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RECOVERIES OF STARLINGS BANDED AT
COLUMBUS, OHIO

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Starlings west of the Appalachians tend to migrate along a North-east-Southwest axis. This was pretty well established by Kessel (1953) who studied all the cards in the files of the Federal Wildlife Service for starlings banded and recovered up to 1951. In the early thirties a project of banding starlings in Columbus, Ohio reached the same conclusion (Thomas, 1934). Inasmuch as the writers banded over 16,000 starlings at Columbus in the winter of 1963-64 it seemed worth-while to analyze our recoveries to see if they indicated the same trend 12 years after Kessel's review and 30 years after the previous Columbus project.

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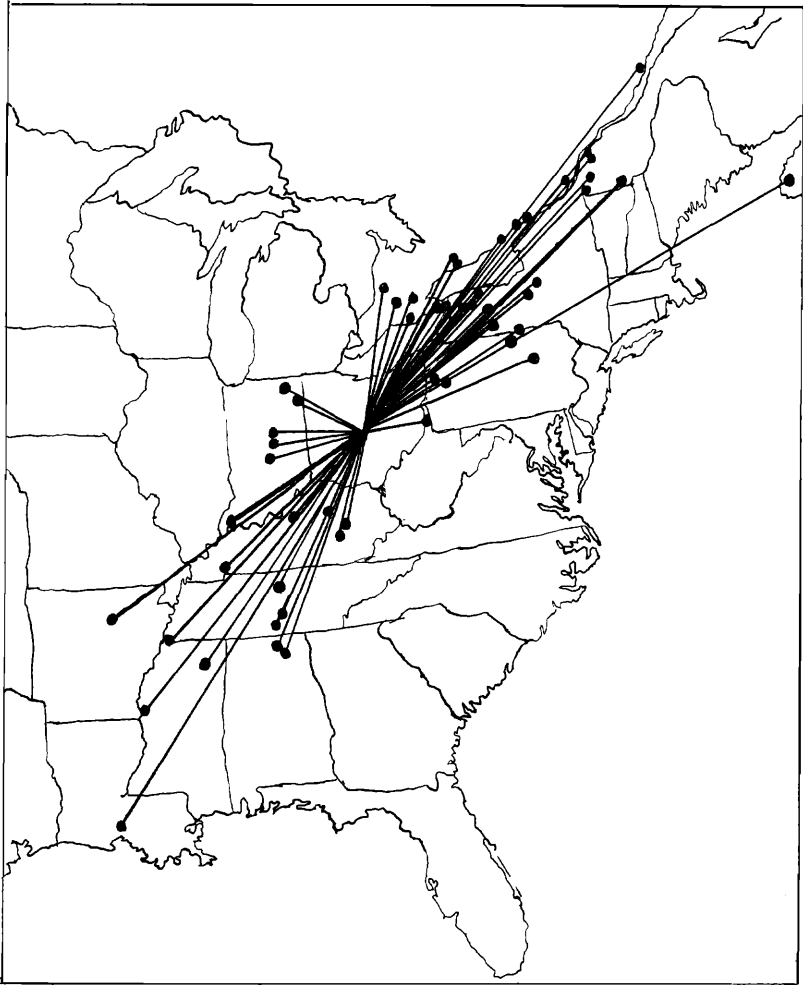


FIGURE 1. Starlings recovered outside Ohio.

Our trap was adjacent to a small wooded area where a large "blackbird" roost built up in the early fall. It was a decoy trap of the walk-in type, 50x25x6 ft. It was made of chicken wire, except for a "ladder" in the top 1x10 ft. made of 2x4 in. mesh. This type of trap was developed by the Federal Wildlife Service following the general idea of the Australian crow trap (Meanley, 1962). Cracked corn and water were kept in the trap but the decoys were an important feature.

While we also banded many cowbirds, redwings and grackles the present analysis is confined primarily to starlings. It is based on birds banded from October 1, 1963 thru January 31, 1964, the period when the roost was active. We banded comparatively few before and after.

TABLE 1.

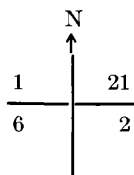
Number banded	16,676
Recovered outside Ohio	53
Recovered in Ohio outside Columbus	65
Recovered in Columbus	74
Total recoveries	192
% recoveries	1.15

Table I gives information about the overall numbers banded and recovered. Most interesting, perhaps, were the 53 birds recovered outside Ohio and thus at an appreciable distance. The total of 192 recoveries is only 1.15% of the number banded.

The main interest in the present analysis is the direction in which the birds went when they did not remain in Columbus. The conventional method of analysis is to plot the recovery points on a map and perhaps draw vectors from the banding location to these points. Figure 1 does this for the 53 recoveries outside Ohio. The trend is quite obviously N.E.-S.W. The five cases in central or northern Indiana and the one in West Virginia do not conform to this trend.

We did not put the Ohio recoveries on this map because it is pretty well filled already with the vectors. Moreover some of the birds recovered presumably had not really departed from Columbus but were merely foraging over a wide area. However, we did make a rough analysis of the Ohio recoveries as follows. The Wildlife Service now furnishes locations of recoveries in terms of 10-minute grids. Our station coordinates are 400-0830. On the map we drew axes on the 40th parallel and 83rd meridian thus dividing the state into quadrants. We dropped all recoveries that were within 50 miles of Columbus on the assumption that beyond that distance they were not part of the Columbus resident population. We also dropped those that were exactly on either axis according to the coordinates furnished with the recovery report. This left 30 usable

TABLE 2.
Recoveries in Ohio 50 miles or more from Columbus



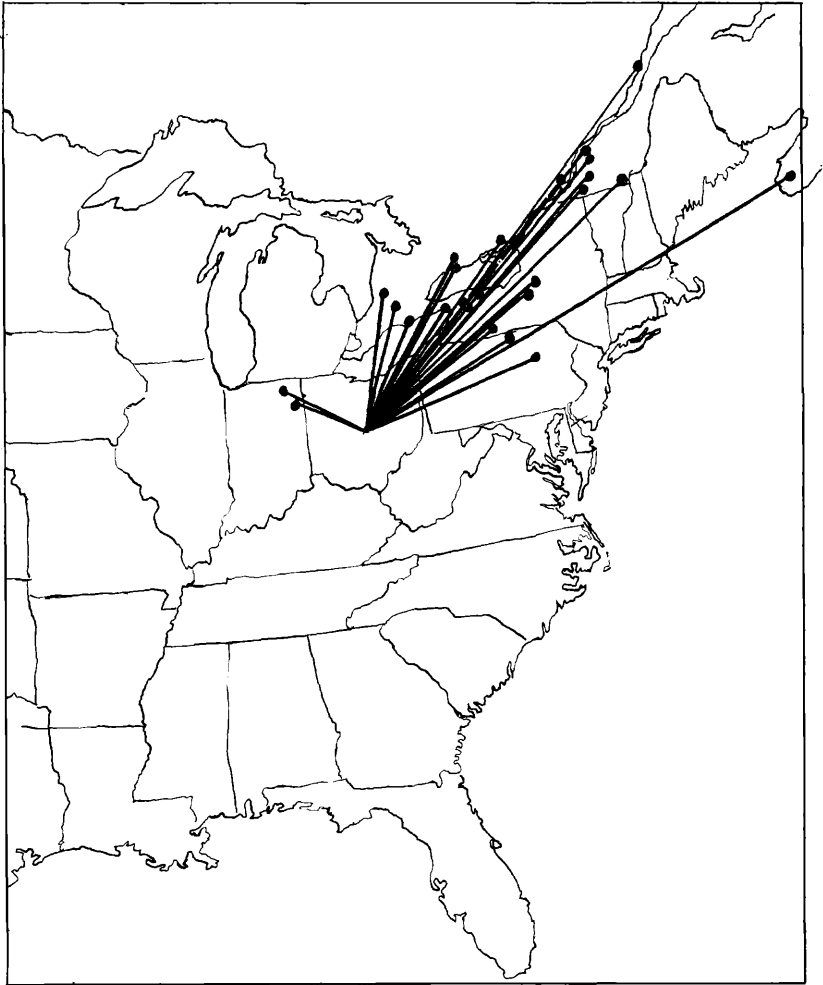


FIGURE 2. Starlings recovered April-July.

recoveries which appear in Table 2 in the appropriate quadrants—for example 21 recoveries in Northeastern Ohio. The results tend to confirm those of Figure 1. Most of the recoveries were in the N.E. or S.W. quadrants—90% in fact.

It seems probable that the birds that go N.E. would do so in the spring to breed and those that go S.W. would be wintering in that direction. As has been done in some other studies we took April thru July inclusive as the breeding and nesting season. Figure 2 plots the recoveries that occurred in those months and is in the same form as Figure 1. With the exception of two cases in Indiana all are

in a N.E. direction. Presumably most of them went there for nesting purposes or at least attempts. In addition there were 3 recoveries in August (not shown) and 2 of them were in Ontario. The other was due east in West Virginia. Perhaps those two bred there and stayed around awhile. Then we had 4 recoveries in March—all in Pennsylvania or New York and somewhat N.E. Possibly they were on their way or maybe early arrivals. At any rate there is a pretty clear tendency for such of our starlings as left Columbus in the spring to turn in their bands somewhere to the Northeast.

It is generally agreed that the Starling species comprises both migratory and sedentary birds. Our population included some of the latter. We did not have enough repeats (i.e. banded birds retrapped) for analysis. But we did have 74 recoveries in Columbus. The greater the lapse of time since banding, the greater the presumption that they were sedentary. Our Columbus lapses ranged from 1 day to 262 days with a median of 48 days. One fourth of them were over 87 days. This suggests that we had an appreciable resident population. It seems to refute the possibility that all our banded starlings migrate but 99% do not die or get caught under circumstances such that their band is sent to Patuxent.

Our results agree quite well with those of Thomas 30 years earlier. (Thomas, *supra*). Our two maps are quite similar to his maps for total recoveries and breeding-season recoveries. A considerable migratory population is obvious in both studies although ours suggests a proportionately larger resident population.

Our starlings appear to be atypical in their N.E.-S.W. trend. The statement is frequently made that in general birds in this country migrate North and South. More specifically, with reference to starlings Kessel says that on the east coast they tend to go N. and S. (Kessel, *supra*). Davis (1960) in an analysis of starling data along the coast likewise mentions the movement to N. or S. Thus our starlings appear to differ from their eastern counterparts. Perhaps they differ also from other species in their own locale. We do have some data on one such other species—cowbirds. Along with our starling banding project we did 12,458 cowbirds at Columbus, October thru January, and had 34 recoveries from outside Ohio. These are shown in Figure 3 which is identical in form with Figure 1 and directly comparable with it. The difference between the two maps is obvious. Quite a few of the cowbirds went north or south. But not so the starlings.

This brings up the question of *why*. In Europe the major migration routes for starlings are N.E.-S.W. except for those along the shores of the Baltic who go E.-W. and the British group that is mostly sedentary (Dorst, 1962). Our starlings are mainly descendants of those imported from Europe in 1890. Some writers have suggested that our mid-western birds are merely continuing the ancestral instinctive tendency. Kessel, however, rejects this suggestion because of "little evidence". . . Dorst (*supra*) in his extensive review of migration says that the American starling adapts its routes to those of native species—the Atlantic coast and the Mississippi valley. Evidently he did not "catch" our N.E.-S.W. migrants.

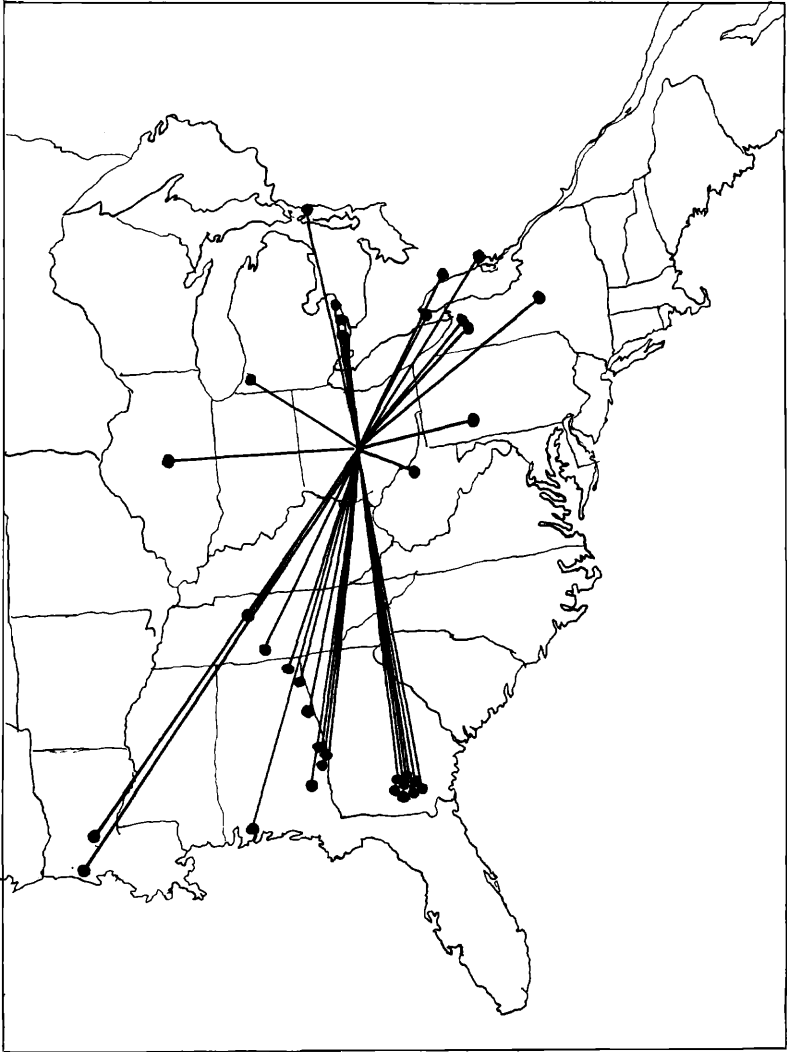


FIGURE 3. Cowbirds recovered outside Ohio.

The writers are not prepared at the moment to abandon the instinctive hypothesis. It is possible that our mid-western birds follow the ancestral tendency where there are no topographic barriers to interfere. In the East there may have been a similar genetic tendency but the mountains impose some limitation to the southwestward progress. There are other instances where an instinctive tendency persists as a species characteristic where it no longer

serves a useful purpose provided it does no harm. A crucial answer might be obtained with populations of captive starlings by watching for "migratory restlessness" by the usual technique of recording automatically the perching on different sides of the cage.

Meanwhile we have shown that those of our Columbus starlings that migrate follow the N.E.-S.W. axis just like their predecessors of many generations ago.

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BEHAVIOR OF MYRTLE WARBLERS IN CAPTIVITY

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Although many parulids form interspecific flocks after the breeding season, Myrtle Warblers (*Dendroica coronata*) are one of the few wood warblers that exist in conspecific flocks at that time. The original purpose of this study was to determine if there are any behavioral mechanisms which enhance flocking and which are absent in other parulids which we had studied previously which do not form conspecific flocks (Ficken, 1962b; Ficken and Ficken, 1962). Since displays often reduce fighting and other high intensity agonistic acts, an increase in the complexity of displays might be expected in social species. For example, the Common Grackle (*Quiscalus quiscula*) which is social even during the breeding season has a larger display repertoire than many nonsocial icterids (Ficken, 1963).

We made preliminary observations of winter flocks in the wild, but the birds were difficult to observe closely and we therefore decided to study them in captivity. This paper describes the agonistic behavior, both visual and vocal, of this species, and the change which occurred with an artificial increase in light. In addition, we obtained information on comfort movements and feeding patterns which had not been previously described in this species. Finally, there is a discussion of the behavioral mechanisms related to flocking in the Myrtle Warbler.