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# Use of Secondary Feathers to Age Mourning Doves

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## ABSTRACT

*Mourning Doves (Zenaida macroura) are banded annually throughout most of the United States and periodically in other parts of North America. I banded 8,579 individuals during 2000-2012 in Tucson, Arizona. Doves captured were classified as hatch year (HY) or after-hatch year (AHY) but careful checking of primary and secondary feathers starting in January 2000 revealed that some AHY doves could be further classified as second year (SY) based on retention of juvenal secondaries. Replacement (molt) of juvenal secondaries(s) originated from two molt centers (at s1 and s8) when juvenal p5 was being replaced and proceeded in sequence from s1 and s8 to s6 which was the last to be replaced. Secondaries were still being replaced at s4-s6 when juvenal p10 was replaced; this continued for up to seven months or replacement of adult p4-p5 in the year following hatching. There was evidence for suspension of replacement of juvenal secondaries (but not primaries) in some years as replacement of juvenal secondaries appeared to be slower than expected once s4 was replaced.*

## INTRODUCTION

There is a need to classify age of birds that are being banded correctly. The Mourning Dove (*Zenaida macroura*) has been studied extensively throughout its range in North America (Baskett and Sayre 1993) possibly because of its large distribution (Aldrich 1993) and importance to hunters (Baskett and Sayre 1993). Thus, it is commonly banded and extensive efforts have been made to capture and band this species in national banding programs throughout the United States

(Nichols and Tomlinson 1993). The typical banding period in nation-wide programs is from 1 Jul to 15 Aug, and doves are classified when banded as HY (hatching year), AHY (after-hatching year), or U (unknown).

More recently, collections of wings from hunter-harvested doves have been instituted with wings collected annually in the 1-15 September period (Miller and Otis 2010, Seamans et al. 2013). Wing surveys produce young to adult (HY:AHY) ratios which are measures of productivity. Doves of unknown age are not included in this ratio. Thus, it is important to classify correctly the age of doves being banded as well as those harvested (wing surveys) (Ruos and Tomlinson 1967).

Portions of the extensive scientific literature on Mourning Doves (reviewed by Baskett and Sayre 1993, Mirarchi and Baskett 1994) relate to describing the molt of Mourning Doves with focus mostly on estimating the age of young (HY) doves and separating them from adults (AHY) (Pearson and Moore 1939, McClure 1943, Swank 1955, Allen 1963, Hanson and Kossack 1963, Reeves et al. 1968, Reeves and Amend 1970, Haas and Amend 1976, Mirarchi 1993a/1993b). Several studies have also reported on the timing of the primary molt of adult Mourning Doves (Sadler et al. 1970, Haas and Amend 1979, Sullivan and Mirarchi 1999), but references to timing of replacement (molt) of other feathers useful in separating ages are minimal (Cannell 1984, Pyle 1995, Pyle 1997). Mirarchi and Baskett (1994) reported there have been no studies of the molt of secondaries of Mourning Doves. Pyle (1997) briefly commented on the molt of primary and secondary feathers of Mourning Doves. My objectives were to describe the timing and molt of secondary feathers of juvenile Mourning Doves.

## METHODS

This study was conducted on a non-migratory (Leopold and Dedon 1983) population of Mourning Doves (*Z. m. marginella*) in northeast Tucson, AZ. The vegetation in the area contained native trees (acacias [*Acacia* spp.], mesquite [*Prosopis* spp.], and palo verde [*Parkinsonia* spp.]) mixed with native shrubs and cactus interspersed with planted exotic trees, shrubs, and ornamental vegetation in a suburban setting. The trap site was under a mesquite tree.

Trapping and banding were initiated in January 2000 and continued during all months of the year in 2000-2002 and, thereafter, primarily from April through September. All banding followed the protocols of the Bird Banding Laboratory of the U.S. Geological Survey. Trapping procedures followed Reeves et al. (1968), but only one wire mesh m<sup>2</sup> drop trap was used. Age (buffy- or white-tipped secondary coverts were

initially used to identify HY doves) and sex classification followed Reeves and Amend (1970) except for identification of SY doves in all years. Data collected were retention of white-tipped primary and secondary coverts, and molt of primaries (p) classified from none (no molting of primaries) to p10, and replacement of secondaries (s), 1 through 8 with s1 being adjacent to p1. Mourning Doves have four tertial feathers (modified innermost secondaries, Pyle 1997) numbered 1 through 4 with tertial 1 being adjacent to s8. Tertials can be mistaken for secondaries but differ in being more brown with at least one dark blotch extending into the vane of the feather (Fig. 1). The timing of secondary replacement in relation to primary molt of all captured birds was further examined in an independent sample in September through December 2013, when 25 unbanded doves were captured and banded each month ( $n = 100$  new bandings). The same data were recorded for recaptures ( $n = 27$ ) during this interval.

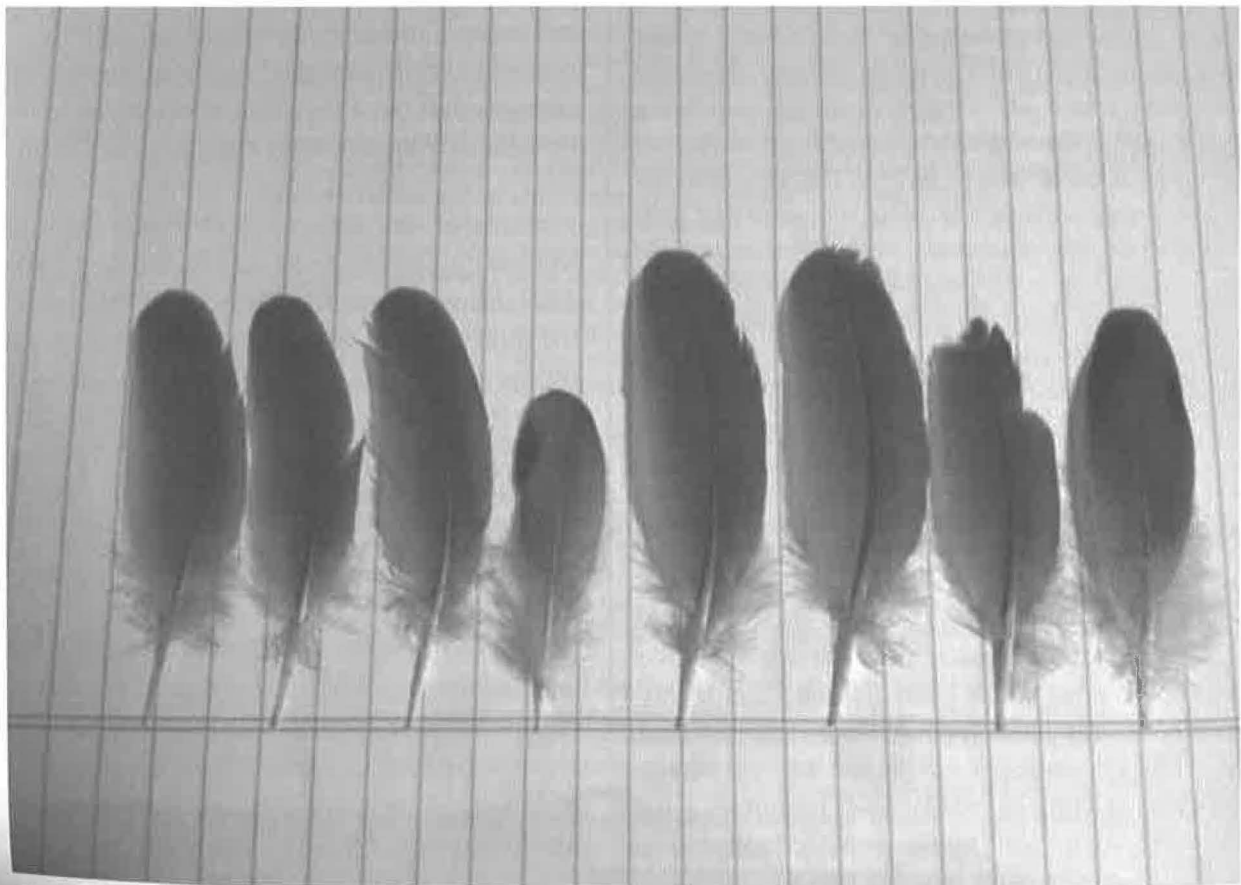


Fig. 1. Appearance of three secondary and one tertial feathers of juvenile (left) and adult (right) Mourning Doves. The four juvenile feathers on the left are shorter, fresher, and more rounded, while the four adult feathers on the right are longer, frequently worn, and more truncate. Note the black spot on the juvenile tertial (fourth feather from the left).

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**Fig. 1.** Appearance of three secondary and one tertial feathers of juvenile (left) and adult (right) Mourning Doves. The four juvenal feathers on the left are shorter, fresher, and more rounded, while the four adult feathers on the right are longer, frequently worn, and more truncate. Note the black spot on the juvenal tertial (fourth feather from the left).

Juvenal secondaries were distinguished from those of adults following Sanders and Braun (2014), as Pyle (1995) did not describe their appearance. Juvenal secondaries were shorter and narrower, and rounded at the tip while those of adults were longer, wider, and more truncate at the tip (Fig. 1). Secondaries of adults were also more noticeably worn prior to replacement in the fall and early winter. AHY doves in late summer and fall can be identified by worn primaries (usually p9 or

p10), secondaries (usually s3-s6), and tertials (any plus dorsal body molt which causes a dappled appearance over the lesser, medial, and greater upper wing coverts with alternating light (old and worn) and new rich brown (new and fresh) feathers. HY doves that had completed their molt of primaries, secondaries, and tertials appeared to have all new dorsal plumage and appeared to be a rich brown color without any worn feathers.

**Table 1. Timing of replacement of juvenal secondaries relative to primary molt of young (HY) Mourning Doves, Tucson, Arizona, 2000-2012**

Primary Molt	Number of Birds	Secondary Molt (Range)	Lesser, Median, and Greater Coverts
None Molting	399	None	White-tipped
p1	284	None	White-tipped
p2	260	None	White-tipped
p3	243	None	White-tipped
p4	185	None	White-tipped
p5	184	s1	White-tipped
p6	268	s1 - s2	White-tipped
p7	317	s1 - s3	White-tipped
p8	179	s3 - s4	White-tipped
p9	113	s4 - s5	3-6 White-tipped
p10	47	s5 - s6	3-6 White-tipped
Totals	2,479		

**Table 2. Timing of replacement of juvenal secondaries of SY Mourning Doves in Tucson, Arizona, after 1 Jan, 2000 - 2012.**

Primary Molt	Number of Birds	Date or Range	Juvenal Secondary Molt Range	Lesser, Median, and Greater Coverts
p6	1	3 Jan	s1 - s2	3-6 White-tipped
p7	1	1 Jan	s1 - s3	3-6 White-tipped
p8	9	3-20 Jan	s3 - s4	3-6 White-tipped
p9	12	1 Jan - 15 Feb	s4 - s5	1-2 White-tipped
p10	10	3 Jan - 2 Apr	s4 - s6	1-2 White-tipped
None molting	96	10 Jan - 30 May	s4 - s6	No White-tipped
p1	22	23 Apr - 5 Jul	s4 - s6	No White-tipped
p2	14	6 May - 24 Jul	s4 - s6	No White-tipped
p3	10	6 Jun - 20 Jul	s4 - s6	No White-tipped
p4	13	3 May - 28 Jul	s4 - s6	No White-tipped
p5	2	16-27 Jul	s6	No White-tipped

## RESULTS

I captured and banded 8,579 Mourning Doves during 2000-2012. This total included 2,479 HY, 190 SY, and 5,910 AHY doves. I incorporated the timing of captures and the molt of primaries and juvenal secondaries of the 190 SY doves. I also documented the timing of the replacement of juvenal secondaries (Table 1) of HY doves.

Second-year Mourning Doves were captured and identified starting on 1 Jan with the latest on 28 Jul (Table 2). The monthly distribution was January = 22, February = 12, March = 11, April = 45, May = 61, June = 8, and July = 31. None was identified in the succeeding months until 1 Jan of the following year. Trapping effort was not uniform and occurred in January-March in only three years. Trap effort was also low in June in all years.

Frequently, more than one juvenal secondary was being replaced. The replacement of secondaries proceeded from two molt centers, starting at s1 and s8 and proceeding to s5-s7 with s6 being the last replaced in most cases. Thus, the common groupings of retained juvenal secondaries were s2-s8, s3-s7, s4-s6, and s5-s6. Identification of when replacement of s8 occurred was difficult as the adjacent tertials were also being replaced at this time.

The sample size was small in January-March, as trapping effort was not even. The distribution of sample sizes in each category of primary molt increased from one (for p6-p7) to 96 (no molt of primaries) and then decreased to two (for p5) retaining only juvenal s6 (Table 2). There was an indication that replacement of juvenal secondaries slowed from s4 through s6 (Table 2).

The captured and banded sample in September-December 2013 consisted of 61 AHY and 39 HY doves. Twenty-seven AHY doves were still molting primaries (range = p7-p10), while the primary molt of the 39 HY doves ranged from none molting to p10. The number of HY doves banded

ranged from 16 (of 25 birds banded) in September, 12 in October, six in November, to five in December. Replacement of secondaries for the 39 HY doves ranged from none molting to s5 to s7 only at primary molt 8. However, retention of juvenal secondaries was variable from primary molt p7 to p9 with juvenal secondaries retained ranging from s3-s6, s3-s7, s3-s8, s4-s5, s4-s6, s4-s7, s5-s7 to s6. Capture dates for this sample ranged from 24 Sep to 18 Dec (the last day of trapping).

There were 25 different recaptures of which only seven (all HY doves) were originally banded in the September-December 2013 interval. Six birds recaptured were banded prior to 2013, and 12 were banded during July 2013. Of the 12 banded in July 2013, only one was banded as a HY and had no primary molt on 21 Jul. It was recaptured on 16 Dec (148 days later). All secondaries were classified as new adult and it was replacing worn body feathers. It was classified as an AHY on recapture.

## DISCUSSION

Replacement of juvenal secondaries started at s1 and s8 and moved towards s6. The initial loss of s1 occurred when juvenal p5 was being replaced at approximately  $70 \pm 5$  days of age (Braun and Tomlinson, Ms In Review). Replacement of s2-s3 and occasionally s4 then continued at approximately 10-12 day intervals coinciding with replacement of p6 through p8 ( $80-112 \pm 5$  days of age). Replacement of secondaries then seemed to slow but continued well past 131 days of age with some retaining s4-s6 into late July of the next calendar year. The last records of retention of s6 (the last juvenal secondary to be replaced) were on 27 and 28 Jul. One would expect the number of SY doves identified in the trap sample to decrease from January through July as the molt of secondaries progressed. The data (Table 2) supported this expectation but replacement of secondaries did not occur at the same rate as during initiation of replacement.

Trapping from September through 18 Dec 2013 revealed the same pattern in replacement of juvenal secondaries as in the larger trap samples from 2000



through 2012. However, the number of doves identified as HY decreased from 16 (of 25 = 64%) to 12 (48%) to 6 (24%) to 5 (20%). The five in December were replacing p8-p9 and retained juvenal secondaries s3-s6, s3-s7, s3-s8, s4-s7, and s6. Some of these individuals would have continued to retain juvenal secondaries into 2014. The data are suggestive that replacement of secondaries may be suspended in some years leading to identification of some SY Mourning Doves well into the year after hatching as documented with the larger sample from 2000-2012.

Pyle (1995) recognized the limitations of age classifications for columbids and tried to improve on Pyle (1995) in his later work (Pyle 1997). However, both works lacked details of the appearance and timing of replacement (molt) of juvenal secondaries of Mourning Doves. Banders (and the Bird Banding Laboratory) have accepted the standard codes of HY, ASY (rarely), and AHY for Mourning Doves. The data from this present study in Tucson, AZ, reveals that retention of juvenal secondaries continues well after 1 Jan in any given year. This allows identification of some SY among AHY doves before (and even after) appearance of HY doves in spring. Understanding the timing and molt of secondary flight feathers of juvenile doves may be particularly useful in correctly classifying HY birds that hatched early in the year and have molted most or all primary feathers and buffy- or white-tipped wing coverts, which makes correct classification of these doves otherwise difficult.

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Mourning Dove Photo R.Pantle