Birds are able to get out of any funnel trap occasionally and this trap is no exception. At first the orientation of the feeder perches towards the trap entrances was not carefully watched. When the feeder perches are directly in front of the entrances, the birds enter, hop on a perch, take a seed, turn around, and fly out of the entrance. When the feeder perches are oriented 90 degrees from the trap entrances, rapid bird exits are minimized. Upon arrival the birds try to escape and I place rags in each entrance to prevent escape. An alternative method involves experimenting with the length and diameter of the funnels. However, as the funnels are lengthened they get closer to the feeder. Reducing the diameter of entrances may reduce captures of different sized finches.

Good results may be obtained by using variations in trap size, feeder size, and bait. A smaller trap version would probably work well for chickadees.

Acknowledgements

Thanks to Harv Halvorsen and Dick Thiel for review of drafts of this paper.

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Fall Migration of Passerine Birds in Ohio: A Co-Operative Study by the Ohio Bird Banding Association

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Introduction

As a group, the Ohio Bird Banding Association (O.B.B.A.) decided to study the fall migration patterns of passerine birds in Ohio. We were interested in the timing of migration and the numbers of birds migrating through Ohio, since no previous study for the state exists. In this paper we present fall migration data on passerine birds in Ohio between 1981 and 1983 and discuss the timing of migration as it relates to their ecology. We also discuss the problems associated with a joint research project of this type.

Methods

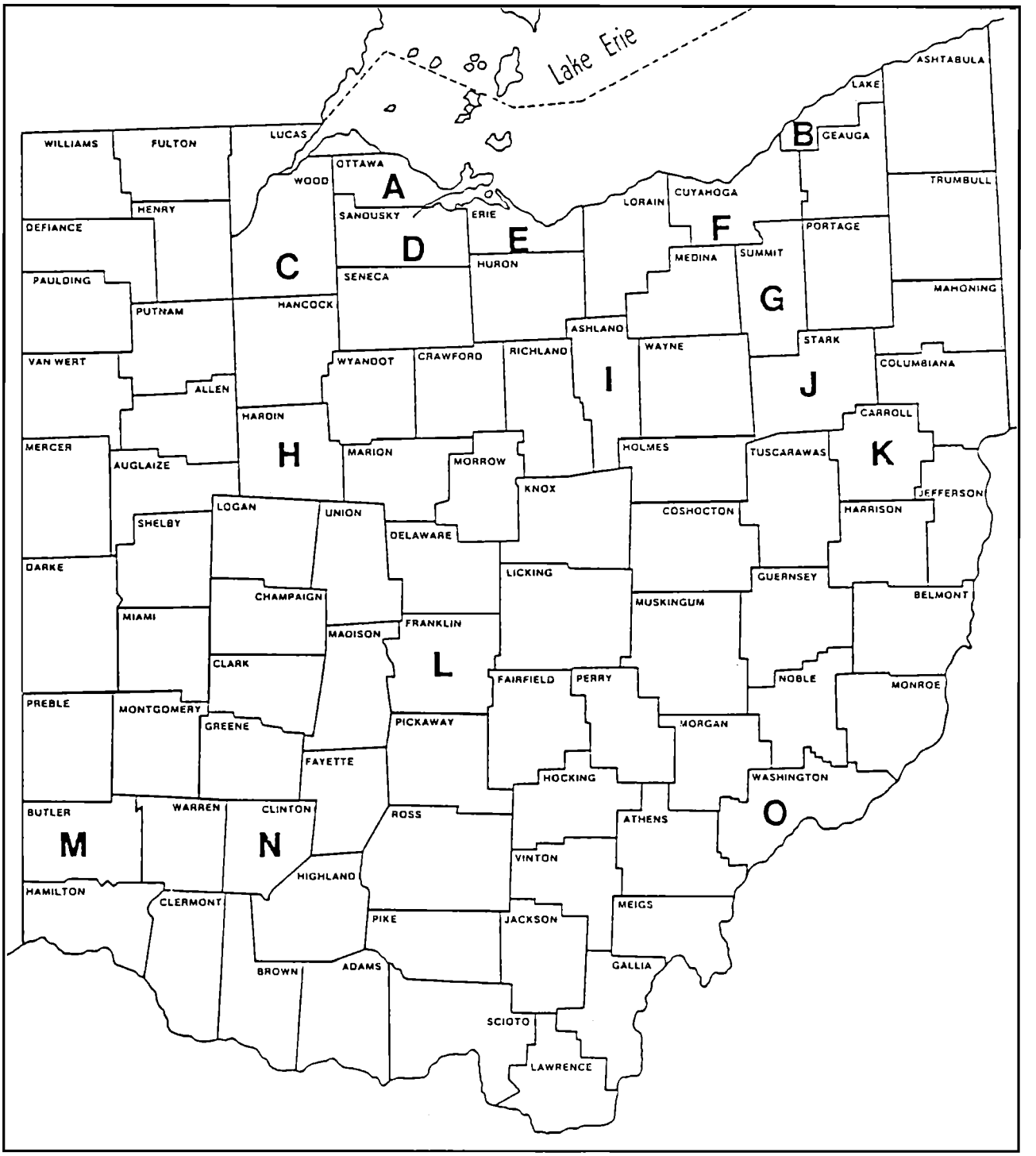
The banding sites used in this study were located in a variety of habitats: scrub willow and cottonwood on the shores of Lake Erie, old fields, beech-maple forest edge, and suburban backyards. The number of banders contributing information each year varied from 8 to 12. Half of the banders participating in this study were located in the counties bordering Lake Erie (Figure 1).

Participants banded whenever feasible between 15 August and 15 November, 1981 through 1983. Standardized forms were provided for recording data. All migratory species were tabulated for each week, and the number of birds captured per 100 net hours was determined (1982-83 only). Non migratory species were not included in the birds per 100 net hour totals.

Results and Discussion

Ohio banders whose banding stations are located in counties bordering Lake Erie captured more birds per unit effort ($X = 249.2 \pm 99.4$ birds/hundred net hr) than did those in central ($X = 28.0 \pm 8.0$) and southern ($X = 29.1 \pm 20.9$) counties. We believe that this difference in capture rate is due to the presence of Lake Erie. The birds remain in the northern counties to rest from the long trip over the open water, not unlike the phenomenon that occurs at Point Pelee in spring (Livingston 1974).

Figure 1. Location of banding sites used in this study (by county). Participants were: A Ottawa Co.: John Pogacnik (82-83), Mark Shieldcastle (81-82); B Lake Co.: Jerry Talkington (81-83); C Wood Co.: Amy Potter (83); D Sandusky Co.: Jim Schroeder (82), Tom Kashmer (82), E Erie Co.: Dan Kramer (82), Phillip Lenke (81), John Redman (81); F Cuyahoga Co.: Jean Eakin (81-83), Tom Denbow (81-83); G Summit Co.: Betty Gatewood (81), Marie Morgan (81-82); H Hardin Co.: Nelson Moore (83); I Ashland Co.: Ron Reed (82); J Stark Co.: Bruce Lombardo (83); K Carroll Co.: C. Holmes Smith (82); L Franklin Co.: Abbot Gaunt (81-82); M Butler Co.: James Ingold (81-82); N Clinton Co.: Bob and Terri Thobaben (81-83); O Washington Co.: Jerie Stewart (81).



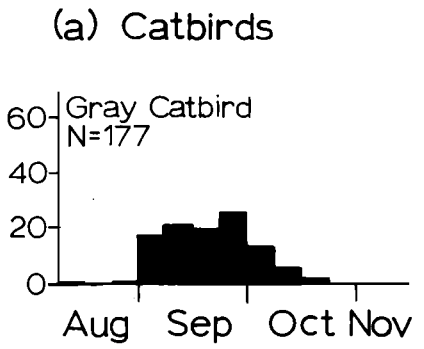
During the three years of this study, 8,795 individuals of 85 migratory passerine species were banded. White-throated Sparrows (*Zonotrichia albicolis,* 1,005 individuals) and Yellow-rumped Warblers (*Dendroica cornonata,* 690 individuals) were the species for which we banded the most individuals. One hundred or more individuals were captured for 22 species. These species comprise 82.5% of the total number of migratory passerines banded.

Timing of Migration

The records of the twenty-two species with largest number of individuals banded were used to examine the timing of migration through Ohio.

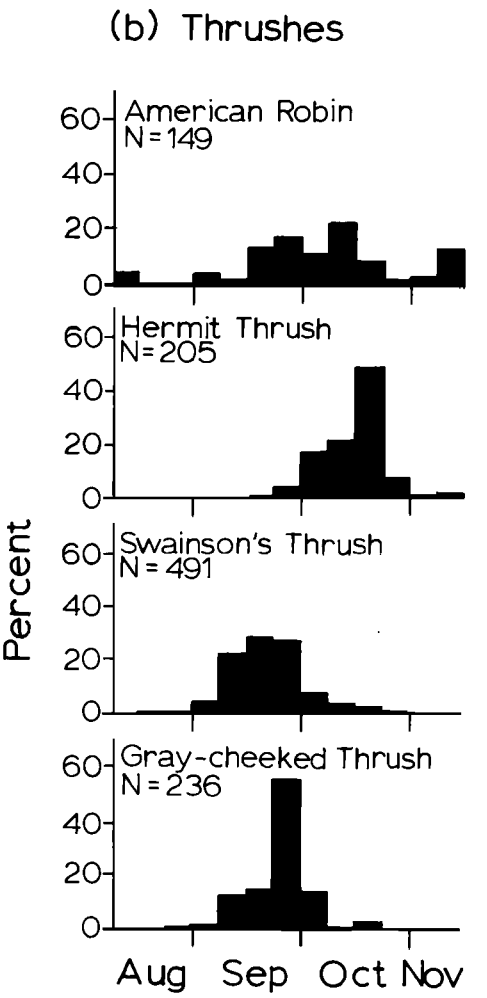
The Gray Catbird (*Dumatella carolinensis*) had a median migration date between the second and third week of September and its migration extended through the third week of October (Figure 2a). Since the fall diet of the Gray Catbird is 81% vegetable matter (Martin et al. 1951), we would expect migration to be influenced by the availability of fruits.

Figure 2. Timing of migration in selected species of passerine birds in Ohio, 1981-1983.



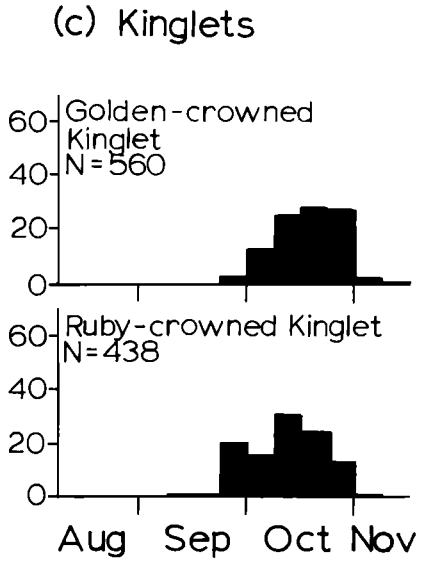
The migration of the American Robin (*Turdus migratorius;* Figure 2b) through Ohio is not clear. It was not possible to separate permanent residents from migratory individuals or from wintering birds. Large numbers of robins winter in the southern part of the state (pers. observation, J.L. Ingold). This species requires a more complete study to distinguish the migratory from the non-migratory birds.

Migration patterns in the brown-backed thrushes are more easily studied since breeding and winter ranges do not overlap. Swainson's Thrush (*Catharus ustulatus*) had a median migration date of the third week of September (Figure 2b) while the Gray-cheeked Thrush's (*C. minimus*) median migration date was a week later. The Hermit Thrush (*C. guttatus*) had the latest migration, with a median date in mid-October (Figure 2b). Since Swainson's and Gray-cheeked Thrushes have the same winter ranges



(Bent 1949), the differences in their migration times may best be explained by the more northerly breeding range of the Gray-cheeked Thrush, that is, it has farther to travel so arrives later. The Hermit Thrush shares a breeding range with Swainson's Thrush but winters much farther north (Bent 1949). The northern edge of its winter range coincides with the southern edge of its breeding range, so a later migration is possible. Therefore, the timing of migration in the three brown-backed thrushes, for which we have sufficient data, was constrained, we believe, by the distance between the breeding and wintering ranges. Food availability may also have an effect on the timing of migration, but this is not clear. The Hermit and Swainson's Thrush's fall diets are composed of approximately 35% vegetable matter, whereas vegetable matter makes up only 25% of the Gray-cheeked Thrush's fall diet (Bent 1949). If we assume that birds that eat greater amounts of vegetable matter could migrate later (since this food source is not affected by weather as dramatically as is animal food) we might expect the timing of migration in Swainson's and the Gray-cheeked Thrush to be the opposite of that observed in the present study.

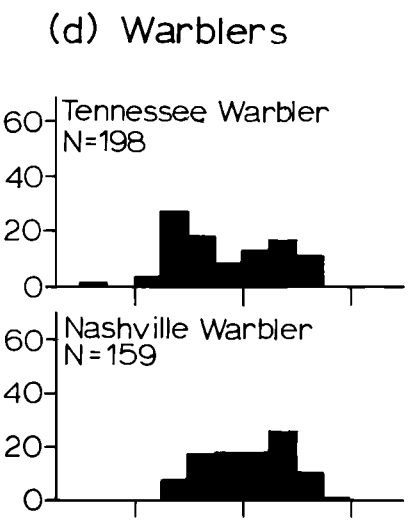
The majority of Ruby-crowned Kinglets (*Regulus calendula*) migrate through Ohio one or two weeks before the Golden-crowned Kinglet (*R. satrapa;* Figure 2c). We believe that the timing of migration in the kinglets can be related to distance traveled to the wintering range instead of to diet. The two species share breeding ranges, but the Golden-crowned winters further north than does the Ruby-crowned (Bent 1949). Only the Ruby-crowned has been shown to eat vegetable material (Bent 1949), but it migrates first. We do believe, however, that foraging techniques can explain why the kinglets are able to migrate so much later than do the larger, insectivorous warblers (discussed below).

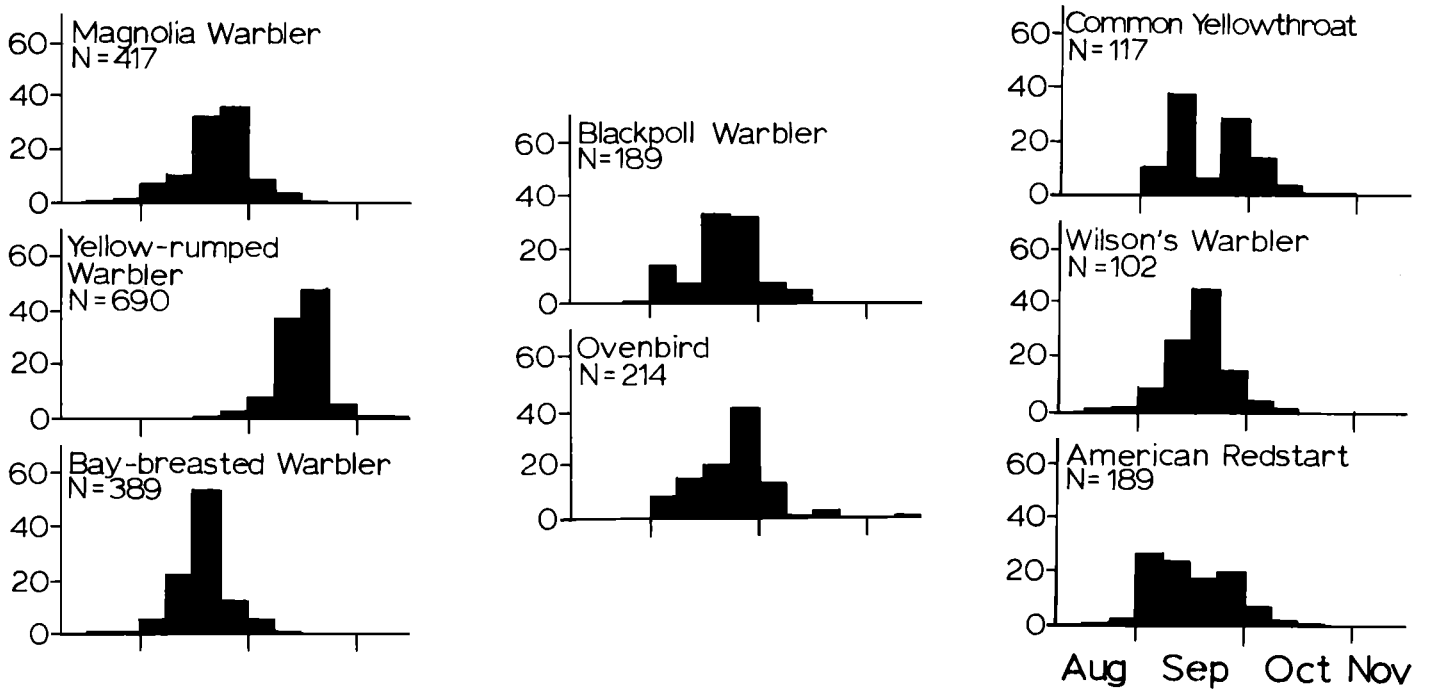


Timing of migration in the wood warblers might be the result of interaction between food and migration distance as we show below. Morse (1971) has pointed out that species which rely almost exclusively on flycatching migrate longer distances than those that exploit vegetable material. The American Redstart (*Setophaga ruticilla*) had the earliest migration (Figure 2d) of the warbler speices for which we have sufficient data. The Redstart feeds exclusively on arthropods it catches by flycatching, and travels to northern South America (Bent 1953).

The next group of warblers, whose median migration date was the second through the third week of September, usually forage by gleaning, but also may flycatch. They share, for the most part, the same breeding range, and winter from Mexico through northern South America (Bent 1953, Griscom and Sprunt 1979). This group includes: Common Yellowthroat (*Geothypis trichas*), Wilson's (*Wilsonia pusilla*), Tennessee (*Vermivora peregrina*), Magnolia (*Dendroica magnolia*), Blackpoll (*D. striata*), and Bay-breasted (*D. castanea;* Figure 2d) Warblers. The Ovenbird (*Seiurus aurocapillus;* Figure 2d) had a median migration date between the third and fourth week of September. The Ovenbird forages on the ground and eats snails and worms, as well as arthropods (Bent 1953). It breeds further south than do most of the previous species discussed, and winters in Mexico and Central America (Bent 1953, Griscom and Sprunt 1979). The Nashville Warbler (*V. ruficapilla*) had a median migration date of the last week of September (Figure 3d). The Nashville Warbler mostly gleans from the underside of leaves, and it winters as far north as southern Texas (Bent 1953, Griscom and Sprunt 1979). Lastly, the Yellow-rumped Warbler first appeared in the third week of September, but 83% of the birds were banded during the second and third weeks of October (Figure 2d). These results are similar to those of Murray (1979) for Island Beach, Ocean County, New Jersey. This species forages by gleaning, flycatching, and, most importantly, by berry picking (Bent 1959, Griscom and Sprunt 1979). The large amount of vegetable matter (17%; Martin et al. 1951) in its winter diet permits the Yellow-rumped Warbler to spend the winter in most of the United States (including Ohio) and, as a result, migrates later.

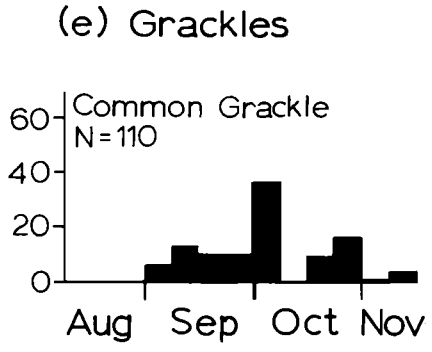
In contrast to the warblers that glean, the kinglets forage on arthropods and their eggs associated with buds and bark much like chickadees (Bent 1949). These food sources are much more reliable as fall progresses than those obtained by gleaning leaf surfaces or flycatching. Therefore, the kinglets can winter farther north and migrate later than warblers that glean leaf surfaces or flycatch.

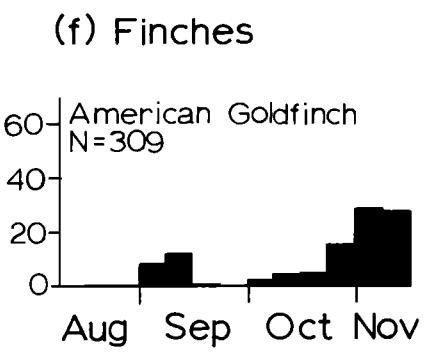




Common Grackles (*Quiscalus quiscala*) were captured from September through the end of the study period, with the largest numbers being banded the first week of October (Figure 2e). Timing of migration in the Common Grackle might be tied to the availability of waste grain, as it comprises almost the entire fall diet (Bent 1958).

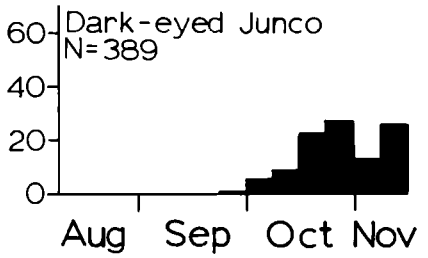
The American Goldfinch (*Carduelis tristis*) showed two peaks in the numbers banded (Figure 2f). The first peak (second week of September) may have been due to young birds just out of the nest, while the second peak (the first two weeks of November) may have been the true migration peak. We believe that migration in the American Goldfinch needs to be studied in greater detail, since recoveries of banded birds show unusual patterns. For example, an adult male banded by Howard and Marcella Meahl (O.B.B.A. members) on 24 January 1972 in Ashtabula County, Ohio was retrapped on 27 January 1974 in Ashford, Houston County, Alabama.





The Dark-eyed Junco (*Junco hyemalis*) first appeared during the last week of September, with the largest number of birds banded the last week of October (Figure 2g). However, large numbers were banded the last week of the study, and we may have missed the median migration date by ending the study too soon.

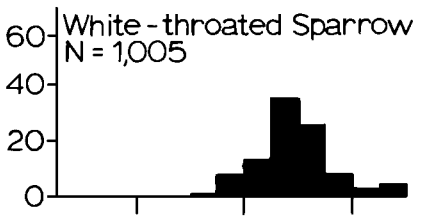
(g) Juncos

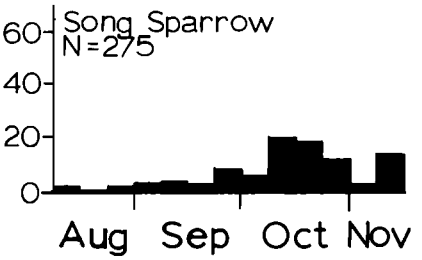


White-throated Sparrows were first encountered the third week of September, and the greatest numbers of individuals were banded on the second week of October (Figure 2h). The parameters that might affect timing of migration in the White-throated Sparrow are not evident at this time, especially since we have no other ground foraging sparrows with which to compare migration times and wintering areas.

Song Sparrows (*Melospiza melodia*) were captured throughout the entire study period (Figure 2h). The largest numbers of birds were banded in the second and third weeks of October. We assume that the birds banded in the early part of the study were breeding birds, and when numbers increased we started capturing migrants. Although the time the true migrants actually started moving through is not known there is a continuous rise in the number of birds banded through the middle of October. Bent (1968) has suggested that the earliest migrants are hatching-year birds.

(h) Sparrows





Group Research Projects

While conducting this study, various problems were encountered that we wish to share, with the hope of making the process easier for other groups which may want to undertake similar projects.

The most difficult problem to solve was the standardization of data from the various participants. We found no easy way to keep records for age and sex of the large number of individuals banded and still maintain a usable field data sheet. This problem may be solved by concentrating on fewer species.

It also was not possible to convince all the participants of the need to keep records of unit effort, such as birds captured per one hundred net hours. Their reasons for not doing so were valid and closely paralleled those of Ralph (1976), such as the effect of time of day, weather and habitat. The most strenuous objection dealt with how to start timing the net hours, since the last net may be set 15 to 30 min after the first net. The same objection about time discrepancies arose when taking down the nets. This problem was not resolved for a number of our members, and their data were not appropriate to this study. We believe that problems such as these could be overcome by conducting a workshop at the initiation of the project. A follow-up workshop sometime during the first field season would be useful to help resolve problems. We have found that direct person-to-person or telephone communication works best for enlisting banders' cooperation. Writing letters or requesting information in a newsletter was an ineffective method for obtaining data.

Since the majority of participants in this study band only on the weekends, we may have missed major movements for some species. We have not been able to rectify the problems that habitat differences may cause, or the fact that certain banders, especially those near Lake Erie, captured most of the individuals.

We hope that the above points will be an aid to other groups embarking on similar projects, and we would encourage input from other researchers who have completed similar projects.

Summary

During a three-year period, we studied the timing of the fall migration of passerine birds through Ohio. In this study, 8,795 individuals of 85 migratory passerine species were banded. White-throated Sparrows and Yellow-rumped Warblers were the most abundant species banded. The timing of migration of the brown-backed thrushes and the kinglets is dependent upon the distance between the breeding and wintering grounds. Migration in the wood warblers is the result of interaction between diet and migration distance. Those species which feed on flying insects and travel the longest distances migrate earlier. The Yellow-rumped Warbler, which migrates the shortest distance and has a diet that includes large amounts of vegetable material, migrates later than any other wood warbler.

Acknowledgements

We wish to thank all those members of O.B.B.A. who took the time to participate and to the other members who have supplied encouragement and insight into the completion of this project. Neal Mundahl prepared the migration figure and is gratefully acknowledged. We are indebted to John Smallwood and Neal Mundahl for reading various drafts of this manuscript. This paper is dedicated to the memory of Jerie Stewart, O.B.B.A. member, bird bander, and friend, whose absence is deeply felt.

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