

absence of conflicting evidence, it seems reasonably safe to conclude that during the last five years at least 95 per cent of the breeding Starlings of central Ohio have produced one brood *only*.

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## NOTES ON THE SURVIVAL, WINTER DISTRIBUTION, AND MIGRATION SPEED OF EASTERN MOURNING DOVES<sup>1</sup>

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CAFE COD, with its woods of scrub pine and oak and its open fields, has long been a favorite breeding area of the Mourning Dove (*Zenaidura macroura carolinensis*). Although not nesting in large numbers in the immediate vicinity of the Austin Station, many birds have been trapped and banded each year. Late in the summer the Doves exhibit a marked tendency to congregate before migrating in localities of abundant feed. Such an area was created at the Station this past summer (1934) by sowing an acre of buckwheat. In late August and early September it was not unusual to flush seventy-five to one hundred doves from the buckwheat or to take twenty from a single house trap. As a result the number of bandings, 315, was nearly double that of any previous year.

From the 519 Mourning Doves banded in the four years 1930 through 1933 a total "return"<sup>2</sup> of 106, or 20.4 per cent, has been reported. Table 1 is based on these "returns" and is arranged to show the numbers killed each year subsequent to banding and the survival rate. The figures in columns S-1, S-2, S-3, etc. give the number of doves shot the first, second, third, etc., shooting seasons subsequent to banding. Thus it is evident that, during the first hunting season immediately following the time of banding 26, or 5.01 per cent, of the Doves were shot, and during subsequent seasons only 7, or 1.34 per cent. The total known kill, then, is 6.35 per cent.

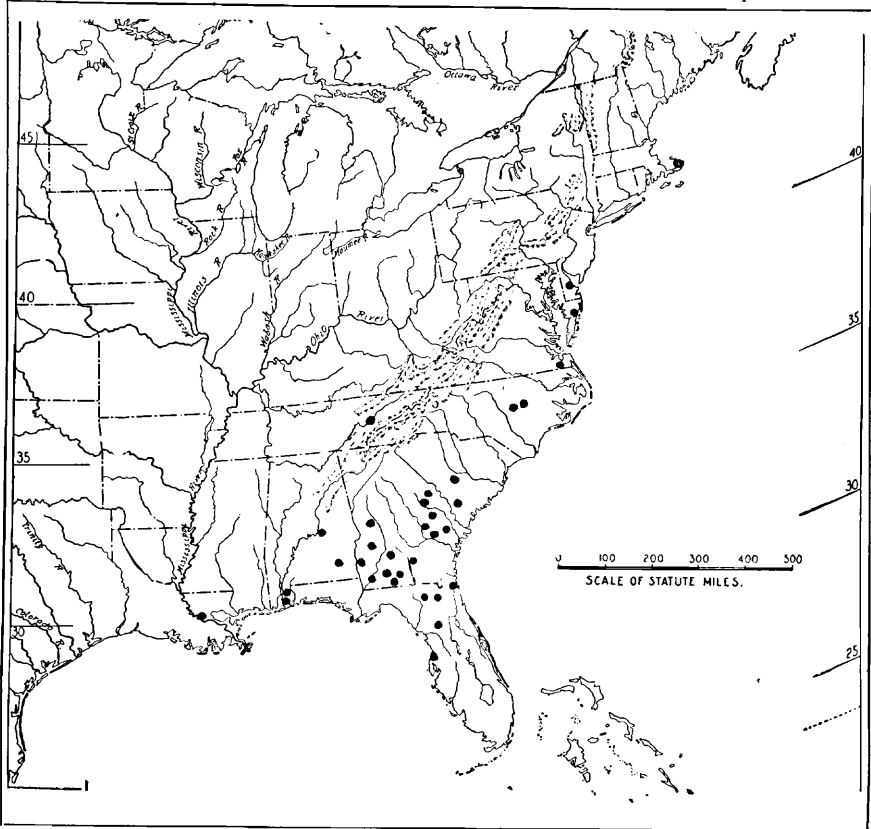
TABLE 1.

Year	Number	S-1	S-2	S-3	S-4	S-5	Y-1	Y-2	Y-3	Y-4
1930	74	3	0	0	0	0	11	6	5	3
1931	110	4	3	2	0	..	32	14	5	..
1932	175	11	0	1	..	..	21	7	..	..
1933	160	8	1	..	..	..	17	..	..	..
	519	26	4	3	0	0	81	27	10	3

Columns Y-1, Y-2, Y-3, and Y-4 give the number of birds known to be alive one, two, three, and four years after banding; *not* the

<sup>1</sup>Contribution No. 20 from the Austin Ornithological Research Station.

<sup>2</sup>Includes both recoveries and Station recaptures.



Map of the Eastern United States showing locations of Banding Station and Mourning Dove Recoveries

number of birds actually recaptured. The known survival may be summed up thus:

Survival at end of one year	81 out of 519—15.6 per cent
“ “ “ “ two years	27 “ “ 359—7.5 “ “
“ “ “ “ three “	10 “ “ 184—5.4 “ “
“ “ “ “ four “	3 “ “ 74—4.1 “ “

The figures, of course, show only the birds known to be alive, not the number actually alive, and it should be borne in mind that the summary is based on birds whose ages at the time of banding in most cases are unknown. Hence, the data are insufficient to determine accurately the longevity of the species. However, they do suggest a trend reaching zero about the ninth year.

<sup>3</sup>The *Wilson Bulletin*, Vol. 42, March, 1930, pp. 17-28.

<sup>4</sup>Reproduced in *Bird-Banding*, Vol. 3, July, 1932, p. 91.

Mr. William Brewster Taber, Jr., in a paper<sup>3</sup> based on all the Dove returns reported to the Biological Survey by March 26, 1928, shows by a map<sup>4</sup> three distinct areas of concentration in winter. The three areas, all close to the Gulf of Mexico, are: southeastern Georgia and northern Florida, southern Louisiana, and northeastern Texas. His map contains no birds banded in New England and only four from the Middle Atlantic States. Hence, it is interesting to see how closely a map of the recoveries (Table 2) of Cape Cod Doves compares with Mr. Taber's and supports his conclusions as to areas of concentration.

TABLE 2

<i>Number</i>	<i>Last Taken</i>	<i>Point of Recovery</i>	<i>Date</i>	<i>Days</i>	<i>Miles</i>	<i>Rate</i>
A413279	Aug. 6	Milford, Delaware.....	Oct. 9	64	345	5.4
A426435	May 18	Snow Hill, Maryland.....	Sept. 19**	..	385	..
A452665	Sept. 13	Norfolk Co., Virginia.....	Dec. 24	102	500	4.9
650982	Aug. 14	Smithfield, N. C.....	Dec. ..	..	630	..
521024	Sept. 6	Benson, N. C.....	Dec. 31	116	640	5.5
A426443	Sept. 15	Dandridge, Tennessee.....	Nov. 21	67	825	12.3
A452668*	Aug. 27	Effingham, S. C.....	Feb. 1	158	750	4.7
A452537*	June 30	Monck Corners, S. C.....	Jan. 15	..	810	..
650817	Aug. 19	Gilbert, S. C.....	Sept. 28	40	830	20.7
A426436	July 8	Allendale, S. C.....	Sept. ..**	..	870	..
A439266	Sept. 11	Thomson, Georgia.....	Dec. 26	116	895	7.7
414912	July 18	Glascok Co., Georgia.....	Nov. 22	127	915	7.2
A452651	Sept. 7	Garfield, Georgia.....	Sept. 28	21	920	43.8
A452678*	Aug. 25	Metter, Georgia.....	Jan. 29	157	925	5.9
A426516	Aug. 12	Ellabell, Georgia.....	Nov. 24	104	925	8.9
521121	May 15	Reidsville, Georgia.....	Dec. 22	..	945	..
650939	Aug. 6	Vidalia, Georgia.....	Jan. 27	174	950	5.5
A452583*	July 30	Vidalia, Georgia.....	Jan. 18	172	950	5.5
A413255	Aug. 8	Reynolds, Georgia.....	Jan. 29	174	1000	5.7
A426417	Sept. 16	Willacoochee, Georgia.....	Jan. 19	125	1025	8.2
521001	Sept. 15	Americus, Georgia.....	Dec. 15	91	1035	11.4
650931*	July 29	Tifton, Georgia.....	Jan. 31**	..	1035	..
A413273	Aug. 7	Sylvester, Georgia.....	Jan. 23	169	1050	6.2
521046	Sept. 7	Hartsfield, Georgia.....	Dec. 10	96	1070	11.1
A413277	Aug. 5	Quitman, Georgia.....	Jan. 19	167	1075	6.4
650977	Aug. 12	Clay County, Georgia.....	Feb. 14	186	1080	5.8
521115	May 11	Camilla, Georgia.....	Nov. 25	..	1085	..
A422163	Aug. 7	Bainbridge, Georgia.....	Jan. 26	172	1100	6.4
650828	July 29	Jacksonville, Florida.....	Dec. 12	144	1040	7.2
521146	Aug. 13	Sanderson, Florida.....	Nov. 20**	..	1060	..
A452603*	Aug. 29	Baker County, Florida.....	Feb. 1	156	1060	6.8
521056	Sept. 28	O'Brien, Florida.....	Jan. 17	111	1100	10.
A422178	Aug. 26	Orala, Florida.....	Jan. 17	144	1120	7.8
650937	July 30	Hernando Co., Florida.....	Dec. 2	125	1160	9.3
521097	Apr. 17	E. Tallahassee, Alabama.....	Jan. 30	..	1080	..
650832	Sept. 5	Ozark, Alabama.....	Feb. 4	121	1120	9.2
521021	Sept. 2	Loxley, Alabama.....	Nov. 14	73	1255	17.2
650848	Aug. 30	Fairhope, Alabama.....	Nov. 11	73	1265	17.3
A452664*	Sept. 7	Geismar, Louisiana.....	Dec. 6	90	1410	15.7
A452531*	Sept. 2	Echo, Louisiana.....	Jan. 12	132	1425	10.8
	July 31	Gallatin, Texas.....	Jan. 15	168	1500	8.9

\* These recoveries were received from the Biological Survey too late to be included in the map.

\*\* The date of recovery is at least one year after the last capture.

One half the recoveries fall in the southwest-Georgia-northern-Florida concentration. The Delaware, Maryland, and two of the South Carolina birds were shot early in the fall and may well have been on their way to Georgia. The Virginia, North Carolina, and the other two South Carolina birds were taken in December or later, and hence, may have been wintering. This could be expected, for a few Doves usually winter in Massachusetts. The recoveries from Thomson, Georgia, and Hernando County, Florida, are practically in the area.

It is to be noted that, with but one important exception, all the birds apparently have kept to the coastal plain. A few have followed it southwest into Alabama, two into Louisiana, and one even into the Texas concentration. The interesting exception is No. A426443 taken at Dandridge, Tennessee, on November 21st. To judge by the date, it would seem that the bird was still migrating. Therefore, contrary to what might be expected, the bird apparently must have crossed the Allegheny Mountains. It is improbable that the Tennessee bird indicates the route by which 15 per cent of all the recovered doves reached Alabama and Louisiana; more likely the bird was an accidental wanderer.

The two maps do show one interesting fact; namely, that somewhere, presumably just south of the Great Smoky Mountains, the route followed by the Ohio, Indiana, and Illinois Doves to Georgia crosses sharply the route followed by some of the Cape Cod Doves to Alabama and Louisiana. Also each map has two recoveries in Baldwin County, Alabama, suggesting a possible minor concentration. To judge by the dates of the recoveries, the Ozark, East Tallahassee, and Marion (Taber's) birds were wintering in those localities, but the Easonville (Taber's) bird was migrating.

Thus, although a few Doves fly as far as Louisiana and Alabama, the majority of the Cape Cod Doves concentrate in the Georgia area for the winter. Mr. Taber aptly explained the large number of recoveries in the apparent concentrations thus: "that the dove hunting is more intense in these localities because of the concentration of doves there."

Mr. Taber concluded that "the speed of doves on the fall migration flight varies from 6 to 13 miles per day." His two fastest birds averaged a minimum rate of 9.4 and 9.3 miles per day. The data furnished by the recoveries of Cape Cod Doves now seems to indicate that the rate is considerably higher than Mr. Taber estimated.

The right-hand column of Table 2 gives the approximate minimum rate of southward migration for all but nine of the recovered birds. The rates for the nine have not been computed because either the date of the last capture was in the spring or the date of the recovery was not accurately reported or was more than one year after the last capture. Although many of the dates of the last captures do not even approximate the actual dates of departure nor all the recovery dates indicate the time of actual arrival, nevertheless all the rates are figured on the basis of the known dates. Consequently the average of the rates gives a low figure for the average minimum rate of travel, namely 9.98 miles per day. If the rates are refigured on the assumption that none of the birds departed south prior to August 30th, the average rises only to 10.7 miles per day. Such an assumption is permissible, for the peak of trapping comes in the first week of September. Whereas in the town of Kansas, Illinois, the peak shows the height of the migration, on outer Cape Cod,

with no migrants from the north to be considered, the peak indicates the flocking just prior to migrating.

The average of 17 miles per day for the ten fastest birds probably affords the closest approximation to the true rate of travel, particularly as in all ten cases the dates are very likely those of actual departure and arrival. This rate, however, may still be very low, for one Dove actually averaged at least 43.8 miles per day.

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### GENERAL NOTES

**Sex Ratios and Weights in Wintering Crows.**—Frequently Crows are shot at their winter roosts in large numbers, but ornithologists seem rarely to avail themselves of the excellent opportunities afforded for study of the specimens.

A large Crow roost in the region of Zanesville, Ohio, (Muskingum County) has now been under observation for six months. This roost began in August, 1934, with 600 to 800 birds, but grew rapidly to 5000 to 6000 in November, 10,000 to 11,000 in January, and 16,000 in February. The roost has changed position many times owing to continued persecution by man, but the birds at intervals select a new roost-site for no apparent reason. A line drawn on a map enclosing all points at which these birds are known to feed, includes more than four hundred square miles of territory. This would mean an average feeding population of about forty birds per square mile.

On February 19, 1935, 75 birds were taken as specimens from this roost. Other smaller collections have indicated the same general results, so these 75 birds are considered as being fairly representative of the whole flock of 16,000 birds.

Of the 75 birds, 45, or exactly 60 per cent, were females. In Ohio wintering Starlings<sup>1</sup>, the *males* commonly make up 60 per cent to 70 per cent of the total population. It seems likely that the two sexes are about equally represented in the total Crow population of eastern United States. This observed top-sided sex-ratio (if actual) is probably due to the sexes having somewhat different winter territories. There is some reason to believe that most of the birds wintering near the northern winter limits for the species are males, and that the majority of the females winter several degrees farther south than the majority of the males. This would account for the preponderance of females among the wintering Crows of southeastern Ohio.

The number of specimens is small, though larger than the number usually found necessary to establish the existing sex-ratio. However, future collections may considerably alter the sex-ratio now believed to prevail. It would seem of considerable value for ornithologists, where possible, to sex Crows, Starlings, or Grackles taken during frequent pest-drives and report on their findings. In no other way can a clear picture be compiled of the winter status of many common species throughout their range. It would be especially valuable to study Crows taken at their northern winter limits in northern Ohio, Pennsylvania, and New York, and compare with those found at the same time in the big roosts of Kentucky and Tennessee.

In regions with few or no wintering Crows, the sex-ratio of the first spring arrivals should be determined. Large roosts should be sampled at intervals in late winter, as the roosts grow and then dwindle as spring breaks, to determine which sex leads in the northward shift.

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<sup>1</sup>Hicks, Lawrence E. Individual and Sexual Variations in the European Starling. *Bird-Banding*, 1934, v, 103-118.