

Abundance of Whip-poor-wills, *Caprimulgus vociferous*, In the Sand Ridge State Forest

Richard G. Bjorklund and Eric R. Bjorklund
Department of Biology, Bradley University
Peoria, Illinois 61625

ABSTRACT

A standardized procedure for censusing caprimulgids (Aves: Caprimulgidae) was established in the Sand Ridge Forest in 1981 and repeated in 1983. Calling-counts were made from seven listening stations along a prescribed five kilometer route through representative forest cover types. Three species of caprimulgids summer on the Forest, but only Whip-poor-wills, *Caprimulgus vociferous*, were numerous enough to determine (1) conditions favoring reliable calling-counts, and (2) abundance in various forest cover types. Calling occurs from April through August, but June is the best month for censusing. The number of calls detected was maximal on moonlit nights when winds were calm or very light, not exceeding Beaufort wind code 3 (8-12 mph). Moonlight, and perhaps high humidity, enhanced vigor of calling. In June, number and vigor of calls was unaffected by temperatures within the range of 8-27°C; however, rainfall markedly reduced calling. Counts completed 30 minutes before sunrise yielded virtually the same results as counts initiated 30 minutes after sunset. For both years, calling-counts were greatest at a station surrounded by mixed pine and oak cover interspersed with wildlife food and cover plots and a campground; oak stands were intermediate, and a station surrounded by pine plantations lowest, in calls recorded. Based upon the highest June count, approximately 220 Whip-poor-will territories were established on the forest in 1981 and 188 territories in 1983. Estimates based upon the average of six June counts made under favorable conditions were 202 territories in 1981 and 158 in 1983.

INTRODUCTION

The Sand Ridge Forest, located in Mason County, is a 3,000 hectare peninsular island of sand scrub hardwoods, conifer plantations, and mixed stands surrounded almost completely by agricultural land. Only a narrow forested isthmus at its

northwest corner connects the Forest with the Illinois River Valley. Members of three species of caprimulgids (Aves: Caprimulgidae), all more often heard than seen, are summer residents of the Forest. They are: Whip-poor-will, *Caprimulgus vociferous*, Chuck-will's-widow, *Caprimulgus carolinensis*, and Common Nighthawk, *Chordeiles minor*. In 1981 the Illinois Department of Conservation funded a survey of the breeding birds of the Forest. As part of that survey, we established a transect for spot censusing caprimulgids from calling-counts in order to determine the abundance and habitat preferences of the three species present. The calling-count procedure initiated in 1981 was repeated in 1983. However, only Whip-poor-wills were numerous enough to determine (1) conditions favorable to reliable counts, and (2) abundance in various forest cover types. Information on behavior and nesting, obtained for all three species, is being reported separately (Bjorklund and Bjorklund, 1984).

METHODS

Standard methods prescribed by the Department of Conservation for censusing breeding birds were necessarily modified for caprimulgids, inasmuch as they are predominately crepuscular and nocturnal, although nighthawks are sometimes active during the day and are a common sight in urban areas with flat roofed buildings. Counts were made by listening for species specific calls at seven stations located at 0.8 km intervals along an unpaved sand road (Sand Ridge Road) which runs east-west through the Forest. The most easterly station was established near the Pine Campground; the most westerly, at the west edge of the Forest. The time spent listening at each station was standardized at 3 min. The counts were started from alternate ends of the route in successive count periods, each of which began with 30 min. of sundown or early enough to conclude 30 min. before sunrise. Until July 1983, counts were paired to make morning-evening comparisons possible. The station intervals and the listening time chosen were fortuitous for, after filing our 1981 field report with the Department of Conservation, Cooper (1981) published his study of the abundance of caprimulgids in Georgia in which he used an identical procedure, except that he began all of his counts at sundown.

Pertinent environmental information — temperature, wind and sky conditions, phase and timing of rising and setting of the moon, humidity, and precipitation were recorded for each census along with the number of calls and field notes on the vigor of calling at each station.

In aggregate, the cover types associated with the seven stations, closely approximate the principal cover types for the forest, which are: 54% deciduous sand forest, predominantly black oak, *Quercus velutina*, and blackjack oak, *Quercus marilandica*; 35% pine plantations, predominantly jack pine, *Pinus banksiana*, red pine, *Pinus resinosa*, white pine, *Pinus strobus*, pitch pine, *Pinus rigida*, and Virginia pine, *Pinus virginiana*; and 10% brush, crop and forage, and developed areas (campgrounds, fish hatchery). The remainder consists of sand prairie and ponds. All of the types are crossed or encircled by firebreaks, which along with several sand roads, create considerable weedy and brushy edge.

RESULTS

Calling occurs from April to August; but June is the best month for censusing, as territories are well established. Results for counts made under various condi-

tions are summarized in Table 1. Unless otherwise noted, assume that winds were calm (Beaufort code 0) or were very slight (Beaufort 1). Only temperature extremes are noted in the table.

During June in both 1981 and 1983, maximum counts were obtained when winds were calm and the moon one quarter to full, although a maximum count was also obtained on the morning of 10 June 1981 after the moon had set, and a high count was recorded on 3 June 1981 when the moon was new. A good demonstration of the effect of moonlight occurred on 15 June, 1983 when a heavy cloud bank completely obscured the moon during counts at the last two stations reducing them from the total of six or seven obtained under moonlit conditions to a total of three calls of reduced vigor. Temperature in June, within the wide range noted in the table, had no effect on the number of calling Whip-poor-wills. However, the vigor of calling was noticeably enhanced on warm humid nights, though moonlight was also a factor in each such instance. While high humidity did not lessen calling of Whip-poor-wills, light rainfall did.

In Sand Ridge Forest, winds of Beaufort 3 or greater generate leaf rustle in deciduous stands and equivalent sounds in pine plantations, sufficient to reduce detectability of calling birds. The moderate velocities (12-15 mph) we experienced on 14 June 1981, may not reduce calling; however, data obtained during winds of even moderate velocity are unreliable because of the detectability problem.

The effect of calendar date is indicated in the reduced calling totals for July, despite otherwise favorable conditions.

Table 2, which displays results of six counts made under favorable conditions for each of the years 1981 and 1983, shows that there is no discernable difference between morning and evening counts made when conditions are favorable. It also shows that mixed cover, especially when food and cover plots or exceptional amounts of forest edge are present (stations 1, 2, 5, and 7), produced consistently higher totals of calling in both years. Deciduous stands dominated by oak trees (stations 3 and 4) ranked second, while a station (6) surrounded by pine plantations produced the lowest calling-count in both years. Lower total calling-counts obtained at every station in 1983 compared with 1981, strongly suggest a lower breeding population of Whip-poor-wills in 1983.

DISCUSSION

Although we found near zero wind velocity most important for reliable censusing of Whip-poor-wills and other caprimulgids from calling-counts, moonlight does appear to have a positive effect on the number of individuals calling and the vigor of calling in Whip-poor-wills. Cadbury (1981) discounted moonlight as an enhancing factor in calling of the Nightjar, *Caprimulgus europaeus*, in the English countryside; however, Cooper (1981) documented the positive effect of moonlight particularly well by monitoring calls of Whip-poor-wills and Chuck-will's-widows before, during, and following a lunar eclipse. Without reporting the wind velocities prevailing during his observations, Cooper discounts wind as a factor affecting the results of calling-counts of caprimulgids. In contrast, we are in agreement with Cadbury (1981) who reported that winds above Beaufort 3 (8-12 mph) adversely affect detectability of calling in nightjars. We are also in agreement with both Cooper and Cadbury regarding the negative effects of rainfall on calling.

With regard to habitat preference, Cooper (1981) found that the Whip-poor-

will, which is extending its range into Georgia, showed a preference for wooded habitat while the Chuck-will's-widow showed an affinity for open areas at the edge of woods. Thus the two species are unlikely to compete for breeding territories, even when present in the same general cover type. This is of interest to us because the Chuck-will's-widow, a rare migrant and summer resident in central Illinois (Bohlen, 1978), was not detected on the Forest until 1975 (Bjorklund, 1981). Over-migrants of this species are establishing a small breeding population in a somewhat open area of the Forest which resembles descriptions of its preferred habitat (Bent, 1940). However, in the open areas at Sand Ridge Forest, the Chuck-will's-widow may be brought into conflict with the Common Nighthawk (Bjorklund and Bjorklund, 1984).

The number of Whip-poor-will territories on the Forest may be estimated using data from Table 2 and an assumption for spot censusing other species of birds by the Illinois Department of Conservation procedure. We assume that under favorable conditions Whip-poor-wills, like most other avian species, can be detected from an area of approximately 64 hectares (160 acres) surrounding each station; thus, we estimate that in 1981 there were 202 Whip-poor-will territories on the 3,000 hectare forest, while in 1983 the number of territories was 158. If we use only the highest June count for each of the two years, the estimated number of territories is 220 in 1981 and 188 in 1983. The decline in calling was apparent at all sampling stations. Its cause is unknown to us.

The average number of calling Whip-poor-wills per station in June was 4.3 in 1981 and 3.3 in 1983. In forest habitat in Georgia, the average number of calling Whip-poor-wills per station in June 1981 was approximately 3.2, but if the number of calling Chuck-will's-widows is included, the average is about 4.2 for caprimulgids.

LITERATURE CITED

- Bent, A.C. 1940. Life histories of North American cuckoos, goatsuckers, hummingbirds, and their allies. *U.S. Natl. Mus. Bull.* 176. 506 pp.
- Bjorklund, R.G. 1981. Observational evidence for homing in birds. *Ill. Aud. Bull.* 195:27-28.
- _____, and E.R. Bjorklund. 1984. Notes on the behavior and nesting of caprimulgids in the Sand Ridge State Forest. *Ill. Aud. Bull.* (in press).
- Bohlen, H.D. 1978. *An Annotated Check-List of the Birds of Illinois*. Springfield: Illinois State Museum popular science series. 154 pp.
- Cadbury, C.J. 1981. Nightjar census methods. *Bird Study* 28(1):1-4.
- Cooper, R.J. 1981. Relative abundance of Georgia caprimulgids based on call-counts. *Wilson Bull.* 93(3):363-371.

Table 1. Number of calling Whip-poor-wills under various conditions, Sand Ridge Forest, 1981 and 1983.

Time	1981	Noteworthy Conditions	Number Calls	1983	Noteworthy Conditions	Number Calls
AM	3 June	ground fog	28	1 June	moon last quarter; 8°C	25
PM	3 June	new moon	30	31 May	prior to moonrise; 10°C	17
AM	10 June	moon set	33	---	no equivalent count; wind interference	---
PM	10 June	thunderstorm approaching	26	---	no equivalent count; wind interference	---
AM	15 June	moon set; wind code 2	24	14 June	moon set; wind code 2	22
PM	14 June	wind code 3-4; near full moon	21	15 June	clouds obscured moon last two stations	17
AM	17 June	moon setting; 11°C	31	19 June	light rain	2
PM	16 June	full moon	33	18 June	light rain	6
AM	---	---	---	25 June	full moon setting; humid	23
PM	---	---	---	22 June	near full moon rising; very humid; 27°C	26
PM	---	---	---	23 June	full moon overhead; very humid; 25°C	28
PM	---	---	---	15 July	first quarter moon; 27°C	17
PM	---	---	---	22 July	full moon; humid; 32°C	15

Table 2. Number of Whip-poor-wills heard calling under favorable conditions in various cover types; three morning and three evening counts each station, June 1981 and 1983.

Station	Type Cover	June 1981			June 1983			
		Total Calls	AM	PM	Total Calls	AM	PM	
1	pine, oak, main campground, wildlife food and cover	33	19	14	26	12	14	59
2	pine, oak, wildlife food and cover	24	13	11	20	12	8	44
3	oak, small campground	24	11	13	18	7	11	42
4	oak	23	10	13	21	11	10	44
5	oak, pine	26	14	12	20	8	12	46
6	predominantly pine plantations	21	10	11	16	9	7	37
7	pine, oak much edge (west margin forest)	30	15	15	20	11	9	50
Totals		181	92	89	141	70	71	322