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Migration and mortality of banded mourning doves

LAWRENCE L. THOMFORDE*

ABSTRACT—Banding data gathered over a three-year period at Savage, Minnesota, were analyzed to determine migration patterns and mortality rates of 2,218 mourning doves. The age ratio among trapped doves was 1.19 immatures per 1 adult and the sex ratio 3.84 males per 1 female. The weighted mean annual mortality rate for immature doves was 58.5 percent. For adult doves, the weighted annual mortality was 28.2 percent. The total weighted recovery rate was 1.24 immatures to 1 adult. The data show that immatures are 75 percent more vulnerable than adults to being shot; although no difference was found in direct recovery rates between immature and adult birds. Correction for differential vulnerability of sexes on basis of banding data showed that females were 143 percent more likely to be shot. The rate of migrational homing was not calculated, but data suggest that a high proportion of the surviving individuals homed to their natal area.

Distribution of recoveries shows south, southeasternly and southwesternly migration patterns. The Central Management Unit accounted for 69 percent of the total recoveries. Most of the outstate recoveries were in Texas, with Florida recoveries second.

The mourning dove, *Zenaidura macroura*, is the most widely distributed game bird in North America, breeding in all of the contiguous 48 United States, several Canadian Provinces, Mexico, and the West Indies. It also has the longest breeding season of any North American bird (Peters, 1961).

Furthermore, the mourning dove is probably the single most important species among all North American game birds from the standpoint of annual hunter harvest, and is becoming more popular as a game species. In 1942, the estimated harvest was approximately 11 million birds. In 1965, about 42 million mourning doves were shot in the United States (Reeves et. al., 1968), and apparently the harvest is still increasing.

In 1969 the mourning dove was classified as a game species in 31 states and one Canadian Province. Minnesota, however, has prohibited dove hunting since 1946.

The increasing popularity of the mourning dove as a game bird can be attributed to several factors. Perhaps foremost is that doves are abundant and offer a challenging sport. Other important reasons would include the inability of other game populations to withstand destruction of their habitat, and the increase in hunting of most species.

Unlike most other game birds, mourning doves tolerate human activity. Dove habitat has been improved by the increase in conifer shelterbelts and by landscape plantings associated with an increase in the human population. Studies of breeding doves in a mixed grove of conifers and deciduous planting in southern Minnesota revealed that from 38 to 65 young were fledged per acre of cover (Harris et. al., 1963).

As with all migratory game birds, the Federal government is charged with setting regulations on the taking and possession of doves. To gain knowledge about this species, the United States Department of the Interior, Bureau of Sport Fisheries and Wildlife, conducts a mourning dove research program in cooperation with

state conservation departments, and other interested parties. Banding, an important part of that program, provides data on the geographical and temporal distribution of the dove harvest, origins of birds harvested, mortality, survival, longevity, differential vulnerability of age and sex classes to shooting, and other information useful to managing the species. Banding has not been uniform in all states, however, and it has been especially inadequate in north-central states which provide many doves to southern hunters. Recovery data from mourning doves banded in Minnesota are valuable for statistical evaluation of management problems.

3 years of banding evidence

This paper presents an analysis of recoveries from mourning doves banded at Savage, Minnesota, from 1967 through 1969 by the author and H. M. Reeves.

The banding site at the edge of Savage immediately north of Minnesota State Highway 13 is paralleled by three railroad tracks and several utility lines. Close by, the wooded suburban areas and the Minnesota River bluffs provided excellent nesting habitat. A small stream bordering the east side of the site assured a drinking water supply for the birds. Mourning doves were attracted to the area by waste grain spilled from railroad cars and trucks in barge loading operations at nearby Port Cargill. Utility wires and dead trees provided ample resting perches. This area is in the physiographic region described as the Interior Plains Division, Central Lowland Province, Dissected Till Plains (Ruos, 1971) and is regarded by the Bureau of Sport Fisheries and Wildlife as high value habitat for nesting mourning doves.

The birds banded in this study were captured in bait traps. Each year the banding site was prebaited with brown or Japanese millet and white proso millet 2 to 4 days before placement of traps. From 15 to 22 funnel traps were set on bare ground. In later trapping years, it became necessary to remove vegetation from around trap locations.

Trapping was conducted intermittently throughout the preseason period of June 1 through August 31 for a total of 91 trap-days during the 3 years. Traps were tended

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TABLE 1. Summary of mourning doves banded at Savage Minnesota.

Year Banded	Immatures			Adults			Unknowns			Total Banded
	Males	Females	Unknowns	Males	Females	Unknowns	Males	Females	Unknowns	
1967	66	3	552	217	128	5	7	1	34	1,013
1968	12	0	443	377	70	1	0	0	6	909
1969	0	0	103	173	20	0	0	0	0	296
Totals	78	3	1,098	767	218	6	7	1	40	2,218

	1179	991	48
Age banded—	<i>Immatures</i>	<i>Adults</i>	<i>Unknowns</i>
percent of total	53.1	44.7	2.2
Sex banded—	<i>Males</i>	<i>Females</i>	<i>Unknowns</i>
percent of total	38.4	10.0	51.6
Sex banded—	<i>Males</i>	<i>Females</i>	<i>Unknowns</i>
percent of adults	77.4	22.0	0.6

every 3 to 4 hours on trapping days and inverted when not in use. Intensive trapping tended to reduce dove usage of the area, thus several days of trapping were alternated with periods of baiting during which the traps were inoperative. Captured doves were sexed, aged, banded, and released. Data was recorded for all retrapped birds.

Extent of banding and classification

A total of 2,218 mourning doves was banded during the 3 year study (Table 1). Fifty-three percent of these were immatures. Adults accounted for 45 percent of the total birds banded. In South Dakota mourning dove bandings from 1917 through 1970, there were 41.3 percent immatures and 44.4 percent adults (Rice, 1971). An analysis covering 1964-1968 pre-season bandings in the Central Management Unit shows that about 56 percent of the doves banded were immatures and 44 percent adults (Reeves, 1972). Almost 78 percent of the adult birds banded at Savage were males. Tomlinson et al. (1960) pointed out that sex differences in incubation schedules favored males being trapped, since they incubate chiefly during mid-day. Banding at Savage would tend to support this, since the trapping efforts were generally scheduled mornings and evenings.

Similarity in the total number of doves banded in each age group during this study must be interpreted carefully when they are used to estimate productivity. Harris et al. (1963) studying mourning dove productivity in Minnesota found that between 3.2 and 4.0 young were fledged per pair per year. However, it is important to consider that immatures are not available to be trapped over the same length of time as are adults during the pre-season banding period. This is because many immatures are not available for trapping until late summer, and because early hatched juveniles may migrate early (Blankenship et al., 1967). An analysis of mourning dove recoveries from the Central Management Unit suggests that immatures generally migrate southward ahead of adults (Reeves, 1972). These factors might account for the

nearly identical proportion of adults and immatures banded.

Recoveries and returns

Information on the encounter of 73 bands was reported to the investigator by the Bird Banding Laboratory. Of these 70 were "recovered" and 3 were "returns." A "recovered" band is a report of a bird shot, found dead, or recaptured at a location distant from the banding site, or otherwise obtained, except as a return. A "returned" band is a report of a banded bird recaptured after 90 days within the same 10-minute latitude-longitude block in which it was banded. The three "returns" were all recaptured more than a year after being banded. The only other recaptured bird was from Texas almost 8 months after being banded.

The 70 band recoveries are reported in Table 2. Age, sex, and location of recoveries is shown in Table 3.

Slightly more than 58 percent of the total bands reported were recovered by hunters. Known hunting recoveries accounted for 1.9 percent of the total birds banded and non-hunting recoveries 1.3 percent. Rice (1971) found a hunting recovery rate of 2.3 percent and a non-hunting recovery rate of 0.5 percent for South Dakota doves. The slightly higher hunting recovery rate in South Dakota probably reflects that state's open hunting seasons on mourning doves since 1967. In Louisiana, a state where the mourning dove has been a game bird for many years, Watts (1969) found a hunting recovery rate of 7.3 percent and a non-hunting rate of 0.4 percent.

Sixty-three percent of the bands recovered to date by hunters occurred during the first hunting season after banding.

Age group comparisons

Birds banded as immatures accounted for 64 percent of the shot recoveries (Table 4) and 53 percent of the total recoveries (Table 3). The banding ratio weighed against the shot recovery ratio shows that doves banded

TABLE 2. Recovery rates of mourning doves banded at Savage, Minnesota.

Year Banded	Number Banded	Total Recoveries by Calendar Year					Total Recoveries	Percent of Total Recovered
		1967	1968	1969	1970	1971		
1967	1,013	23	15	6	3		47	4.6
1968	909		6	5	5	1	17	1.9
1969	296			2	1	3	6	2.0
Total	2,218	23	21	13	9	4	70	3.2

as immatures were 1.75 times more likely to be shot than adults. This agreed with results obtained by Wight (1963) and other investigators. In South Dakota, however, no difference in vulnerability to hunting was found between immatures and adults (Rice, 1971); possibly this was because some of the immatures escaped local hunting pressure through early migration. Besides being shot more heavily, immatures do not seem to live as long as adults. Of the doves shot, 53.8 percent of adults and 66.6 percent of the immatures were taken during the first hunting season. Contrary to this, however, the mean longevity by hunting season shot for adults was 1.66 compared with 1.77 for immatures.

In the southeastern states, immatures comprised 70 percent of the doves harvested from 1949 through 1955, inclusive (Southeastern Association of Game and Fish Commissioners, 1957). Crawford (1969) reported the age ratio of hunter-bagged mourning doves in Missouri as 1.52 immatures to 1 adult.

The direct recovery rate for both immatures and adults was 0.9 percent. This suggests that there was no differential vulnerability. This is quite similar to that reported by Rice (1971) during a period when South Dakota was a nonhunting state and much lower than the direct recovery rate of 7.4 percent for immatures and 5.2 percent for adults banded in Louisiana (Watts, 1969). Direct recovery

rates for Central Management Unit doves (Reeves, 1972) are 2.18 percent for immatures and 1.65 percent for adults. Total weighted recovery rate for immatures was 24 percent higher than for adults.

The 3.2 percent total recovery rate of the mourning doves banded in this study is difficult to compare with total recovery rates reported by other investigators. Tomlinson (1968), sampling 15 widely separate sections of the United States, found an average recovery rate of 3.8 percent but substantial variability among states. He also found that about 32 percent of retrieved mourning dove bands are reported. The national recovery rate of mourning doves is 3.7 percent (Ruos et al., 1968). Total recovery rates of all mourning doves banded in Minnesota is 2.8 percent.

Average annual mortality rate for mourning doves is typically high in comparison with other species of migratory game birds. Studies by the Bureau of Sport Fisheries and Wildlife (Tomlinson, 1966) indicated a 60 percent annual mortality for doves from both hunting and non-hunting states. Hanson (1963), studying mourning doves in Illinois, found an average annual mortality of 53 percent. In South Dakota, annual adult mortality was 51.7 percent, whereas, immature annual mortality was 60.3 percent (Rice, 1971). Henry (1970) determined the annual mortality rates for Missouri doves to be 47.1 per-

TABLE 3. Summary of all recoveries from mourning doves banded at Savage, Minnesota, 1967-1969.

State of Recovery	Immature			Adult			Unknown			Totals	
	Male	Female	Unknown	Male	Female	Unknown	Male	Female	Unknown	No.	Percent
Minnesota	1		10	11	3					25	35.7
Texas			13	4	2			2		21	30.0
Florida			5	2				1		8	11.4
Mexico			2	2						4	5.7
Louisiana			1	1	2					4	5.7
Alabama			3							3	4.3
Georgia				1						1	1.4
Oklahoma					1					1	1.4
Arkansas			1							1	1.4
California			1							1	1.4
Kansas					1					1	1.4
Totals	1		36	21	9				3	70	99.8
			37		30			3			
Age banded— percent of total			<i>Immature</i>		<i>Adult</i>			<i>Unknown</i>			99.9
			52.8		42.8			4.3			
Sex banded— percent of total			<i>Male</i>		<i>Female</i>			<i>Unknown</i>			100.0
			31.4		12.9			55.7			
Sex banded— percent of adults			70.0		30.0						100.0

TABLE 4. Banding age and sex composition of all shot recoveries.

	Immature			Adult			Unknown	Total
	Male	Female	Unknown	Male	Female	Unknown	Unknown	
Total, by sex			27	8	5		2	42
Total, by age		27			13		2	42
Age banded— percent of total		<i>Immature</i> 64.3			<i>Adult</i> 30.9		<i>Unknown</i> 4.8	100.0
Sex banded— percent of total		<i>Male</i> 19.1			<i>Female</i> 11.9		<i>Unknown</i> 69.0	100.0
Sex banded— percent of adults		61.5			38.5			100.0

cent for adults and a combined mortality rate for adults and immatures of about 57.0 percent. Reeves (1972) calculates that annual mortality rates for adult and immature doves banded in the Central Management Unit were approximately 53 percent and 60 percent respectively.

Mortality rates for the 2,218 mourning doves banded were analyzed by the Composite time — specific method described by Hickey (1952). The yearly mortality for each age class was weighted according to the number of doves banded that year within the age class. Immatures showed a weighted mean annual mortality of 58.5 percent compared to 28.2 percent adult mortality. Small samples prohibited a significant comparison of the mortality rates of sex groups.

Sex group comparison

Because of the small number of adult recoveries, the following data perhaps represents general tendencies rather than precise comparisons.

Although there was a preponderance, 3.52 to 1, of males to females in the adult banding sample, the weighted total recovery data showed a male to female ratio of 1 to 1.65. The weighted shot recovery rate showed an even higher ratio of 1 male to 2.43 females, or adult females were being shot at a rate 143 percent greater than adult males. Henry (1970) found Missouri adult males 1.28 times more vulnerable to shooting than females.

The 25 mourning dove bands recovered in Minnesota (Table 3), account for almost 36 percent of the bands recovered. Of these recoveries, 84 percent occurred during a calendar year subsequent to the banding year. All of the Minnesota recoveries were within 20 miles of the banding site. It is highly probable that doves return to nest in the general area of their fledging, as indicated by recoveries of 11 doves banded as immatures and recovered within a few miles of the banding site in a subsequent year. Forty-two doves "returned" and were recaptured at the banding site during a year following the banding year. These data support the findings of Wight (1956), who observed that most nestlings and adults returned the following year to within a mile of the point of banding, and Harris (1961) who calculated a homing rate of 80 percent for adult Minnesota doves.

Migration from Minnesota

Although the sample is small, band recoveries suggest that Minnesota mourning doves either fly non-stop over many of the interior states as they move southward to their wintering grounds or they have migrated through these states before the hunting season begins.

Sixty-four percent of the recoveries of mourning doves banded at Savage were from out of state. About 56 percent of these were from Texas and Mexico, and 18 percent were from Florida. McClure (1943) found that 83 percent of the banded doves reported from Iowa bandings were recovered in Texas and Mexico. Rice (1971) reported that Texas and Mexico together accounted for more than 86 percent of all hunting recoveries of mourning doves banded in South Dakota from 1964-1969. Only 4 of the out of state recoveries from this study were obtained by a non-hunting manner (Table 5).

Only 69 percent of the birds in this study were recovered in the Central Management Unit. It should be noted, however, that Minnesota adjoins the boundary with the Eastern Management Unit. This is similar to what Henry (1970) found of doves banded in Missouri, another border state. However, Kiel (1959), reports 95 percent of the doves harvested in any unit are produced in that unit.

Mexico is an important wintering area for mourning doves produced in the United States. Data from the Migratory Bird Populations Station shows that about 3 per-

TABLE 5. Summary of mourning dove recoveries by areas.

State of Recovery	Shot	Found Dead	Injured and Died	Captured Released	Other Informatic	Total
Minnesota	2	15	2	1	5	25
Texas	19			1	1	21
Florida	8					8
Mexico	3	1				4
Louisiana	3	1				4
Alabama	3					3
Georgia	1					1
Oklahoma	1					1
Arkansas	1					1
California	1					1
Kansas	1					1
Total	43	17	2	2	6	70
Percent	61.4	24.2	2.9	2.9	8.6	100.0

cent of the doves reported from bandings in the United States are recovered in Mexico (Blankenship, 1970). In this study, 6 percent of the recoveries were from Mexico. This twofold difference may reflect Minnesota's geographic position directly north of Mexico.

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