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MOURNING DOVE STUDIES IN COLORADO

Clait E. Braun and Howard D. Funk

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COLORADO DIVISION OF WILDLIFE

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FOREWORD

Harold M. Swope
Wildlife Research Chief

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MOURNING DOVE STUDIES IN COLORADO

ABSTRACT

Mourning doves (*Zenaida macroura*) were trapped and banded in Colorado through a cooperative State and Federal program from 1964 through 1974. Primary objectives were to investigate migration patterns and mortality rates. We trapped and banded 31,523 doves, mostly free flying, in the study interval, whereas only 2,702 had been banded prior to 1964 (1913-1963). Distribution of bandings in the 1964-1974 interval was about 6,800 on the eastern prairies, 6,200 west of the Continental Divide, and about 18,500 along the foothills and intermountain valleys east of the Continental Divide. Adult males outnumbered females (57 to 43%) in trap samples, while age ratios of adults and immatures were similar (51 to 49%, respectively). Recaptures of previously banded birds were few and contributed little to overall understanding of migration paths and mortality rates. Chronology of hatching was compared between those immatures trapped and banded (14,560) and those for which wings were collected from hunters (4,792). Most early hatched young were not available to hunters during the hunting season in Colorado. Migration of early hatched young before 1 September was documented.

Age ratios in the harvest approximated 1.4 immatures per adult or 2.8 young per adult female. Hunter response and harvest greatly increased during the 1964-1974 period although probably not as much as indicated by the annual survey of small game license purchasers. Analysis of 691 recoveries of doves banded in Colorado (52 from bandings in

the 1913-1963 interval, 639 from bandings in the 1964-1974 period) revealed that most (451) were from within the Central Management Unit (C.M.U.) with smaller numbers (154) from other countries, and other management units (W.M.U. = 32, E.M.U. = 2). Mexico, primarily the states of Jalisco and Michoacan, was the major recovery area for non-United States recoveries (149 of 154). Colorado was the leading recovery state (352) within the United States followed by Texas (48), New Mexico (44), Arizona (18), and California (10). No more than three recoveries were reported from any other state or country. Recoveries of doves banded west of the Continental Divide were primarily to the southwest, while those banded east of the Continental Divide were recovered primarily to the south-southwest. Doves banded outside of Colorado comprised about 20% of the annual number of recoveries reported within Colorado. Most of these doves originated north and northeast of Colorado with Montana being the major state of origin. About 14% of the doves recovered in Colorado from out of state bandings were from states other than those in the Central Management Unit. Most (10 of 12) of these doves originated in the Western Management Unit. Recovery rates of doves banded in Colorado varied from 0.07 to 2.5%, depending upon age, sex, and location banded. Calculated survival rates were 34.4% for nestlings, 52.8% for immatures, and 57.0% for adults. Adult females (58.3%) had a higher survival rate than adult males (55.5%). Doves banded west of the Continental Divide had substantially lower recovery rates but similar survival rates to those banded east of the Continental Divide.

INTRODUCTION

Mourning doves are important migratory game birds throughout much of North America as they are widely distributed and occur in huntable numbers in most of their range (Peters 1961, Keeler 1976). This species nests throughout Colorado, primarily below 8,600 ft elevation (Bailey and Niedrach 1965) and occurs from above timberline (C.E. Braun, personal observation) to river bottoms, prairies, sagebrush (*Artemisia* spp.) semi-deserts, croplands, and urban areas during spring and fall migration. Little was known prior to this study in 1964 of the timing of nesting, migration paths, wintering areas, harvest patterns, and survival and mortality rates of doves seasonally resident in Colorado. Previous studies in Colorado (Funk 1965) emphasized timing of late summer and fall migration of doves through the state. This study was initiated in 1964 because of the need to more fully understand the biology of this species. Cooperative banding studies throughout the Central Management Unit as delineated by Kiel (1959) did not get underway until after 1967. This report summarizes all banding and recovery data in two periods, 1913-1963 and 1964-1976, trapping and banding data from 1964-1974, and derived hatching dates from bandings and harvest collections from 1964 through 1974.

METHODOLOGY

Mourning doves were trapped in locations where they concentrated including livestock feeding areas, fallow fields, edges of little used roads, harvested grain fields, near watering areas, and adjacent to roosting areas. Most doves were captured through use of 3 ft² cage type, welded wire funnel traps similar to the modified Kniffin dove trap described by Reeves et al. (1968). A few doves were captured through use of cannon nets (Braun 1976) incidental to capture of band-tailed pigeons (*Columba fasciata*). Some

doves were captured prior to 1967 in mist nets following procedures described by Reeves et al. (1968). Most doves captured were free flying but, prior to 1967, small numbers of nestlings were banded. Bait used to attract doves varied with site, but wheat (*Triticum aestivum*), millet (*Panicum* spp.), and milo (*Sorghum vulgare*) were most frequently used. Wheat appeared to attract doves more readily in most areas of the state.

All doves trapped were banded with U.S. Fish and Wildlife Service bands, size 3A, except in 1974 when some size 3 bands were used. Reward bands (N = 122) were placed on a sample of immature (HY) doves banded in 1971 in conjunction with a Central Management Unit-wide study of reporting rates. Doves banded were classified to age (HY = immature, AHY = adult) and sex (adult male and female, and a few immatures molting past primary 3) (Reeves et al. 1968). A few adults were classified as unknown sex each year. The primary flight feather molt of most immature doves banded was recorded for estimation of hatching dates (Allen 1963). Each year doves were trapped primarily in the June through mid-August period with goals of 1,000 birds in the eastern prairies, 2,000 along the foothills and intermountain valleys east of the Continental Divide and 1,000 west of the Continental Divide (Ruos 1968). Colorado had a suggested quota of 2,000 birds per year prior to 1969 (Wight 1963). Collections of wings of hunter-harvested doves were made in some years to ascertain age ratios in the harvest and hatching dates of immature birds.

Distribution of recoveries and recaptures from all Colorado bandings for the 1913-1963 and 1964-1974 periods was ascertained from recovery cards obtained from the Bird Banding Laboratory, U.S. Fish and Wildlife Service, Laurel, Maryland. Records of recoveries and recaptures from doves banded outside of Colorado but recovered within

the state were also obtained from the Bird Banding Laboratory. Distribution of recoveries and recaptures were grouped by dove management unit (CMU, EMU, WMU) and state. Analysis of survival and mortality rates for doves banded in Colorado was by the relative recovery rate method. Estimates of hunter numbers and harvest were obtained from the files of the Colorado Division of Wildlife (H.D. Funk).

RESULTS AND DISCUSSION

Trapping

Banding of mourning doves in Colorado was first reported in 1913 when one dove was banded. Through 1963, 2,702 doves were reported banded in Colorado while 31,523 were banded in the 1964-1974 period (Table 1).

Table 1. Number of mourning doves banded in Colorado, 1913-1974.

Prior to 1964		1964-1974	
Years	N Banded	Years	N Banded
1913-1920	1	1964	295
1921-1930	156	1965	808
1931-1940	17	1966	220
1941-1950	75	1967	2232
1951-1960	2096	1968	2501
1961	308	1969	3390
1962	31	1970	3159
1963	18	1971	5356
		1972	4633
		1973	4409
		1974	4520
Totals	2702 ok		31523 ok

Most trapping and banding of doves was by personnel of the Colorado Division of Wildlife (24,408) and U.S. Fish and Wildlife Service (8,723) with > 100 doves being banded by only two other Federal permit holders, R. A. Ryder with 236 and D. A. Hein with 212, both of Colorado State University. The remaining 646 doves banded were by 42 different permittees over a 63-year period.

Geographic Area of Banding

Trapping and banding efforts for mourning doves were not uniform by geographic area or by time intervals. The suggested quotas of 1,000 doves west of the Continental Divide (sites at Arboles, Buford, Carbondale, Craig, Durango, Hayden, Lay, Meeker, Montrose, Sanborn Park, Stoner, and Unaweep Canyon), 2,000 along the foothills and valleys east of the Continental Divide (sites at Denver, Estes Park, Evergreen, Fort Carson, Fort Collins, Fort Garland, LaVeta, Longmont, Monte Vista, Rye, Salida, and Woodland Park), and 1,000 on the eastern prairies (sites at Bonny Reservoir, Fort Lyons, Fort Morgan, Pritchett, Rocky Ford, Springfield, and Vineland) starting in 1968 were not met prior to 1971 (Table 2).

Table 2. Number of mourning doves banded by geographic area and year, 1964-1974 (CDOW and USFWS only).

Year	E. Prairies N Banded	Foothills/Valleys E. Cont. Divide N Banded	West of Cont. Divide N Banded
1964	226	48	0
1965	105	679	0
1966	0	199	0
1967	761	1373	0
1968	1217	1119	0
1969	477	2114	703
1970	480	1876	527
1971	1000	2756	1477
1972	944	2465	1146
1973	780	2619	1000
1974	900	2399	1200
Totals	6,890	17,647	6,053

Mourning doves were banded at many sites in the 1964-1974 interval but a relatively small number of sites produced the majority of those banded. Major sites trapped, number of years, and number of doves banded varied (Table 3).

Table 3. Major mourning dove trapping areas, Colorado, 1964-1974 (CROW and USFWS only, excludes sites with < 100 doves banded).

Location	N Banded	Years	Location	N Banded	Years	Location	N Banded	Years
Vineland	3481	8	Denver	5984	10	Durango	2435	6
Ft. Morgan	2810	7	Ft. Collins	5052	8	Montrose	1632	4
Springfield	354	3	Ft. Monte	2787	5	Craig	871	4
Rocky Ford	171	4	Vista	2680	6	Meeke	733	4
			Ft. Carson	468	2	Unaweep	358	2
			Longmont	318	4			
			Salida	303	5			

Age and Sex of Mourning Doves Banded

Attention was given to attaining even age (AHY, HY) and sex (AHY only) ratios in the banded samples once trapping and banding efforts intensified. However, due to time and personnel constraints, banded samples were frequently biased towards adults at some sites (trapped in June) and immatures at others (trapped in late July and August). Thus, age and sex composition of banded samples combined for all years at each site and geographic area varied (Table 4).

Differences in sex and age composition between locations within geographic areas were occasionally significant ($P < 0.05$). However, it is doubtful that differences in sex composition were real. It is more likely that observed differences in percentages of adult males and females trapped were related to time of day of trapping effort and patterns of bird behavior. Both sexes of mourning doves share incubation and brooding activities with males being associated with the nest from mid-morning until mid-afternoon, and females from mid-afternoon until mid-morning. Consequently, during nesting males may be available for trapping in both the early morning and late afternoon

periods, while females are available only during the mid-day period. Percentages of adults versus immatures in trap samples were most probably related to timing of the trapping effort in relation to the breeding and nesting period. Higher percentages of immatures were banded at sites trapped in August (Denver, Fort Garland) than at sites trapped in June (Fort Collins, Durango).

Table 4. Age and sex composition of banded samples of mourning doves by geographic area and location, 1964-1974 (CDOW and USFWS only).

Geographic Area and location	AHY				Total		HY		Totals
	M	%	F	%	N	%	N	%	
E. Prairies									
Vineland	804	50.4	792	49.6	1596	47	1797	53	3393
Fort Morgan	335	43	444	57	779	27.7	2031	72.3	2810
Springfield	37	67.3	18	32.7	55	15.5	299	84.5	354
Rocky Ford	7	87.5	1	12.5	8	4.7	163	95.3	171
Bonny Reservoir	8	88.9	1	11.1	9	12.2	65	87.8	74
Subtotals	1191	48.7	1256	51.3	2447	36	4355	64	6802
E. Foothills/Valleys									
Denver	1102	55.9	869	44.1	1971	32.9	4013	67.1	5984
Fort Collins	2239	60.3	1476	39.7	3715	73.5	1337	26.5	5052
Fort Garland	671	63.3	389	36.7	1060	38	1726	62	2786
Monte Vista	801	54.9	658	45.1	1459	54.4	1221	45.6	2680
Fort Carson	182	56.9	138	43.1	320	69.4	141	30.6	461
Longmont	138	60	92	40	230	72.3	88	27.7	318
Salida	152	58.7	107	41.3	259	87.2	38	12.8	297
Other	37	74	13	26	50	90.9	5	9.1	55
Subtotals	5322	58.7	3742	41.3	9064	51.4	8569	48.6	17633
W Continental Divide									
Durango	1118	56.3	867	43.7	1985	81.6	449	18.4	2434
Montrose	473	52.7	424	47.3	897	55	735	45	1632
Craig Area	263	58.4	187	41.6	450	51.7	421	48.3	871
Meeker	334	59.3	229	40.7	563	76.8	170	23.2	733
Unaweep Canyon	151	66.2	77	33.8	228	63.7	130	36.3	358
Other	12	52.2	11	47.8	23	95.8	1	4.2	24
Subtotals	2351	56.7	1795	43.3	4146	68.5	1906	31.5	6052
Totals	8864	56.6	6793	43.4	15657	51.4	14830	48.6	30487

Totals by area may not correspond to those in Table 3 as birds not classified by sex (adults only) and age are not included.

Henry et al. (1976), in study in Missouri, demonstrated that placement of traps could clearly bias age and sex composition of dove capture, while Lewis and Morrison

(1973) presented data documenting biases in trap results from use of different types of traps and time of day. All of these factors, except time of day and type of trap, were undoubtedly involved in affecting the age and sex composition of the doves we banded (Table 4). Trapping in Colorado during the 1964-1974 interval was usually consistent with traps being checked three times per day at approximately the same times. Type of trap used did not change throughout the study.

Recaptures

All previously banded mourning doves recaptured were recorded each year with few exceptions. Those exceptions primarily involved repeat captures of birds known to have been banded at the same site within a few days of original banding. Few mourning doves were recaptured in Colorado that were banded elsewhere (7) or that were banded in Colorado but were recaptured out of original degree block of banding (22). Origin of mourning doves recaptured in Colorado that had moved at least one degree block varied (Table 5). Detailed analyses of origin of mourning doves could not be made because of the limited data available. The longest intervals between banding and recapture were 6 (one) and 5 years (two) with most being of a duration of 1 to 3 years.

Table 5. Origin of mourning doves recaptured in Colorado, 1913-1974.

EMU		CMU		WMU	
State	Number	State	Number	State	Number
Alabama	1	Colorado	22	Arizona	1
		New Mexico	3	Utah	1
		Texas	1		

No out of degree block of banding recaptures reported prior to 1961.

Two recaptures are of interest as one adult male banded on 21 July 1971 near Lay in northwest Colorado was recaptured on 13 August 1971 near Fort Garland (West Slope

to East Slope) while another adult male banded on 2 August 1972 near Fort Garland was recaptured near Montrose on 25 June 1973 (East Slope to West Slope). All recaptures of doves banded out of state, with the exception of an adult female banded on 7 June 1973 in New Mexico and recaptured on 2 August 1973 in Colorado, were recaptured one or more subsequent years after original banding. No obvious pattern could be discerned in age and sex of those birds being recaptured out of degree block within Colorado (HY U = 9, AHY M = 8, AHY F = 1, AHY U = 1, HY M = 1, HY F = 1, LU = 1), or recaptured from bandings out of Colorado (HY U = 2, AHY F = 2, AHY M = 1, AHY U = 1, LU = 1).

Hatching Chronology

Primary wing molt data were recorded for 14,560 immature mourning doves newly banded and 4,792 hunter-harvested immatures during 1964-1974. Hatching dates were calculated following procedures and data published by Allen (1963) even though limited data from free-flying immature doves banded and recaptured in Colorado suggest that Allen's molt schedules may be 3 to 4 days longer than actually occurring in the wild (Petersen and Braun 1974). Hatching chronologies calculated by year for wild trapped and harvested immature mourning doves in Colorado varied by year (Tables 6, 7).

Table 6. Percent of wild-trapped immature mourning doves by time intervals in Colorado, 1964-1974.

Interval	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Overall %
< 1 May	1.4	0.4	0	0.8	0.1	1.2	0.2	0.1	0.1	0.2	0.6	0.4
1-7 May	0.5	0.3	4	1.7	0.8	1.1	0.4	0.8	1.9	0.7	1.5	1.1
8-14 May	3.3	0.4	7.9	4.7	4.5	6.6	1.1	2.3	5.4	2.9	5	3.8
15-21 May	9	13.1	17.2	9.7	6.5	15.9	6.1	6.3	12.2	6.9	14	9.4
22-28 May	15.7	13.1	31.1	13.2	10.1	10.1	9.9	13.7	14.6	16	17.1	13.8
29-4 Jun	14.3	14.6	16.6	13.6	12.5	12.1	14.2	11.4	14.8	14.3	13.5	13.4
5-11 Jun	26.2	21.4	10.6	18.2	11.6	8.3	6.9	12.7	12.4	12.1	11.4	12.5
12-18 Jun	28.1	25.3	5.3	13.4	15	12	7.8	11.6	14	13.1	11.7	13.3
19-25 Jun	1.4	13.1	7.3	4.9	10.8	8.8	10.9	11.6	8.4	16.1	10.2	10.5
26-2 Jul	0	2	0	3.4	12	8.7	14.9	12.5	6	13	7.2	9.1
3-9 Jul	0	2.6	0	4.2	9.8	6.4	15.2	8.2	5.8	4.2	6.9	7
10-16 Jul	0	3	0	4.4	4.6	6.3	7.4	7.8	3.4	0	0.9	4
17-23 Jul	0	0	0	6.5	1.7	2.4	4.7	0.8	1	0	0	1.6
24-30 Jul	0	0	0	1.1	0	0	0.1	0	0	0	0	0.1
Sample Size	210	700	151	1161	1421	1047	1253	2467	2323	1815	2012	14,560

Table 7. Percent of hunted-harvested immature mourning doves by time intervals in Colorado, 1964-1974.

Interval	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Overall %
< 12 Jun	0	2.4	2.2	0.2	0	1.7	1.5	0.7	1.4	0.5	0.1	0.8
12-18 Jun	0	6.7	10	0.4	4.2	7.4	7.8	8.4	0.6	3.3	3.5	3.8
19-25 Jun	0	19.7	11.5	2	10.6	15.7	9.3	6.3	15.6	6	5.2	8.2
26-2 Jul	0	2.8	1.1	0.7	0	0	3.6	9.1	2.3	1.9	3	2.4
3-9 Jul	0	15	10.4	5.5	12.7	14	14	16.8	7.3	8.7	1.2	9.9
10-16 Jul	10.5	15	14.8	9.5	17.6	14.9	17.6	13.3	16.7	10.8	8.9	12.3
17-23 Jul	26.3	13	8.9	18.6	14.1	12.4	12.4	10.8	12.1	6.8	9.4	10.6
24-30 Jul	26.3	11.4	13.7	22.4	16.9	14	13.5	17.1	7	15	11.9	14.1
31-6 Aug	5.3	10.2	24.8	32.1	23.9	19	19.7	12.6	17	13.7	16.5	17.7
7-13 Aug	31.6	3.5	2.6	7.1	0	0	0	4.9	13.8	9.1	8.9	7.8
14-20 Aug	0	0.4	0	0.4	0	0	0	0	3.1	7.8	10.6	4.7
21-27 Aug	0	0	0	0	0	0	0	0	3.1	12.9	5.3	5.3
28-3 Sep	0	0	0	0.7	0	0	0.5	0	0	3.8	5.5	2.2
4-10 Sep	0	0	0	0.4	0	0	0	0	0	0	0	0.2
Sample Size	19	254	270	548	142	121	193	286	653	1509	797	4,792

Examination of the data (Table 7) indicate that doves hatching prior to 12 June are poorly represented (< 1.0% of the total) in the harvest, whereas doves produced in this early period comprise about 54% of those trapped and banded (Table 6). Few doves hatching after 30 July were represented in trap samples as trapping normally ceased by

15-20 August. However, doves hatching after 30 July comprised about 38% of the immature doves harvested each year. These differences are significant ($P < 0.05$) and suggest real differences occur in availability of early and late hatching immatures to hunters in Colorado. Funk (1965) earlier documented that the peak of dove migration through Colorado occurred prior to 1 September. Data from wings of immature doves examined in the present study support Funk's earlier work. It can reasonably be concluded that most early hatching young doves have migrated from Colorado prior to the hunting season.

Age Ratios of Harvested Mourning Doves

Wings from hunter-harvested doves were not routinely collected in most years. Consequently, sample sizes ranged from few in 1968 to over 2,900 in 1973, when efforts to collect wings were increased. Intensive efforts to collect wings were made from 1972 through 1974 (Table 8).

Table 8. Age ratios of hunter-harvested mourning doves in Colorado, 1964-1974.

Year	AHY	HY	Totals	HY:AHY
1964	62	19	81	0.3:1
1965	128	254	382	2.0:1
1966	148	344	492	2.3:1
1967	569	582	1151	1.0:1
1968	No Data	No Data	No Data	No Data
1969	51	121	172	2.4:1
1970	37	192	229	5.2:1
1971	24	286	310	11.9:1
1972	446	654	1100	1.5:1
1973	1451	1509	2960	1.0:1
1974	368	797	1165	2.2:1
Totals	3284	4758	8042	1.4:1

These data (Table 8) should be viewed with caution because of small sample sizes in most years and uneven geographic distribution of the sample from within Colorado.

Most samples were from eastern Colorado, either primarily southeast (i.e., Springfield) in 1964-1971, or southcentral (i.e., Fort Carson) in 1972-1974. Neither of these areas may be representative of the total harvest in the state. Assuming that larger sample sizes most nearly approximate actual age composition of the harvest, it is noteworthy that age ratios in the 4 years (1967, 1972-1974) when over 1,000 wings were available each year, ranged from 1.0 HY:1 AHY (2 years) to 1.5:1 to 2.2 HY:1 AHY. These ratios would appear to be lower than expected given that mourning doves have multiple nests in each breeding season. Data from Fort Carson from 1972-1974 reveals a low immature to adult ratio (usually from 0.5 to 0.8:1) during the opening week of the hunting season with immatures predominating as the season progressed. This may indicate early migration of immatures as also indicated by banding records. If one assumes the average of 1.4:1 immatures to adult age ratio in the harvest (Table 8) is realistic and 50% of the adult harvest is comprised of females, then 2.8 young per female were produced. This ratio may be minimal due to early migration of immatures resulting from first and second nestings.

Hunter Pressure and Harvest

Harvest surveys were not included in this study as they were conducted by the Surveys Group, Wildlife Management Section, of the Colorado Division of Wildlife. They are included to provide the important data for the 1964-1974 interval. Estimated number of hunters and total harvest from 1964 through 1974 derived varied (Table 9), possibly because of procedural changes in the surveys (1968 = reporting bias correction as multiples of the bag were deleted, 1972 = added multiple follow up surveys instead of one survey as in prior years, 1974 = stratification of hunters by license type). Season

regulations during the 1964-1974 interval also varied. The season length was 60 days (1 September through 30 October), daily bag and possession limits were either 12 and 24 (1964-1968) or 10 and 20 (1969-1974), while shooting hours were one half hour before sunrise to sunset (1964-1969) or sunrise to sunset (1970-1974).

Table 9. Mourning dove harvest statistics, Colorado, 1964-1974, (estimated from Annual Survey of Small Game License Holders).

Year	Number of Hunters	Total Harvest
1964	22,477	130,367
1965	19,545	137,401
1966	25,227	174,066
1967	24,593	140,180
1968	25,186	308,881
1969	25,119	323,773
1970	24,149	301,562
1971	22,033	298,767
1972	33,299	513,898
1973	31,688	484,660
1974	41,518	688,312

The procedural changes in the Small Game Hunter Survey during 1964-1974 made it difficult to accurately represent numbers of hunters and annual harvest. Hunter numbers and annual harvests increased during the 11-year period, hunters by possibly 85% and harvest by possibly 428% (Table 9). While these numbers may be real, they are not overly plausible. Independent surveys using 100% sampling of all hunters of several minor game species suggested the annual survey of small game hunters may have overestimated hunter numbers by as much as 30% and harvest by 100%. It is probable that numbers of mourning dove hunters were slightly overestimated (by about 10%) with actual numbers of doves harvested being moderately overestimated (by as much as 50%). Thus, best estimates of numbers of dove hunters and annual harvest in 1974 were about $35,000 \pm 3,000$ and $500,000 \pm 50,000$, respectively.

Mourning Dove Recoveries

There were 34,225 mourning doves banded in Colorado from 1913 through 1974 (Table 10). Only one major period of intensive banding occurred as 31,523 doves were banded during 1964-1974. Most bandings were of free-flying doves but 2,021 nestlings or locals (L U) were banded primarily in the 1951-1963 and 1970-1971 periods. There were 691 recoveries of doves banded in Colorado reported through 22 November 1976. Of this number, only 52 were from the 2,702 bandings prior to 1964 (1.9% of the doves banded between 1913 and 1963). All but 7 were hunting season recoveries.

Table 10. Mourning dove bandings in Colorado by age and sex, 1913-1974.

Interval	Local	HY U	HY M	HY F	AHY U	AHY M	AHY F	Unknown	Totals
1913-1920	0	0	0	0	1	0	0	0	1
1921-1930	110	26	0	0	5	5	6	4	156
1931-1940	0	6	0	0	8	1	1	1	17
1941-1950	46	2	0	0	23	2	1	1	75
1951-1960	1136	578	0	0	296	11	2	73	2096
1961-1963	234	7	0	0	16	8	3	89	357
Subtotals	1526	619	0	0	349	27	13	168	2702
1964	18	210	0	1	3	44	16	3	295
1965	13	701	0	0	4	59	25	6	808
1966	7	153	0	0	4	23	30	3	220
1967	14	1180	0	1	19	637	378	3	2232
1968	10	1463	46	3	11	486	480	2	2501
1969	40	1056	23	10	8	1363	890	0	3390
1970	235	1363	7	11	3	816	692	32	3159
1971	107	2475	2	1	8	1572	1191	0	5356
1972	49	2357	0	0	1	1255	971	0	4633
1973	0	1764	28	31	7	1341	1150	88	4409
1974	2	1853	55	126	6	1407	1065	6	4520
Subtotals	45	14,575	161	184	74	9003	6888	143	31,523
Totals	2021	15,194	161	184	423	9030	6901	311	34,225

The hunting season in the United States was considered to be from 1 September through 31 January (shot and found dead, 00 and 01 codes). All shot, trapped, and found dead recoveries in Mexico from 1 September through 30 May were included. Recovery rates did not change significantly between the 1913-1963 and 1964-1976 periods as 639 recoveries were reported from 31,523 bandings (2.0% of the banded sample). Of the 639 total recoveries, 54 were non-hunting season recoveries. This is a substantial decrease from the non-hunting mortalities reported in the 1913-1963 period (8.4% of all recoveries in 1964-1976 versus 13.5% in 1913-1963). This decrease could be the result of larger samples or lower reporting rates.

Origin of Banded Mourning Doves Recovered in Colorado

Nine mourning doves banded outside of Colorado and 26 doves banded in Colorado were reported recovered in the state in the 1913-1963 interval. Thus, of 35 banded doves reported, 25.7% originated elsewhere. Point of origin (banding location) for these 9 birds was two each from New Mexico and North Dakota, and one each from Arizona, Kansas, Nebraska, South Dakota, and Texas. Only one bird was banded outside of the Central Management Unit (Arizona). This dove was recovered west of the Continental Divide in Colorado. Recoveries of birds banded outside of Colorado and recovered within the state in the 1913-1963 period were too few to ascertain the importance of migrant doves to the statewide harvest.

During the 1964-1976 interval, 88 doves banded outside of Colorado (Table 11) and 352 doves banded in Colorado were reported recovered in the state. Thus, of 440 banded doves reported, 20.0% originated elsewhere. This would suggest that about one-fifth of the doves harvested each year in Colorado originated from outside of the state.

This may be misleading as banding activities and dove populations may not be similar between Colorado and other origin areas.

Table 11. Origin of banded mourning doves recovered in Colorado from out-of-state bandings, 1964-1976.

Eastern Management Unit		Central Management Unit	
State	Number	State	Number
Louisiana	1	Iowa	3
Wisconsin	1	Kansas	1
Total	2	Minnesota	1
		Montana	32
Western Management Unit		Nebraska	7
State	Number	New Mexico	6
Arizona	3	North Dakota	2
California	1	Oklahoma	1
Nevada	2	South Dakota	10
Utah	1	Texas	6
Washington	3	Wyoming	7
Total	10	Total	76

Only 12 recoveries from bandings outside of the Central Management Unit were reported in the 1964-1976 period. Two originated in the Eastern Management Unit, while 10 originated in the Western Management Unit. Patterns of recoveries from bandings in these management units could not be ascertained but 3 doves banded in the Western Management Unit were recovered west of the Continental Divide in Colorado. Over 86% (86.4) of the 'foreign' recoveries in Colorado were from other states in the Central Management Unit (Table 11). Over one-half (51.3%) originated in areas directly north of Colorado (Montana and Wyoming) with lesser numbers (15.8%) originating in areas directly south of Colorado (New Mexico and Texas).

Considering the 88 out of state of banding recoveries, 54 were direct (within year of banding) and 34 were indirect (after year of banding) recoveries. Only 8 (5 indirect and 3 direct) were from bandings outside of the preseason (1 June through 31 August)

banding period. One direct recovery (from Wisconsin) was received from the Eastern Management Unit, while the other recovery from this unit (Louisiana) was indirect. Seven of the 10 recoveries (all but 3 from Washington) in the Western Management Unit were indirect. If a pattern exists in direct and indirect recoveries of banded doves recovered in Colorado, it is that doves banded north (Montana and Wyoming) tend to be recovered (29 of 39) in the same year as banding, while doves banded south of Colorado (New Mexico and Texas) tend to be recovered (8 of 12) one or more years after banding.

Distribution of Recoveries

Through 22 November 1976, 691 recoveries of doves banded in Colorado were reported, of which 52 were in the 1913-1963 period and 639 were from bandings in the 1964-1974 interval. Considering only the 52 recoveries from the 1913-1963 bandings, 26 (50%) were from Colorado, 18 (34.6%) were from Mexico, 4 (7.8%) were from Texas, 2 (3.8%) were from Arizona, while 1 each were from New Mexico and Louisiana. All but 5 were found dead (5) or shot (42). Distribution of recoveries in Mexico was in the west central states with 8 from Jalisco, 4 from Michoacan, and 2 each from Guanajuato, Guerrero, and Sinaloa. Only one recovery was reported from the Eastern Management Unit, while 2 (one banded on each side of the Continental Divide) were reported from the Western Management Unit.

Distribution of the 639 recoveries from dove banded from 1964 through 1974 varied (Table 12). Of this sample, 560 were harvested, 24 were found dead, 14 were 'obtained only', 11 were caught due to injury or in traps other than for bird banding, 6 were caught by cats, 4 were caught due to disease, 3 each were the result of striking

objects, vehicles, and adverse weather conditions. The remaining 11 recoveries resulted from casualties in 9 different categories.

Table 12. Distribution of mourning dove recoveries from bandings in Colorado, 1964-1976.

Eastern Management Unit		Central Management Unit	
State	Number	State	Number
Alabama	1	Colorado	352
Illinois	1	Kansas	1
Total	2	Minnesota	1
Western Management Unit		Missouri	1
State	Number	New Mexico	44
Arizona	18	Oklahoma	2
California	10	South Dakota	2
Oregon	1	Texas	48
Utah	3	Total	451
Total	32		
Other Countries			
Canada			
Quebec	1		
Central America			
El Salvador	2		
Guatemala	1		
Nicaragua	1		
Mexico	149		
Total	154		

Recoveries were clustered in the Central Management Unit (451 of 639, 70.6%) and Mexico (149, 23.3%) with lesser numbers from the Western Management unit (32, 5.0%) and Eastern Management Unit (2, 0.3%). Central American countries (4) and Canada (1) contributed little to the reported distribution of band recoveries. Colorado was the leading recovery area (55.1% of all recoveries) followed by Mexico (23.3%), Texas (7.5%), and New Mexico (6.9%). No other state or country provided more than 3% of the total reported recoveries.

Almost one-half (46.5%) of all recoveries were from after the year of banding (indirect). This was most notable for recoveries within Colorado (48.9%) and least (37.6%) for those from Mexico. Only one (Illinois) of two recoveries in the Eastern Management Unit was direct while 17 of 32 (53.1%) from the Western Management Unit were direct. Thus, the pattern of recoveries was similar for both direct and indirect recoveries of mourning doves banded in Colorado.

Recoveries from bandings from other than the preseason period (1 June through 31 August) were too few (3 recoveries from 293 bandings in the 1964-1974 period) to be important. These three recoveries were all direct with two from within Colorado and one from Texas.

Recoveries in Mexico were examined by state of recovery. All but 9 of the Mexican recoveries had discernable locations (Table 13). Of this sample of recoveries, 98 (70.0%) were from the adjacent states in West Central Mexico of Jalisco, Michoacan, and Guanajuato. Only one recovery was from northern Mexico (Sonora) and none was recovered south of Puebla. Thus, mourning doves banded in Colorado are not exceptionally vulnerable to hunters in Mexico until they reach presumed wintering areas. These data are similar to those reported from an earlier analysis of all mourning dove recoveries in Mexico (Blankenship and Reeves 1970).

Table 13. State of recovery of mourning doves banded in Colorado recovered in Mexico, 1964-1976.

State	Number	State	Number
Jalisco	46	Zacatecas	4
Michoacan	34	Colima	3
Guanajuato	18	Morelos	3
Sinaloa	14	Puebla	3
Guerrero	7	San Luis Potosi	2
Nayarit	5	Sonora	1

Particular attention was given to recoveries resulting from bandings west of the Continental Divide. Sixty recoveries (Table 14) had been reported from 7,107 bandings west of the Continental Divide from 1913 through 22 November 1976. Seven (from 895 bandings) were from the 1913-1963 period with the remainder, 53 (from 6,212 bandings) being from the 1964-1974 banding effort.

Table 14. Distribution of recoveries from mourning dove bandings west of the Continental Divide, Colorado, 1913-1976.

State/Country	Number	State/Country	Number
Mexico	20	California	6
New Mexico	12	Texas	4
Arizona	10	Utah	1
Colorado	7		

These data (Table 14) differ markedly from those presented for recoveries from all bandings in Colorado (Table 12). Few West Slope banded doves were recovered in Colorado (11.7%) with most being recovered in Mexico (33.3%) and Western Management Unit states (17 of 60, 28.3%). We examined recovery locations in New Mexico and 5 of the recoveries in that state were west of the Continental Divide. Recoveries in Texas from West Slope bandings were similar (6.7% versus 7.5%) to recoveries from all doves banded in Colorado. Thus, it appears that doves banded west of the Continental Divide in Colorado move south-southwest and have some affinity with Western Management Unit states.

We further examined the affinity of mourning doves west of the Continental Divide in Colorado by reviewing the origin of 17 banded doves recovered in West Slope areas in the 1913-1976 period (but only one recovery banded prior to 1964). Seven of these recoveries were from doves banded in Colorado of which six were West Slope bandings. Three were banded in New Mexico, all of which were banded east of the

Continental Divide. Two were from Arizona with one each from Minnesota, Montana, Texas, Wyoming, and Utah. The one recovery originating in Wyoming was banded west of the Continental Divide. Only 10 of the 96 outside of Colorado bandings recovered in the state were recovered west of the Continental Divide. Eleven of the 96 recoveries were from Western Management Unit states of which only 3 were recovered west of the Continental Divide. There were 47 recoveries from states bordering the Western Management Unit (Montana = 32, Wyoming = 7, New Mexico = 8) and only 5 recoveries were from the West Slope in Colorado and only two of these five recoveries were originally banded west of the Continental Divide. Thus, there were too few recoveries west of the Continental Divide in Colorado that were banded in other states, especially those west and north of Colorado to support placing western Colorado in the Western Management Unit. More bandings are needed in West Slope areas of Wyoming and Montana to obtain definitive data on migrations routes of doves banded in those areas.

Mortality and Survival Rates

Nestling. Banding of nestling or 'local' doves was encouraged at one time with the purpose of identifying specific production areas (Kaczynski and Kiel 1963). Unfortunately, this program was plagued by high loss of bands from nestlings prior to fledging, high pre-fledging loss of young doves, and misinterpretation of the term 'local' by some banders (Kaczynski and Kiel 1963). Consequently, banding of nestlings has not been emphasized by State or Federal agencies in recent years.

Nestling mourning doves were banded in Colorado during 31 years in the 1913-1974 interval totaling 2,021 birds. Most, 1,526 nestling doves, were banded prior to 1964.

Recoveries from all nestling bandings totaled 37 through 22 November 1976. The direct recovery rate (23 from 2,021 bandings) was 1.1% with an overall recovery rate of 1.8%. This is substantially lower than the 4.6% recovery rate reported for 643 nestlings banded in Kansas in 1961-1968 (Schroeder and Ely 1972). The direct recovery rate in that study was 2.6% (12 recoveries from 643 bandings).

Recoveries from nestling doves in Colorado were reported from consecutive years 1958-1961 and 1969-1970. These data were too sparse for derivation of accurate estimates of mortality rates but the estimated average survival rate was .344 with an average mortality rate of .656 (relative recovery rate method, Geis 1972). Data were not sufficient to compare mortality rates of nestlings banded on either side of the Continental Divide. The estimated mortality rate of 65.6% is higher than the annual mortality estimates of 54.5 to 64.5% for nestlings banded in South Dakota in 1956-1961 (Rice and Lovrien 1974).

Immature. There were 15,539 immature mourning doves banded in Colorado during the 1913-1974 period. This total included 14,920 banded in the 1964-1974 period. There were 8 recoveries scattered over 7 years from the 619 immature doves banded prior to 1964 (recovery rate = 1.3%). There were 312 recoveries reported through 22 November 1976 from the 1964-1974 bandings (recovery rate = 2.1%). Recovery rates for the 1964-1974 immature bandings were 1.2% for those banded west of the Continental Divide and 2.2% for those banded east of the Continental Divide. The direct recovery rates were 0.06 and 1.2%, respectively, west and east of the Continental Divide. Only data from 1967-1974 were used for mortality and survival estimates due to small sample sizes (Table 15, and Appendix Tables 16-27).

Table 15. Survival and mortality rate estimates for mourning doves banded in Colorado by age, sex, and location of banding 1967-1974.

	Average Survival Rate (%)			Average Mortality Rate (%)		
	Statewide	E. Slope	W. Slope	Statewide	E. Slope	W. Slope
Immatures	52.8	52	64.9	47.2	48	35.1
Adults	57	56.3	58.2	43	43.7	41.8
Adult Males	55.5	55.7	48.4	44.5	44.3	51.6
Adult Females	58.3	56.2	51.1	51.1	43.8	48.9

W. Slope immatures = 1971-1974.

W. Slope adults = 1968-1974.

W. slope adult males = 1969-1974.

W. Slope adult females = 1970-1974.

Estimates of annual survival rates for immature mourning doves were 52.8% for the entire state, 52.0% for immatures banded east of the Continental Divide, and 64.9% for immatures banded west of the Continental Divide (Table 15). The annual survival rate for immatures of 52.8% was higher than the 39.7% reported by Rice and Lovrien (1974) for immature doves banded in South Dakota and higher than that (37.8-39.1%) reported for immature doves in the Eastern Management Unit (Hayne 1975).

Reward bands were placed on 122 immature doves in 1971 as part of a Central Management Unit cooperative study; an additional 1,106 immatures were banded at the same times for use as controls. Through 22 November 1976, 4 (recovery rate = .0328) reward bands were reported, while 20 (recovery rate = .0181) control bands were reported. Direct and indirect recovery rates (2 and 2, 10 and 10 recoveries, respectively) were similar. Thus, while sample sizes are small, reward band data for Colorado suggest that only one-half (55.2%) of all bands recovered are reported. This is substantially

higher than the estimated 32% reporting rate for mourning doves banded in 1965-1966 calculated by Tomlinson (1968).

Adult. Prior to 1964, 389 adult (349 unknown sex, 27 males, 13 females) mourning doves were banded in Colorado. These bandings resulted in 9 recoveries (recovery rate = 2.3%) spread over 7 years. There were 15,965 adult (423 unknown sex, 9,030 males, 6,901 females) banded in Colorado in the 1964-1974 interval. These bandings resulted in 318 recoveries (1 unknown sex, 189 males, 128 females). This is a recovery rate of 2.0% with a direct recovery rate of 1.0%. Only 3 recoveries (all direct) were received from 293 bandings accomplished prior to or after the 1 June-31 August period. Consequently, these bandings and recoveries were included in all calculations.

Estimated survival rates were 57.0% for all adults, 55.5% for males, and 58.3% for females (Table 15 and Appendix Tables 19-27). These survival rates are higher than those (48.4, 47.6, and 51.5%, respectively) reported for mourning doves banded in South Dakota (Rice and Lovrien 1974). Estimates of survival rates of adult males and females in Colorado are substantially higher than those of adult males (39.1 to 41.8%) and adult females (34.3 to 37.6%) banded in the Eastern Management Unit (Hayne 1975).

Sample sizes of bandings and recoveries of mourning doves in West Slope areas were small (4,271 banded and 30 recovered). However, it is apparent the recovery rate (0.07%) in West Slope areas is substantially lower than for doves banded east of the Continental Divide (2.49%). While inadequate numbers of recoveries have been received from West Slope bandings, indications are that doves banded in that geographic area of the state have lower harvest rates than those banded in East Slope areas.

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APPENDIX

Table 16. Relative recovery rate estimates, immature mourning doves, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	211	7	4	--	--
1965	701	27	16	--	--
1966	153	1	0	--	0
1967	1181	49	16	--	.0135
1968	1512	49	26	.0324	.0172
1969	1089	35	17	.0321	.0156
1970	1381	29	10	.0210	.0072
1971	2478	44	26	.0178	.0105
1972	2357	27	12	.0115	.0051
1973	1823	27	7	.0148	.0038
1974	2034	17	8	.0084	--
Totals	14,920			.1380	.0728

Average Survival Rate = .528
Average Mortality Rate = .472

Table 17. Relative recovery rate estimates, immature mourning doves banded east of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	211	7	4	--	--
1965	701	27	16	--	--
1966	153	1	0	--	0
1967	1181	49	16	--	.0135
1968	1481	49	26	.0331	.0176
1969	756	27	13	.0357	.0172
1970	1205	29	10	.0241	.0083
1971	2039	35	20	.0172	.0098
1972	1798	23	11	.0128	.0061
1973	1703	25	7	.0147	.0041
1974	1757	17	8	.0097	--
Totals	12,985			.1473	.0766

Average Survival Rate = .520
Average Mortality Rate = .480

Table 18. Relative recovery rate estimates, immature mourning doves banded west of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964		0			
1965		0			
1966		0			
1967		0			
1968		31	0	0	0
1969		333	8	4	--
1970		176	0	0	0
1971		439	9	6	--
1972		559	4	1	.0072
1973		120	2	0	.0167
1974		277	0	0	.0000
Totals	1,935			.0239	.0155

Average Survival Rate = .649
Average Mortality Rate = .351

Table 19. Relative recovery rate estimates, adult mourning doves, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	63	3	0	--	--
1965	88	6	2	--	--
1966	57	1	0	--	0
1967	1034	29	16	--	.0155
1968	977	36	24	.0368	.0246
1969	2261	63	25	.0279	.0111
1970	1511	51	18	.0338	.0119
1971	2771	33	24	.0119	.0087
1972	2227	42	21	.0189	.0094
1973	2498	34	12	.0136	.0048
1974	2478	20	11	.0081	--
Totals	15,965			.1510	.0860

Average Survival Rate = .570
Average Mortality Rate = .430

Table 20. Relative recovery rate estimates, adult mourning doves banded east of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	62	3	0	--	0
1965	88	6	2	--	--
1966	57	1	0	--	0
1967	1033	29	16	--	.0155
1968	873	34	23	.0389	.0263
1969	1875	61	23	.0325	.0127
1970	1160	48	17	.0414	.0147
1971	1733	29	21	.0167	.0121
1972	1640	38	20	.0232	.0122
1973	1618	26	10	.0161	.0062
1974	1555	13	7	.0084	--
Totals	11,694			.1772	.0997

Average Survival Rate = .563

Average Mortality Rate = .437

Table 21. Relative recovery rate estimates, adult mourning doves banded west of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	1	0	0		
1965	0				
1966	0				
1967	1	0	0	0	0
1968	104	2	1	--	.0096
1969	386	2	2	.0052	.0052
1970	351	3	1	.0085	.0028
1971	1038	4	3	.0039	.0029
1972	587	4	1	.0068	.0011
1973	880	8	2	.0091	.0023
1974	923	7	4	.0076	--
Totals	4,271			.0411	.0239

Average Survival Rate = .582

Average Mortality Rate = .418

Table 22. Relative recovery rate estimates, adult male mourning doves, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	44	2	0	--	0
1965	59	4	2	--	--
1966	23	1	0	--	0
1967	637	22	11	--	.0173
1968	486	17	11	.0350	.0226
1969	1363	42	18	.0308	.0132
1970	816	34	11	.0417	.0135
1971	1572	19	13	.0121	.0083
1972	1255	20	10	.0159	.0080
1973	1341	16	5	.0119	.0037
1974	1407	12	7	.0085	--
Totals	9,003			.1559	.0866

Average Survival Rate = .555
 Average Mortality Rate = .445

Table 23. Relative recovery rate estimates, adult male mourning doves banded east of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964	44	2	0	--	0
1965	59	4	2	--	--
1966	23	1	0	--	0
1967	636	22	11	--	.0173
1968	437	16	11	.0366	.0252
1969	1137	40	16	.0352	.0141
1970	632	33	10	.0522	.0158
1971	929	17	12	.0183	.0129
1972	913	18	10	.0197	.0110
1973	866	10	4	.0115	.0046
1974	911	7	4	.0077	--
Totals	6,587			.1812	.1009

Average Survival Rate = .557
 Average Mortality Rate = .443

Table 24. Relative recovery rate estimates, adult male mourning doves banded west of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964		0	0	0	0
1965		0	0	0	0
1966		0	0	0	0
1967		1	0	0	0
1968	49	1	0	--	0
1969	226	2	2	--	.0088
1970	184	1	1	.0054	.0054
1971	643	2	1	.0031	.0016
1972	342	2	0	.0058	.0000
1973	475	6	1	.0126	.0021
1974	496	5	3	.0101	--
Totals	2,416			.0370	.0179

Average Survival Rate = .484
 Average Mortality Rate = .516

Table 25. Relative recovery rate estimates, adult female mourning doves, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964		16	0	0	0
1965		25	2	0	0
1966		30	0	0	0
1967		378	7	5	.0132
1968	480	19	13	.0396	.0271
1969	890	21	7	.0236	.0079
1970	692	17	7	.0246	.0101
1971	1191	14	11	.0118	.0092
1972	971	22	11	.0227	.0113
1973	1150	18	7	.0157	.0061
1974	1065	8	4	.0075	--
Totals	6,888			.1455	.0849

Average Survival Rate = .583
 Average Mortality Rate = .417

Table 26. Relative recovery rate estimates, adult female mourning doves banded east of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964		16	0	0	0
1965		25	2	0	--
1966		30	0	0	0
1967		378	7	5	--
1968		435	18	12	.0414
1969		734	21	7	.0286
1970		525	15	7	.0286
1971		797	12	9	.0151
1972		726	20	10	.0275
1973		745	16	6	.0215
1974		638	6	3	.0094
Totals		5,049			.1721

Average Survival Rate = .562
 Average Mortality Rate = .438

Table 27. Relative recovery rate estimates, adult female mourning doves banded west of the Continental Divide, Colorado, 1967-1974 (recoveries through 22 November 1976).

Year	N Banded	Number of Recoveries		Recovery Rate	
		1-n	2-n	1-n	2-n
1964		0	0	0	0
1965		0	0	0	0
1966		0	0	0	0
1967		0	0	0	0
1968		45	1	1	--
1969		156	0	0	0
1970		167	2	0	--
1971		394	2	2	.0051
1972		245	2	1	.0082
1973		405	2	1	.0049
1974		427	2	1	.0047
Totals		1,839			.0229

Average Survival Rate = .511
 Average Mortality Rate = .489

Table 28. Distribution of recoveries of immature mourning doves, Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	1181	33	10	1	3	2	0	0
1968	1512	23	16	5	3	0	2	0
1969	1089	18	9	4	2	2	0	0
1970	1381	19	6	2	1	1	0	0
1971	2478	18	14	8	1	3	0	
1972	2357	15	6	2	4	0		
1973	1823	20	6	1	0			
1974	2034	9	7	1				

Table 29. Distribution of recoveries of immature mourning doves, banded east of the Continental Divide, Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	1181	33	10	1	3	2	0	0
1968	1481	23	16	5	3	0	2	0
1969	756	14	9	2	2	0	0	0
1970	1205	19	6	2	1	1	0	0
1971	2039	15	11	6	1	2	0	
1972	1798	12	6	2	3	0		
1973	1703	18	6	1	0			
1974	1757	9	7	1				

Table 30. Distribution of recoveries of immature mourning doves, banded west of the Continental Divide, Colorado, 1969-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1969	333	4	0	2	0	2	0	
1970	176	0	0	0	0	0		
1971	439	3	3	2	0	1		
1972	559	3	0	0	1	0		
1973	120	2	0	0	0			
1974	277	0	0	0				

Table 31. Distribution of recoveries of adult mourning doves, banded in Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	1034	13	9	6	1	0	0	0
1968	977	12	14	4	3	1	2	0
1969	2261	38	14	5	3	1	1	1
1970	1511	33	3	9	6	0	0	0
1971	2771	9	14	6	2	2	0	
1972	2227	21	15	5	1	0		
1973	2498	22	5	7	0			
1974	2478	9	11	0				

Table 32. Distribution of recoveries of adult mourning doves, banded east of the Continental Divide, Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	1033	13	9	6	1	0	0	0
1968	873	11	13	4	3	1	2	0
1969	1875	38	12	5	3	1	1	1
1970	1160	31	2	9	6	0	0	0
1971	1733	8	12	6	1	2	0	
1972	1640	18	14	5	1	0		
1973	1618	16	5	5	0			
1974	1555	6	7	0				

Table 33. Distribution of recoveries of adult mourning doves, banded west of the Continental Divide, Colorado, 1968-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1968	104	1	1	0	0	0	0	0
1969	386	0	2	0	0	0	0	0
1970	351	2	1	0	0	0	0	0
1971	1038	1	2	0	1	2	0	
1972	587	3	1	0	0	0		
1973	880	6	0	2	0			
1974	923	3	4	0				

Table 34. Distribution of recoveries of adult male mourning doves, banded in Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	637	11	7	3	1	0	0	0
1968	486	6	4	3	2	0	2	0
1969	1363	24	10	4	2	1	0	1
1970	816	23	3	4	4	0	0	0
1971	1572	6	9	2	0	2	0	
1972	1255	10	6	3	1	0		
1973	1341	11	3	2	0			
1974	1407	5	7	0				

Table 35. Distribution of recoveries of adult male mourning doves, banded east of the Continental Divide, Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	636	11	7	3	1	0	0	0
1968	437	5	4	3	2	0	2	0
1969	1137	24	8	4	2	1	0	1
1970	632	23	2	4	4	0	0	0
1971	929	5	8	2	0	2	0	
1972	913	8	6	3	1	0		
1973	866	6	3	1	0			
1974	911	3	4	0				

Table 36. Distribution of recoveries of adult male mourning doves, banded west of the Continental Divide, Colorado, 1969-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1969	226	0	2	0	0	0	0	
1970	184	0	1	0	0	0	0	
1971	643	1	1	0	0	2	0	
1972	342	2	0	0	0	0		
1973	475	5	0	1	0			
1974	496	2	3	0				

Table 37. Distribution of recoveries of adult female mourning doves, banded in Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	378	2	2	3	0	0	0	
1968	480	6	10	1	1	1	0	
1969	890	14	4	1	1	0	1	
1970	692	10	0	5	2	0	0	
1971	1191	3	5	4	2	0	0	
1972	971	11	9	2	0	0		
1973	1150	11	2	5	0			
1974	1065	4	4	0				

Table 38. Distribution of recoveries of adult female mourning doves, banded east of the Continental Divide, Colorado, 1967-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1967	378	2	2	3	0	0	0	0
1968	435	6	9	1	1	1	0	0
1969	734	14	4	1	1	0	1	0
1970	525	8	0	5	2	0	0	0
1971	797	3	4	4	1	0	0	
1972	726	10	8	2	0	0		
1973	745	10	2	4	0			
1974	638	3	3	0				

Table 39. Distribution of recoveries of adult female mourning doves, banded west of the Continental Divide, Colorado, 1970-1974.

Year	N Banded	Number Recovered in Year						
		1	2	3	4	5	6	7
1970	167	2	0	0	0	0		
1971	394	0	1	0	1	0		
1972	245	1	1	0	0	0		
1973	405	1	0	1	0			
1974	427	1	1	0				