U.S. Fish & Wildlife Service

Mourning Dove, White-winged Dove, and Band-tailed Pigeon

2008 Population Status

Cover photograph: Mourning Dove on Tree Limb by Larry Ditto

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Sanders, T.A. 2008. Band-tailed pigeon population status, 2008. Pages 33-43 *in* Mourning dove, white-winged dove, and band-tailed pigeon population status, 2008. U.S. Fish and Wildlife Service, Laurel, Maryland. USA.

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MOURNING DOVE POPULATION STATUS, 2008

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Abstract: This report includes Mourning Dove Call-count Survey information gathered over the last 43 years within the conterminous United States. Between 2007 and 2008, the average number of doves heard per route decreased significantly in the Eastern and Central Management Units, but did not change significantly in the Western Unit. Over the most recent 10 years, no significant trend was indicated for doves heard in either the Eastern or Western Management Units while the Central Unit showed a significant decline. Over the 43-year period, all 3 units exhibited significant declines. In contrast, for doves seen over the 10-year period, no significant trends were found for any of the three Management Units. Over 43 years, no trend was found for doves seen in the Eastern and Central Units while a significant decline was indicated for the Western Unit.

The mourning dove (*Zenaida macroura*) is a migratory bird, thus, authority and responsibility for its management is vested in the Secretary of the Interior. This responsibility is conferred by the Migratory Bird Treaty Act of 1918 which, as amended, implements migratory bird treaties between the United States and other countries. Mourning doves are included in the treaties with Great Britain (for Canada) and Mexico (U.S. Department of the Interior 1988). These treaties recognize sport hunting as a legitimate use of a renewable migratory bird resource. The annual harvest is estimated to be between 5 and 10% of the population (Otis et al. 2008a). As one of the most abundant species in both urban and rural areas of North America, it is familiar to millions of people. Maintenance of mourning dove populations in a healthy, productive state is a primary management goal. To this end, management of doves in the United States includes assessment of population status, regulation of harvest, and habitat management. Call-count surveys are conducted annually in the 48 conterminous states by state, federal, local, and tribal biologists to monitor mourning dove populations. The resulting information on status and trends is used by wildlife administrators in setting annual hunting regulations. A history of dove hunting regulations is provided in Appendix A.

The primary purpose of this report is to facilitate the prompt distribution of timely information. Results are preliminary and may change with the inclusion of additional data.

DISTRIBUTION AND ABUNDANCE

Mourning doves breed from the southern portions of Canada throughout the United States into Mexico, Bermuda, the Bahamas and Greater Antilles, and scattered locations in Central America (Fig. 1). While mourning doves winter throughout much of the breeding range, the majority winter in the southern United States, Mexico, and south through Central America to western Panama (Aldrich 1993, Mirarchi and Baskett 1994).

The mourning dove is one of the most widely distributed and abundant birds in North America (Peterjohn et al. 1994, Fig. 1). The fall population for the United States was recently estimated to be about 350 million (Otis et al. 2008b).

POPULATION MONITORING

Call-count Survey

The Mourning Dove Call-count Survey (CCS) was developed to provide an annual index to population size (Dolton 1993). This survey is based on work by McClure (1939) in Iowa. In the United States, the survey currently includes more than 1,000 randomly selected routes, stratified by physiographic region (Fenneman 1931, Dolton 1993).

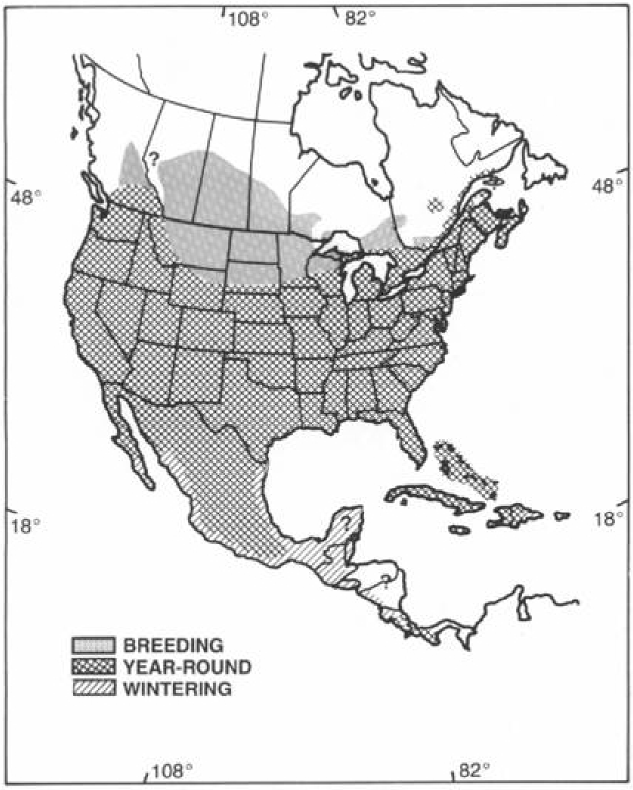

Figure 1. Breeding and wintering ranges of the mourning dove (adapted from Mirarchi and Baskett 1994).

Call-count survey routes are located on secondary roads and have 20 listening stations spaced at 1-mile intervals. At each stop, the number of individual doves heard calling, the number of doves seen, and the level of disturbance (noise) that impairs the observer's ability to hear doves are recorded. Observers also record the number of doves seen while driving between stops.

Counts begin one-half hour before sunrise and take about 2 hours to complete. Routes are run once between 20 May and 5 June. Surveys are not conducted when wind velocities exceed 12 miles per hour or when it is raining.

The total number of doves heard on each route is used to determine trends in populations and is used to develop an index to population size during the breeding season. Indices for doves seen are also presented in this report, but only as supplemental information for comparison with indices of doves heard. Even though both the numbers of doves heard and seen are counted during the survey, they are recorded and analyzed separately.

Within the United States, there are 3 zones that contain mourning dove populations that are largely independent of each other (Kiel 1959). These zones encompass the principal breeding, migration, and U.S. wintering areas for each population. As suggested by Kiel (1959), these 3 areas were established as separate management units in 1960 (Kiel 1961). Since that time, management decisions have been made within the boundaries of the Eastern (EMU), Central (CMU), and Western (WMU) Management Units (Fig. 2).

The EMU was further divided into 2 groups of states for analyses. States permitting dove hunting were combined into one group and those prohibiting dove hunting into another. Wisconsin became a hunting state for the first time in 2003 while Minnesota became a hunting state in 2004. Additionally, some states were grouped to increase sample sizes. Maryland and Delaware were combined; Vermont, New Hampshire, Maine, Massachusetts, Connecticut, and Rhode Island were combined to form a New England group. Due to its small size, Rhode Island, which is a hunting state, was included in this nonhunting group of states for analysis.

Breeding Bird Survey

The North American Breeding Bird Survey (BBS) is completed in June and is based on routes that are 24.5 miles long. Each route consists of 50 stops or point count locations at 0.5-mile intervals. At each stop, a 3-minute count is conducted whereby every bird seen within a 0.25-mile (400 m) radius or heard is recorded. Surveys start one-half hour before local sunrise and take about 5 hours to complete. Data for birds heard and seen at stops are combined for BBS analyses while those data are analyzed separately for the CCS.

There has been considerable discussion about utilizing the BBS as a measure of mourning dove abundance. Consequently, we are including 1966-2007 BBS trend information in this report to allow comparisons to those from CCS results over the same time period (Dolton et al. 2007) for consistency in intervals of years. Sauer et al. (1994) discussed the differences in the methodology of the 2 surveys. BBS data are not available in time for use in regulations development during the year of the survey. Research is currently underway to evaluate the causes of differences in estimated trends between the CCS and BBS results.

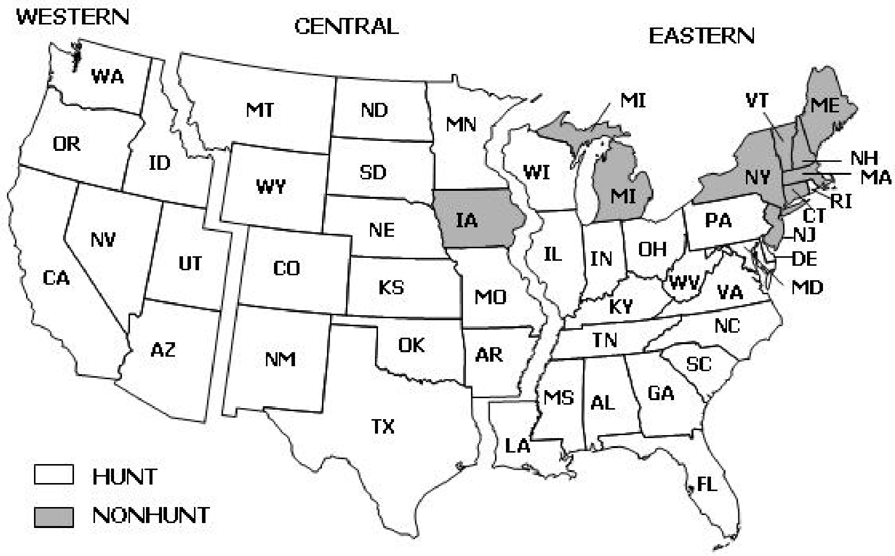

Figure 2. Mourning dove management units with 2007 hunting and nonhunting states.

Harvest Survey

Wildlife professionals have long recognized that reliable harvest estimates are needed to monitor the impact of hunting. In past years, state harvest surveys were used to obtain rough estimates of mourning dove harvest and hunter activity in the United States. However, the results from state surveys were not directly comparable because of a lack of consistent survey methodology among states and limitations in geographic coverage.

To remedy the limitations associated with using the results of state surveys, the U.S. Fish and Wildlife Service (Service) and state wildlife agencies initiated the national, cooperative State-Federal Harvest Information Program (HIP). The HIP was established in 1992 and became fully operational on a national scale 1999. This Program is designed to enable the Service to conduct nationwide surveys that provide reliable annual estimates of the harvest of mourning doves and other migratory game bird species on state, management unit, and national levels. Under HIP, states provide the Service with the names and addresses of all licensed migratory bird hunters each year, and the Service conducts surveys to estimate the harvest and hunter activity (number of hunters, days hunted, and average bag/hunter) in each state. All states except Hawaii are participating in the program.

METHODS

Estimation of Population Trends

A population trend is defined as an interval-specific rate of change. For two years, the change is the ratio of the dove population in an area in one year to the population in the preceding year. For more than 2 years of data, the trend is expressed as an average annual rate of change. A trend was first estimated for each route by numerically solving a set of estimating equations (Link and Sauer 1994). Observer data were used as covariates to adjust for differences in observers' ability to hear or see doves. The reported sample sizes are the number of routes on which a given trend estimate is based. This number may be less than the actual number of routes surveyed for several reasons. The estimating equations approach requires at least 2 non-zero counts by at least one observer for a route to be used. Routes that did not meet this requirement during the interval of interest were not included in the sample size. State and management unit trends were obtained by calculating a mean of all route trends weighted by land area, within-route variance in counts, and relative abundance (mean numbers of doves counted on each route). Variances of state and management unit trends were estimated by bootstrapping route trends (Geissler and Sauer 1990).

For the CCS, the annual change, or trend, for each area in doves heard over the most recent 2- and 10-year intervals and for the entire 43-year period were estimated (Table 1). Additionally, trends in doves seen were estimated over the 10- and 43-year periods as supplemental information for comparison (Table 2).

For purposes of this report, statistical significance was defined as $P<0.05$, except for the 2-year comparison where $P<0.10$ was used because of the low power of the test. Significance levels may be unreliable for states with less than 10 routes.

For the BBS, trends were calculated for the 10-year period (1998-2007) and over 42 years (1966-2007) and are presented in Table 3.

Estimation of Annual Indices

Annual indices show population fluctuations about fitted trends (Sauer and Geissler 1990). The estimated indices were determined for state and management units by finding the deviation between observed counts on a route and those predicted from the area trend estimate. These residuals were averaged by year for all routes in the area of interest. To adjust for variation in sampling intensity, residuals were weighted by the land area of the physiographic regions within each state. These weighted average residuals were then added to the fitted trend for the area to produce the annual index of abundance. This method of determining indices superimposes yearly variation in counts on the long-term fitted trend. These indices should provide an accurate representation of the fitted trend for regions that are adequately sampled by survey routes. Since the indices are adjusted for observer differences and trend, the index for an area may be quite different from the actual count. In order to estimate the percent change from 2007 to 2008, a short-term trend was calculated. The percent change estimated from this short-term trend analysis is the best estimator of annual change. Attempts to estimate short-term trends from the breeding population indices (which were derived from residuals of the long-term trends) will yield less precise results. The annual index value incorporates data from a large number of routes that are not comparable between the two years 2007 and 2008, i.e., routes not run by the same observers. Therefore, the index is much more variable than the trend estimate.

In a separate analysis, the mean number of doves heard calling per route in 2008 was calculated for each state or groups of states. In contrast to the estimated annual indices presented in Table 4 (which illustrate population changes over time based on the regression line), the

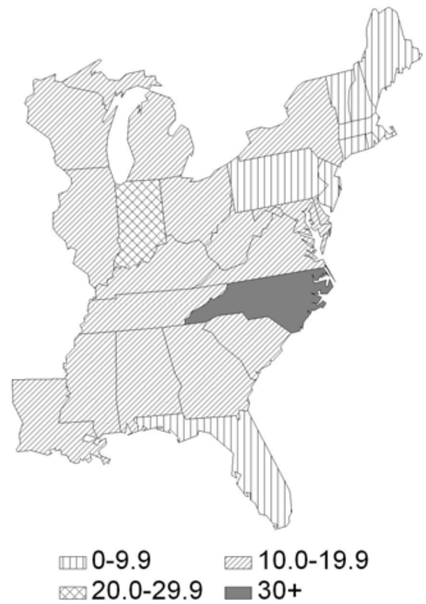

Figure 3. Mean number of mourning doves heard per route by state in the Eastern Management Unit (EMU), 2007-2008.

estimated relative abundance shown in Figures 3, 7, and 11 illustrate the average actual numbers of doves heard per route in 2007 and 2008.

CALL-COUNT SURVEY RESULTS

Eastern Management Unit

The Eastern Management Unit (EMU) includes 27 states comprising 30% of the land area of the contiguous United States. Dove hunting is permitted in 19 states, representing 80% of the land area of the unit (Fig. 2).

2007-2008 Population Distribution.—North Carolina had the highest count in the EMU with an average of 43 actual doves heard per route over the 2 years (Fig. 3). Florida, Pennsylvania, New Jersey, and the New England states had <10 per route. Indiana had an average of 20 doves heard per route, and all other states had mean counts in the range of 10-20 doves heard per route.

2007 to 2008 Population Changes.—The average number of doves heard per route in the EMU decreased significantly (-8.5%) (Table 1). The average number heard also decreased significantly between years in the combined hunting states (-10.1%), but did not change significantly in the combined nonhunting states (0.4%).

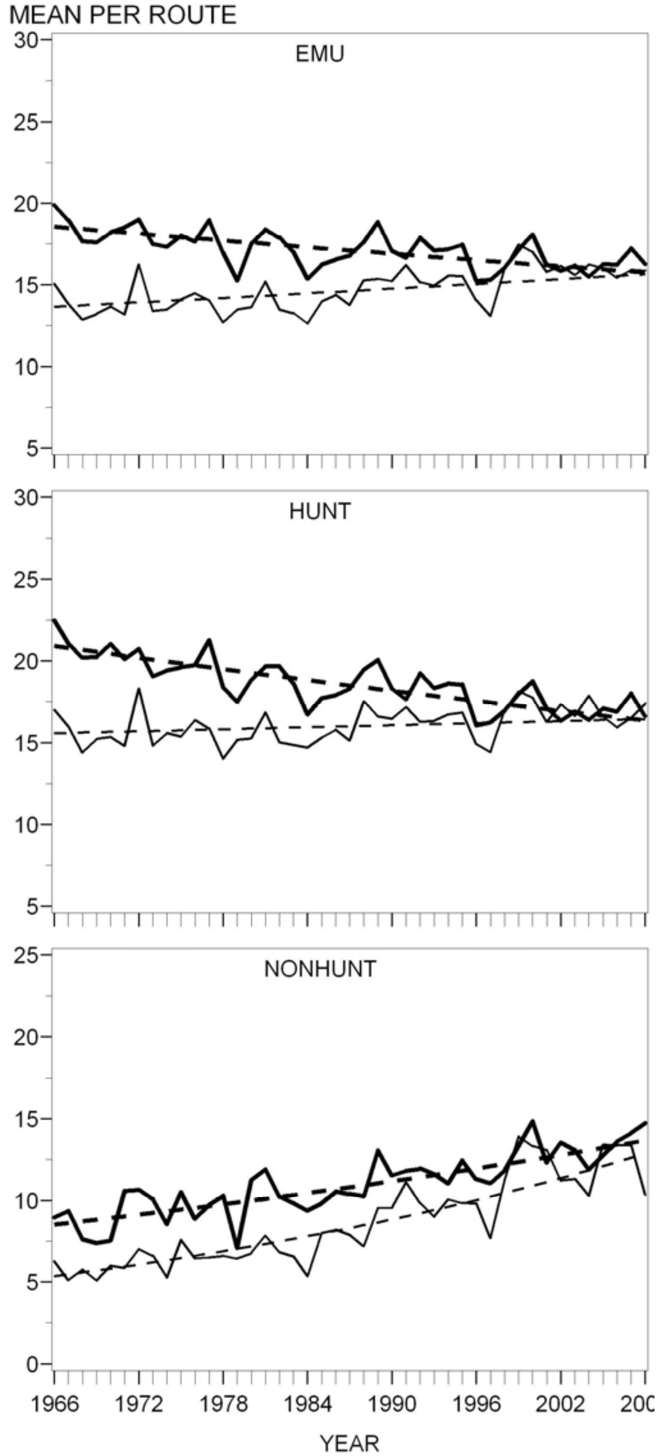

Figure 4. Population indices and trends of breeding mourning doves in the Eastern Management Unit (EMU), combined EMU hunting states (HUNT), and combined non-hunting states (NONHUNT), 1966-2008. Heavy solid line = doves heard; light solid line = doves seen. Light and heavy dashed lines = predicted trends.

The 2008 population index of 16.3 doves heard per route for the EMU is slightly above the predicted count based on the long-term estimate of 15.8 (Fig. 4, Table 4). In the hunting states, the index of 16.6 is essentially the same as the predicted estimate of 16.4 and, in the nonhunting states, the index of 14.7 is above the predicted estimate of 13.7.

The number of doves heard increased significantly in Georgia while they decreased significantly in Florida, Illinois, Ohio, Wisconsin, and in New England (Table 1). No significant changes were detected for the other states.

Population Trends: 10 and 43-year.—Over the most recent 10 years, there was no significant trend indicated in either the combined nonhunting states or the EMU as a whole (Table 1). A significant decline was detected in the combined hunting states. For the 43-year period, a significant declining trend was found in both the combined hunting states and the unit while no trend was indicated for the combined nonhunting states. Annual indices both for doves heard and seen are shown in Figure 4. In contrast to doves heard, an analysis of doves seen over 10 years indicated no significant trend for either group of states or the unit (Table 2). Over 43 years, a significant increase was detected for the combined nonhunting states; no trend was shown for the combined hunting states or the unit.

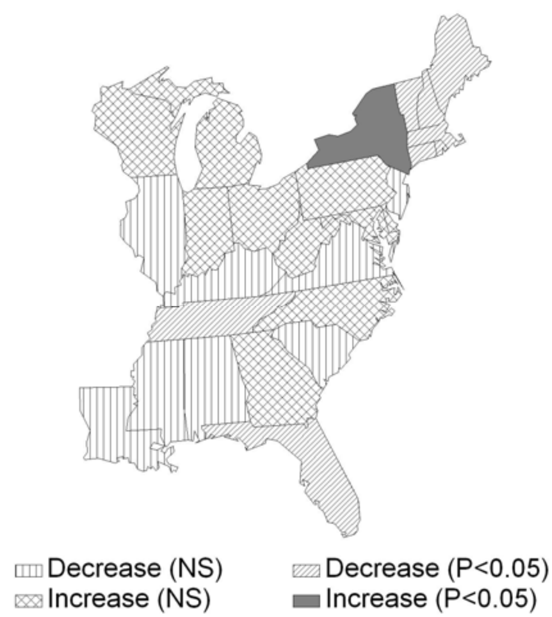

Figure 5. Trends in number of mourning doves heard per route by state in the Eastern Management Unit (EMU), 1999–2008.

State population trends for doves heard are shown in Figure 5 (10-year interval), Figure 6 (43-year interval), and Table 1. Over 10 years, an increase was found for New York while Florida, Tennessee, and New England showed declines. Between 1966 and 2008, no significant increases were noted while a downward trend was noted in Georgia, Indiana, Ohio, South Carolina, and Tennessee.

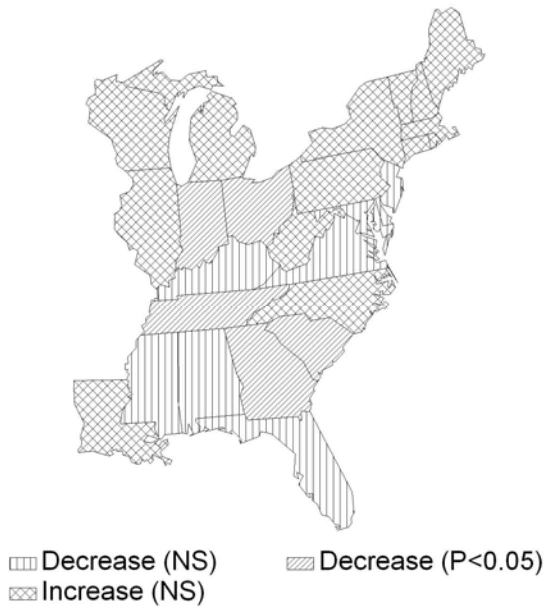

Figure 6. Trends in the number of mourning doves heard per route by state in the Eastern Management Unit (EMU), 1966-2008.

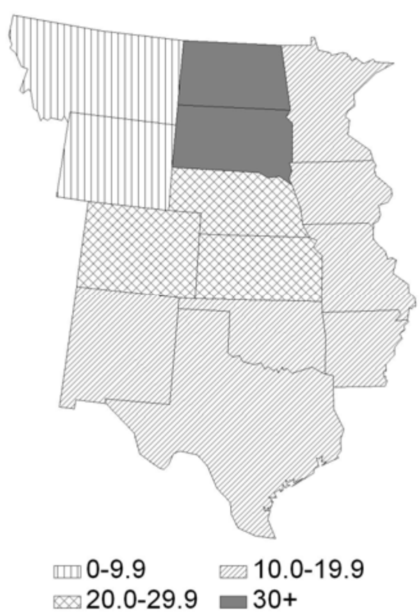

Figure 7. Mean number of mourning doves heard per route by state in the Central Management Unit (CMU), 2007–2008.

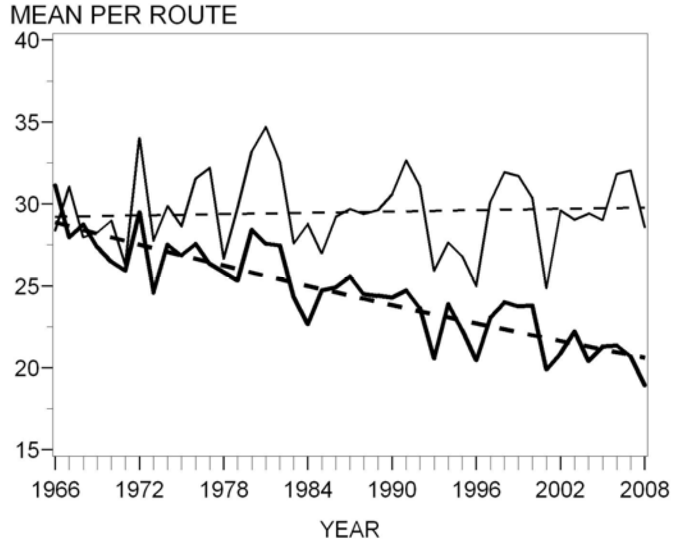

Figure 8. Population indices and trends of breeding mourning doves in the Central Management Unit (CMU), 1966-2008. Heavy solid line = doves heard; light solid line = doves seen. Light and heavy dashed lines = predicted trends.

Central Management Unit

The Central Management Unit (CMU) consists of 14 states, containing 46% of the land area of the contiguous United States. It has the highest population index of the 3 units. Within the CMU, dove hunting is permitted in 13 states (Fig. 2).

2007-2008 Population Distribution.—North Dakota and South Dakota had the highest actual average number of doves heard per route over the 2 years (34 and 38, respectively) (Fig. 7). Historically, these states often have the highest average counts in the Nation (Table 4). Montana and Wyoming were the only states with less than 10 doves per route. The remaining states had intermediate values (Fig. 7).

2007 to 2008 Population Changes.—The average number of doves heard per route in the CMU decreased significantly between the 2 years (-8.5%) (Table 1). The 2008 index for the unit of 18.9 doves heard per route is less than the predicted long-term trend estimate of 20.6 (Fig. 8, Table 4). The population increased significantly in Colorado and North Dakota while it decreased significantly in Kansas, Missouri, Nebraska, New Mexico, Oklahoma, and Texas. No significant changes were found in any of the other states (Table 1).

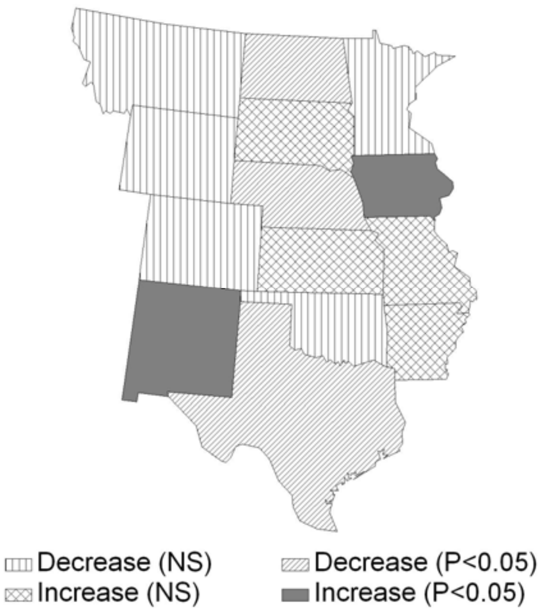

Figure 9. Trends in number of mourning doves heard per route by state in the Central Management Unit (CMU), 1999-2008.

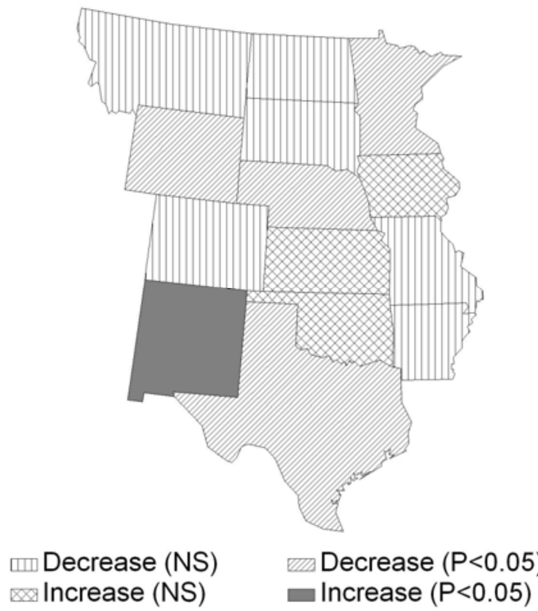

Figure 10. Trends in mourning doves heard per route by state in the Central Management Unit (CMU), 1966-2008.

Population Trends: 10 and 43-year.—A significant decline in doves heard was indicated for the CMU over both the 10-year and 43-year periods (Table 1). In contrast, trends in doves seen were not significant for either time period (Table 2).

State trends in doves heard over 10 years are illustrated in Fig. 9 and Table 1. Iowa and New Mexico showed an increase while Nebraska, North Dakota, and Texas had a decline during this time. Figure 10 portrays trends over 43 years. New Mexico showed a significant increase in doves heard while a significant downward trend was found in Minnesota, Nebraska, Texas, and Wyoming (Table 1).

Western Management Unit

Seven states comprise the Western Management Unit (WMU) and represent 24% of the land area of the contiguous United States. All states within the WMU permit mourning dove hunting (Fig. 2).

2007-2008 Population Distribution.—Arizona averaged 15 actual doves heard per route (Table 1, Fig. 11). California and Idaho averaged 11 and 10 doves heard per route, respectively. The other states in the WMU averaged < 10 birds per route.

Figure 11. Mean number of mourning doves heard per route by state in the Western Management Unit (WMU), 2007-2008.

2007 to 2008 Population Changes.—The average number of doves heard per route did not change significantly between years (-0.1%; Table 1). The 2008 population index of 8.2 doves heard per route is essentially the same as the predicted count of 8.3 based on the long-term trend estimate (Fig. 12, Table 4). No state had a significant increase in doves heard between

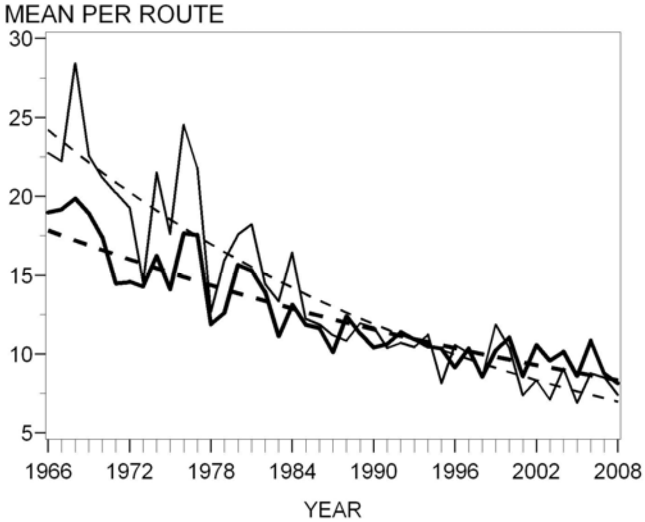

Figure 12. Population indices and trends of breeding mourning doves in the Western Management Unit (WMU), 1966-2008. Heavy solid line = doves heard; light solid line = doves seen. Light and heavy dashed lines = predicted trends.

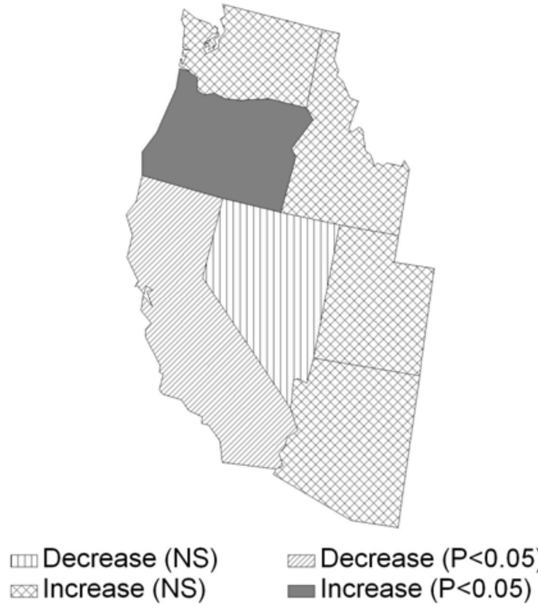

Figure 13. Trends in number of mourning doves heard per route by state in the Western Management Unit (WMU), 1999-2008.

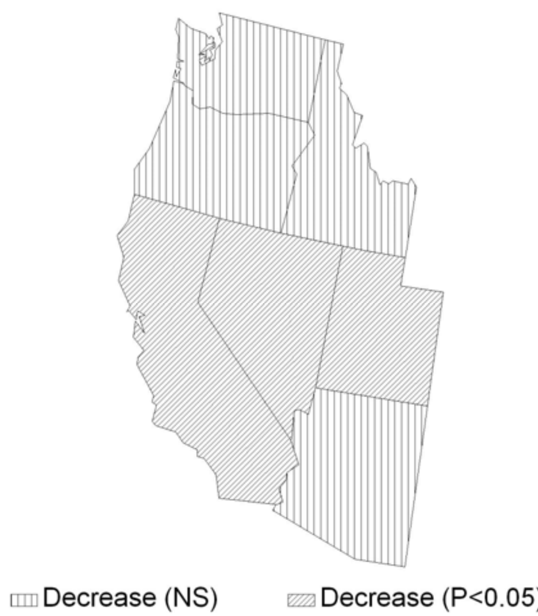

Figure 14. Trends in number of mourning doves heard per route by state in the Western Management Unit (WMU), 1966-2008.

years. The number of doves heard per route decreased significantly in Idaho and Washington (Table 1). No significant differences were found in other states.

Population Trends: 10 and 43-year.—WMU-wide, no significant trend in numbers of doves heard was indicated over the most recent 10 years although a significant decline was apparent over 43 years (Table 1). Analyses of doves seen gave the same pattern of results (Table 2).

Trends by state are illustrated in Figs. 13 and 14, and Table 1. Oregon showed a significant increase over 10 years while California showed a decline. Between 1966 and 2008, California, Nevada, and Utah showed significant declines. There were no significant trends in the other states.

BREEDING BIRD SURVEY RESULTS

In general, trends indicated by the BBS tend to indicate fewer declines. The major differences occur in the EMU. This is likely due to the larger sample size of BBS survey routes and greater consistency of coverage by BBS routes in the unit (Sauer et al. 1994), although additional analyses are needed to clarify some differences in results between surveys within states. Comparisons below are from Table 3 and CCS results for doves heard (Table 1) in Dolton et al. (2007).

Eastern Management Unit

For the 10-year period, 1998-07, the BBS showed a significant increase in doves heard and seen in the EMU while the CCS indicated no trend in doves heard. Over 42 years, 1966-07, the BBS showed a significant increase while the CCS showed a significant decrease.

Central Management Unit

Over 10 years, there was a significant increase in doves heard and seen in the CMU according to BBS results. In contrast, results of doves heard via CCS indicated a significant decrease. For the 42-year period, declines were found by both surveys.

Western Management Unit

There was no significant trend in doves heard and seen in the WMU indicated by the BBS over the 10 and 42-year time periods. Similarly, no trend was indicated over 10 years with the CCS, but a significant decline was present over 42 years.

HARVEST SURVEY ESTIMATES

Preliminary results for doves from the HIP survey for the 2006-07 and 2007-08 hunting seasons are presented in Tables 5 and 6, respectively. The total estimated harvest for the 2007-08 season by management unit and for the U.S. are as follows: Eastern: 8,908,400 ± 7%; Central: 9,180,200 ± 9%; Western: 2,461,500 ± 7%; and, U.S.: 20,550,000 ± 5%.

Additional information about HIP, survey methodology, and results can be found in annual reports located at http://www.fws.gov/migratorybirds/reports/HuntingStatistics/HuntingStatistics.htm

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Table 1. Trends (% change[a] per year as determined by linear regression) in number of mourning doves heard along Call-count Survey routes, 1966-2008.

	2007-2008[b]					10 year (1999-2008)					43 year (1966-2008)				
	N	% Change[c]		90% CI		N	% Change[c]		90% CI		N	% Change[c]		90% CI	
EASTERN UNIT															
Hunt															
AL	26	3.0		-12.7	18.8	31	-1.5		-3.7	0.8	45	-0.8	*	-1.6	0.0
DE/MD	13	-3.0		-29.5	23.5	15	1.7		-1.4	4.9	20	-0.9		-2.5	0.7
FL	12	-21.6	*	-43.7	0.6	24	-4.7	***	-8.1	-1.2	29	-0.7		-1.6	0.3
GA	20	37.5	**	8.2	66.7	23	0.3		-3.0	3.5	31	-1.0	**	-1.8	-0.2
IL	13	-26.1	***	-35.6	-16.6	20	-0.6		-3.6	2.4	22	0.2		-1.2	1.6
IN	14	-7.4		-16.5	1.6	15	0.5		-4.0	5.0	18	-1.2	**	-2.4	-0.1
KY	18	-14.6		-34.5	5.4	20	-0.7		-2.2	0.7	26	-0.5		-1.7	0.8
LA	16	-10.2		-35.0	14.6	19	-0.4		-3.4	2.7	23	1.1	*	-0.2	2.4
MS	17	-11.7		-41.5	18.1	22	-2.3	*	-4.8	0.3	31	-1.8	*	-3.7	0.0
NC	20	1.3		-11.7	14.2	21	0.8		-1.2	2.8	24	0.2		-0.7	1.2
OH	33	-9.5	*	-20.5	1.5	36	0.4		-1.8	2.7	57	-1.1	***	-1.8	-0.3
PA	10	-8.9		-29.8	11.9	19	1.4		-1.5	4.3	19	1.0		-0.7	2.6
SC	15	-6.1		-23.3	11.0	21	-3.1	*	-6.3	0.1	27	-1.2	**	-2.2	-0.2
TN	16	3.2		-14.6	20.9	25	-4.0	***	-6.2	-1.8	35	-1.7	***	-2.9	-0.5
VA	23	-18.2		-40.9	4.4	33	-0.6		-3.9	2.7	33	-1.6		-3.6	0.4
WI	17	-20.4	***	-35.8	-5.0	22	1.3		-0.7	3.3	23	0.9		-0.5	2.4
WV	10	4.7		-24.1	33.4	11	2.9	*	-0.1	5.8	12	1.6		-0.5	3.6
Subunit	293	-10.1	***	-15.2	-5.0	377	-0.9	**	-1.6	-0.1	475	-0.6	***	-1.0	-0.2
Nonhunt															
MI	12	6.1		-11.5	23.7	19	2.9		-1.3	7.1	23	1.1		-0.7	2.9
N.England[d]	24	-18.7	**	-34.2	-3.2	42	-2.9	**	-5.6	-0.2	76	0.9	*	0.0	1.8
NJ	11	19.4		-48.3	87.2	11	-1.9		-5.3	1.5	20	-2.2		-5.1	0.8
NY	10	-0.3		-27.4	26.8	17	2.8	***	0.8	4.8	22	2.3	*	-0.4	4.9
Subunit	57	0.4		-12.3	13.1	89	1.5		-1.3	4.3	141	1.1	*	0.0	2.3
Unit	350	-8.5	***	-13.3	-3.7	466	-0.5		-1.3	0.4	616	-0.4	**	-0.8	0
CENTRAL UNIT															
AR	13	-6.8		-29.2	15.7	19	0.3		-2.8	3.4	21	-0.8		-2.0	0.5
CO	9	18.0	*	-0.3	36.3	16	-2.7		-6.4	1.0	21	-0.7		-1.7	0.3
IA	13	-11.5		-27.3	4.3	17	3.5	**	0.7	6.2	19	0.2		-0.7	1.2
KS	16	-16.6	**	-31.2	-2.0	28	0.0		-3.0	3.0	36	0.0		-0.9	0.9
MN	8	-6.9		-33.0	19.1	13	-1.2		-7.4	5.0	13	-1.9	**	-3.7	-0.2
MO	14	-27.4	***	-35.3	-19.5	20	0.4		-1.4	2.3	28	-1.8	*	-3.7	0.1
MT	10	2.9		-12.9	18.8	19	-1.4		-8.5	5.8	29	-1.7	*	-3.6	0.2
NE	15	-16.7	*	-33.5	0.1	24	-3.3	***	-4.9	-1.6	28	-1.1	***	-1.9	-0.3
NM	20	-34.6	***	-41.9	-27.3	28	4.9	**	0.3	9.4	31	1.4	**	0.2	2.6
ND	25	23.7	*	-0.8	48.2	27	-3.0	***	-4.3	-1.6	30	-0.7		-1.9	0.5
OK	14	-34.1	***	-51.7	-16.5	16	-1.5		-5.6	2.5	25	0.5		-3.3	4.2
SD	17	20.7		-7.9	49.4	21	1.9		-2.4	6.2	30	-0.5		-2.0	1.0
TX	104	-14.7	***	-23.2	-6.1	140	-5.6	***	-7.0	-4.2	213	-1.1	***	-1.9	-0.3
WY	11	26.9		-23.5	77.4	18	-4.4	*	-9.6	0.8	25	-2.4	**	-4.7	-0.1
Unit	289	-8.5	***	-14.0	-3.0	406	-3.2	***	-4.0	-2.3	549	-0.8	***	-1.2	-0.4
WESTERN UNIT															
AZ	30	22.1		-20.3	64.5	53	1.2		-2.2	4.5	71	-0.8	*	-1.6	0.0
CA	43	-2.4		-12.1	7.4	61	-3.3	***	-5.1	-1.5	84	-2.5	***	-3.6	-1.3
ID	11	-13.9	**	-25.7	-2.2	22	3.7		-4.8	12.2	28	-0.7		-2.0	0.6
NV	7	-19.2		-71.5	33.1	20	-1.5		-8.2	5.2	33	-3.3	***	-5.4	-1.3
OR[e]	6	10.3		-64.3	84.9	19	6.2	**	0.2	12.2	25	-1.5	*	-3.1	0.1
UT	11	-19.3		-71.6	32.9	16	0.8		-6.0	7.5	20	-3.9	***	-6.7	-1.0
WA	13	-26.6	*	-53.9	0.7	23	1.8		-2.6	6.2	28	-2.0	*	-4.2	0.2
Unit	121	-0.1		-17.0	16.7	214	-0.7		-2.5	1.1	289	-1.8	***	-2.4	-1.2

[a] Mean of route trends weighted by land area and population density. The estimated count in the next year is (%/100+1) times the count in the current year where % is the annual change. Note: Extrapolating the estimated trend statistic (% change per year) over time (e.g., 43 years) may exaggerate the total change over the period.

[b] As stated in the *Estimation of Annual Indices* on page 3 of this report, the 2-year trend is the best estimate of the change between 2007 and 2008. This is because only data from comparable routes (those run by the same observer in both years) are used in the analysis. This change will differ from the change calculated from 2007 to 2008 using the annual indices because the index values are less precise, as they incorporate data from routes not surveyed in both years. The 2-year trend is useful in evaluating short-term change; however, the long-term trend is more relevant to management decision-making.

[c] *$P<0.1$; **$P<0.05$; ***$P<0.01$. For purposes of this report, statistical significance was defined as $P<0.05$, except for the 2-year comparison where $P<0.10$ was used because of the low power of the test.

[d] New England consists of CT, ME, MA, NH, RI, and VT.

[e] Due to small sample sizes within OR strata, a pooled estimate amongst strata is provided for Oregon for the 2-year trend.

Table 2. Trends (% change[a] per year as determined by linear regression) in number of mourning doves <u>seen</u> along Call-count Survey routes, 1966-2008.

	10 year (1999-2008)					43 year (1966-2008)				
	N	% Change[b]		90% CI		N	% Change[b]		90% CI	
EASTERN UNIT										
Hunt										
AL	31	-3.5	**	-6.8	-0.2	45	-1.4	**	-2.6	-0.2
DE/MD	15	-1.0		-3.2	1.3	20	0.5		-0.8	1.8
FL	25	-1.6		-7.4	4.1	29	3.3	***	1.9	4.6
GA	23	0.7		-5.3	6.7	31	0.5		-1.0	1.9
IL	20	3.0	***	0.9	5.0	22	-0.7		-2.6	1.1
IN	15	-0.3		-7.8	7.3	18	-1.6		-5.1	1.8
KY	20	-2.2		-5.7	1.3	24	1.3		-0.4	2.9
LA	18	-0.4		-3.1	2.2	23	2.1	***	1.2	3.0
MS	22	-0.2		-2.9	2.5	31	-1.2		-3.4	1.1
NC	21	3.0	**	0.2	5.8	24	-0.1		-1.3	1.1
OH	36	-2.3		-5.3	0.8	57	0.6		-1.0	2.2
PA	19	-5.2	**	-10.3	-0.1	19	0.8		-1.1	2.7
SC	21	-1.3		-6.0	3.5	27	1.2	**	0.0	2.4
TN	25	-1.3		-4.3	1.8	35	-0.8		-2.0	0.4
VA	33	0.5		-6.3	7.4	33	0.0		-2.7	2.7
WI	21	5.0	**	0.9	9.1	23	3.1	***	1.9	4.4
WV	11	-4.7	**	-9.2	-0.1	12	3.2	***	1.4	5.0
Subunit	376	-0.7		-1.8	0.4	473	0.1		-0.6	0.8
Nonhunt										
MI	19	1.2		-1.5	4.0	23	2.2	***	0.7	3.6
N.England[c]	40	-1.4		-5.4	2.5	73	1.7	*	-0.3	3.6
NJ	11	2.0		-4.7	8.6	20	-0.6		-2.8	1.6
NY	17	-2.1		-8.9	4.7	22	2.9	*	-0.4	6.2
Subunit	87	0.5		-1.6	2.7	138	2.1	***	1.0	3.2
Unit	463	-0.5		-1.6	0.5	611	0.3		-0.3	1.0
CENTRAL UNIT										
AR	19	0.7		-3.0	4.5	21	-1.1	**	-2.1	-0.1
CO	16	-4.0		-9.6	1.6	20	-0.5		-2.1	1.2
IA	17	3.6	*	-0.7	7.8	19	0.5		-1.0	2.1
KS	28	2.3	*	-0.2	4.7	36	-0.3		-1.2	0.6
MN	13	-2.5		-7.5	2.6	14	-1.1		-3.2	1.0
MO	20	0.5		-2.2	3.3	28	-2.9	***	-4.9	-0.9
MT	21	4.1		-6.1	14.3	29	1.6	*	-0.2	3.4
NE	24	-0.6		-3.7	2.6	28	-0.6		-2.4	1.1
NM	27	10.9	***	7.5	14.4	31	0.9		-2.1	4.0
ND	27	-4.7	***	-7.0	-2.5	30	-0.3		-1.4	0.9
OK	16	1.2		-2.4	4.9	25	0.4		-0.9	1.7
SD	21	0.9		-4.1	5.8	30	-1.0		-2.5	0.6
TX	140	-1.3		-3.3	0.6	213	0.7	*	-0.1	1.4
WY	15	-2.5		-9.1	4.1	23	-3.2	*	-6.7	0.3
Unit	404	-0.5		-1.9	0.8	547	0.0		-0.5	0.6
WESTERN UNIT										
AZ	50	-5.0	**	-8.9	-1.0	72	-3.9	***	-6.0	-1.8
CA	57	-3.4	***	-5.5	-1.3	83	-2.4	***	-3.6	-1.3
ID	21	9.3	**	1.7	16.9	28	-2.2		-5.3	0.9
NV	19	3.9		-8.4	16.2	33	-1.5		-5.0	2.0
OR	19	-3.9		-13.8	5.9	23	-4.5	***	-7.4	-1.6
UT	15	-8.1		-17.8	1.7	20	-5.4	**	-9.9	-0.9
WA	23	0.4		-5.9	6.6	25	0.9		-1.9	3.6
Unit	204	-2.2	*	-4.7	0.3	284	-2.9	***	-3.9	-1.9

[a] Mean of route trends weighted by land area and population density. The estimated count in the next year is (%/100+1) times the count in the current year where % is the annual change. Note: Extrapolating the estimated trend statistic (% change per year) over time (e.g., 43 years) may exaggerate the total change over the period.

[b] *P<0.1; **P<0.05; ***P<0.01. For purposes of this report, statistical significance was defined as P<0.05, except for the 2-year comparison where P<0.10 was used because of the low power of the test.

[c] New England consists of CT, ME, MA, NH, RI, and VT.

Table 3. Trends (% change[a] per year as determined by linear regression) in number of mourning doves heard and seen along Breeding Bird Survey routes, 1966-2007.

	10 year (1998-07)					42 year (1966-07)				
	N	% Change[b]		90% CI		N	% Change[b]		90%CI	
EASTERN UNIT										
Hunt										
AL	92	-1.6	**	-2.7	-0.5	102	-1.4	***	-2.0	-0.8
DE/MD	67	-1.4	***	-2.3	-0.5	79	0.2		-0.3	0.7
FL	74	-2.1	**	-3.8	-0.4	87	1.4	***	0.7	2.1
GA	69	-1.7	*	-3.2	-0.1	82	-1.6	***	-2.4	-0.7
IL	101	6.3	***	4.8	7.8	102	1.3	***	0.6	2.0
IN	56	3.0	***	1.9	4.2	61	0.3		-0.2	0.8
KY	39	1.0		-0.3	2.4	55	0.4		-0.3	1.1
LA	52	2.7	***	1.1	4.3	72	2.4	***	1.2	3.6
MS	25	0.4		-1.8	2.5	35	-1.7	***	-2.6	-0.9
NC	74	2.1	***	0.8	3.4	87	0.3		-0.5	1.0
OH	59	0.8		-0.3	1.9	78	0.7	**	0.2	1.3
PA	100	-0.5		-1.4	0.4	122	1.7	***	1.1	2.3
SC	31	3.0		0.0	6.1	39	-0.1		-0.9	0.8
TN	41	-0.1		-1.8	1.6	47	-0.7		-1.4	0.1
VA	48	-0.6		-1.8	0.6	55	-0.7	**	-1.3	-0.2
WI	93	3.5	***	2.7	4.2	96	1.7	***	1.0	2.3
WV	48	1.8		-0.1	3.7	56	5.0	***	4.2	5.8
Subunit	1069	1.4	***	0.9	1.8	1255	0.3		0.0	0.5
Nonhunt										
MI	60	2.2	***	1.2	3.1	84	0.8	**	0.2	1.4
N.England[c]	127	-2.3	***	-3.3	-1.2	155	2.5	***	1.9	3.2
NJ	26	-1.0		-3.5	1.5	37	0.2		-0.9	1.4
NY	94	-0.7		-1.8	0.4	118	2.5	***	2.1	2.8
Subunit	307	-0.2		-0.8	0.4	394	1.7	***	1.3	2.1
Unit	1376	1.1	***	0.7	1.5	1649	0.5	***	0.2	0.7
CENTRAL UNIT										
AR	31	1.9	*	0.1	3.6	35	1.1		-0.2	2.4
CO	120	2.8	**	0.5	5.1	133	1.1	*	0.1	2.1
IA	33	4.7	***	2.0	7.5	39	-0.3		-1.3	0.7
KS	61	3.6	**	1.0	6.3	62	0.2		-0.6	0.9
MN	60	0.3		-2.3	2.9	71	-1.0	*	-1.8	-0.1
MO	52	1.7	*	0.0	3.3	66	-1.4	***	-2.2	-0.6
MT	45	-0.6		-2.7	1.6	53	-0.8	*	-1.6	0.0
NE	45	3.5	**	0.8	6.2	49	-0.3		-1.0	0.4
NM	62	3.3	*	0.4	6.1	74	0.5		-0.8	1.9
ND	42	-0.8		-3.5	1.9	47	0.4		-0.3	1.1
OK	53	1.1		-0.5	2.7	60	-1.2	***	-1.8	-0.6
SD	42	0.6		-1.6	2.9	51	0.4		-0.3	1.2
TX	179	-0.6		-1.8	0.6	209	-1.3	***	-1.8	-0.8
WY	73	2.0	*	0.1	4.0	107	0.7		-1.0	2.4
Unit	898	1.5	***	0.8	2.2	1056	-0.4	**	-0.6	-0.1
WESTERN UNIT										
AZ	56	1.0		-3.1	5.2	78	0.4		-2.6	3.5
CA	162	1.9	**	0.7	3.2	225	-1.0	*	-1.8	-0.2
ID	40	4.3	**	1.3	7.4	43	-0.2		-1.1	0.8
NV	25	0.4		-2.4	3.2	37	1.7	*	0.1	3.3
OR	76	0.7		-2.2	3.6	101	-2.0	***	-3.2	-0.8
UT	86	3.9	*	0.6	7.3	94	-1.6	***	-2.3	-0.8
WA	58	1.5		-0.7	3.7	66	0.4		-0.5	1.4
Unit	503	1.7	*	0.2	3.2	644	-0.6		-1.4	0.1

[a]Mean of route trends weighted by land area and population density. The estimated count in the next year is (%/100+1) times the count in the current year where % is the annual change. Note: Extrapolating the estimated trend statistic (% change per year) over time (e.g., 42 years) may exaggerate the total change over the period.

[b]*P<0.1; **P<0.05; ***P<0.01. For purposes of this report, statistical significance was defined as P<0.05, except for the 2-year comparison where P<0.10 was used because of the low power of the test.

[c]New England consists of CT, ME, MA, NH, RI, and VT.

Table 4. Breeding population indices[a] based on mourning doves heard along Call-count routes, 1966-2008.

Management unit/state	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
EASTERN UNIT										
Hunt										
AL	26.7	23.8	21.5	21.8	22.0	18.1	25.9	22.6	17.1	21.8
DE/MD	14.8	18.3	12.8	13.7	16.9	14.6	15.9	15.8	17.0	12.2
FL	13.8	13.1	11.2	11.8	15.0	12.5	12.8	13.0	15.2	15.6
GA	29.9	28.0	24.0	25.7	32.5	25.6	24.4	26.8	27.7	30.1
IL	22.0	18.9	22.5	19.5	22.5	20.5	21.1	20.7	17.5	24.2
IN	36.4	33.5	33.0	32.0	31.0	41.9	36.8	32.9	31.5	33.2
KY	24.2	22.0	21.4	22.4	26.9	24.1	20.3	24.1	27.9	19.7
LA	10.2	10.4	9.7	11.3	7.0	10.2	11.2	8.8	10.3	10.7
MS	40.0	34.4	29.1	26.8	29.7	30.2	33.7	30.2	24.2	25.6
NC	33.4	27.0	28.6	41.0	47.3	27.6	22.4	42.6	24.4	13.8
OH	24.7	23.3	21.0	23.9	23.7	24.5	25.6	20.3	24.7	37.8
PA	8.7	9.3	8.6	8.2	5.4	6.2	8.7	5.7	8.4	5.8
SC	33.8	36.9	37.5	36.2	34.0	29.8	26.4	30.1	28.1	27.8
TN	33.8	24.6	25.3	24.9	33.8	23.9	30.1	22.9	24.3	23.2
VA	24.3	20.5	23.2	20.6	26.2	21.3	12.7	15.0	20.6	23.0
WI	10.0	12.9	12.9	9.9	10.8	15.6	16.3	10.9	11.5	14.6
WV	6.5	5.5	5.6	6.0	5.6	5.1	6.7	3.9	4.2	2.4
Subunit	22.5	21.1	20.2	20.2	21.0	20.1	20.7	19.1	19.4	19.6
Nonhunt										
MI	12.5	13.7	8.9	9.2	7.4	14.7	15.6	12.7	10.8	12.2
N. England[b]	6.5	7.0	6.3	5.4	6.3	6.6	7.3	8.5	5.3	5.0
NJ	20.8	17.8	22.0	20.2	27.3	25.6	26.9	23.8	23.2	16.6
NY	5.9	6.0	5.7	5.6	7.0	8.2	6.5	6.7	7.0	12.6
Subunit	9.0	9.4	7.6	7.4	7.5	10.6	10.7	10.1	8.5	10.5
Unit	19.9	19.0	17.7	17.6	18.2	18.5	19.0	17.5	17.3	18.0
CENTRAL UNIT										
AR	22.0	22.9	22.0	21.2	22.9	23.0	21.5	24.2	22.3	21.5
CO	23.3	22.9	21.0	28.6	28.6	20.8	26.5	16.4	26.2	19.2
IA	31.6	28.5	30.9	27.8	20.2	24.8	33.3	31.4	25.1	23.3
KS	47.2	48.6	50.4	51.1	47.1	47.9	53.6	47.6	47.3	45.3
MN	33.0	26.4	28.3	20.9	16.5	23.7	27.3	20.6	28.7	31.2
MO	37.0	35.0	44.1	26.8	37.0	31.1	42.3	31.9	27.3	32.3
MT	28.0	26.0	20.4	22.6	18.1	25.7	20.5	14.7	17.2	23.4
NE	47.8	41.9	53.3	52.1	50.3	47.6	45.6	43.6	45.2	42.5
NM	12.9	9.5	13.3	10.2	10.1	9.5	11.0	7.9	9.8	12.2
ND	43.7	41.6	56.9	47.2	41.7	42.6	44.1	48.0	46.0	33.3
OK	17.9	22.1	26.1	26.4	19.9	15.6	25.8	24.3	25.7	23.3
SD	52.5	32.9	45.0	38.3	45.7	40.4	40.2	42.4	50.8	43.0
TX	30.0	24.8	24.2	21.7	23.6	22.4	29.8	23.5	24.5	22.0
WY	19.6	20.5	10.9	17.8	17.2	9.8	13.6	13.6	19.5	17.3
Unit	31.1	28.0	28.8	27.4	26.5	25.9	29.5	24.6	27.5	26.9
WESTERN UNIT										
AZ	28.0	28.3	25.3	30.1	30.2	20.4	23.0	27.8	24.2	26.6
CA	29.0	27.4	25.3	25.0	24.3	18.2	22.2	21.3	23.0	19.4
ID	12.4	12.7	12.0	13.0	12.1	9.9	9.5	12.1	10.6	7.4
NV	9.6	9.0	21.3	15.3	11.0	6.7	9.1	6.4	8.6	5.7
OR	14.4	9.6	11.4	10.4	7.9	7.0	6.8	6.8	12.1	9.3
UT	24.8	37.9	19.1	18.0	21.0	29.3	17.0	14.7	16.7	17.9
WA	11.9	17.5	16.3	13.1	13.3	15.7	11.2	10.3	13.0	14.2
Unit	19.0	19.2	19.9	18.9	17.4	14.5	14.6	14.3	16.2	14.1

[a]Annual indices are the predicted value from the trend analysis plus the deviation from the expected value in a year. Large but nonsignificant changes due to small sample sizes produce exaggerated indices over the 43-year period.
[b] New England consists of CT, ME, MA, NH, RI, and VT.

Table 4. Continued.

Management unit/state	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
EASTERN UNIT										
Hunt										
AL	21.0	23.1	25.3	24.3	24.3	23.2	23.6	23.6	19.8	25.2
DE/MD	15.1	13.8	14.8	14.4	13.7	13.2	13.9	9.8	11.3	12.4
FL	14.4	15.8	12.3	13.3	10.6	9.4	11.0	12.8	8.7	11.1
GA	23.7	24.7	27.1	23.7	24.0	26.6	28.6	25.6	20.8	26.6
IL	23.7	25.3	19.4	16.9	17.3	19.4	23.6	24.3	19.7	16.9
IN	33.6	37.6	20.4	21.7	27.5	31.8	22.6	19.5	21.2	18.7
KY	24.6	23.1	24.7	16.9	16.5	28.0	24.0	13.4	21.5	22.4
LA	10.8	8.9	10.4	8.9	12.4	10.6	13.3	12.2	11.7	10.5
MS	26.0	26.8	30.2	25.8	24.5	24.5	30.9	25.9	19.1	25.2
NC	16.8	45.4	24.3	28.8	27.9	27.5	23.1	27.3	30.7	21.4
OH	27.5	26.3	13.9	13.6	16.2	19.7	18.7	19.9	18.6	17.4
PA	5.9	4.8	5.9	6.5	7.8	9.3	8.9	8.8	8.0	8.9
SC	27.4	23.3	30.8	26.1	32.8	31.9	32.9	31.3	28.4	28.5
TN	22.9	25.1	30.9	21.2	23.0	19.4	26.0	20.1	17.2	22.1
VA	22.3	29.7	22.0	19.4	18.9	16.4	18.1	18.0	17.6	16.6
WI	14.7	19.4	7.8	11.5	14.9	20.1	11.3	13.2	10.4	10.8
WV	6.0	5.7	6.5	7.3	8.4	6.8	6.5	6.2	5.4	6.7
Subunit	19.8	21.3	18.4	17.5	18.8	19.7	19.7	18.6	16.7	17.7
Nonhunt										
MI	12.4	10.7	12.4	7.3	13.5	15.5	11.3	10.1	10.9	12.1
N. England[b]	4.7	8.7	7.3	6.0	7.5	9.1	7.4	7.9	6.7	7.4
NJ	20.9	22.9	18.1	19.3	18.0	14.6	17.0	20.2	12.7	12.8
NY	7.4	7.5	9.1	6.1	11.1	9.3	10.1	9.4	9.4	8.5
Subunit	8.9	9.7	10.3	7.1	11.2	11.9	10.2	9.8	9.4	9.8
Unit	17.7	19.0	17.0	15.3	17.5	18.4	17.9	17.0	15.4	16.2
CENTRAL UNIT										
AR	26.1	21.2	15.0	12.2	20.2	22.1	25.7	19.3	13.7	13.6
CO	27.2	25.2	27.9	23.2	26.9	30.4	29.5	16.3	20.4	24.3
IA	28.7	22.3	25.1	21.4	28.9	32.0	23.1	16.4	24.1	26.6
KS	49.8	47.3	37.1	54.1	59.1	56.5	53.8	60.7	48.0	62.3
MN	27.0	31.1	29.9	30.4	32.7	28.9	25.4	22.1	18.7	20.3
MO	28.8	33.4	21.4	20.4	32.1	27.2	23.9	23.2	22.3	21.3
MT	17.0	20.8	20.0	20.0	18.3	17.1	21.9	17.7	13.4	18.5
NE	47.9	48.4	39.7	42.4	53.9	51.1	49.8	45.3	43.1	44.4
NM	12.1	10.8	11.0	7.5	12.3	12.2	9.6	13.1	14.2	12.3
ND	53.4	44.0	46.4	43.2	48.8	48.9	45.7	43.6	33.9	44.2
OK	24.6	31.9	24.5	24.1	25.1	25.0	26.2	26.8	20.3	19.8
SD	46.1	40.5	43.8	42.9	43.1	38.8	46.3	40.0	44.6	41.9
TX	21.4	20.4	21.2	26.1	24.8	22.3	21.4	19.8	19.3	19.9
WY	16.1	10.2	16.7	13.2	11.8	13.1	16.9	11.5	10.5	12.3
Unit	27.6	26.3	25.8	25.3	28.4	27.6	27.5	24.3	22.7	24.7
WESTERN UNIT										
AZ	27.5	24.7	24.8	24.3	21.8	24.6	28.1	21.9	27.0	21.8
CA	23.2	17.8	16.0	12.4	21.0	17.4	21.6	13.3	18.5	13.1
ID	13.7	16.7	9.4	9.1	9.9	10.9	11.3	9.1	10.7	10.0
NV	9.3	9.6	5.6	8.4	12.2	8.9	5.1	4.6	4.5	5.8
OR	9.7	11.0	5.9	6.2	9.3	8.0	7.8	6.0	7.7	8.4
UT	20.4	24.0	10.6	12.9	15.5	20.6	11.0	12.4	13.8	9.1
WA	13.7	14.9	9.7	13.6	9.4	11.3	10.5	8.9	7.8	9.8
Unit	17.7	17.6	11.9	12.6	15.7	15.3	14.0	11.1	13.1	11.8

[a]Annual indices are the predicted value from the trend analysis plus the deviation from the expected value in a year. Large but nonsignificant changes due to small sample sizes produce exaggerated indices over the 43-year period.
[b] New England consists of CT, ME, MA, NH, RI, and VT.

Table 4. Continued.

Management unit/state	Year										
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
EASTERN UNIT											
Hunt											
AL	22.8	20.3	22.3	19.1	17.9	16.5	19.1	20.8	21.4	22.5	17.3
DE/MD	14.9	13.1	12.2	17.2	8.4	12.9	16.6	11.2	13.8	12.5	11.7
FL	13.0	11.7	13.9	12.4	11.3	12.2	12.4	10.9	10.3	12.0	11.2
GA	23.8	24.8	25.0	25.3	26.1	21.7	30.6	18.9	21.9	26.2	22.0
IL	23.4	22.8	25.9	25.3	24.8	25.1	25.9	22.5	25.1	25.8	20.3
IN	24.8	25.0	30.1	25.5	27.8	28.1	24.8	26.2	31.1	25.2	21.6
KY	20.1	24.7	19.8	27.1	22.6	21.5	17.1	21.9	21.2	20.7	17.5
LA	9.6	13.6	10.1	15.7	11.1	11.3	14.9	11.6	12.7	14.5	11.9
MS	24.8	22.0	26.0	24.4	20.4	17.1	22.2	24.3	20.4	18.7	17.2
NC	30.0	29.2	27.0	31.7	28.9	24.5	23.9	24.8	25.0	27.3	27.7
OH	17.0	18.6	21.2	20.0	18.4	19.6	20.3	17.2	19.1	17.4	14.1
PA	9.4	10.7	7.2	9.2	9.3	9.4	10.4	11.5	10.8	10.4	10.1
SC	24.4	35.3	27.9	26.8	29.1	23.4	23.0	26.9	24.0	19.2	23.9
TN	16.7	20.5	20.1	18.1	15.9	19.2	18.7	16.4	20.2	18.5	16.2
VA	13.5	14.5	15.8	15.4	13.1	13.9	12.3	13.9	13.7	14.8	11.9
WI	11.6	7.7	18.2	18.2	14.5	13.1	20.0	19.5	15.9	13.5	12.3
WV	6.3	6.6	7.6	8.1	10.7	9.2	7.4	8.7	9.6	9.9	4.9
Subunit	17.9	18.3	19.5	20.1	18.3	17.7	19.2	18.3	18.6	18.6	16.1
Nonhunt											
MI	15.5	12.7	15.3	19.4	14.8	12.0	14.1	13.0	12.4	13.9	14.3
N. England[b]	7.9	7.5	7.0	7.3	8.1	8.9	9.4	9.8	8.9	11.1	7.7
NJ	15.1	13.8	13.4	16.4	12.7	15.5	10.0	16.0	13.9	10.4	13.5
NY	7.2	9.7	7.8	12.1	10.7	13.4	11.5	10.1	10.3	11.6	11.0
Subunit	10.5	10.4	10.3	13.1	11.5	11.8	12.0	11.6	11.1	12.5	11.3
Unit	16.5	16.8	17.6	18.9	17.1	16.7	17.9	17.1	17.2	17.5	15.2
CENTRAL UNIT											
AR	14.7	13.8	15.2	21.4	16.6	15.0	18.1	16.7	19.9	18.4	18.7
CO	23.3	24.9	27.1	30.4	27.4	18.2	13.9	13.3	23.7	19.9	14.8
IA	24.1	23.1	31.2	28.6	32.6	24.4	32.3	24.0	25.1	26.5	34.6
KS	42.8	46.5	54.0	48.6	42.5	59.3	57.9	39.2	52.5	62.8	33.0
MN	18.5	23.6	24.0	19.0	15.6	19.2	22.3	16.1	19.9	20.0	18.8
MO	22.1	24.9	25.0	24.7	20.1	21.9	23.2	22.5	27.2	23.8	23.3
MT	19.3	18.6	15.3	19.7	20.9	14.1	14.7	11.0	10.0	12.9	13.1
NE	37.0	36.5	36.4	40.4	40.2	41.0	38.5	40.5	37.6	41.4	34.4
NM	14.8	17.9	13.5	15.1	16.7	15.6	10.2	11.5	14.4	13.0	11.4
ND	40.1	45.6	42.8	44.2	42.6	47.0	49.9	43.1	37.2	39.0	40.6
OK	22.4	24.9	21.9	16.8	22.1	22.4	25.5	22.0	28.8	21.8	23.2
SD	38.9	34.1	40.5	43.6	45.3	48.0	38.6	34.8	37.8	38.8	39.9
TX	21.2	20.9	21.3	16.3	17.2	23.8	21.7	19.8	21.8	16.3	13.9
WY	15.2	12.3	7.6	9.5	9.6	10.2	10.7	7.9	10.6	7.9	9.4
Unit	24.9	25.6	24.5	24.4	24.3	24.7	23.6	20.6	23.9	22.3	20.5
WESTERN UNIT											
AZ	25.9	17.4	19.5	24.3	18.6	23.7	25.4	26.5	23.5	22.0	13.0
CA	15.1	11.6	15.5	11.4	11.5	11.2	12.2	14.6	12.1	11.5	12.1
ID	7.1	7.4	10.1	10.0	11.1	10.4	9.4	8.7	8.5	7.9	7.6
NV	3.8	4.4	6.1	5.2	3.7	4.9	4.1	3.5	3.1	5.3	4.8
OR	6.9	6.3	7.8	6.4	7.2	4.5	7.3	6.0	7.1	6.0	5.6
UT	12.6	11.0	11.3	11.8	10.1	9.2	11.7	9.8	10.2	6.6	7.5
WA	11.7	9.3	9.4	8.1	8.5	10.7	9.4	8.2	8.4	9.4	6.2
Unit	11.6	10.1	12.4	11.3	10.4	10.6	11.4	10.9	10.5	10.3	9.2

[a]Annual indices are the predicted value from the trend analysis plus the deviation from the expected value in a year. Large but nonsignificant changes due to small sample sizes produce exaggerated indices over the 43-year period.
[b] New England consists of CT, ME, MA, NH, RI, and VT.

Table 4. Continued.

Management unit/state	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
EASTERN UNIT												
Hunt												
AL	16.3	18.2	17.5	18.7	17.7	20.7	15.9	18.1	18.1	18.5	17.8	19.0
DE/MD	9.8	13.5	9.6	9.2	9.2	7.8	12.5	12.9	11.9	11.5	14.5	10.1
FL	10.3	12.7	13.2	12.8	9.1	10.0	10.6	10.2	11.2	11.8	9.9	10.8
GA	18.9	18.1	18.4	16.2	22.5	12.3	19.6	18.5	20.2	18.8	16.4	21.6
IL	20.8	20.8	19.2	25.0	21.0	22.3	24.7	20.3	23.3	25.8	25.9	17.6
IN	21.4	21.6	22.5	24.5	21.7	19.5	19.4	21.5	24.7	19.3	23.1	20.3
KY	16.3	21.0	21.6	22.7	19.0	22.0	20.6	17.7	17.2	18.9	23.9	20.5
LA	12.0	13.5	14.2	17.0	18.2	14.4	16.8	13.7	16.5	11.7	18.5	13.1
MS	16.6	17.1	20.7	18.0	17.1	14.0	15.9	12.2	13.7	15.3	17.3	14.7
NC	30.6	30.0	30.7	36.5	40.5	34.3	33.1	28.6	27.2	32.6	30.8	34.0
OH	14.0	16.4	17.1	18.2	14.9	17.0	16.5	15.3	15.0	15.3	17.6	14.2
PA	9.4	10.9	9.2	11.6	10.5	10.4	9.4	9.7	9.7	11.7	11.2	10.8
SC	22.9	25.8	24.5	23.8	23.8	22.1	23.1	22.4	20.8	19.2	23.7	21.0
TN	17.2	16.2	16.6	18.6	14.5	15.6	15.2	14.1	13.8	13.7	12.5	14.3
VA	15.1	14.1	14.4	15.6	12.0	14.1	10.7	12.1	13.4	12.7	14.2	13.5
WI	12.7	10.2	19.8	17.4	16.9	14.3	19.5	20.6	21.0	18.0	20.1	15.6
WV	10.3	8.6	10.0	9.5	6.5	9.3	5.6	10.3	9.3	11.0	12.4	12.2
Subunit	16.2	17.0	18.0	18.8	17.1	16.3	16.9	16.4	17.1	16.9	18.0	16.6
Nonhunt												
MI	13.9	16.0	16.1	17.9	15.6	15.3	16.7	13.4	16.9	16.9	16.7	24.2
N. England[b]	7.7	8.4	9.7	10.3	8.5	11.4	9.0	8.9	7.7	8.7	9.4	8.1
NJ	7.1	11.7	9.7	12.3	6.5	10.5	8.8	8.9	8.0	9.7	8.8	11.9
NY	11.8	10.3	13.8	15.7	13.2	13.0	13.6	13.1	15.3	16.0	17.1	13.2
Subunit	11.1	11.8	13.3	14.9	12.3	13.6	13.1	11.9	12.8	13.6	14.1	14.7
Unit	15.3	16.0	17.1	18.1	16.2	15.9	16.2	15.5	16.2	16.2	17.2	16.3
CENTRAL UNIT												
AR	18.6	19.5	17.6	17.2	16.8	12.8	17.5	14.4	14.7	15.5	16.3	19.0
CO	20.2	21.2	23.0	23.1	14.8	18.1	17.0	22.8	16.6	26.5	19.1	14.7
IA	28.1	31.0	26.8	24.0	23.4	24.7	32.2	30.6	28.8	35.3	34.6	30.6
KS	59.1	55.0	68.0	51.1	31.3	44.5	52.6	44.1	55.8	59.2	50.2	43.4
MN	19.9	18.6	16.7	17.2	13.9	19.1	10.0	10.9	13.0	11.8	16.8	11.5
MO	23.0	20.7	19.1	19.8	16.8	18.8	20.7	17.7	17.7	22.6	18.6	15.1
MT	12.0	14.3	13.2	15.1	10.8	13.1	12.7	12.8	11.6	12.1	11.7	11.8
NE	31.6	40.2	36.6	36.7	31.1	29.3	39.7	32.6	34.0	31.9	30.7	29.9
NM	15.5	13.1	15.4	17.5	18.2	12.3	17.9	14.9	16.2	16.4	19.9	15.7
ND	35.9	32.7	44.2	43.5	34.7	29.1	43.7	27.8	47.4	37.3	30.3	40.0
OK	22.3	32.3	29.2	24.9	25.8	24.6	32.1	34.1	32.1	25.6	29.2	19.8
SD	34.0	36.3	38.2	41.0	36.6	38.7	37.7	36.8	33.6	39.3	36.7	37.9
TX	20.8	21.2	20.8	18.1	18.6	18.4	19.0	15.5	19.0	15.0	13.9	12.9
WY	9.1	10.0	7.6	10.9	6.7	9.0	7.1	7.5	6.0	6.6	6.6	7.6
Unit	23.1	24.0	23.8	23.8	19.9	20.9	22.2	20.4	21.3	21.4	20.7	18.9
WESTERN UNIT												
AZ	19.8	22.8	24.8	25.5	19.2	19.1	16.9	20.1	23.3	23.9	16.6	17.9
CA	10.6	11.1	11.4	10.6	9.8	12.6	11.6	12.2	8.8	8.2	8.4	8.3
ID	10.9	6.3	8.8	8.4	7.0	11.0	7.9	10.0	8.0	10.7	12.1	7.9
NV	4.4	3.8	4.7	3.7	3.3	3.6	3.5	3.5	2.7	6.6	2.3	2.6
OR	5.7	4.3	4.4	7.4	5.0	6.4	6.7	5.9	5.2	5.6	8.4	6.7
UT	9.3	5.3	8.5	12.9	5.7	8.1	6.5	7.6	5.0	8.5	5.1	5.1
WA	7.7	5.3	7.2	8.2	7.8	8.1	8.6	7.0	8.7	8.2	7.3	6.0
Unit	10.4	8.6	10.2	11.1	8.6	10.6	9.6	10.2	8.6	10.8	8.8	8.2

[a]Annual indices are the predicted value from the trend analysis plus the deviation from the expected value in a year. Large but nonsignificant changes due to small sample sizes produce exaggerated indices over the 43-year period.
[b] New England consists of CT, ME, MA, NH, RI, and VT.

Table 5. Preliminary estimates of the number of hunters, days hunted, and total bag from Harvest Information Program surveys for the 2006-07 season.

Management Unit	Hunters		Days hunted		Birds bagged	
EASTERN						
AL	56,300	±17 % [1]	141,800	±17 %	1,015,300	±20 %
DE	2,400	±19 %	7,000	±24 %	39,400	±20 %
FL	15,900	±19 %	53,600	±21 %	298,800	±24 %
GA	38,600	±14 %	120,200	±20 %	851,500	±22 %
IL	40,500	±10 %	129,200	±15 %	948,700	±13 %
IN	13,200	±18 %	40,200	±22 %	190,500	±23 %
KY	20,700	±19 %	64,000	±28 %	491,300	±24 %
LA	22,700	±19 %	65,800	±24 %	373,700	±23 %
MD	9,300	±19 %	29,500	±25 %	162,700	±28 %
MS	23,000	±15 %	60,100	±18 %	492,800	±21 %
NC	40,400	±14 %	125,500	±16 %	861,500	±19 %
OH	14,300	±19 %	70,000	±26 %	284,400	±20 %
PA	31,600	±18 %	113,700	±21 %	372,200	±23 %
RI	100	±108 %	600	±155 %	500	±123 %
SC	36,200	±13 %	118,500	±15 %	696,200	±13 %
TN	37,800	±17 %	101,000	±24 %	656,100	±26 %
VA	20,400	±12 %	52,500	±12 %	304,200	±14 %
WI	11,200	±26 %	40,100	±29 %	100,900	±38 %
WV	1,100	±21 %	2,700	±24 %	14,600	±24 %
Unit	435,700[2]		1,336,000	±5 %	8,155,400	±6 %
CENTRAL						
AR	31,300	±16 %	77,500	±18 %	621,500	±20 %
CO	19,800	±11 %	45,700	±13 %	270,300	±19 %
KS	35,400	±8 %	116,400	±11 %	711,800	±12 %
MN	8,000	±33 %	24,200	±39 %	50,000	±46 %
MO	44,700	±7 %	129,800	±12 %	709,500	±15 %
MT	1,800	±36 %	3,900	±38 %	14,800	±33 %
NE	15,000	±12 %	43,000	±12 %	249,700	±12 %
NM	7,100	±20 %	33,900	±28 %	226,900	±33 %
ND	4,000	±23 %	10,800	±24 %	56,400	±25 %
OK	36,100	±9 %	108,300	±17 %	704,400	±24 %
SD	6,400	±16 %	19,600	±17 %	103,300	±18 %
TX	258,900	±10 %	986,200	±14 %	5,138,700	±14 %
WY	2,300	±29 %	6,500	±36 %	29,500	±37 %
Unit	470,800[2]		1,605,900	±9 %	8,887,000	±9 %
WESTERN						
AZ	37,300	±9 %	130,100	±21 %	750,700	±14 %
CA	63,300	±8 %	215,900	±18 %	1,020,400	±12 %
ID	10,100	±16 %	26,900	±22 %	98,100	±22 %
NV	4,100	±21 %	9,400	±25 %	38,900	±27 %
OR	7,700	±24 %	21,600	±32 %	84,300	±37 %
UT	11,900	±11 %	28,900	±16 %	77,600	±20 %
WA	10,500	±12 %	26,000	±12 %	132,900	±14 %
Unit	144,900[2]		458,800	±10 %	2,202,900	±8 %
U.S.	1,051,400[2]		3,400,700	±5 %	19,245,300	±5 %

[1] This represents the 95% confidence interval expressed as percent of the point estimate.
[2] This total is slightly exaggerated because people are counted more than once if they hunted in more than one state.

Table 6. Preliminary estimates of the number of hunters, days hunted, and total bag from Harvest Information Program surveys for the 2007-08 season.

Management Unit	Hunters		Days hunted		Birds bagged	
EASTERN						
AL	48,500	±8 % [1]	127,500	±12 %	829,300	±11 %
DE	2,600	±20 %	8,100	±20 %	50,900	±22 %
FL	21,600	±18 %	66,000	±24 %	372,600	±24 %
GA	37,900	±16 %	145,600	±26 %	1,107,500	±32 %
IL	41,400	±10 %	137,200	±15 %	912,300	±16 %
IN	15,000	±26 %	46,000	±23 %	258,400	±17 %
KY	10,600	±38 %	34,100	±48 %	278,100	±41 %
LA	24,600	±23 %	63,700	±25 %	412,900	±29 %
MD	11,800	±20 %	36,600	±24 %	212,900	±26 %
MS	30,100	±12 %	82,000	±18 %	612,000	±21 %
NC	50,900	±16 %	144,800	±22 %	854,000	±24 %
OH	17,500	±21 %	60,600	±33 %	307,700	±35 %
PA	37,500	±17 %	159,000	±20 %	509,100	±27 %
RI	300	±66 %	1,100	±71 %	2,000	±55 %
SC	43,400	±12 %	139,400	±16 %	865,900	±18 %
TN	33,000	±19 %	85,500	±24 %	682,700	±32 %
VA	26,500	±11 %	78,600	±18 %	418,100	±21 %
WI	13,600	±24 %	61,600	±29 %	202,000	±38 %
WV	1,800	±16 %	4,300	±29 %	20,200	±32 %
Unit	468,600[2]		1,481,700	±6 %	8,908,400	±7 %
CENTRAL						
AR	37,000	±16 %	115,900	±23 %	791,700	±24 %
CO	21,800	±11 %	57,800	±14 %	315,000	±14 %
KS	36,300	±8 %	119,100	±11 %	725,100	±13 %
MN	7,700	±35 %	27,600	±49 %	67,400	±52 %
MO	42,600	±8 %	124,400	±13 %	603,300	±15 %
MT	1,700	±31 %	4,000	±34 %	20,900	±43 %
NE	17,000	±12 %	55,300	±16 %	319,600	±18 %
NM	8,600	±18 %	40,100	±33 %	198,700	±25 %
ND	3,200	±27 %	9,900	±26 %	48,700	±27 %
OK	24,600	±14 %	73,100	±19 %	480,000	±24 %
SD	6,000	±20 %	18,200	±25 %	104,000	±30 %
TX	275,200	±10 %	1,149,600	±13 %	5,463,300	±14 %
WY	4,000	±20 %	8,800	±24 %	42,600	±27 %
Unit	485,700[2]		1,803,900	±9 %	9,180,200	±9 %
WESTERN						
AZ	39,500	±8 %	125,500	±10 %	792,800	±11 %
CA	63,800	±6 %	201,100	±10 %	1,162,100	±11 %
ID	22,800	±21 %	68,500	±36 %	192,300	±35 %
NV	2,800	±26 %	9,600	±42 %	38,500	±43 %
OR	6,800	±49 %	27,600	±60 %	96,900	±55 %
UT	14,200	±12 %	36,400	±24 %	90,000	±20 %
WA	7,400	±18 %	18,500	±21 %	88,900	±19 %
Unit	157,300[2]		487,300	±8 %	2,461,500	±7 %
U.S.	1,140,600[2]		3,772,900	±5 %	20,550,000	±5 %

[1]This represents the 95% confidence interval expressed as percent of the point estimate.

[2]This total is slightly exaggerated because people are counted more than once if they hunted in more than one state.

Appendix A. History of federal framework dates, season length, and daily bag limits for hunting mourning doves in the United States.

	Eastern Management Unit			Central Management Unit			Western Management Unit		
Year(s)	Outside dates[a]	Maximum season length	Daily bag limit	Outside dates	Maximum season length	Daily bag limit	Outside dates	Maximum season length	Daily bag limit
1918	Sep 1 - Dec 31	107	25	Sep 1 - Dec 15	106	25	Sep 1 - Dec 15	106	25
1919-22	Sep 1 - Jan 31	108	25	Sep 1 - Dec 15	106	25	Sep 1 - Dec 15	106	25
1923-28	Sep 1 - Jan 31	108	25	Sep 1 - Dec 31	106	25	Sep 1 - Dec 15	106	25
1929	Sep 1 - Jan 31	106	25	Sep 1 - Dec 31	106	25	Sep 1 - Dec 15	106	25
1930	Sep 1 - Jan 31	108	25	Sep 1 - Dec 15	106	25	Sep 1 - Dec 15	106	25
1931	Sep 1 - Jan 31	106	25	Sep 1 - Dec 15	106	25	Sep 1 - Dec 15	106	25
1932-33	Sep 1 - Jan 31	106	18	Sep 1 - Dec 15	106	18	Sep 1 - Dec 15	106	18
1934	Sep 1 - Jan 31	106	18	Sep 1 - Jan 15	106	18	Sep 1 - Dec 15	106	18
1935	Sep 1 - Jan 31	107	20	Sep 1 - Jan 16	106	20	Sep 1 - Jan 05	107	20
1936	Sep 1 - Jan 31	77	20	Sep 1 - Jan 16	76	20	Sep 1 - Nov 15	76	20
1937[b]	Sep 1 - Jan 31	77	15	Sep 1 - Nov 15	76	15	Sep 1 - Nov 15	76	15
1938	Sep 1 - Jan 31	78	15	Sep 1 - Nov 15	76	15	Sep 1 - Nov 15	76	15
1939	Sep 1 - Jan 31	78	15	Sep 1 - Jan 31	77	15	Sep 1 - Nov 15	76	15
1940	Sep 1 - Jan 31	77	12	Sep 1 - Jan 31	76	12	Sep 1 - Nov 15	76	12
1941	Sep 1 - Jan 31	62	12	Sep 1 - Oct 27	42	12	Sep 1 - Oct 12	42	12
1942	Sep 1 - Oct 15	30	10	Sep 1 - Oct 27	42	10	Sep 1 - Oct 12	42	10
1943	Sep 1 - Dec 24	30	10	Sep 1 - Dec 19	42	10	Sep 1 - Oct 12	42	10
1944	Sep 1 - Jan 20	58	10	Sep 1 - Jan 20	57	10	Sep 1 - Oct 25	55	10
1945	Sep 1 - Jan 31	60	10	Sep 1 - Jan 31	60	10	Sep 1 - Oct 30	60	10
1946	Sep 1 - Jan 31	61	10	Sep 1 - Jan 31	60	10	Sep 1 - Oct 30	60	10
1947-48[c]	Sep 1 - Jan 31	60	10	Sep 1 - Dec 3	60	10	Sep 1 - Oct 30	60	10
1949	Sep 1 - Jan 15	30	10	Sep 1 - Nov 14	45	10	Sep 1 - Oct 15	45	10
1950	Sep 1 - Jan 15	30	10	Sep 1 - Dec 3	45	10	Sep 1 - Oct 15	45	10
1951	Sep 1 - Jan 15	30	8	Sep 1- Dec 24	42	10	Sep 1 - Oct 15	45	10
1952	Sep 1 - Jan 10	30	8	Sep 1 - Nov 6	42	10	Sep 1 - Oct 12	42	10
1953	Sep 1 - Jan 10	30	8	Sep 1 - Nov 9	42	10	Sep 1 - Oct 12	42	10
1954[d]	Sep 1 - Jan 10	40	8	Sep 1 - Nov 9	40	10	Sep 1 - Oct 31	40	10
1955	Sep 1 - Jan 10	45	8	Sep 1 - Nov 28	45	10	Sep 1 - Dec 31	45	10
1956[e]	Sep 1 - Jan 10	55	8	Sep 1 - Jan 10	55	10	Sep 1 - Jan 10	50	10
1957	Sep 1 - Jan 10	60	10	Sep 1 - Jan 10	60	10	Sep 1 - Jan 10	50	10
1958-59	Sep 1 - Jan 15	65	10	Sep 1 - Jan 15	65	10	Sep 1 - Jan 15	50	10

Appendix A. Continued.

Year(s)	Eastern Management Unit: Outside dates	Eastern: Maximum season length	Eastern: Daily bag limit	Central Management Unit: Outside dates	Central: Maximum season length	Central: Daily bag limit	Western Management Unit: Outside dates	Western: Maximum season length	Western: Daily bag limit
1960-61[f]	Sep 1 - Jan 15	70[g]	12	Sep 1 - Jan 15	60	15	Sep 1 - Jan 15	50	10
1962	Sep 1 - Jan 15	70[g]	12	Sep 1 - Jan 15	60	12	Sep 1 - Jan 15	50	10
1963	Sep 1 - Jan 15	70[g]	10	Sep 1 - Jan 15	60	10	Sep 1 - Jan 15	50	10
1964-67	Sep 1 - Jan 15	70[g]	12	Sep 1 - Jan 15	60	12	Sep 1 - Jan 15	50	12
1968	Sep 1 - Jan 15	70[g]	12	Sep 1 - Jan 15	60	12	Sep 1 - Jan 15	50	10
1969-70	Sep 1 - Jan 15	70[g]	18[h]	Sep 1 - Jan 15	60	10	Sep 1 - Jan 15	50	10
1971-79	Sep 1 - Jan 15	70[g]	12	Sep 1 - Jan 15	60	10	Sep 1 - Jan 15	50	10
1980	Sep 1 - Jan 15	70	12	Sep 1 - Jan 25	60	10	Sep 1 - Jan 15	50 - 70	10 (AZ -12)
1981	Sep 1 - Jan 15	70	12	Sep 1 - Jan 25	60 days - bag of 12 or 45 days - bag of 15		Sep 1 - Jan 15	50 - 70	10 (AZ -12)
1982	Sep 1 - Jan 15	70 days - bag of 12 or 45 days - bag of 15		Sep 1 - Jan 25	70 days - bag of 12 or 45 days - bag of 15		Sep 1 - Jan 15	70 days - bag of 12 or 45 days - bag of 15	
1983-86	Sep 1 - Jan 15	70 days - bag of 12 or 60 days - bag of 15		Sep 1 - Jan 25	70 days - bag of 12 or 60 days - bag of 15		Sep 1 - Jan 15	70 days - bag of 12 or 60 days - bag of 15	
1987-07[i]	Sep 1 - Jan 15	70 days - bag of 12 or 60 days - bag of 15		Sep 1 - Jan 25	70 days - bag of 12 or 60 days - bag of 15		Sep 1 - Jan 15	30-45 days[j] - bag of 10	

[a] From 1918-47, seasons for doves and other "webless" species were selected independently and the "outside dates" were the earliest opening and latest closing dates chosen. Dates were inclusive. There were different season lengths in various states with some choosing many fewer days than others. Only bag and possession limits, and season dates were specified.

[b] Beginning in 1937, the bag and possession limits included white-winged doves in selected states.

[c] From 1948-53, states permitting dove hunting were listed by waterfowl flyway. Only bag and possession limits, and season dates were specified.

[d] In 1954-55, states permitting dove hunting were listed separately. Only bag and possession limits, and season dates were specified.

[e] From 1956-1959, states permitting dove hunting were listed seperately. Framework opening and closing dates for seasons (but no maximum days for season length) were specified for the first time along with bag and possession limits.

[f] In 1960, states were grouped by management unit for the first time. Maximum season length was specified for the first time.

[g] Half days.

[h] More liberal limits allowed in conjunction with an Eastern Management Unit hunting regulations experiment.

[I] Beginning in 2002, the limits included white-winged doves in all states in the Central Management Unit. Beginning in 2006, the limits included white-winged doves in all states in the Eastern Management Unit.

[j] Depending on state and season timing.

White-winged Doves

Traditionally, the Service has requested that Arizona and Texas provide information about white-winged dove status in their respective states since those states conduct their own surveys with no federal involvement. In past years, we have taken those reports and summarized them orally for discussions pertaining to the regulations-setting process. In order to provide more comprehensive information this year, we are including a formal report from Arizona. In the future, we expect to include a report from Texas and possibly other areas as well. Texas is transitioning to a new survey methodology that includes urban areas statewide and data have not been analyzed fully. Also, due to a loss of personnel, they were unable to provide a formal report this year.

WHITE-WINGED DOVE STATUS IN ARIZONA, 2008

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Abstract: The Arizona Game and Fish Department (AGFD) has monitored white-winged dove populations by means of a call-count survey to provide an annual index to population size. It runs concurrently with the U.S. Fish and Wildlife Service's Mourning Dove Call-count Survey. The index peaked at 52.3 mean number doves heard per route in 1968, but fell precipitously in the late 1970s. The index has stabilized to around 25 doves per route in the last few years; in 2008, the mean number of doves heard per route was 26.9. AGFD also monitors harvest. Harvest during the 15-day season (September 1-15) peaked in the late 1960's at ~740,000 birds (1968 AGFD estimate) and has since stabilized at around 100,000 birds; the 2006 Harvest Information Program (HIP) estimate was 127,600 birds. In 2007, Arizona redesigned their dove harvest survey questionnaire to sample only from hunters registered under HIP. In the future, AGFD and HIP harvest estimates should be more comparable than they have been in the past.

BACKGROUND

The white-winged dove (*Zenaida asiatica*) is one of 14 species of Columbidae occurring in North and Middle America north of Mexico (Aldrich 1993). Twelve subspecies of white-winged doves have been described for North, Central and South America, and the West Indies (Saunders 1968). Of these, four are known to reside and breed in the United States (Western, *Z. a. mearnsi*; Eastern, *Z. a. asiatica*; Big Bend, *Z. a. grandis*; and Mexican Highland, *Z. a. monticola*). Only the Western and Eastern races represent populations of significant size in the U.S.

In Arizona, only the Western subspecies is known to occur (Fig. 1). Distribution of the white-winged dove in Arizona is mostly restricted to lower desert areas although there are infrequent reports of birds summering as far north as Flagstaff, (2,100 m elevation). The highest populations occur in the lowland Sonoran desert areas. Large numbers of birds can be found in the urban complexes of Phoenix and Tucson. There are small populations in Casa Grande and Tucson that apparently do not migrate.

White-winged doves nest at relatively low densities throughout the Sonoran, Mohave, and Chihuahua deserts of southern and western Arizona, southern California, and southern New Mexico. However, in riparian woodlands near agricultural areas, populations have historically been present in high densities. Butler (1977) found that birds that nested in high densities in mesquite (*Prosopis* sp) or salt cedar (*Tamarix ramosissima*) had higher nest success. Brown (1977) referred to these nesting concentrations as colonial populations, as opposed to the non-colonial populations in upland desert regions.

Figure. 1. The principal breeding, wintering, and resident area of migratory white-winged dove populations in North America, from George et al. (1994). Since George et al. (1994), white-winged doves have expanded their range into north-central New Mexico and southern Colorado. These new range expansions most likely are Mexican highland birds. The Eastern Population has expanded northward throughout most of the central United States.

Cottam and Trefethen (1968) speculated that white-winged doves may have been relatively uncommon in Arizona prior to the advent of agriculture because of the near absence of white-winged dove remains at prehistoric ruins in Arizona and because early European explorers failed to mention the species in their journals. Although many of the early explorations in Arizona were conducted during cool winter months after white-winged doves had presumably migrated south, some expeditions occurred during the nesting season; surely the dove's presence would have been documented had the populations along the Gila River approached even current densities. Cottam and Trefethen (1968) present arguments that the Imperial Valley population represents a relatively recent range expansion, probably since 1901, as the result of flooding of the Salton Sink and subsequent development of agriculture. In contrast, Brown (1989:239) maintains that white-winged doves were common in Arizona from the beginning of settlement.

Haughey (1986) studied desert nesting white-winged doves and their relationships to saguaro cactus (*Carnegiea gigantea*) in the Saguaro National Monument in southern Arizona, where they are totally dependent on native food sources. Saguaros were used extensively for both nectar and fruit in Arizona. The similarity in the nesting range of white-winged doves and that of the saguaro has been cited by several authors as noted by Haughey (1986). Those areas where white-wings occur and saguaro do not, i.e., southeastern California, southwestern New Mexico, southeastern Arizona and southern Nevada, may represent recent range extensions in response to agriculture.

In recent times, white-winged dove densities have been greatest in areas near agriculture because of the abundance of food available there. Response of white-winged doves to agricultural activities are well documented and are likely partially responsible for recent large changes in abundance in the southwestern U.S. Rapid declines in white-winged dove populations following either loss of food crops or nesting habitat have been noted in Arizona (Cunningham et al. 1977, Rea 1983) and Mexico (Tomlinson 1993).

White-winged doves typically migrate into Arizona beginning in March. Breeding usually occurs in two peaks in the summer, although the timing of their breeding varies among years. The peak breeding times for these desert doves occur from May-June to July-August (Cunningham et al., 1977). Breeding in urban areas also occurs in two peaks but may be somewhat offset in timing compared to the desert birds. By early September, most of the adult birds have already begun the migration south. The young leave the state soon after. In most years much of the harvest consists of juvenile birds.

IMPORTANCE

White-winged doves are important pollinators of saguaro cactus in Arizona. Haughey (1986) noted that white-winged doves visited saguaro blooms more often than any other bird species. For desert-dwelling doves, 60% or more of the diet is saguaro (Haughey 1986, Wolf and Martinez del Rio 2000). Haughey (1986) suggested that the breeding cycle of these birds is timed to coincide with the saguaro bloom. Fleming et al. (1996) identified white-winged doves as the major vertebrate pollinator of saguaro.

White-winged doves are also popular with non-hunting interests. People in many areas provide feeding stations and water in backyards to attract them for observation. Bird watchers and photographers also avidly pursue white-winged doves for observation and the satisfaction of adding them to their life-lists.

POPULATION MONITORING

The Arizona Game and Fish Department (AGFD) has conducted a spring auditory survey, similar to the Mourning Dove Call-count Survey, since 1962 (Table 1). Arizona collects data from 25-30 routes (the number varies with logistic circumstances that may prevent running some routes in some years). Typically, AGFD runs 19-22 routes in Sonoran/Mohave desert habitat, 3 routes in chaparral habitat, and 4-5 routes in Chihuahua desert habitat. The index is calculated as a simple weighted mean of the counts from the single year. For example, in 2007, 26 routes were run: 19 in Sonoran Desert, 3 in chaparral, and 4 in Chihuahua desert habitat. The Sonoran routes were weighted 0.731 (19/26), chaparral 0.115 (3/26) and the Chihuahua desert route mean was weighed as 0.154 (4/26) of the total yearly mean. The numbers of routes in each habitat are representative of the total area of white-winged dove habitat in the state.

There is no attempt to monitor the population of urban doves.

The index peaked at 52.3 mean doves heard per route in 1968 and decreased significantly during the next four years to less than 40 doves per route. Indices remained fairly stable from 1985-2000. Call-counts have declined since then (Table 1, Fig. 2). Most of the recent white-winged dove decline in Arizona is likely due to loss of large nesting colonies in the 1960's and 1970's due to habitat destruction, shifts in agricultural trends, and possible over harvest. Clearing of the large mesquite forests in river bottoms for flood control and fuel wood removed the most productive nest areas. Large breeding colonies in the past were attracted to and maintained by grain fields that now grow vegetables and cotton. The more dispersed, solitary nesting white-winged populations have been less affected by these changes and have remained relatively stable in Arizona.

Two check stations are run on opening day (September 1) for the dove season in Arizona. One check station is at Milligan Road, near Picacho, Arizona. The other check station is at Robbin's Butte, a state wildlife area managed by Arizona Game and Fish located west of Buckeye, Arizona. Both areas were chosen because they were popular with dove hunters and both have been monitored since 1968. The number of white-winged doves examined at the two check stations varies from year to year, and numbered in the thousands in the late 1960s and early 1970s. The number of dove hunters and doves monitored has since declined due to loss of hunters and changes in the bag limit. In a typical year, 250-500 doves are sampled to estimate the percent of young in the harvest. Since 1968 to the 2007 season, mean percent young was 63.3 (SE = 1.85, n = 40) (Table 1).

HARVEST

Hunting season dates and bag limits in Arizona have changed significantly during the past 60 years (Table 2; see Cottam and Trefethen 1968:320 for Arizona regulations prior to 1956), becoming much more restrictive since 1970. Arizona has conducted random mail surveys of general license holders to obtain harvest statistics specific to white-winged doves (Table 2, and Fig. 2). These surveys are sent to general license holders at the end of the season. From 1982 to 2001, the mean number of white-winged hunters per year sampled from this survey was 430. Results of the surveys are then multiplied by the estimated proportion of license holders that hunted doves each year.

In 2007, Arizona redefined the sampling frame for white-winged doves. Instead of surveying a random

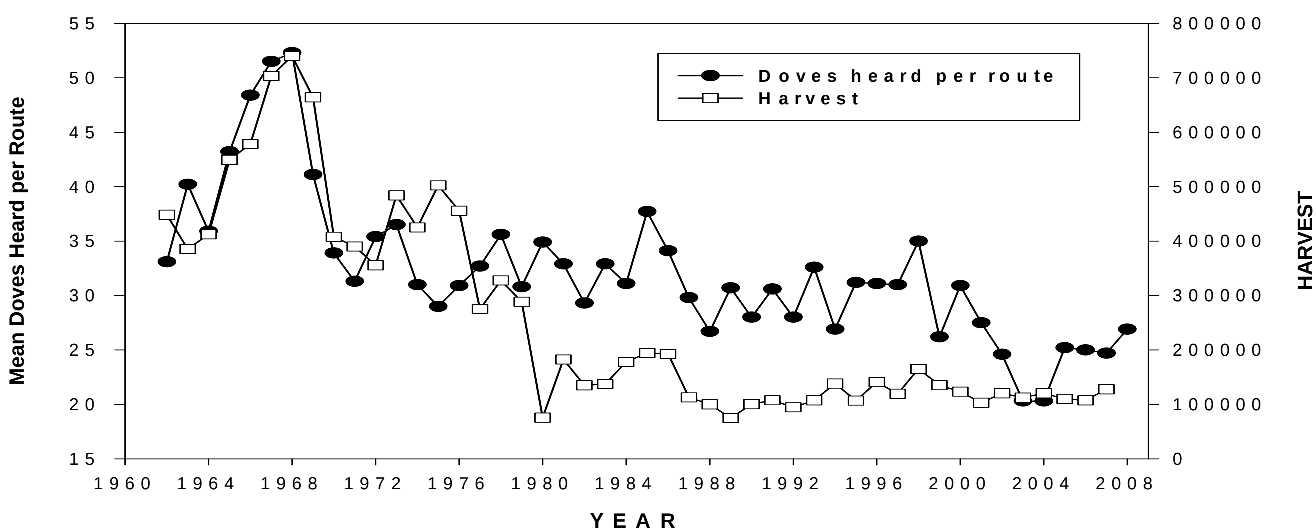

Figure 2. Arizona white-winged dove mean doves heard per route, 1975-2008, and estimated harvest, 1975-2007. Harvest estimates from 2002-2007 are Harvest Information Program estimates; prior to 2002, estimates are from Arizona Game and Fish Department's small game questionnaire.

sample of state hunting license holders, the 2007 survey sampled hunters who held migratory bird stamps only. This means that the Arizona and the Harvest Information Program Survey (HIP) are now using the same sampling frame, although the two questionnaire programs make no effort to survey the same hunters. In 2007, Arizona sampled 647 white-winged dove hunters. This new Arizona questionnaire is more likely to provide similar results as the HIP survey. In the past, Arizona estimates differed from HIP estimates, sometimes by a substantial amount. (Table 3).

White-winged dove populations in high-density nesting areas have been subjected to high hunting pressure, particularly during the 1960s when the bag limit in Arizona was 25 birds per day (Table 2). White-winged doves appear more vulnerable to over harvest than mourning doves (George 1993). A combination of high dove harvest in Arizona during the 1960s (Fig. 2), destruction of river-bottom nesting habitat, and a shift in agricultural crops (substantial shifts from cereal grains to cotton and other non-food crops) (Cunningham et al. 1977) was associated with declining harvests. In response, bag limits were reduced from 25 per day to 10 per day in 1970. Continued harvest declines prompted further reduction in bag limits (6 per day) in 1980 where they remain today. In 1988, season length was reduced from 3 weeks to 2 weeks and half day shooting was implemented in 1989 (Table 1).

The white-winged dove harvest in Arizona peaked in 1968 (740,000) and dropped to a plateau of about 400,000 for 7 or 8 years in the mid-1970s (Table 1). However, it has continued to decline. Although the specific levels of harvest estimates are likely inaccurate, the downward trend is real. The declining harvest trend can be partially attributed to hunting restrictions, but there clearly are far fewer white-winged doves in Arizona now than there were in the 1950s and 1960s. Recent discrepancies between the call-counts and harvest trends appears to be a function of the disproportionate weight given by the call-count survey to desert nesting populations that have not experienced as much habitat loss, changes in food availability, and high hunting pressure colonial nesting doves have. Arizona white-winged dove harvest appears to have stabilized since 1/2 day shooting hours were implemented in 1989 (Tables 1 and 2).

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Table 1. Mean number of white-winged doves heard per route, harvest from Arizona's harvest questionnaire, and percent young estimated in hunter bags from two check stations since 1962.

Year	Mean doves heard per route	Harvest	Percent young in bag
1962	33.1	448,398	
1963	40.2	385,249	
1964	35.9	412,542	
1965	43.2	549,045	
1966	48.4	578,166	
1967	51.5	703,157	
1968	52.3	740,079	57
1969	41.1	664,053	69
1970	33.9	407,921	58
1971	31.3	390,016	54
1972	35.4	355,633	79
1973	36.5	484,095	67
1974	31.0	425,127	75
1975	29.0	502,225	58
1976	30.9	455,692	66
1977	32.7	274,998	74
1978	35.6	327,555	65
1979	30.8	288,516	43
1980	34.9	75,611	51
1981	32.9	182,535	65
1982	29.3	134,981	61
1983	32.9	137,284	83
1984	31.1	177,957	82
1985	37.7	194,508	41
1986	34.1	192,734	69
1987	29.9	112,838	78
1988	26.7	99,955	78
1989	30.7	74,944	73
1990	28.0	100,163	71
1991	30.6	107,455	46
1992	30.8	94,551	63
1993	32.6	107,393	51
1994	26.9	138,080	44
1995	31.2	106,925	51
1996	31.1	140,974	63
1997	31.0	119,446	56
1998	35.0	165,190	41

Table 1. Continued.

Year	Mean doves heard per route	Harvest	Percent young in bag
1999	26.2	135,226	68
2000	30.9	123,259	70
2001	28.5	102,941	45
2002	24.6	186,532	61
2003	20.3	147,711	55
2004	20.3	86,355	69
2005	25.2	139,984	82
2006	25.0	236,126	60
2007	24.7	84,142	61
2008	26.9	NA	NA

Table 2. White-winged dove season dates, lengths, and bag possession limits since 1956 to present.

Year	Season Dates[1]	Season Length	Bag/possession Limits[2]
1956	9/1-10/4 & 12/8-23	34 & 16	12/15
1957	9/1-29 & 12/7-27	29 & 21	25/25
1958	9/1-28 & 12/13-1/3	27 & 23	25/25
1960	9/1-25 & 12/10-1/3	25 &25	25/25
1961	9/1-24 & 12/9-1/3	24 & 26	25/25
1962	9/1-24 & 12/8-1/2	24 & 26	25/25
1963	9/1-25 & 12/7-31	25 & 25	25/25
1964	9/1-27 & 12/12-1/3	27 & 23	25/25
1965	9/1 - 9/26	26	25/25
1966	9/1 - 9/26	25	25/25
1967	9/1 - 9/24	24	25/25
1968	9/1/24 & 12/11-1/5	24 & 26	25/25
1969	9/1-28 & 12/21-1/11	28 & 22	25/25
1970	9/1-20 & 12/12-1/10	20 & 30	10/10
1971	9/1-12	12	10/10
1972	9/1-12	12	10/10
1973	9/1-23	23	10/10
1974	9/1-22	22	10/10
1975	9/1-21	21	10/10
1976	9/1-20	20	10/10
1977	9/1-25	25	10/10
1978	9/1-24	24	10/10
1979	9/1-23	23	10/10
1980 [3]	9/1-28	28	(5/10 North.6/12 South)
1981	9/1-27	27	6/12
1982	9/1-26	26	6/12
1983	9/1-26	25	6/12
1984	9/1-23	23	6/12
1985	9/1-22	23	6/12
1986	9/1-21	22	6/12
1987	9/1-13	21	6/12
1988	9/1-11	13	6/12
1989	9/1/-10	10	6/12
1990	9/1-10	10	6/12
1991	9/1-10	10	6/12
1992	9/1-10	10	6/12
1993	9/1-12	12	6/12
1994	9/1-11	11	6/12

Table 2. Continued.

Year	Season Dates[1]	Season Length	Bag/possession Limits[2]
1995	9/1-10	10	6/12
1996	9/1-10	10	6/12
1997	9/1-14	14	6/12
1998	9/1-15	15	6/12
1999	9/1-15	15	6/12
2000	9/1-15	15	6/12
2001	9/1-15	15	6/12
2002	9/1-15	15	6/12
2003	9/1-15	15	6/12
2004	9/1-15	15	6/12
2005	9/1-15	15	6/12
2006	9/1-15	15	6/12
2007	9/1-15	15	6/12

[1] Federal white-winged dove frameworks have been set to coincide with those of mourning doves. The frameworks have allowed a white-winged dove season only during the first segment of a split mourning dove season from 1971 to present. From 1983–1986, all WMU states were permitted a mourning dove framework option (including white-wings in CA, AZ, and NV) of 60 days (45 in 1982) and 15/30 aggregate bag/possession.

[2] Between 1957 and 1979, mourning and white-winged doves had separate limits; since 1980, aggregate bag limits permitting either 10 or 12 doves, no more than 5 or 6 could be white-wings, have been in effect.

[3] Arizona was divided into a special white-winged dove zone and the remainder of the state in 1979. Hunting was permitted from noon to sunset during the first 3 days of the season in the special zone. In 1980, the state was divided into North and South zones, that latter having shooting hours of sunrise to noon. Since then season and bag limits have applied statewide.

Table 3. Harvest Information Program and Arizona Game and Fish Department Harvest questionnaire data from 1999 to 2007. Note the difference between the 2006 estimates and other years. In 2006, Arizona Game and Fish Department redesigned the questionnaire. The 2006 questionnaire had a 17% return rate and results are unreliable.

Harvest Information Program estimates			
Year	Hunters	Harvest	Hunter Days
1999	24,900	122,100	71,200
2000	19,600	84,500	56,400
2001	21,100	86,500	62,500
2002	22,700	120,400	72,700
2003	23,000	112,300	75,500
2004	24,200	120,300	81,200
2005	21,600	110,100	65,700
2006	18,300	107,400	56,500
2007	23,200	127,600	68,700
Arizona Harvest Questionnaire			
1999	26,689	143,129	89,709
2000	28,652	128,695	87,868
2001	21,180	102,941	77,462
2002	35,747	185,654	107,525
2003	26,598	147,711	86,120
2004	20,962	86,355	69,104
2005	29,057	139,984	98,477
2006	30,017	236,126	86,255
2007	13,852	84,142	46,203

BAND-TAILED PIGEON POPULATION STATUS, 2008

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Abstract: This report summarizes information on the abundance and harvest of band-tailed pigeons collected annually in the western United States and British Columbia. Annual counts of Interior band-tailed pigeons seen and heard per route have not changed ($P = 0.11$) since implementation of the Breeding Bird Survey (BBS) in 1966; however, they decreased ($P < 0.01$) over the last 10 years by a mean of 12.0 ± 2.1% ($\bar{x}$ ± SE). Current (2007) estimates of harvest and hunter participation were 4,800 ± 1,739 birds and 12,800 ± 2,155 hunter days afield. Composition of harvest was 20.5% hatching year birds. For Pacific Coast band-tailed pigeons, annual BBS counts of birds seen and heard per route have decreased ($P = 0.06$) by a mean of 1.3 ± 0.7% since 1966, but they have not changed ($P = 0.66$) over the last 10 years. According to the Pacific Coast Mineral Site Survey, annual counts of Pacific Coast band-tailed pigeons seen per mineral site have increased ($P = 0.01$) since the survey was experimentally implemented in 2001 by a mean of 7.1 ± 2.9%. Current (2007) estimates of harvest and hunter participation were 12,700 ± 2,073 birds and 13,500 ± 2,066 hunter days afield. Composition of harvest was 17.2% hatching year birds. Current estimates of the age-related vulnerability to harvest for these populations are unknown.

Maintenance of band-tailed pigeon (*Patagioenas fasciata*) populations in a healthy, productive state is a primary management goal. To this end, management of these birds includes assessment of population status, regulation of harvest, and habitat management. Surveys are conducted annually in the western United States and British Columbia by state, federal, and local biologists to monitor band-tailed pigeon populations. The resulting information on status and trends is used by wildlife administrators in setting annual hunting regulations.

Band-tailed pigeons are cooperatively managed among States and the U.S. Fish and Wildlife Service, and is detailed in population (Interior and Pacific Coast) specific management plans (Pacific Flyway Study Committee and Central Flyway Webless Migratory Game Bird Technical Committee 2001, Pacific Flyway Study Committee 1994).

Comprehensive material on the life history of the band-tailed pigeon may be found in Keppie and Braun (2000), Braun (1994), Jarvis and Passmore (1992), and Neff (1947).

The primary purpose of this report is to facilitate the prompt distribution of timely information. Results are preliminary and may change with the inclusion of additional data.

DISTRIBUTION AND ABUNDANCE

Two subspecies of band-tailed pigeon occur north of Mexico, each in a disjunct geographic distribution in western North America: Pacific Coast and U.S. Interior regions (Fig. 1). The coastal race (*P. f. monilis*) breeds from extreme southeastern Alaska and western British Columbia south into Washington, Oregon, California, and extreme western Nevada, primarily west of the Cascade and Sierra Nevada ranges, into Baja California; and winters from central California into northern Baja California. Some in Mexico and southern California and the few wintering north of southern California may represent non-migratory population segments. The interior race (*P. f. fasciata*) breeds from northern Colorado and eastcentral Utah south through Arizona, New Mexico, extreme western Texas into the Sierra Madre Occidental of Mexico; and winters from northern Mexico south to at least Michoacon. Some interchange occurs between races (Schroeder and Braun 1993).

Little is known about the demographics of band-tailed pigeon populations because their habits and habitat make it impractical to locate and observe or trap an adequate sample of birds. However, in the early 1970s the total population size was approximated at 2.9–7.1 million birds in Pacific Coast region and <250,000 birds in the

Figure 1. Distribution of band-tailed pigeons in North America (after Braun et al. 1975).

Interior region (estimated from harvest reports and band recovery rates, Braun 1994), which demonstrates the likely sizes and disparity between the two populations.

ECOLOGY

Band-tailed pigeons primarily inhabit coniferous forests. They are highly mobile; individuals potentially traveling long distances (up to about 32 miles) daily to feed and drink. Their diet includes buds, flowers, and fruits of deciduous trees and shrubs, especially oak, madrone, elder, cherry, cascara, huckleberry, and blackberry, but varies seasonally and with location. Early migrants are readily attracted to grain fields and fruit orchards dispersed below the forested hills where they nest, particularly before the onset of natural foods, which are preferred. Adults, especially in summer and particularly the Pacific Coast region, frequently visit natural springs and water bodies high in mineral salts where they drink and peck at the soil between long bouts of roosting in nearby trees.

Band-tailed pigeons nest primarily in conifers, occasionally in hardwoods and shrubs, within closed-canopy conifer or mixed hardwood and conifer forest stands. Nests are loosely constructed twig platforms. Placement is highly variable ranging 6–120 feet above ground, but is generally near the bole and in dense foliage. Adults are presumably monogamous, and most clutches have one egg, however, some nesting pairs may complete up to three nesting cycles a year in mild climates offering long nesting seasons. Both parents incubate the egg and brood the squab. Nestlings are fed curdlike crop milk formed from the inside lining of the crop of both adults.

MONITORING METHODS

The Breeding Bird Survey

The North American Breeding Bird Survey (BBS) is an all bird survey that also provides an annual index to abundance of both Interior and Pacific Coast populations of band-tailed pigeons (Sauer et al. 2007). The survey is based on thousands of routes distributed along secondary roads across the United States and Canada. Each route is 24.5 miles in length and consists of 50 stops or count locations at 0.5 mile intervals. At each stop, a 3-minute count is conducted whereby every bird seen within a 0.25 radius or heard is recorded. Surveys start one-half hour before local sunrise and take about 5 hours to complete. Data for birds heard and seen at stops are combined for BBS analyses.

Mineral Site Survey

The Mineral Site Survey (MSS) was developed to provide an annual index to abundance of Pacific Coast band-tailed pigeons. This survey is based on work by U.S. Geological Survey scientists who examined the effectiveness of existing survey methods in detecting long- and short-term population changes. Past monitoring efforts for the Pacific Coast population relied on the BBS, which includes all birds, and other band-tailed pigeon specific surveys in Oregon (visual counts at mineral sites in August) and Washington (audio counts along transects in June). There was no specific monitoring program in California or British Columbia. Their results suggested that short-term (3- to 5-year) trends were most reliably estimated using mineral site surveys adopted from the Oregon protocol (Casazza et al 2005). Additional research illustrated impacts of rainfall on mineral site surveys (Overton et al. 2005).

The MSS was developed and initiated on an experimental basis in 2001 (Casazza et al. 2003), and became operational in 2004. The survey is a coordinated effort among State and Provincial wildlife agencies in California, Oregon, Washington, and British Columbia, and the U.S. Fish and Wildlife Service. The MSS involves a visual count of band-tailed pigeons at select mineral sites (n = about 60, final site selection to be determined) throughout the populations range (14 in California, 28 in Oregon, 14 in Washington, and 4 in British Columbia) during July from one-half hour before sunrise to noon. These counts provide an index of abundance. Unfortunately, a similar survey for Interior band-tailed pigeons is not possible because use of mineral sites is primarily limited to the Pacific Coast region (Sanders and Jarvis 2000).

Harvest Information Program

In past years, a compilation of non-uniform, periodic state harvest surveys have been used to obtain rough estimates of the number of band-tailed pigeon hunters and birds killed. Thus, the data were of limited use at a population range level. Those data are no longer collected by states (with the exception of possibly New Mexico).

Wildlife professionals have long recognized that reliable harvest surveys are needed to estimate the magnitude of harvests and monitor the impact of hunting. Since 1952, the U.S. Fish and Wildlife Service (Service) has conducted a national harvest survey (Mail Questionnaire Survey), but it was based on a sampling frame that included waterfowl hunters and so harvest of non-waterfowl species could not be estimated reliably. To remedy this problem and challenges associated with combining state surveys, the Service and state wildlife agencies initiated the national, Migratory Bird Harvest Information Program (HIP) in 1992. This Program was designed to enable the Service to conduct nationwide surveys that provide reliable annual estimates of the harvest of band-tailed pigeons and other migratory game bird species. Under HIP, states provide the Service with the names and addresses of all licensed migratory bird hunters each year, and the Service conducts surveys to estimate the harvest and hunter effort in each state. All states except Hawaii have participated in this Program since 1998. However, estimates of band-tailed pigeon harvest and hunter participation were not available until 1999.

Parts Collection Survey

The Parts Collection Survey (PCS) is a secondary component of the national harvest survey, currently HIP, which began in 1961. PCS is the primary means by which the composition (species, age, and sex) of the annual harvest is assessed. The survey randomly selects a sample of hunters registered with HIP. These persons are sent envelopes in which to return one wing from each bird harvested. All wings received annually are examined at wing bees, one in each of the four flyways, in which the wings are categorized by species, age, and sex. Band-tailed pigeons were included in PCS in 1994.

MONITORING RESULTS

The Breeding Bird Survey

Results of BBS are presented in Tables 1–3. According to the BBS survey, there is little evidence (P = 0.11) that annual counts of Interior band-tailed pigeons seen and heard per route have changed since survey implementation in 1966 or over the last 5 years (P = 0.83). However, there is evidence that these counts decreased (P < 0.01) over the last 10 years by a mean of 12.0 ± 2.1% ($\bar{x}$ ± SE). For Pacific Coast band-tailed pigeons, there is evidence that annual counts decreased (P = 0.06) since 1966 by a mean of 1.3 ± 0.7%, but increased (P = 0.02) over the last 5 years by a mean of 9.2 ± 3.8%. There is no evidence (P = 0.66) that annual counts changed over the last 10 years. Caution should be used in interpreting results, particularly for the Interior region, because sample sizes (routes) and pigeon counts per route are low, variances are high, and coverage of habitat by BBS routes is poor.

Mineral Site Survey

Results of MSS are presented in Tables 4–6. According to the MSS survey, there is evidence (P = 0.01) that annual counts of Pacific Coast band-tailed pigeons per mineral site increased since the survey was experimentally implemented in 2001 by a mean of 7.1 ± 2.9%. There is no evidence that these counts changed over the last 5 years (P = 0.74), or over the last 4 years (P = 0.99) when the survey was formally implemented. Caution should be used in interpreting P-values because they are approximate based on Wald's test. Evaluation of confidence intervals and whether or not they include 0 may be more reliable. Confidence intervals are based on bootstrap methods and may be asymmetrical.

In comparison to results obtained from the BBS during the same 5-year time period (2003–2007), both surveys show evidence of stable or increasing counts of Pacific Coast band-tailed pigeons. MSS indicated annual counts of birds seen per mineral site did not change ($P = 0.74$, mean = 1.3 ± 3.8%) while BBS indicated annual counts of birds seen and heard per route increased ($P = 0.02$) by a mean of 9.2 ± 3.8%. The reason for the discrepancy in the magnitude of the trend estimate between these two surveys is unknown.

Harvest Information Program

Results of HIP are presented in Tables 7–9 for Interior band-tailed pigeons and Tables 10–12 for Pacific Coast band-tailed pigeons. According to preliminary estimates from 2007, total harvest and hunter participation for Interior band-tailed pigeons were 4,800 ± 1,739 birds and 12,800 ± 2,155 hunter days afield. Total harvest and hunter participation for Pacific Coast band-tailed pigeons were 12,700 ± 2,073 birds and 13,500 ± 2,066 hunter days afield. The season was closed in Washington from 1991 through 2001.

Parts Collection Survey

Results of PCS are presented in Tables 13 and 14. Data from 2007 show that the composition of the Interior band-tailed pigeon harvest was comprised of 20.5% hatching year birds based on a total sample of 44 birds. Composition of the Pacific Coast band-tailed pigeon harvest was comprised of 17.2% hatching year birds based on a total sample of 443 birds. The season was closed in Washington from 1991 through 2001. Caution should be used in interpreting state specific estimates with small sample size. Also, numbers are an index to recruitment and not adjusted for differential vulnerability to harvest between age classes. Consequently, the annual composition of harvest may not be representative of the population.

There is not adequate data to evaluate current differential vulnerability rates between young and adult birds (young:adult). There is however some data for male and females combined during 1968–1976 for the Interior population and during 1962–1977 for the Pacific Coast population. Estimates are variable among years and range from 0.20 ± 0.20 to 5.62 ± 5.92 with a mean of
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1.90 ± 0.60 for the Interior population and 0.55 ± 0.24 to 1.54 ± 0.81 with a mean of 1.05 ± 0.10 for the Pacific Coast population. Possibly young are nearly twice as likely to be harvested compared to adults in the Interior population, whereas young and adult birds alike have nearly equal probability of harvest in the Pacific Coast population. The difference in age-related vulnerability between the populations may be related to the use of mineral sites by the Pacific Coast population and associated exposure to harvest. It is unknown whether these mean age-related vulnerability estimates apply to more recent years. But if they do, then the proportion of young in the Interior population may be about half of that estimated from the Parts Collection Survey, whereas the proportion of young in the Pacific Coast population may be as estimated from the Parts Collection Survey.

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Table 1. Trend estimates (expressed as a mean annual percentage change in abundance over the time period) of band-tailed pigeons seen and heard along routes from the Breeding Bird Survey, 1966–2007 (42-year trend). No estimate for Utah was available.

	Trend					$\bar{x}$ birds	
Region	$\bar{x}$	SE	LCI	UCI	*P*-value	per route	Routes
Interior	-3.2	1.9	-7.0	0.6	0.11	0.6	33
Arizona	-0.7	7.4	-15.2	13.8	0.92	0.8	11
Colorado	8.7	7.0	-5.0	22.4	0.24	0.2	12
New Mexico	-9.0	1.6	-12.0	-6.0	0.00	1.1	9
Pacific Coast	-1.3	0.7	-2.7	0.1	0.06	2.7	197
British Columbia	-3.4	1.2	-5.8	-1.1	0.01	2.2	28
California	-0.5	1.3	-3.1	2.1	0.72	2.7	107
Oregon	-0.7	1.0	-2.5	1.2	0.51	3.8	33
Washington	-0.5	0.9	-2.3	1.3	0.59	3.5	29

Table 2. Trend estimates (expressed as a mean annual percentage change in abundance over the time period) of band-tailed pigeons seen and heard along routes from the Breeding Bird Survey, 1997–2007 (10-year trend). No estimate for Utah was available.

	Trend					$\bar{x}$ birds	
Region	$\bar{x}$	SE	LCI	UCI	*P*-value	per route	Routes
Interior	-12.0	2.1	-16.0	-7.9	<0.01	0.60	21
Arizona	-8.3	4.6	-17.3	0.7	0.14	0.71	6
Colorado	-14.4	13.1	-40.1	11.3	0.33	0.17	6
New Mexico	-12.6	3.3	-19.1	-6.1	0.01	1.44	8
Pacific Coast	1.6	3.6	-5.5	8.7	0.66	2.26	136
British Columbia	7.0	5.6	-3.9	18.0	0.23	1.22	17
California	9.3	2.2	5.1	13.6	0.00	2.72	71
Oregon	-0.4	3.1	-6.4	5.7	0.91	2.92	25
Washington	-10.2	9.1	-28.0	7.6	0.27	4.25	23

Table 3. Trend estimates (expressed as a mean annual percentage change in abundance over the time period) of band-tailed pigeons seen and heard along routes from the Breeding Bird Survey, 2002–2007 (5-year trend). No estimate for Utah and Colorado were available.

	Trend					$\bar{x}$ birds	
Region	$\bar{x}$	SE	LCI	UCI	*P*-value	per route	Routes
Interior	-2.6	11.5	-25.1	19.8	0.83	0.44	11
Arizona	-29.3	0.4	-30.1	-28.4	0.01	0.49	3
New Mexico	24.7	11.1	3.0	46.4	0.09	1.05	6
Pacific Coast	9.2	3.8	1.8	16.5	0.02	1.85	97
British Columbia	18.4	25.3	-31.2	67.9	0.49	0.93	9
California	7.9	4.2	-0.3	16.2	0.07	2.57	55
Oregon	7.6	5.7	-3.6	18.8	0.20	2.07	18
Washington	9.3	8.8	-8.1	26.6	0.31	3.07	15

Table 4. Trend estimates of band-tailed pigeons seen at mineral sites from the Mineral Site Survey, 2001–2007 (7-year trend, all data available). Trends are expressed as a mean annual percentage change in abundance over the time period, with a bootstrapped standard error and 95% lower (LCI) and upper (UCI) confidence intervals. The *P*-values are approximate based on Wald's test.

	Trend					$\bar{x}$ birds	
Region	$\bar{x}$	SE	LCI	UCI	*P*-value	per site	Sites
Pacific Coast	7.1	2.9	1.8	13.1	0.01	175.5	60
British Columbia	16.1	8.2	4.1	32.2	0.05	125.3	4
California	-1.3	4.7	-12.4	5.9	0.99	63.8	14
Oregon	11.6	4.1	5.9	22.3	0.01	241.0	28
Washington	2.3	3.5	-5.1	8.5	0.42	186.2	14

Table 5. Trend estimates of band-tailed pigeons seen at mineral sites from the Mineral Site Survey, 2003–2007 (5-year trend). Trends are expressed as a mean annual percentage change in abundance over the time period, with a bootstrapped standard error and 95% lower (LCI) and upper (UCI) confidence intervals. The *P*-values are approximate based on Wald's test.

	Trend					$\bar{x}$ birds	
Region	$\bar{x}$	SE	LCI	UCI	*P*-value	per site	Sites
Pacific Coast	1.3	3.8	-6.6	8.2	0.74	143.8	56
British Columbia	27.1	18.7	1.8	67.0	0.15	135.9	4
California	2.1	5.3	-8.4	12.5	0.70	71.4	14
Oregon	4.6	5.0	-4.3	14.9	0.35	166.5	24
Washington	-3.7	4.3	-12.0	3.8	0.99	194.0	14

Table 6. Trend estimates of band-tailed pigeons seen at mineral sites from the Mineral Site Survey, 2004–2007 (4-year trend, since official implementation). Trends are expressed as a mean annual percentage change in abundance over the time period, with a bootstrapped standard error and 95% lower (LCI) and upper (UCI) confidence intervals. The *P*-values are approximate based on Wald's test.

	Trend					$\bar{x}$ birds	
Region	$\bar{x}$	SE	LCI	UCI	*P*-value	per site	Sites
Pacific Coast	-2.0	3.3	-44.2	4.3	0.99	145.4	56
British Columbia	-6.6	20.3	-8.1	32.8	0.99	156.8	4
California	2.7	5.5	-4.1	13.4	0.62	79.1	14
Oregon	4.6	4.9	-17.3	15.2	0.34	166.5	24
Washington	-8.8	4.3	-8.4	-1.0	0.99	190.9	14

Table 7. Harvest estimates (mean and 95% confidence interval ½ width expressed as percent of the mean) for Interior band-tailed pigeon from the Harvest Information Program, 1999–2007. The most recent year estimates are preliminary.

	Arizona		Colorado		New Mexico		Utah		Total	
Year	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI
1999	500	154	700	129	0	0	100	69	1,300	94
2000	2,300	110	1,700	147	400	122	300	192	4,600	78
2001	400	118	600	94	600	126	300	169	2,000	62
2002	1,000	153	100	117	600	158	400	149	2,100	89
2003	1,400	126	900	97	400	65	100	132	2,900	70
2004	1,400	120	500	57	700	115	200	136	2,800	68
2005	2,200	105	100	113	300	106	100	193	2,700	86
2006	500	56	600	76	100	109	400	95	1,600	42
2007	1,000	101	900	102	2,800	113	200	195	4,800	71

Table 8. Active hunter estimates (mean and 95% confidence interval ½ width expressed as percent of the mean) for Interior band-tailed pigeon from the Harvest Information Program, 1999–2007. The most recent year estimates are preliminary.

	Arizona		Colorado		New Mexico		Utah		Total[a]	
Year	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI
1999	700	105	100	113	100	121	<50	46	900	
2000	600	79	400	95	300	67	<50	192	1,300	
2001	500	65	500	61	500	53	200	97	1,800	
2002	400	85	200	101	300	81	200	98	1,000	
2003	1,500	61	400	71	400	67	300	81		
2004	900	56	300	29	100	103	50	92		
2005	800	69	200	46	100	109	100	134		
2006	600	73	900	52	100	172	200	92		
2007	2,100	43	1,400	45	800	47	300	86	4,600	

[a] Estimates in total may be biased high because the HIP sample frames are state-specific; therefore, hunters are counted multiple times if they hunt in more than one state.

Table 9. Days afield estimates (mean and 95% confidence interval ½ width expressed as percent of the mean) for Interior band-tailed pigeon from the Harvest Information Program, 1999–2007. The most recent year estimates are preliminary.

	Arizona		Colorado		New Mexico		Utah		Total	
Year	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI
1999	2,000	97	300	122	300	158	100	50	2,700	76
2000	1,600	83	2,800	107	900	75	300	192	5,600	60
2001	1,000	71	800	54	1,800	64	700	133	4,300	39
2002	1,000	110	400	105	900	109	500	104	2,800	58
2003	3,700	77	2,100	89	1,400	75	600	136	7,900	47
2004	2,300	80	700	35	300	92	100	72	3,400	55
2005	1,600	74	300	51	400	140	200	142	2,500	54
2006	1,100	70	1,700	63	300	163	200	87	3,300	43
2007	5,000	57	3,800	56	3,600	62	400	73	12,800	33

Table 10. Harvest estimates (mean and 95% confidence interval ½ width expressed as percent of the mean) for Pacific Coast band-tailed pigeon from the Harvest Information Program, 1999–2007. The season was closed in Washington from 1991 through 2001, and estimates are not available until 2002. The most recent year estimates are preliminary.

	California		Oregon		Washington		Total	
Year	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI
1999	19,300	101	3,800	42			23,100	85
2000	12,200	65	4,100	92			16,300	54
2001	8,300	49	5,000	45			13,200	35
2002	4,200	39	4,000	36			8,200	27
2003	8,000	50	4,900	33	1,500	78	14,400	31
2004	14,300	45	3,300	44	300	160	17,900	37
2005	11,100	58	1,400	34	1,000	84	13,500	48
2006	12,500	40	1,500	25	900	97	14,900	34
2007	9,700	39	1,400	74	1,700	61	12,700	32

Table 11. Active hunter estimates (mean and 95% confidence interval ½ width expressed as percent of the mean) for Pacific Coast band-tailed pigeon from the Harvest Information Program, 1999–2007. The season was closed in Washington from 1991 through 2001, and estimates are not available until 2002. The most recent year estimates are preliminary.

	California		Oregon		Washington		Total[a]	
Year	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI
1999	3,900	48	1,500	47			5,400	
2000	5,600	37	1,700	46			7,300	
2001	2,600	34	1,700	31			4,200	
2002	2,500	30	1,300	25			3,800	
2003	4,600	38	1,800	24	1,000	23		
2004	4,700	37	1,500	36	500	64		
2005	3,900	39	500	14	700	58		
2006	6,000	35	400	13	500	61		
2007	4,900	33	700	113	900	44	6,500	

[a] Estimates in total may be biased high because the HIP sample frames are state-specific; therefore, hunters are counted multiple times if they hunt in more than one state.

Table 12. Days afield estimates (mean and 95% confidence interval ½ width expressed as percent of the mean) for Pacific Coast band-tailed pigeon from the Harvest Information Program, 1999–2007. The season was closed in Washington from 1991 through 2001, and estimates are not available until 2002. The most recent year estimates are preliminary.

	California		Oregon		Washington		Total	
Year	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI	$\bar{x}$	CI
1999	9,100	54	3,500	33			12,600	40
2000	10,000	41	3,800	61			13,800	34
2001	7,500	39	4,700	39			12,200	28
2002	4,600	35	3,400	28			7,900	23
2003	11,500	52	5,100	29	1,600	58	18,300	34
2004	9,700	36	3,400	35	800	83	13,900	27
2005	8,800	47	1,300	21	1,000	62	11,000	38
2006	13,500	47	1,200	20	700	68	15,400	41
2007	10,600	37	1,200	69	1,800	60	13,500	30

Table 13. Age structure of Interior band-tailed pigeons determined from hunter shot birds during September, 1994 to 2007. Values are percentage of hatch year birds (%), number of hatch year birds (n), and number of both hatch year and after hatch year birds examined (N).

	Arizona			Colorado			New Mexico			Utah			Total		
Year	%	n	N	%	n	N	%	n	N	%	n	N	%	n	N
1994	24.6	16	65	66.7	4	6	28.6	14	49			0	28.3	34	120
1995	60.0	6	10	28.9	52	180	19.0	12	63	54.5	6	11	28.8	76	264
1996	0.0	0	1	38.5	5	13	34.1	15	44			0	34.5	20	58
1997	33.3	7	21	31.5	17	54	15.5	13	84			0	23.3	37	159
1998	48.4	15	31	20.0	2	10	10.0	2	20	16.7	1	6	29.9	20	67
1999	13.0	3	23	33.3	6	18	24.1	7	29			0	22.9	16	70
2000	41.7	30	72	11.8	2	17	26.9	18	67	0.0	0	3	31.4	50	159
2001	52.9	9	17			0	23.5	4	17	33.3	1	3	37.8	14	37
2002	53.9	55	102	27.3	3	11	50.8	32	63	8.3	1	12	48.4	91	188
2003			0			0	33.3	1	3			0	33.3	1	3
2004	34.8	8	23			0	40.0	4	10			0	36.4	12	33
2005	15.4	2	13	66.7	8	12	0.0	0	3			0	35.7	10	28
2006	11.5	6	52	20.0	4	20	29.9	20	67			0	21.6	30	139
2007	20.5	9	44										20.5	4	44

Table 14. Age structure of Pacific Coast band-tailed pigeons determined from hunter shot birds during September through December, 1994 to 2007. Values are percentage of hatch year birds (%), number of hatch year birds (n), and number of both hatch year and after hatch year birds examined (N). The season was closed in Washington from 1991 through 2001.

	California			Oregon			Washington			Total		
Year	%	n	N	%	n	N	%	n	N	%	n	N
1994	44.6	226	507	22.9	131	571			0	33.1	357	1078
1995	29.6	74	250	20.1	109	542			0	23.1	183	792
1996	27.9	68	244	15.1	38	252			0	21.4	106	496
1997	31.1	65	209	17.7	64	361			0	22.6	129	570
1998	32.0	81	253	18.4	45	244			0	25.4	126	497
1999	33.2	119	358	20.1	79	394			0	26.3	198	752
2000	32.1	69	215	17.5	58	332			0	23.2	127	547
2001	22.9	33	144	17.0	46	271			0	19.0	79	415
2002	31.5	52	165	14.1	33	234	3.8	22	180	18.5	107	579
2003	34.4	72	209	21.2	49	231	3.1	17	112	25.0	138	552
2004	25.2	33	131	19.6	38	194	2.6	9	27	22.7	80	352
2005	18.8	25	133	13.3	24	180			0	15.7	49	313
2006	18.1	47	260	19.0	48	253	13.6	6	44	18.1	101	557
2007	24.8	34	137	14.3	36	251	10.9	6	55	17.2	76	443

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