

# The Habitat Requirements of Sage Grouse and the Role of Fire in Management

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SAGE grouse (*Centrocercus urophasianus* Bonaparte), due to their dependence upon sagebrush-grassland habitat for food and cover, are limited in distribution to the range type dominated by sagebrush, principally big sagebrush (*Artemisia tridentata*) but also its related species.

Much of their habitat is in a depleted condition. The extent of the depletion of rangelands was recognized as far back as 1936 when the Secretary of Agriculture described the western ranges as “. . . a great but neglected natural resource.” (Wallace 1936). The major finding of his report was that range depletion was so nearly universal that the exceptions served only to prove the rule (Clapp 1936). The sagebrush-grassland ranges suffered along with the rest. From a rather sparse cover of sagebrush beneath which was a rich stand of palatable perennial grasses and weeds, the stands deteriorated to higher density brush types with less perennial grasses and weeds. Many ranges no longer contained palatable grasses and forbs. Over a large part of the sagebrush grassland, practically the only livestock forage left was the sagebrush itself (McArdle et al. 1936). The condition classes were described by Pechanec and Stewart (1949) for southern Idaho ranges. Ones in satisfactory condition were those

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with a good understory of perennial grasses and weeds. Unsatisfactory condition included: "Sagebrush with a sparse understory of perennial grasses; sagebrush with principally annual grasses and weeds in the understory; and ranges on which the original vegetation has been almost completely replaced by annual grasses or weeds." A considerable percentage of our sagebrush rangelands are still in the three unsatisfactory range condition classes.

#### **THE IMPACT OF HABITAT CHANGE ON SAGE GROUSE**

The depletion of rangelands was paralleled with a decline in sage grouse populations. Western sportsmen and conservationists were expressing concern regarding the downward trend as early as 1906 (Patterson 1952). This sage grouse decline coincided rather closely with the period of maximum utilization of range resources by livestock from 1900 to 1915. From 1935 to 1950, with grazing management changes made possible by the Taylor Grazing Act including a marked reduction in the numbers of sheep permitted on most grazing districts, the sage grouse decline reversed itself and populations again rose, but not to their former levels. Patterson (1952) estimated that 50 percent of the original sage grouse range had been destroyed by settlement and civilization. Habitat was lost due to grazing, agriculture, to urban development, to industry such as oil and mining and to reclamation projects involving dams. Much of this is native rangeland that still can be reclaimed by habitat management.

#### **THE HABITAT REQUIREMENTS OF SAGE GROUSE**

Habitat management must consider the large areas sage grouse require in their annual cycle of movements. This is particularly true where deep snow covers the spring and summer ranges. Then they must migrate to more desirable areas to return as the snow depths decrease. They begin the return in the spring, during late February or March, first noticed as a build-up of sage grouse on the breeding grounds (Patterson 1952; Dalke et al. 1963; Rogers 1964). These grounds are usually located at a point intermediate between the winter range and summer range. They are small, usually open areas, from  $\frac{1}{10}$  acre to 10 acres in size. Some areas are used year after year, dependent

on the grouse population size for any given year (Dalke et al. 1963) and others may be occupied in hard winters, but not in light or average winters. Snow conditions play a part in the suitability of an area for strutting as does the amount of vegetation.

The strutting ground, is an area supporting low, sparse sagebrush or else an area denuded of vegetation. Grassy swales, natural and irrigated meadows where grass has been removed, burned areas, cultivated fields adjacent to sagebrush-grass rangelands, cleared roadsides, etc., serve for this purpose with seemingly little attention paid to other land uses (Bean 1941; Carhart 1941; Patterson 1952; Dalke et al. 1963).

From the breeding grounds the hens disperse to nest. In southeastern Idaho Schlatterer (1960) found many hens nesting near the strutting grounds, but others have reported that while this did occur some may fly as far as 12 to 20 miles from the strutting grounds to favorable nesting areas (Rogers 1964; Gill 1965). The nesting habitat will often be a broad belt between summer and winter range (Bean 1941; Klebenow 1969).

Adequacy of cover is critical for nesting. There can be too little: where 13 percent was the average percent total crown cover on Idaho ranges nests were located where cover was 17 percent. No grouse nested in the most arid, open areas—less than 10 percent total shrub cover. The average shrub cover at 87 nest sites was 18.4 percent (Klebenow 1969). In more dense cover, grouse did not nest where total shrub cover was greater than 25 percent. Others have noted the avoidance of the more dense areas where brush is tall such as along watercourses and on moist areas and the preference for short sagebrush of medium density (Patterson 1952).

Hens that do not nest and males gather in flocks during the nesting season, feeding on areas that are relatively open and roosting in more dense clumps or patches of sagebrush. In Nevada, these flocks consistently used low sagebrush (*Artemisia arbuscula*) flats with scattered islands of big sagebrush during this period (Savage 1968). On the United States Sheep Experiment Station near Dubois, Idaho, most of the birds used an area that had been burned in 1936 as an experiment to control sagebrush (Blaisdell 1953). In late May they disappeared, presumably migrating to higher elevation near their summering areas.

Broods are tied to food in addition to cover. Their diet is chiefly insects early in life, shifting to succulent forbs and shrub foliage as they develop (Patterson 1952; Klebenow and Gray 1968; Savage 1968). The succulence of their favored foods appeared to be a key to their movements (Klebenow 1969; Wallestad 1971). Favored foods are common dandelion (*Taraxacum officinale*), common salsify (*Tragopogon dubius*), western yarrow (*Achillea millifolium*), prickly lettuce (*Lactuca serriola*), sego lily (*Calochortus macrocarpus*) and others (Klebenow and Gray 1968; Savage 1968; Peterson 1970). As food plants mature and dry, the grouse move to areas still supporting succulent vegetation. These may be lower elevation native meadows or irrigated meadows when no uplands with green vegetation are in the area (Eng 1952; Rogers 1964) or they migrate upward, seeking out habitats where succulent forbs are still available such as more mesic swales (Klebenow 1969; Wallestad 1971) or upland meadows (Gill 1965; Savage 1968; Oakleaf 1971). A delay in maturing of forbs has a noticeable effect on bird movements. Savage (1968) noted that on one study site where the range was in good condition, grouse did not use the meadows one summer, apparently because moisture was adequate on the outside areas to keep succulent forbs available all summer.

Food is important, but all studies emphasize the need for cover. The usual case, however, is that the birds appear to prefer relatively open sagebrush vegetation types as compared to dense stands of sagebrush (Klebenow 1969; Wallestad 1971). In southern Idaho the percent canopy cover of big sagebrush at brood sites was 8.5 percent, significantly less than the average for the entire area, 14.3. Three out of 98 broods were found where total shrub cover was 40 to 49 percent; the rest were where cover was less than 31 percent (Klebenow 1969). Where there was an interspersed of openings mixed with dense sagebrush, they used the more open portions. There were large acreages of dense sagebrush where no birds were seen in three summers of sampling, i.e., the birds were counted when seen from a vehicle traveling at low speed in the evening. These routes were run at least weekly, sometimes several times or every evening during a week. Wallestad (1971) also reported that large tracts of dense sagebrush appeared to be undesirable brood habitat.

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In late August at high elevations, or in September or October in some lower areas, the meadows dry and the incidence of frost increases, leading to drying or killing of the foliage of forbs. The incidence of sagebrush consumption increases at that time (Rasmussen and Griner 1938; Patterson 1952; Leach and Hensley 1954; Gill 1965) and continues to be the major forage throughout the winter.

Wintering birds respond to snow. Snow depth forces the birds to lower elevations and appears to be a factor determining the actual wintering site for a flock (Girard 1935; Rasmussen and Griner 1938; Griner 1939; Patterson 1952; Pyrah 1954; Dalke et al. 1963). Deep snow limits the availability of food which is almost entirely sagebrush during the winter (Griner 1939; Patterson 1952). Black sage (*Artemisia nova*) was preferred as forage in southeastern Idaho and the sage grouse remain on the areas supporting this species until the snow covers their food and return again when the black sage is available (Pyrah 1954; Crawford 1960). Biologists and field personnel report a similar preference for low sagebrush on Nevada rangelands.

#### RANGE IMPROVEMENTS

Range improvements have come under criticism because of the impact on sage grouse. Trueblood (1952) and Enyeart (1956) in Utah and Anderson (1960) in Colorado have worked on the effects of reseeding. Reseeding is generally considered undesirable for sage grouse, however Rogers (1964) believed that reseeding can be beneficial to sage grouse in certain areas dependent upon the success of the reseeding, the percent of sagebrush destroyed, the number and size of sagebrush areas not destroyed because of topography or soils, and the vegetative succession following reseeding.

Much concern has been expressed regarding the welfare of wildlife and the possible conflict with sagebrush control programs involving herbicides. Not only is there a loss of cover when the sagebrush is sprayed, but there is the potential for the loss of forb food items as well (Quimby 1966). The effects of this type of control have been studied. Some of the results of a Colorado study were inconclusive, but they found spraying was not detrimental to strutting. They

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thought spraying may be a barrier to movement, particularly when the dead sagebrush stems have deteriorated. Birds avoided sprayed blocks on spring and winter ranges (Carr and Glover 1970). In Montana where strips of sagebrush were controlled, the sage grouse showed a preference for the areas left unsprayed and the author concluded this was related to vegetation composition (Martin 1970). No nesting occurred on sprayed areas in Idaho and the effect was noticeable for at least 5 years or more. Broods were less affected by herbicide treatment and continued to use some sprayed areas (Klebenow 1970).

Considering the needs of the birds and the effects of herbicide treatment I conclude that the possibility of conflict is great. But whether spraying is beneficial or harmful will be determined by the individual situation. Excessive removal of food and cover is not tolerable when these factors are significant as they are for broods. However, not all sagebrush-grassland is brood habitat and not all brood habitat is in the most desirable condition. Cover is most significant for nesting but not all sagebrush is nesting cover nor in the best of condition for nesting. Some control may be desirable in cases where the range has degraded to the point where it is unsuitable because of too great amounts of cover or high shrub density crowding out food plants. There is need for continued range improvement. Guidelines for improvement of depleted sagebrush rangelands must recognize that differences in habitat quality exists and that different sagebrush-grass rangelands may serve different purposes for sage grouse.

Nevada guidelines developed by the Fish and Game Commission recognize that some habitats are significant and high quality for sage grouse and should be entirely excluded from vegetal control programs (Christensen 1968). These include areas used for breeding and nesting, wintering ranges, cover adjacent to water courses or springs, upland meadows and other summering areas. They recommend that big sagebrush and other shrubs be removed to the extent of the original meadow boundary.

Of medium importance are extensive sagebrush covered areas (usually in a valley floor) which are not used for strutting, nesting, or as summer range and generally receive a low amount of sage grouse use. In these cases, control practices are allowed, but they

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recommend removal of sagebrush in irregular patterns, leaving islands of brush. No large blocks should be treated.

No major importance is associated with the areas of big sagebrush which are unoccupied by sage grouse. Nevada has many such areas, usually in valley floors or on surrounding slopes which often encompass the salt desert shrub vegetation type. Here there is no objection to control practices.

### ROLE OF FIRE

Recognizing the significance of sagebrush to sage grouse, it is obvious that sage grouse have not increased proportionately to the increase in sagebrush. Factors other than sagebrush are significant as well. Nesting requires cover but of a certain type, not too dense, not too sparse. Ten percent total shrub cover is a minimum, 15 to 20 percent is near optimum. Broods require food, mainly forbs, in addition to cover. Both may be in one given acre of land, but the birds also use and appear to seek areas where there is an interspersion of habitat types. They only feed in areas where cover is nearby.

Fire seemingly can be an ideal tool to achieve our management objective, a diverse habitat providing for all the needs of the sage grouse. Schlatterer (1960) and Dalke et al. (1963) mentioned how an area unintentionally burned created a strutting ground that birds were quick to occupy. These openings are necessary for the birds and small burned areas, 1 to 10 acres in size, at the elevations utilized for breeding would be beneficial in homogeneous sagebrush types.

Nesting occurs in moderate density sagebrush. Where sage is dense habitat improvements could be achieved by moderate burning coupled with grazing management to get the mosaic of shrub plus grass and forb cover the sage grouse indicate they prefer. Repeated burning could be bad in this case, as could the use of large, hot fires where an excessive amount of cover is removed. Griner (1939) noted where burning caused a decline in Utah. Pyrah (1963) also alluded that fire has been a problem in some of the areas to be studied. Where cover is limiting, it has been a problem.

Broods seek out areas where their favored forbs are abundant. Meadows are significant food producing areas and Oakleaf (1971)

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described the needed desirable features, food adjacent to cover. Most sites such as this have been depleted by excessive grazing use and require rejuvenation. Sagebrush rangeland interspersed with meadows and other grassy openings has been converted to monotonous sagebrush-covered hills and valleys. Fire can be an important part of management to improve these lands. Burning small areas to achieve a mosaic of food and cover areas should produce a pattern most suitable for these birds. Different stages of successional growth would be desirable in order to produce the greatest variety of forb food items. Therefore, burning within one area should probably be done on a rotational basis, burning different patches each year or every few years, possibly with as long as 20 years between burning treatments on each site. A diversity of habitat types, in terms of both food and cover, should be an objective for this habitat. Fire appears to be an ideal tool. It creates openings and Blaisdell (1953) reported considerable higher yields of forbs on sites that had been intentionally burned.

In wintering habitats, there seems to be little place for fire since there is nearly a complete reliability on shrubs for both food and cover. It would be necessary for shrubs to remain on these ranges.

#### **PRESENT STATUS OF FIRE AS A TOOL IN NEVADA**

A small amount of burning is being done on public lands in Nevada. Management is taking the first steps in what hopefully will result in a more desirable practice than the present reliance on herbicides. The United States Forest Service has burned portions of ranges on two ranger districts on the Humboldt National Forest. Both ranges are summer habitats for sage grouse. Their objective was to increase the habitat diversity by creating openings, improving meadows, and increasing the amount and variety of food items for all occupants of each sagebrush-grass ecosystem. In one case approximately 650 acres of actual burned areas were interspersed through approximately 4,000 acres in one large pasture. Small, mostly irregular patches were burned. The burning was done in April, 1972, as soon as possible after snow melt. Wet conditions prevented the need for fire guards. After ignition, a fire would creep through a patch of sagebrush and



then go out. The burns remained small, less than an acre to possibly 20 acres. Few were as large as 20 acres. A month later it was apparent that the fires had little effect on the grasses and forbs.

The other site was one on which a wildfire occurred in August, 1971. At the time it occurred to the manager that this could be a desirable tool since the sagebrush being burned was in need of control. Follow-up prescribed burning was carried out in early May, 1972, to open some additional areas in the same pasture. My intent is to study the effects of these fires on this location. Preliminary observations indicated that the late summer wildfire may have been harmful to some of the grass and forbs components on some sites. These appeared to be the dense sagebrush pockets where fuel had accumulated and the fire burned very hot. Other areas appeared to be recovering quite well, particularly the portions burned in the spring. I consider that this mosaic of fire intensity will ultimately prove beneficial, providing a mosaic of vegetation responding to the variability in the treatment. My initial reaction to the wildfire was that possibly too little cover remained to be ideal sage grouse habitat. However, the overall effect should be beneficial. Approximately 600 acres burned in an area containing many thousands of acres of sagebrush. The fingers of openings that formed will provide desirable edge. Meadows are already obvious because of the dense carpet of green herbaceous material that now is exposed.

The prospect that fire may be a tool by which sagebrush-grassland habitats can be rejuvenated is an exciting thought. Here is a tool that is a natural regulating force to which organisms have adapted. The same cannot be said for most other means we have tried, clearing and seeding, leading to an exotic or depauperate environment for native species, or clearing large areas by mechanical means or herbicides and in doing so, removing necessary cover and possibly selectively removing food items.

Treatment cost is much lower when fire is used, even when done as on the Nevada ranges where small scattered areas are treated individually. A man makes a decision and prescribes the treatment on each individual site. No other control method provides this flexibility at less than half the cost of using herbicides.

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