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ENHANCING SAGE GROUSE HABITAT...A WYOMING GUIDE

Introduction

The Wyoming Game and Fish Department (Department, WG&F) formed the Wyoming Sage Grouse Working Group (WSGWG) in the fall of 2000. The charge of the working group was to create a management plan that could be implemented by local (population based) working groups, providing them a framework of land management decisions that would be beneficial to the habitat of sage grouse and other wildlife dependent on the sagebrush ecosystem in Wyoming. This effort is also to provide for balanced management that will maintain a diverse and stable economic base for the State including livestock grazing and oil and gas development. The purpose of the Wyoming Sage-grouse Conservation Plan is to provide for coordinated management across jurisdictional/ownership boundaries and to develop statewide support necessary to assure the survival of Wyoming's sage-grouse populations. Designed to be dynamic, the plan will be flexible enough to include new information and issues as well as results from current and future conservation efforts. The plan will develop a Wyoming solution and will use Wyoming based research to the extent practical. Every effort will be made to keep sage-grouse management in balance with social-cultural community values, the multiple-use ethic, and the economic viability of the state. (Briefing paper for the Governor, July 2001)

This guide was created by members of the WSGWG, Grazing Sub-committee with input from numerous individuals working both in and peripheral to the working group, including Kelly Crane from the University of Wyoming, Range Department. We wish to acknowledge the work of retired wildlife biologist Dr. Don Klebenow and the members of the Northwest Nevada Sage Grouse Working Groups and thank them for sharing with us the concept for this guidance document. The purpose of their effort and of ours is to educate landowners, land managers, conservation organizations and other interested individuals about the special habitat needs of the Greater Sage-Grouse. We believe this can be accomplished through a balanced approach to ecosystem management.

For a wide variety of reasons Sage-Grouse populations have experienced severe population declines across its range. Within Wyoming the declines have not been as exaggerated as those seen in other areas. Nor has the habitat loss been as wide spread or as complete. While Wyoming is in reasonably good shape from the perspective of grouse numbers and acres of suitable habitat we do need to be more thoughtful in some of our land management practices. To this end we are providing this guide for management of a healthy sagebrush ecosystem supporting sufficient quality and quantity of sage grouse habitat to sustain and increase, where possible, sage grouse populations in the state. History has shown us that single species management is not wise, whether that species is sage grouse, cattle or mule deer. Sage grouse are sagebrush obligates and viewed by some as an indicator species for the overall health of the sagebrush ecosystem. Balanced management of the rangelands of Wyoming will not only benefit the sage grouse but should also benefit other wildlife and livestock of Wyoming as well. A healthy sagebrush ecosystem, diverse in age classes and vegetation, will benefit us all. What can you, as a land manager, land owner or other interested individual do to assist in this effort? We ask that you become informed about the habitat and management needs of the sage grouse by reading this booklet and implementing applicable recommendations for enhancing or maintaining good sage grouse habitat.

STATUS

North America

Approximately 220 million acres of sagebrush (Artemisia sp.) vegetation types originally existed in North America, making it one of the most widespread habitats in the country. Much of this habitat has been lost or degraded over the last 100 years with some estimates of a 50% loss due to urbanization, agricultural development, fires, range conversions, weed invasions and grazing practices. Sage grouse distribution has always paralleled that of sagebrush and the grouse populations suffered when the sagebrush declined. Population declines are estimated at 45 to 80% over the last 20 years, with only between 150,000 to 200,000 breeding sage grouse left throughout its entire range today.

Sage grouse currently range from southeastern Alberta and southern Saskatchewan; western North and South Dakota to the east; Colorado, Utah, and Nevada to the south; and eastern California, eastern Oregon and eastern Washington to the west. The core of sage grouse populations has shrunk to land in Colorado, Idaho, Montana, Nevada, Oregon, and Wyoming with remnant populations in other states. Even within this remaining core area of their range, populations have dramatically declined. Sage grouse have been extirpated in British Columbia, Nebraska, New Mexico and Oklahoma. Populations remaining in Alberta, North Dakota, Saskatchewan, South Dakota, California, Colorado, Utah and Washington appear to be "greatly reduced" or "marginal".

Wyoming

Large ungulates grazed and browsed the whole western region of North America until very recently. An archeological excavation of a cave in the Fort Lake region of south central Oregon found animal remains that indicate the human diet consisted of horses, camels (now extinct), bison, wolf, fox, and birds, including sage-grouse. Sandals found in the cave were radiocarbon dated to 1593 plus or minus 400 years ago (Cressman 1942).

Bison largely disappeared from the intermountain west in the early 1800's. There is evidence that bison were not only abundant but widespread in Wyoming up until that time. The are historical accounts of numerous herds of buffalo in the Green River Lakes area and thousands of buffalo in the Pinedale area whose tracks obliterated all signs of other activity.

Historical accounts, those written by various pioneers and the photographs taken by William Jackson on the 1870's Hayden Expedition through Wyoming, show what Wyoming looked like during the nineteenth century. When 56 of the original Jackson photographs were compared to contemporary conditions, it was stated that "it seems that ecological change from 1870 to the present has been relatively small, and the overall impression is one of stability." Robert Dorn came to similar conclusions in his comparisons of photographs taken during the early explorations and settlement of Wyoming at the same locations 100 years later. Among other conclusions Dorn found that in Wyoming the vegetation has not changed much, except for introduced weeds and crops, grass is more abundant now, and that buffalo were very abundant even in the mountains. Accounts of the early exploration of Wyoming include experiences near Bates Hole where there were huge numbers of grouse darkening the sky. In an account from southwestern Wyoming we find a photograph of a sheep wagon filled with grouse following a successful hunt.

Sage grouse numbers crashed in the 1920's causing some states, including Wyoming, to stop hunting the birds. Licenses were again made available in the early 1950's when it was determined the population had increased sufficiently to survive the pressure. This peak of sage grouse numbers has been followed by a general and continued downward trend. The population decline is variously speculated to be the result a decline in suitable of habitat, possibly as the result of loss of succession in the absence of normal perturbation such as fire, floods, long term climate trends which maybe exacerbated by inappropriate management decisions. Other possible causes of the decline in quality and quantity of available Sage-Grouse habitat include livestock grazing management systems, fragmentation caused by oil and gas and mining development, roads, urbanization or the removal of the artificial protection provided by an aggressive predator control program.

Sage-grouse were and are currently distributed across the State of Wyoming. Grouse are found where ever large stands of sagebrush are found; from the west in the arid sagebrush ecosystems of the Red Desert to the more temperate areas around Jackson Hole, eastward to Albany County where they are making a comeback and north to Campbell County where the sagebrush is widely scattered. Some areas have experienced a more significant decline than others, while other areas see what could be considered “normal” oscillations in population numbers. The Wyoming grouse population is still robust but we do see a decline in overall numbers.

HABITAT REQUIREMENTS

Sage grouse are a "landscape species", annually using widespread areas of sagebrush habitats but appear to prefer seasonal micro-sites within the landscapes. They only occur where sagebrush is found. Suitable sagebrush habitat consists of plant communities dominated by a canopy cover of the various big sagebrush (*A. tridentata*) subspecies and a diverse bunchgrass and forb (flowering herbaceous plants) understory. The composition of brush, grass and forb varies with the subspecies of sagebrush, the condition of the habitat at any given location and range site potential. Sites with mountain big sagebrush (*A. t. vaseyana*) and basin big sagebrush (*A. t. tridentata*) in the best condition have shrub canopy amounts between 15 and 20 percent. Many of these stands begin to show signs of decadance when sagebrush canopy exceeds 26% and the majority of all plants are 70+ years old. As condition declines sagebrush cover values reach 30 to 40 percent or more with much restricted herbaceous production and no recruitment of herbaceous seedlings. For example, dense stands of Wyoming big sagebrush (*A. t. wyomingensis*), those with a canopy cover of between 12 and 15 percent, begin to have reduced understory production which continues to decline with increased brush cover, finally leading to the elimination of understory plants.

Sagebrush habitats are critical for sage grouse year long. Land use conversion or elimination of sagebrush habitat will be detrimental to the sage grouse population. Sagebrush ecosystems serve critical breeding and nesting needs of sage grouse. Meadows, riparian areas, irrigated hay fields and other moist areas provide summer foraging areas for sage grouse that are all the more critical for the birds during dry years. Grouse depend on sagebrush exclusively during the winter for forage and cover. A decline in the quantity of habitat or its quality may result in a loss of sage grouse.

These seasonal habitats must occur in a patchwork across the landscape. Their spatial arrangement, the amount of each seasonal habitat, and the vegetative condition determine the landscape's potential for sage grouse. Both quantity and quality of the sagebrush environment determines suitability and therefore productivity. Within a large area of dense, decadent sagebrush habitat, patches may have to be manipulated by some treatment such as fire or mechanically, with a brush beater, in order to provide a mosaic of needed habitat attributes. Significant reduction in the native grass and forb under story can reduce the quality of sage grouse habitat.

Sage grouse populations decline when sagebrush/grassland habitat is affected by large scale events of active alteration/manipulation or by management decisions which allow broad scale habitat degeneration. Large scale, long term changes in ecological condition are a sizeable part of the problem. The long standing public lands policy of controlling fire has contributed to the vast, even age stands of sagebrush which now appear to lack the diversity in age and abundance of grasses and forbs grouse need for cover and food. Equally detrimental was the trend of converting sagebrush to grass with mechanical or chemical tools, again eliminating the natural diversity of the ecosystem so important to sustaining wildlife populations. Other management decisions that result in significant changes to the habitat include failure to re-seed areas following disturbances such as fire or land use conversions and fragmentation resulting from residential or industrial development and associated infrastructure. Expansion of stands of pinyon and juniper as a result of fire control is also an issue in declining habitats as are power lines, fences, roads and various livestock management practices have further led to grouse declines.

EARLY SPRING HABITAT

Leks
Strutting grounds (leks) are the focal point of breeding during late March and April. Leks often are situated on low sagebrush sites, broad ridge tops, grassy openings, disturbed sites such as burns, dry lakebeds and even altered habitats such as abandoned oil well locations, airstrips or roads. The common feature of lek sites is that the birds select spots with less herbaceous and shrub cover than surrounding areas. There is no evidence that lek habitat is limiting sage grouse.

Stands of sagebrush surrounding leks are used extensively by sage grouse. Males use the habitat surrounding a lek for foraging, loafing and shelter. Hens select suitable nesting sites within the surrounding sagebrush, generally 50% of hens will nest within 2 miles of the lek where they were bred.

There are migratory and non-migratory populations of sage grouse, in some areas both migratory and non-migratory birds may be using the same lek. If all of the components of their habitat are available within one area, grouse may not migrate and for those populations the lek may be an approximate center of their annual range. Migratory populations of birds may move seasonally through hundreds of square miles of widely distributed habitats. There is some evidence that sage grouse hens may exhibit fidelity to lek and nesting areas while males may return to leks where they have achieved stature in the breeding hierarchy.

Pre-laying hen nutrition

The plant composition in the early spring habitat is one factor that contributes to nesting success. Forbs are more nutritious than sagebrush. Sage grouse hens need these protein, calcium, and phosphorus rich foods to support initiation rate, clutch size, successful hatch and chick survival immediately following the hatch. Food forbs identified in Wyoming studies include common dandelion (*Taraxacum officinale*), curlycup gumweed (*Grindelia squarrosa*), western salsify (*Tragopogon dubius*), western yarrow (*Achillea lanulosa*), prickly lettuce (*Lactuca serriola*), cudweed (*Gnaphalium palustre*), fleabane (Erigeron spp.), sweetclover (*Melilotus officinalis*), milkvetch (*Astragalus bizulcatus*), alfalfa (*Medicago sativa*), winterfat (*Eurotia lanata*) andf fringed sagewort (*Artemisia frigida*).

It appears that hens search out the same insects in the pre-laying stage as chicks do in early-brood rearing. While not enough is currently known about these insects they comprise various arthropods including darkling beetles (Tenebrionidae), thatch ants (Formicidae), harvester ants, dung beetles and other Scarabs.

A combination of big sagebrush and others such as rabbit brush and grease wood in good health interspersed with dead brush crowns provides the habitat to insure forbs are available to sage grouse. The low sagebrush sites are richer in forbs and during drought periods are the sites most attractive to pre-laying hens.

LATE SPRING HABITAT

Nesting sites
After mating, sage grouse hens leave the lek to nest. Hens nest at the general elevation of the lek and often in the vicinities of leks. Average distances between nests and nearest leks vary from approximately 2/3 to 4 miles, but hens have been known to nest in the immediate vicinity of the lek to as far as 12 miles away. Lek location does not necessarily identify the location of suitable nesting habitat.

Sage grouse are very selective in choosing a nest site, which is nearly always under a sagebrush. Sage grouse choose nest sites which have vegetative characteristics significantly different than randomly selected vegetation. The Wyoming studies point towards Total Shrub and Dead sagebrush canopy cover, plus residual grass cover as the most important vegetative attributes for sage grouse in the nest selection process, when comparing nest site vegetation to surrounding

vegetation. New grass height, new grass cover, and litter cover were statistically higher at nest sites, in two studies. Sage-grouse can select for residual grass, but not new grass as it is not present when nesting is initiated. In Wyoming studies sage-grouse chose nest sites which had greater and more decadent shrub cover, with more left over (residual) grass, and tended to be more successful when they had adequate food (forbs and insects) close to the nest. Dense shrub cover provides good concealment from the air and ground, while residual grass cover provides ground level concealment from predators. The dead sagebrush component may provide a crown type which offers better hiding cover. A closer source of forbs means less time spent away from the nest, which should reduce the risk of predation.

In the Wyoming studies the attributes most commonly selected had the following ranges:

Total shrub canopy cover = 29%-38%
Dead sagebrush canopy cover = 3.1%-6.8%
Residual grass cover = 1%-4.1%
Live sage canopy cover = 19%-26%
Forb cover = 2% - 8.2%

Dense stands of sagebrush with a significant dead sage component is the basis for sage grouse nesting habitat in Wyoming. These sagebrush stands should have sagebrush of varying heights with good residual grass under the sagebrush canopy, and the areas in between the sagebrush should have good forb cover while maintaining some grass and litter cover. Perennial bunch grasses would probably provide the best combination of grass height and ground cover for concealing nesting hens. In Wyoming, sage grouse nesting most often occurs and is successful in sagebrush steppe, which exhibits the above described characteristics. However, the vegetative composition of an area depends upon site potential and past and current management and activities and sage grouse will nest within that potential.

EARLY BROOD REARING HABITAT

June to mid-July

Broods are tied to food and cover. Insects are important during a brood's first month of life when they require high protein food. During this period abundant forbs and insects characterize brood areas. Food forb species important to chick survival are very similar to those listed as important for pre-laying hens. Brood rearing habitat may be relatively open, where the hens and chicks will use areas where big sagebrush provides only 10% cover in their search for insects and forbs. They are generally found where shrub cover is less than 30%.

In three of the four Wyoming studies sage grouse chose early-brood rearing (EBR) sites which were significantly different from randomly selected vegetation. The sites selected for brood rearing had more open sagebrush canopies and greater herbaceous cover than randomly selected vegetation. To date only one Wyoming study, conducted in Bates Hole, has compared the vegetative characteristics of nest sites to EBR sites. Researchers found significant vegetative differences between these two seasonal usage areas. While sage grouse nest sites are physically close to EBR sites, usually within 1 mile, EBR sites had significantly lower total shrub canopy cover, live sage canopy cover, and live sage height than nest sites, but significantly higher total herbaceous cover.

EBR habitat can best be described by examining those vegetative attributes which set it apart from nesting habitat because it occurs in the same general area. The following are the range of vegetative attributes which best describe EBR habitat in Wyoming:

Total Shrub Canopy Cover = 19 - 30%
Live Sage Canopy Cover = 14 - 21.5%
Avg. Live Sage Height = 10 – 13 in
Total herbaceous cover = 15.5-37%
Forbs cover = 2.8 - 9.25%

Native site potential or current site potential results from past and present land management activities may not allow some areas of Wyoming to meet this description of EBR habitat.

The most critical stage for sage grouse productivity occurs from pre-nesting through early-brood rearing. Sage grouse occupy pre-nesting and EBR habitats for approximately three months which compares to about one month, spent in nesting habitat. Sage grouse use more open sage canopies with higher herbaceous vegetation, especially food forbs, three times longer than they do the dense sage stands associated with nesting. This suggests that in order to enhance sage grouse productivity the landscape should provide more patches of sage brush with an open, or lower percentage, canopy cover and higher forb cover than it does in dense sage stands.

The vegetative characteristics of pre-nesting habitat were not examined in the Wyoming studies. However, Gregg (2001) states, "... management of pre-laying and brood rearing habitat should concentrate on maintenance of cover type diversity and availability of forbs." The Nevada report states, "The availability of forbs to the pre-laying hen in March and April affects the hen's nutrition that in turn determines the outcome of nesting." "The low sagebrush sites are richer in forbs and during drought periods are the sites most attractive to pre-laying hens." Pre-nesting habitat provides many of the same elements as EBR sites for sage grouse, which suggests that their vegetative characteristics may be similar.

LATE BROOD REARING HABITAT

Mid-July through August

As food plants mature and dry, grouse move to areas still supporting succulent herbaceous vegetation with adjacent sagebrush for cover and loafing. These may be lower elevation native or irrigated meadows where no uplands with green vegetation are in the area or they migrate upward, seeking habitats where succulent forbs are still available such as moist grassy areas, or upland meadows. A delay in maturing of forbs has a noticeable effect on bird movements. Where the habitat is in good condition in years of above normal precipitation, grouse may find succulent forbs on the dryer upland sites all summer. This is not the usual situation, however.

The more arid the area the more important the riparian meadow areas are to the survival of the broods in the late summer. From mid to late summer the meadows in drainages and meadows associated with springs and streams are the main sites that produce the forbs necessary for juvenile birds. The drier the summer, the more birds are attracted to the remaining green areas.

These green areas are an attraction and are important for domestic livestock and wild ungulates as well as sage grouse. Dual use by cattle and grouse do not necessarily conflict, however. Research has shown that grouse select grazed meadows over those ungrazed. Early in the summer grouse use both grazed and ungrazed meadows and are found where the grass and forb heights are less than average. Selection for lower vegetation heights disappears as the summer progresses on a heavily grazed meadow for the plants become uniformly short throughout the meadow. Then grouse must rely on cover provided by sagebrush on the meadow edge.

In addition to reducing vegetation height, grazing improves the condition of the food plants eaten by sage grouse. When birds first appear on meadows, generally mid-summer, both grazed and ungrazed are attractive to the birds. The main attraction at that time is the availability of food, common dandelion often a main one. By mid-August, the condition of the food plants on the grazed meadows remains succulent and green while vegetation cures on the ungrazed meadows. Regrowth of grazed food plants contains more moisture and more nutrients than ungrazed plants and this regrowth is sought by grouse.

FALL HABITAT

Sage grouse form flocks as brood groups break up in early fall. As the meadows dry and frost leads to the drying or killing of the foliage of forbs, the incidence of sagebrush consumption increases and continues to be the major food throughout the winter. Fall movements to winter ranges are slow and meandering and occur from late August to December.

WINTER HABITAT

During winter, sage grouse feed almost exclusively on sagebrush leaves and buds. The availability of sagebrush above snow determines the suitability of an area. Movements to wintering areas vary widely, ranging from a few miles to over 50 miles, depending on the area. Berry and Eng observed hens in Montana moved to wintering areas before heavy snowfall, which indicated fidelity for specific winter areas. Throughout the range of sage grouse and, dependent upon location and availability, virtually all the species of sagebrush are consumed. At any given locality wintering habitat needs to be identified and managed because the loss of sagebrush on winter ranges can lead to the loss of a sage grouse population.

Suitable winter habitat varies with climatic conditions. Sage grouse will roost in open, low sagebrush sites on clear, calm nights if temperature remains above approximately 10 degrees Fahrenheit. On windy nights or during snow storms sage grouse seek out taller shrubs with greater canopy cover (>20%). When night temperatures drop below 10 degrees Fahrenheit and deep powdery snow is available, sage grouse will snow burrow to conserve energy. Sage grouse will fly considerable distances (>5 miles) and elevations (>1,000 feet) between winter feeding sites and suitable snow roosting sites when temperatures drop below 10 degrees Fahrenheit.

MANAGEMENT RECOMMENDATIONS

Take a close look at the sage grouse habitat in your area. If it is in good condition, continue management activities /practices and monitor sage grouse numbers. If it is not in good condition, determine what is missing.

* Have birds on leks decreased or disappeared? If so, is the reason apparent?
* Is the sagebrush canopy cover too thick, too low, or too tall?
* Is the ground cover under or around the sagebrush depleted or missing?
* Is residual perennial grass missing or too low for nesting?
* Are insects and forbs available for broods?
* Are the meadows providing suitable food and cover and water for birds in the summer?
* Do wintering areas contain the varieties, densities, and heights of sagebrush the birds prefer?

If your sage grouse habitat needs improvement the following practices are recommended (taken mainly from Beck and Mitchell 2000):

1. **Fire Thinning:** Sagebrush eradication treatments should not be practiced. However, thinning sagebrush to enhance forb and grass production while maintaining about 15% shrub cover could enhance grouse habitat. Small burns conducted in a mosaic to enhance forbs and create a diversity of age classes of mountain big sagebrush may provide benefits. Use caution when conducting prescribed burning in Wyoming big sagebrush--there may be potential for invasion of annual grasses and shrub recovery on these dry sites can be extremely slow. Be careful with fire as removal of large expanses of sagebrush is detrimental to the grouse and the proper pattern of interspersion and ideal size of burn sites for enhancement of chick foods remains unknown.

2. **Rehab / Grazing / Seeding:** Rehabilitation following disturbances such as wildfires should consist of immediate reestablishment of mixes of sagebrush and native grasses and forbs. A major aim is to prevent establishment of annual grasslands. Protect the seeded areas from grazing until seeded species, including sagebrush, are well established.

3. Seeding: Range seedings should focus on establishing forbs and subspecies of sagebrush suited to various range sites. Native grasses that do not out-compete beneficial forbs and shrubs should be used in the seed mixtures. Seedings designed strictly to increase grass production are discouraged, especially monoculture seedings of crested wheatgrass and other non-native species. Use plant species adapted to the soil type, elevation and amount of precipitation on the site. Consider sage grouse food habits when selecting forb species, with special consideration of the species with milky juice found in the Compositae family.

4. **Insecticides:** Do not spray insecticides on sage grouse spring and summer habitat. Insects are essential for survival and normal development of chicks up to 3 weeks of age and are an important source of nutrition through out the summer and fall. Furthermore, sage grouse die-offs have been documented when exposed to organophosphorus insecticides applied to cultivated drops in areas occupied by sage grouse.

5. **Livestock Grazing:** (a) Livestock use around water sources and wet meadows in brood-rearing areas should be regulated through fencing, grazing or herding management to restrict overuse, thereby protecting riparian systems. However, moderate livestock grazing of meadows during the summer enhances the food quality for grouse. Initiate a program of reestablishment where meadows have been depleted. Watershed functionality and replacement of basin big sagebrush with meadow vegetation should be the goal. Maintaining adequate forb cover in riparian meadows should be a priority.

(b) Livestock grazing should be managed to allow optimum growth of forbs, grasses and sagebrush. Manage for a variety of sagebrush cover depending on how the area is used by sage grouse: 10-30% sagebrush canopy cover for nesting, 5-15% cover in summer habitat, or 20-35% in winter. The grazing system, grazing duration, kind of livestock, and stocking intensity should be adjusted to maximize the vegetative goals.

(c) Manage livestock grazing to insure that adequate residual grasses remain for nest concealment. Sage grouse in Wyoming select nesting sites with 1-4% residual grass cover. Grazing should be managed, in nesting areas, to promote native bunch grasses under the sagebrush canopy, with adequate forb and grass cover in the interstitial areas.

ADDITIONAL INFORMATION

To obtain more information on restoration of sage grouse habitat, contact the Wyoming Game and Fish Department Wildlife Habitat Specialist at …….