey methods and recording procedures are standardized to insure that the most consistent and comparable data is collected both through time and throughout the state. Lek counts provide the best current method through which wildlife managers can get a sense of population trends within an area, and are the best long term data available. Lek counts are used for analyzing population trends, estimating population size, and are often the focal point of populations, especially non-migratory populations. All known sage-grouse leks (occupied and unoccupied) are recorded in a geographic information system (GIS). Utah has 429 known leks. Of the 429 known leks, 304 (71%) have been active in the last five years; 328 (76%) are occupied, 101 (24%) are unoccupied, 29 sites are undetermined (have had < 2 counts of ≥ 2 males). Eight counties do not have any known occupied leks; Davis, Salt Lake, Weber, Utah, Millard, San Pete, Grand, and Washington.

Most lek count data for Utah was collected beginning in 1967 with Box Elder, Rich, and Summit counties starting earlier. Throughout the following decade and continuing to the present, efforts have focused on annual counts of existing leks and searches to discover unidentified new leks throughout the state. The number of leks counted has increased over time, as new leks have been located (Figure 6). Only 13 leks were counted in 1961, which is the lowest number since lek counting began in 1959. The highest number of leks counted was in 2007, with 285 leks counted. Deep and persisting snow pack, making it difficult to access lek locations, explains much of the variability in the number of leks counted through the years.

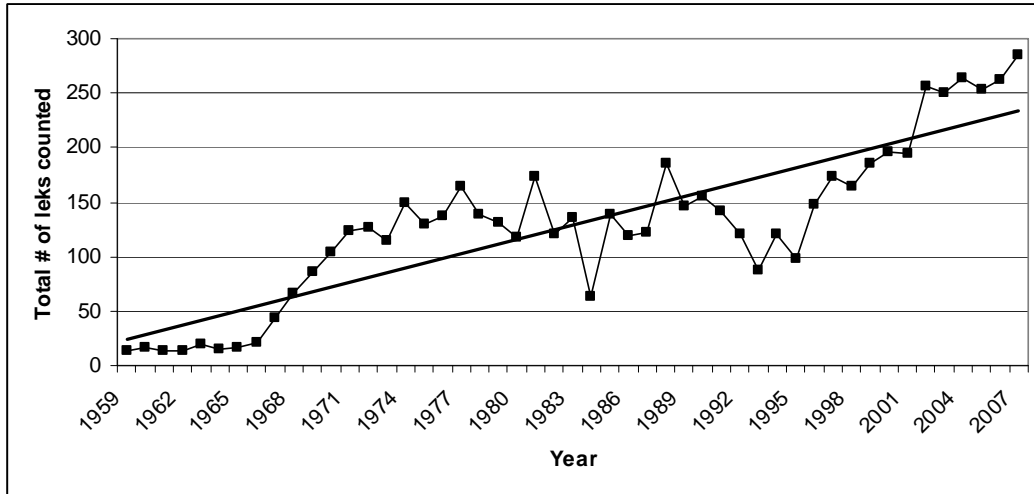


Figure 6. Number of sage-grouse leks counted each year in Utah, 1959-2007.

The total number of males counted has gradually increased since 1996 (Figure 7), this effort could be due to the fact that a greater effort to count, search, and incorporate more leks in to the database has occurred but equally likely is that populations are increasing due to management efforts. The highest recorded number of male sage-grouse on leks was in 2005 (5,748 males observed). The early 1990s showed a decline in both the overall population and a reduction in the number of males/lek, but numbers for both attributes increased in recent years. The males/lek ratio showed a decline from 1989-1996, but has increased since 1997 with some variability (Figure 8). The highest number of males/lek was observed in 1969 (32 males/lek), and the lowest number of males/lek was observed in 1996 (10.4 males/lek). The ratio of 29.8 males/lek in 2005 is the highest ratio since 1979. The data for number of males/lek suggests a 10-year cycle with the highest numbers reached during 1969-1970, 1979-1980, 1989-1990, and 1999-2001.

The most current lek data can be found at: www.wildlife.utah.gov/uplandgame/annualreports/

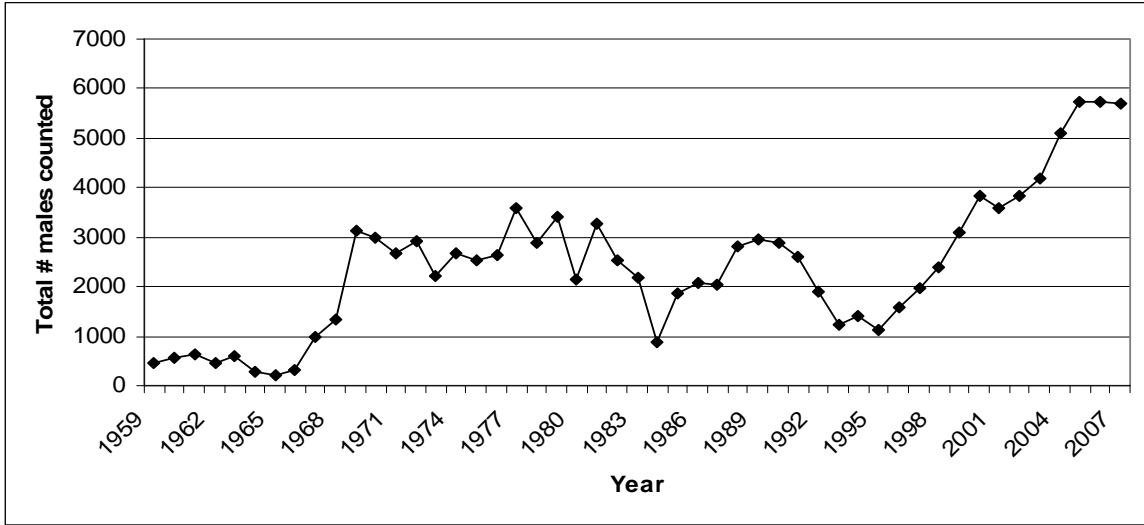
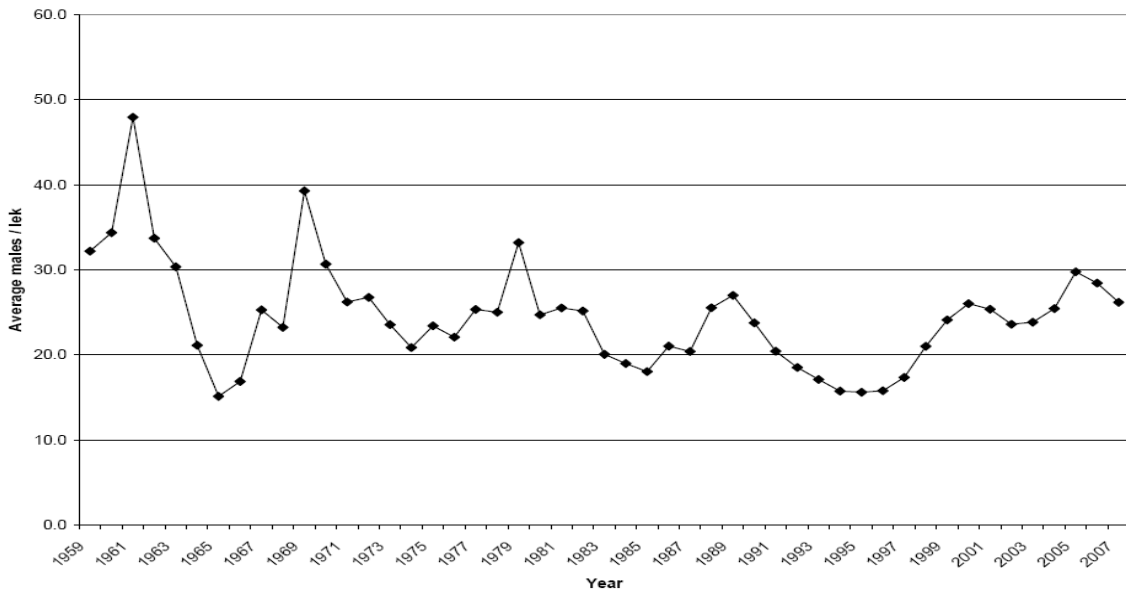


Figure 7. Total number of male sage-grouse counted on leks in Utah, 1959-2007.

Statewide trends of average Sage-grouse males per lek, Utah 1959–2007.



*Only leks where birds were counted were used to calculate the average number of males/lek.

Figure 8. Average number of male sage-grouse counted per lek in Utah, 1959-2007.

In 2007, Utah’s estimated sage-grouse breeding population consisted of 22,780 birds. The 2008 estimated Utah sage-grouse breeding population was 18,700 birds. Data collected in 2008 were problematic due to poor survey conditions and access to leks during peak male attendance. Population estimates in 2006 (22,992) were high likely due to the high production in 2005. Population estimates are based on the assumption that 75% of all males were counted on

strutting grounds and that the male:female ratio in the population is 1:2. These assumptions are arbitrary, but represent the best information currently available for estimating population size. Research will be conducted to better these assumptions.

Harvest History and Management

Sage-grouse hunter harvest information has been collected in Utah since 1951. From 1951-1962 sage-grouse hunters and subsequently harvest were limited by permits. From 1951 to 1961 season length was 2 days, with a daily and season possession limit of 4 birds. The season length remained at 2 days until 1968, and then changed to 7 days through 1972. The bag limit changed to 2 birds from 1962 to 1967 and 1972, while it was 3 birds from 1968 to 1971. From 1972 to 1995 the bag limit was 1-3 birds in different parts of the state. From 1996 to 2001 there was a 1 bird bag limit. Possession limit was twice the bag limit from 1962 to 2001. Season dates generally were progressively later in September through the years. The earliest opening season date was September 7, in 1996; the latest start date was September 27, in 2008. Harvest peaked in the late 1970s and early 1980s with the highest harvest of 28,280 sage-grouse in 1979, with significant reductions in harvest since 2000 when management direction changed (Figure 9).

While there is not an established hunting season for Gunnison sage-grouse, Utah greater sage-grouse are hunted when populations meet minimum criteria that were originally established in 2002 (UDWR 2002). Utah's system for determining both huntable populations and the number of permits or harvestable birds are conservative (see Conservation Strategy A-1.2B) compared to some recommended guidelines (Connelly et al. 2000, Connelly et al. 2003b). Currently hunts are provided in Sevier/Wayne, Rich, Box Elder and Uintah counties. Beginning in fall 2000, a free permit was required to hunt sage-grouse in these 4 areas. This new requirement decreased hunter participation in the sage-grouse hunt, subsequently reducing the overall harvest. Harvest for 2000 was estimated at 1,498 sage-grouse, down 77% from the 1999 estimate when permits and hunting was unlimited. Beginning in 2002 the number of permits was limited and each hunter was required to have a 2-bird season bag permit; 521 hunters pursued sage-grouse, and hunters harvested 511 birds. In 2003, a total of 954 two-bird permits were issued and 1,017 birds were harvested. This permit system has enabled biologists to collect more accurate harvest data based on follow up telephone surveys. Since 2000, the number of sage-grouse hunted and harvested has stabilized, due to the permit number restrictions. The number of sage-grouse per hunter maximum was in 1987 with 1.8 grouse/hunter, the lowest rate was 0.95 grouse/hunter in 2001; sage-grouse/hunter day showed a gradual decline from 1980-2002, with an increase since then (Figure 10). In 2008, there were 1,120, 2-bird permits available to hunters on a first come first serve basis. The permits sold out within the first few hours available. There is still a high demand for sage-grouse hunting in Utah. On a scale of 1 to 5 (5 being most satisfied), the average hunter satisfaction score reported in 2008 was 4.0, and 68.2% of hunters reported that they would prefer to keep management the same.

Updated harvest information is available at: www.wildlife.utah.gov/uplandgame/annualreports/
Current hunting areas and closures can be found at: www.wildlife.utah.gov/guidebooks

Continued sage-grouse hunting and harvest elicits opinions ranging from total support to rejection and opposition. Sage-grouse are hunted throughout their range both in Utah and

surrounding states. Not all greater sage-grouse populations are hunted in Utah, only those defined as being stable or increasing (>500 breeding adults). Those who question continued sage-grouse hunting and harvest do so from two perspectives. Some feel the birds should be left alone as part of nature and appreciated solely from that perspective. Others question whether hunter harvest should be allowed when populations and their habitats have shown range wide declines.

Harvest management has operated under two primary conceptual theories: additive and compensatory mortality. Additive mortality occurs when each harvested individual is an additional death to natural mortality. Thus, the result is that total mortality is greater than natural mortality when harvest occurs. Compensatory survival is when animal populations have relatively stable annual mortality; regardless of decimating factors influencing the population. Thus, under compensatory mortality, if an animal does not fall to hunter harvest, it will succumb to some other naturally inflicted mortality factor such as predation. Therefore, eliminating hunter harvest would simply result in increased natural mortality rates by other factors with no net gain in the sustainable annual population.

Whether sage-grouse populations function more fully under additive or compensatory mortality systems is still unclear. The cumulative effect of harvest may vary annually based on population demography and reproductive rates. Sage-grouse are considered a relatively long-lived low reproductive gallinaceous species (Connelly and Braun 1997, Connelly et al. 2000), and as such have relatively low population turnover. Even if hunter harvest is additive in some proportion to natural mortality, this does not mean populations can not sustain some level of harvest without risk of extirpation or even substantial reductions (Connelly et al. 2005).

An expert panel, convened by the USFWS during the 2004 status review provides biological perspective on the issue of hunting harvest across sage-grouse range. The panel assessed relative threats and risks to greater sage-grouse and ranked hunting 17th out of 19 potential threats to the species (Appendix 3). Four years later in a letter sent to Tom Christiansen (Wyoming Game and Fish Department) dated January 30, 2008 the USFWS stated, “We are not aware of any new information that would change the results of that analysis,” and “it would not be necessary or appropriate to apply the PECE (Policy for Evaluation of Conservation Efforts When Making Listing Decision) framework to conservation actions related to hunting that have already been demonstrated to be effective and do not threaten the species” (Christiansen 2008). Connelly et al. (2004:9-6) states, “No studies have demonstrated that hunting is a primary cause of reduced numbers of greater sage-grouse.” Greater sage-grouse hunting and harvest provides population data (band returns and wing-based information); recreational, cultural, and economic values; increases interest, awareness, and appreciation of the species; provides funding and incentives for conservation; and creates a constituency of sage-grouse advocates who are interested in conserving sage-grouse populations.

Statewide trends of Sage-grouse harvest statistics, Utah 1963–2007.

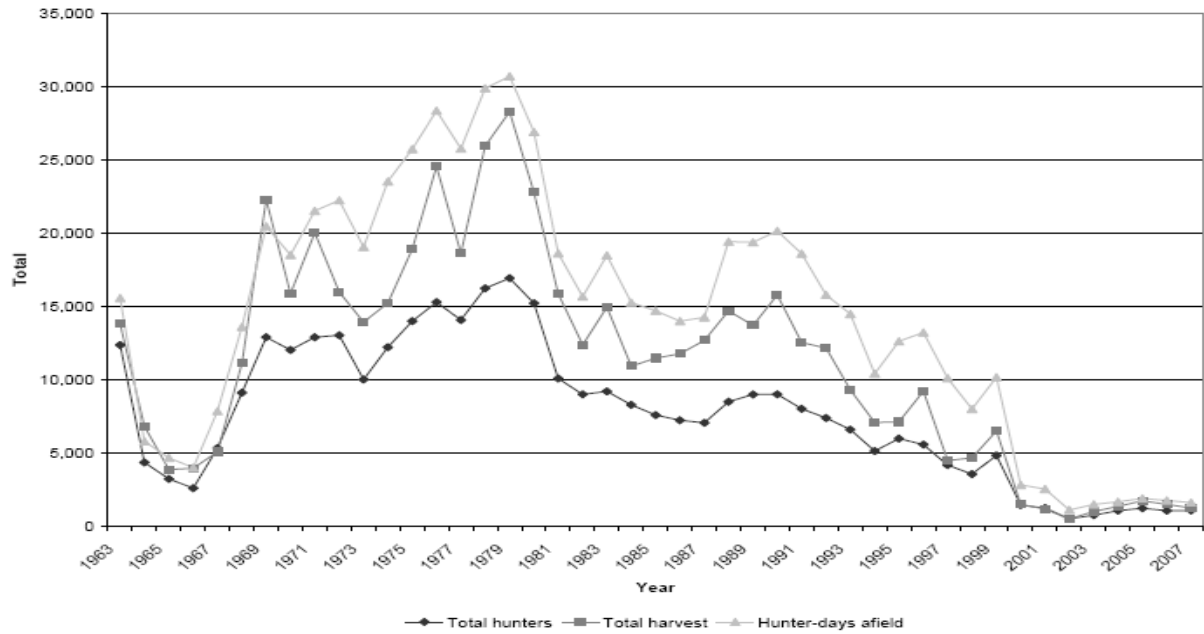


Figure 9. Total sage-grouse harvest and hunters in Utah, 1963-2007.

Statewide trends of Sage-grouse hunter success, Utah 1963–2007.

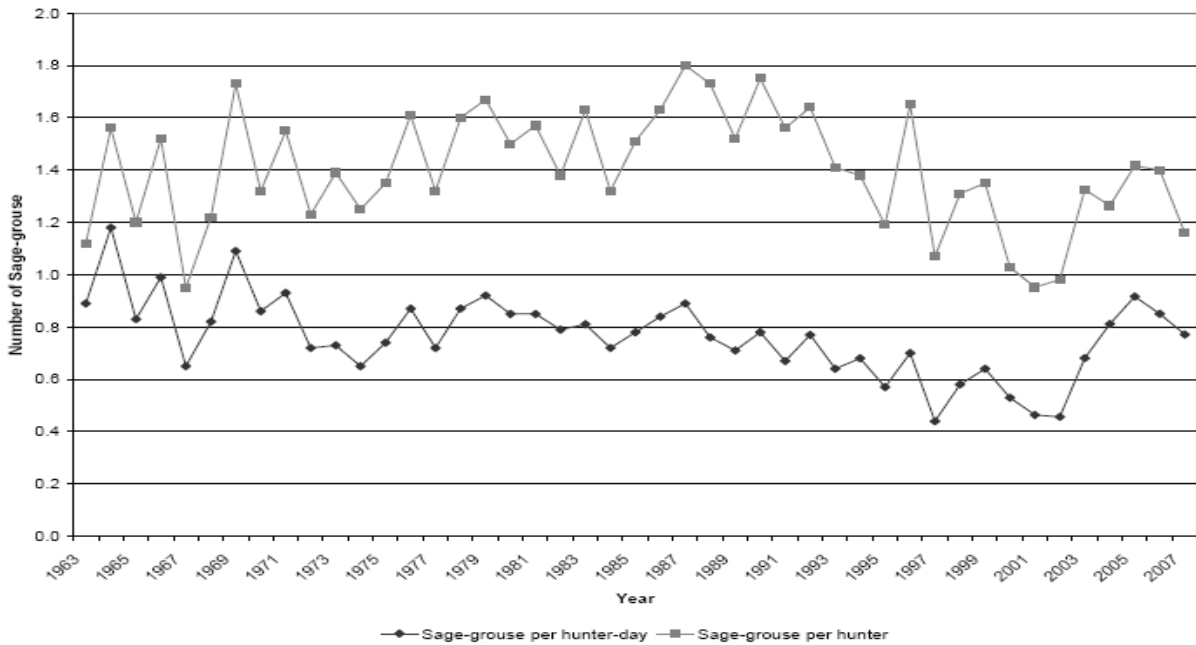


Figure 10. Number of sage-grouse harvested/hunter and hunter-day in Utah, 1963-2007.

SAGE-GROUSE HABITAT

Habitat Requirements

Sage-grouse are considered a landscape species, indicating their dependence on large, relatively open and undisturbed sage-brush dominated vegetative communities. While this habitat foundation is basic to the bird's welfare and persistence throughout its range, sage-grouse habitat use and requirements change through the annual flow of the seasons and life functions. The following general timelines apply throughout the year for greater sage-grouse seasonal habitats:

- Breeding Habitat (March through July)
- Lek Habitat (March through mid-May)
- Nesting Habitat (April through June)
- Early-Brood Rearing Habitat (mid-May through July)
- Late-Brood Rearing Habitat (July through September)
- Summer-Fall Habitat (July through November)
- Winter Habitat (November through February)

Breeding/Nesting Habitat

Leks, or strutting grounds, tend to be traditional. The same general sites are used year after year and typically occur in open areas surrounded by sagebrush (Patterson 1952, Gill 1965). Examples of lek sites include landing strips, old lakebeds or playas, low sagebrush flats, openings on ridges, roads, cropland, and burned areas (Connelly et al. 1981, Gates 1985). Sage-grouse males appear to form leks opportunistically at sites within or adjacent to potential nesting habitat. The lek is considered to be the center of year-round activity for non-migratory grouse populations (Eng and Schladweiler 1972, Wallestad and Pyrah 1974, Wallestad and Schladweiler 1974), but this may not be the case for migratory populations (Connelly et al. 1988, Wakkinen et al. 1992). Average distances between nests and the nearest leks vary from 0.6-3.9 miles (1.1-6.2 km), however, some females may nest > 12.5 miles (20 km) away from the lek (Autenrieth 1981, Wakkinen et al. 1992, Fischer 1994, Hanf et al. 1994).

Habitat used by pre-laying hens is also part of the general breeding habitat. These areas provide hens with forbs high in calcium, phosphorus, and protein, all of which are necessary for egg production. The condition and availability of these forb rich areas are thought to have a significant effect on reproductive success (Barnett and Crawford 1994, Coggins 1998).

Most sage-grouse nests are located under sagebrush plants (Patterson 1952, Gill 1965, Gray 1967, Wallestad and Pyrah 1974); however, nests have been found under other plant species (Griner 1939, Connelly et al. 1991, Gregg 1991, Knerr 2007, Robinson 2007). Sage-grouse nesting under sagebrush experience a higher nest success than those nesting under other plant species (Connelly et al. 1991). Research on sage-grouse nesting habitat has documented that sage-grouse tend to select sites under sagebrush plants that have large canopies. The canopies provide overhead cover and an herbaceous understory, thus providing lateral cover and allowing birds to be hidden from view (Patterson 1952, Gray 1967, Klebenow 1969, Wallestad and Pyrah 1974, Wakkinen 1990, Gregg 1991, Fischer 1994, DeLong et al. 1995, Bunnell et al. 2000). Selected nesting habitat has more sagebrush canopy cover and taller sagebrush than surrounding available habitats (Connelly et al. 2004, Robinson 2007). Sagebrush canopy cover used by

nesting sage-grouse varies by site, but generally ranges from 15-55%, with heights from 10–26 inches (25-65 cm). Herbaceous cover associated with nest sites may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995). A study in Oregon (Coggins 1998) correlated increased spring forb cover (14.5 – 18.2% vs. 6.8 – 12.8%), food forb cover (3.1 – 5.6% vs. 0.5 – 1.9%), and tall (>18 cm) grass cover (4.7 – 17.2% vs. 0.3 – 4.7%) with increased overall nest initiation rates (99 vs. 65%), renesting rates (30 vs. 14%), and nesting success rates (37 vs. 22%). In two separate Utah sage-grouse nesting studies, most hens (> 75%) nested within 2 mi (3.2 km) of a lek (Robinson 2007, Knerr 2007). Contiguous nesting habitat across the landscape is essential for maintaining or increasing sage-grouse populations. Connelly et al. (2000) recommends that 80% of nesting habitat be in sagebrush cover classes between 10-25%.

Brood-rearing Habitat

Early brood-rearing habitat generally occurs relatively close to nest sites, but movements of individual broods may be highly variable (Connelly 1982, Gates 1983). Early brood-rearing habitats may be relatively open (\leq 14 percent canopy cover) stands of sagebrush when compared to optimum nesting habitat (Martin 1970, Wallestad 1971), but sage-grouse prefer > 15% canopy cover of forbs and grasses (Sveum et al. 1998, Bunnell et al. 2000). High plant species richness with abundant forbs and insects characterize brood areas (Dunn and Braun 1986, Klott and Lindzey 1989, Drut et al. 1994, Apa 1998). Insects, especially ants and beetles, are an important food component of early brood-rearing habitat (Drut et al. 1994, Fischer 1996, Baxter 2003). As herbaceous plants mature and dry, hens usually move their broods to mesic sites during June and July where more succulent vegetation and greater insect abundance is available (Gill 1965, Klebenow 1969, Connelly and Markham 1983, Connelly et al. 1988, Fischer et al. 1996, Bunnell et al. 2000). Sage-grouse broods occupy a variety of habitats during summer including sagebrush, relatively small burned areas within sagebrush, wet meadows, farmland, and other irrigated areas adjacent to sagebrush habitats (Savage 1969, Martin 1970, Connelly and Markham 1983, Gates 1983, Connelly et al. 1988, Pyle and Crawford 1996). Late brood-rearing habitats are highly variable.

Patterson (1952) reported that sage-grouse move from summer to winter range in October but during mild late fall weather some birds may still use summer range. Fall movements to winter range are slow and meandering and occur from late August to December (Connelly et al. 1988). Wallestad (1975) documented a shift in feeding habits from September, when grouse were consuming a large amount of forbs, to December when birds were feeding only on sagebrush.

Winter Habitat

Sage-grouse winter habitats are relatively similar throughout most of their range. Because their winter diet consists almost exclusively of sagebrush, winter habitats must provide adequate sagebrush that is accessible through the winter. Eng and Schladweiler (1972) and Wallestad (1975) indicated that most Montana winter sage-grouse observations occurred in sagebrush habitats with >20% canopy cover. However, Robertson (1991) indicated that sage-grouse used sagebrush habitats that had average canopy cover of 15%. Sage-grouse tend to select areas with both high canopy cover and taller big sagebrush (*Artemisia tridentata*).

During winter, sage-grouse feed almost exclusively on leaves of sagebrush (Patterson 1952, Wallestad 1975). Big sagebrush dominates the diet of sage-grouse in most portions of their range (Patterson 1952, Wallestad 1975, Remington and Braun 1985, Welch et al. 1988) but low sagebrush (*A. arbuscula*), black sagebrush (*A. nova*) (Dalke et al. 1963, Beck 1977), fringed sagebrush (*A. frigida*) (Wallestad 1975) and silver sagebrush (*A. cana*) (Aldridge 1998) are also consumed in many areas depending on the availability. Sage-grouse in some areas apparently prefer Wyoming big sagebrush (*A. t. wyomingensis*) (Remington and Braun 1985, Myers 1992) and in other areas mountain big sagebrush (*A. t. vaseyana*) (Welch et al. 1988). Some of the differences in selection may be due to preferences for higher levels of protein (Remington and Braun 1985). Current research in Utah is showing some populations may select black sagebrush over big sagebrush (E. Thacker, personal communication, 2008).

It is critical that sagebrush be exposed at least 10-12 inches (25 cm) above snow level (Hupp and Braun 1989). This provides both food and cover for wintering sage-grouse. In situations where snow covers the sagebrush, birds will move to areas where sagebrush is exposed. During severe winter conditions, sage-grouse may either partially or completely bury themselves in snow (snow roosting) for added thermal protection.

Sage-grouse may be negatively influenced by disturbances within or near their winter habitats. Doherty et al. (2008) found that females avoided winter areas with coal-bed natural gas development, and were 30% less likely to use an area with coal-bed natural gas development even if it contained suitable habitat.

For an extensive review of literature on habitat requirements readers are encouraged to reference the WAFWA document; Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats (Connelly et al. 2004).

Habitat Trends

The complex mosaic of land ownership, competing resource uses, and administration of the habitat compound the difficulty of properly managing sage-grouse. One population of sage-grouse can utilize land administered by several different federal and state agencies as well as private land. Current occupied sage-grouse habitat in Utah covers primarily Bureau of Land Management (BLM) administered and private lands. Private lands provide the greatest amount of sage-grouse habitat at 40.5%, with BLM administered lands next at 34.4%. United States Forest Service (USFS) administers 9.7% of the current sage-grouse habitat and Utah State owned land accounts for 9.5% [School and Institutional Trust Land Administration (SITLA) (8.0%), Division of Parks and Recreation (<1%), and UDWR (1.5%)]. Ute Tribal land covers 5.2% and National Park Service and military reservations cover less than one percent each.

Land managed by SITLA are trust lands, the purpose of SITLA set forth in 53C-1-102(2)(b) is to “manage the lands and revenues generated from the lands in the most prudent and profitable manner possible, and not for any purpose inconsistent with the best interest of the trust beneficiaries.” Furthermore, 53C-1-102(2)(d) specifically states that “the beneficiaries do not include other governmental institutions of agencies, the public at large, or the general welfare of this state.” Due to the unique nature of SITLA lands and the interpretation of this mandate, some

special considerations may be warranted with land management practices. The Watershed Restoration Initiative (WRI) and the Utah Partners for Conservation and Development (UPCD) have helped address the challenges associated with diverse land ownership and management. From 2004 – January 2009, 236,975 acres of greater sage-grouse habitat were treated as part of an effort to restore and enhance habitats on a variety of land ownerships, including SITLA, through the UPCD process.

It is unlikely that climate change will have a significant short-term impact on Utah sage-grouse populations during the life of this plan; however, climate change may have an influence on long-term conservation. Climate change scenarios for the sagebrush region predict increasing trends in temperatures, increased atmospheric CO², and increased frequency of severe weather events which may result in a decline in sagebrush communities. Changing environmental conditions may also favor invasive species (e.g. cheatgrass) expansions and result in increased fire sizes and frequencies. In addition, an estimated 12% of the current distribution of sagebrush is predicted to be replaced, primarily by expansion of woody vegetation (e.g. pinyon, juniper), for each 1° C increase in temperature (Miller *In Press*). Climate change may already be impacting Utah sage-grouse populations and may have a greater influence on long-term conservation strategies. The combined interactions of invasive plant species, uncharacteristic fire events, and climate change will likely continue to change sagebrush communities and create challenges for future conservation and management.

Sage-grouse habitat quality and quantity has declined throughout Utah and coincides with declines in sage-grouse numbers. The reasons for habitat loss vary from site to site but include wildfire, urban expansion, development, agricultural conversion, herbicide treatments, rangeland seeding, noxious weeds/invasive species expansion, conifer encroachment, drought, and improper livestock grazing management. Connelly et al. (2004) provide considerable information on characteristics of sage-grouse habitats and the threats and risks facing these habitats.

STATEWIDE SAGE-GROUSE MANAGEMENT ISSUES

Issues that potentially impact greater sage-grouse and their habitats were identified and reviewed by the Sage-grouse Plan Committee. The cumulative affect or impact of issues may offset one another or may be of minor significance individually but swell to create “watershed” level outcomes when collectively brought to bear - as in the adage that “in an avalanche no single snowflake is responsible”. Recognizing this consideration and its ultimate influence on the relative importance of any single perspective, an attempt is made to prioritize the Issues, Objectives, and Strategies within each heading. Prioritization was based on a subjective system incorporating LWG identified biological threats, Utah habitats affected, population sizes, feasibility of addressing issues within this plan, and corroboration with range wide issue prioritization (Appendix 3).

PRIMARY FOCUS ISSUES

- Loss of sage-grouse habitat (quality and quantity) within Utah
- Lek identification, surveying, and protection
- Continued funding for surveys, monitoring, research, and habitat improvements
- Identification of sage-grouse distribution, seasonal habitat use, and continuity of habitats and populations
- Retention of large contiguous tracts of sagebrush habitats

MANAGEMENT ISSUES

M1) Understand the sage-grouse populations within the state

- a) Continue conducting lek management surveys.
- b) Continue searching for unidentified leks.
- c) Determine and map each population’s seasonal habitats.
- d) Determine/verify use (food and shelter) of sagebrush taxa used by the various sage-grouse populations in Utah (Big vs Black/Silver), especially in wintering habitats.
- e) Gather, assemble and use individual population information to develop viable management strategies for each population.

M2) Maintain/protect large contiguous intact sagebrush communities that contain seasonal habitat needs of sage-grouse populations within the state.

- a) Identify and protect traditional breeding, brood-rearing, migration corridors, and wintering habitats (local populations).
- b) Identification of seasonal habitats and movements (migratory or non-migratory) for all populations, including those on private lands (local populations).
- c) Identify (good GIS database) and quantify (state their condition) sagebrush habitats.
- d) Identify focus areas for fire prevention/suppression.
- e) Identify how habitats are connected and determine if improvements can be made.
- f) Develop energy and other development guidelines/strategies for Utah based on sound scientific data.
- g) Manage recreation
 - i) Need to develop travel management plans that are consistent with

conservation of important sage-grouse habitat. This will allow us to eliminate illegal & cross-country OHV and full-sized vehicle use in crucial sage-grouse habitats and restrict use to designated roads, and/or designated seasons.

- ii) Develop management strategy for antler searching on spring sage-grouse habitats
- h) Develop guidelines on the use of prescribed fire in sagebrush habitats.

M3) Rehabilitate or restore large contiguous intact sagebrush communities within the state.

- a) During wildfire rehabilitation in Wyoming big sagebrush sites, reseed with a combination of native and non-native species, including site-adapted sagebrush seed, where available.
- b) Restore degraded sagebrush habitats through appropriate treatment methods which will retain sagebrush while incorporating native and non-native perennial grasses and forbs.
- c) When conducting any habitat improvement/enhancement project, make sure to monitor, evaluate, and document the sage-grouse response as well as the other species response to habitat treatment projects.

M4) Monitor effectiveness of habitat improvement projects

- a) In all vegetation treatments designed to enhance or restore sagebrush habitats and increase sage-grouse populations, establish vegetation and wildlife objectives and monitoring procedures prior to treatments which will provide the data necessary to determine treatment effectiveness.
- b) Document and publicize both effective and ineffective sagebrush treatment methodologies to enhance knowledge of treatment technologies and avoid repeating treatment failures in similar sites.

M5) Provide sage-grouse conservation recommendations based on peer-reviewed literature.

MAJOR THREATS TO SAGE-GROUSE CONSERVATION IN UTAH

invasive species expansion

- Specifically annual grasses (cheatgrass, red brome) that detrimentally alter the fire cycle
- Spread of other invasive species including: medusahead, non-native thistle and knapweeds on rangelands, and tamarisk and Russian olive in riparian areas.

habitat conversion (agricultural, loss of CRP, urban encroachment)

conifer encroachment of sagebrush habitats (low and high elevations)

energy development (oil/gas, wind, etc.)

- Direct disturbance (vehicles, compressor stations), displacement, grouse mortality, direct habitat loss, increase in predation pressure, increase in invasive plant species, habitat quality decline and fragmentation (roads, fencing, powerlines, pipelines, etc.), and cumulative landscape level impacts.

altered fire cycles (the onset of fine fuel fires that burn frequently impeding sagebrush regeneration)

Predation (native and non-native predators)

RESEARCH QUESTIONS

R1) Energy and Mineral Development

- a) Need additional research on sage-grouse tolerance to energy developments (including well pad densities, well pad distance, seasonal restrictions, noise limitations, human disturbance, and associated infrastructure) specific to Utah populations.
 - What are the effects in large sage-grouse populations?
 - What are the effects in more fragmented habitats and/or populations?
- b) Need research on the effectiveness of rehabilitating or restoring sage-grouse habitat following energy development or other surface disturbing activity (this will help determine if off-site mitigation is a viable option).
- c) Need research to understand the efficacy of recommended mitigation (on- and off-site) to avoid, minimize, or reduce the effects of surface-disturbing activities (on-site), or replace or enhance suitable habitat (off-site).
- d) How do powerlines/poles and other tall structures affect sage-grouse populations?

R2) Genetics

- a) What are the effects of genetic isolation of small, isolated populations?
 - Is there inbreeding depression?
 - Is there loss of genetic variability?
- b) What are the Utah population genetics and how does the connectivity of those populations look?

R3) Drought

- a) How does drought affect sage-grouse over the short- and long-term?

R4) Predation

- a) How do predators impact each Utah sage-grouse population?
- b) How do native predators (at un-naturally high population levels) (e.g. ravens) impact sage-grouse population?
- c) How do non-native predators impact each Utah sage-grouse population?
- d) Under what circumstances is predator management an effective management approach?

R5) Harvest and Population Estimation

- a) How close do lek counts reflect sage-grouse population size and change?
- b) How does the timing of the hunt affect sage-grouse populations and demographics?
- c) Effects of sage-grouse hunts overlapping with big game?
- d) What are the harvest impacts to sage-grouse relative to season length, bag limits, and sex?

R6) Ungulate Grazing

- a) How does domestic grazing directly affect sage-grouse populations?
- b) How does domestic grazing directly or indirectly affect sage-grouse habitats (all seasonal)?
- c) How do water developments affect sage-grouse and their habitat (directly and indirectly)?
- d) Does domestic grazing alter behavior in seasonal habitat areas (including meadows/riparian areas)?

R7) Other Mortality

- a) What are the impacts of vehicle and fence mortality/collisions (leaks near roads/travel corridors crossing roads)?
- b) Are there population impacts from research-related mortalities?
- c) Are there population impacts from poaching?
- d) What are the effects of West Nile Virus and other bacterial, fungal, viral and parasitic diseases on sage-grouse populations in Utah?

R8) Cumulative

- a) What are the long term effects of cumulative human impacts?
- b) How will the predicted climate change in Utah affect local sage-grouse populations?
- c) What is the connectedness of populations in Utah? How linked are the smaller populations to the larger populations?
- d) How does the loss of habitat or degradation of habitat affect the connectedness/continuity of populations in Utah?
- e) Is a 500-breeding-bird-minimum a biologically defensible population count to maintain or sustain a healthy sage-grouse population?
- f) What are the effects of using herbicides in sage-grouse habitat (direct and indirect)?
- g) What are the effects of using pesticides in sage-grouse habitat (direct and indirect)?

PLANNING CHALLENGES

P1) Funding

- a) Habitat enhancement projects (beyond UPCD and WRI monies)
- b) Research and monitoring
- c) Acquisition/easements
- d) Need to develop a system to prioritize projects and use money
- e) Need to prioritize areas for funding (based on the specifically identified [informed] needs of the specified population).
 - Need to monitor habitat projects
 - Need to monitor bird response to projects
- f) Need to require that projects have a maintenance component and that the financial investment is monitored to make sure it meets stated objectives.

P2) Coordination among stakeholders (agencies, governments, private, tribes).

- a) Ensure data availability and sharing among agencies and partners.
- b) Establishing and maintaining landowner trust is critical.

- c) Need to coordinate on a regional scale to try to develop a system where native and desirable seed is available when needed.

P3) Implementation of adaptive management principles

P4) Need to approach planning at a landscape level and need to analyze cumulative impacts at a landscape level.

- a) Improve information flow and communications with planners.
- b) Improve information flow and communications with land managers.

P5) Need to establish effective methods to enforce regulations that protect/conservate sage-grouse populations and habitat.

- a) Is there a way to do so with law enforcement (ticketing)?
- b) Would signage be effective?
- c) Educational incentives?

P6) Outreach

- a) Need to get the information to the public and industry
- c) Public awareness/attitudes/education (hunting/grazing), especially along the greater populated areas in Utah.

P7) Need to make sure LWG members are participating in the WRI/UPCD process to ensure that projects are consistent with sage-grouse LWG plans.

STATEWIDE SAGE-GROUSE GOAL

Protect, maintain, enhance, and restore greater sage-grouse populations, habitats, and the ecosystems that sustain them. Reestablish, augment, and facilitate sustainable populations of greater sage-grouse in suitable habitats to improve statewide population continuity and distribution.

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STATEWIDE SAGE-GROUSE OBJECTIVES AND STRATEGIES

A. POPULATION OBJECTIVES

Objective A-1: Monitor, protect, and maintain current population numbers.

- Sub-Objective A-1.**
1. Maintain an average spring male lek count of $\geq 5,000$ males statewide over the next 5 years, based on a 200 lek minimum count per year.
 2. Maintain an average statewide males/lek ratio above 26.7 males/lek based on a running 5 year average and a minimum of 200 leks surveyed annually. The approximate distribution of the counts from each region should be: 43% northern, 5% central, 25% southern, 20% northeast, and 7% southeast.

A-1.1 Population Monitoring

- A. Lek Surveys.
 1. Annual lek surveys will form the base metric to determine and assess both annual and long term population status and trend
 2. Strive to survey all known, occupied and active, leks annually utilizing standard UDWR protocol (Appendix 4). Use lek definitions outlined in this plan.
 3. Conduct planned and systematic surveys and searches for new and unidentified leks in all potential habitats. Document, map, and file all search areas with GPS tracks.
- B. Population Estimates.
 1. Population estimates for individual leks, lek complexes, or other lek groupings will be determined using the following assumptions (until better estimators can be established – see research needs):
 - 75% of all males within a population are seen on leks.
 - A male to female ratio of 1:2.
- C. Wing Analysis.
 1. Wings will be solicited and collected from hunters from all hunted populations within the state.
 - a) a target sample size is to analyze $> 25\%$ of the hunt harvest total.
 - b) standard UDWR protocols will be followed in collecting and analyzing wings (Appendix 4).
 2. Wing analysis from hunter harvested birds will be used to determine the following:
 - Age and sex ratios
 - Hatching periods and peaks
 - Successful nesting hen ratios
 - Genetic tissue samples when warranted
- D. Hunter Harvest and Monitoring.

1. Hunting seasons and allowable harvest levels will be determined annually.
 2. Hunter harvest monitoring will be conducted annually via a phone survey of 25% of permit holders; reported annually in upland game report. The efforts are to determine:
 - Total hunters and total harvest
 - Hunter days afield, sage-grouse per hunter, and sage-grouse per hunter day
- E. Lek Searches.
1. New lek searches will be continued annually in suitable sage-grouse habitat in a systematic manner (use mapping/GIS to document searched areas and what was found). Seek assistance from all natural resource agencies; allow trained LWG members/volunteers the opportunity to be involved in lek counting/survey efforts. Training will be by UDWR personnel to ensure compliance with accepted protocols (Appendix 4).

Conservation Strategies:

A-1.2 Population Maintenance and Protection

A. Leks.

1. Strive to conduct annual surveys on each identified lek in the state.
2. Draft, update, and maintain written Guidelines For Development Activity Within Utah Sage-Grouse Habitats as a stand-alone appendix within this management plan (APPENDIX 5). These guidelines (APPENDIX 5) will provide land and resource managers at all levels and applications the best available science for sage-grouse management, and will provide recommended practices to minimize negative impacts to sage-grouse populations and their habitats.

B. Harvest.

1. Hunter harvest should continue to provide hunting opportunity through limited permits. Maintain a conservative harvest of $\leq 10\%$ of the estimated fall population in areas where ≥ 500 birds comprise the breeding population over a three-year running average (Connelly et al. 2000). Populations will be estimated based on the following assumptions (until better estimates can be established):
 - Breeding population: 75% of males attend leks, that the male:female sex ratio is 1:2;
 - Fall populations: 65% male survival to fall, 75% female survival to fall, and 1.04 – 1.73 (1.38 most years) juveniles/hen in the fall population (Connelly et al. 2000, Crawford et al. 2004). Hunter success will be considered when allocating permits.
2. Evaluate additional populations to expand hunting opportunity in the future.
3. Efforts will continue to reduce unlawful harvest and inform the public of hunting regulations. Unlawful harvest of sage-grouse does occur, however, it is not considered to be a significant issue at a population level in Utah. From 2003 – 2008 law enforcement efforts specifically directed towards sage-grouse accounted for 522 hours of effort, 26 arrests, 22 warnings, 1,071

people contacted, and 825 licenses checked. There is 1 arrest for every 20 hours of sage-grouse enforcement efforts. Arrests included any hunting related infraction from loaded guns in vehicles through hunting without a license (poaching).

4. Continue to collect an adequate sample of wings from check stations and wing barrels to monitor production in areas where sage-grouse are hunted.

C. Winter Concentration Areas

1. Sage-grouse winter concentration areas should be identified as either high concentration areas (>50 birds) or low concentration areas (<50 birds), and all surface-disturbing or disruptive activities in delineated winter concentration areas should be avoided or minimized from Nov. 15 – March 15, with highest priority to high concentration areas.

Objective A-2: Increase, restore, and reestablish sage-grouse populations to improve continuity and distribution.

Sub-Objective A-2. Increase the average number of sage-grouse males counted statewide on leks to $\geq 6,000$ males by 2014, using the same regional distribution as sub-objective A-1.

Conservation Strategies:

A-2.1 Leks.

- A. Use lek searches to increase the number of known occupied leks
- B. Use telemetry studies to gain a better understanding of the populations, which could result in identification of more leks, as well as counting leks during peak male attendance.

A-2.2 Telemetry.

- A. Continue or expand telemetry studies on sage-grouse populations throughout the state to determine migratory/non-migratory status of each population, document continuity or connectivity of populations, identify and map seasonal habitats, including; nesting, brood-rearing and wintering, as well as areas where habitat enhancement or restoration should be accomplished. Implement new studies in areas where little is known about sage-grouse ecology.

A-2.3 Translocations.

- A. Pursue opportunities to expand/reestablish populations within the state, and develop a list of possible translocation/reestablishment sites by 2011. Translocations may be used to augment populations where ≤ 165 males (≤ 500 adult sage-grouse) make up the breeding population, or an increase in genetic diversity is warranted. Capture and release sites should be selected by local biologists based on habitat quality, the extent of available habitat, and existing sage-grouse populations. Source birds should be captured ≥ 62 mi (100 km) from the release site, and released the same night in the spring on an active lek, following the protocols described by Baxter et al. (2008). The migratory or non-migratory status of the source and augmented populations should be considered.

A-2.4 Predator Control.

- A. Predator control should be considered for populations that are suspected to be suppressed by native and non-native predators. Predator control is warranted when local UDWR biologist and Wildlife Services biologists determine a need and should be viewed as a short-term and prescriptive measure. The need for predator control should be evaluated annually and directed at specific sage-grouse populations and predators. Schroeder and Baydack (2001) and Coates (2007) examine the effects of predators and sage-grouse.
 - 1. Explore best management practices to reduce or prevent predator blooms near anthropomorphic structures.
 - 2. Explore habitat improvements to minimize and reduce predator impacts to nesting birds.

Objective A-3: Continue to conduct additional needed management activities for sage-grouse populations in Utah.

Conservation Strategies:

A-3.1 Habitat Identification and Mapping.

- A. Continue and expand cooperative efforts to determine the presence/absence of sage-grouse, obtain baseline population data, including distribution and connectivity with other populations, and map crucial seasonal habitats and determine the condition and habitat trends of those key habitats. Update UDWR seasonal and key habitat maps in GIS every 2 years and provide updated maps to local land management agency offices and others.

A-3.2 Disease.

- A. Continue to monitor disease in sage-grouse populations, specifically West Nile Virus that can have negative population level effects (Naugle et al. 2004).

A-3.3 Genetics.

- A. Collect genetic information from all sage-grouse populations in Utah to better understand the heterogeneity, make-up, potential for inbreeding depressions, and connectivity of sage-grouse in Utah.

B. GREATER SAGE-GROUSE HABITAT OBJECTIVES

Objective B-1: Protect and maintain currently occupied sage-grouse habitat and the ecosystems that sustain them.

Conservation Strategies:

B-1.1 All Land Ownerships (with permission on private land); emphasis on key or at-risk populations or habitats.

A. Maps.

1. Update and distribute habitat maps that identify key seasonal habitats to land management agencies. Mapping should be accomplished at an agreed-upon scale statewide (e.g. broad scale = statewide, mid-scale = region wide, fine scale or site scale = population level).
2. Prepare cover type maps and assess habitat conditions using standard methods for key seasonal habitats.

B. Site-specific Strategies.

1. In cooperation with interested and affected parties, develop site-specific habitat management objectives and conservation strategies.

B-1.2 Private land habitat (voluntary landowner actions).

A. Technical assistance.

1. Contact landowners and developers in key seasonal habitat areas to explain sage-grouse needs and seek their support for improving sage-grouse habitat.
2. Meet with groups and agencies that work with private landowners (i.e. Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), Utah Cattlemen's Association, Utah Association of Soil Conservation Districts, Utah State University Extension, County Planning Offices, Utah Farm Bureau (UFB), and Utah Division of Oil, Gas and Mining (UDOGM) to explain and seek support for actions outlined in this plan.
3. Publish best management practices and strategies for minimizing disturbance to sage-grouse during the construction of housing, industry, and energy and mineral resources.

B. Voluntary agreements.

1. Provide cost-share funds to aid private landowners in protecting, managing, and restoring sage-grouse habitat. Possible sources of funds include federal Farm Bill programs, WRI/UPCD, and the U.S. Fish and Wildlife Service's Partners for Wildlife Program.
2. Offer information on Candidate Conservation Agreements with Assurances (CCAA), through the USFWS, and other agreements with landowners through agencies and LWGs.

C. Pesticides/Herbicides.

1. Provide information to agricultural producers outlining methods to reduce potential for pesticide poisoning of sage-grouse, and the potential for sage-grouse impacts from poisoning of non-target insects during Mormon cricket/grasshopper control efforts.
2. Request landowners, pesticide applicators, and others to report incidents of dead or apparently intoxicated sage-grouse found in and around agricultural fields.
3. Inform landowners regarding appropriate application rates of herbicides and encourage landowners to work with resource experts when designing herbicide treatment projects in occupied sage-grouse habitat.

D. Long-term habitat protection.

1. Identify and prepare a prioritized list of the most important sage-grouse habitats on private land within each Sage-grouse Management Area, and especially those within UPCD sagebrush Focus Areas. Offer conservation easements or acquire crucial habitats from willing sellers through land exchange, reserved interest deed, or direct purchase.

B-1.3 Public/SITLA land habitat (Utah Division of Parks and Recreation, UDWR, and all federal agencies).

A. Vegetation management.

1. Manage seasonal sage-grouse habitats in a manner appropriate to the site conditions, and based on habitat assessment or local expert knowledge and observed ecological condition.
2. Manage to maintain/create large, un-fragmented blocks of sagebrush habitat with a variety of seral stages which will meet the seasonal needs of sage-grouse.
3. Strive to manage nesting and early brood-rearing habitat based on site specific conditions and local research. General guidelines are to manage for 15-25% sagebrush canopy coverage and 7 inches (15cm) or taller of grass and forb understory during the nesting period in those areas of Utah capable of meeting these criteria (Connelly et al. 2000). Research (Connelly et al. 1991) shows that this provides 50% nesting success and potential for increasing populations. Early brood-rearing habitat should have a high diversity and abundance of insects.
4. Manage for late summer brood-rearing habitat that includes a variety of succulent vegetation adjacent to sagebrush escape and loafing cover. Create or enhance riparian/wet meadow habitat in areas where late brood-rearing habitat is lacking. Strive to manage sagebrush habitats with 10-25% canopy cover.
5. Manage for winter habitat that has sagebrush exposed under all possible snow depths. This can consist of low/black sagebrush (*A. arbuscula* or *A. nova*) and big sagebrush (*A. tridentata*) communities. A sagebrush canopy of 15-25% with heights of 10-12 inches (22-27

cm) above the snow is recommended. These crucial winter habitats should be identified and mapped during severe winters and protected from vegetative treatments or prescribed burns.

B. Lek Disturbance.

1. Draft, update, and maintain written Guidelines For Development Activity Within Utah Sage-Grouse Habitats as a stand-alone appendix within this management plan (APPENDIX 5). These guidelines (APPENDIX 5) will provide land and resource managers at all levels and applications the best available science for sage-grouse management, and will provide recommended practices to minimize negative impacts to sage-grouse populations and their habitats.
2. Use caution when conducting habitat improvement projects on or near leks, and conduct in the fall. Perform pre and post-treatment lek counts to assess effects of treatment on the lek.
3. Incorporate timing and distance limitations in rights-of-way grants, conditions of approval, and other land use authorizations, incorporate site specific conditions.

C. Invasive species.

1. Work with Cooperative Weed Management Associations (CWMA), county weed board, and employees to identify and control noxious and invasive weed species.
2. Take measures to rehabilitate wildfire areas to discourage the establishment/expansion of invasive species. Reseed burned areas before the next growing season with an appropriate seed mix for the site, including site-adapted sagebrush seed where possible.
3. Intense invasive species control efforts should be implemented during and following all development activities.
4. Incorporate invasive species control requirements in all rights-of-way grants, conditions of approval and other land use authorizations and monitor for compliance.

D. Fire management.

1. Rate sage-grouse wintering and nesting habitats as high priority for wildfire suppression.
2. Provide BLM's "key habitats map" of important sage-grouse wintering, breeding, and brood-rearing habitats to help fire suppression personnel prioritize fire suppression efforts to protect habitats important to sage-grouse.
3. Use prescribed fire in high precipitation [> 16 inches (35 cm)] sagebrush communities (e.g., *A. t. vaseyana*) as needed to mimic natural fire frequencies.
4. Protect remaining sage-grouse habitat in habitats where natural fire frequency is 50-130 years and recent wildfire has greatly reduced sage-grouse habitat. This should include:
 - Increased emphasis or priority for fire suppression;
 - Development of strategically placed firebreaks using greenstripping techniques, including the use of forage kochia

- Better training of fire crews on the importance of sagebrush habitat; especially in Wyoming sagebrush systems;
 - Use of Resource Advisors to better delineate of the most important sage-grouse habitat;
 - Control of all noxious/invasive weeds.
5. When making fire management decisions, recognize that remaining islands of sagebrush within a wildfire are very important as a seed source for reestablishing sagebrush in a burned area.
- E. Conifer encroachment.
1. Reduce conifers that are encroaching on sagebrush habitats using appropriate methods, which may include: masticators, chains, chain saws, prescribed fire, etc. Conifer removal has been shown to be beneficial to sage-grouse (Commons et al. 1999). This includes not only the mechanical removal of Utah juniper encroaching into Wyoming big sagebrush at lower elevations, but also the removal of other conifers encroaching into mountain big sagebrush sites, which could include the use of prescribed fire.
- F. Pesticides/herbicides.
1. Avoid the use of pesticides in nesting and early brood-rearing habitat during the early developmental stage of sage-grouse chicks (April-July).
 2. When needed, timing and application of herbicides should be during the period of active growth of target species, but when forbs are dormant.
 3. Tebuthiuron is an herbicide that is highly effective at selectively decreasing sagebrush cover when used at low application rates. It may be considered when some sagebrush retention is desired on a treated area and conservation of forbs is important (Dahlgren et al. 2006).
- G. Grazing Management (domestic and wild).
1. Implement domestic livestock grazing management practices, wild horse and burro management, and big game regulations to achieve and maintain sagebrush and riparian/meadow habitats in good ecological condition (as defined by NRCS Ecological Sites Guide or USFS Site Guides).
 2. Encourage livestock grazing practices which will result in understory vegetation that will provide cover for nesting sage-grouse from April through May.
- H. Energy, Wind, Urban, Suburban, and Mineral Development.
SEE APPENDIX 5.
- I. Full-sized and Off Highway Vehicles (OHV).
1. Enforce illegal and off trail travel in sage-grouse habitats.

2. Post seasonal restriction in crucial habitats.
3. Increase OHV law enforcement in crucial habitats; especially during periods of seasonal sage-grouse use.
4. Participate in the development of BLM and Forest Service travel plans and incorporate sage-grouse concerns.

J. Fencing.

1. When constructing new fencing in sage-grouse habitat, make the fence as visible to sage-grouse as possible.
2. Retrofit existing fencing in sage-grouse habitats with visible markings to reduce the likelihood of fatal sage-grouse collisions with the fencing. Paige (2008) offers some useful suggestions on fencing with wildlife in mind.
3. Avoid the use of net wire in sage-grouse habitat whenever possible. Remove fences in sage-grouse habitat which are no longer necessary for livestock control.

Objective B-2: Enhance and restore current and potential sage-grouse habitats and the ecosystems that sustain them.

Sub-Objective B-2. Work to enhance or restore at least 175,000 acres of sage-grouse habitat by 2014.

Conservation Strategies:

B-2.1 All Land Ownerships (with permission on private land).

A. Habitat Continuity.

Increase the continuity of habitats by designing habitat projects on a landscape scale and working with multiple land management agencies, WRI, and private landowners.

B. Restoration Priority.

Restore sage-grouse habitats in the following priority: 1) restore sagebrush habitats adjacent to currently occupied sage-grouse habitat, 2) enhance or restore sagebrush within 10 miles of occupied sage-grouse habitat, and 3) enhance or restore sagebrush > 10 miles from occupied sage-grouse habitat.

B-2.2 Private land habitat (Voluntary landowner actions)

A. Landowner Assistance.

1. Assist landowners with rehabilitation on private lands following wildfires in current and historical sage-grouse habitats, utilizing the WRI/UPCD process already in place.
2. Use LWGs, NRCS, FSA, UFB, and WRI/UPCD for technical assistance, planning, implementation, and possible funding sources to accomplish objectives.

B-2.3 Public/SITLA land habitat (UDPR, UDWR, and all federal agencies)

A. Habitat restoration.

1. Include native forbs and grasses in seeding mixtures; and when and where appropriate non-native species of both.
2. Include site-adapted sagebrush seed (from local populations) or bare root stalk where available, in all seeding mixtures where residual natural seed sources are inadequate.
3. Consider targeting annual weed growth through herbicide applications such as Plateau.
4. Improve seed establishment techniques and generate new seed sources for rehabilitation of areas that are at risk of annual weed establishment.
5. Following rehabilitation, base livestock grazing use on the biological needs of the range plants.
6. Rehabilitate gullied meadows to raise the water table and restore

wet meadow characteristics.

7. Where needed, modify existing water pipelines (e.g., install floats on troughs) to enhance or restore springs, seeps, and associated moist areas.
8. Discourage development of natural water sources.
9. Restore habitats lost to: type conversion, conifer encroachment, invasive species expansion, wildfire, and development.
10. Mitigate for habitat loss from wind and energy development.

Objective B-3: Monitor the condition and trend of sage-grouse habitat.

Conservation Strategies:

B-3.1 GIS.

- A. Develop and maintain a GIS database identifying seasonal habitats and movements.
- B. Identify and quantify sagebrush habitats, the condition of those habitats, and inter-connectedness.
- C. Collaborate with other states in WAFWA Management Zones II, III, IV, and VII in developing methods for assessing sage-grouse habitats at multiple scales.

B-3.2 Habitat Improvement.

- A. Coordinate with and utilize the WRI evaluation crew to monitor and evaluate vegetative and sage-grouse response to habitat improvement projects. Factor in cost of monitoring in project proposals. Gather pre-treatment data on habitat and sage-grouse use.
- B. Utilize the big game range trend studies crew to establish vegetative trend studies to determine habitat condition in appropriate areas, and evaluate the effectiveness of habitat improvement projects.
- C. Publish and share successes and failures of habitat restoration and revegetation projects. Incorporate these techniques into existing guidelines and conditions of surface use.

B-3.3 Plan Evaluation.

- A. Conduct evaluations at appropriate intervals to determine if management objectives of this plan and LWG plans are being met. These should include:
 - 1. Evaluation of current satellite imagery to classify habitats and quantify loss/gain of sagebrush.
 - 2. Establishment of permanent transects in sagebrush habitats measuring shrub canopy coverage with line intercept, and grass/forb cover and presence with Daubenmire frames. Shrub and grass height will also be measured along these transects (Connelly et al. 2003).
 - 3. Completion of a WRI monitoring and evaluation report at least every 5 years to determine if management objectives are being met or if changes are needed.

C. GREATER SAGE-GROUSE PLANNING AND COORDINATION OBJECTIVES

Objective C-1: Conduct sage-grouse management on an ecosystem basis.

Conservation Strategies:

C-1.1 Coordinate among land management agencies and the Watershed Restoration Initiative partners to conduct landscape level planning.

C-1.2 Implement adaptive management principles.

C-1.3 Evaluate management actions over both time and space.

C-1.4 Identify how and where sage-grouse management may affect other species, i.e., Utah prairie dog, burrowing owl, sage thrasher, mule deer, pygmy rabbit, etc.

Objective C-2: Identify and secure funding for habitat enhancement, research, monitoring, and maintenance.

Conservation Strategies:

C-2.1 Use the WRI and UPCD as a funding source and an avenue to funnel funds and help prioritize projects.

C-2.2 Continually look for and pursue additional funding sources, and identify/prioritize funding needs.

Objective C-3: Enhance coordination and cooperation between federal and state agencies, local government planners, UDWR, Tribal governments, LWGs, industry, private landowners, and other interested groups.

Conservation Strategies:

C-3.1 Continue and expand cooperative interagency management activities that will conserve sagebrush habitats, and encourage the use of this Plan, LWG plans, other agency plans, peer-reviewed guidelines, and recommendations of local biologists.

C-3.2 Increase data availability and sharing among agencies; UDWR should provide land management agencies with updated habitat maps every 2 years.

C-3.3 Establish a Statewide Utah Sage-grouse Working Group including state and federal agencies and private groups that meets at least once a year to provide information, technical advice, and direction to interested parties throughout Utah.

C-3.4 UDWR to develop and present a presentation and reference information to land management agencies and land use planners outlining this Plan by January 2010.

Conduct briefings for BLM, NRCS, UDWR, USFS, SITLA, DOGM, industry, local governments and other interested parties and staff on the needs of sage-grouse on an as needed basis.

C-3.5 Encourage participation and enhancement in the local working group efforts.

Objective C-4: Increase public awareness and support for sage-grouse populations and habitat conservation.

Conservation Strategies:

C-4.1 Use LWGs to: increase the awareness/attitudes/education of sage-grouse needs; get information to the public; and develop solutions to local management area problems.

C-4.2 Develop/present a presentation to LWGs outlining this Plan by January 2010. The presentation should be designed to provide information on the status and management needs of Utah sage-grouse and outline the contents of this Plan.

C-4.3 Use NRCS, Farm Bureau, LWGs, and UPCD to increase private landowner trust and increase participation in sage-grouse conservation efforts.

C-4.4 Develop 2 brochures by 2010 for general distribution that: 1) provide sage-grouse information targeting the general public and school children, and 2) target landowners with information and ways to help conserve sage-grouse on their private lands.

A. Include information on effects of OHV use, and spring season disturbances, such as OHVs and antler gathering.

C-4.5 Update the UDWR sage-grouse web page by 2011 to include: this plan, LWG plans, and other Utah sage-grouse information.

D. GREATER SAGE-GROUSE RESEARCH OBJECTIVE

Objective D-1: Conduct and support research to improve knowledge and aid in management of sage-grouse in Utah.

Conservation Strategies:

D-1.1 Determine and publish the relationship of lek attendance to the population as a whole, effects of possibly double counting males, and reasons for unoccupied leks. Evaluate the population estimate assumptions, and define sustainable and huntable populations in Utah.

D-1.2 Determine and publish the effects of and possible control of invasive species on habitat loss and resulting population effects.

D-1.3 Determine and publish the susceptibility of small isolated and fringe populations to habitat and population factors, and the contributions of these populations to the larger meta-population.

D-1.4 Implement, evaluate, and publish the translocation methods/success outlined in Baxter et al. (2008) in appropriate sites.

D-1.5 Develop and publish methods to better evaluate the effects of habitat improvement projects on sage-grouse populations; and use those methods to monitor and evaluate the effects.

D-1.6 Develop more effective habitat restoration techniques for sage-grouse habitat to improve success of rehabilitation efforts after wildfire and to restore previously degraded sagebrush communities, meadows, and riparian areas in uplands.

D-1.7 Evaluate and publish the effects of drought and water developments on sage-grouse populations.

D-1.8 Evaluate and publish the direct and indirect effects of livestock grazing on sage-grouse populations and habitat (Beck and Mitchell 2000). Develop best management practices for livestock grazing in sage-grouse habitats.

D-1.9 Evaluate and publish the relationship between hunting and natural mortality on sage-grouse populations and trends (additive vs. compensatory).

D-1.10 Evaluate and publish the effects of wind and energy development, disturbance densities, noise, recreation, mitigation efforts, and rehabilitation and other disturbances on sage-grouse populations (e.g. increases in noxious weeds, predators, infrastructure, etc).

D-1.11 Evaluate and publish the effects of OHV use on sage-grouse populations and habitats; evaluate the efficacy of deterrents, penalties, and enforcement of laws and mandates.

D-1.12 Evaluate and publish the effects of predation, insecticides, disease, and other sources of mortality on the juvenile segment of sage-grouse populations.

D-1.13 Determine and publish sagebrush taxa use by Utah sage-grouse. Do sage-grouse use different taxa disproportionately to availability during various seasons?

D-1.14 Determine the relationship between designated sage-grouse habitat and occupied sage-grouse habitat. Evaluate habitat designations based on outcome.

GLOSSARY

Adult	A sage-grouse that is at least 15 months of age and has entered or is about to enter its second breeding season.
Brood-mixing	When one or more chicks move from their natal brood to another non-natal brood.
Brood Success	When one or more chicks in a brood survive to ≥ 50 days.
Chick	A sage-grouse up to 10 weeks of age.
Development	Any of a number of man induced activities that changes the natural landscape. Could include activities from: energy, wind, mineral, urban, suburban, exurban.
Disturbance	Any activity that disrupts common activities or behavior of sage-grouse within a habitat at either the population or local scale.
Enhance	To make an improvement to existing habitat, based on biologist stated goals and objectives, which does not result in an acreage gain.
Forb	An herbaceous plant other than grasses and sedges.
Herbaceous	Plants that die back to the ground surface each year, normally with non-woody stems.
Juvenile	A sage-grouse that is >10 weeks of age, but has not entered into its first breeding season.
Key Habitats	Areas of crucial importance to sage-grouse population survival throughout the year. These are normally identified as breeding, nesting, brood rearing and winter habitat but could also include connective parcels of habitat or other locally recognized areas of importance to sage-grouse life function and behavior.
Lek	An area where ≥ 2 strutting males attend the same location for ≥ 2 years; not necessarily 2 consecutive years.
Active leks	Any lek that has been attended by male sage-grouse during the annual strutting/breeding season.
Inactive leks	A lek where it is documented that no strutting activity has occurred during the course of a strutting season
Occupied Lek	A lek that has been active during at least one strutting season within the last 10 years.
Unoccupied lek	A lek that has not been active in > 10 years.
Undetermined lek	Any leks for which lek activity has not been documented for > 10 years,

but survey information is inadequate to designate the lek as unoccupied, or strutting males have only been observed on one occasion. An example would be grouse droppings or other sign during or subsequent to normal lek display periods.

Population	A group of sage-grouse utilizing similar habitats in a geographic area that share genetic traits, but are spatially separated from other populations and gene flow is lacking.
Sub-population	A subset of a population where sage-grouse genetically mix, but may be spatially separated in seasonal or year-long habitat use.
Core Population	Populations that comprise 25% of the total Utah spring population based on lek counts, in 2009 those populations are: Northwest Utah (West Box County), Northeast Utah (Rich County), Dinosaur (Uintah County, Blue and Diamond Mountain), and South-Central (Wayne, Piute, Garfield Counties, Parker Mountain).
Non-migratory Population	Sage-grouse that do not move >10 km between seasonal ranges.
Migratory Population	Sage-grouse that move >10 km between seasonal ranges.
Management Area	Eleven areas of Utah delineated by UDWR, and the 11 LWGs based on sage-grouse geographic habitats, populations, and/or political administrative considerations.
Management Zone	Seven floristic regions of rangewide Sage-grouse habitat delineated by WAFWA; Utah includes Zones II, III, IV, and VII.
Nest success	A nest is deemed successful when one or more eggs hatch a viable offspring.
Restore	To make an improvement to habitat, based on biologist stated goals and objectives, which results in habitat acreage gain.
Sensitive Species	UDWR Administrative Rule R657-48 defines as wildlife species that are Federally listed under the Endangered Species Act (ESA), candidates for Federal ESA listing, or for which a conservation agreement is in place automatically qualify for the <i>Utah Sensitive Species List</i> . The additional species on the <i>Utah Sensitive Species List</i> , described as “wildlife species of concern,” are those species for which there is credible scientific evidence to substantiate a threat to their continued population viability.
Tier II Species	The Utah Comprehensive Wildlife Conservation Strategy (CWCS) sage-grouse are classified as “state species of concern” and are among the terrestrial species identified as being in the second tier (i.e. Tier II) of three priority categories of species. Tier I includes species listed under the Federal ESA, and species for which a Conservation Agreement has been completed and implemented. Tier II species include those listed on the

Utah Species of Concern List for which sole management authority remains with the state. Tier III includes species that are of conservation concern because they are linked to an at-risk habitat, have suffered marked population declines, or there is little information available regarding the ecology or status of the species. The tiered ranking system provides a perspective for wildlife managers to prioritize conservation activities.

Yearling

A sage-grouse that has entered its first breeding season but has not completed its second summer molt, normally between 10-17 months of age.

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APPENDIX 1. Utah Greater Sage-grouse Strategic Management Plan Committee Participants

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APPENDIX 2. SAGE-GROUSE LOCAL WORKING GROUPS AND MANAGEMENT AREAS

An important part of solving the habitat management problems that face sage-grouse is to work closely together so that all landowners and land managers are aware of the needs of local populations and how to meet them. Although many of the potential strategies to better manage local sage-grouse populations are listed above in the “Statewide Management Objectives and Conservation Strategies” section, the Local Working Group (LWG) plans offer more site specific management needs, key local management issues, conservation strategies, and population goals.

Background

The Utah Strategic Management Plan for Sage-grouse (2002) established 13 Sage-grouse Management Areas delineated by combining populations that show similar population trends, management issues and land ownership (Figure 11). USU Extension was tasked with facilitating the development of LWGs. The Utah Community Based Conservation Program (CBCP) is the avenue chosen to accomplish this task. As a result of an analysis of historic and current sage-grouse distribution, existing lek count data, brood survey data, harvest data, and local expert opinion the LWGs developed 11 management areas (Figure 12). These management areas are dynamic and are updated and revised as new information becomes available. All 11 LWG areas have completed local conservation plans and threat tables (Appendices 2.A - 2.K).

Organization of LWGs

LWGs will operate under the goals and objectives of this State Plan. Meetings will be organized by a leadership team chosen by the LWG and a USU extension representative. Meetings should include at least one representative from an agricultural group, one from a federal or state land management agency, one from the Utah Division of Wildlife Resources, and one from a wildlife conservation group. A neutral and trained facilitator will lead all meetings. Volunteer LWG subcommittees could be formed to accomplish specific tasks. The entire local working group will review all products of these subcommittees. LWG will meet at least twice annually to review progress, address new issues, and modify actions as necessary. In addition to the annual meetings each LWG will hold one annual field tour highlighting local issues and management. LWG should identify/develop one habitat project annually, and participate in lek searches. All LWGs should be balanced in composition so that all interests are given fair representation.

Membership

Membership in LWGs is open to anyone that has interest in sage-grouse management.

Goals of LWGs

- To assist in sage-grouse management efforts;
- To achieve local population and community goals and objectives;
- To complete actions that makes listing of greater sage-grouse unwarranted;
- To increase awareness, appreciation, involvement, and ownership of sage-grouse conservation and management.

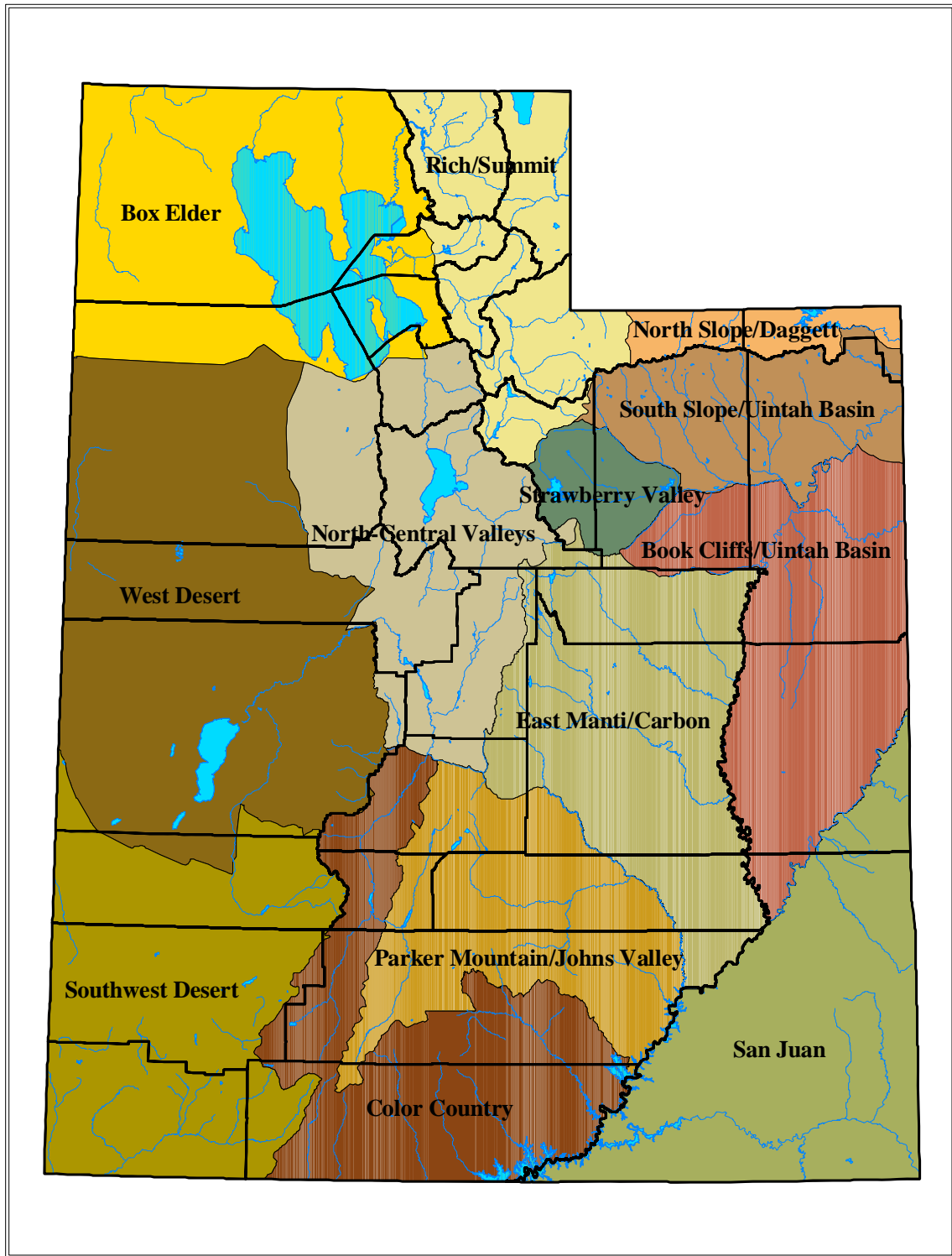


Figure 11. Utah sage-grouse management areas, as identified in the 2002 plan.

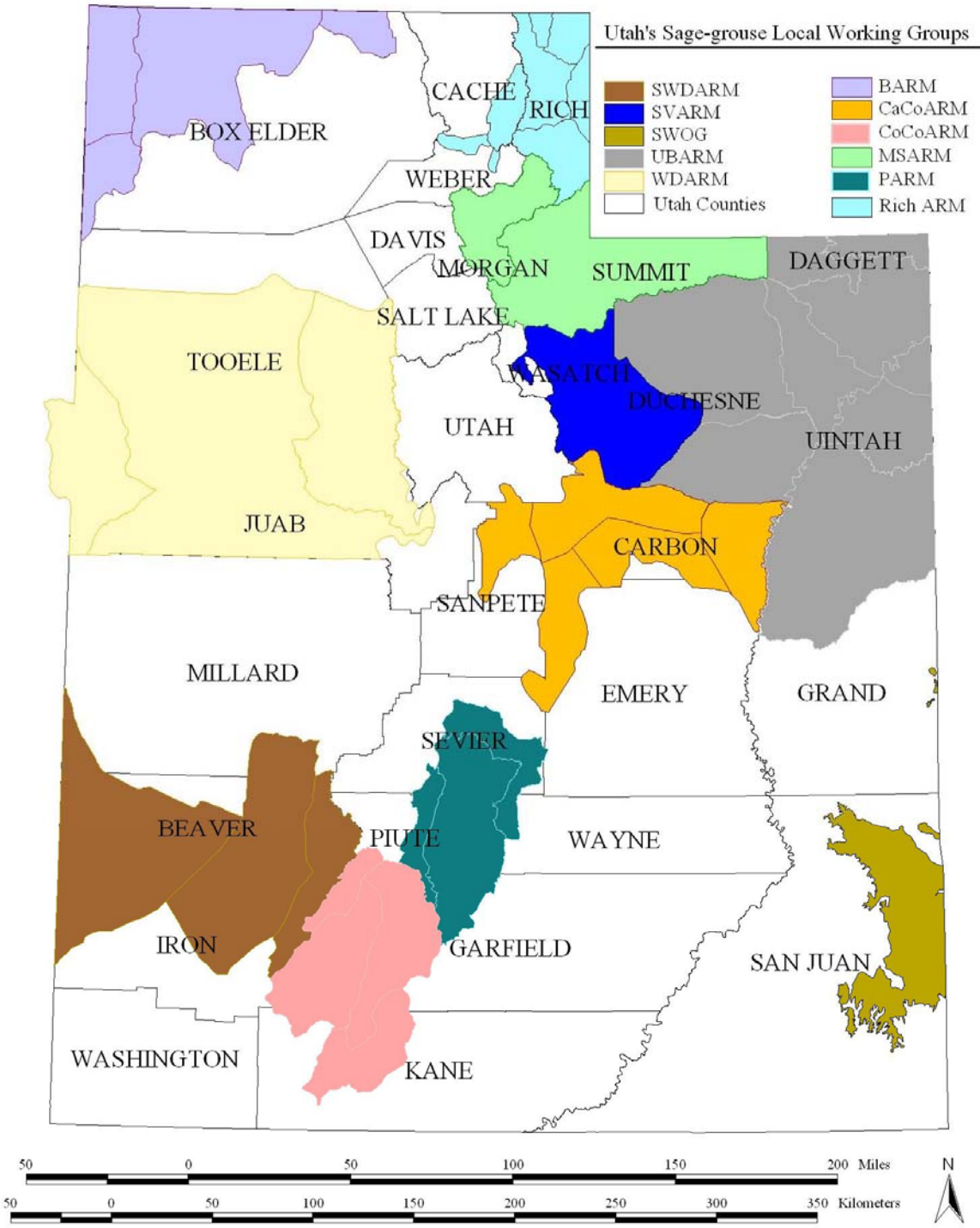


Figure 12. Current (2009) Utah Sage-grouse Local Working Group Boundaries.

APPENDIX 2.A Management Area 1: West Box Elder Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Box Elder County Adaptive Resources Management Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

BARM							
Threat	Reduced Population Size	Population Distribution	Reduced Breeding Habitat Quality	Reduced Late Summer/Fall Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Altered Water Distribution	-	VH	VH	H	L	L	H
Drought and Weather	M	M	M	H	L	L	L
Existing and New Fences	-	M	M	M	-	M	-
Home and Cabin Development	-	M	M	M	M	M	M
Power lines and Other Tall Structures	-	M	M	M	-	M	-
Renewable and Non-renewable Energy Development	-	M	M	M	-	L	L
Roads	-	M	M	M	M	M	M
Vegetation Management	M	M	M	M	M	M	M
Hunting	M	M					
Fire	-	-	VH	VH	VH	H	M
Livestock Grazing	-	-	H	H	L	L	L
Recreation	VH	VH	H	M	VH	M	M
Invasive/Noxious Weeds	-	-	VH	VH	H	H	M
Parasites and Disease	M	M	-	-	-	-	-
Predation	VH	M	-	-	-	-	-
Pinyon-Juniper Encroachment	-	-	H	H	H	H	-
Conversion to Agriculture	-	-	L	L	-	-	-

A copy of the BARM Conservation Plan, which includes local conservation strategies and actions, is available at: <http://utahcbcp.org/files/uploads/BARM/BARMfnl-10-06-web.pdf>

APPENDIX 2.B Management Area 2: Rich County Coordinated Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Rich County Coordinated Resource Management Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

Threat	Reduced Population Size	Population Distribution	Reduced Breeding Habitat Quality	Reduced Summer/Late Brood-rearing Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Home & Cabin Development	M	M	M	M	L	M	M
Powerlines, Fences, & Other Tall Structures	H	L	M	L	L	M	M
Renewable & Non-renewable Energy Development	M	M	H	H	M	L	L
Roads	H	L	M	L	L	M	M
Drought & Weather	H	H	M	H	L	H	H
Hunting Pressure	L	M	-	-	-	-	H
Incompatible Fire Management Practices	H	H	H	H	H	H	H
Incompatible Livestock Grazing	H	H	H	H	M	H	H
Incompatible OHV Recreation	H	M	M	M	M	H	H
Invasive/Noxious Weeds	M	H	M	L	L	M	M
Parasites & Disease	M	M	-	-	-	-	H
Predation	M	M	L	-	-	-	M

A copy of the Rich County Conservation Plan, which includes local conservation strategies and actions, is available at: http://utahcbcp.org/files/uploads/rich/RICOSAGRPlan_Draft1.pdf

APPENDIX 2.C Management Area 3: Morgan-Summit Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Morgan-Summit Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

Threat	Aspects of Sage-grouse population in the MSARM Resource Area							
	Reduced Population Size	Population Distribution	Reduced Nesting Habitat Quality	Reduced Brood-rearing Habitat Quality	Reduced Summer/Fall Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Drought and Weather	M	M	H	H	H	L	M	L
Existing and New Fences	L	L	L	L	L	L	L	L
Home and Cabin Development	H	H	M	M	M	M	H	VH
Power lines and Other Tall Structures	M	H	H	H	H	M	H	H
Renewable and Non-renewable Energy Development	M	M	M	M	M	M	M	M
Roads	M	H	H	H	H	M	H	H
Vegetation Management	M	H	M	M	M	H	M	L
Hunting	L	L	-	-	-	-	-	-
Fire	L	L	L	L	L	L	L	L
Livestock Grazing	L	L	L	L	L	L	L	L
OHV Recreation	M	M	H	H	H	VH	M	M
Invasive/Noxious Weeds	-	-	L	L	L	L	L	-
Parasites and Disease	M	M	-	-	-	-	-	-
Predation	VH	VH	H	H	M	M	M	M
Pinyon-Juniper Encroachment	M	M	M	L	L	M	M	M

A copy of the Morgan-Summit Conservation Plan, which includes local conservation strategies and actions, is available at: <http://utahcbcp.org/files/uploads/morgan/msarmsagrplan.pdf>

APPENDIX 2.D Management Area 4: Uintah Basin Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Uintah Basin Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

Threat	Aspects of Sage-grouse population in the UBARM Resource Area							
	Reduced Population Size	Population Distribution	Reduced Lek Habitat Quality	Reduced Nesting/Early Brood-rearing Habitat Quality	Reduced Summer/Late Brood-rearing Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Home and Cabin Development	L	M	L	L	L	L	L	L
Power lines, Fences, & Other Tall Structures	-	M	H	M	M	M	M	M
Oil and Gas Development	M	M	M	M	M	M	M	M
Roads	L	M	M	M	L	M	H	H
Drought and Weather	L	-	L	H	H	H	-	-
Hunting Pressure	L	L	-	-	-	-	-	-
Incompatible Fire Management Practices	-	H	H	H	H	H	H	M
Incompatible Livestock Grazing	-	L	L	H	H	L	-	-
OHV Recreation	-	M	H	M	M	L	L	L
Invasive/Noxious Weeds	-	M	M	VH	VH	H	M	L
Parasites and Disease	H	H	-	-	-	-	-	-
Predation	VH	H	-	-	-	-	-	-
Vegetation Management	-	-	H	H	H	H	H	M
Pinyon-Juniper Encroachment	-	M	H	M	M	H	H	H

A copy of the Uintah Basin Conservation Plan, which includes local conservation strategies and actions, is available at: <http://utahcbp.org/files/uploads/uintah/ubarmsagrplan.pdf>

APPENDIX 2.E Management Area 5: Strawberry Valley Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Strawberry Valley Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

Threat	Aspects of Sage-grouse population in the SVARM Resource Area							
	Reduced Population Size	Population Distribution	Reduced Nesting Habitat Quality	Reduced Brood-rearing Habitat Quality	Reduced Summer/Fall Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Drought and Weather	M	M	H	H	H	L	M	L
Existing and New Fences	L	L	L	L	L	L	L	L
Home and Cabin Development	H	H	M	M	M	M	H	VH
Power lines & Other Tall Structures	M	H	H	H	H	M	H	H
Renewable & Non-renewable Energy Development	M	M	M	M	M	M	M	M
Roads	M	H	H	H	H	M	H	H
Historic Vegetation Treatments	M	H	M	M	M	H	M	L
Hunting	L	L	-	-	-	-	-	-
Fire	L	L	L	L	L	L	L	L
Livestock Grazing	L	L	L	L	L	L	L	L
OHV Recreation	M	M	H	H	H	VH	M	M
Invasive/Noxious Weeds	-	-	L	M	M	H	L	-
Parasites and Disease	M	M	-	-	-	-	-	-
Predation	VH	VH	H	H	M	M	M	M
Pinyon-Juniper Encroachment	M	M	M	L	L	M	M	M

A copy of the Strawberry Valley Conservation Plan, which includes local conservation strategies and actions, is available at:

<http://utahcbcp.org/files/uploads/SVARM/SVARMfnl-10-06-web.pdf>

APPENDIX 2.F Management Area 6: West Desert Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the West Desert Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

WDARM							
Threat	Reduced Population Size	Reduced Population Distribution	Reduced Breeding Habitat Quality	Reduced Late Summer/Fall Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Altered Water Distribution	-	VH	VH	H	L	L	H
Drought and Weather	M	H	M	M	L	L	-
Existing and New Fences	-	M	M	M	-	M	-
Home and Cabin Development	-	M	M	M	M	M	M
Power lines and Other Tall Structures	-	M	M	M	-	M	-
Renewable and Non-renewable Energy Development	-	M	M	M	-	L	L
Roads	-	M	M	M	M	M	M
Incompatible Vegetation Management	H	M	H	L	M	M	M
Poaching	H	L	-	-	-	-	-
Fire	-	-	VH	VH	VH	H	M
Incompatible Livestock Grazing	-	-	H	H	L	L	L
Recreation	VH	VH	H	M	VH	M	M
Invasive/Noxious Weeds	-	-	VH	VH	H	H	M
Parasites and Disease	M	M	-	-	-	-	-
Predation	VH	M	-	-	-	-	-
Pinyon-Juniper Encroachment	-	-	H	H	H	H	-
Conversion to Agriculture	-	-	L	L	-	-	-

A copy of the West Desert Conservation Plan, which includes local conservation strategies and actions, is available at:

<http://utahcbcp.org/files/uploads/westdesert/WDARMSAGRPlanFinal.pdf>

APPENDIX 2.G Management Area 7: Castle Country Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Castle Country Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

Threat	CaCoARM Resource Area							
	Reduced Population Size	Population Distribution	Reduced Lek Habitat Quality	Reduced Nesting/Early Brood-rearing Habitat Quality	Reduced Summer/Late Brood-rearing Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Hindrance of ability to maintain local management	M	M	M	M	M	M	M	M
Power lines, Fences, & Other Tall Structures	M	M	H	M	M	M	M	M
Oil and Gas Development	M	M	M	M	M	M	M	M
Roads	L	M	M	M	L	M	H	H
Prolonged drought and or extreme Weather shifts	L	-	L	H	H	H	-	-
Lack of proper range management	L	L	M	M	M	M	M	M
Incompatible Fire Management Practices	-	H	H	H	H	H	H	M
Incompatible Livestock Grazing (domestic and wild ungulate)	-	L	L	H	H	L	-	-
OHV Recreation	-	M	H	M	M	L	L	L
Invasive/Noxious Weeds	-	M	M	VH	VH	H	M	L
Parasites and Disease	H	H	-	-	-	-	-	-
Predation	VH	H	-	-	-	-	-	-
Vegetation Management	-	-	H	H	H	H	H	M
Pinyon-Juniper and shrubby species	-	M	H	M	M	H	H	H

A copy of the Castle Country Conservation Plan, which includes local conservation strategies and actions, is available at: http://utahcbcp.org/files/uploads/carbon/CaCoARM_final-01-07.pdf

APPENDIX 2.H Management Area 8: San Juan Adaptive Resource Management Local Working Group (Gunnison sage-grouse)

A copy of the San Juan Conservation Plan, which includes local conservation strategies and actions, is available at: <http://utahcbcp.org/files/uploads/2000SANJuanLWGPLAN.pdf>

A copy of the Rangewide Conservation Plan for Gunnison sage-grouse is available at: <http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/Birds/GunnisonConsPlan.htm>

APPENDIX 2.I Management Area 9: Parker Mountain Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Parker Mountain Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Rankings are as follows: L=low; M=medium; H=high; and VH=very high. Ranks are defined according to TNC (2005).

Threat	Aspects of Sage-grouse population in the PARM Resource Area						
	Reduced Population Size	Population Distribution	Reduced Lek Habitat Quality	Reduced Brood-rearing Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Powerlines, Fences, & Other Tall Structures	M	M	M	L	M	H	H
Natural resource exploration and development	H	H	M	H	H	VH	VH
Grazing practices the are detrimental to the habitat (domestic/wild)	H	H	L	H	H	M	M
Drought & Weather	H	H	L	H	M	M	M
Lack of proper range management	L	M	L	H	M	M	M
Hunting Pressure	L	L	L	L	L	L	L
Altered Fire Regimes	L	L	M	M	L	H	M
Livestock Grazing	L	L	L	H	L	L	L
Incompatible OHV Recreation	L	M	L	L	L	M	M
Invasive/Noxious Weeds	M	M	M	VH	H	M	L
Parasites & Disease	VH	VH	L	L	L	L	H
Extraordinary Predation	VH	H	L	L	L	L	M
Vegetation Management	H	M	H	H	H	H	M
Pinyon-Juniper Encroachment	M	M	M	M	M	M	M
Inability to maintain local control and input	H	H	H	H	H	H	H

A copy of the Parker Mountain Conservation Plan, which includes local conservation strategies and actions, is available at: <http://utahcbcp.org/files/uploads/parm/PARMfnl-10-06-web.pdf>

APPENDIX 2.J Management Area 10: Color Country Adaptive Resource Management Local Working Group

The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Color Country Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Ranks are defined according to TNC (2005).

Threat	Reduced Population Size	Population Distribution	Reduced Lek Habitat Quality	Reduced Nesting/Early Brood-rearing Habitat Quality	Reduced Summer/Late Brood-rearing Habitat Quality	Reduced Winter Habitat Quality	Reduced Connectivity of Seasonal Habitat Types	Reduced Connectivity of Populations & Sub-populations
Enhanced native and domestic predators	Medium	Low	Low	High	High	Medium	High	High
Recreational use	Medium	Medium	Medium	High	High	High	Medium	Medium
Invasive/alien vegetation species	High	High	Medium	Very High	High	Medium	High	High
Concentrated wildlife and/or livestock use	High	Medium	Medium	High	High	Medium	Medium	Medium
Fire and Vegetation Management	High	Medium	Medium	High	High	High	High	High
Development of roads or utilities	High	Medium	Low	Very High	High	High	High	High
Lack of communication among public parties	Medium	Medium	Low	High	Medium	Medium	Medium	Medium
Diseases and parasites	Medium	Medium	Low	Medium	Medium	Medium	High	High
Alternative Land Uses (mining, wind power, water development)	High	High	Medium	High	High	High	High	High
Dramatic Weather Events	High	Medium	Medium	High	High	High	High	High

A copy of the Color Country Conservation Plan, which includes local conservation strategies and actions, is available at: <http://utahcbcp.org/files/uploads/color/CoCARM-finalplan.pdf>

APPENDIX 2.K Management Area 11: Southwest Desert Adaptive Resource Management Local Working Group

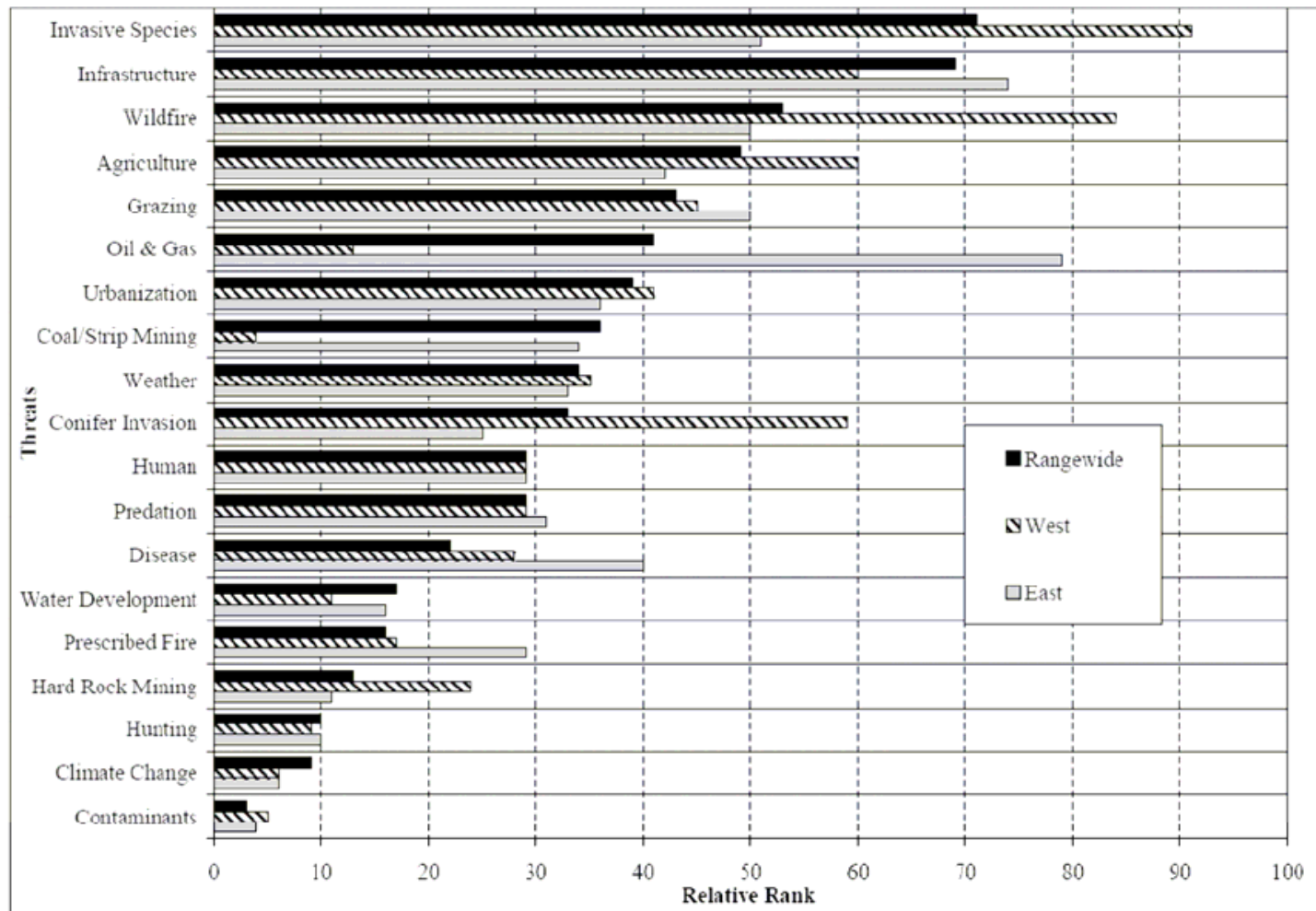
The following table is a ranking of the relative importance/contribution of threats to sage-grouse populations within the Southwest Desert Sage-grouse Local Working Group area. Threats are described in the “Threat Analysis” section of the Local Plan. Ranks are defined according to TNC (2005).

Threat	Aspects of Sage-grouse population in the SWARM Resource Area							
	Lack of key habitat type connectivity	Poor Condition of Surrounding Community	Degradation of Winter Habitat Quality	Loss of Breeding Quality (Leks and nesting) Habitat	Loss of Brood-rearing habitat quality	Loss of Riparian Area Quality	Reduction of Population Size	Reduction of Population Distribution
Enhanced native and domestic predators	Medium	Low	Low	High	High	Medium	High	High
Recreation use	Medium	Medium	Medium	High	High	High	Medium	Medium
Invasive/ alien vegetation species	High	High	High	Very High	High	Medium	High	High
Concentrated wildlife and/or livestock use	High	Medium	Medium	High	High	Medium	Medium	Medium
Fire and Vegetation Management	High	Medium	Medium	High	High	High	High	High
Development of roads or utilities	High	Medium	Low	Very High	High	Medium	Medium	High
Lack of communication among public parties	Medium	Medium	Low	High	Medium	Medium	Medium	Medium
Diseases and parasites	Medium	Medium	Low	High	Medium	Medium	High	High
Alternative Land Uses (mining, wind power, water development)	High	High	Medium	High	High	High	High	High
Dramatic Weather	High	Medium	Medium	Very High	High	High	High	High

A copy of the Southwest Desert Conservation Plan, which includes local conservation strategies and actions, is available at:
<http://utahcbcp.org/files/uploads/SWARM/SWARMfnl-10-06-web.pdf>

APPENDIX 3. Greater sage-grouse relative threats ranking.

Range wide threats to sage-grouse and their relative rank developed by an expert panel convened by the USFWS. The rationale for these relative ranks can be found in the 2005 listing document (USFWS 2005).



APPENDIX 4. UDWR STANDARDIZED SURVEY AND MONITORING PROTOCOL

Technique 1. New Lek Search/Survey

Application: Determination of geographic distribution; and verification of population size using known lek counts.

Methodology:

- a) Searches may be conducted from early March through the first week in May. Use the Sage-grouse Lek Search and Status Data Form.
- b) Systematic coverage of known sage-grouse habitat, beginning before sunrise, on foot, horseback or vehicle stopping at ½ to 1 mile intervals to listen and look for strutting grouse. Noises associated with strutting can be heard over 1 mile when listening conditions (e.g. wind, light, etc.) are ideal. Strutting males are also visible for a considerable distance. In less accessible areas, searches can be made from a mountain bike, trail motorcycle, 4-wheel all terrain vehicle, horseback, or on foot. On a calm morning, breeding sage grouse may be heard at a distance of 1.5 km (about 1 mi). All openings or areas of less dense sagebrush should be searched for breeding birds with binoculars or a spotting scope. Areas searched should be documented on a map and later transferred to a GIS shapefile. A copy should stay in the region and one sent to SLO.
- c) **Helicopters or fixed-wing airplanes** can be used for aerial surveys. Calm, clear mornings are a prerequisite to aerial searches. Cocks can be observed from the air at distances >1 km (0.6 mi) in early morning sun, but cloud cover greatly reduces observability. The early morning sun tends to illuminate the white breast of strutting males making them visible for up to 1 mile under ideal light conditions. Under conditions of marginal light, transect width should be narrowed.

Suspected breeding habitat should be flown on north - south transects with lines about **1 km (0.6 mi)** apart. Transects should be flown at about **50-150 meters (150-500 ft)** above ground level. Flight speed will vary based on conditions but should generally be between **30-60 mph**. Speed of the aircraft should be slow enough to allow for recognition of sage-grouse leks. All flight paths should be recorded with a GPS in datum **NAD83**. All newly identified leks should have waypoints recorded, as well as any sage-grouse observed. At least **two observers** should be used in addition to the pilot so that one observer is always looking away from the sun regardless of the direction the aircraft is flying. Surveys should begin at the closest edge of the survey area and work away to minimize the possibility of the plane flying over leks prior to them being observed. If feasible the area to be in the sunlight soonest should be surveyed first. Lek searches from an aircraft should be conducted from **½ hour before to 2 hour after sunrise**. In some instances a transect path other than straight north and south may be more appropriate (i.e. following contour of a mountain range), this is appropriate as long as the flight path is recorded and there is justification for doing so.

NEW LEKS – If a possible new lek is located an accurate UTM coordinate should be taken in NAD83. The lek should not be disturbed to get the coordinate and the observer may have

to return later in the day to get an accurate coordinate. If a possible new lek is located a **Lek Location Data Form** (attached) should be filled out completely. The lek should be given a name that would correspond to a local geographic feature (often found on a USGS 1:24,000 map). If the lek is located on private property the lek should not be named after the landowner to reduce conflicts (landownership changes and landowners may own several different parcels). The regional biologists are responsible for determining if the new location is an actual lek.

Technique 2. Lek Counts

Application: Determination of population trend; determination of winter population estimate; and determination of active/inactive known leks.

Methodology:

1. All data should be recorded on the standard Sage-grouse Lek Counting Form for Utah.
 - a) Season of Year - Counts should be conducted at about weekly intervals between March 15 and May 15. During the first part of March males move to the strutting grounds. By mid-Mar females occur in strutting areas and mating probably commences, reaching a peak in the early part of April. Most mating is completed by mid-April or soon after. At this time adult males become less dominant and allow juvenile males to appear and strut on the strutting grounds. When this occurs, maximum cock counts are obtainable. It may be from 1 to 3 weeks after the peak of mating. However, if strutting grounds are small the number of males observed may not vary appreciably throughout the strutting period.

The above sequence of strutting would probably occur earlier in the southern portion of the state than in the north. Also, altitudinal variation seems to influence strutting in that birds at higher elevations tend to strut later than those at lower levels. Annual variation should be minimal since the initiation of strutting is primarily a response to day length rather than weather.

It is necessary to begin counts early in March or early April to assure obtaining the maximum possible count, which is necessary if trends are to be accurate. Experience will show when counts should be made.

- b) Number of Counts - A minimum of 3 counts at approximate weekly intervals must be made on all strutting grounds. Additional counts may be made as deemed necessary to obtain a maximum count. At least one count every 7-10 days.
 - c) Time of Day – Counts should be conducted as close to sunrise as possible. Counts should be done from 1/2 hour before sunrise until 1 ½ hour after sunrise. It is important to arrive at the first strutting ground before daylight. If strutting grounds are located in close proximity to each other, 2-3 grounds may be counted during a given morning.
 - d) Counting Procedures - Counts should be made from inside a vehicle, at close range, if possible. Strutting grouse show very little fear of vehicles unless they have been repeatedly disturbed or if they detect movement within the vehicle. If access is not available via vehicle then a cautious approach on foot or horseback can also lead to successful counts. Always use binoculars, and if needed, a spotting scope to assure

counting accuracy. Count the number of cocks present at least 3 different times at about 5 minute intervals and record the maximum count.

- e) Count Only Males. Record only the total number of males observed. Note, if hens compose more than 25% of the total grouse present, the count is probably being made too near the peak of breeding to yield maximum counts.
- f) Weather Data - A clear, windless day is ideal for counts. Adverse weather such as rain, snow or wind generally discourages strutting and counts on such days are less reliable. Temperature does not seem to impact lek attendance. Record weather conditions.
- g) ADDITIONAL DATA – Additional comments concerning counts may also be recorded. Observations of predators, presence and number of hens observed, peripheral male display activity (obvious association with lek yet some distance from the lek principle area), distance to man made things such as fences, well pads, roads, camps, pole lines, etc., should be considered. If the lek location has moved from previous years locations this should be noted and a new UTM coordinate recorded in NAD83. This new coordinate should be taken on the lek when no sage-grouse are attending (afternoon).

Technique 3. Random/Oppportunistic Brood Count

Application: Determination of reproductive success (juveniles/adults); and determination of summer geographic distribution.

Methodology:

- a) All counts should be made between June 15 and September 15 (as long as juveniles can be distinguished from adults).
- b) Counts may be made via waterhole counts, horseback or walking flushing counts, or use of well trained bird dogs (after all young-of-the-year chicks are able to fly), roadside counts, whichever is best suited for local conditions. A combination of all 3 methods will probably be required to obtain an adequate sample. Roadside counts should be made during early morning and late evening. Horseback and walking counts may include midday hours.
- c) Record all sage grouse observed under the appropriate column of the data sheet. Use a separate line for each observation. Do not record broods as being distinct unless a complete and accurate count is certain. Observations which are not distinctly complete broods must be placed under "mixed young and adults." Flush all broods to be certain of an accurate count. Broods accompanied by more than one adult female cannot be considered distinct broods.
- d) It is essential that an accurate account of miles and hours spent performing this work be recorded. Record only those hours spent (to the nearest 1/4 hour) in search of broods. Maintain separate records for each county or area in which brood counts are made.
- e) Space is provided for recording each observation and for summarizing daily total birds counted and effort expended. Complete the summary table and submit forms to the regional wildlife manager with 7 days following the end of the count period (Aug 27).

Technique 4. Wing Barrels

Application: Determination of sex and age composition of the harvest; and determination of

harvest trends both over units and geographic trends within units.

Methodology:

- a) Establish wing barrels and associated signs at least 1 day before the beginning of the hunt. The location of each wing barrel is clearly defined. Wing barrels are annually placed at the precise location.
- b) Collect wings from each barrel after the opening weekend and again after the end of the hunt. Record the number of wings collected from each barrel location.
- c) Remove wing barrels and signs, and place in storage.
- d) Determine sex (male, female) and age (juvenile, yearling, adult) composition of the harvest (Eng 1955, Pyrah 1963, Cruden 1963, Beck et al. 1975, Autenrieth et al. 1982). Use of a dichotomous key (“A key for age/sex identification from wings of hunter-harvested sage grouse,” Clait E. Braun) will aide in determination of age and sex. Include wings collected during field bag checks and from checking stations.
- e) Permanent checking stations are located at Snowville in Box Elder County and on Parker Mountain in Wayne County.
- f) Submit wing data to the regional wildlife manager within 30 days following the end of the hunt.

Technique 5. Random/Oppportunistic Hunter Field Bag Check

Application: Determination of hunter success; collection of wings; interaction with hunters; and enforcement of state laws.

Methodology:

- a) Check hunters and bags throughout the season.
- b) Record number of hunters, number of hours/hunter, and number of birds harvested.
- c) Collect 1 wing from each harvested bird with hunter permission.
- d) Submit bag check forms to the regional wildlife manager within 7 days following the end of the hunt.

Technique 6. Checking Stations

Application: Determination of hunter success; collection of wings; interaction with hunters; and enforcement of state laws.

Methodology:

- a) Check stations are annually established at the precise same locations.
- b) Check stations are operated on opening weekend (Saturday and Sunday) from 9:00 A.M. to 7:00 P.M.
- c) Record the number of hunters, the number of hours/hunter, and the number of birds harvested.
- d) Collect 1 wing from each harvested bird with hunter permission.
- e) Submit check station data to the regional wildlife manager within 7 days following the end of the hunt.

SAGE-GROUSE LEK COUNTING FORM

Lek Name: _____ County: _____ Year: _____

UTM (NAD 83): _____ Observer: _____

Status (Occupied, Unoccupied, Active, Inactive): _____

Site Description and Habitat Type: _____

DATE	# OF MALES	TEMP	WIND VELOCITY	% CLOUD COVER	COMMENTS

INSTRUCTIONS

1. A minimum of three counts should be made at approximate weekly intervals between March 20 and May 7. Maximum seasonal count should be observed after the peak of breeding.
2. Make all counts from 1/2 hour before to 1 1/2 hours after sunrise.
3. Record the maximum number of males observed on the lek each date visited in space provided above. Each lek should be counted 3 to 5 times each morning to determine the maximum number of males.
4. Use a separate form for each lek.
5. Record weather conditions as specified below.
6. Record other observations or comments such as: disturbances to the birds (eagles, coyotes), the presence of hens and if breeding is occurring, snow conditions, and if you determined the count was good.
7. Completed forms should be returned to the Regional Office no later than May 15; and to SLO by June 1.

Beaufort Wind Scale:

Calm	smoke rises vertically, leaves motionless
1-3 mph	smoke drifts, leaves move slightly
4-7 mph	wind felt on face
8-12 mph	leaves move constantly
13-18 mph	dust rises, small branches move

<OVER>

SAGE-GROUSE LEK LOCATION FORM

LEK NAME: _____ YEAR LOCATED: _____

COUNTY: _____ USGS 7.5 QUAD: _____

TOWNSHIP: _____ RANGE: _____ SEC: _____ ¼ _____ ¼ _____

UTMs: _____ E _____ N (GPS SHOULD BE SET TO NAD83)

UTM collected by (check one): GPS _____ MAP _____

Dominate Vegetation Type: _____

Secondary Vegetation Type: _____

Land Ownership: _____ Elevation: _____

General Comments:

Driving Directions: (Give driving directions from a major road or prominent location)

Datasheet Instructions

Leak Name:	Unique name given to lek. Adjacent major landmark or map feature often used to identify lek.
Year Located:	Year lek was initially located and counted.
County:	County where lek is located.
USGS 7.5-minute Quad:	Name of quad map where lek is located.
Township	Township where lek is located
Range:	Range where lek is located.
Sec.	Section number where lek is located.
¼:	Sub-quarter section where lek is located. Use NW, NE, SW, SE.
¼:	Quarter section where lek is located. Use NW, NE, SW, SE.
UTM Easting	UTM easting of lek. Should be six (6) numbers long.
UTM Northing	UTM northing of lek. Should be seven (7) numbers long and begin with 4.
	UTM data should be collected in North American Datum 1983 (NAD83)
Dominant Vegetation:	Indicate the dominant vegetation around lek.
Secondary Vegetation:	Indicate secondary vegetation around lek (if needed).
Land Ownership:	Indicate the proper ownership of land where lek is located (e.g. private, USFS, BLM, SITLA, Tribal).
Elevation	Elevation of lek in FEET.
Comments:	Any pertinent comments helpful in describing lek location not covered above.
Driving Directions:	Concise driving directions to lek. Start directions at an easily located landmark.

SAGE-GROUSE LEK SEARCH AND STATUS FORM

Each flush site, lek search, and all lek counts should be reported (even where no birds are seen).

- Arrive at search site at least **15** minutes before dawn.
- Mark a topo map in pencil with the present lek position or search area.
- Return maps and data sheets to UDWR Regional Offices or Search coordinator

Lek Name (nearest lek): _____

Observer Name(s) _____

Date: _____ Time Start: _____ Time End: _____ Total Minutes Observed: _____

Current location via UTM (correct the location on maps if needed):

_____ UTM (E) or Longitude _____ UTM (N) or Latitude _____

UTM Zone (circle one): **11 12 13**

DATUM of UTM or LatLong coordinates (circle one): NAD27 **NAD83** WGS84

T _____ / R _____ / S _____ / _____ 1/4 / _____ 1/4-1/4
Township/ Range / Section / 1/4 section / 1/4-1/4 section

Land Ownership (circle one): Public/Private/unknown County: _____

Survey Type (circle one): **Search, Status, or Count** (if strutting birds are discovered)

Survey Method (circle one): **Vehicle or Foot or horseback**

Sky (circle one): **Clear, Partly Cloudy, Overcast, Raining, Snowing**

Wind Speed: _____ (see Beaufort scale)

Air Temp (circle one): _____ **F C**

Disturbance: (circle one) **Low, Moderate, High**

Count Quality: (circle one) **Low, Mod, High**

Beaufort Wind Speed Scale:
0 (< 1 mph, smoke rises vertically)
1 (1-3 mph, wind direction shown by smoke drift)
2 (4-7 mph, wind felt on face, leaves rustle)
3 (8-12 mph, leaves and twigs in constant motion)
4 (> 13 mph – DO NOT RUN A LISTENING ROUTE)

Lek Status (circle one): **Active / Inactive / Unknown / Probably Satellite**

New Lek (circle one): **Yes No**

Dog Used (searches only)? _____

Number of Birds: _____ / _____ / _____
(Total) (Males) (Females) (Unclassified)

<OVER>

Cheat grass present? No _____ Yes _____ Not determined _____
If yes: Scarce/spotty _____ Moderate _____ Abundant _____

Other weeds? _____

Grouse droppings present? No _____ Yes _____ Not determined _____

UTM locations of groups of piles:

E _____ N _____
E _____ N _____
E _____ N _____

Presence of:

Wetlands, wet meadows, water developments: No _____ Yes _____

Type & distance to lek: _____

Utility poles/lines No _____ Yes _____ Est. distance to lek: _____

Fences and fence posts No _____ Yes _____ Est. distance to lek: _____

Trees (e.g., junipers, riparian) No _____ Yes _____ Est. distance to lek: _____

Trails and/or roads No _____ Yes _____ Est. distance to lek: _____

Size (circle one): Trail / two-track / ranch road / improved road / paved road

Estimated traffic: Scarce / light / moderate / heavy

Recent land disturbances? (e.g. burns, sod busting, oil and gas development, new structures, roads, other alterations?) _____

Habitat Description/Condition:

A. Land Cover Types

General land cover type description: percent of Sagebrush-Grassland: _____ Introduced Pasture: _____ and Cropland: _____ within 1 mile of lek. Categories: <5%=1, 5-50%=2, 50-95%=3, >95%=4 (Place number in blank)

B. Land Cover Status

Has the amount of sagebrush cover changed between this year and last year? Y N (circle), if Y then indicate % change. _____%; unknown _____%.

C. Residual Cover Status

Indicate quality/quantity of the herbaceous cover as Good (good growth during previous year, no to light grazing, good residual cover), Average (moderate growth and/or grazing pressure, residual cover patchy), or Poor (previous growing season dry or heavy grazing pressure, little residual cover). Circle good, average, or poor descriptor.

Comments (Take picture of lek and attach):

APPENDIX 5. GUIDELINES FOR DEVELOPMENT ACTIVITY WITHIN UTAH SAGE-GROUSE HABITATS

Appendix 5, Guidelines For Development Activity Within Utah Sage-grouse Habitats, is currently being developed as a stand-alone appendix within this management plan, and will be available after a public review process and approved by the Utah Wildlife Board.

These guidelines (APPENDIX 5) will be science based and provide land and resource managers at all levels and applications the best available science for sage-grouse management, and will provide recommended practices to minimize negative impacts to sage-grouse populations and their habitats.