

SOME DEMOGRAPHIC CHARACTERISTICS OF MOURNING DOVE POPULATIONS IN WESTERN OKLAHOMA

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More than 14,000 doves were banded in the summers of 1968-1973 in western Oklahoma. Research objectives included determining hatching dates, post-fledging mortality, distribution of harvest, migration routes, and wintering locations. Hatching occurred from early April to late August in most years and the peak typically occurred in June. Forty to 45% of the recovered bands were being reported. Thirty-three percent of all reported recoveries occurred in Oklahoma, 42% in Texas, and 19% in Mexico. Central Mexico appeared to be the principal wintering area. The average annual mortality was 47.5%. Hunter-related mortality (harvest and associated crippling loss) averaged 5.4% of the population and 11.4% of total mortality.

INTRODUCTION

The Oklahoma Cooperative Wildlife Research Unit initiated studies of mourning doves (*Zenaida macroura*) in the summer of 1968 and continued them each summer through 1973. These studies were a response to information needs expressed by the two agencies responsible for management of doves in Oklahoma: the Oklahoma Department of Wildlife Conservation and the U.S. Fish and Wildlife Service. Our research objectives include determining hatching dates, post fledging mortality rates, distribution of harvest, migration routes, and wintering locations.

MATERIALS AND METHODS

Unit personnel trapped doves in Major and Garfield counties in northwestern Oklahoma during four summers (1968-1971); trapping also occurred in southwestern Oklahoma in Greer County in the summers of 1969 and 1970 and in Jackson County in the summers of 1972 and 1973. All of these localities are characterized by a sparsely wooded ravine relief vegetated with mesquite (*Prosopis juliflora*) var. *glandulosa* grassland (1). Vegetation at trapping sites was dominated by an interspersion of mesquite thickets and wheat fields. Trapping usually began in early June and terminated on 26 August, a few days prior to hunting. Two to five trappers participated each summer.

Wire traps of several designs, baited with grain, were the main means of capturing doves. The most successful trap designs and baits have been described by Lewis and Morrison (2) and by Dyer (3). We placed the wire traps along the edges of wheat fields that bordered habitat where doves nest and roost in mesquite thickets, osage orange (*Maclura pomifera*) hedgerows, and shelterbelts. Wheat fields are stubble-mulched soon after harvest in June and then tilled one or more times within the next few weeks. However, spilled wheat remaining on the soil creates attractive feeding locations. A few doves were also captured in mist nets at roost or water sites.

A U.S. Fish and Wildlife Service (FWS) size 3-A leg band was placed on each dove before its release at the capture site. During the summer of 1971, 1,000 immature doves were included in a cooperative study of band recovery reporting rates throughout the Central Management Unit. A gold-anodized band bearing the inscription "Reward" was applied to one leg and a regular FWS band applied to the other leg of every 10th bird. Only standard FWS bands were placed on the other 900 birds to be treated as the control group. Reports of band recoveries were provided by the Bird Banding Laboratory of the FWS at Laurel, Maryland. Model H₂ (4) as used to calculate survival rates.

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The sex and age (5, 6) of birds were recorded. The aging technique (5) provided a means of estimating the hatch date of each immature by backdating from the date of capture. Thus, the peak of hatch of the trapped sample was determined.

RESULTS

The 14,088 doves banded during the study included 2,645 adults, 11,402 immatures, and 41 of undetermined age. The ratio of adults to young was 1:4.3. The ratio of adult males to adult females was 1.4: 1. Sex and age ratios in the catch are significantly influenced by the month of trapping, time of day when traps are used, type of trap, and location of the trap (2, 7). For the majority of doves produced in western Oklahoma the peak hatch typically occurred during June (Table 1). Two to three significant peaks of hatch occurred in some years. The peak of hatch usually occurred 1 to 2 weeks earlier in southwestern than in northwestern Oklahoma.

Dates and Locations of Band Recoveries

Among the 14,088 birds banded, 410 were reported recovered by the end of 1976 (Table 2). Almost all reported recoveries were by hunters. Approximately equal numbers (7,000) of doves were banded in northwestern and southwestern Oklahoma and the percents recovered as direct recoveries (1.5% and 1.6% respectively) from the two areas were similar. Direct recoveries are those occurring relatively soon after banding and before a change in direction of movement has occurred due to migration. The similar percent direct recoveries indicates that the two populations were subject to similar levels of hunting pressure.

The timing of band recoveries within Oklahoma reflected the heavy hunting pressure early in the season which opened 1 September. Sixty-one percent of the banded dove harvest in Oklahoma occurred in the first week of September, 16% the second week, 7% the third week, and 12% the remainder of the month. Only 3.5% of the in-state recoveries occurred during October. The coincidence of hunting season dates and the timing of southward migration apparently determined the time at which peak harvest rates of doves occurred in major collection areas (September in Oklahoma and northern Texas, October in southern Texas, October-December in southern Mexico; Table 3). Some birds migrated early and were recovered in Mexico and Central America in September.

Approximately 33% of all reported bands were recovered in Oklahoma, 42% in Texas, 4% in other states, 19% in Mexico, and 2% in Central America (Figure 1). In Mexico, band recoveries were most prevalent in the states of Guerrero, Guanajuato, Jalisco, and Michoacan in southern Mexico (76% of all recoveries in Mexico), all within a 300-km radius of Mexico City. This four-state area may be the principal winter area used by doves reared in western Oklahoma or may simply be the principal harvest area

TABLE 1. Estimated peak hatching dates of juvenile mourning doves banded in western Oklahoma, 1968-1973.

Year	Number of juveniles	Trapping locations and peak hatching dates ^a		
		Major and Garfield counties	Greer Co.	Jackson Co.
1968	1,718	1 June		
1969	1,721	19 June	10 June	
1970	2,189	28 June & 5 July	7 June	
1971	1,135	23 May & 27 June		
1972	2,745			5 June
1973	1,894			7 & 19 June & 2 July

TABLE 2. Numbers of mourning doves banded in Oklahoma (1968-1973) and reported recoveries (1968-1976).

Year	Number banded	Year and number recovered									
		1968	1969	1970	1971	1972	1973	1974	1975	1976	Totals
1968	2,219	43	12	8	6	3	1				73
1969	2,143		23	19	11	4	3	2			65
1970	3,110			40	29	4	7	3	1	1	85
1971	1,360				13	12	3	4		2	34
1972	3,015					46	27	9	2	1	85
1973	2,240						52	11	4	1	68
Total	14,088	43	35	67	59	69	93	30	9	5	410

in Mexico because it is near greater numbers of hunters from nearby centers of human population. Such a clumped distribution of recoveries of mourning doves banded in the United States and recovered in Mexico has previously been reported (8).

Dunks (9) indicated that doves banded in southern Texas did not migrate as far as those banded in northern Texas. Such a pattern was not evident in Oklahoma. Doves banded in northwestern Oklahoma moved an average of 827 km between capture and recovery point. Those banded in southwestern Oklahoma moved farther southward than those banded in the northwestern counties, by an average of 72 km, a nonsignificant difference ($P > 0.05$).

Eighty-two percent of the 200 doves recovered as adults and 74.5 percent of the 210 doves recovered as immatures were recovered north of Mexico. The average immature recovered south of Oklahoma had flown 877 km while the average adult had flown 34 km farther south, a nonsignificant difference according to a t test ($P > 0.05$). Although fewer adult doves than immature doves were recovered in Mexico and Central American countries, the *average* adult had flown farther south than the average immature.

Reporting Rates

The special study of band reporting rates suggested that about half of the recovered bands are reported. Twenty-one of the 900 control bands (2.3%) and 5 of the 100 reward bands (5%) were reported recovered. In the larger Central Management Unit study during 1971 and 1972, of which the study in Oklahoma was a part, 2,001 reward bands and 18,099 control bands were applied. Reporting rates for the Central Management Unit were 45% (H. M. Reeves, *Estimates of Reporting Rates for Mourning Dove Bands*, Unpubl. Rep., U.S. Fish Wildl. Serv., 1976), a figure similar to the 47% calculated for doves banded in Oklahoma. Thus, the reported recovery rate for the standard FWS bands was less than half as high as the reporting rate for the reward bands. Delayed reporting of reward bands indicates that estimated reporting rates are probably biased upwards (Reeves, *op. cit.*) so the reporting rate of recovered nonreward bands may be closer to 40%.

Mortality

Only 37 adult males (2.4%) were recovered from among 1,563 adult males banded and 22 females (2%) were reported recovered from among 1,082 adult females banded. A test for survival differences between male and female was not significant ($\chi^2 = 20.09$, 13 d.f., $P < 0.093$). The power of the test may be weak because the data are sparse.



FIGURE 1.

TABLE 3. Location and month of recovery of mourning doves banded in western Oklahoma, summers of 1968-1973, inclusive.^a

Location	Recovery month and number recovered								Totals	%
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr		
Kansas	5	2							7	1.8
Oklahoma	118	3					1		122	31.2
Texas (N of 31° Lat)	115	11		1	1				128	32.7
Texas (S of 31° Lat)	19	19	4		7				49	12.5
Mexico (N of 20° Lat)	3	2	2		1	3			11	2.8
Mexico (S of 20° Lat)	3	13	15	16	4	3	4	7	65	16.6
Central America	1	1	2	1	3			1	9	2.3
Totals	264	51	23	18	16	6	5	8	391	
%	67.5	13.0	5.9	4.6	4.1	1.5	1.3	2.0		

^aMonth of recovery or specific recovery location not available for 19 recoveries.

There were problems resulting from the small sample of adult recovery data when models were used to analyze separately annual band recoveries from birds banded as adults and from birds banded as young. Thus, an analysis was made of annual band recoveries with all age and sex grouping combined, an alternative approach when data for adults are so sparse. The analysis assumed that survival rates were constant but that recovery rates were time-specific (Model H₂ [4]). The estimated constant survival rate was 52.4% (CI 47.2-47.7%; SE 2.7%; mortality rate 47.5%). The mean life span of adults was 1.5 years (95% CI, 1.3-1.8 years). A chi-square test indicated that the data fit the model well. This annual mortality rate of 47.5% is lower than rates of 51.6% for adults and 60.3% for immatures in South Dakota (10), 51.5% for adults and 89.7% for immatures in Missouri (11), and 55.2% for adults and 58.6% for young in Texas (9). However, the data are not directly comparable because the same model was not used in data analysis in all studies.

The mean recovery rate, which indicates the fraction of birds reported recovered in a year, was 1.5% (CI 1.3-1.7%; SE 0.1%). When the data were corrected for bands that were recovered but not reported (using a conservative 40% reporting rate), the mean recovery rate was about 3.8% per year. Allowance must then be made for doves shot but not recovered (crippling loss of 30% of total doves shot [9, 12]). Thus, a hunter-related mortality of 5.4% is probably a realistic figure judging from the moderate hunting pressure the dense populations of doves were subject to in western Oklahoma.

Direct recovery rates are generally considered a suitable index to annual mortality due to hunting. These rates ranged from 0.9 to 2.3% (Table 4) and when these values were corrected for unreported band recoveries and crippling losses they indicate annual average hunter-related mortality of 5.4% of the population. Thus 11.4% of total mortality is due to hunting (Table 4).

The only other data on harvest rates of mourning doves in Oklahoma are those reported by Hayne and Geissler (*Mourning Dove Movement Analysis for Virginia Use*, Unpubl. Rep. to Virginia Commission of Game and Inland Fisheries, 1975), who estimated a population of 30 ± 9.5 million doves in Oklahoma subjected to 259,300 days of hunting effort. Hayne and Geissler indicated that 3.6% (1,074,500) of the doves produced in Oklahoma were harvested in Oklahoma and another 2.5% (741,400) were harvested outside the state. Eighty-three percent of the doves harvested in Oklahoma are hatched in Oklahoma. Dove populations are lower in eastern Oklahoma than in central and western Oklahoma (13 and unpublished data, Oklahoma Cooperative Wildlife Research Unit) and they are exposed to higher hunting pressure in central Oklahoma than in western Oklahoma.

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TABLE 4. *Direct recoveries and hunter-related mortality estimates for dove populations of Western Oklahoma, 1968-1973.*

Year	Direct recoveries		Hunter-related mortality	
	No.	%	% of population ^a	% of total mortality
1968	43	1.9	6.8	14.3
1969	23	1.1	3.9	8.2
1970	40	1.3	4.6	9.7
1971	13 ^b	0.9	3.2	6.7
1972	46	1.5	5.4	11.4
1973	52	2.3	8.2	17.3
Total	217	1.5	5.4	11.4

^aCompensates for band reporting rate of approximately 40% and an estimated crippling rate (doves shot and killed but not recovered) of 30% of total doves shot.

^bIncludes two direct recoveries of doves with reward bands. If these two were deleted the percent recovery would remain 0.9.

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^aAnd reports with a similar title published in Special Scientific Reports for data collected 1968-1975.