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MOURNING DOVE RECOVERIES FROM MEXICO

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MOURNING DOVE RECOVERIES FROM MEXICO

By

Lytle H. Blankenship and Henry M. Reeves
Migratory Bird Populations Station
Division of Wildlife Research
Laurel, Maryland

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CONTENTS

Abstract iv

Introduction 1

Methods 1

Results

- Relative Number of Recoveries Reported from Mexico 2
- Distribution of Bands Reported from Mexico 2
- Origins of Banded Mourning Doves Reported from Mexico 4
- Intermingling of Doves from Widely Separated U.S. States of Banding 7
- Mexican Mourning Dove Recoveries by "How Obtained" 7
- Mexican Mourning Dove Recoveries by "When Obtained" 7
- Nationality and Surname Classification of Persons Reporting Bands 8
- Factors Influencing the Distribution and Incidence of Reported Band Recoveries 8
- Estimates of Mexican Harvests of U.S. Produced Doves 9

The Need for Further Investigation 13

Acknowledgment 13

References 14

Appendix 15

ABSTRACT

Of 37,000 reports of mourning dove band recoveries in the files of the Migratory Bird Populations Station on October 30, 1967, 1,120 came from Mexico, and half of those were from Jalisco and Michoacan, both in west-central Mexico; Jalisco alone accounted for nearly a third. Few recoveries were reported from the area between the U.S. border and mid-Mexico.

Generally, lower proportions of total recoveries were reported from Mexico under the current pre-hunting season banding program for flying birds than were reported from the nestling dove banding program of the 1950's. Bandings in northern U.S. States produced proportionately more recoveries than bandings in southern U.S. States. Doves banded over diverse areas of the United States were harvested in common migration and wintering areas of Mexico.

Possible explanations of the heterogeneous distribution of recoveries throughout Mexico are discussed. Of the banded birds for which "how obtained" was known, 83.5 percent were reported as shot (or killed) and only 3.2 percent reported as captured or trapped. Among the 658 persons who gave their name and residence when they reported bands, 95.7 percent had typically Spanish surnames and were residents of Mexico.

Depending upon actual band reporting rates and the representativeness of the banding data analyzed, the Mexican dove harvest may equal or exceed harvests in leading U.S. States. Factors influencing band reporting rates (the proportions of banded birds taken by hunters that are reported) must be resolved before Mexico's importance as a harvest area can be accurately determined.

INTRODUCTION

Mexico is an important wintering area for mourning doves produced in the United States; however, its role as a mourning dove harvest area is poorly understood. This report provides preliminary data on mourning doves banded in the United States and recovered in Mexico. Information presented here includes distribution of recoveries in Mexico, the origins of banded birds recovered in Mexico, how and when banded birds were recovered, nationalities of persons reporting bands, and factors influencing the distribution of Mexican recoveries. A preliminary estimate of the possible annual dove harvest in Mexico is presented, based upon several assumptions regarding band reporting rates, recovery rates, and estimated harvests in portions of the United States. More importantly, the report identifies problems which must be resolved before Mexico's importance as a harvest area can be ascertained.

Large-scale mourning dove banding commenced with the nestling banding program of the mid-1950's. More than 152,000 doves were banded before the program terminated in the early 1960's. Banding since then has been chiefly of flying doves trapped during the pre-hunting season (June through August) and post-hunting season (mid-January through mid-March) banding periods, with fewer numbers being banded at other times of the year.

METHODS

This report is based on three sources of data. The first source, a tabulation of band recoveries of various species of birds from 1920 to October 30, 1967, is filed in the Bird Banding Laboratory; it provided the number of mourning dove band recoveries by States of banding and recovery. These data were used to ascertain the importance of Mexico as a band recovery area in relation to other recovery areas south of the border, and to serve as an index for calculating the Mexican harvest. The second source of data, which was compiled by Blankenship, consisted of band recovery reports ("flimsies") from 1920 to early 1966.[1/] The third group of data, a summary of continent-wide mourning dove banding and recovery data from 1965 to January 1968, was

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1/ The use of "flimsies" as the Bird Banding Laboratory's reporting form for banded birds recovered in the United States was discontinued in July 1961. However, "flimsies" were retained as the reporting medium for most foreign band recoveries because many proper names and addresses are too long for processing on computer cards.

analyzed by Reeves. The latter two sources included 951 Mexican recoveries, which we believe approximate 80 to 85 percent of the total number of Mexican recoveries in the Bird Banding Laboratory files as of early 1968. These data were used to ascertain the States and management units contributing banded birds to Mexico, information regarding how bands were obtained, the time that banded doves were encountered in Mexico, and the nationality of persons reporting banded doves to the Bird Banding Laboratory. Records excluded from the present analysis represent mourning doves banded anytime before 1965 and recovered after 1965, plus a few foreign recoveries from 1961 through 1964 that were not processed with "flimsies," and thus not readily available for tabulation.

The data presented relate only to band recoveries reported to the Bird Banding Laboratory. Also, when discussing U.S. sources of banded birds taken in Mexico, one must consider intensity of banding effort, time of banding, and relative sizes of populations being sampled by banding. An index to the relative importance of Mexico as a harvest area for dove populations banded in the United States can be determined by comparing the weighted Mexican harvest index, derived from the number of Mexican recoveries, with the weighted U.S. harvest index, derived from the number of bands reported from the United States. Inasmuch as a band reporting rate has not been specifically ascertained for Mexico, it is impossible to precisely estimate the total number of banded doves taken in Mexico, or to adjust band recovery rates to harvest rates.

RESULTS

Relative Number of Recoveries Reported from Mexico

Approximately 37,000 mourning dove band recoveries were on file in the Bird Banding Laboratory according to a tabulation on October 30, 1967. Of these, 1,120, or about 3 percent, were of birds taken in Mexico. Table 1 shows that Mexico is the main source of recovery reports of U.S. banded doves taken south of the United States.

Distribution of Bands Reported from Mexico

Bands have been reported from 28 of the 30 States and Territories plus the Federal District (Mexico D.F.) comprising the Republic of Mexico (table 2). Quintana Roo, Tabasco, and Yucatan, where no recoveries have been reported, are in the easternmost part of the Republic (fig. 1). British Honduras, also having no recoveries, is immediately adjacent to these three Mexican States.

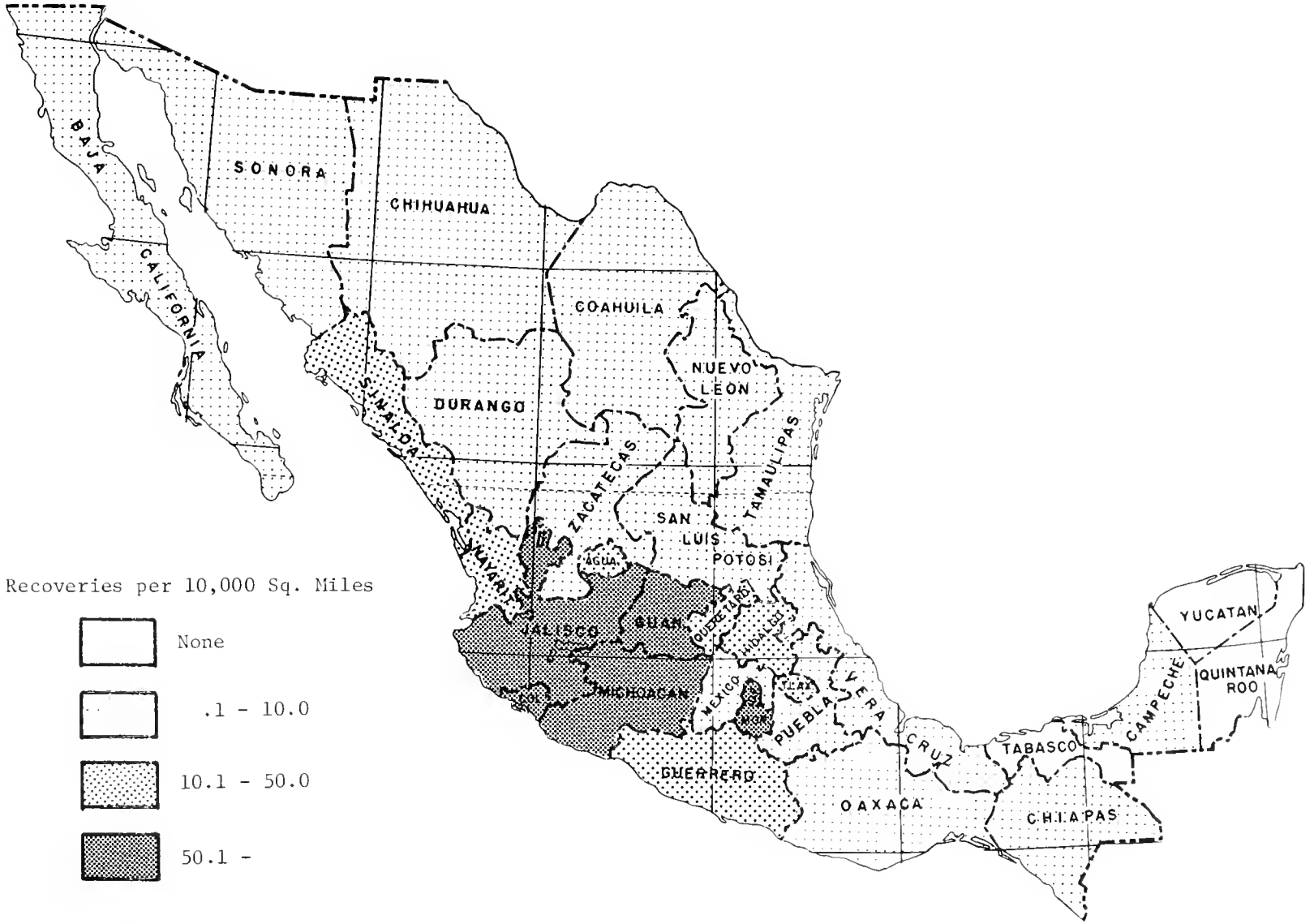

Figure 1. Distribution of mourning dove recoveries from Mexico.

The uneven distribution of recoveries in Mexico is striking. Many large States (Coahuila, Durango, San Luis Potosi) have only one or a few recoveries each--even though they are situated between the United States and the main area of west-central Mexico where the bulk of recoveries originate. Chihuahua, the largest Mexican State, and adjacent to Texas, had only five recoveries.

Two-thirds (67.1 percent) of the Mexican mourning dove recoveries included in this analysis were reported from an area lying between the Federal District and the Pacific Ocean (fig. 1). In this area, the State of Jalisco accounted for nearly one-third (31.3 percent) of the nation's total mourning dove recoveries; Michoacan accounted for 25.0 percent; and Guanajuato for 10.8 percent.

Origins of Banded Mourning Doves Reported from Mexico

The U.S. State of banding for 951 doves reported from Mexico is listed in table 2. Included are all States west of the Mississippi River and seven States east of it. No conclusions regarding the relative importance of each State in supplying doves to Mexico's harvest can be drawn from this information alone. To resolve this problem, one must know the distribution, magnitude, nature, and timing of the respective banding programs, the relative importance of each State as a mourning dove production area, and, in Mexico, dove harvest and band reporting information. For example, South Dakota probably ranks second to Texas in terms of recoveries from Mexico because of (1) its very large dove banding program and (2) its geographical position, directly north of Mexico.

Banded birds from the Central Management Unit (CMU) accounted for 66.5 percent of the 929 recoveries for which the Mexican recovery area was known (table 3). The Western Management Unit (WMU) accounted for 28.2 percent, and the Eastern Management Unit (EMU) for 5.3 percent. The previously mentioned precautions about interpreting recoveries by State of banding apply equally to evaluations involving the dove management units as dove suppliers to Mexico. For example, the EMU probably contributes far less than 5.3 percent of the kill in Mexico. The relative importance of the EMU is no doubt exaggerated due to the vigorous banding program in that area.

The interpretive values for immatures and adults banded in the 1949-1962 period are lessened considerably because they relate to year-round banding when many doves cannot be identified with production areas. During those years, many States conducted large-scale

banding programs for flying doves relating mostly to the postseason period; these doves were wintering in the United States and unavailable for Mexican harvest. Nearly all EMU-produced doves winter within their Unit; also, large numbers of CMU- and WMU-produced doves winter in the southern portions of their respective management units.

Figure 2, compiled from 1965-1967 preseason banding data for immatures, suggests that the north-central States contributed proportionately more Mexican recoveries than the south-central States, even those immediately adjacent to Mexico. A thorough analysis of banding data and the timing of hunting seasons is needed to determine whether differential migration is involved. Very few doves have been banded in recent years during the preseason period in Montana and Wyoming; as a result, no Mexican recoveries have been received. However, limited information from the nestling banding program suggests that these States do supply doves to Mexico.

Marked differences in the proportion of total recoveries originating from Mexico exist between the 1949-1962 local (nestling) banding data and data from the recent preseason banding program (table 4). Generally, the results from preseason banding follow the same pattern of distribution as the nestling banding program, except that the proportion of recoveries originating from Mexico is much less. For example, 41 of 107 (38.3 percent) nestling recoveries from Kansas bandings during 1949-1962 came from Mexico; during 1965-67, only 1 of 22 (4.6 percent) total immature recoveries came from Mexico. This pattern seems to hold wherever fairly good sample sizes are available.

Because both the nestling and the preseason immature banding efforts presumably relate to birds produced in the States of banding, the question may be raised as to why the percentages differ so. Possible explanations are: (1) different banding and recovery periods are involved; (2) there may have been changes in the intensity, timing, and geographical distribution of hunting activity in both the United States and Mexico; or (3) U.S. and/or Mexican band reporting rates have changed. Mexican dove hunting regulations customarily allow widely differing seasons throughout the Republic. For example, the 1968-69 season began on August 28 in the northern zone and lasted until March 31 in parts of southern Mexico. Also, there have been substantial changes in U.S. hunting seasons and bag limits in recent years.

Another possibility is that much of the nestling banding was done in late spring and early summer when many nesting doves concentrate in

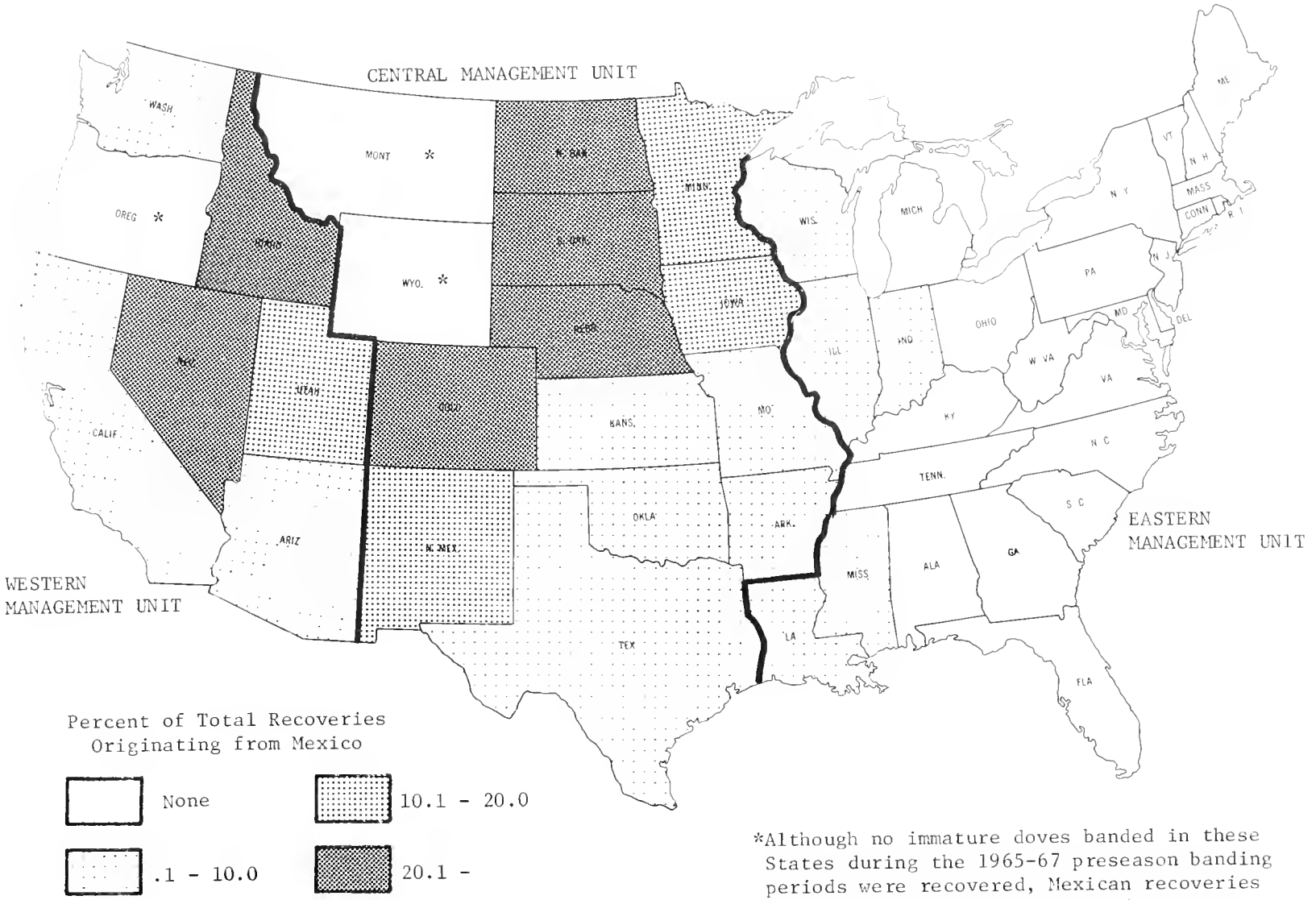

Figure 2. Relative importance of Mexico as a harvest area for mourning doves associated with various States, based on the percent of total recoveries from immature doves banded during June, July, and August 1965-1967.

easily searched habitat. Some of the most successful banding of nestlings occurred in conifers prior to the time that deciduous trees leafed. On the other hand, most preseason banding has been undertaken in July and August when the greatest number of doves are available for trapping. Do early-produced doves migrate differently or earlier, causing them to arrive in Mexico prior to, or more abundantly than, later-produced doves? Truett (1966) found that early-produced doves in Arizona began drifting southward in July.

Intermingling of Doves Which Were Banded in Widely Separated U.S. States

One of the most interesting aspects of this preliminary study is that doves banded in widely separated portions of the United States are simultaneously present in common harvest areas of Mexico. This is most obvious in the States of Jalisco, Michoacan, and Guanajuato, where doves banded in Washington, California, Louisiana, and Minnesota, and intervening regions, are harvested. Further study should be given this important finding.

Mexican Mourning Dove Recoveries by "How Obtained"

Records in the Bird Banding Laboratory indicate how a banded bird came to the attention of the individual who directly or indirectly was responsible for the band being reported. For this report, "killed" was interpreted as being "shot" although this may not always have been correct. In Mexico, an unknown proportion of doves reported as "killed" or "shot" may have been taken by slingshots, because these weapons are widely used in rural areas. In the United States, many migratory game birds taken in season by hunters are reported as "killed" although they actually were "shot." Table 5 summarizes major categories of "how obtained" and lists them according to the Mexican State of recovery. A high proportion (83.5 percent) of the banded birds were obtained by shooting (including those reported as "killed"), in contrast to the very low proportion (3.2 percent) that were reported as "captured" or "trapped." Other minor causes were "found" and miscellaneous means including "no information."

Mexican Mourning Dove Recoveries by "When Obtained"

Time periods in which recoveries were reported from each of the Mexican States are summarized in table 6. Of the 951 available Mexican records, 727 (76.7 percent) showed dates of recovery. Excluded from the analysis were 163 dates derived only from postmarks and 59 unknown

dates. These records indicate that U.S. banded doves have been taken in Mexico during every month of the year. Although we believe the preponderance of the dates to be accurate, there is a possibility that the 23 recoveries in May, June, and July may reflect erroneously reported or recorded data, or possibly data from captive, crippled, or sick birds.

Judging from recovery dates, U.S. banded doves arrived in Mexico as early as August, with the number of recoveries steadily increasing until late October and early November. October, the most important month, accounted for 24.3 percent of all recoveries; November followed closely with 22.2 percent of all recoveries. Together, these 2 months included nearly half of the usable "when obtained" dates. After those months the number of recoveries per month steadily declined; April was the last month in which many bands were reported.

Nationality and Surname Classification of Persons Reporting Bands

The names and addresses of persons reporting dove bands were shown on band report "flimsies" examined by Blankenship but were not presented in the tabulations checked by Reeves. Table 7 summarizes the nation of residence and the surname classification of persons reporting 658 bands summarized for the period 1920 to early 1966. This information indicates that an overwhelming proportion of persons reporting dove bands from Mexico were residents of Mexico with typically Spanish surnames. No doubt a portion of the other persons residing in Mexico but having typically non-Spanish surnames were also Mexican nationals.

Factors Influencing the Distribution and Incidence of Reported Band Recoveries

Fragmentary information gives some insight into why the Jalisco-Michoacan-Guanajuato area so dominates the Mexican dove band recovery situation. All three States are heavily populated; they rank third, sixth, and seventh, respectively, in population among the 31 States and the Federal District (table 8). In terms of population density per square mile they rank twelfth, ninth, and sixth, respectively. All have over half of their population classified as rural. Jalisco and Michoacan, in particular, are very important agricultural areas, with corn, wheat, and rice being important crops. On the other hand,

relatively low human populations, less agriculture, and possible differences in hunter attitudes may partially explain why more bands are not reported from the expanse between the U.S. border and the Jalisco-Michoacan-Guanajuato area.

Estimates of Mexican Harvests of U.S. Produced Doves

It is possible to obtain crude estimates of the annual Mexican harvest of U.S. produced doves by comparing the distribution of band recoveries between the United States and Mexico, and kill estimates for the United States. This procedure relies upon a number of basic assumptions: (1) band recoveries reflect the distribution of harvest; (2) the preseason banding program resulted in banding a sample of all significant populations; (3) the annual call-count survey is an index to production as well as dove breeding populations, and reflects the relative size of dove populations associated with each area; and (4) equal band reporting rates prevail wherever U.S. produced doves are harvested. For our purposes, the best estimate of the current total U.S. mourning dove harvest is 40.8 million (Ruos and Tomlinson, 1968). The analysis ignores the unknown, but obviously small, contribution made by Canadian production to the Mexican dove harvest. Also, it excludes the Mexican harvest of mourning doves produced in Mexico. The species is an abundant breeding bird in the northern and central portions of the Republic of Mexico (Leopold, 1959).

Using information from the annual call-count survey, it is possible to determine the index of each State's breeding dove population. The value of each State's dove production habitat is indicated in the annual dove status reports; data from the 1967 report are used in this analysis (Ruos and MacDonald, 1968). The report also provided information on the average number of doves heard calling for all survey routes run in each State. The breeding population index for each State is obtained by multiplying the two figures. These values are shown in table 9. Excluded from the calculations are Maine, New Hampshire, Rhode Island, and Vermont, all relatively unimportant dove-producing States in which survey routes have not yet been randomized. For the three EMU States having no recoveries from the 1965-67 preseason banding program, the breeding population index was added to that of an adjacent State which had recoveries. Connecticut and Massachusetts were grouped with New York, and Delaware was combined with Maryland. According to available data, none of these States is known to have produced doves which were subsequently recovered in

Mexico. For band recovery weighting purposes, the band recoveries and breeding population indexes for two CMU States and one WMU State which had little or no band recovery data were combined with those of certain adjacent States. It is known that all of these grouped States produced doves which were later recovered in Mexico, even though, in the 1965-67 preseason banding data being analyzed, no Mexican recoveries were recorded from bandings in Wyoming, Montana, and Oregon.

Data from the 1965-67 preseason banding program were used in the analysis because they are thought to be most representative of current harvest conditions, and because of the volume of recoveries they offered for study. They include direct and indirect recoveries of doves banded as immatures or adults. Thus, from the 1965 preseason banding, direct recoveries were obtained of immatures shot in the 1965-66 hunting season, and of surviving doves, then adults, shot in the 1966-67 and 1967-68 seasons. Only "shot" or "found dead" in hunting season recoveries are included in the analysis.

In order to compare recoveries from the United States and Mexico in a meaningful manner, it is necessary to weight the recoveries from each State of banding to recognize: (1) differences in the size of the populations associated with each State, and (2) differences between States in the rate at which dove populations they produce are harvested. The procedure followed in calculating weighting factors is shown in table 9. First, the number of recoveries available from each State was divided into the breeding population index to obtain a value representing the "population index per recovery." Then this value was multiplied by the first hunting season recovery rate of immatures to obtain an estimate of the "harvest index" per recovery. This weighting factor was then multiplied by the number of recoveries in Mexico, and in the United States and elsewhere, to obtain a value that reflects the relative size of the kill in each area. Note the relatively high Mexican harvest index values that accumulate from bandings in the CMU. In these cases, a high proportion of the total recoveries originate from Mexico; although the overall number may be small, each such recovery carries a high assigned value. On the other hand, indexes from EMU States carry relatively low values. By totaling the sums for Mexican recoveries for all States, and for the United States and elsewhere, one obtains a weighted index of the dove harvest that occurs in Mexico, and the United States and elsewhere.

The harvest component for foreign countries other than Mexico now must be removed from the U.S. and other harvest data to produce the U.S. harvest component. Table 1 indicates that Mexican recoveries comprise 1,120 of the 1,226 total foreign recoveries from U.S. banded doves. Of the total foreign recoveries, 106 were from foreign countries other than Mexico. These recoveries equal 9.46 percent of the Mexican recoveries (106 divided by 1,120). Assuming that this is a weighted representative value, the non-Mexican foreign index would be .0946 times the Mexican harvest index, 95.368 (from table 9), or 9.022. This value, when subtracted from the U.S. and other foreign harvest index, 1372.771, leaves the United States with a harvest index of 1363.749.

It is now possible to write an algebraic equation, letting X equal the Mexican harvest of U.S. produced doves.

$$\frac{\text{U.S. Harvest Index}}{\text{U.S. Harvest}} = \frac{\text{Mexican Harvest Index}}{X}$$

$$X = \frac{\text{Mexican Harvest Index x U.S. Harvest}}{\text{U.S. Harvest Index}}$$

Substituting:

$$X = \frac{95.368 \times 40{,}800{,}000}{1363.749}$$

$$X = 2{,}853{,}200$$

Thus, if our assumptions are correct, the annual Mexican harvest of mourning doves produced in the United States approximates 2.85 million.

The estimated Mexican annual harvest of 2.85 million doves from U.S. produced doves is based on the premise that the U.S. and Mexican band reporting rates are equal; however, it seems unlikely that the two would be equal. A number of factors influence human behavior in band reporting. For example, bands with foreign inscriptions, such as English language bands in Mexico, possibly are reported at a higher rate than those inscribed in the native language because they arouse more curiosity.

The subject of band reporting is far too complex to examine here in detail; however, the great importance of the reporting rate in modifying the Mexican harvest, as calculated above, can be readily demonstrated.

The following Mexican harvests would result if Mexican band reporting rates were 50 and 25 percent higher, and 25 and 50 percent lower, than the U.S. rate:

1. Reporting rate 50 percent higher than U.S. rate

$$\frac{2,853,200}{1.5} = 1,902,133 = 1.9 \text{ million}$$

2. Reporting rate 25 percent higher than U.S. rate

$$\frac{2,853,200}{1.25} = 2,282,560 = 2.3 \text{ million}$$

3. Reporting rate 25 percent lower than U.S. rate

$$\frac{2,853,200}{.75} = 3,804,267 = 3.8 \text{ million}$$

4. Reporting rate 50 percent lower than U.S. rate

$$\frac{2,853,200}{.5} = 5,706,400 = 5.7 \text{ million}$$

Thus, if the Mexican band reporting rate is less than the U.S. rate, the Mexican harvest becomes more significant in relation to the U.S. harvest. Conversely, the magnitude of the Mexican harvest becomes less if the Mexican band reporting rate is higher than the U.S. rate. If we assume that equal band reporting rates prevail, and our other assumptions are correct, the Mexican harvest equals about 7 percent of the U.S. dove harvest.

This calculated annual harvest of 2.85 million mourning doves in Mexico is greater than the annual harvest that occurs in many U.S. States in which the species is an important game bird. No reliable harvest figures are available for Texas, which is believed to be the State with the largest dove harvest. California probably ranks second to Texas in annual harvest. According to data from the kill survey in California, dove take in recent years has ranged from 4.0 to 5.1 million (Blankenship, 1969). Data derived from a telephone survey in the EMU following the 1968-69 hunting season (Hayne, 1969) indicate that no single State in the Unit harvested as many doves as Mexico. The Mexican harvest apparently surpasses the dove kill in such important States as Alabama (2.6 million), Florida (2.6 million), Georgia (2.7 million), and North Carolina (2.2 million).

It appears that the Mexican harvest is of such magnitude that it cannot be disregarded in any study of mourning dove population dynamics, particularly in the Central and Western Management Units.

THE NEED FOR FURTHER INVESTIGATION

As is true with many preliminary investigations, this study raises more questions than it answers. A more complete study supported by an analysis of all available banding and recovery information is needed. Special effort should be made to ascertain whether differential sex or age migrations to Mexico occur for U.S. produced doves. Better information on dates of Mexican recoveries as related to times and places of U.S. banding is required. A more precise measure of the relative value of dove production by U.S. States is needed to relate production areas to Mexican recovery areas. A greater knowledge of the complex factors related to dove harvest and the reporting of banded birds is necessary if we are to understand Mexico's role as a mourning dove harvest area.

ACKNOWLEDGMENT

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APPENDIX

Table 1.--Relative importance of countries south of the United States as reporters of mourning dove band recoveries

Country	Recoveries from U.S. banded doves[1/]	Percent
Mexico	1,120	91.35
British Honduras	0	0.00
Costa Rica	5	0.41
El Salvador	21	1.71
Guatemala	49	4.00
Honduras	14	1.14
Nicaragua	5	0.41
Colombia	1	0.08
Cuba	11	0.90
Total	1,226	100.00

1/ From tabulation of Bird Banding Laboratory files, October 30, 1967.

Table 2.--Distribution of Mexican mourning dove band recoveries by Mexican States of recovery and U.S. States of banding

Mexican State of recovery	Ariz.	Ark.	Calif.	Colo.	Idaho	Ill.	Ind.	Iowa	Kans.	La.	Mich.	Minn.	Miss.	Mo.	Mont.	Nebr.	Nev.	N. Mex.	N.C.	N. Dak.	Ohio	Okla.	Ore.	S. Dak.	Tenn.	Tex.	Utah	Wash.	Wis.	Wyo.	Total	Percent
Aguascalientes	1													1								1									3	0.3
Baja California			31		1																		1								33	3.6
Campeche																								1							1	0.1
Chiapas										1				1		1															3	0.3
Chihuahua	1				1													3													5	0.5
Coahuila																										1					1	0.1
Colima	1		1				1	1				2								2	1	1		2		1				1	14	1.5
Durango	1		2															1									1				5	0.5
Guanajuato	3	3	4	4		1	2	2	8	4		6	1	4	2	2		4		5		3		15		23	1	1		2	100	10.8
Guerrero	2			2				1	1	1		2		5		5	1	3		4		1		11		10		1		1	51	5.5
Hidalgo			1			1			2	2		2												1		1					10	1.1
Jalisco	13		24	9	13	1		12	15	4	1	6	2	15		28	9	22		23		4	9	28		25	12	9	2	5	291	31.3
Mexico	1								1	1		1		1												2		1			8	0.9
Mexico D.F.			1				1	1								1												1			5	0.5
Michoacan	13	2	13	9	9	2		7	15	3		10	1	14	1	15	1	17	1	13		3	5	26		38	4	6	2	2	232	25.0
Morelos		1	1					1		1		1	1	1		2				3				1		5			1		19	2.0
Nayarit	5		1		1			2						1			1	2		2			1	1		2				2	21	2.2
Nuevo Leon										1						1								1		2					5	0.5
Oaxaca								3	1	2										2				3		3					14	1.5
Puebla														1											1	6					8	0.9
Queretaro								1		1			1					1						1				1			6	0.6
Quintana Roo																															0	
San Luis Potosi																										1					1	0.1
Sinaloa	2		8	1	4				1			1				1	1	2					1			1	1	1			25	2.7
Sonora	16		7		3												3	1					1				2				33	3.6
Tabasco																															0	
Tamaulipas							1		1	1		1		1		2								3		5					15	1.6
Tlaxcala								1		1																1					3	0.3
Vera Cruz									1	1		1		2										2		2					9	1.0
Yucatan																															0	
Zacatecas				1						2		1				1							1	1			1				8	0.9
Unknown	1	1	3		1				1							4						1		10							22	
Total	60	7	97	26	33	5	5	32	47	26	1	34	6	47	3	63	16	56	1	54	1	14	19	107	1	129	22	21	5	13	951	
Percent	6.3	0.7	10.2	2.7	3.5	0.5	0.5	3.4	4.9	2.7	0.1	3.6	0.6	4.9	0.3	6.6	1.7	5.9	0.1	5.7	0.1	1.5	2.0	11.3	0.1	13.6	2.3	2.2	0.5	1.4	99.9	99.9

Table 3.--Distribution of mourning dove band recoveries by Mexican States and by U.S. dove management units in which banded

Mexican State of recovery	U.S. Management Unit in which banding occurred						Total Number of Recoveries[1/]
	Western		Central		Eastern		
	Recovered	Percent	Recovered	Percent	Recovered	Percent	
Aguascalientes	1	33.3	2	66.7			3
Baja California	32	97.0	1	3.0			33
Campeche			1	100.0			1
Chiapas			2	66.7	1	33.3	3
Chihuahua	2	40.0	3	60.0			5
Coahuila			1	100.0			1
Colima	2	14.3	10	71.4	2	14.3	14
Durango	4	80.0	1	20.0			5
Guanajuato	9	9.0	83	83.0	8	8.0	100
Guerrero	4	7.8	46	90.2	1	2.0	51
Hidalgo	1	10.0	6	60.0	3	30.0	10
Jalisco	89	30.6	192	66.0	10	3.4	291
Mexico	2	25.0	5	62.5	1	12.5	8
Mexico D.F.	2	40.0	2	40.0	1	20.0	5
Michoacan	51	22.0	172	74.1	9	3.9	232
Morelos	1	5.3	15	78.9	3	15.8	19
Nayarit	9	42.9	12	57.1			21
Nuevo Leon			4	80.0	1	20.0	5
Oaxaca			12	85.7	2	14.3	14
Puebla			7	87.5	1	12.5	8
Queretaro	1	16.7	4	66.7	1	16.7	6
Quintana Roo							0
San Luis Potosi			1	100.0			1
Sinaloa	18	72.0	7	28.0			25
Sonora	32	97.0	1	3.0			33
Tabasco							0
Tamaulipas			13	86.7	2	13.3	15
Tlaxcala			3	100.0			3
Vera Cruz			8	88.9	1	11.1	9
Yucatan							0
Zacatecas	2	25.0	4	50.00	2	25.0	8
Total	262	28.2	618	66.5	49	5.3	929

1/ Recovery locations not known for 22 other Mexican recoveries.

Table 4.--Indexes of the relative importance of U.S. banding States in supplying mourning doves to Mexico, as indicated by various banding data

State of banding	Total "Shot" Recoveries--1949-1962[1]									Total Recoveries from preseason 1965-67 banding					
	Locals[2]			Immatures			Adults[3]			Immatures			Adults		
	Total Rec.	Mex. Rec.	Percent from Mexico	Total Rec.	Mex. Rec.	Percent from Mexico	Total Rec.	Mex. Rec.	Percent from Mexico	Total Rec.	Mex. Rec.	Percent from Mexico	Total Rec.	Mex. Rec.	Percent from Mexico
Ariz.	76	1	1.3	258	16	6.2	652	18	2.8	236	15	6.4	358	7	2.0
Ark.	39	0	0.0	5	0	0.0	21	3	14.3	83	2	2.4	19	0	0.0
Calif.	381	28	7.4	45	4	8.9	58	6	10.3	284	10	3.5	127	2	1.6
Colo.	22	10	45.5	6	4	66.7	--	--	--	47	12	25.5	17	0	0.0
Idaho	7	4	57.1	17	4	23.5	7	1	14.3	66	15	22.7	64	5	7.8
Ill.	201	1	0.5	6	0	0.0	13	0	0.0	169	1	0.6	82	2	2.4
Ind.	39	3	7.7	21	1	4.8	2	0	0.0	28	2	7.2	2	0	0.0
Iowa	54	14	25.9	1	0	0.0	1	1	100.0	45	8	17.8	27	7	25.9
Kans.	107	41	38.3	6	2	33.3	2	0	0.0	22	1	4.6	30	3	10.0
La.	133	0	0.0	974	11	1.1	712	7	1.0	618	1	0.2	175	1	0.6
Mich.	45	1	2.2	1	0	0.0	5	0	0.0	6	0	0.0	4	0	0.0
Minn.	51	14	27.5	1	1	100.0	12	1	8.3	55	6	10.9	27	6	22.2
Miss.	244	7	28.7	35	0	0.0	32	0	0.0	187	1	0.5	62	0	0.0
Mo.	125	11	8.8	30	5	16.7	180	15	8.3	136	4	2.9	77	4	5.2
Mont.	2	2	100.0	--	--	--	1	1	100.0	5	0	0.0	--	--	--
Nebr.	72	36	50.0	4	2	50.0	2	1	50.0	15	9	60.0	11	9	81.8
Nev.	0	0	0.0	9	3	33.3	9	2	22.2	22	5	22.7	17	2	11.8
N. Mex.	15	4	26.7	69	37	53.6	71	14	19.7	105	13	12.4	44	5	11.4
N. Dak.	111	41	36.9	4	2	50.0	3	1	33.3	6	5	83.3	2	1	50.0
Ohio	134	1	0.7	25	0	0.0	13	0	0.0	17	0	0.0	10	0	0.0
Okla.	45	8	17.8	4	0	0.0	5	2	40.0	11	1	9.1	4	0	0.0
Ore.	5	0	0.0	43	3	7.0	67	8	11.9	19	0	0.0	13	0	0.0
S. Dak.	54	22	40.7	1	1	100.0	1	0	0.0	242	55	22.7	203	20	10.0
Tex.	990	89	9.0	1	0	0.0	35	7	20.0	47	3	6.4	23	1	4.4
Utah	13	4	30.8	9	0	0.0	45	6	13.3	37	4	10.8	52	9	17.3
Wash.	110	12	10.9	--	--	--	8	0	0.0	89	6	6.7	18	1	5.6
Wis.	38	4	10.5	6	0	0.0	4	0	0.0	18	1	5.6	14	0	0.0
Wyo.	16	13	81.3	--	--	--	--	--	--	--	--	--	---	--	--

1/ From MBPS Administrative Report No. 40, Mourning Dove Banding and Shot-Recovery Data, 1949-1962.

2/ Doves banded as nestlings.

3/ In this early study, all doves exhibiting no discernible immature characteristics were classified as adults. This definition probably resulted in completely molted immatures being incorrectly classed as adults.

Table 5.--Summary of mourning dove recoveries from Mexico, "How Obtained" by Mexican State of recovery

Mexican State of recovery	Number of Recoveries					Percent
	Shot (including "Killed")	Found	Trapped or Captured	Other, or No Information	Total	
Aguascalientes	3				3	0.3
Baja California	29	1	1	2	33	3.5
Campeche		1			1	0.1
Chiapas	2			1	3	0.3
Chihuahua	2	1		2	5	0.5
Coahuila	1				1	0.1
Colima	12			2	14	1.5
Durango	4			1	5	0.5
Guanajuato	88	7	2	3	100	10.5
Guerrero	34	4	9	4	51	5.4
Hidalgo	10				10	1.1
Jalisco	250	12	3	26	291	30.6
Mexico	8				8	0.8
Mexico D.F.	3	1	1		5	0.5
Michoacan	190	7	10	25	232	24.4
Morelos	19				19	2.0
Nayarit	17		1	3	21	2.2
Nuevo Leon	5				5	0.5
Oaxaca	12	1		1	14	1.5
Puebla	8				8	0.8
Queretaro	6				6	0.6
Quintana Roo					0	--
San Luis Potosi	1				1	0.1
Sinaloa	22		1	2	25	2.6
Sonora	25	3	1	4	33	3.5
Tabasco					0	--
Tamaulipas	13	1		1	15	1.6
Tlaxcala	2	1			3	0.3
Vera Cruz	9				9	0.9
Yucatan					0	--
Zacatecas	6		1	1	8	0.8
Unknown	13	1		8	22	2.3
Total	794	41	30	86	951	99.8
Percent	83.5	4.3	3.2	9.0		100.0

Table 6.--Distribution of mourning dove recoveries in Mexico by time when taken
1920 through December 1968

Mexican State of recovery	Time of Recovery															Total No. of Usable Dates	Unusable Dates		Total
	Aug.	Sept.		Oct.		Nov.		Dec.		Jan.	Feb.	Mar.	Apr.	May	June	July		Letter	Unknown	
		1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31											
Aguascalientes											1	1					2	1		3
Baja California	1	6	3	2	1	1	2	1	1	1	3	2	1	1			26	6	1	33
Campeche																			1	1
Chiapas						1									1		2		1	3
Chihuahua					1		1	3									5			5
Coahuila																			1	1
Colima				1	2	2			1	2		2	1				11	3		14
Durango				1						1	1	1	1				5			5
Guanajuato		1		16	18	8	10	7	4	4	3	2	6				79	19	2	100
Guerrero				1	3	8	4	4	1	2	2	9	2	2			38	7	6	51
Hidalgo						2			1		1	2	1				7	2	1	10
Jalisco	1	2	6	23	30	35	16	15	15	29	18	20	6	2	2	3	223	56	12	291
Mexico						1	2		1	1		2					7	1		8
Mexico D.F.							1		1	2				1			5			5
Michoacan		5	5	20	30	28	13	16	8	14	15	8	14	3			179	43	10	232
Morelos				1	4	2	2	1	1	4	1		1				17	1	1	19
Nayarit						3	1	1		4	3	1	1				14	7		21
Nuevo Leon										1			2	1		1	5			5
Oaxaca					3	1	2	1		1		1					9	2	3	14
Puebla							2		4		1			1			8			8
Queretaro				1	2		1						1				5		1	6
Quintana Roo																				0
San Luis Potosi			1														1			1
Sinaloa			2	1	3	1	1		1	7		3	1	1			21	4		25
Sonora				3		2	1		1	4	6	4	2	1	1	1	26	6	1	33
Tabasco																				0
Tamaulipas		1		1	3			1			2				1		9	3	3	15
Tlaxcala							1				1						2		1	3
Vera Cruz				2	1	1					1		1				6	1	2	9
Yucatan																				0
Zacatecas						1	1			1			2				5	1	2	8
Unknown		2		1	2	2	2	1				1	1				12		10	22
		17	17	74	103	99	63	51	40											
Subtotal Number	2	34		177		162		91		78	59	59	44	13	5	5	729			
Percent	0.27	4.66		24.28		22.22		12.48		10.70	8.09	8.09	6.04	1.78	0.69	0.69	99.99			
Total Number																	729	163	59	951
Percent																	76.65	(17.14)	(6.20)	(99.99)

Table 7.--Nation of residence and surname classification of persons reporting banded mourning doves from Mexico from 1920 to early 1966

Nation of Residence	Classification of Surname		Total
	Typically Spanish	Typically Non-Spanish	
Mexico			
Number	630	15	645
Percent	95.7	2.3	98.0
United States			
Number	2	11 [1/]	13
Percent	0.4	1.7	2.1

1/ Includes one band from a bird reportedly shot by a Mexican

Table 8.--Summary of area, population, population density, percent of population classified as rural, and mourning dove band recoveries by Mexican States

Mexican State	Area in Sq. Miles[1/]	Population			Mourning Dove Bands		
		1960 Census[1/]	Per Sq. Mile	Percent Rural[2/]	Total Number	Per 10,000 Sq. Miles	Per 100,000 Population
Aguascalientes	2,158	243,363	112.8	45.1	3	14.2	1.3
Baja California	55,518	601,759	10.8	[3/]	33	5.9	6.5
Campeche	21,666	168,219	7.8	42.6	1	0.5	0.6
Chiapas	28,528	1,210,870	42.4	76.9	3	1.0	0.2
Chihuahua	95,400	1,226,793	12.9	55.9	5	0.5	0.4
Coahuila	58,521	907,734	15.5	42.6	1	0.2	0.1
Colima	2,106	164,450	78.1	39.9	14	69.7	8.9
Durango	46,196	760,836	16.5	71.4	5	1.0	0.7
Guanajuato	11,810	1,735,490	147.0	58.4	100	84.7	5.8
Guerrero	24,631	1,186,716	48.2	78.3	51	20.5	4.3
Hidalgo	8,103	994,598	122.7	78.9	10	12.4	1.0
Jalisco	30,941	2,443,261	79.0	52.1	291	93.0	12.1
Mexico	8,286	1,897,851	229.0	73.6	8	9.7	0.4
Mexico D.F.	579	4,870,876	8,412.6	5.4	5	87.3	0.1
Michoacan	23,113	1,851,876	80.1	67.9	232	100.0	12.5
Morelos	1,908	386,264	202.4	56.6	19	99.2	5.0
Nayarit	10,664	389,929	36.6	65.9	21	20.1	5.4
Nuevo Leon	24,925	1,078,848	43.3	44.1	5	2.0	0.5
Oaxaca	36,820	1,727,266	46.9	79.3	14	3.8	0.8
Puebla	13,096	1,973,837	150.7	66.8	8	6.1	0.4
Queretaro	4,544	355,045	78.1	75.8	6	13.5	1.7
Quintana Roo	16,228	50,169	3.1	73.1	0	--	--
San Luis Potosi	24,266	1,048,297	43.2	69.6	1	0.4	0.9
Sinaloa	22,429	838,404	37.4	72.1	25	11.1	3.2
Sonora	71,403	783,378	11.0	54.7	33	4.7	4.3
Tabasco	9,522	496,340	52.1	78.1	0	--	--
Tamaulipas	30,822	1,024,182	33.2	47.1	15	4.9	1.9
Tlaxcala	1,511	346,699	229.5	61.2	3	19.3	0.9
Vera Cruz	28,114	2,727,899	97.0	66.7	9	3.2	0.3
Yucatan	16,749	614,049	36.7	44.8	0	--	--
Zacatecas	28,973	817,831	28.2	74.9	8	2.8	1.0
Total	761,601[4/]	34,923,129	45.9		929	12.2	2.7

1/ Encyclopaedia Britannica, 1967 Edition.
2/ The Encyclopedia Americana, 1962 Edition.
3/ In 1950, Baja California was divided into two districts; the North had 35.5 percent of its population classified as rural, the South, 67.1 percent as rural.
4/ Includes Federal Islands; 2,071 sq. miles.

Table 9.--Calculation of weighted band recoveries and harvest indexes from mourning doves banded as immatures during preseason banding periods, 1965-67

Management Unit and State[1]	Breeding Population Index[2]	Total No. of Band Recoveries	Population Index per Recovery	Direct Recovery Rate - Imm. (1965-66-67 mean[3])	Harvest Index Per Recovery	No. of Recoveries		Weighted Harvest Indexes	
						Mexico	U.S. & Other	Mexico	U.S. & Other
	A	B	AxB=C	D	CxD=E	F_1	F_2	$ExF_1=G_1$	$ExF_2=G_2$
Eastern									
Alabama	666.4	661	1.008	.0683	.0688		661		45.477
Connecticut, Massachusetts, and New York	290.4	40	7.260	.0183	.1328		40		5.312
Delaware and Maryland	110.4	102	1.082	.0594	.0643		102		6.559
Florida	358.2	178	2.012	.0341	.0686		178		12.211
Georgia	590.0	674	0.875	.0819	.0717		674		48.326
Illinois	965.0	169	5.710	.0414	.2364	1	168	0.236	39.715
Indiana	663.4	28	23.692	.0060	.1422	2	26	0.284	3.697
Kentucky	764.1	114	6.702	.0728	.4879		114		55.621
Louisiana	504.5	618	0.816	.0855	.0698	1	617	0.070	43.067
Michigan	487.1	6	81.183	.0320	2.5978		6		15.587
Mississippi	1114.9	187	5.962	.0572	.3410	1	186	0.341	63.426
New Jersey	140.4	1	140.400	.0278	3.9031		1		3.903
North Carolina	461.5	92	5.016	.0580	.2909		92		26.763
Ohio	496.7	17	29.217	.0218	.6369		17		10.827
Pennsylvania	255.3	24	10.637	.0562	.5978		24		14.347
South Carolina	529.7	382	1.386	.0523	.0725		382		27.695
Tennessee	925.8	629	1.471	.0731	.1075		629		67.618
Virginia	713.8	187	3.817	.0468	.1786		187		33.398
West Virginia	288.2	10	28.820	.0713	2.0549		10		20.549
Wisconsin	569.9	18	31.661	.0591	1.8712	1	17	1.871	31.810
Subtotal								2.802	575.908
Central									
Arkansas	587.7	83	7.080	.0464	.3285	2	81	.657	26.608
Colorado and Wyoming[4]	2147.2	47	45.685	.0119	.5436	12	35	6.523	19.026
Iowa	1174.9	45	26.108	.0169	.4412	8	37	3.530	16.324
Kansas	2506.2	22	113.918	.0151	1.7202	1	21	1.720	36.124
Minnesota	968.2	55	17.603	.0224	.3943	6	49	2.366	19.321
Missouri	2043.0	136	15.022	.0392	.5889	4	132	2.356	77.735
Montana and North Dakota[4]	2190.7	11	199.154	.0056	1.1153	5	6	5.576	6.692

Table 9.--Calculation of weighted band recoveries and harvest indexes from mourning doves banded as immatures during preseason banding periods, 1965-67 (continued)

Management Unit and State[1]	Breeding Population Index[2]	Total No. of Band Recoveries	Population Index per Recovery	Direct Recovery Rate - Imm. (1965-66-67 mean[3])	Harvest Index Per Recovery	No. of Recoveries		Weighted Harvest Indexes	
						Mexico	U.S. & Other	Mexico	U.S. & Other
	A	B	AxB=C	D	CxD=E	F_1	F_2	$ExF_1=G_1$	$ExF_2=G_2$
Central (continued)									
Nebraska	3542.9	15	236.193	.0097	2.2911	9	6	20.620	13.747
New Mexico	1606.4	105	15.299	.0135	.2065	13	92	2.684	18.998
Oklahoma	1807.1	11	164.281	.0341	5.6020	1	10	5.602	56.020
South Dakota	2568.2	242	10.612	.0152	.1613	55	187	8.872	30.163
Texas	3349.6	47	71.268	.0638	4.5469	3	44	13.641	200.064
Subtotal								74.147	520.822
Western									
Arizona	1859.8	236	7.880	.0281	.2214	15	221	3.321	48.929
California	2766.5	284	9.741	.0507	.4939	10	274	4.939	135.329
Idaho	1005.8	66	15.239	.0188	.2865	15	51	4.298	14.612
Nevada	163.9	22	7.450	.0221	.1646	5	17	.823	2.798
Oregon and Washington[4]	1618.7	108	14.987	.0417 (Wash.)	.6250	6	102	3.750	63.750
Utah	869.4	37	23.497	.0137	.3219	4	33	1.288	10.623
Subtotal								18.419	276.041
U.S. Total	43782.808[5]	5709	7.669			180	5529	95.368	1372.771

1/ Maine, New Hampshire, Rhode Island, and Vermont were excluded because dove call-count survey routes in these States were nonrandom and thus excluded from the nationwide call-count survey analysis.

2/ Derived by multiplying assigned State area value by average number of doves heard calling per route. For example, the assigned land area of Alabama was 33.32 (thousands of square miles), and the average number of doves heard calling per route for the 1957-66 period was 20.0. These multiplied together equal 666.4. See Ruos and MacDonald, 1968.

3/ Based upon best available data; in some States sample sizes were small.

4/ Certain States (Montana, Oregon, and Wyoming) lacking Mexican recoveries were grouped with adjacent States for weighting purposes. All are known to produce doves harvested in Mexico (see distribution of recoveries from banded local or nestling doves table).

5/ Calculated from U.S. totals (Ruos and MacDonald, 1968). Because of roundings, this table differs slightly from the column summations.

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