

SAGE GROUSE USE OF NEST SITES IN SOUTHEASTERN IDAHO

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Abstract: We investigated nest site selection by sage grouse (*Centrocercus urophasianus*) in southeastern Idaho from 1987 to 1989. During 3 breeding seasons, 79% of 84 nest sites were found under sagebrush (*Artemisia* spp.). Nest success averaged 53% for grouse that used sagebrush and 22% for birds that used nonsagebrush nest sites. Total vegetative cover for sagebrush and nonsagebrush nest sites was similar. However, grass height was shorter ($P = 0.01$) at sagebrush compared to nonsagebrush nest sites. Herbaceous cover was important to nesting sage grouse but the relatively low nest success of nonsagebrush nest sites indicated they might provide less than optimal nesting habitat.

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Most studies that have examined sage grouse nest site selection reported that >90% of nests were found under sagebrush (Patterson 1952: 114, Gill 1965, Wallestad and Pyrah 1974, Braun et al. 1977, Gates 1983). Other species of shrubs commonly grow in sagebrush habitats (Tisdale and Hironaka 1981) but are seldom used by nesting sage grouse. Only Hulet et al. (1984) reported a relatively high incidence (34%) of sage grouse use of shrubs other than sagebrush (hereafter called nest shrub species) for nest sites. Unfortunately, Hulet et al. (1984) did not address the relationship of nest shrub species to habitat quality and nesting success.

Our purpose is to describe the use of nest shrub species by sage grouse in southeastern Idaho and to test the hypothesis that nesting success for grouse nesting under sagebrush is greater than that of grouse nesting under other plant species.

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STUDY AREA

The study areas were the Big Desert portion of the upper Snake River Plain and the Curlew Valley in southeastern Idaho. Topography of the Big Desert area is flat to gently rolling with frequent lava outcrops. Annual precipitation averages 23 cm with 40% falling from April through June. The area is classified as a Wyoming big sagebrush (*A. tridentata wyomingensis*)/bluebunch wheatgrass (*Agropyron spicatum*) habitat type (Hironaka et al. 1983). Although portions of the study area have been burned, most are dominated by native stands of sagebrush (Wakkinen 1990).

The Curlew Valley is about 90 km south of the Big Desert and consists of a sagebrush-dominated valley and foothills. Annual precipitation varies from 28 to 36 cm. The vegetation is generally more complex than that of the Big Desert. Mountain big sagebrush (*A. tridentata vaseyana*) and basin big sagebrush (*A. t. tridentata*) are common (Winward and Tisdale 1977), and the shrub community contains bitterbrush (*Purshia tridentata*), snowberry (*Symphoricarpos oreophilus*), and wild cherry (*Prunus* spp.). The area is intensively managed for cattle grazing, and sagebrush control programs (e.g., burning, discing, spraying) are commonly employed.

METHODS

Fieldwork was conducted from 1987 through 1989. We captured sage grouse hens by night-lighting (Wakkinen 1990) on and near leks dur-

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Table 1. Shrub characteristics of random plots on the Big Desert and Curlew Valley study areas in southeastern Idaho, 1987–89.

Area	n	Sagebrush			Rabbitbrush			Other shrubs		
		% canopy cover		Presence ^a (%)	% canopy cover		Presence (%)	% canopy cover		Presence (%)
		$\bar{x}$	SE		$\bar{x}$	SE		$\bar{x}$	SE	
Big Desert	70	16.9	0.8	99	3.1	0.4	90	0.9	0.2	51
Curlew Valley	17	23.6	3.6	94	1.6	1.0	47	8.6	2.7	82

^a Percent occurrence of the shrub on random plots.

ing March and early April. Birds were fitted with solar-powered transmitters attached to ponchos (Amstrup 1980). The radio package (transmitter and poncho) was ≤ 20 g. All grouse were also marked with numbered aluminum leg bands. Radio-marked hens were monitored throughout the nesting season. We located nests and inconspicuously marked them with natural materials placed >10 m or with flagging placed >30 m from the nest. We also located 14 active nests of unmarked hens and included them in our sample. We did not purposely flush or otherwise disturb nesting hens.

After a hen ceased her nesting efforts, we classified the nest as either successful or unsuccessful. A nest was considered successful if ≥ 1 egg hatched. Membrane condition of the eggs and/or visual observation of the hen with a brood were used to indicate nest fate.

We estimated shrub and grass cover along 4 20-m line intercepts (Canfield 1941) that were oriented from the nest along cardinal directions. Grass height was recorded at 5-m intervals along these lines, and nest bush size was determined by measuring the length and width of the shrub crown. We made similar measurements at sites selected by randomly generating Universal Transverse Mercator (UTM) points throughout the study area to allow comparison of vegetation at the nest site with that of the entire study area.

We used a G-test with a Williams correction factor (Sokal and Rohlf 1981) to evaluate success between grouse nesting under sagebrush and nonsagebrush shrubs and a *t*-test to evaluate vegetative characteristics associated with sagebrush and nonsagebrush nest sites. Differences were considered significant if *P* was ≤ 0.05 .

RESULTS

Success rates for nests under sagebrush (*n* = 60) did not vary among years ($\chi^2 = 1.03$, *P* > 0.05). Similarly, overall nest success rates did not differ (*P* > 0.05) between the Big Desert

(44%) and Curlew Valley (43%) study areas. Use of sagebrush for nest cover was also similar between study areas ($\chi^2 = 0.69$, *P* > 0.05). Because of these similarities and because habitats did not change over the study period, we pooled data over years and from both study areas.

Sagebrush was the most common shrub, and it provided $>16\%$ of the shrub canopy cover in both study areas (Table 1). This species occurred on $>90\%$ of the random plots in the Big Desert and Curlew Valley. Rabbitbrush (*Chrysothamnus* spp.) was also relatively common on both study areas but provided a much lower canopy cover than sagebrush (Table 1). The mean canopy cover of all other shrubs was also relatively low in both study areas.

Over 3 breeding seasons, we located 84 sage grouse nests (75 nests in Big Desert, 9 nests in Curlew Valley), and 18 (21%) of these were found under plants other than live sagebrush (Table 2). Sage grouse used plants other than sagebrush for nest sites in both study areas and in each of the 3 years. Besides sagebrush, shrubs used for nest sites included rabbitbrush, snowberry, and bitterbrush. Twenty of 21 yearling nest sites (95%) occurred under sagebrush, whereas 38 of 48 adult nest sites (79%) occurred under sagebrush (Table 2).

Although sage grouse selected nonsagebrush plants for nest sites, nesting success for these birds was less (*P* < 0.025) than that for grouse using sagebrush for nest sites (Table 3). Over 3 years, nesting success was about 2 times greater for grouse nests under sagebrush than for nests

Table 2. Number of sage grouse nests under different plant types in southeastern Idaho, 1987–89.

Age of hen	Sagebrush	Other shrubs	Dead shrubs	Grass
Yearling	20	1	0	0
Ad	38	8	1	1
Unknown	8	4	1	2
Totals	66	13	2	3

1980). This might explain why nesting success was higher for nests under sagebrush; however, we could not test this hypothesis directly.

MANAGEMENT IMPLICATIONS

Although we found greater use of nonsagebrush plants as nest sites of sage grouse than had been reported previously, we do not suggest that sagebrush is less important for nesting habitat than was suggested by Braun et al. (1977). Rather, we believe that the relatively low nest success of nonsagebrush nest sites indicates that they are less than optimal. Therefore, conversion of large tracts of sagebrush habitat to other vegetation (e.g., crested wheatgrass [*Agropyron cristatum*]) will probably result in declining sage grouse populations because of reduced nesting success.

Some sage grouse leks persist even after sagebrush areas have been burned (Hulet et al. 1984; J. W. Connelly, unpubl. data). Our data suggest that 1 reason sage grouse continue to use leks in altered areas is because some hens successfully nest under nonsagebrush plants. Persistence of leks in burned areas should not be interpreted as evidence that the fire had little effect on the sage grouse population. The long-term influences of range fires on sage grouse populations have not been well documented. Sage grouse use of nonsagebrush shrubs for nest sites may allow populations to persist at low levels in a burned area until the area recovers. However, this behavior may also simply act to slow, but not prevent, the birds' ultimate disappearance from the burned area.

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