

## Characteristics of Drumming Habitat of Ruffed Grouse in Indiana

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### Introduction

The drumming of the male ruffed grouse (*Bonasa umbellus*) is part of its territorial and reproductive behavior. Drumming sites are the focal point of spring courtship activity and relatively easy to identify. Several studies have concentrated on describing habitat characteristics around drumming sites (Palmer 1963, Boag and Sumanik 1969, Stoll et al. 1975, Sousa 1978). Drumming sites are generally associated with dense understories of young trees or shrubs (Boag 1976, Hale et al. 1982). Gullion (1977) described optimum drumming habitat to be composed of 14,000-20,000 woody stems per ha. The objective of this study was to describe the vegetative characteristics of drumming sites used by ruffed grouse in Indiana.

### Study Area

Drumming sites were studied on 3 areas. Thirty-two drumming sites were examined on 517 ha of the Jasper-Pulaski State Fish and Wildlife Area in northwest Indiana. Field work was conducted as part of an evaluation of ruffed grouse releases made in 1970 and 1971 (Kelly 1971, Kelly and Kirkpatrick 1979). The area is composed of two vegetative communities. The upland hardwood-brush community occurs on dry, sandy ridges and is dominated by black, white, and red oaks (*Quercus velutina*, *Q. alba* and *Q. rubra*). Brush consists of scrub oak, principally stunted black oak, sprouted from burned hardwood areas. The lowland-woody association consists of moist areas dominated by river birch (*Betula nigra*), quaking aspen (*Populus tremuloides*), and pin oak (*Q. paulstris*).

Sixteen drumming sites were also examined on each of two study areas in unglaciated, southcentral Indiana on Hoosier National Forest. One area was Happy Hollow, 320 ha, located in Perry County; T4S, R1W, section 3. The other area, referred to as the Maumee Grouse Study Area, located on the Jackson-Brown county line consists of 335 ha; T7N, R2E, sections 11, 12, 13, and 14. Common upland species include red, black, white, and chestnut oaks (*Q. prinus*), American beech (*Fagus gradifolia*), and hickories (*Carya* spp.). Common lowland species include ash (*Fraxinus* spp.), yellow-poplar (*Liriodendron tulipifera*), elm (*Ulmus* spp.), sycamore (*Platanus occidentalis*), and river birch. Several pines (*Pinus strobus*, *rubra*, *virginiana*, and *echinata*) are found in small plantations introduced by various public agencies. Common understory species include blackberry (*Rubus* spp.), cherry (*Prunus* spp.), sassafras (*Sassafras albidum*), ironwood (*Ostrya virginiana*), greenbriar (*Smilax* spp.), flowering dogwood (*Cornus florida*), maples (*Acer saccharum* and *rubrum*), and sumac (*Rhus* spp.).

### Methods

Male grouse were located by listening for drumming and searching for the drum-

ming stage (the spot where a grouse habitually stands while drumming) from late-March through mid-April. Good indications of an actively used drumming state are an accumulation of fecal droppings on the stage, molted feathers, and a bare spot of ground at the base of the log where leaves have been blown away by the drumming performance. The physical characteristics of the drumming stage are generally not considered important (Gullion 1967, Boag and Sumanik 1969). Ruffed grouse are known to use rock ledges, boulders, rock walls, moss mounds, upturned roots, and stumps (Frank 1947, Bump et al. 1947). All stages used in this study were downed logs.

Characteristics of the vegetation directly surrounding used drumming logs were compared to similar but unused logs located within 50 m of the used log and to the surrounding vegetation sampled at 4 points 20 m from each used log in 4 cardinal directions. The mean value of each vegetational parameter measured at the 4 20-m points was used to represent the surrounding vegetation. Trees (woody species  $\geq 13$  cm diameter at breast height, DBH) were tallied by point sampling at the drumming stage with a 10-factor, basal area prism (Beers and Miller 1964). A similar point was sampled at each unused log and at the 4 20-m points. A 0.002 ha circular plot (radius = 2.5 m) centered at the drumming stage and the other sample points was used to sample shrubs (wood species  $< 13$  cm DBH). The herb layer vegetation was not sampled since it is absent during the early spring and thus would not influence the selection of drumming sites (Boag and Sumanik 1969, Palmer 1963). Tree and shrub frequencies were reported as their proportional occurrence in the plots sampled. An analysis of variance and Duncan's new multiple-range test (Steel and Torrie 1960) were used to determine differences in the tree and shrub densities surrounding used logs, unused logs, and 20-m plots.

### Results and Discussion

Tree densities were similar ( $P > 0.05$ ;  $F = 1.21$ ) at the three sample plots (Table 1). However, shrub densities were greatest at used drumming logs ( $P < 0.01$ ;  $F = 16.05$ ) and were the most important variable in determining drumming log use. High shrub

TABLE 1. Tree and shrub densities (stems per ha) surrounding used drumming logs, unused logs, and at sample points 20 m from drumming logs used by ruffed grouse in Indiana.

Variable	Used Logs	Unused Logs	20-m Plots
TREES			
$\bar{x}$	258	222	216 <sup>1</sup>
SE	26.5	19.7	13.0
Range	0-1,389	6-582	6-591
SHRUBS			
$\bar{x}$	34,914	20,789	21,350
SE	2,425.4	1,869.5	1,769.3
Range	4,500-87,500	1,500-63,000	1,750-49,995
OVERALL			
$\bar{x}$	35,172	21,011	21,566
SE	2,366.0	1,830.0	1,555.0
n	64	64	64
Range	4,500-88,889	1,506-63,582	1,756-50,586

<sup>1</sup>Any two means not underscored by the same line are significantly different; those underscored are not ( $P \leq 0.05$ ); Duncan's New Multiple Range Test.

densities were responsible for the overall woody stem densities being greatest at used drumming logs ( $P < 0.01$ ;  $F = 16.96$ ). The importance of a dense shrub layer in the selection of drumming sites by ruffed grouse has been determined previously (Boag and Sumanik 1969, Rusch and Keith 1971, Boag 1976, Stoll et al. 1979) and is further supported by results of this study. The overall mean stem density for drumming logs used in Indiana falls within the range of values reported elsewhere (Palmer 1963, Boag and Sumanik 1969, Rusch and Keith 1971, Gullion 1977, Sousa 1978, Stoll et al. 1979, Hale et al. 1982).

Species composition of the vegetation sampled generally reflected the overall composition of the study areas (Table 2). Oaks were the most common trees occurring

TABLE 2. Vegetative composition surrounding used drumming logs, unused logs, and at sample points 20 m from logs used by ruffed grouse in Indiana.<sup>1</sup>

Variable	Used Logs %	Unused Logs %	20-m Plots %
TREES			
<i>Quercus velutina</i>	39	45	67
<i>Quercus alba</i>	47	67	77
<i>Quercus palustris</i>	23	17	45
<i>Carya glabra</i>	9	13	23
<i>Quercus rubra</i>	11	25	33
<i>Populus spp.</i>	12	8	24
SHRUBS			
<i>Prunus virginiana</i>	36	25	41
<i>Rubus spp.</i>	34	25	53
<i>Cornus florida</i>	41	41	50
<i>Sassafras albidum</i>	45	48	72
<i>Prunus serotina</i>	34	25	53
<i>Smilax sqp.</i>	23	30	33
<i>Quercus alba</i>	44	50	77
<i>Ostrya virginiana</i>	30	34	41

<sup>1</sup>Tree and shrub frequencies reported as their proportional occurrence in the plots sampled.

around used drumming logs in Indiana. Shrub species occurring at high frequencies around used drumming logs were cherry, blackberry, flowering dogwood, sassafras, and greenbriar. Although aspen is considered an important component of ruffed grouse habitat in the Lake States (Gullion 1977) it occurred at relatively low frequency in our sample plots. Overall, the vegetation surrounding used drumming logs reflected the species composition of early seral or understory types indicative of the central hardwood forests of Indiana. Species composition is generally considered less important in determining drumming site use than the physical structure of the vegetation (Stoll et al. 1979, Hale et al. 1982).

### Conclusions

Habitat around drumming logs used by ruffed grouse in Indiana is generally characterized by high woody stem densities. The mean number of stems around 64 used drumming logs was 35,172 stems/ha, ranging from 4,500 to 88,889 stems/ha. Stem densities around unused logs averaged 21,011 stems/ha ranging from 1,506-63,582 stems/ha. Stem densities at sample points 20 m from drumming logs averaged 21,566 stems/ha, ranging from 1,756-50,586 stems/ha. Differences in shrub densities separated

used from unused logs. Results from this study agreed with similar studies elsewhere, indicating that the physical structure of the habitat, primarily the shrub layer, governs drumming log selection.

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