WAVE PHENOMENA OF LAND MIGRANTS AT ISLAND BEACH STATE PARK, NEW JERSEY

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Since 1956 an Operation Recovery bird-banding program has been conducted at Island Beach State Park, Ocean County, New Jersey. The history, goals, and current projects of banding at this station have been summarized recently by the current program coordinator, Katherine G. Price (1971). From the great quantity of data collected, however, only a few elements have been published (Murray and Jehl, 1964, for example). This short article suggests new areas of study with the Island Beach data, and presents a graphic summary of the wave patterns of autumnal land movements during eight years. This descriptive summary should be of interest in itself, and useful for comparisons with similar data from other banding localities.

INTRODUCTION

Island Beach State Park constitutes the southern 10 miles of a barrier beach, bounded by the Atlantic Ocean on the east and Barnegat Bay on the west. Natural vegetation covers most of the 2,300 park acres. Net lanes are usually located in shrub-thickets, where the important plants include: bayberry (*Myrica pensylvanica*), cherry (*Prunus* sp.), poison ivy (*Rhus radicans*), oaks (*Quercus* spp.), holly (*Ilex opaca*), red cedar (*Juniperus virginiana*), pitch pine (*Pinus rigida*), and a variety of small herbs (Martin, 1959).

Banding at Island Beach is conducted in an organized program in the fall (since 1956) and spring (since 1968) migration periods, with an attempt to provide continuous daily coverage. All banding schedules are collated at the end of a season, yielding a summary of birds banded each day on an individual species basis. Total net-hours are also recorded daily.

METHODS

Data summary sheets were examined for the fall seasons, 1956-1970. For this analysis some years were considered insufficient because of shorter netting seasons, lack of net-hour data, or non-continuous coverage. The present study thus used data from 1961-1963 and 1966-1969, which together represented 179,191 birds banded and 162,586 net-hours (Table 1).

For a given year the total number of birds per net-hour was calculated for each day of banding. This figure included all birds, involving more than 100 species over an entire fall season, but the majority of the migrants were 15 common species as listed in Table 2. The daily birds/net-hr. were then used to form a 3-point floating average for each day (using a Hewlett-Packard 9100A computing calculator). The advantage of the floating average is its property of smoothing insignificant daily variations, while more clearly demonstrating major flights that include large numbers of birds over several days. A drawback of this method is the loss of data from

TABLE 1. Birds banded and net-hours in the fall at Island Beach recovery station.

	1961	1962	1963	1965	1966	1967	1968	1969	Totals
Birds banded	21,179	21,718	31,676	18,573	25,556	21,364	26,988	12,137	179,191
Net-hours	25,389	28,836	35,362	19,317	13,941	15,830	14,905	8,952	162,586
Average net-hr. per day	445	401	442	285	221	264	248	128	—

TABLE 2. The most common migrants netted at Island Beach in fall, listed in order of abundance.

1. Slate-colored Junco (*Junco hyemalis*)
2. White-throated Sparrow (*Zonotrichia albicollis*)
3. Catbird (*Dumetella carolinensis*)
4. Brown Creeper (*Certhia familiaris*)
5. Myrtle Warbler (*Dendroica coronata*)
6. Golden-crowned Kinglet (*Regulus satrapa*)
7. Swainson's Thrush (*Hylocichla ustulata*)
8. American Redstart (*Setophaga ruticilla*)
9. Red-eyed Vireo (*Vireo olivaceus*)
10. Yellowthroat (*Geothlypis trichas*)
11. Rufous-sided Towhee (*Pipilo erythrophthalmus*)
12. Song Sparrow (*Melospiza melodia*)
13. Ruby-crowned Kinglet (*Regulus calendula*)
14. Palm Warbler (*Dendroica palmarum*)
15. Yellow-shafted Flicker (*Colaptes auratus*)

netting days adjacent to days for which there was no coverage. Thus continuous coverage is highly desirable and fortunately available for most of the years considered here. The daily 3-point floating averages for the entire seasons were then plotted on extra-large graph sheets (10″ x 16″), and the smaller summary figures (Figure 1) prepared from these.

RESULTS AND DISCUSSION

These figures can be read directly as a seasonal index to migration activity patterns at Island Beach in the fall. The few periods where no activity is recorded indicate an absence of data, or more rarely, data omitted because the netting involved less than 20 net-hrs./day.

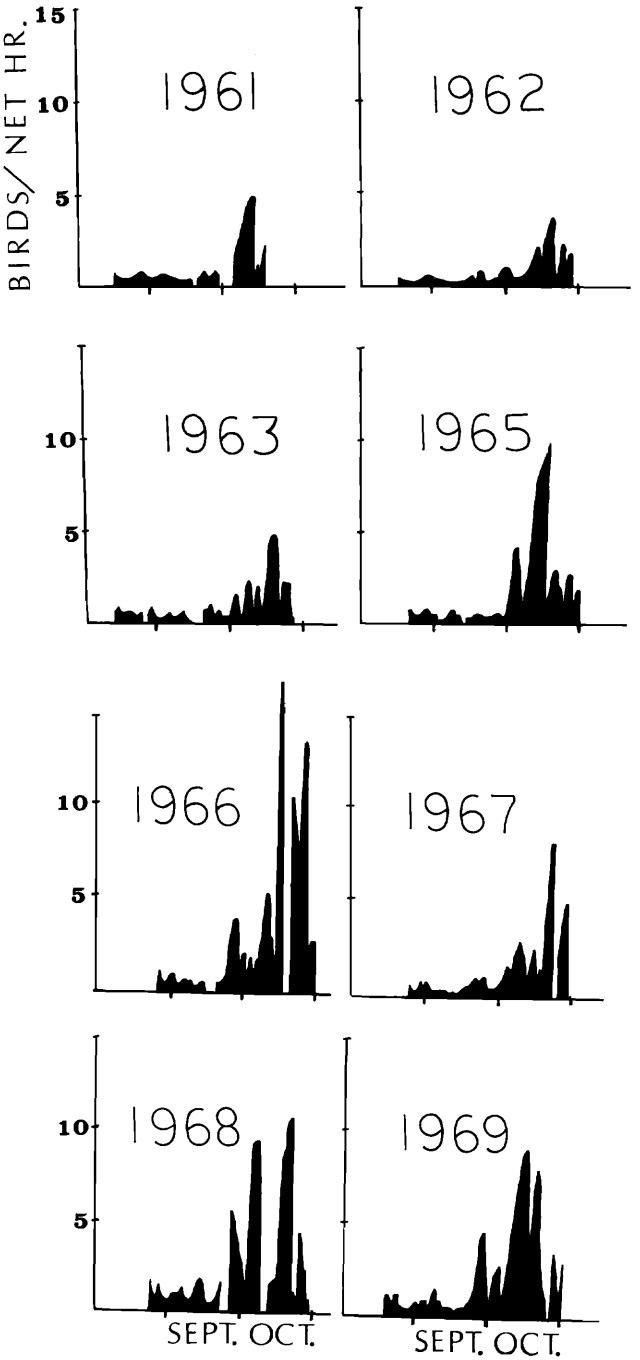

FIGURE 1. Autumn netting rates at Island Beach State Park for the years 1961-1963 and 1965-1969.

The usual high numbers of net-hours and birds per day lend confidence to the patterns shown by these figures, with late August and September as periods of moderate activity, and October as the month of mass migratory waves. It is interesting that except for 1961 (with incomplete coverage), each year has four or five distinct waves in October, whereas only one or two major peaks were ever noted in September, at the end of the month. That the greatest movements are within October has long been recognized, but the dramatic pattern of successive peaks is seldom so easily discerned or verified as with this review of the eight years through graphs.

Why do migrants exhibit this wave phenomenon? Their activity is of course strongly correlated with weather patterns, particularly with frontal movements. Fall migration peaks typically occur immediately after the passage of a cold front with winds from a northerly direction (Bennett, 1952), and meteorologists in the northeast report October as a month with fronts passing through successively at five or six-day intervals. I think it is also significant that gregarious or flocking species such as thrushes and juncos become a much more important element of the total land migration as the season progresses. October has many more intraspecific flocks of migrants than September, which is dominated by the passage of solitary species such as the Catbird and Red-eyed Vireo.

The figures also suggest that the birds/net-hr. are increasing in recent years, but this suggestion is probably an interesting artifact of netting procedures. In more recent years there have been somewhat fewer persons involved and, more frequently, it has been necessary to close net lanes after a heavy morning flight. Hence, while the number of net-hours per day became less (Table 1), the birds per net-hr. increased with more data being restricted to the active hours of the morning.

We are now at a stage where it would be particularly interesting to compare the wave patterns of migrants at Island Beach with those at other Atlantic stations to the north or south, or with those at Pacific coast stations. An analysis of the spring migration at Island Beach would also be valuable, but such a study must wait for a more complete coverage of that season in future years.

ACKNOWLEDGMENTS

In the years since its start, the Island Beach Program has been successful because of a great many bird-banders who have so willingly given their time and maintained excellent records. It is impossible to name them all, but each deserves much thanks for his or her contributions. The station coordinators, past and present, deserve particular recognition for their sustained efforts in organization of netting activities and data collating. All have generously shared their results. The New Jersey State Museum kindly permitted me to work from their files of the banding records at Island Beach.

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