BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. 45, No. 3 SUMMER 1974 PAGES 197-292

ANALYSIS OF STARLING AND MYNA MOVEMENTS IN THE PACIFIC NORTHWEST

By STEPHEN R. JOHNSON

INTRODUCTION

From spring 1968 until summer 1970, Starlings (*Sturnus vulgaris*) and Crested Mynas (*Acridotheres cristatellus*) were banded on the campus of the University of British Columbia, under the Connaught Bridge (a communal roost in downtown Vancouver, B. C.), and on the three major islands at the mouth of the Fraser River (Westham, Sea, and Lulu islands). All of these locations are in the extreme southwestern corner of mainland British Columbia.

During these two years, secondary to a study of the colonizing success of these two species of Sturnidae introduced into North America (Johnson, 1972), 1,063 Starlings and 222 Crested Mynas were banded at the above stations. Since 1968, 78 recoveries of sturnids that we banded have been returned and analyzed. The purpose of this paper is to incorporate our recoveries with over 450 others supplied by the Canadian Wildlife Service and to show the broad picture of seasonal sturnid movements in the far Pacific Northwest (Oregon, Washington, western Idaho, and British Columbia) during the past 10 years.

Starlings first colonized the far Northwest by movements south from the Peace River Parklands (Munro and Cowan, 1947) of British Columbia and Alberta during the mid to late 1950s. They have only become common along the coast of British Columbia, Washington, and Oregon since 1960, and appeared as regular nesting birds in southwestern British Columbia in the early 1960s (see Myres, 1958, for a discussion of early Starling movements in British Columbia).

Crested Mynas were introduced to the northwest in 1897 at Vancouver, B. C. The entire North American population originated presumably from only 1 or 2 pairs of birds which escaped while part of a shipment of caged birds from Hong Kong was being unloaded (Cummings, 1925).

RESULTS AND DISCUSSION

The discussion of Crested Myna movements may be dispensed with quickly. Only seven returns have been received, and all were recoveries from the Vancouver area, indicating no spread in distribution by the species.

A total of 512 Starling banding returns have been analyzed, of which 40 contained erroneous data—impossible dates or banding

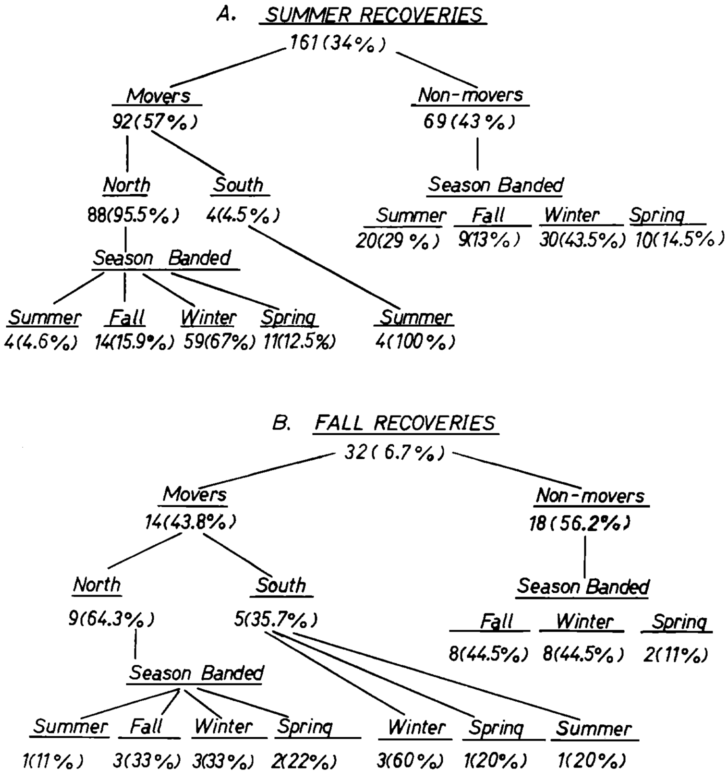


FIGURE 1. Seasonal distribution of Starling recoveries. A through D show the various components of the Summer, Fall, Winter, and Spring returns, respectively, for the Pacific Northwest.

coordinates necessitated their removal from the sample.

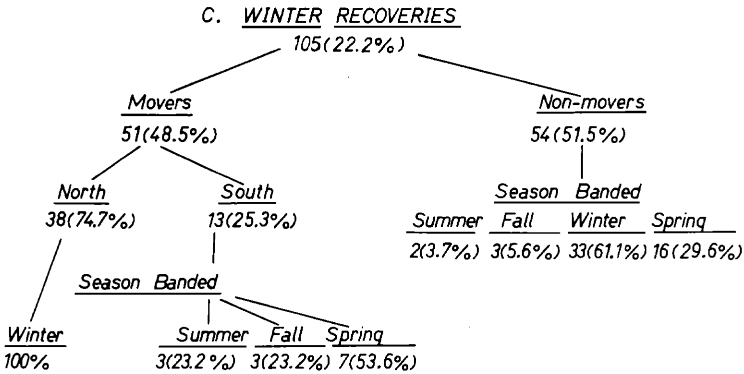
Northward movements and subsequent recoveries of Starlings wintering below 42°N were recorded earlier than those of birds wintering above 42° N. Therefore two spring starting dates (or winter terminating dates) were used to describe movements of Starlings in terms of seasonal relationships. For the purposes of this analysis the seasons were defined as follows:

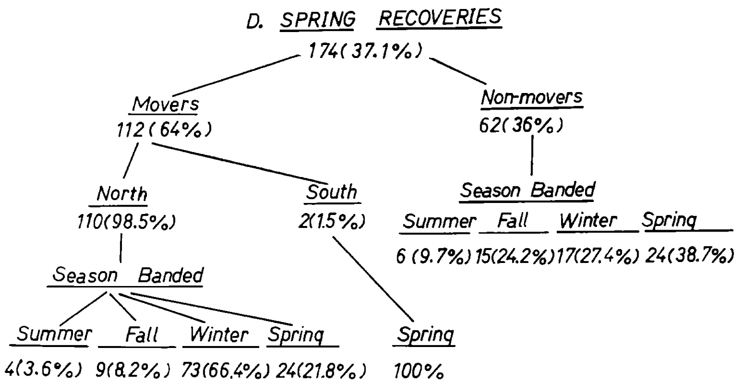
Summer: 1 May until 15 August

Fall: 16 August until 15 November

Winter: 16 November until either 31 January (southern birds) or 15 February (northern birds)

Spring: Either 1 February or 16 February until 30 April





Recoveries have been grouped into these four seasons and birds were classified as "movers" or "non-movers" depending upon whether the recovery was made more than 30 minutes of latitude or longitude from the original banding site. Intraseasonal returns are not included on the recovery maps (Figs. 2 - 5). Also since most recoveries furnished neither age nor sex information (see Table 1) a discussion on the basis of these characters was not attempted. (For similar treatments see the earlier paper by Kessel, 1953, and the recent paper by Royall et al., 1972.)

Of the 472 valid recoveries the majority were from spring and summer. Winter returns comprised a major segment of the remaining recoveries, whereas those from fall made up only about 7% of the total.

Summer Recoveries

Slightly over one-half (57%) of the total 161 summer banding recoveries (Fig. 1A) involved movements further than 30 minutes, and the majority of these were birds recovered north of their

TABLE 1.
Relationships between age and time between banding and recovery.

	Age Classes			
	Unknown	Adult	Immature	Nestling
Sample size[1]	266 (56.20%)	166 (35.30%)	20 (4.25%)	20 (4.25%)
Time between banding and recovery (months)				
Mean ± 1 SE	17.2 ± 0.9	18.2 ± 1.4	22.3 ± 4.9	12.9 ± 2.3
Maximum	84	86	89	36

[1]Total = 472

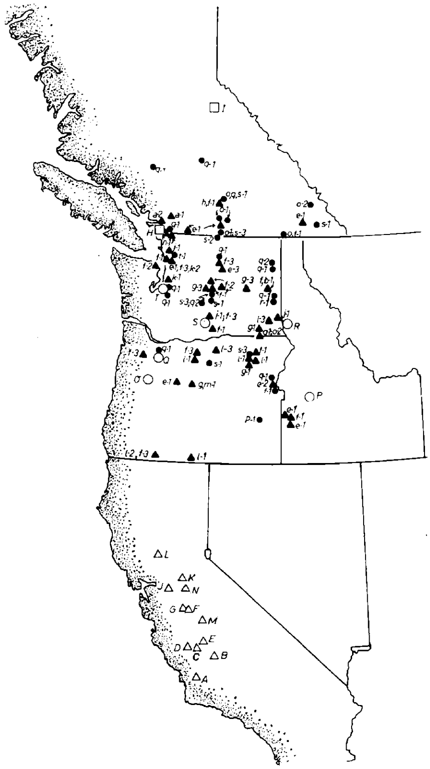


FIGURE 2. Summer recovery map. Banding sites are open triangles △, dots ○, and squares □; these represent sites in California, Oregon-Washington-Idaho, and British Columbia, respectively. Capital letters label the specific banding sites. Uncircled triangles ▲, dots ●, and squares ■, represent sites; the symbol indicates from which general geographic area the individual originated. The lower case letters relate back to the specific banding sites, and the numbers (1, 2, or 3) relate to the season when banding occurred. Only *interseasonal movements* are represented in these figures.

original banding coordinates (Fig. 2). Two-thirds of these northward moving birds were winter-banded, with the fall and spring-banded birds comprising most of the remainder of this segment of movers. All four of the birds that were recovered in the summer, south of their original banding coordinates, were summer-banded birds.

The large percentage of non-moving winter and summer-banded birds that were recovered in summer (43.5% and 29% respectively, See Fig. 1A) suggests either that a sizable portion of the summer recoveries are from sedentary segments of the population, or that they are birds which nest in the same general area for several consecutive years.

Fall Recoveries

Fall recoveries represented the fewest encounters (Figs. 1B and 3), possibly reflecting either effort by banders, susceptibility of

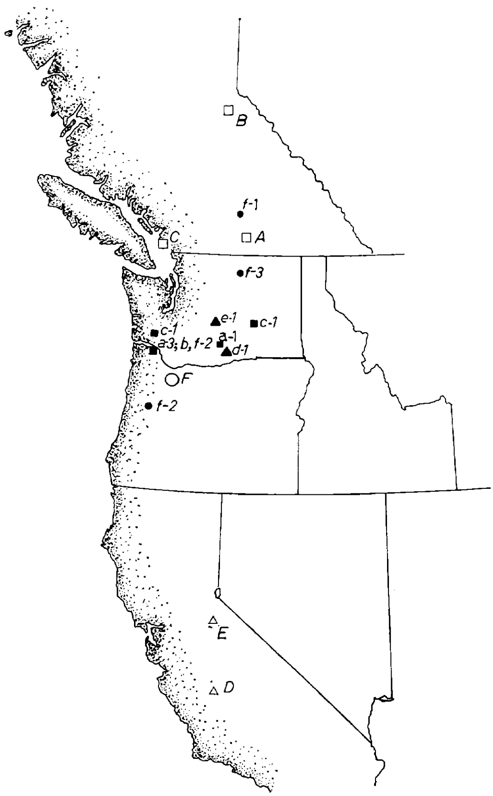


FIGURE 3. Fall recovery map. Numbers 1, 2, and 3 relate to bandings in Winter, Spring, and Summer, respectively.

birds to trapping or netting, or reduced mortality during this period.

Almost two-thirds of the fall recoveries from movers were recovered north of their original banding coordinates. Although the sample size for these is small, it should be noted that over one-half were banded during fall or winter, suggesting either that (1) birds were expanding their wintering ranges north, or (2) they were still in the process of migrating south. As I will show later, winter recoveries suggest that the former is probably true.

Of the fall recoveries within 30 minutes of their original banding coordinates (non-movers), the majority were also winter and fall-banded birds. Because no summer-banded (i.e., nesting) birds were recovered in this segment of the fall sample, it should not be concluded, however, that these fall non-movers were part of a sedentary segment of the population.

Winter Recoveries

Of the total winter recoveries, about one-half (Fig. 1C) were non-movers. The majority of these were winter-banded birds;

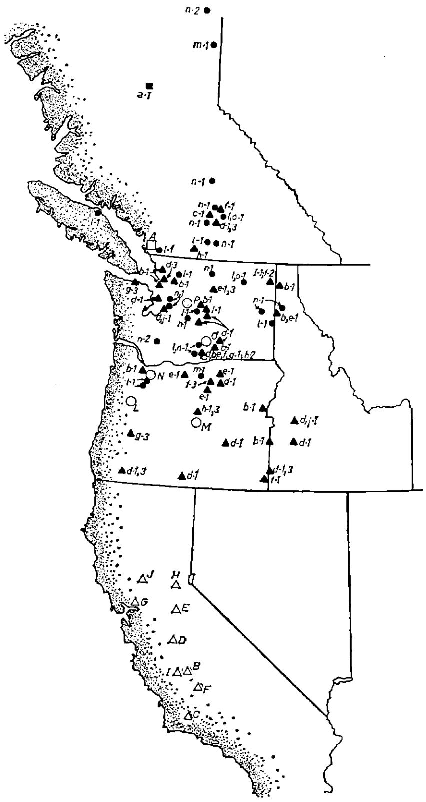


FIGURE 4. Winter recovery map. Numbers 1, 2, and 3 relate to bandings in Spring, Summer and Fall.

spring-banded birds comprised the second largest group. Because only interseasonal recoveries are considered here, it seems safe to conclude that a large portion of the Starling population winters in the same region year after year, as also suggested by Royall et al. (1972). Many birds remain until spring and a few seemingly sedentary birds spend the winter, spring, summer, and fall in the same area (Fig. 4).

The major portion of winter movers were those birds that apparently extended winter ranges north of their original winter banding coordinates. These were almost exclusively Oregon and California banded birds that were recovered in northern Oregon, Washington, and British Columbia. It now seems apparent that the earlier mentioned recoveries north of the winter and fall banding coordinates were movers that had extended their winter ranges north (at least 30 minutes and most more than 1° N) of their original banding coordinates.

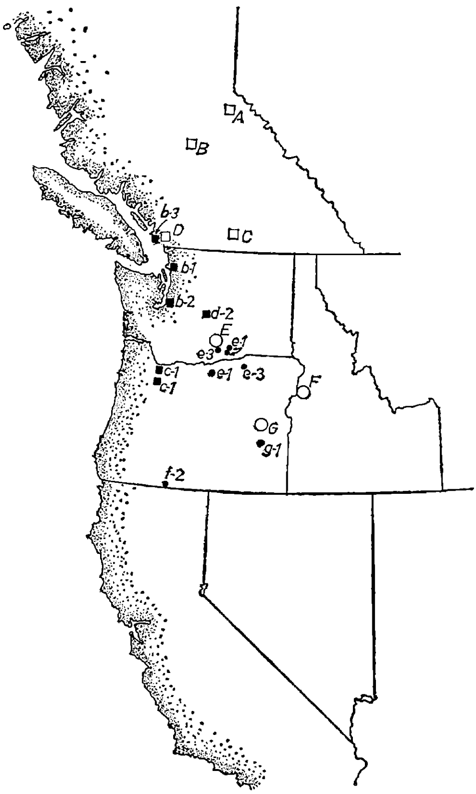


FIGURE 5. Spring recovery map. Numbers 1, 2, and 3 relate to banding in Winter, Summer, and Fall.

Spring Recoveries

Nearly two-thirds of the spring recoveries were movers and almost all were recovered north of their original banding coordinates (Figs. 1D and 5). Of the remaining one-third (non-movers) about 40% were banded during a previous spring in their recovery locations, but since only 6 of 62 were summer-banded (i. e., nesting), we cannot assign these birds sedentary status. It is interesting, however, that so large a segment of the total spring returns were non-movers.

CONCLUSIONS

Returns from 472 Starlings, the majority banded in California and Oregon, indicated that two major groups of birds are represented: (1) those showing migratory tendencies (movers) and (2) a sedentary segment of the population (non-movers). However, the small number of summer banded non-movers recovered in spring, fall, and winter makes the latter classification (sedentary) rather questionable.

An average, for all seasons, of slightly more than one-half (53.3%) of all recoveries were from birds which had shown movements more than 30 minutes from their original banding coordinates. Of these movers, most (83.2%) were recovered north of their banding locations. This would be expected for the spring (98.5%) and the summer (95.5%) returns since normal migration would place these birds in more northern latitudes during these seasons. However, the large number of northern recoveries during fall (64.3%) and especially winter (74.7%) suggests a northward extension of wintering areas by Starlings in the Pacific Northwest.

Findings presented in this analysis seem to substantiate parts of a hypothesis developed by Berthold (1968). In his review of possible reasons for the mass increase by Starlings in Europe, he mentions that Starlings have reduced their migration to the extent that many more are wintering in their breeding areas (becoming more sedentary) or are wintering further north between previous wintering areas and breeding areas.

Band returns unfortunately furnish limited information concerning movements. Usually only one recovery is made, especially when the majority of returns are the result of control programs, as with Starlings. Large scale capture and release programs could provide biologists with more multiple recoveries for individuals over a longer time period. This information, along with more sex and age information (the result of more concentrated summer banding of nestlings), could make analyses more meaningful.

ACKNOWLEDGMENTS

The 450 recoveries upon which a major portion of this paper is based are a segment of a larger number supplied to me in 1971 by the Canadian Wildlife Service. All recoveries from bandings not made by me are over five years old. Most of the original bandings that generated these 450 recoveries were from birds banded in California,

Oregon, Washington, and Idaho by U. S. Bureau of Sport Fisheries and Wildlife personnel.

This work was conducted while the author was a graduate student, under the direction of Dr. Ian McTaggart Cowan, at the University of British Columbia.

My thanks go to the many people who helped with the sturnid banding, especially Dr. Rudolf Drent, Wayne Weber, Ian Robertson, Brian Kemper, Jim Biggar, Larry Licht, John Ward, and many others. Donald Borchert, graphics specialist at the Institute of Arctic Biology, University of Alaska, supplied material and services for earlier drafts of the recovery maps (Figs. 2 - 5). Dr. Cowan, Wayne Weber, and David Hatler critically read earlier drafts of the manuscripts. The Institute of Resource Ecology, Univ. of B. C., provided computer facilities.

LITERATURE CITED

BERTHOLD, P. 1968. Die Massenvermehrung des Stars Sturnus vulgaris in fortpflanzungsphysiologischer Sicht. *J. Ornithol.*, **109:** 11-16.

CUMMINGS, R. A., 1925. Observations on the Chinese Starling (*Ethiospar cristatellus*). *Can. Field-Nat.*, **39:** 187-190.

JOHNSON, S. R., 1972. Thermal adaptation in North American Sturnidae. Ph.D. dissertation, University of British Columbia, Vancouver, British Columbia, 128 p.

MUNRO, J. A., AND I. McT. COWAN, 1947. A review of the bird fauna of British Columbia. Spec. Pub. 2, B. C. Prov. Mus. 285 p.

MYRES, M. T. 1958. The European Starling in British Columbia: 1947-1957. *Occas. Pap. B. C. Prov. Mus.*, **11:** 1:60.

KESSEL, BRINA, 1953. Distribution and migration of the European Starling in North America. *Condor*, **55:** 49-67.

ROYALL, W. C., GUARINO, J. L., ZAJANC, A., AND C. C. SIEBE, 1972. Movements of Starlings banded in California. *Bird-Banding*, **43**(1): 26-37.

Department of Zoology, University of British Columbia, Vancouver 8, B. C. Canada (present address: Dept. of Zool., Univ. of Aukland, Private Bag, Aukland, New Zealand.)

Received 2 August 1973, accepted 15 December 1973.