

GREATER SAGE-GROUSE

MANAGEMENT PLAN

SOUTH DAKOTA

2008 - 2017



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Executive Summary

Purpose of Plan

The mission of the Division of Wildlife is to manage South Dakota's wildlife and fisheries resources and their associated habitats for their sustained and equitable use, and for the benefit, welfare, and enjoyment of the citizens of this state and its visitors. The Greater Sage-grouse Management Plan of South Dakota was developed to fulfill the division's mission statement as it pertains to sage grouse in South Dakota.

Distribution of Sage grouse and Habitat Needs

Western South Dakota is considered the most easterly fringe of the sage grouse range in the United States (Appendix Figure 1). Because sage grouse are sagebrush obligate¹ species, sage grouse are only found in areas where adequate sagebrush is available to meet habitat and biological needs. Within South Dakota, the vast majority of sage grouse are found in Harding and Butte counties, with incidental observations found in the western portions of Perkins and Meade County. Monitoring of a historical lek in Fall River County between Edgemont and the Wyoming border has resulted in only a few birds observed, none of which have been counted since 2006 and those were not counted on the historical lek.

A sagebrush obligate, sage grouse rely upon this specific plant species to meet most of its habitat needs to complete all aspects of its annual life cycles. During the reproductive (breeding, nesting, brood-rearing) time of the year, sagebrush plays critical, yet different roles. Cleared areas surrounded by sagebrush are often used as "leks", where the sagebrush provides cover and food during times of loafing and feeding. More often than not, sage grouse nests are located under sagebrush intermixed with grass, providing the appropriate concealment characteristics. Sagebrush also provides brood-rearing habitat by supplying canopy cover and succulent food sources. In respect to winter habitat, sagebrush is essential as sage grouse rely almost entirely on the leaves for food and plant structure for cover.

Sage grouse Population Dynamics

During pre-settlement time, this species was considered abundant in the western part of the state and was even reported in several counties east of the current range where it was considered less common. As land-use changed with settlement, the sage grouse range shrunk as more sagebrush was lost to cropland expansion and altered by livestock grazing which impacted the natural vegetative communities and reduced available cover.

Early hunting records are sparse; however it is thought that high harvest in the early 1900's led to the rapid decline of sage grouse. Department records indicate that the sage grouse season reopened in 1955 where 59 birds were harvested. Thereafter the season was open and closed

¹ The term sagebrush as used throughout this document refers to big sagebrush (*Artemisia tridentata*) although many stands of big sagebrush in South Dakota include other sage species like silver sagebrush (*A. cana*).

with little information available in respect to harvest. The season was again closed from 1980-1999, and re-opened in 2000. Since then, an average of 36 hunters per year take the field with an average of 18 sage grouse harvested annually. Hunters are interviewed in the field and biological data is ascertained to determine age and sex information, providing some insight to reproduction; although acquired from a limited sample size.

In 1955, it was believed that the breeding population in Butte and Harding Counties was roughly 15,000 breeding birds. In the early to mid 1970's sage grouse populations were monitored by spring lek surveys and summer brood count surveys. Brood count surveys were discontinued in 1978 due to such low sample sizes the previous years. Today, traditional leks in Harding and Butte counties, and one historical lek in Fall River County, are monitored and total males are counted.

Recent studies on sage grouse in Butte and Harding counties indicate that survival of adult birds is quite high, similar to other sage grouse populations throughout its range. Nest initiation was over 90%, with nest success (at least one egg hatching) over 35%. Mortalities to hens and chicks during the brood-rearing period (June-October) were primarily caused by predators, both avian and mammalian, and additional mortality caused by West Nile virus. Sage grouse are not considered migratory, although some birds move into Wyoming and/or Montana to winter, however most returning to leks where captured. Most sage grouse tend to winter in large drainages near leks where captured, forming large flocks ranging from 30-175 birds.

Issues Requiring Conservation Action

Habitat/Vegetation: Continued sagebrush loss occurs due to the reduction and/or the elimination for improved grazing lands, conversion to cropland acres, long term grazing practices, energy development, and the effects of drought conditions. It will be important to document the sagebrush range through mapping efforts to assist with future sage grouse management and specific management practices.

Population Monitoring: Continued monitoring of sage grouse numbers is essential to future management plans and practices. Current method of monitoring includes spring lek counts which focus on the number of displaying males. Considerations for future monitoring need to include multiple visits to leks, prioritization of leks to be counted, and exploration of existing and new leks established. Active leks need to be identified, along with associated habitats, and management plans developed to minimize disturbance or alterations to these areas.

Harvest Management: Due to continued declines in sage grouse numbers across its range, many individuals are concerned that hunting mortalities may be causing unnecessary harm to the population and negatively affecting the population status. Although the South Dakota season is very restrictive (2 days, 1 bird limit) and removes only a small percentage of the overall population, it will be important that monitoring remains in place and appropriate actions/responses are implemented if proven necessary. Although a small sample size, annual harvest data does provide long term population structure information, as well as some recruitment statistics for any given year.

Grazing Management: Livestock grazing over the past century has altered the sagebrush range; in some cases eliminating sagebrush, other cases altering the plant composition, including the necessary under-story grass species and associated forbs. Although grazing can have positive effects, it will be imperative to apply grazing management which considers weather conditions such as drought so that these habitats are not adversely affected, and which also consider sage grouse in their grazing plan.

Disease: Over the past five years the prevalence of various diseases effecting gallinaceous species has become quite prominent; none more so than West Nile virus (WNV). Sage grouse have been identified to be highly susceptible to the WNV, causing high mortality rates in certain locations. It is of high importance that continued monitoring takes place and considered when making future management decisions.

Noxious Weeds/Invasive Plant: Herbicide use on noxious weeds is the most commonly used method for weed control on both private and public lands. Although effective at removing target plants, the indirect effects of removing desirable plants such as forbs that are necessary for chick survival can be quite damaging. The invasion of sagebrush steppe by cheatgrass has also altered this plant community making it more vulnerable to fire.

Energy and Other Development: Continued energy exploration and development, accompanied by fragmentation created by roads and other barriers, are known to have negative impacts on sage grouse populations. Active lek sites and critical habitats should be identified and provided ample buffers to avoid negative disturbances.

Outreach and Education: Efforts to inform the public and landowners on the importance and management of sagebrush are critical in maintaining the sage grouse population. Increased collaboration between private, state, federal, and non-governmental agencies is essential, along with the dissemination of important facts and information through public meetings and management-oriented pamphlets.

Introduction

The Greater Sage-grouse (*Centrocercus urophasianus*) is the largest of all North American grouse, and often referred to as sagehen, sage chicken, or sage cock. In this document, the term sage grouse refers to the Greater Sage-Grouse. An adult male can weigh in excess of 5 pounds and measure 27-34 inches in length, while the adult female can weigh between 2-3 pounds and measure 18-24 inches. Both the male and female sage grouse have a grayish-brown appearance, narrow pointed tail feathers, and feathering to the toes. An adult male is distinguished by a dark throat surrounded by a V-shaped area of white on the neck. Under the white feathers, 2 skin sacs of a yellow-green coloration can be found which are inflated and used during courtship displays. The males also possess yellow eyecombs which are very obvious during courtship display activities. The females do not have the distinct colored features of males; however still resemble the general coloration of males.

The importance of “leks” (breeding grounds where males display) to sage grouse livelihood can not be stressed enough, as these courting areas are essentially the hub of all activities. Multiple males can be found strutting on leks, however typically only a few will do the majority of mating with hens. Leks are usually surrounded by sagebrush habitat to provide escape cover as well as loafing and feeding areas. Quite often nests can be found within 4 miles of the lek, however some can range as far as 12 miles.

The nesting period begins in early April. Most nests will be found under sagebrush plants, with an understory of grass. On average, clutch size ranges from seven to 10 eggs, with an incubation of about 28 days. Hen survival during the nesting and brood-rearing period is typically fairly high. Brood break-up (young of the year leave hen) occurs mainly in the September-October time frame.

Adult sage grouse feed primarily on sagebrush leaves, however during early brood-rearing activities female sage grouse will feed on insects as well. During the first 4-6 weeks post-hatch, chicks will feed on a combination of insects and forbs. At that time, diets will begin to switch primarily to forbs, and as the summer continues and vegetation dries, diet will focus on sagebrush leaves.

Inventory and Historical Information

A sagebrush obligate, the sage grouse can be mainly found in the northwestern corner of South Dakota. In the early 1900s, Visher (1909) recorded the presence of sage grouse in western SD, and later noted them abundant in areas with big sagebrush (*Artemisia tridentata*) like Harding County (Visher 1914), although the term “abundant” is descriptive and not quantitative. Although believed to be found throughout western South Dakota, by the early 1900s the sage grouse range had been restricted to Butte and Harding counties. In the early 1920s, the state Geological and Natural History survey indicated that sage grouse were found in Fall River, Butte, and Harding counties (Over and Thoms 1921). In the mid 1950s, sage grouse were documented in Fall River, Butte, Harding, Meade, and Perkins counties; however the number of birds was considerably less in Meade and Perkins County. Today’s sage grouse range is similar

to that of the 1950s, as most birds are found in the more extensive sagebrush range within Butte and Harding counties, with incidental sightings in Perkins and Meade counties. One historical lek in Fall River is still monitored today, however only a few birds have been observed near that lek over the past 5 years (GF&P, unpublished data).

Sagebrush habitat plays a critical role in the continuation of sage grouse populations as it is the primary vegetative cover used for nesting, brood-rearing, escape cover and loafing areas around leks. From the standpoint of food, big sagebrush is vital as it is the primary food source throughout the year; and during the winter months becomes the sole food item.

Sagebrush areas throughout North America have gone through many changes over the past 150 years. As settlement advanced westward, many areas of sagebrush were altered to accommodate agricultural practices, as well as to make the land more suitable for grazing. At one time it was estimated that sagebrush occupied a region of about 155 million acres, however over one-third of sagebrush habitat has been destroyed or otherwise drastically altered (Tweit 2000). Several practices that can destroy or alter sagebrush habitats include herbicide treatment, burning, plowing, overgrazing, and various types of construction and development (Connelly et al. 2000, Miller and Eddleman 2001, Welch 2005). Herbicide treatment to destroy sagebrush was especially prevalent from the 1940s through the 1960s (Miller and Eddleman 2001) but has been greatly restricted in recent years on public lands managed by agencies such as the Bureau of Land Management and the U.S. Forest Service. Overgrazing of sagebrush ecosystems has destroyed valuable native grasses and forbs and encouraged the spread of invasive plant species such as cheatgrass [downy brome (*Bromus tectorum*) and japanese brome (*Bromus japonicus*)] into sagebrush steppe; this plant is of little value to wildlife or livestock and dries quickly in late spring and summer, providing fuel for destructive fires. However, over the past few years efforts to improve sage grouse habitat through the implementation of grazing systems which includes a minimum of one growing season of deferment on native rangeland pastures has occurred. These practices are the result of landowners utilizing opportunities provided by federal Farm Bill programs such as those available in the Environmental Quality Incentives Program (EQIP).

Unfortunately, data and information quantifying sagebrush loss are not as plentiful as grassland loss data in South Dakota; however it can be assumed that some of the same trends have and continue to occur as in other western states. Although alterations continue today, it appears that losses of sagebrush may be slowing in South Dakota. A study evaluating sage grouse in northwestern South Dakota determined that the percentage of tilled ground within 2.5 miles of active leks was no different in 1999-2000 compared to 1972-1976, nor was there a difference between the percentage of tilled ground near active and non-active leks for the same time periods (Smith 2003).

A recent sagebrush mapping project on public lands on the western half of Harding and Butte counties (Wright and Wegner 2007) will provide resource managers and researchers valuable information when monitoring and evaluating sage grouse habitat in South Dakota. Acreages determined in the mapping process, along with known leks and radio-telemetry data obtained through on-going SDSU research will provide much needed data and a better understanding of sage grouse movements, habitat selection, and which areas should be considered high priorities for sagebrush management efforts.

Throughout the sage grouse range, spring lek counts (counting the number of birds on the lek) and surveys (determining active vs. non-active leks) are the most widely used monitoring tools for evaluating and comparing current year to past years numbers (both total males and males per lek). Spring lek counts have been conducted in South Dakota for many years, however records and data are incomplete or unavailable for certain years. Historical leks located in Harding, Butte, and Fall River counties are still monitored today, with many existing in essentially the same location for several decades (Appendix Figure 2). Over the course of the past 50 years, sage grouse numbers have seen highs and lows depending on habitat and environmental conditions; as holds true today. Sage grouse numbers, as estimated by number of males observed at leks, during the last 20 years show the same fluctuations, however these numbers are probably not an exact representation because of inconsistency in the number and selection of leks counted. Most recently, more consistency has occurred with count efforts for specific leks in these counties, providing valuable information and reasonable benchmarks for future lek counts and population status comparisons (Appendix Figure 3). Due to this increased consistency, leks have been selected and prioritized from Butte and Harding County, as well as Fall River County. These leks will be the focus of surveying efforts in an attempt to standardize counts and provide trend data for population monitoring.

Although not used today, sage grouse brood surveys were also conducted to determine annual production within the sage grouse population. Similar to lek count information, data are difficult to find and are missing for many years. However, records from the mid 1950s indicate that average brood size was around 5 chicks per brood. Then, between 1974-1976 average brood sizes ranged from 2.8-3.8 chicks per brood, however these numbers were generated from a very small sample size of actual broods counted (21, 17, and 19 respectively). In 1977, only 10 broods were observed with an average size of 4.9 chicks per brood. This was the last year brood surveys were conducted. Current research results from South Dakota State University indicate that the brood success (at least one chick surviving to August 15) was 59% for 35 broods (Dr. KC Jensen, South Dakota State University, personal communication), with an overall chick survival of about 27-28% during the brood-rearing time of the year.

Harvest information for sage grouse seasons is unfortunately sparse and inconsistent, especially for the time frame between 1955 and 1979. During the 1955 season, sage grouse numbers were fairly abundant, as hunter interviews revealed that most hunters bagged their birds in less than one hour (Podoll 1957). Although abundant, the number of birds harvested was still quite low as there were high levels of local opposition to the season. During the early 1970s, a few years did have structured hunting seasons that ranged from 5-7 days in length, however with the continued decline in grouse numbers, the season was once again closed in 1980 and remained closed until 2000 (Appendix Table 1). Earlier hunting seasons were restricted to Harding and Butte counties; however since 2000 the season has been restricted to public land in Harding County and that west of US Highway 79 in Butte County. In recent sage grouse seasons (2000-2007) an average of 36 hunters per year have harvested an average of 18 birds per season (Huxoll 2006, SD GF&P unpublished data).

Current Status

Status

The current range of both sagebrush habitat and sage grouse are quite similar to that of 30 years ago. The majority of sage grouse are found in Harding and Butte counties, although incidental observations occur in Perkins and northwest Meade counties. One historical lek in Fall River County continues to be monitored; however sage grouse numbers have declined in that area to a point where only a few birds were observed near the lek in 2006.

Sage grouse are monitored by spring lek counts. Observers count the total number of males on each lek and this information is used as a reference point to compare current numbers to the previous year and historical numbers. In the spring of 2007, a total of 21 leks were monitored, with a total of 488 males counted. In 2008, 22 leks were counted and a total of 339 male sage grouse were observed.

The sage grouse hunting season in South Dakota is very restrictive: two day season in late September (Wednesday and Thursday), one bird season limit per hunter, and only on public lands (Bureau of Land Management (BLM), U.S. Forest Service, State School and Public Lands, and private land leased by SD GF&P for public hunting as Walk-In Area) in all of Harding and those located west of US Highway 79 in Butte County. During the 2007 season, 10 sage grouse were harvested by 25 hunters surveyed by SD GF&P and BLM staff.

SD Game, Fish, and Parks funded an all-bird conservation planning effort, coordinated by Kristel Bakker, an ornithologist and researcher with Dakota State University. The plan identified the greater sage-grouse as a Level 1 Priority species, the highest conservation priority, because this species is declining across its range (Bakker 2005). The greater sage-grouse was also listed as a species of greatest conservation need in South Dakota's Wildlife Action Plan (SDGFP 2006), fitting the criterion of a species that is indicative of or dependent upon a declining or unique habitat in South Dakota.

Issues & Concerns

Declining Habitat

The dependence on sagebrush habitat for overall sage grouse is unparalleled compared to any other habitat requirement of upland game species in South Dakota. However, the continued degradation and loss of sagebrush habitat through various means could eventually have catastrophic impacts on the overall population. Although it appears that sagebrush loss in northwest South Dakota is not increasing (Smith 2003), conservation management should be at the forefront as more and more acres are being converted to cropland and the trend continues to move westward. However, as drought resistant crops and the demand for more cropland acres expand, pressure to eradicate additional sagebrush habitat may increase. Coincidentally, the demand for rangeland will also increase, thus increased management efforts to rid sagebrush for more productive and suitable grassland for livestock production. Conversions of sagebrush areas, especially those with active leks and those determined as high priorities for nesting and brood-rearing, would have significant negative impacts on sage grouse reproduction and

population status. One of the most critical aspects of sage brush habitat in jeopardy is the loss of winter habitat which may be a key component to further expansion and distribution of South Dakota's sage grouse range as determined by on-going research (Dr. KC Jensen, South Dakota State University, personal communication). Factors jeopardizing winter habitat include grazing practices, environmental conditions, and mechanical/chemical treatments.

Grazing Management

Overall land-use in northwestern South Dakota remains as rangeland; managed and maintained for livestock grazing. However, in instances where over-grazing occurs, whether caused by domestic livestock or high ungulate numbers such as pronghorn antelope, the ramifications to sage grouse habitat can be severe. Unlike many grasses, damaged or highly stressed sagebrush take much longer to rebound, negatively impacting grouse populations by limiting nesting, brood-rearing, and winter cover. During these periods, it is not unusual for invasive species such as cheatgrass to become more prominent and lowering the overall value to sage grouse. During times of drought, adaptability and contingency options should be part of grazing plans to assure undo damage to sagebrush habitats do not occur. In the case of high pronghorn numbers, GF&P has continued to increase license numbers in an effort to lower the population.

Disease

Increased awareness and concern over the potential impacts of WNV on localized populations has the potential to become a real issue. Continued habitat loss, coupled with negative impacts from natural occurrences such as WNV, could lead to significant declines in populations. In sage grouse populations west of South Dakota, it was determined that female survival decreased by 25% when mortality was associated with WNV (Naugle et al. 2005). During 2006 and 2007, researchers from SDSU submitted 26 sage grouse (birds found deceased) to be tested; 8 were confirmed positive to having WNV (Dr. KC Jensen, South Dakota State University, personal communication). Although test results from mortalities have come back positive, the true impact to South Dakota's sage grouse population is unknown and continued monitoring through lek counts and harvest information should provide insight to the potential impacts of this virus.

Monitoring Population

Although South Dakota's sage grouse population is on the eastern fringe of the sage grouse range and only exists in a very small proportion of the state, it is important that this population continues to be monitored to determine any major changes to the population's status. Current efforts include lek counts (males counted on leks) on historically known active leks, however intensive lek surveys (inventory of active and non-active) presently do not occur, as well as an inventory of new leks in areas outside of known leks. In respect to harvest, SD GF&P and BLM staff interview hunters to obtain harvest, age, and gender information. Although the sample size is small, data obtained from harvested birds provides valuable reproductive information.

Harvest Management

Because of the low number of sage grouse present in South Dakota, there is a sector of the public which believes an annual hunting season adds unnecessary mortality to an already distressed bird population. On the other hand, the restrictive 2-day season is looked upon as a trophy hunt to a small but avid group of grouse hunters. However, setting aside the social issues involved with a season, studies and data suggest that a harvest of less than 10% of the annual **fall** population will

not have a negative impact on the population, and most importantly the following spring breeding population (Connelly et al. 2000). Although a fall population can only be estimated, sage grouse harvest in South Dakota is well below that 10% mark as an average of 18 birds per year are harvested, which is less than 5% of the total males counted on **spring** leks. If future spring lek counts determine significant decreases in bird numbers, the hunting season will need to be evaluated and determined if a restrictive season can continue.

Energy Development

Across its range, the discussion of energy development and the impacts on sage grouse populations has expanded and intensified. Concerns surrounding these land-use practices and the potential negative impact on grouse populations have biologists working on management practices and guidelines to minimize impacts. Within South Dakota's sage grouse range, little gas and oil drilling has occurred, however with new technologies and the demand for energy, increased exploration is rapidly growing. The growing popularity and expansion of wind power and associated infrastructure is also a concern, although most wind power development in South Dakota has occurred in the eastern half of the state. Fragmentation due to roads, power lines, and the turbines themselves will be the most instrumental aspect of this energy development imposing negative stress to the population. The location of these elements, especially those in close proximity to active leks, could also lead to lek abandonment, displacement, and reduced reproduction. Siting of energy developments needs to be such that it does not decrease the remaining sagebrush areas, and where possible, should be placed on lands that have already been altered for cropland.

Outreach and Education

Over the past 10-15 years, much attention has been given to the continued decline in sagebrush habitat and sage grouse populations (Stiver et al. 2006). Although extensive efforts have occurred across the sage grouse range to make the public more aware of the continued population and sagebrush habitat decline, similar efforts have not occurred within South Dakota. The awareness of the issue exists, however additional information detailing the reasons and facts for these declines needs to be disseminated throughout the public. Coinciding with information dissemination, increased efforts to work with landowners to evaluate and discuss opportunities to enhance rangeland will be essential in future sage grouse management. Management considerations need not only extend to individual landowners, but to partnering federal and state agencies with vested interest in sound land management and healthy wildlife populations.

Future Direction and Actions

Guiding Philosophies of the Department of Game, Fish, and Parks: Division of Wildlife

Values are deeply held beliefs. They form the salient basis for all decisions, actions, and attitudes. Agencies do not have values; people do. The following statements reflect the collective values of the people who are in the Division of Wildlife in relation to sage grouse management in South Dakota.

WE BELIEVE...

- That wildlife, including sage grouse, contributes significantly to the quality of life in South Dakota and therefore must be sustained for future generations.
- In providing for and sustaining the diversity of our wildlife heritage for present and future generations.
- Although a small portion of western South Dakota lies on the far eastern distribution of sage grouse, it is important to conserve the sagebrush habitat which sage grouse rely upon.
- That the future of sage grouse in South Dakota depends on a public that appreciates, understands, and identifies the importance of sage grouse and of intact, native habitats.

Sage Grouse Management Goal

<p>Goal for sage grouse management in South Dakota is to monitor and maintain a sage grouse population and habitats consistent with the ecological, social, and aesthetics values of South Dakota citizens while addressing the concerns and issues of both residents and visitors of South Dakota.</p>

Objectives and Strategies

Objective 1. Maintain the existing status and range of sagebrush habitat in South Dakota.

Strategies:

- A. Work with private landowners to develop grazing regimes that have positive impacts on sagebrush habitats that benefit livestock and wildlife.
- B. Enhance cooperative efforts between other state agencies, federal agencies, and non-government organizations to institute sound rangeland management that maintain and improve sagebrush habitat.
- C. Provide necessary information and incentives to prevent additional conversion of rangeland to cropland, and to prevent the eradication of sagebrush to create “improved” rangelands that are comprised of grass species only.

- D. Continue periodic monitoring of sagebrush habitat abundance and quality.
- F. Utilize available programs, such as State Acres for Wildlife Enhancement (SAFE), to convert cropland back to sagebrush habitat.

Objective 2. Monitor sage grouse on an annual basis to determine any changes in population status and distribution.

Strategies:

- A. Evaluate historical lek data and use prioritized leks (minimum subset to be counted each year to serve as a baseline) to complete lek counts in Butte, Harding, and Fall River counties. The prioritized leks will serve as a benchmark for comparing the population status. (Appendix Table 2)
- B. Obtain reproductive information by examining harvested birds. Although limited due to a small sample size, it does provide some insight to the current year reproduction.
- C. Utilize information gathered by the sage-brush mapping project and SDSU research to prioritize areas of importance and those needing protection to maintain sage grouse populations.

Objective 3. Use current and past lek and harvest information to set the annual hunting season.

Strategies:

- A. Retain a restrictive season structure until data provides evidence to allow fewer restrictions or to close the season based on significant changes in the population status.
- B. Maintain a hunting season where less than 10% of the fall population is harvested.
- C. Provide the opportunity to harvest sage grouse unless the breeding population drops below 300 birds (i.e., <100 males counted on leks) (Connelly et al. 2000).

Objective 4. Develop a list of research needs and prioritize on an annual basis.

Strategies:

- A. Use on-going research to identify significant elements of sage grouse biology and management that need further evaluation in maintaining at minimum the current population status.
- B. Explore the impact of continued energy development and fragmentation effects on sage grouse populations.

- C. Utilize current partnerships with SDSU and cooperating agencies to capture more information and knowledge on the state's sage grouse population and associated habitats.
- D. Explore cooperative research opportunities to identify limiting factors to sage grouse expansion in South Dakota.
- E. Develop an interagency agreement with state and federal land management agencies to maintain and enhance sagebrush habitat on public lands.
- F. Explore opportunities to cooperate with the United State Department of Agriculture (USDA) and US Fish and Wildlife Service (USFWS) to incorporate sagebrush habitat enhancement on private lands and increase SDGFP private lands efforts targeting blocks of sagebrush habitat on private lands.

Objective 5. Determine the impacts and develop management responses to disease issues affecting sage grouse populations.

Strategies:

- A. Monitor and follow on-going research evaluating the impacts of West Nile virus on sage grouse populations range-wide.
- B. Use spring lek counts and harvest information as additional indicators on the impact of WNV.
- C. Evaluate information gathered by on-going research projects from SDSU and other research institutions to quantify the relative impact on the sage grouse population in South Dakota.

Objective 6. Develop a public outreach and educational plan that informs the public, landowners, and wildlife/conservation agencies on sage grouse management and the issues of highest concern.

Strategies:

- A. Write and distribute an informational brochure for the public emphasizing sage grouse habitat requirements, management options, and greatest risks to future populations.
- B. Provide information on sage grouse and sagebrush habitat through popular articles found in the Conservation Digest, local newspapers, and other media.
- C. Translate scientific data and reports into public friendly brochures that can provide helpful and useful management options to landowners and agency personnel.
- D. Provide sage grouse management information and issues of concern impacting populations on the SDGFP web page under the small game section.

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APPENDIX

Appendix Table 1. Sage Grouse historical harvest data.

Year	Season Dates	County	? Adult	? Juv	? Adult	? Juv	Male/ Female	Juvenile/Adult		Juv/Adult	# Hunters	Total Harvest
								Males	Females			
1955 ^{a,b}	Sept. 18-19	Harding & Butte	4	16	11	28	0.51	4.00	2.55	2.93	43	59
1956-59 ^b	Season Closed											
1960-61 ^b	Unknown	Unknown	No Harvest Data									
1962-68 ^b	Season Closed											
1969 ^b	Aug. 30-Sept. 5	Harding & pt. Butte	No Harvest Data									
1970-72 ^b	Listed as a Season in Hunting Handbook - No Harvest Data											
1973 ^b	Aug. 25-31	Harding & Butte	NA	NA	NA	NA	0.59	NA	NA	1.01	80	121
1974	7-Day Season	Harding & Butte	16	7	28	11	0.59	0.44	0.39	0.41	29	37
1975	5-Day Season	Harding & Butte	5	1	10	4	0.43	0.20	0.40	0.33	28	20
1976-77 ^b	Season Closed											
1978 ^b	Sept. 1-7	Harding & pt. Butte	No Harvest Data									
1979 ^b	Sept. 4-6	Harding & Butte	NA	NA	NA	NA	NA	NA	NA	1.75	27	13
1980 ^b	Sept. 2-4	Harding & Butte	No Harvest Data									
1981-1999	Season Closed											
2000 ^c	Sept. 20-21	Harding & pt. Butte pub. land	6	10	1	7	2.00	1.67	7.00	2.43	28	24
2001 ^c	Sept. 26-27	Harding & pt. Butte pub. land	5	2	2	3	1.40	0.40	1.50	0.71	27	12
2002 ^c	Sept. 25-26	Harding & pt. Butte pub. land	5	5	3	3	1.67	1.00	1.00	1.00	32	16
2003 ^c	Sept. 24-25	Harding & pt. Butte pub. land	6	1	1	4	1.40	0.17	4.00	0.71	36	12
2004 ^c	Sept. 22-23	Harding & pt. Butte pub. land	8	5	0	12	1.08	0.63	0.00	2.13	53	25
2005 ^c	Sept. 28-29	Harding & pt. Butte pub. land	8	6	2	10	1.17	0.75	5.00	1.60	40	26
2006 ^c	Sept. 27-28	Harding & pt. Butte pub. land	2	7	2	4	1.50	3.50	2.00	2.75	46	15
2007 ^c	Sept. 26-27	Harding & pt. Butte pub. land	3	5	0	2	4.00	1.67	0.00	2.33	25	10
2008 ^c	Sept. 24-25	Harding & pt. Butte pub. land	6	3	3	5	1.13	0.50	1.67	0.89	24 ^d	17

a. 1955 was first season since 1935

b. Information limited from 1955-1980; data sources (SD GFP P-R Project W-95-R-Jobs 1-8; Jerry Kobriger & George Vandel, pers. comm.)

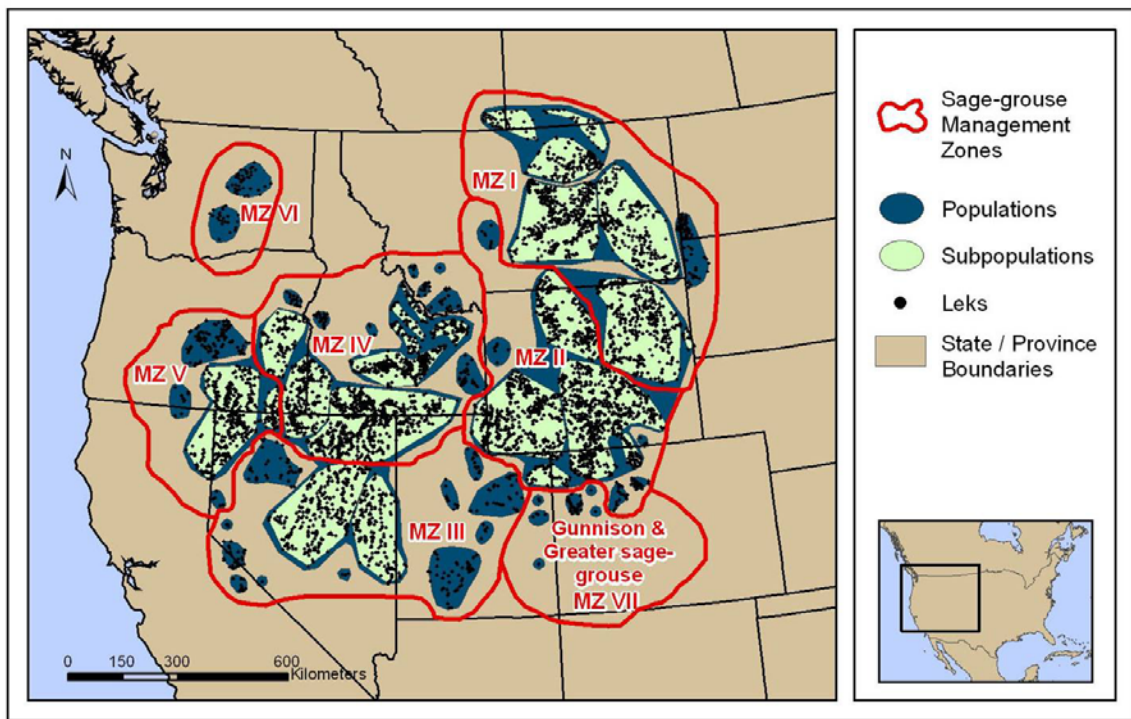
c. Season open only on public lands and walk-in areas in Harding County and Butte County west of U.S. Hwy. 85.

d. In 2008, volunteer check stations at designated locations replaced field checks to determine hunter harvest and obtain biological information.

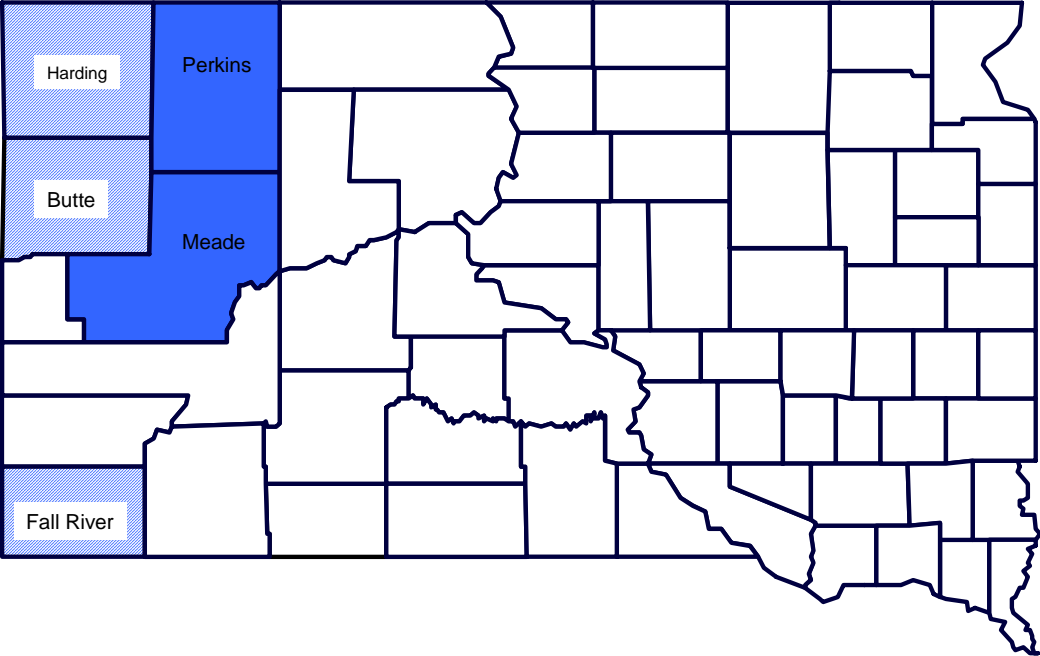
Appendix Table 2. Priority leks selected from Harding, Butte, and Fall River County to be counted on an annual basis to monitor the sage grouse population in South Dakota. Collectively, these counts will serve as a benchmark to evaluate the status of South Dakota's sage grouse population.

<u>HARDING COUNTY</u>				
<u>Lek #</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
1	1	2	2	11
2	15	7	4	3
3	3	19	26	25
5	31	28	40	26
7	19	14	17	15
8	31	29	37	33
10	17	19		8
17	25	32	24	9
28	8	15	21	12
34	23	41	20	24
Total Males	173	206	191	166
Males per Lek	17.3	20.6	21.2	16.6
<u>BUTTE COUNTY</u>				
<u>Lek #</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
5	52	39	46	26
10	30	31	23	12
11	4	8	5	2
12	24	58	56	26
13	24	14	28	18
14	26	22	26	13
15	17	29	23	11
18	12	17	16	14
21	29	26	12	25
22	17	24	26	12
23	12	26	36	14
Total Males	247	294	297	173
Males per Lek	22.5	26.7	27.0	15.7
<u>FALL RIVER COUNTY</u>				
<u>Lek #</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
1	0	0	0	0
Total Males	0	0	NA	0
Males per Lek	0	0	NA	0
<u>ALL LEKS COMBINED</u>				
	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
Total All Males	420	500	488	339
Males per Active Lek	19.1	22.7	23.2	15.4

Appendix Figure 1. Range-wide distribution map of sage grouse.



Appendix Figure 2. Sage grouse distribution in western South Dakota. Counties with hash markings are those where leks have been identified and included in annual spring lek counts.



Appendix Figure 3. The number of males/lek derived from lek counts conducted in Butte, Harding, and Fall River County from 1987-2008 using the leks chosen as priority leks to be counted on an annual basis. The box around the last four years indicate the males/lek that will serve as the benchmark for comparing leks counted in future years.

