

Breeding Activity of American Woodcock in Alabama as Related to Temperature

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Abstract: Nests and broods of American woodcock (*Scolopax minor*) were located during late winter and early spring in Alabama from 1976 through 1985 using trained pointing dogs. The number of hours of search effort required to locate a nest or brood decreased linearly with an increase in the number of days in January with mean temperatures $\geq 4.4^{\circ}\text{C}$. Generally, warmer Januarys resulted in increased nesting activity by American woodcock in Alabama.

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Considerable nesting activity by American woodcock in Alabama was first noted in February 1974 (Causey et al. 1974). By spring of 1976 a research project had been initiated with objectives that included statewide searches for nests and broods of woodcock. Breeding and nesting activity appeared to vary widely from year to year as evidenced by success in locating nests and broods and by other breeding studies (Walker and Causey 1982, Mason 1986).

Territorial courtship displays by males occurred as early as the third week of December in most years, but these males apparently did not reach full sexual development until after the first of January (Mason 1986). The greatest amount of courtship activity in the southeastern United States appears to occur in January and February (Stamps and Doerr 1977, Roberts 1980, Whiting and Boggus 1982, Rushing and Doerr 1984, Mason 1986), and we felt that January was the critical period affecting the number of wintering or migrating male woodcock successfully estab-

lishing singing territories and subsequently mating in Alabama. Blankenship (1957) and Goudy (1960) had noted that courtship and singing activity by woodcock males in Michigan primarily occur when temperatures exceed 1.7° to 4.4° C.

We hypothesized that nesting activity varied annually in response to the number of evenings in January suitable for courtship activity (i.e., temperature $\geq 4.4^\circ\text{C}$). A minimum of 10 years of observations was needed before attempting to draw meaningful conclusions. Therefore, annual nest and brood counts were accumulated from 1976 through 1985.

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Methods

Research personnel began daily travel throughout Alabama in November 1976, systematically searching selected coverts with trained pointing dogs and flushing and counting woodcock. By mid-December of each year, special attention was paid to crepuscular singing activity (especially at dusk) in and around coverts occupied by numerous woodcock. Beginning in mid-January, productive coverts were revisited and searched for nests and broods. Searches were repeated on a statewide circuit as weather and dog health permitted until the first week of May. These searches included what we had determined to be the entire nesting season (Roboski and Causey 1981), although we did locate a brood in June 1978. Numbers of woodcock nests and broods located per hour of search at each covert each year were recorded. Efforts were terminated in April 1985.

The number of days in January with mean temperatures $\geq 4.4^\circ\text{C}$ were recorded after each research season from records kept by the National Weather Service Southeast Agricultural Weather Service Center at Auburn University. Accurate temperature data were not available in close proximity to all coverts; therefore, we elected to let data accumulated at the above station, located centrally in Alabama, represent the state as a whole. Daily temperature lows recorded at this station are often among the lowest for the entire state because this station is one of the highest above mean sea level in Alabama.

The relationship between temperature and the number of hours to locate a brood or nest was investigated with regression analysis. Events studied included the number of days per month with a mean daily temperature $\geq 1.7^\circ, 4.4^\circ, 5.0^\circ, 7.2^\circ, 10^\circ,$ and 12.8°C and the number of days per month when dawn and dusk temperatures exceeded 4.4°C .

Results

More nests and broods per unit effort were located in 1980, a year when January contained 26 days with mean daily temperatures $\geq 4.4^\circ\text{C}$ (Table 1). Poorest success was experienced in 1977, with only 9 such days in January. Data collected in 1979 were omitted because personnel turn-over and loss of reliable dogs resulted in an abnormally low number of nest and brood locations (1/61.3 hours). The best and worst years were associated with the warmest and coldest January temperatures recorded during the study.

The number of hours required to locate a brood or nest decreased linearly with the number of days in January with a mean daily temperatures of $\geq 4.4^\circ\text{C}$ (Fig. 1). Although we found significant relationships with temperatures of 1.7° , 5.0° , and 7.2°C , only the regression results for the relationship between the number of days in January with a daily mean $\geq 4.4^\circ\text{C}$ and the number of hours to locate a brood or nest are reported. This was the most significant relationship with the highest coefficient of determination.

Table 1. American woodcock nests and broods located throughout Alabama from 1976–1985.

Year	Nests	Broods	Dog hours	Nests or broods/hr
1976	8	29	189	1/5.1
1977	5	7	317	1/26.4
1978	3	15	227.5	1/12.6
1980	8	22	113.5	1/3.8
1981	0	6	97.0	1/16.2
1982	4	11	266.5	1/17.8
1983	7	14	248.5	1/11.8
1984	7	11	148.0	1/8.2
1985	3	5	107.5	1/13.4

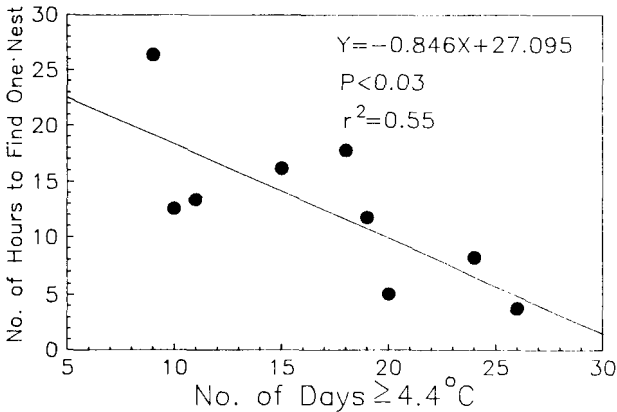


Figure 1. Relationship between number of hours required to locate an American woodcock nest or brood and the number of days in January with mean temperature $\geq 4.4^\circ\text{C}$ in Alabama 1976–85.

Discussion

Mason (1986) noted the first stage of spermatogenesis in male woodcock collected in Alabama occurred as early as 7 December, and by 4 January at least some male woodcock had reached the final stage. It appears that woodcock males can be involved in courtship behavior and can be capable of viable copulations early in January if not inhibited by cold temperatures. Similar observations were reported by Rushing and Doerr (1984) in North Carolina.

During winter 1973–74 Causey et al. (1974) located 7 nests and 11 woodcock broods with minimal search effort in close proximity to Auburn. Three nests and 10 broods were located on a single 132-ha farm. No extensive searches were made elsewhere in Alabama that year. January temperatures were especially warm and daily mean temperature exceeded 4.4° C each day. Thirteen days had recorded highs exceeding 21° C. Twenty-five days had mean temperatures exceeding 10° C, and 16° to 18° C means were recorded on 13 occasions. Unfortunately for our study purposes, January temperatures did not approach those recorded in January 1974 during the subsequent 11 years.

The correlation between January temperature and the magnitude of woodcock nesting activity in Alabama is significant, although with only moderate predictive capability. Variables such as search methods, personnel experience, dog quality, weather, and many others posed problems. We attempted to control all variables under our influence. We hypothesize that January temperature is the most important environmental variable influencing nesting activity by woodcock in Alabama.

Generally, warm January temperatures appear to stimulate male woodcock to establish territories for singing and display and to breed with receptive females. It appears that cold January temperatures suppress much of this activity, and many woodcock leave Alabama before conditions are suitable, thereby reducing the overall number nesting in Alabama.

We do not believe many of the woodcock nesting in Alabama are “resident” birds. Efforts (Horton and Causey 1981) to determine dispersal of these birds indicate they leave the general nesting and brood rearing coverts soon after brood break-up. One chick leg-banded in March 1976 was shot in Michigan the following October (Causey et al. 1979). A hen located and leg-banded with her brood in March 1984 also was shot in Michigan the following October. This suggests a breeding strategy by woodcock whereby they begin breeding and nesting as environmental temperature permits from mid-January onward, from the Gulf Coast to the northern limits of their range.

The most interesting speculation concerns the possibility that in years with warm January temperatures, early southern nesting birds could produce a brood on the southern portion of their range and still have time to move north and produce another brood on the northern breeding grounds.

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