

Western Management Unit Mourning Dove



This management plan is one of a series of cooperatively developed plans for managing various species of migratory birds of the Pacific Flyway. Inquiries about this plan may be directed to member states of the Pacific Flyway Council or to the Pacific Flyway Representative, U.S. Fish and Wildlife Service, 911 N.E. 11th Avenue, Portland, OR 97232

PACIFIC FLYWAY MANAGEMENT PLAN
FOR THE
WESTERN MANAGEMENT UNIT MOURNING DOVE

Prepared for the:

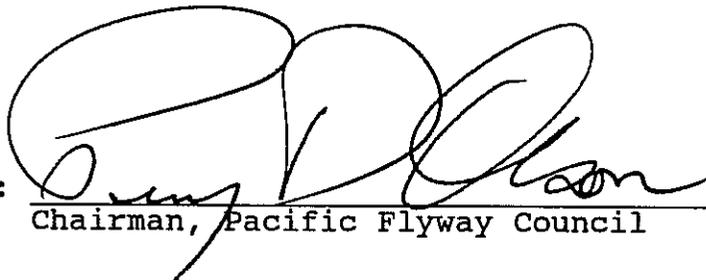
Pacific Flyway Council
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Prepared by:

Subcommittee on Mourning Doves
Western Migratory Upland Game Bird Technical Committee

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Approved by:



Chairman, Pacific Flyway Council

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FOR THE
WESTERN MANAGEMENT UNIT MOURNING DOVE

Prepared by the WMU Mourning Dove Subcommittee of the Western
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I. INTRODUCTION

The mourning dove is one of 14 species of Columbidae occurring in North America north of Mexico (Aldrich in press). Five subspecies are recognized in North and Middle America and in the West Indies (Ridgway 1916, Aldrich and Duvall 1958). The breeding range of the Western mourning dove (Zenaida macroura marginella) extends from British Columbia and the Prairie Provinces of Canada to central Mexico and from approximately the eastern borders of Nebraska and Kansas to the West Coast (Dolton 1991). Mourning doves in the United States are managed by population in three management units: Eastern (EMU); Central (CMU); and Western (WMU) (Figure 1). The management units are further divided into subunits; in the WMU, the subunits are Coastal (Washington, Oregon, and California) and Interior (Nevada, Idaho, Utah, and Arizona). Mourning doves breeding within the WMU and each of the subunits seldom move outside those boundaries except for migration into Mexico.

Since 1966, WMU dove populations, as measured by the annual call-count survey, have exhibited a significant long-term decline. Although particularly apparent in the Coastal Subunit, the decline is seen in all states of the WMU. Concurrent declines in dove harvest also have been noted.

The purpose of this management plan is to provide guidelines for cooperative management of the mourning dove throughout its range in the WMU.

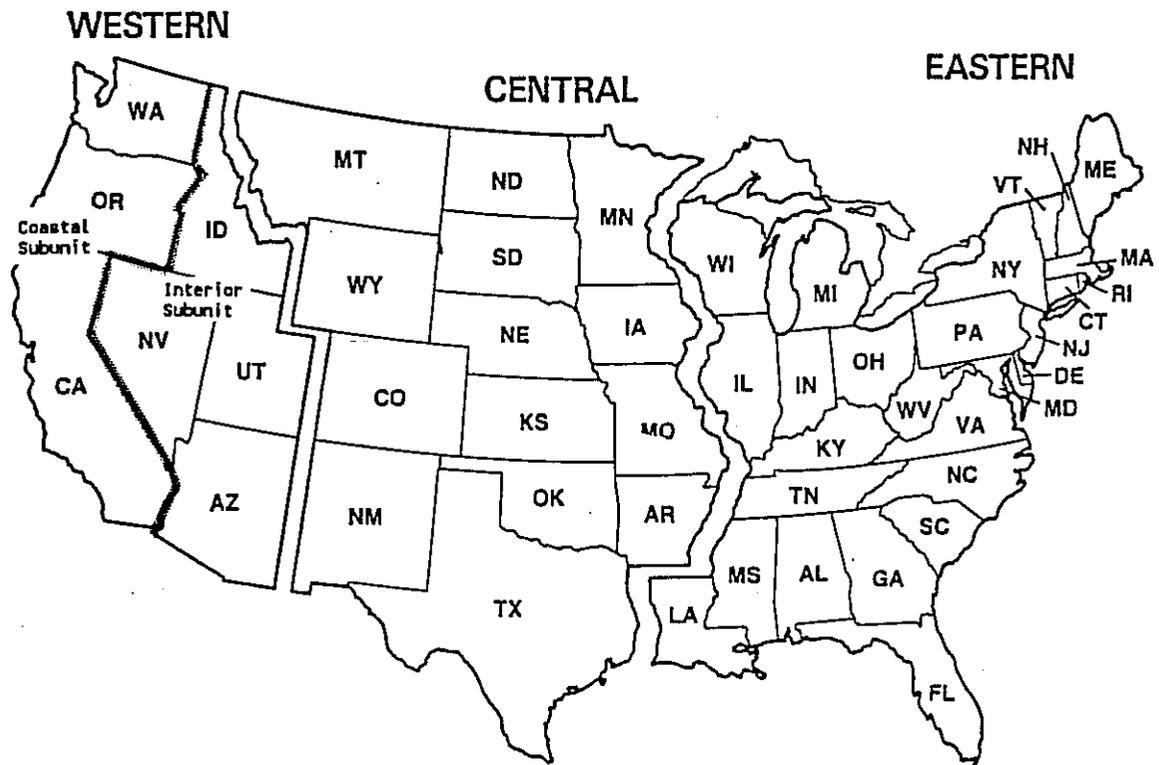


Figure 1. Mourning Dove Management Units and Subunits.

II. GOALS AND OBJECTIVES

The goal of this management plan is to maintain the WMU population of mourning doves and its habitat at levels consistent with optimum distribution, density, and recreational uses of the resource.

Objectives of this management plan are to:

- A. Determine the causes for dove mourning dove population declines in the WMU and establish procedures to reverse the trends.
- B. Increase the population levels of WMU mourning doves to a point where call-count indices average no less than 16 and 15 in the Coastal and Interior Subunits, respectively. This target may be revised in accordance with information gained under Objective A in updated versions of the plan.
- C. Increase and maintain adequate habitat to sustain the current seasonal distribution of WMU mourning doves throughout their range. The important habitat components are:
 1. Appropriate structures for nesting and roosting (trees).
 2. Food and water sources.
- D. Maximize the potential for sustained consumptive and non-consumptive uses of the mourning dove resource in the WMU. Preliminary goals for sustained annual harvest are 4 million in the Coastal Subunit and 2 million in the Interior Subunit (to be revised as necessary using information gained under Objective A).

It is proposed that a subcommittee be designated by the Western Migratory Upland Game Bird Technical Committee to review and implement this management plan. Composition of the subcommittee should be comprised of, but not limited to, representatives from state and federal agencies having management responsibility for WMU mourning dove populations.

III. STATUS

Description

WMU mourning doves are medium-sized birds with long pointed tails; overall length ranges from about 28-33 cm and weight averages about 127 g for males and 116 g for females (Keeler 1977, MBMO files). Adult doves give an overall gray-brown appearance; the Western race is paler and slightly smaller than the Eastern race. Males have a bluish crown and pink breast whereas females exhibit a muted gray and tan in these areas. See Baskett et al. (in press) for a more complete description.

Distribution

The breeding range of WMU mourning doves encompasses a wide variety of habitat types throughout the seven western states of the United States, southern British Columbia and Alberta in Canada, and northern Sonora and Baja California in Mexico. WMU doves are highly adaptable and occur in most ecological types except marshes and heavily forested areas (Tomlinson et al. 1988). Nesting habitat varies from open grasslands where ground nesting is common, to deserts where cacti and mesquite are used, to trees and shrubs in urban areas. They nest along forest edges, in desert brush, in orchards, in riparian habitats, and in cities and towns from sea level to about 2,200 m in elevation. Doves primarily are seed eaters and adapt readily to agricultural environments where the main food sources are wheat, sorghum, and corn as well as a large variety of weed seeds associated with farming practices. Stock tanks and irrigation developments, as well as natural occurring water sources, provide drinking needs.

Winter range of WMU mourning doves extends mainly from southern California and Arizona south to a 5-state area in Mexico (Jalisco, Michoacan, Guerrero, Colima, and Guanajuato) referred to by Tomlinson et al. (1988) as the Western Highlands (Figure 2). Although some doves remain north of central California and southern Arizona during the winter, they represent a small percentage of the total. Similarly, essentially no WMU mourning doves migrate farther south than the Western Highlands into southern Mexico and Central America. On the wintering grounds, as in nesting areas, doves seek out agricultural areas for food and water.

Population Numbers and Density

Breeding mourning dove populations are monitored annually by the nationwide call-count survey (Dolton 1991). During the past

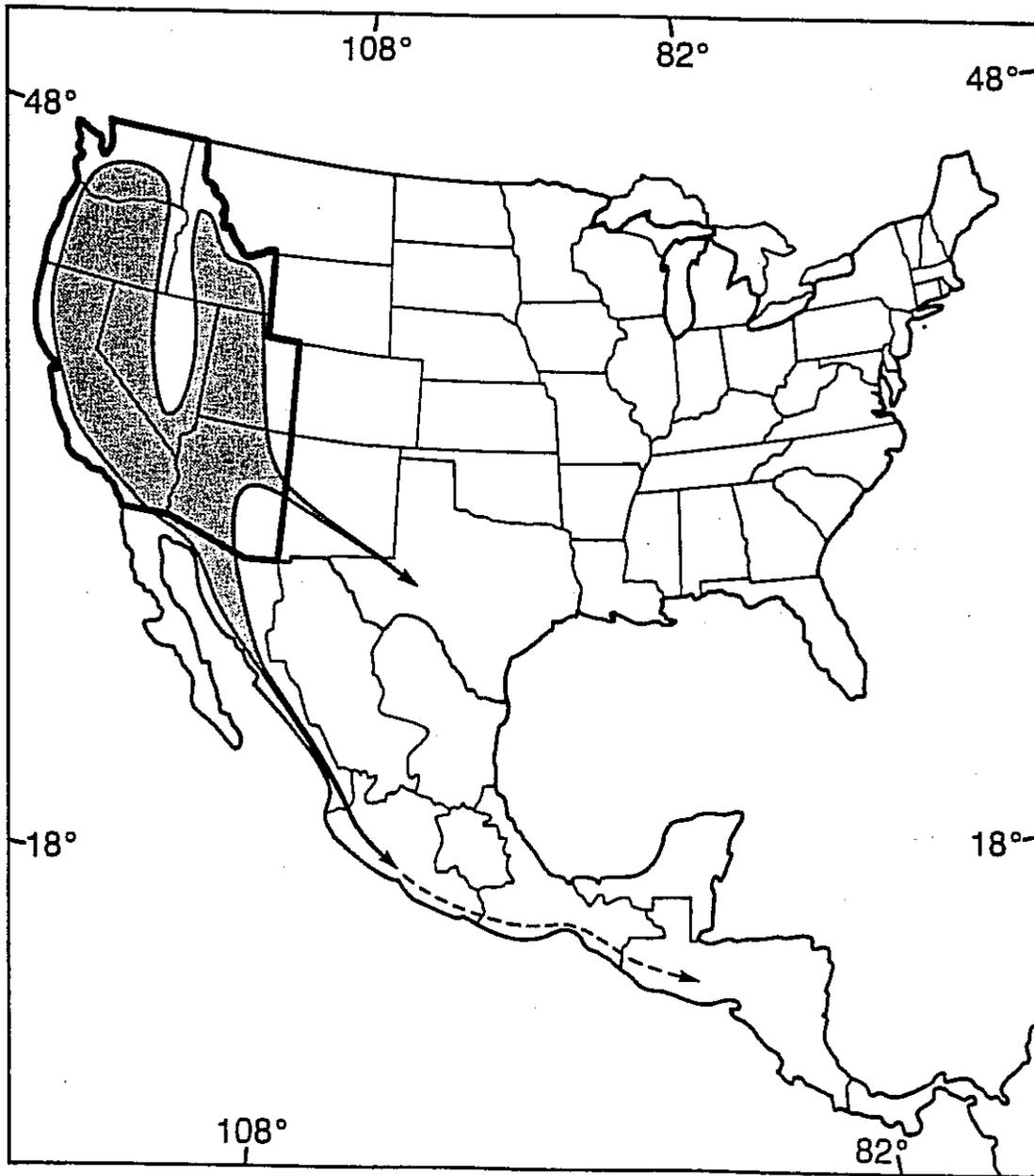


Figure 2. General distribution of mourning doves banded in the Western Management Unit (from Baskett et al. in press).

26 years (1966-1991) WMU dove population indices have declined steadily at a rate of 2.7% per year ($P < 0.01$) (Table 1). The Breeding Population Index has dropped from 19.6 (1966-1970) to 10.0 (1987-1991) (Table 2). Although the decline is most apparent in the Coastal Subunit (-3.9% per year, $P < 0.01$), it is also manifest in the Interior Subunit (-2.1% per year, $P < 0.05$) (Table 1).

Survival estimates calculated for doves banded during 1964-1974 varied considerably among WMU states; however, the unit-wide unweighted average survival rate estimates for adults and immatures were 52.4 and 34.0%, respectively (Tomlinson et al. 1988). Comparative survival rate estimates in the CMU were 52.7 and 43.8% for adults and immatures; the WMU immature survival rate estimate was significantly lower ($P < 0.05$) than for the CMU immature survival estimate.

To offset annual mortality and maintain a stable population, WMU breeding adults in 1964-1975 needed to fledge 2.8 young per pair annually whereas CMU adults needed to fledge only 2.2 young per pair annually (Reeves et al. in press). The effective length of the dove nesting season is shorter in the WMU (89 days) than the other two units (CMU, 101 days; EMU, 138 days) (Geissler et al. 1987). Considering the short nesting season, the high production required to maintain a stable population, and the long-term downward trend in the WMU, the ability of doves to counterbalance mortality may have been exceeded during the past 25 years (Reeves et al. in press).

The causes for the declining WMU dove populations are unknown, but Reeves et al. (in press) concluded that the underlying reason is a combination of factors that includes loss of nesting habitat, agricultural changes that degraded many habitats, pesticides, diseases, and mortality including hunting and predation.

Table 1. Trends (% change^a per year as determined by linear regression) in breeding population indices for mourning doves heard by State in the Western Management Unit, 1966-1991.

Location	2-year (1990-91)		10-year (1982-91)		26-year (1966-91)	
	N	% Change ^b 95% C.I.	N	% Change ^b 95% C.I.	N	% Change ^b 95% C.I.
Coastal States						
Washington	5	-17.5 -44.8 8.6	18	-0.6 -13.2 10.7	21	-3.0* -6.2 0.5
Oregon	10	-24.6 -56.4 7.3	21	5.6* -0.2 12.0	23	-2.3** -5.0 -0.1
California	31	-8.6 -36.6 18.8	56	-1.8 -5.2 1.6	72	-4.0*** -6.9 -1.4
Subtotals	46	-10.3 -33.9 12.4	95	-1.6 -4.7 1.6	116	-3.9*** -6.4 -1.5
Interior States						
Idaho	7	44.4 -20.1 5.9	21	3.3 -3.2 9.5	23	-1.6 -5.8 2.7
Utah	11	6.9 -6.6 19.9	15	0.5 -4.7 6.5	16	-3.3 -9.2 1.6
Nevada	9	57.1 -58.0 93.9	19	-2.8 -7.6 2.1	27	-4.5* -8.2 0.1
Arizona	37	35.5** 8.0 65.4	57	-5.1*** -7.5 -2.7	66	-1.6 -3.8 0.5
Subtotals	64	34.6*** 13.4 57.7	112	-4.1*** -6.1 -2.0	132	-2.1** -3.9 -0.2
Total WMU	110	15.3* -2.5 33.3	207	-3.2*** -5.1 -1.3	248	-2.7*** -4.5 -1.1

^aRoute trend means 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.

^b* P<0.10; ** P<0.05; *** P<0.01.

WMU91BPT July 1991

Table 2. Breeding population indices* based on mourning doves heard calling along call-count routes in the Western Management Unit, 1966-1991.

Year	Coastal WMU				Interior WMU				WMU Total	
	Wash.	Oregon	California	Subtotal	Idaho	Nevada	Utah	Arizona		Subtotal
1966	9.7	16.3	33.9	24.1	15.7	9.1	19.5	29.3	18.0	20.2
1967	14.2	10.9	31.6	22.3	16.2	7.4	29.9	29.4	18.6	19.9
1968	13.3	12.9	29.4	22.3	14.8	17.6	15.3	26.3	20.0	20.6
1969	10.5	11.7	28.4	20.2	15.9	12.6	14.5	30.8	19.4	19.4
1970	10.6	8.9	27.8	18.4	14.8	9.1	16.6	30.8	17.9	17.8
1971	12.5	7.8	20.4	15.6	11.8	5.7	23.3	20.5	14.4	14.7
1972	8.9	7.6	24.4	15.9	11.4	6.9	13.5	23.1	13.9	14.6
1973	8.0	7.5	22.8	14.8	14.0	4.8	11.8	27.7	13.6	14.0
1974	9.9	13.2	25.0	18.9	12.0	7.4	13.4	23.6	14.5	16.2
1975	10.5	9.9	20.4	15.6	8.4	4.4	14.5	26.0	12.4	13.7
1976	10.2	10.4	24.3	17.3	15.4	7.3	17.2	26.8	17.2	17.1
1977	11.3	11.7	18.5	15.7	19.1	7.5	20.1	23.7	18.1	17.0
1978	7.2	6.2	16.6	11.2	10.6	4.5	8.8	23.6	11.6	11.4
1979	10.1	6.4	12.3	10.3	10.3	6.5	10.9	24.4	13.6	12.1
1980	6.7	9.6	21.4	14.1	11.1	9.5	13.2	20.4	15.3	14.8
1981	7.9	8.2	16.7	12.3	12.2	6.7	17.5	23.0	15.8	14.2
1982	7.4	8.2	20.6	13.4	12.5	3.9	10.5	26.3	12.7	13.1
1983	6.2	6.1	12.8	9.3	10.0	3.4	10.4	20.4	11.0	10.2
1984	5.4	7.7	17.4	11.4	11.7	3.5	12.2	25.0	12.5	12.1
1985	6.7	8.5	11.9	10.0	10.8	4.6	8.0	20.0	11.4	10.8
1986	8.3	6.8	14.0	10.4	7.6	3.0	11.3	23.6	10.7	10.7
1987	6.4	6.3	10.0	8.2	8.0	3.5	9.9	15.7	9.7	9.1
1988	6.4	7.4	13.7	10.1	10.9	4.7	10.3	17.8	11.9	11.2
1989	5.9	7.0	9.9	8.2	10.4	4.1	10.9	22.0	12.1	10.3
1990	5.5	8.2	10.2	8.6	12.0	2.9	9.8	16.7	10.2	9.7
1991	6.5	5.0	11.4	8.1	9.7	3.4	8.7	21.3	10.7	9.7
Averages:										
1966-70	11.7	12.1	30.2	21.5	15.5	11.2	19.2	29.3	18.8	19.6
1987-91	6.1	6.8	11.0	8.6	10.2	3.7	9.9	18.7	10.9	10.0
1966-91	8.7	8.9	19.5	14.1	12.2	6.3	13.9	23.8	14.1	14.0

* Annual indices are defined as the predicted value from the trend analysis plus the deviation from the expected value in a year. A large, but not significant change based upon a small sample size will produce exaggerated indices over the 25-year period. Subtotals and total derived as an average of all routes in subunits or the WMU through the route regression method of analysis.

IV. USES

Mourning dove hunting seasons have been permitted in all states of the WMU since the turn of the century and in Mexico for many years. In Canada, mourning doves are hunted only in British Columbia. Season dates and bag limits have varied little in the WMU during the past 30 years (Table 3), but restrictive regulations have been in effect since 1987.

All WMU states have conducted random mail or telephone harvest surveys of general license holders during most years between 1961 and 1990 (Table 4). The annual Coastal WMU harvest averaged over 5 million mourning doves during the 1960's, dropped to about 4.5 million in the 1970's, and then dramatically decreased to about 2.2 million during the late 1980's. In the Interior WMU, annual harvest increased from about 1.3 million doves in the early 1960's to 2.8 million in the mid-1970's, and then dropped again to about 1.4 million in the late 1980's. Total WMU annual harvest has decreased from about 7 million doves prior to 1976 to 3.5 million in the late 1980's. The average annual daily bag of mourning doves (1966-1990) decreased from about 4.5 to 3.8 doves, a significant decline of 0.02 doves per year ($P < 0.01$, Figure 3). The number of dove hunters remained high (ca. 450,000) for many years despite lower annual bag sizes, but during later years, hunter participation also has dropped (to about 275,000). The significant decline of hunter numbers and harvest probably occurred because fewer doves were available (Table 1), although factors such as increased costs of hunting and difficulty in gaining access to shooting areas may have contributed.

Mourning doves are also popular to non-hunting interests. Suburbanites in many areas of the WMU provide feeding stations and water in backyards to attract them for observation. Bird watchers and photographers also avidly pursue doves for the satisfaction of adding them to their lists. Many people think of the dove as "the bird of peace" and some of them oppose hunting as a recreational use.

Table 3. Federal frameworks and state selections for hunting seasons and daily bag and possession limits on mourning doves in the Western Management Unit.

Year	Federal Frameworks					Arizona			
	Outside Dates	Season Length	No. Seas. Segments	Zones	Bag/Poss. Limits	Season Dates	Season Length	Bag/Poss. Limits	
1981	Sep 1-Jan 15	50	2	None	10/20	Sep 1-24 & Dec 9-Jan 3	24 & 26	10/20	
1982			3			Sep 1-24 & Dec 8-Jan 2	24 & 26		
1983						Sep 1-25 & Dec 7-31	25 & 25		
1984					12/24	Sep 1-27 & Dec 12-Jan 3	27 & 23	12/24	
1985						Sep 1-26 & Dec 10-Jan 2	26 & 24		
1986						Sep 1-25 & Dec 9-Jan 2	25 & 25		
1987				CA ^a		Sep 1-24 & Dec 13-Jan 7	24 & 26		
1988				None	10/20	Sep 1-24 & Dec 11-Jan 5	24 & 26	10/20	
1989						Sep 1-28 & Dec 21-Jan 11	28 & 22		
1990						Sep 1-20 & Dec 12-Jan 10	20 & 30		
1971						Sep 1-12 & Dec 3-Jan 9	12 & 38		
1972						Sep 1-17 & Dec 14-Jan 15	17 & 33		
1973						Sep 1-23 & Dec 1-27	23 & 27		
1974						Sep 1-22 & Nov 30-Dec 27	22 & 28		
1975						Sep 1-21 & Dec 7-Jan 4	21 & 29		
1976						Sep 1-20 & Dec 11-Jan 9	20 & 30		
1977						Sep 1-27 & Dec 10-Jan 3	25 & 25		
1978						Sep 1-24 & Dec 9-Jan 3	24 & 26		
1979				AZ ^b		Sep 1-23 & Dec 8-Jan 3	23 & 27	10/20 ^d	
1980		50 ^c		AZ ^c	^d	See footnote ^c .		10/20-12/24 ^d	
1981				None	^d	Sep 1-27 & Nov 27-Jan 8	27 & 43	12/24 ^d	
1982		45 (or 70) ^e			15/30 (or 12/24) ^e	Sep 1-26 & Nov 27-Jan 9	26 & 44		
1983		60 (or 75) ^e				Sep 1-25 & Nov 25-Jan 8	25 & 45		
1984						Sep 1-23 & Nov 28-Jan 13	23 & 47		
1985						Sep 1-22 & Nov 23-Jan 9	22 & 48		
1986						Sep 1-21 & Nov 24-Jan 11	21 & 49		
1987	Sep 1-15 & Nov 1-Jan 15	45	2		10/20	Sep 1-13 & Nov 27-Dec 28	13 & 32	10/20 ^d	
1988	Sep 1-Jan 15 ^f	30 (60) ^f	1 (2) ^f			Sep 1-11 & Nov 12-Dec 26	11 & 49		
1989						Sep 1-10 & Nov 24-Jan 12	10 & 50		
1990						Sep 1-10 & Nov 23-Jan 11	10 & 50		
1991						Sep 1-10 & Nov 24-Jan 12	10 & 50		
1992						Sep 1-10 & Nov 22-Jan 10	10 & 50		

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^a In California, in 1967, the seasons were Sep. 1-Oct. 10 (40 days) in the North Zone and Sep. 2-Oct. 11 (40 days) in the South Zone.
^b In Arizona, in 1979, the state was zoned into a special w-w dove zone and the "remainder of the State" zone, with hunting being permitted from noon to sunset during the first 3 days of the season in the special zone.
^c Arizona, in 1980, was divided into a North Zone having a season of Sep. 1-Oct. 30 (60 days), and a South Zone with a season of Sep. 1-28 (28 days; sunrise to noon) and from Nov. 28-Jan. 8 (42 days). In 1981, the season could be 70 full days in designated w-w dove management units.
^d In Arizona, aggregate limits of mourning and white-winged doves were in effect since 1979. In 1980, the aggregate limits in the North Zone were 10/20, including not more than 5/10 w-w doves, and in the South Zone 12/24, including not more than 6/12 w-w doves. During 1981-86, the aggregate limits throughout the state were 12/24, including not more than 6/12 w-w doves. During 1987-92, the aggregate limits were 10/20, including not more than 6/12 w-w doves.
^e During 1982-1986, all WMU states could select either a shorter season with larger limits or a longer season with smaller limits.
^f During 1988-92, Arizona and California were offered longer seasons (60 days) but required that seasons be within framework dates that were different from those offered the remainder of the WMU, i.e., Sep. 1-15 and Nov. 1-Jan. 15.

Table 3. (Continued.)

Year	California			Idaho			Nevada		
	Season Dates	Season Length	Bag/Poss Limits	Season Dates	Season Length	Bag/Poss Limits	Season Dates	Season Length	Bag/Poss Limits
1981	Sep 2-Oct 1	30	10/20 ^a	Sep 1-15	15	10/20	Sep 1-Oct 20	50	10/20 ^a
1982	Sep 1-30	30		Sep 1-15	15		Sep 1-Oct 20	50	
1983	Sep 1-30	30		Sep 1-15	15		Sep 1-Oct 20	50	
1984	Sep 1-Oct 14	44	12/24 ^a	Sep 1-15	15	12/24	Sep 1-Oct 20	50	12/24 ^a
1985	Sep 1-Oct 3 & Dec 10-19	33 & 10		Sep 1-19	19		Sep 1-Oct 20	50	
1986	Sep 1-Oct 2 & Dec 10-18	32 & 9		Sep 1-18	18		Sep 1-Oct 20	50	
1987	Sep 1-Oct 10 ^a & Sep 2-Oct 11 ^a	40		Sep 1-17	17		Sep 1-Oct 20	50	
1988	Sep 1-30 & Nov 30-Dec 8	30 & 9	10/20 ^a	Sep 1-22	22	10/20	Sep 1-Oct 20	50	10/20 ^a
1989	Sep 1-30 & Nov 29-Dec 14	30 & 16		Sep 1-21	21		Sep 1-Oct 20	50	
1990	Sep 1-30 & Nov 28-Dec 13	30 & 16		Sep 1-20	20		Sep 1-Oct 20	50	
1971	Sep 1-30 & Nov 27-Dec 12	30 & 16		Sep 1-19	19		Sep 1-Oct 20	50	
1972	Sep 1-30 & Nov 25-Dec 10	30 & 16		Sep 1-17	17		Sep 1-Oct 20	50	
1973	Sep 1-30 & Nov 24-Dec 9	30 & 16		Sep 1-16	16		Sep 1-Oct 20	50	
1974	Sep 1-30 & Nov 23-Dec 8	30 & 16		Sep 1-15	15		Sep 1-Oct 20	50	
1975	Sep 1-30 & Nov 22-Dec 7	30 & 16		Sep 1-14	14		Sep 1-Oct 20	50	
1976	Sep 1-30 & Nov 20-Dec 5	30 & 16		Sep 1-19	19		Sep 1-Oct 20	50	
1977	Sep 1-30 & Nov 19-Dec 4	30 & 16		Sep 1-18	18		Sep 1-Oct 20	50	
1978	Sep 1-30 & Nov 18-Dec 3	30 & 16		Sep 1-17	17		Sep 1-Oct 20	50	
1979	Sep 1-30 & Nov 17-Dec 2	30 & 16		Sep 1-16	16		Sep 1-Oct 20	50	
1980	Sep 1-30 & Nov 15-Dec 4	30 & 16		Sep 1-22	22		Sep 1-Oct 20	50	
1981	Sep 1-30 & Nov 21-Dec 10	30 & 20		Sep 1-Oct	50		Sep 1-Oct 20	50	
1982	Sep 1-30 & Nov 20-Dec 4	30 & 15	15/30 ^a	Sep 1-Oct	45	15/30	Sep 1-Oct 15	45	15/30 ^a
1983	Sep 1-Oct 15 & Nov 19-Dec 3	45 & 15		Sep 1-Oct	60		Sep 1-Oct 30	60	
1984	Sep 1-Oct 15 & Nov 17-Dec 1	45 & 15		Sep 1-Oct	60		Sep 1-Oct 30	60	
1985	Sep 1-Oct 15 & Nov 16-30	45 & 15		Sep 1-Oct	60		Sep 1-Oct 30	60	
1986	Sep 1-Oct 15 & Nov 15-29	45 & 15		Sep 1-Oct	60		Sep 1-Oct 30	60	
1987	Sep 1-30	30	10/20 ^a	Sep 1-30	30	10/20	Sep 1-30	30	10/20 ^a
1988	Sep 1-15 & Nov 12-Dec 26	15 & 45		Sep 1-30	30		Sep 1-30	30	
1989	Sep 1-15 & Nov 11-Dec 25	15 & 45		Sep 1-30	30		Sep 1-30	30	
1990	Sep 1-15 & Nov 10-Dec 24	15 & 45		Sep 1-30	30		Sep 1-30	30	
1991	Sep 1-15 & Nov 9-Dec 23	15 & 45		Sep 1-30	30		Sep 1-30	30	
1992	Sep 1-15 & Nov 14-Dec 28	15 & 45		Sep 1-30	30		Sep 1-30	30	

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^a Aggregate limits of mourning and white-winged doves.

Table 3. (Continued.)

Year	Oregon			Utah			Washington		
	Season Dates	Season Length	Bag/Poss Limits	Season Dates	Season Length	Bag/Poss Limits	Season Dates	Season Length	Bag/Poss Limits
1961	Sep 1-30	30	10/20	Sep 1-24	24	10/20	Sep 1-30	30	10/20
1962	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1963	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1964	Sep 1-30	30	12/24	Sep 1-30	30	12/24	Sep 1-30	30	12/24
1965	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1966	Sep 1-30 & Oct 10-Nov 7	30 & 20		Sep 1-30	30		Sep 1-30	30	
1967	Sep 1-30 & Oct 21-Nov 5	30 & 20		Sep 1-30	30		Sep 1-30	30	
1968	Sep 1-30	30	10/20	Sep 2-30	29	10/20	Sep 1-30	30	10/20
1969	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1970	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1971	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1972	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1973	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1974	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1975	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1976	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1977	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1978	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1979	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1980	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1981	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1982	Sep 1-30	30	15/30	Sep 1-30	30	15/30	Sep 1-30	30	
1983	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1984	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1985	Sep 1-30	30		Sep 2-30	29		Sep 1-30	30	
1986	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1987	Sep 1-30	30	10/20	Sep 1-30	30	10/20	Sep 1-30	30	
1988	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1989	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1990	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	
1991	Sep 1-30	30		Sep 2-30	29		Sep 1-30	30	
1992	Sep 1-30	30		Sep 1-30	30		Sep 1-30	30	

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Table 4. Estimated numbers of mourning doves harvested in the Western Management Unit, as measured by State surveys, 1961-1990.

Year	Number of Mourning Doves Harvested (x 1,000)										
	Coastal WMU					Interior WMU					WMU
	Washington	Oregon	California	Subtotal		Idaho	Nevada	Utah	Arizona	Subtotal	Total
1961	335.8	202.1	3,906.7	4,444.6		140.0	110.2	128.0	886.8	1,284.8	5,709.4
1962	383.0	184.1	4,884.3	5,391.4		159.7	106.8	144.8	435.4	846.7	6,238.1
1963	398.4	184.0	4,786.3	5,368.7		203.3	121.6	162.8	940.6	1,428.3	6,777.0
1964	460.1	208.5	4,911.8	5,580.4		181.9	81.5	193.5	1,138.2	1,615.1	7,195.5
1965	436.8	163.1	4,451.3	5,051.2		198.0	120.8	184.1	1,075.7	1,556.6	6,608.8
1966	437.7	186.8	4,019.9	4,654.4		182.5	86.1	212.7	1,394.1	1,885.4	6,539.8
1967	286.7	172.4	5,126.3	5,589.4		214.4	155.8	283.9	1,644.4	2,278.3	7,867.7
1968	420.3	188.4	4,481.8	5,068.6		185.6	110.3	207.9	1,944.0	2,457.8	7,526.4
1969	339.2	198.5	4,880.3	5,218.0		220.2	170.4	279.3	2,072.2	2,742.1	7,960.1
1970	300.3	208.6	4,712.2	5,221.1		223.9	131.3	232.5	1,717.6	2,305.3	7,526.4
1971	318.1	180.8	4,248.3	4,747.2		249.3	115.8	228.6	1,552.0	2,143.7	6,890.9
1972	280.0	182.3	3,850.5	4,322.8		251.5	119.5	238.4	1,671.8	2,281.2	6,604.0
1973	316.7	156.9	4,350.2	4,823.8		229.8	130.0	307.1	2,345.8	3,012.7	7,836.5
1974	263.4	181.1	4,551.1	4,975.6		238.3	140.6	306.1	1,984.9	2,699.9	7,645.5
1975	274.6	201.9	4,151.6	4,628.1		246.8	147.2	420.3	2,122.1	2,936.4	7,564.5
1976	212.0	179.8	3,306.1	3,697.9		210.1	146.6	298.5	2,068.2	2,721.4	6,419.3
1977	287.3	208.1	3,543.5	4,038.9		268.4	125.5	267.5	1,933.9	2,485.3	6,532.2
1978	216.6	209.6 a	3,267.0	3,693.2 b		192.6	113.0	383.7	2,231.3	2,920.6	6,613.8
1979	223.2	213.1	3,386.4	3,832.7		219.3	125.5	351.2	2,500.9	3,196.9	7,029.6
1980	183.1	215.6	3,262.4	3,641.1		185.7	143.3	343.9	1,527.7	2,210.6	5,851.7
1981	172.5	288.2	3,336.9	3,775.6		243.9	120.4	310.1	1,775.6	2,450.0	6,225.6
1982	121.2	214.3	3,272.6	3,608.1		204.5	112.8	282.2	1,699.1	2,298.6	5,906.7
1983	111.8	191.5	2,738.7	3,042.0		219.8	117.3	273.0	1,402.5	2,012.6	5,054.6
1984	85.1 c	187.9 a	2,551.6	2,824.6 b		86.1 c	85.5	282.3	1,639.2	2,093.1	4,917.7
1985	71.8	184.2	2,640.8	2,996.6		124.1	81.0	258.0	1,820.2	2,281.3	5,177.9
1986	64.8	180.8	2,018.4	2,243.8		91.0	70.0	227.0	1,606.0	1,994.0	4,237.8
1987	55.8	113.7	1,935.6	2,105.1		74.0	68.3	204.0	1,207.0	1,551.3	3,656.4
1988	58.9	149.7	2,111.6	2,320.2		48.3	55.5	178.5	873.5	1,155.8	3,476.0
1989	91.0	108.2 a	2,728.2	2,927.4 b		60.6	52.1	190.3	744.1	1,047.1	3,974.5
1990	91.0 a	66.7 c	1,057.1	1,214.8 b		79.5	59.9	199.0	834.9	1,173.3	2,388.1
Averages:											
1961-65	398.8	184.4	4,580.1	5,163.3		178.6	110.2	158.6	895.3	1,342.7	6,506.0
1966-90	72.3	119.8	1,970.2	2,162.3		70.7	60.8	199.8	1,053.1	1,384.3	3,646.6
1961-90	242.0	181.5	3,607.4	4,030.8		182.1	111.4	251.2	1,556.3	2,100.9	6,131.8

a Survey not conducted.
 b Subunit and WMU totals include a derived estimate for the harvests in Oregon (1978, 1984, 1989) and Washington (1980).
 c Initiated change in survey methods.

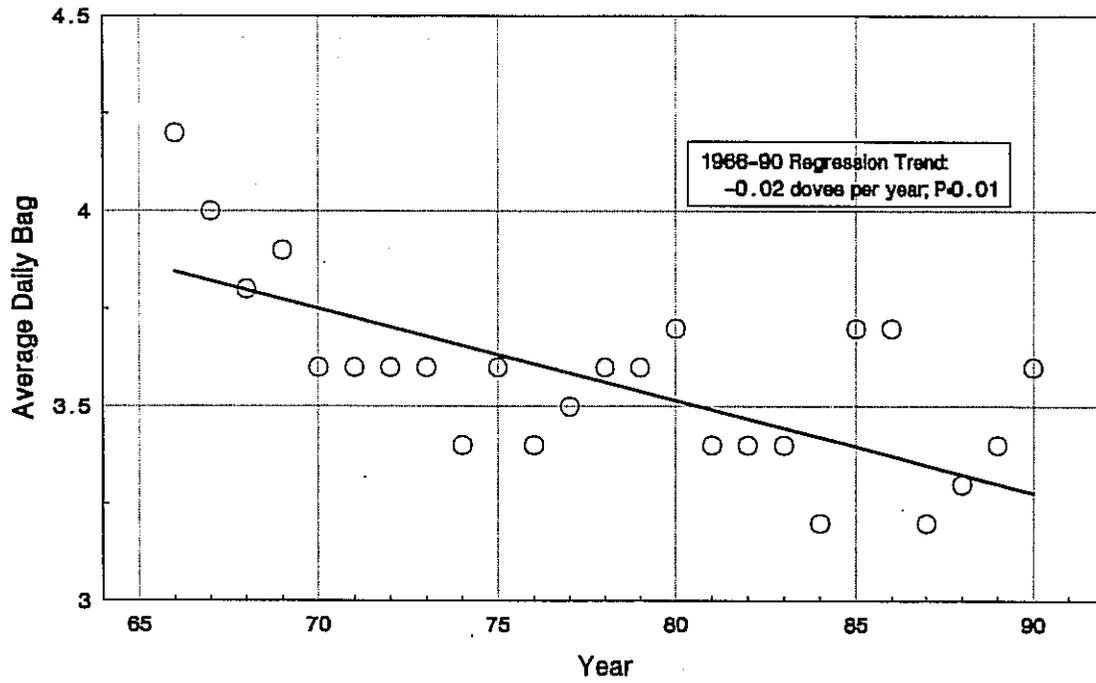


Figure 3. Trend in Numbers of Mourning Doves Harvested per Hunter per Year, 1961-1990.

V. RESEARCH AND MANAGEMENT

An abundance of research and management studies of mourning doves has been conducted during the past 70 years. Baskett et al. (in press) list over 1,300 literature citations of mostly published papers and bulletins on the species. Early studies detailing life history, breeding density and production per unit area, nesting success, and food habits included Nice (1922,23) in Oklahoma, Moore and Pearson (1941) in Alabama, Jackson (1941) in Texas, McClure (1943) in Iowa, and Quay (1951) in North Carolina. A comprehensive study of several aspects of dove ecology, including movements, breeding reactions, population densities and distribution, and effects of hunting was conducted in 10 southeastern states between 1948 and 1956 (Southeastern Association of Game and Fish Commissioners 1957). During this study, the concept for and the development of the nationwide call-count survey was formulated (Foote and Peters 1952, Foote et al. 1958). However, concerns that the call-count survey did not monitor the entire breeding population (as only males heard calling are counted) led to a study investigating the biological parameters of the survey (Baskett et al. 1978). It was concluded there and in a recent review (Baskett in press) that data derived from large samples of call-count routes (e.g., management units) likely provide reasonable estimates of long-term population trends. This tool is presently the primary means of monitoring dove populations throughout the United States (Dolton 1991).

A series of banding studies was conducted in various sections of the United States which are summarized by Tomlinson (in press). The first nationwide banding effort was conducted during 1953 to 1957 and culminated in a publication by Kiel (1959) that delineated the three management units in which management decisions have been made since 1961. Soon after Kiel's work, the Pacific Flyway Council recommended to the Western Association of Fish and Game Commissioners that a "Dove Technical Committee" be formed (Reeves et al. in press). In the fall of 1961, the Western Association responded by appointing one wildlife technician from each member state to the committee. The first meeting was held in March 1962 and meetings have been held annually since. Between 1962 and 1984, a formal summary of the meeting and state reports of dove and pigeon status were compiled and distributed annually by the Pacific Flyway Representative (see for example, Western Migratory Upland Game Bird Committee Report, June 1984). Since then, annual minutes have been prepared, but formal state reports have not been included.

The Western Migratory Upland Game Bird Committee (now so named) has been active in several important research and management efforts. Prominent among them were: randomization of call-count survey routes (in place since 1966); a weekly survey

to document progression of fall migration (see Miles 1976); standardization studies of state harvest surveys; a pre-season banding program during 1967-1975; evaluation of studies proposed for funding under the "Accelerated Research Program for Migratory Shore and Upland Game Birds" (between 1975 and 1982); coordination of the WMU portion of a national mourning dove nesting study (see Geissler et al. 1987); evaluation of agricultural practices in relation to dove populations (Tomlinson and Dolton 1987, Tomlinson et al. 1987); and finally, the analysis of data from the pre-season banding program (Tomlinson et al. 1988, see also Reeves et al. in press).

Several important aspects of WMU mourning dove ecology have been determined from banding analysis and other studies, as follow (See Dolton [1991], Miles [1976], Leopold and Dedon [1983] Tomlinson and Dolton [1987], Tomlinson et al. [1987], Tomlinson et al. [1988], and Reeves et al. [in press] for more detailed descriptions of WMU mourning dove ecology):

The pattern of migration for doves banded in the WMU is generally straight south or southeast and little interchange of populations is apparent among WMU subunits or with the CMU (Figure 2). The wintering area for WMU doves extends from southern California and Arizona to the Western Highlands of Mexico. Doves banded in the WMU and CMU have equal probabilities of being recovered in Mexico, but doves from the CMU are 13 times more like to be recovered in Central America. WMU doves begin migration in late August and gradually move into and through California and Arizona by late September. Peak arrival dates in Mexico fall within the second 10 days of October. Some doves in parts of central and southern California and southern Arizona are probably non-migratory.

The unweighted average survival and recovery rates for WMU doves banded 1964-1975 are: 52.4% and 2.2%, respectively for adults and; 35.0% and 3.2%, respectively for immatures. Doves from the Coastal WMU had significantly lower survival rates and higher recovery rates than doves from the Interior WMU. An average production rate of 2.8 young per pair of breeding adults was estimated to be needed to compensate for annual mortality to maintain a constant breeding population in the WMU. The fall-flight population of WMU mourning doves was estimated at 76 million birds.

Mourning Dove Population Indices in both the Coastal and Interior WMU demonstrate highly significant downward trends between 1966 and 1991. The declines are greatest in the Coastal subunit. The reasons for the declines are unknown but thought to be a combination of factors including loss of nesting habitat, changing agricultural practices, pesticide use, disease, and mortality from hunting and other sources. However, a preliminary examination of agricultural cropping practices in relation to

dove populations failed to isolate substantial causative correlations.

Mourning dove hunting has been allowed in all 7 WMU states since the early 1900's. A highly significant decline in harvest occurred between 1976 and 1991 (from about 7.5 million to about 4 million birds annually). Declining average daily bags per hunter and numbers of hunters both contributed to the lower harvest. The harvest in most WMU states consists mainly of doves that nested or were hatched in those states. However, California and Arizona each had recoveries from 13 other states for 19 and 11% of their harvests, respectively.

Note: The information on migration, survival rates, recovery rates, required production, and fall-flight population were obtained from doves banded between 1964 and 1975 and may not pertain to current populations.

VI. PROBLEMS

Population index data suggest that WMU mourning dove populations have been declining for 25 years. The following factors are seen as problem areas:

- A. Representative quality of the call-count survey. Several physiographic regions, as well as some states are under-represented by routes and provide trend information less precise than desired. Further, restratification is needed to better represent the unit and subunits.
- B. Decreasing harvest trends; thought to be due to lower dove population levels, increased costs of hunting relative to other recreational activities, and difficulty in obtaining permission to hunt on private areas. Related harvest issues are:
 1. Lack of standardized survey methods among states in deriving harvest estimates.
 2. Dove harvest in Mexico is unknown and may have an impact on populations.
 3. The relationship of hunting mortality to overall mortality is poorly understood.
- C. Development and changing agricultural practices. It is thought that practices associated with agriculture, reclamation, and urban and rural development projects are having adverse effects on dove habitats. Of particular concern is the physical destruction of suitable trees for nesting. Among the practices and their possible effects on doves are:
 1. Urban and suburban sprawl; the growth of cities, towns, and suburban areas often results in the destruction of large tracts of suitable trees for nesting. Conversely, trees grown for shade or as ornamentals in housing developments can develop into excellent nesting habitat.
 2. Fewer and larger farms; this trend eliminates fence rows containing trees suitable for nesting and weed seeds used for food by doves. Fall plowing and burning ditchbanks, field edges, and roadways also may have reduced food supplies.

3. Changing cropping regimes; the changeover from grain farming to truck farming, pasture, cotton, and nut trees reduces food available to nesting doves.
 4. Elimination of hedgerows and windbreaks has occurred in several areas of the West, causing elimination of a preferred nesting environment.
 5. Modification of riparian woodlands through reclamation projects has reduced nesting habitat in the arid southwest.
 6. Elimination of large tracts of sagebrush for improved pasture may have reduced nesting habitat in the Great Basin.
 7. Conversion from free-flow irrigation (in canals and ditches) to central-pivot circular spray systems may have limited water availability to doves.
 8. Grain harvest techniques have been improved and permit less waste grain in fields for use as food by doves.
 9. Conversion from regular varieties of fruit trees to semi-dwarf varieties that provide less suitable structure for dove nests. A related factor is the change from gravity-flow irrigation of orchards to overhead sprinkling systems that discourage nesting.
 10. Increased use of biocides. An enormous amount of pesticides and herbicides are now used by farmers to control insect pests and weedy growth in fields. It is suspected that biocides may have reduced dove populations, both directly by outright mortality and indirectly by decreasing reproductive capacity. In Mexico, wintering WMU doves are subjected to pesticides now banned in the United States (e.g., DDT).
- D. Little is known about productivity and recruitment of WMU mourning doves. This factor is important to understanding the ability of dove populations to counter mortality.
- E. The diseases trichomoniasis and fowl pox are known to exist in WMU dove populations, but the epidemiology of the diseases is largely unknown. An epidemic of trichomoniasis occurred in the Southeast in the 1950's that reduced dove populations significantly.

- F. An organized banding program of mourning doves in the WMU was conducted in the late 1960's through the mid-1970's from which valuable information on survival and recovery were derived. No current banding program is being conducted with which to compare survival and recovery estimates. This lack may be crucial to understanding some of the problems associated with those areas of greatest population decline.

VII. RECOMMENDED RESEARCH AND MANAGEMENT PROCEDURES

Because of the urgency to the work proposed in this plan, it is imperative that an organized effort be undertaken immediately and continued for at least 5 years. Therefore, it is recommended that the Office of Migratory Bird Management (MBMO-USFWS) undertake the responsibility of coordinating all research and management activities for mourning doves in the WMU. It would be the responsibility of MBMO to solicit funding for cooperative research and management studies within the WMU and to conduct field investigations, primarily on habitat-related issues. This would include an extensive evaluation of land-use and agricultural changes over time through a Geographic Information System (computer generated digitized mapping and evaluation) in relation to specific locations where population surveys indicate declines. Further, MBMO would aid in establishing joint investigations involving state and other federal agencies, as well as universities and cooperative wildlife research units. Federal Aid studies by state wildlife agencies would be an integral part of this effort.

Population Assessment

- A. Nationwide Call-count Survey - Evaluate the efficiency of the call-count survey to produce more precise estimates of population trend by physiographic region, state, and subunit in the WMU.
1. Improve the observer participation rate and decrease the incidence of observer change among years.
 2. Increase the sample sizes (numbers of routes) in those physiographic regions and states where representation is low.
 3. Restratify call-count survey units (physiographic regions) to better represent broad ecological types.
 4. Evaluate the feasibility of utilizing data from the Breeding Bird Survey as an alternate means of monitoring mourning dove populations.

Priority: 3

Responsibility: USFWS in conjunction with individual states.

Schedule: Evaluation, 1992; implementation, 1993.

B. Harvest Survey - Improve methods to obtain harvest information for long-term trends by state and WMU.

1. Improve participation in and efficiency of state mail or telephone questionnaire surveys to provide comparable estimates of harvest until a standardized method has been implemented.
2. Encourage early entry of each WMU state into the joint federal/state Nationwide Migratory Bird Harvest Information Program to provide comparable harvest data among all WMU states.

Priority: 3

Responsibility: USFWS and individual states.

Schedule: Pilot study 1992 and 1993; implement operational survey 1998 or before.

C. Productivity and Recruitment

1. Obtain base-line data on average annual productivity of mourning doves in selected areas of the WMU.

Priority: 1

Responsibility: Section of Pacific States Ecology Field Station (USFWS), MBMO, and state agencies as necessary.

Schedule: 1992 and 1993.

2. Determine utility of deriving age ratios from wing collection data (adjusted by banding data) in states with sufficient information of both types.

Priority: 2

Responsibility: USFWS in cooperation with individual states (Utah and Arizona are candidate states).

Schedule: 1993 hunting season.

3. If warranted, collect annual information on recruitment through a parts collecting survey in the WMU.

Priority: 3

Responsibility: USFWS in cooperation with individual states.

Schedule: Annually starting fall 1994.

D. Survival and Recovery Rate Determination

1. Institute a preseason banding program in those areas of greatest decline in the WMU. Data on survival and recovery rates to be used for comparison with those of 1964-1975. The role of hunting mortality to total mortality also would be investigated.

Priority: 2
Responsibility: Individual states, where necessary, in conjunction with USFWS.
Schedule: Annually for 5 years beginning summer 1993.

2. Develop a radiotelemetry study to investigate annual production and term survival rates of nesting mourning doves in selected areas of the WMU.

Priority: 2
Responsibility: Committee to write study proposal; University or Cooperative Wildlife Research Unit to undertake work.
Schedule: 1993-1994.

Habitat and Agriculture

- A. Inventory of Habitat - Identify, classify, rank, and catalog habitats used by mourning doves in selected areas of the WMU.

Priority: 1
Responsibility: USFWS and state agencies
Schedule: 1992-1996.

- B. Habitat Degradation and Agriculture Practices - Through a GIS system and satellite imagery, identify and evaluate habitat and agricultural changes occurring during the 20-year period 1973-1992. Relate to mourning dove trend information.

Priority: 2
Responsibility: USFWS
Schedule: 5-year analysis beginning in 1993.

- C. Biocide Use:

1. Identify the types of biocides used in agriculture and determine their application rates in critical areas of dove population decline in the WMU.
2. Determine adult dove survival during the nesting season in relation to pesticide exposure.
3. Evaluate reproductive success in relation to pesticide exposure.

Priority: 1
Responsibility: Committee to initiate research proposal.
Schedule: 5-year study beginning in 1993.

- D. Food Habits - Investigate the food habits of mourning doves in selected areas of the WMU and relate to seed availability and agricultural practices.

Priority: 3

Responsibility: Committee to write study proposal;
University or Cooperative Wildlife Research Unit to undertake work.

Schedule: 1994-1995.

- E. Conditions in Mexican Wintering Areas - Investigate possible mortality factors in Mexico (including pesticides, hunting harvest, and habitat deterioration).

Priority: 3

Responsibility: Committee to write study proposal;
University or Cooperative Wildlife Research Unit to undertake work.

Schedule: 1995-1996.

Disease

- A. Trichomoniasis and Pox - Investigate trichomoniasis and fowl pox and their effects on mourning doves in the WMU.

Priority: 3

Responsibility: Committee to write study proposal;
University or Cooperative Wildlife Research Unit to undertake work.

Schedule: 1994-1995

Sport Hunting

- A. Harvest Strategy - Develop a strategy for sport harvest in the WMU consistent with population indices and long-term trends. Strategy may contain triggering mechanisms as necessary.

Priority: 2

Responsibility: Committee members in conjunction with MBMO.

Schedule: 1992-1993

VIII. ANNUAL REVIEW OF THE PLAN

The subcommittee shall meet annually, or as needed, to review progress in meeting the goals and objectives of this plan and to recommend revisions. The subcommittee shall report on this progress to the Pacific Flyway Council (through the Western Migratory Upland Game Bird Technical Committee), to state and federal agencies, and to organizations interested in cooperating in management of WMU mourning doves. It will be the responsibility of MBMO (or as designated by the subcommittee) to annually update tables on population status and harvest; until the Nationwide Migratory Bird Harvest Information Program becomes operational, states will provide harvest figures by June 5 to MBMO for incorporation into an annual status summary for use at the Early Seasons Regulations meetings in Washington, D.C.

Rotation of the subcommittee Chairmanship is proposed as follows:

Arizona	Oct. 1, 1991 - Sept. 30, 1993
California	Oct. 1, 1993 - Sept. 30, 1995
Idaho	Oct. 1, 1995 - Sept. 30, 1997
Oregon	Oct. 1, 1997 - Sept. 30, 1999
Nevada	Oct. 1, 1999 - Sept. 30, 2001
Washington	Oct. 1, 2001 - Sept. 30, 2003
Utah	Oct. 1, 2003 - Sept. 30, 2005
British Columbia	Oct. 1, 2005 - Sept. 30, 2007
USFWS	Oct. 1, 2007 - Sept. 30, 2009

LITERATURE CITED

- Aldrich, J. W. In press. Classification and distribution. In T. S. Baskett, M. W. Sayre, R. E. Tomlinson, and R. E. Mirarchi, eds., Ecology and management of the mourning dove. Wildlife Management Institute. Washington, D. C.
- Aldrich, J. W., and A. J. Duvall. 1958. Distribution and migration of races of the mourning dove. Condor 60(2): 108-128.
- Baskett, T. S., M. J. Armbruster, and M. W. Sayre. 1978. Biological perspectives for the mourning dove call-count survey. Trans. N. Amer. Wildl. and Natur. Resour. Conf. 43:163-180.
- Baskett, T. S., M. W. Sayre, R. E. Tomlinson, and R. E. Mirarchi., eds. In press. Ecology and management of the mourning dove. Wildlife Management Institute, Washington, D. C.
- Dolton, D. D. 1991. Mourning dove breeding population status, 1991. Unpublished report. Office of Migratory Bird Management, U. S. Fish and Wildlife Service, Laurel, Md. 14 pp.
- Foote, L. E., and H. S. Peters. 1952. Introduction. Spec. Sci. Rep.--Wildl. 17:1-3. U. S. Fish and Wildlife Service, Washington, D. C. 53 pp.
- Foote, L. E., H. S. Peters, and A. L. Finkner. 1958. Design tests for mourning dove call-count sampling in seven southeastern states. J. Wildl. Manage. 22(4):402-408.
- Geissler, P. H., D. D. Dolton, R. Field, R. A. Coon, H. F. Percival, D. W. Hayne, L. D. Soileau, R. R. George, J. H. Dunks, and S. D. Bunnell. 1987. Mourning dove nesting: seasonal patterns and effects of September hunting. Resour. Publ. 168. U. S. Fish and Wildlife Service, Washington, D. C. 33 pp.
- Jackson, A. S. 1941. The mourning dove in Throckmorton County, Texas. M. S. Thesis. North Texas State Teachers College, Denton, Texas.

- Keeler, J. E., Chairman. 1977. Mourning dove (Zenaida macroura). Pages 275-298 in G. C. Sanderson, ed., Management of migratory shore and upland game birds in North America. International Assoc. Fish and Wildlife Agencies, Washington, D. C. 358 pp.
- Kiel, W. H., Jr. 1959. Mourning dove management units--a progress report. Spec. Sci. Rep.--Wildl. 42. U. S. Fish and Wildlife Service, Washington, D. C. 24 pp.
- Leopold, A. S., and M. F. Dedon. 1983. Resident mourning doves in Berkeley, California. J. Wildl. Manage. 47(3):780-789.
- McClure, H. E. 1943. Ecology and management of the mourning dove, Zenaidura macroura (Linn.) in Cass County, Iowa. Res. Bul. 310:356-415. Iowa State College of Agriculture and Mechanical Arts, Ames.
- Miles, A. K. 1976. Fall migration of mourning doves in the Western Management Unit. M. S. Thesis. Oregon State University, Corvallis. 85 pp.
- Moore, G. C., and A. M. Pearson. 1941. The mourning dove in Alabama. Bull. Ala. Cons. Dep. July 1941. 36 pp.
- Nice, M. M. 1922, 1923. A study of the nesting of mourning doves. Auk 39(4):457-474; Auk 40(1):37-58.
- Quay, T. L. 1951. Mourning dove studies in North Carolina. Proj. 2-R and 26-R, North Carolina Wildl. Res. Comm., Raleigh. 90 pp.
- Reeves, H. M., R. E. Tomlinson, and J. C. Bartonek. In press. Population characteristics and trends in the Western Management Unit. In T. S. Baskett, M. W. Sayre, R. E. Tomlinson, and R. E. Mirarchi, eds., Ecology and management of the mourning dove. Wildlife Management Institute, Washington, D. C.
- Ridgway, R. 1916. The birds of North and Middle America. Bull. U. S. Nat. Mus. 50(7):543 pp.
- Southeastern Association of Game and Fish Commissioners. 1957. Mourning dove investigations, 1948-56. Southeast. Assoc. Game and Fish Comm. Tech. Bull. 1. 166 pp.
- Tomlinson, R. E. In press. Migration. In T. S. Baskett, M. W. Sayre, R. E. Tomlinson, and R. E. Mirarchi, eds., Ecology and management of the mourning dove. Wildlife Management Institute, Washington, D. C.

- Tomlinson, R. E., and D. D. Dolton. 1987. Current status of the mourning dove in the Western Management Unit. Proc. Ann. Conf. West. Assoc. Fish and Wildl. Agencies. 67:119-133.
- Tomlinson, R. E., P. Smith, and L. A. McKibben. 1987. Agricultural practices and their possible effects on mourning dove populations in the Western Management Unit. Unpublished report to the Western Migratory Upland Game Bird Technical Committee. 9 pp., 5 tables, 4 figs.
- Tomlinson, R. E., D. D. Dolton, H. M. Reeves, J. D. Nichols, and L. A. McKibben. 1988. Migration, harvest, and population characteristics of mourning doves banded in the Western Management Unit, 1964-1977. Fish and Wildl. Tech. Rep. 13. U. S. Fish and Wildlife Service, Washington, D. C. 101 pp.

APPENDIX

PROPOSAL FOR JOINT USFWS AND STATE MOURNING DOVE INVESTIGATIONS IN THE WESTERN MANAGEMENT UNIT

Because of the urgency of the work proposed in the accompanying WMU Mourning Dove Management Plan, it is imperative that an organized effort is undertaken and continued for at least 5 years. Therefore, it is recommended that a field station of the Office of Migratory Bird Management (MBMO-USFWS) be established to coordinate research and management activities for mourning doves and band-tailed pigeons in the WMU. The station would be located either in Portland, Oregon, or in Davis/Dixon, California. It would be the responsibility of this station to coordinate all research and management studies on the two species within the WMU and to conduct field investigations, primarily on habitat-related issues. This would include an extensive evaluation of land-use and agricultural changes over time through a Geographic Information System (computer generated digitized mapping and evaluation) in relation to specific locations where population surveys indicate declines.

Research studies on the effects of biocides and disease on mourning dove populations, productivity and recruitment, food habits, and conditions on wintering grounds in Mexico could be conducted by universities and Cooperative Wildlife Research Units under contract to the states and USFWS.

State wildlife agencies could contribute materially by establishing Federal Aid programs to investigate various problems such as increasing the efficiency of population and harvest surveys and on banding programs.

RECOMMENDED FUNDING REQUIREMENTS

Five-year Program

MBMO Field Station Establishment

One time costs:

Moving expenses, office equipment, and vehicles

\$80K

Annual costs:

Personnel and benefits (1 GS-12/13 WLBIOL.;
2 GS-5/7 Bio. Techs, and 1 GS-5 Secy.)

\$100K

Station Operating/Contract expenses (incl. GIS)

\$100K
\$200K

Total

\$280K

Research and Contract Expenses

Productivity and Recruitment		
Radiotelemetry study		
First year		\$30K
Annual (2nd-5th years)		\$100K
Parts Collection Survey		
Annual (5 years)		\$50K
Banding		
Annual (5 years)		\$50K
Biocide Investigation		
First year		\$100K
Annual (2nd-5th years)		\$300K
Disease Investigation		
Annual (2 years)		\$60K
Food Habits		
Annual (2 years)		\$60K
Mexican Wintering Areas Investigation		
Annual (2 years)		\$60K

Annual Breakdown of Proposed Expenditures

Year 1	Year 2	Year 3	Year 4	Year 5
\$690K	\$880K	\$700K	\$700K	\$700K
