WOODCOCK ON NORTH CAROLINA WINTERING GROUNDS

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ABSTRACT

During the winters of 1974-75 and 1975-76, the regional distribution patterns of American woodcock (Philohela minor) *in North Carolina were determined from harvest and banding surveys. Woodcock were common transients in all regions of North Carolina but were common winter residents only in the central and eastern regions. Immatures were more abundant among birds collected in coastal counties than in interior counties, and males were disproportionately common in western counties. Woodcock were numerous in the vicinity of New Holland, Hyde County, and 341 were banded in 17 night-lighting trips. It appears that woodcock abundance patterns vary from western counties to eastern counties and that a split season may be needed to equitably distribute hunting opportunity. Excellent opportunities for wintering ground banding exist in northeastern North Carolina.*

In North Carolina there has been little interest in the sporting qualities of the woodcock. In a 1972-73 survey of North Carolina hunters (Hamilton 1974) the woodcock ranked only fourteenth among 15 game species in number of hunting enthusiasts. However, with more hunters taking advantage of the recreational opportunity afforded by woodcock over most of its range (Artmann 1976) specific information about the woodcock on southeastern wintering grounds is needed for effective management. In 1974, the authors initiated a five-year investigation of the woodcock in cooperation with the North Carolina Wildlife Resources Commission (NCWRC). This paper presents results of harvest and banding surveys during the winters of 1974-75 and 1975-76. The primary objective was to determine the regional distribution patterns of wintering woodcock.

The research was supported by the U. S. Fish and Wildlife Service (USFWS) through contract number 14-16-0008-882 with the North Carolina Wildlife Resources Commission (NCWRC) and North Carolina State University (NCSU). We are indebted to numerous personnel of the NCWRC for administrative assistance, for providing records of woodcock sightings and for assisting with hunter surveys and banding operations (S. Baines, G. Barnes, J. Bowman, E. Gillis, H. Hall, D. Hamilton, B. Hyder, A. Manning, L. Mechlin, A. Olmstead, M. Scruggs, S. Thomas, R. Wilson, and S. Wiseman). B. Kletzley and J. Rieffenberger, West Virginia Department of Natural Resources, provided valuable banding assistance. Our gratitude is extended to sportsmen who contributed wings to harvest surveys and to landowners who gave permission to band woodcock on their property. We sincerely thank F. Barkalow, T. Sanders, and two anonymous reviewers for their criticism and suggestions.

METHODS

The Study Areas

North Carolina extends across three physiographic regions which differ from one another in relief and climate. The Coastal Plain ranges in elevation from sea level to about 90 meters where it borders the Piedmont. Because of the low elevation and relatively flat terrain, many wide areas are covered by swamps, pocosin, and marshes; large tracts of bottomland forests occur along the floodplains of coastal rivers. In the Piedmont, terrain becomes increasingly rolling and bottomland forests are restricted to narrow strips along creeks and rivers. Elevations in the Mountains range from about 400 meters in the foothills of the Blue Ridge to 2,037 meters at the summit of Mt. Mitchell.

While most of the state is in the warm-temperate belt, the western region, due to higher elevations, is in the cold-temperate zone. The mountains provide a barrier to cold air masses moving southeastward from the interior of the continent and have a modifying influence on the winter climate of the Piedmont. The close proximity to the Atlantic Ocean and coastal sounds has a year-round modifying influence on the eastern Coastal Plain. As a result, a temperature gradient exists across North Carolina with the frost-free season ranging from approximately 130 days in the west to 290 days in the east (Carney 1960).

In the Coastal Plain woodcock were banded within an area of approximately 16-km² near New Holland in southern Hyde County (35° 27′ N, 76° 10′ W). New Holland is a farming community located between the Mattamuskeet National Wildlife Refuge and the Pamlico Sound (Fig. 1). Although numerous fields are cultivated in corn and soybean, extensive forests lie adjacent to the refuge and the sound. Woodcock inhabited forests characterized by cypress (*Taxodium distichum*), pond pine (*Pinus serotina*), sweet gum (*Liquidambar styraciflua*), and red maple (*Acer rubrum*) in the overstory, and by pond pine, sweet gum, red maple, wax myrtle (*Myrica cerifera*), greenbrier (*Smilax* spp.), grape (*Vitis* spp.) and various other shrubs, vines, and small trees in the understory. At night woodcock were usually found in deeply furrowed soybean fields left untilled after harvesting but were occasionally seen in corn, winter wheat, or fields that were recently tilled.

A second banding site was located in the Piedmont along the New Hope River (Fig. 1), approximately four kilometers southwest of Wilsonville in Chatham County (35° 42′ N, 79° 2′ W). Woodcock were found in bottomland forest characterized by oaks (*Quercus* spp.), sweetgum, sycamore (*Platanus occidentalis*), and river birch (*Betula nigra*) in the overstory and by river birch, sweet gum, honeysuckle (*Lonicera japonica*), and various other hardwood saplings and vines in the understory. A 26-ha abandoned field was used by woodcock at night and had cover of smartweed (*Polygonum sp.*), sweetgum seedlings, rushes (*Juncus spp.*), sour dock (*Rumex crispus*), rose (*Rosa sp.*), and other herbaceous perennials.

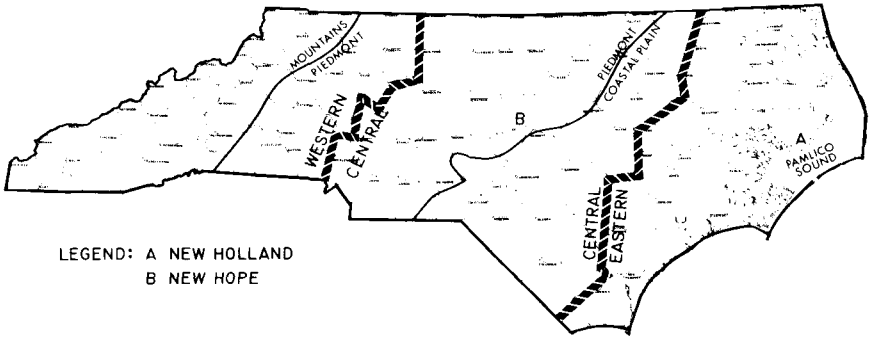

Figure 1. Woodcock banding sites and regional designations for wing collection analysis.

Harvest Surveys

Woodcock wings were collected from hunters to provide a chronological index of regional woodcock distribution. Although the USFWS collects wings from North Carolina, the average annual return for five seasons, 1969-70 through 1973-74, was only 141 wings (Clark 1974; Artmann 1975). Assuming that the majority of woodcock killed in North Carolina are taken incidental to other small game, we placed articles in *Wildlife in North Carolina* (Stamps and Doerr 1974; 1975) asking small game hunters, in addition to bona fide woodcock hunters, to contribute wings to the study. Packets of mailing envelopes were sent to 84 and 134 volunteers in 1974 and 1975, respectively. Instructions listed on envelopes were that participants use one envelope for each successful hunt, that they enclose one wing from each woodcock bagged, and that they record the date and location of the hunt, the primary species hunted, and the duration of the hunt.

Wings received at NCSU were aged and sexed by plumage characteristics (Martin 1964). At the end of the hunting season, data were processed by ten-day periods and by geographic region; the regional designations (eastern; central; western) correspond to boundaries of the NCWRC management districts and do not represent the three physiographic regions of the state (Fig. 1). Data collected from North Carolina hunters by the USFWS were made available to the authors by J. W. Artmann (personal communication).

In addition, during the 1974-75 hunting season business reply questionnaires were placed on parked vehicles in public hunting areas (game lands) by NCWRC biologists and technicians. Chronological and regional trends in woodcock abundance were determined from information recorded by hunters: the date and location of the hunt, the primary species being hunted, the number of woodcock flushed and killed. Two hundred fifty-eight questionnaires were distributed in the eastern region, 48 in the central region, and 250 in the western region. Distribution in the central region was ended early because of a conflict with deer relocation projects.

The 1974-75 hunting season extended from 6 December to 8 February and the 1975-76 season extended from 22 November to 24 January. Wings from birds shot out-of-season were excluded from the harvest summaries.

Banding

Night-lighting was attempted during dark periods of the moon from November, 1975, to March, 1976. Crews of two to six men worked swaths across night fields at New Hope and New Holland searching for woodcock eye reflection with the beam from six-volt night-hunters headlights. When located, woodcock were captured in long-handled nets by the method described by Glasgow (1958). Birds were aged, sexed, banded, and released in the field of capture. For each trip crews recorded the number of woodcock observed.

RESULTS

Harvest Surveys

Participants in the NCSU and USFWS wing collections returned combined totals of 401 and 332 wings during the 1974-75 and 1975-76 seasons, respectively. Although many wings returned by NCSU participants were collected while woodcock hunting, 28.4 and 39.6 percent of the yearly returns were taken while hunting either quail, rabbit, grouse, duck, or squirrel.

The harvest chronology by region was similar for both seasons. Woodcock apparently decreased in abundance during December in the western region but no detectable changes in woodcock abundance occurred in the central and eastern regions during the study period (Fig. 2). Because two Saturdays occurred in the ten-day period from 6-15 December and 26 December-4 January for both seasons, 25 January-3 February, 1975, and 15-24 January, 1976, some of the variation among harvest sizes during the ten-day periods is possibly related to differences in the amount of hunting effort rather than to changes in woodcock abundance. The trend toward decreasing abundance in the western region, however, is supported by wing collection participants in western counties who wrote that woodcock were numerous during October and early November but that numbers declined early in the hunting season.

There were no significant differences in the age and sex composition of the 1974-75 and 1975-76 harvests by region (eastern, $X^2 = 0.80$, $0.75<P<0.90$; central, $X^2 = 2.80$, $0.25<P<0.50$; western, $X^2 = 7.56$, $0.05<P<0.10$; 3 d.f.). Consequently, data for the two seasons were combined (Table 1) for regional comparisons in the age and sex composition of the harvest. Several differences between regions were significant. In western counties, the proportion of males (68 percent) was much greater than that for central (49 percent, $X^2 = 12.77$, $P<0.005$, 1 d.f.) or eastern (46 per cent, $X^2 = 13.09$, $P<0.005$, 1 d.f.) counties. Immatures comprised a greater percent of the harvest in the eastern region (66 percent) than in the central (37 percent, $X^2 = 40.65$, $P<0.005$, 1 d.f.) or western (49 percent, $X^2 = 8.84$, $P<0.005$, 1 d.f.) regions; however, the percentage of immatures in the western region was greater than the percentage in the central region ($X^2 = 5.17$, $P<0.025$, 1 d.f.).

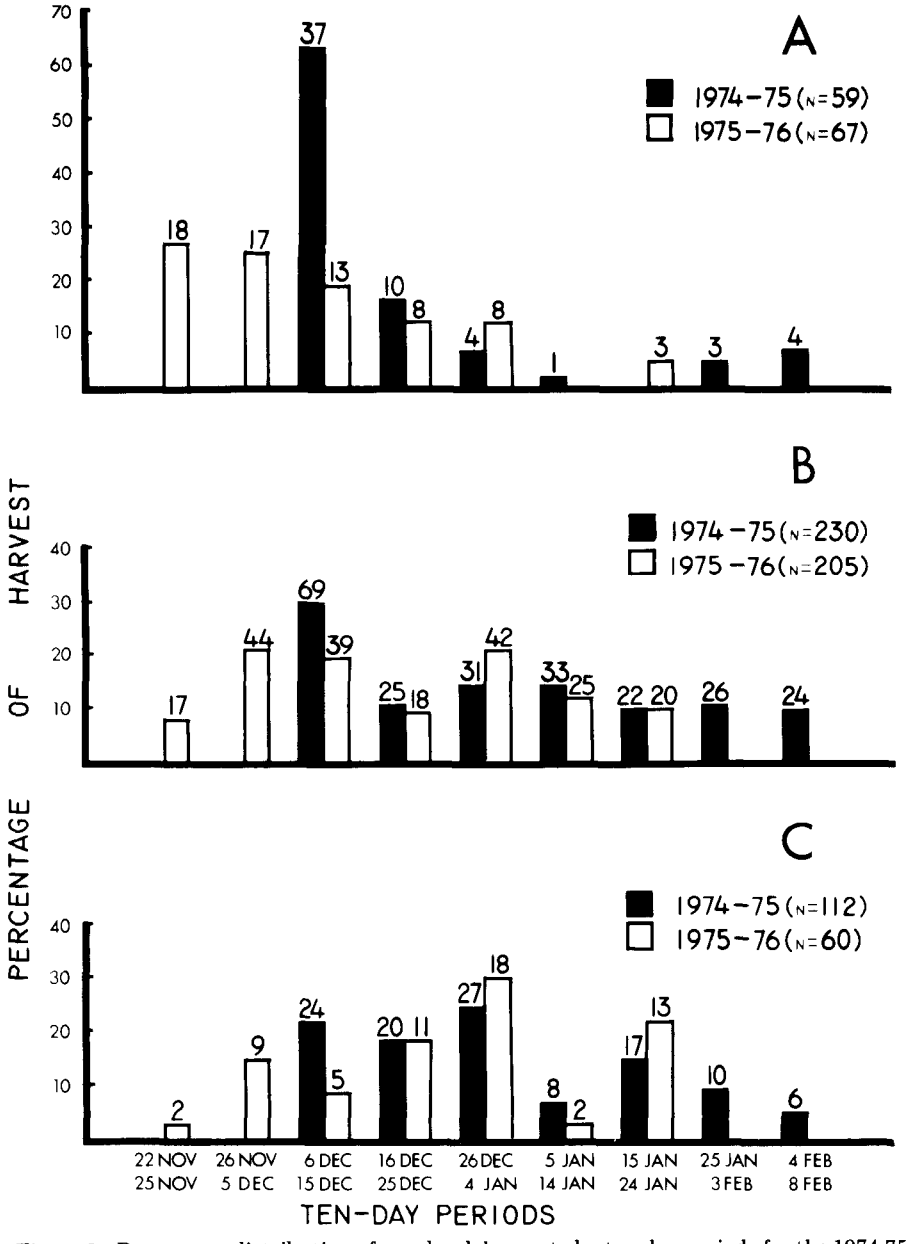

Figure 2. Percentage distribution of woodcock harvests by ten-day periods for the 1974-75 and 1975-76 hunting seasons. The 1974-75 season extended from 6 December to 8 February and the 1975-76 season extended from 22 November to 24 January. The first and last periods are four and five days, respectively. Numbers above bars equal the number of wings returned per period. A. Western region. B. Central region. C. Eastern region.

No questionnaires were returned by woodcock hunters but grouse (22), quail (11), rabbit (8), deer (5), squirrel (4), duck (1), and wild boar (1) hunting parties returned questionnaires and reported 86 woodcock flushes and 20 kills. Eighty-three percent of the flushes were reported by quail and grouse hunters. Forty-one of the questionnaires were returned from the western region. Although few returns were expected from the limited distribution in the central region, the return of only four questionnaires from the eastern region was puzzling. Biologists in that region believe that most questionnaires were distributed to deer hunters. The rate at which deer hunters observe woodcock is probably low and, apparently, hunters were not motivated to return questionnaires unless woodcock were actually seen.

All except one of the 79 flushes observed in the western region occurred after 15 January. The scarcity of flushes during the period from the onset of questionnaire distribution (16 December) to 15 January suggests, in agreement with wing collection results, that woodcock did not winter in the western region. Although wing returns did not document an increase in woodcock abundance in late January, the small harvest at the end of the season possibly resulted because of little hunting effort rather than because of a lack of woodcock. We believe that hunters may have stopped hunting specifically for woodcock after woodcock became scarce in December.

Banding

At New Holland, woodcock were usually numerous, but at New Hope, they were common one day and scarce the next. Consequently, 241 man-hours of banding effort were expended at New Holland, whereas only 39 man-hours were attempted at New Hope.

At New Holland, 341 woodcock and 22 common snipe (*Capella gallinago*) were banded in 17 trips. On the average 2.93 woodcock were observed per man-hour and 49.5 percent of the birds observed were captured. Immature males were more than twice as numerous as any other cohort banded (Table 1). The greatest density of woodcock observed was 11.0 per ha in a 6.8-ha field on 8 January. The number of birds observed per man-hour during periods of the new moon was large from early December to early February but few were found in late February (Fig. 3). No banding was attempted in November.

Eleven woodcock were recaptured (3.23 percent); ten of them were caught more than 21 days after the initial banding. In addition, one bird banded 9 December was shot on 9 January adjacent to the field of banding. Evidently, some woodcock remain at New Holland during the winter.

At New Hope, woodcock were relatively numerous in early November, late December, and in early March (Fig. 3). Nineteen were banded; however, only 25.3 percent of the birds observed were captured. The fact that the capture success at New Hope was less than that at New Holland is possibly due to the difference in the vegetation types on the night fields. There was little vegetation in the furrows of soybean fields at New Holland. Thus, woodcock were easily located and footing was silent while stalking the birds. At New

Table 1. Percentage age and sex composition of the regional woodcock harvests in North Carolina during the 1974-75 and 1975-76 hunting seasons and of woodcock banded at New Holland during the winter of 1975-76.

		Adult		*Immature*		
Source	*Region*	*Males* %	*Females* %	*Males* %	*Females* %	*Total* % *(n)*
Harvest	Eastern	14	20	32	34	100(172)
	Central	28	35	21	16	100(432)
	Western	33	18	35	14	100(124)
Live Capture	New Holland	19	12	47	22	100(341)

Hope, however, woodcock were difficult to locate among the weed stubble and the dry vegetation made a silent approach difficult.

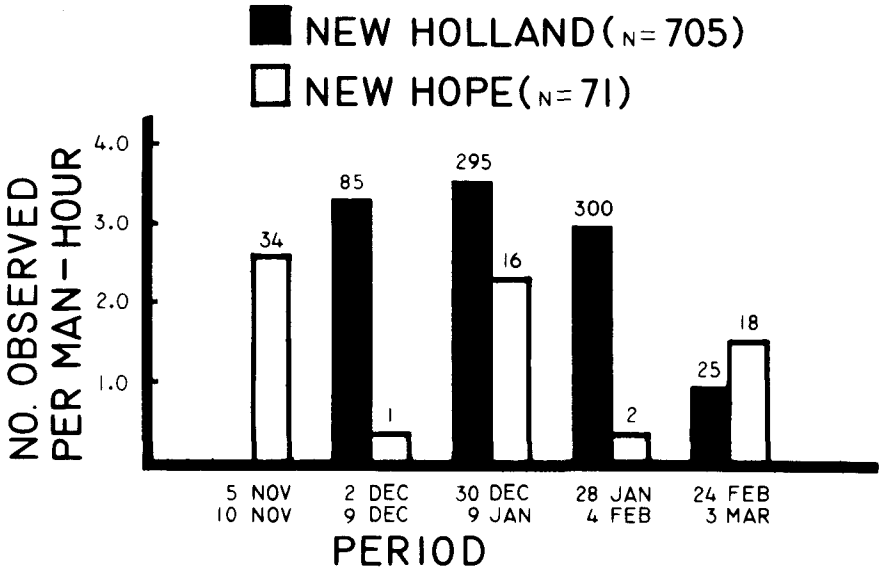

Figure 3. Number of woodcock observed per man-hour in night fields at New Holland and New Hope during the 1975-76 banding season by dark periods of the moon. Numbers above bars equal the number of woodcock observed per period.

DISCUSSION

Winter Distribution and Migration Patterns

Results of hunter and banding surveys provide evidence that woodcock are usually common winter residents in central and eastern North Carolina but that few woodcock winter in the western region. That the wintering range of woodcock excludes the western region is consistent with the winter range description in the AOU Check-List (1957). Woodcock forage by probing and are restricted in range by the severity of the weather (Sheldon 1967). Therefore, the winter distribution of woodcock in North Carolina is possibly related to the climatic gradient across the state; few birds winter in the western region where the incidence of freezing is greatest but relatively stable numbers occur in the eastern region where the moderating influences of the coastal sounds and Atlantic Ocean exist.

Hunter surveys suggest that woodcock are common in the western region before mid-December and after mid-January. If that abundance is attributable to migrating birds then it is logical to assume that the fall migration subsides by 15 December and that the spring migration begins after 15 January. In fact, winter populations are most stable in Louisiana (Glasgow 1958; Britt 1971) and in the southeast (Pursglove and Doster 1971) during that interval. Because males arrive later on wintering grounds than females (Williams 1969), the preponderance of males (68 percent) in the western harvest lends further evidence that late November and early December is the latter period of the fall woodcock migration through western North Carolina.

Our harvest results agree with studies by Martin et al. (1965) in suggesting that immatures are more abundant among coastal migrants than among birds in inland counties. Krohn et al. (unpub. ms.) suggests that immatures, being inexperienced and possibly weaker fliers, are drifted to the coast by prevailing northwest winds and then follow the coastline for orientation.

The preponderance of immature males in night-lighted samples has been documented by many investigators. Although immature males are apparently more vulnerable to capture than other cohorts, Dunford and Owen (1973) found no apparent difference in the use of night fields by immature males and females in central Maine.

Concentrations at New Holland

Concentrations of woodcock sufficient for large-scale banding were located at New Holland, and our banding success there represents a solid beginning towards establishing a woodcock banding program on south Atlantic wintering grounds. Geographically, New Holland resembles woodcock concentration points at Cape May, New Jersey, and Cape Charles, Virginia, in that a large expanse of water occurs south of the concentration area. However, woodcock are apparently found in greater density at Cape May; Rieffenberger and Ferrigno (1970) found a maximum of 40.2 birds per ha in fields night-lighted by walking at Cape May, whereas our greatest observed density was 11.0 per ha.

Whether woodcock are more abundant at New Holland than in other areas of northeastern North Carolina remains to be seen. In general, because of poor drainage, sparse human population, and the interspersion of cultivated and forested land, northeastern North Carolina is excellent habitat for woodcock. Further exploration may reveal areas of woodcock density equal to or greater than that found at New Holland.

Management Considerations

Current hunting seasons afford little hunting opportunity for woodcock enthusiasts in western North Carolina. Although earlier seasons would possibly increase hunting opportunity in the western region, the statewide availability of woodcock during the fall is unknown. We have observed birds during the entire fall in all regions but are not certain of the relative sizes of fall and winter populations, of the origin of the birds (native or transient), or of regional differences in the timing of migration. For a better understanding of woodcock movement patterns in North Carolina, additional banding is needed, particularly in the central and western regions.

Our results document the fact that woodcock are shot incidental to the hunting of other game and reveal that some birds are shot out-of-season. The illegal harvest equalled about three percent of the legal returns for wing collections and 33 percent of the legal kill reported on the questionnaire. Evidently, woodcock are vulnerable to shooting during seasons for other small game species. We have observed nesting woodcock in February, and both quail and grouse seasons extend through February in North Carolina. While we do not intend to imply that these seasons be shortened, we believe that the possible loss of woodcock productivity to late winter shooting in the southeastern region is reason for concern and for further study.

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