



# Nevada Wildlife Federation, Inc.

An Affiliate of the National Wildlife Federation

Post Office Box 71238  
Reno, Nevada 89570

## *Enhancing Sage Grouse Habitat ... A Nevada Landowner's Guide*

*A Northwest Nevada Sage Grouse Working Group publication*

### INTRODUCTION

The Nevada Wildlife Federation formed the Northwest Nevada Sage Grouse Working Group to address factors that have led to declines in sage grouse numbers in northwestern Nevada.

The purpose of this booklet is to inform Nevada landowners about the habitat needs of sage grouse. This booklet was completed by members of the Northwest Nevada Sage Grouse Working Group under the guidance of wildlife biologist and University of Nevada, Reno Professor Emeritus Donald A. Klebenow.

Sage grouse have experienced severe population declines. What can you do as a Nevadan? We ask that you acquaint yourself with the conditions that sage grouse prefer within the sagebrush ecosystem. Then, when the opportunity presents itself, you may be able to implement some practices that will enhance habitat for these birds.

Sage grouse are a sagebrush obligate and a species that is said to characterize sagebrush landscapes. If we conserve sage grouse, other species that prefer or require habitat similar to that outlined in this booklet will also benefit.

Gale Dupree  
Chairman, Northwest Nevada Sage Grouse Working Group

### STATUS

#### **North America**

Throughout time, sagebrush vegetation types and sage grouse (*Centrocercus urophasianus*) distributions have varied significantly as climatic patterns shifted. It is estimated that about the time Western lands were being occupied by white Americans, approximately 220 million acres of sagebrush existed in North America, one of the most widespread habitats in the country. At that time, the distribution of sage grouse paralleled that of sagebrush. However, a portion of that sagebrush type would have been occupied by successional plant communities due to fires, effects of prolonged drought, localized flooding, disease outbreaks and other cyclic disturbances. An unknown portion of that 220 million acres would not have provided ideal sage grouse habitat. Those lands did not support sufficient sagebrush cover on the site following a disturbance, or sagebrush canopy was excessive because the interval between disturbance cycles was too long.

Given that natural fluctuations in both vegetation communities and sage grouse populations occur, a great proportion of the sagebrush vegetation type has been eliminated over the past 150 years, converted for agriculture, mining, urbanization, or changed for other purposes. In addition, the sagebrush type habitat has been altered by wildfires followed by weed invasions, exotic grass seedings, fire suppression that has led to successional progression and grazing practices,

particularly unregulated grazing prior to enactment of the Taylor Grazing Act. Intensive predator control on grazed lands has also taken place.

As these practices changed the sagebrush ecosystem, sage grouse populations have fluctuated, both increasing and declining over the years. The recent low numbers are causing particular concern. In the past 20 years, population decline is estimated at 45 percent to 80 percent with between 150,000 to 200,000 breeding sage grouse left throughout its entire range (Connelly and Braun 1997).

Sage grouse now 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. Core sage grouse populations have shrunk to land in Colorado, Idaho, Montana, Nevada, Oregon and Wyoming. Even within these remaining core range areas, populations have dramatically declined. Sage grouse have disappeared in British Columbia, Nebraska, New Mexico and Oklahoma. Populations remaining in Alberta, North Dakota, Saskatchewan, South Dakota, California, Colorado, Utah and Washington are greatly reduced and can be considered marginal.

### **Nevada**

Historic abundance of sage grouse is difficult to determine due to limited long-term data on population size and trends and the circumstantial nature of much of the existing evidence. For example, the presence of sage grouse was recorded in archaeological excavations of an Indian cave and a shelter in northwestern Nevada and another cave in Utah near Wendover, Nev., (Grayson 1988). Sage grouse remains were found in deposits as old as 10,000 to 11,000 years. At the Utah site, local extinction of sage grouse and other species apparently coincided with the retreat of Lake Bonneville, only to reappear in the more recent strata.

In 1867 and 1868, the ornithologist, R. Ridgeway (1877), surveyed birds across central Nevada. He listed sage grouse as birds characteristic of sagebrush and in his conclusions, “... we saw it so seldom that little was learned of its habits, particularly during the breeding season. It came under our notice only late in summer and during the autumn, when it was found to be abundant in certain localities, but by no means uniformly distributed.” Little other scientific evidence from the 1800s exists from which sage grouse abundance can be judged.

A review of historic information in personal journals, newspapers and publications by Robert McQuivey, retired Nevada Division of Wildlife biologist of Reno, Nev., found few references of abundant sage grouse during exploration and emigration in the 1840s and 1850s or early settlement following 1860. More common was recording of game scarcity. Local abundance was sometimes recorded, however, paralleling the conclusion made by Ridgeway (1877).

Since about 1860, settlement led to changes in plant communities that favored increased sage grouse populations. Some populations grew during the 1870s with increased reports of birds harvested by hunters. During the 1880s, sage grouse numbers probably reached their highest peak and then declined. During that era, market hunting also peaked. Hunting laws began around 1890 with liberal seasons and bags. As time passed and bird populations decreased, there were reductions of hunting seasons length and bag limits beginning around 1900, continuing until the late 1920s. More recently, sage grouse numbers peaked in the 1950s followed by a general and continued decline in numbers.

Implementation of government sponsored predator control coincided with the development of ranches, livestock grazing on public lands and hunting. The control programs included large efforts to eliminate predators of domestic cattle and sheep using shooting, trapping and poisoned baits. The result was a reduction of coyotes and other sage grouse predators such as golden eagles. Poisoned baits increased the vulnerability of scavengers like ravens, a sage grouse egg predator. In the late 1940s an efficient poison, 1080, was added to the poison bait selection, primarily for mammal control. Predator control using poisons ceased when banned by government edict in 1972. How predator control programs influenced sage grouse numbers is open to speculation, because it is not supported by scientific study.

Currently, sage grouse are distributed from central Nevada (i.e., about Tonopah) northward. The largest populations occur from the northwestern corner of the state across the northern part with the northeastern counties having the most continuous habitat. Western Nevada's Douglas, Lyon and Mineral counties and adjoining Mono and Inyo counties in California contain a population of sage grouse that is genetically distinct from any birds within the sage grouse

distribution. Nevada still has many sage grouse, but the statewide population has declined. Many local or regional populations have had a 40 percent to 80 percent decline with a mean of about 50 percent (Nevada Division of Wildlife, personal communication).

### HABITAT REQUIREMENTS

While widespread acreages of sagebrush still occur, the sage grouse is a bird that occurs in low densities within the overall habitat. They are locally abundant seasonally. Their seasonal and annual movements tend to be widespread and are often unpredictable. They are referred to as “landscape species,” due to their annual use of broad areas of nonhomogenous sagebrush-grassland habitat types. They only thrive where sagebrush is found.

In general, suitable sagebrush/grassland habitat has plant communities dominated by a canopy of either dwarf sagebrush, most commonly low sagebrush (*A. arbuscula*), or big sagebrush (*A. tridentata*) and a diverse understory of bunchgrasses and forbs (flowering herbaceous plants) (Peterson 1970, Wallestad 1971, Eng and Schladeweiler 1972). The absolute and relative amounts of sagebrush, grasses and forbs on a specific site varies with the subspecies of sagebrush, the ecological site potential and condition of the habitat. Sagebrush sites best for sage grouse have shrub canopy cover between 15 percent and 25 percent. Beyond those values, as shrub cover increases, the preferences displayed by grouse decline. Sagebrush cover values may reach 30 percent to 40 percent or more with declines in herbaceous production and no recruitment of herbaceous seedlings. In the case of Wyoming big sagebrush (*A. t. wyomingensis*), understory production begins to decrease when sagebrush cover is between 12 percent and 15 percent depending on specific site features. The continued increase in brush cover eventually leads to the elimination of understory plants (Winward 1991).

Sagebrush habitats are critical for sage grouse yearlong. Grouse depend on sagebrush exclusively during the winter. Sagebrush/perennial grasslands also provide critical breeding and nesting habitats for sage grouse. Meadows, riparian areas, irrigated hay fields and other moist areas within or adjacent to sagebrush habitat provide summer foraging areas. These mesic sites are critical for sage grouse broods during dry years and remain important during years with above average rainfall.

Sage grouse seasonal movements often cover large distances in scattered directions across the landscape. The spatial arrangement, the amount and the vegetative condition of each seasonal habitat determine the landscape’s potential for sage grouse. Both the quantity and quality of the sagebrush environment determines habitat suitability. In a large area of dense sagebrush that is declining in habitat quality, the creation of a mosaic of successional stages would counter the



**By John Kallested**

In early spring, male sage grouse gather on open areas (leks), where they strut to attract females.

loss of understory grasses and forbs across the landscape. Significant reduction in the native grass and forb understory will eventually reduce the quality of sage grouse habitat.

Sage grouse populations decline when sagebrush/grassland habitat is altered or fragmented by large-scale brush control, the establishment of large monocultures of grasses, converting rangeland to cropland or the conversion of rangelands dominated by perennial plant species to rangelands dominated by invading annual grass species (e.g. cheatgrass, *Bromus tectorum*). Fires; pinon and juniper invasion; developments such as power lines, fences, roads and urbanization; and improper livestock management practices can also result in small grouse populations. Fire suppression that has permitted natural changes in plant community composition and structure also has created problems. Vast, old stands of sagebrush may lack the herbaceous grasses and forbs grouse need for cover and food.

## 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 ridgetops, grassy openings, disturbed sites (such as burns) and dry lakebeds. The bird select leks with one common feature – spots with less herbaceous and shrub cover than surrounding areas. Because lek sites are sparsely vegetated, they are sometimes associated with altered habitats such as cultivated fields, airstrips, gravel pits and roads. No evidence shows that lek habitat is limiting sage grouse (Schroeder, et al. 1999).

Stands of sagebrush surrounding leks are used extensively by sage grouse. Males use the habitat surrounding a lek for foraging, loafing and shelter. They are found in shrub stands 7 to 15 inches high (Rothenmeier 1979, Call and Maser 1985) with canopy coverage of 20 percent to 50 percent (Wallestad and Schladweiler 1974, Autenrieth 1981, Ellis, et al. 1989).

If all of the components of their habitat are available within one area, grouse may not migrate. The lek may be an approximate center of their annual range (Eng and Schladweiler 1972, Wallestad and Pyrah 1974, Wallestad and Schladweiler 1974). This is not the case for migratory populations (Connelly, et al. 1988, Wakkinen et al. 1992). Some populations have seasonal movements through widely distributed habitats, even a 50- to 80-mile migration cycle. The location of the lek is no indication of overall habitat requirements. At times, these grouse may pass what is considered excellent habitat to use what appears to be less desirable.

### Pre-laying hen nutrition



**By Donald Klebenow**

Low sagebrush provides important early spring habitat where hens find food (forbs) for their newly hatched chicks.

Good plant composition in early spring habitat is one of several factors that affect nesting success. Forbs are more nutritious than sagebrush. The availability of forbs to pre-laying hens in March and April affect the hens' nutrition, which influences nesting success (Crawford 2001). Without protein, calcium and phosphorus provided by forbs, declines occur in nest initiation rate, clutch size, successful hatch and chick survival immediately following the hatch (Barnett and Crawford 1994, Coggins 1998).

On low sagebrush and Wyoming big sagebrush sites in southeastern Oregon, important forb species consumed by sage grouse hens were: desert-parsley (*Lomatium spp.*), hawksbeard (*Crepis spp.*), long-leaf phlox (*Phlox longifolia*), mountain-dandelion (*Agoseris spp.*), clover (*Trifolium spp.*), everlasting (*Antennaria spp.*), and Pursh's milk-vetch (*Astragalus purshii*). In that study, a decline in the availability of forbs was associated with a decline in sage grouse chicks per hen and average brood size the second year (Barnett and Crawford 1994).

A combination of low sagebrush and big sagebrush sites in good health provides the habitat to insure forbs are available



**By Donald Klebenow**

Forbs, such as this mountain dandelion, provide early food nutrition for chicks.

to sage grouse. Low sagebrush sites are generally richer in forbs and most attractive to pre-laying hens (Barnett and Crawford 1994).

## 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 may nest in the immediate vicinity of the lek or as far as 12 miles away (Wakkinen, et al. 1992, Fischer, 1994, Hanf et al. 1994). Research shows that lek location does not necessarily identify the location of nesting habitat (Bradbury et al 1989, Wakkinen et al. 1992).

Most nests are under shrubs, mainly sagebrush. Adequate brush cover is critical for successful nesting. Shrub cover can be either too little, or too much. In an Idaho study where average shrub cover was 13 percent, nests were located where cover averaged 17 percent (Klebenow 1969). No grouse nested in areas with less than 10 percent total shrub cover. Where sagebrush cover was as high as 50 percent, sage grouse nested in more open areas with 25 percent cover. Numerous studies have concluded that optimum nesting habitat has a 15 percent to 25 percent canopy cover of shrubs (Connelly et al. 1991, Gregg et al. 1994, Sveum 1995).

Both sagebrush and perennial grasses are important habitat components at nest sites (Connelly et al. 1991, Gregg et al.

1994, Sveum 1995). Fewer losses to predators occur when nests are located under sagebrush, where there is residual grass cover, and where shrub cover at immediate nest sites is greater than surrounding shrub cover (Gregg 1991, Wallestad and Pyrah 1974). In eastern Oregon, both natural nests and artificial sage grouse nests were least preyed upon when located where shrubs were medium height (16 to 32 inches), with cover of residual grasses 7 inches or more (Gregg et al. 1994, DeLong et al. 1995).

### **Non-nesting habitat**

Hens not nesting and males gather in flocks during the nesting season. They may feed in relatively open areas such as low sagebrush sites, burned areas or other locations where forbs are abundant. They roost in adjacent sagebrush (Klebenow 1972). In Nevada and southeastern Oregon, these flocks consistently used mosaics of low sagebrush and big sagebrush or stands of Wyoming big sagebrush (Savage 1969, Gregg et al. 1993). In May on southeastern Idaho's Snake River Plains, groups of non-nesting birds were found just above the upper elevations favored by nesting grouse. In late May, they disappeared, migrating to higher elevations and their summering areas (Klebenow 1985).

## **EARLY BROOD REARING HABITAT**

### **June to July**

Broods are tied to food and cover. Insects and forbs are important during a brood's first month of life when chicks require a diet high in protein. Abundant forbs and insects characterize high-quality brood habitat (Dunn and Braun 1986, Klott and Lindzey 1990, Drut et al. 1994, Apa 1998). In southeastern Oregon on an area with low grouse productivity, these food sources were less abundant and sagebrush became a major part of the chick's diet (Drut et al. 1994).

Forb species selected during this period include hawksbeard, milkvetch, common dandelion (*Taraxacum officinale*),



**By Donald Klebenow**

Wet meadows provide food and water for hens and chicks during the summer.

mountain dandelion, microsteris (*Microsteris gracilis*), broomrape (*Orobanche spp.*), clover, salsify (*Tragopogon spp.*), western yarrow (*Achillea millifolium*), prickly lettuce (*Lactuca serriola*), sego lily (*Calchortus spp.*) (*Calchortus spp.*) and others (Klebenow and Gray 1968, Savage 1969, Peterson 1970, Drut et al. 1994).

The major insects in a chick's diet are June beetles (*Fam. Scarabeidae*), darkling beetles (*Fam. Tenebrionidae*) and ants (*Fam. Formicidae*) (Klebenow and Gray 1968, Drut et al. 1994).

Brood-rearing habitat may be relatively open, with about 14 percent canopy cover of sagebrush (Wallestad 1971). Grouse will forage in areas where big sagebrush provides only 10 percent cover. They are nearly always found where

shrub cover is less than 30 percent (Klebenow 1969, 1985)

Habitats for brood-rearing often contain a mosaic of low sagebrush and big sagebrush sites. Their co-occurrence provides an optimum combination of food and cover. In Nevada, areas that provide an abundance of forbs are generally low sagebrush sites, or other sites occupied by dwarf sagebrush species. The edge between big and low sagebrush is important because sage grouse broods are seldom found far from big sagebrush cover, presumably because it provides better hiding cover.

## **LATE BROOD REARING HABITAT**

### **July through August**

As food plants mature and dry, grouse move to areas that support succulent vegetation (Eng 1952, Rogers 1964). These may be lower-elevation native or irrigated meadows located in a matrix of uplands without green herbaceous vegetation. Succulent plants can also be found at higher elevation sites typically in moist grassy areas or upland meadows (Klebenow 1969, Gill 1965, Savage 1969, Oakleaf 1971, Wallestad 1971). Delays in maturing forbs have a noticeable effect on bird movements. Where habitat that is in good condition in above normal precipitation years, grouse may find succulent forbs on dryer upland sites all summer (Savage 1969). This is not the usual situation, however.

Upland sage grouse habitat in Nevada typically is more arid than upland habitat in most Western states. This results in meadows being an important part of the late summer brood habitat. From mid to late summer, stringer meadows in drainages, meadows associated with springs and streams, and irrigated hay fields provide the highest abundance of forbs for juvenile birds. The drier the summer, the more the birds are attracted to the relatively few green areas (Klebenow 1985).

These green areas support cattle as well as sage grouse. Their dual use of the same meadows does not necessarily conflict. Research has shown that grouse select grazed meadows over ungrazed meadows (Neel 1980, Evans 1985, Klebenow 1985). Early in the summer, grouse use both grazed and ungrazed meadows and are found where the height of grasses and forbs is less than average. On a northwestern Nevada study, the birds were found where vegetation height ranged from 3 to 6 inches, whereas surrounding vegetation ranged from 4 to 10 inches tall. Grouse selection for shorter vegetation disappears as the summer progresses on a grazed meadow if all plants are grazed closely to the ground. For safety on closely grazed meadows, grouse must rely on cover provided by sagebrush on the meadow edge. Given a choice, the grouse appear to select areas where grasses and forbs are approximately 4 inches tall (Klebenow 1985). This height provides them adequate hiding cover as they will press to the ground to avoid detection.

An optimum meadow for grouse would be one that is grazed in a fashion that enables sage grouse to select the cover height they prefer. When grazed to an average of 4 inches, there will be portions of the meadow grazed more closely and areas with taller vegetation, a mosaic grouse find most suitable for foraging and hiding. With such cover, sage grouse broods may be observed a considerable distance from the edge of meadows or hay fields.

In addition to reducing vegetation height, grazing improves the quality of the food plants eaten by sage grouse. When birds first appear on meadows (usually mid-July in northwestern Nevada), both grazed and ungrazed areas are attractive to the birds. The main attraction at that time is the availability of forbs, of which common dandelion is a valuable species. By mid-August, food plants on the grazed meadows remain succulent and green. Vegetation on ungrazed meadows typically has cured. Regrowth of grazed food plants contains more moisture and more nutrients than ungrazed plants, and this regrowth is sought by grouse (Evans 1985).

Ideally, the spring and summer habitats used for nesting and brood-rearing should be in close proximity since much of the travel from early brood-rearing to late brood-rearing habitats is on foot. A mosaic of sagebrush sites interspersed with meadows is the desired combination.

## **FALL HABITAT**

Sage grouse form flocks as brood groups break up in early fall. Both desiccation and frost result in the drying or killing



**By Gary Back**

This meandering stream and meadows mixed with sagebrush provide a diversity of good sage grouse habitat.

of forbs in the meadows. The consumption of sagebrush increases, and it continues to be the major food item throughout the winter (Rasmussen and Griner 1938, Patterson 1952, Leach and Hensley 1954, Gill 1965 Wallestad et al. 1975). 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. Winter habitat has sagebrush stems and leaves that protrude above the snow. Movements to wintering areas vary widely, ranging from a few miles to more than 50 miles, depending on the area. Hens have been observed in Montana moving to wintering areas before heavy snowfall, which indicated fidelity for specific winter areas (Berry and Eng 1985). Throughout the range of sage grouse, dependent upon location and availability, virtually all species of sagebrush are consumed. At any given locality, wintering habitat needs to be identified and managed because loss of sagebrush on winter ranges can lead to the loss of a sage grouse population.

In northeastern Nevada, low sagebrush is the preferred forage in fall and early winter. Since this species is often covered by snow for extensive periods in mid- to late-winter, sage grouse switch to Wyoming big sagebrush (Back no date).

Winter habitat varies with climatic conditions. Sage grouse will roost in open, low sagebrush sites on clear, calm nights if the temperatures remain above approximately 10 degrees Fahrenheit. On windy nights or during snowstorms, sage grouse seek out taller shrubs with greater canopy cover (more than 20 percent). When night temperatures drop below 10 degrees and deep powdery snow is available, sage grouse will snow burrow to conserve energy (Back et al. 1987). Sage grouse will fly considerable distances (more than 5 miles) and elevations (more than 1,000 feet) between winter feeding sites and suitable snow roosting sites when temperatures drop below 10 degrees (Back, no date).

### **MANAGEMENT RECOMMENDATIONS**

Take a close look at sage grouse habitat in your area. Are sage grouse populations optimum for the habitat? If the habitat is not in good condition or sage grouse populations are low, determine what is missing. Have birds on leks decreased or disappeared? If so, is the reason apparent? Is the sagebrush canopy cover too dense, too low or too tall? Is the ground cover under 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, cover and water for birds in the summer? Do wintering areas contain the varieties, densities and heights of sagebrush the birds prefer?



**By Gary Back**

Sagebrush leaves constitute the entire diet for sage grouse in winter. The birds must find sagebrush above the snow for subsistence.

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

1. Complete sagebrush eradication treatments over large areas should not be practiced, particularly on a large scale. However, thinning sagebrush to enhance forb and grass production while maintaining about 15 percent shrub cover could enhance grouse habitat. Small burns conducted in a mosaic to enhance forbs and create age-class diversity of mountain big sagebrush (*A. t. vaseyana*) will provide benefits. Use caution with prescribed burning in Wyoming big sagebrush – there may be potential for invasion of annual grasses, and shrub recovery on these dry sites is extremely slow. Plan prescribed fires carefully as removal of large expanses of sagebrush is detrimental to grouse. The proper pattern of interspersion and ideal size of burn sites for enhancement of chick foods remains unknown. Complete removal of sagebrush from patches in a large matrix of sagebrush is not considered sagebrush eradication and may be the prescription for enhancing sites with declining sage grouse habitat.
2. 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 grasses. Protect seeded areas from grazing until seeded species are established.
3. In low rainfall zones where wildfire in Wyoming big sagebrush leads to the establishment of cheatgrass or other introduced annuals, the competitive ability of exotic annuals prevents the ready rehabilitation of native species of grasses, forbs and shrubs. It may be necessary to seed a perennial species of grass capable of competing with the annual species in order to occupy the site. Once this perennial species is established, the site may be interseeded with native species, particularly the forbs and shrubs sage grouse require.
4. 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. Monoculture seedings designed strictly to increase grass production are discouraged. Use plant species adapted to the site's soil type, elevation and amount of precipitation. Consider sage grouse food habits when selecting forb species, with special consideration of the species with milky juice found in the Compositae family.
5. During insect outbreaks, consider sage grouse presence before spraying insecticides. Insects are essential for survival and normal development of chicks up to 3 weeks of age. Furthermore, sage grouse die-offs have been documented when exposed to organophosphorus insecticides applied to cultivated crops in areas occupied by sage grouse.
6. Livestock use around water sources and wet meadows in brood-rearing areas should be regulated through fencing or herding management to restrict overuse, thereby protecting vulnerable forbs and grasses. Light or moderate livestock

grazing inside meadow exclosures during the summer enhances the food quality for grouse. Initiate a program of reestablishment where meadows have been depleted. Restoration of watershed quality and replacement of basin big sagebrush (*A. t. tridentata*) with meadow vegetation should be the goal.

7. Manage for a variety of sagebrush cover depending on how the area is used by sage grouse: 15 percent to 30 percent sagebrush canopy cover for nesting, 5 percent to 15 percent cover in summer habitat or 20 percent to 35 percent in winter.

8. Manage livestock grazing to insure that residual grasses remain for nest concealment, and optimum growth of forbs, grasses and sagebrush. The grazing system, grazing duration, kind of animals, and stocking intensity should be adjusted to maximize the vegetative goals.

### ADDITIONAL INFORMATION

To obtain more information on restoration of sage grouse habitat, contact:

Nevada Wildlife Federation, Inc.

Nevada Division of Wildlife

Nevada Farm Bureau

U.S. Natural Resources Conservation Service

U.S. Bureau of Land Management

U.S. Forest Service

University of Nevada, Reno, Cooperative Extension Service

The Web version of this paper was last revised in April 2002. This paper was first published by the Nevada Wildlife Federation in October 2001. A paper copy of this booklet was printing January 2002. The paper copies are available by calling (775) 677-0927 or (775) 885-0405 or writing Nevada Wildlife Federation, P.O. Box 71237, Reno, NV 89570.

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**Funding for this guide was made possible through the generous donations of the Daily Sparks Tribune, Nevada Section, Society for Range Management; Nevada Wildlife Federation; Northeast Nevada Stewardship Group; Patagonia; The Wildlife Society and Quail Unlimited.**