

ECCENTRIC PREFORMATIVE MOLT IN THE SPOTTED TOWHEE

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Examination of wing-feather molt often provides information essential for aging birds in the hand (Mulvihill 1993, Pyle 1997b, 2008). Correctly aging birds is important for understanding the causal relationships between age-class survival rates and population changes (DeSante et al. 2005). For example, correctly aging birds facilitates understanding of climate effects on reproduction better than merely monitoring population numbers because reproduction varies widely with annual weather patterns (DeSante and O'Grady 2000). Age-class information can also provide a clear measure of habitat quality without confounding effects such as population sources and sinks (Van Horne 1983) or misleading habitat-quality information based on relative abundance or population size (Pulliam 1988). Changes in bird populations often lag changes in the survival rate of an age class, while environmental changes often affect one age class immediately or after a short lag (Temple and Wiens 1989).

Greenlaw (1996) reported that the preformative molt of the Spotted Towhee (*Pipilo maculatus*) consists of the replacement of body feathers, tail feathers, and secondary coverts while the remiges and primary coverts of the juvenile plumage are retained. In addition, Byers et al. (1997), writing about the Rufous-sided Towhee before its split into the Eastern Towhee (*P. erythrophthalmus*) and Spotted Towhee, reported the preformative molt also includes some or all of the rectrices. Pyle (1997b) corroborated earlier reports that the preformative molt includes all median and greater coverts, with the outermost greater covert occasionally retained, and the number of tail feathers replaced ranging from 0 to all 12.

An eccentric molt is one that starts not at primary 1 (p1) but among the middle primaries, most commonly from p3 to p7, and proceeds distally (Pyle 1997b). Such eccentric molts commonly include the secondaries, beginning typically at a point from s2 to s5 and proceeding proximally. In some cases, eccentric replacement can be arrested before completion, but most often it proceeds through the outermost primary and s6 (Pyle 1997b).

In 2010, Los Alamos National Laboratory began operating a constant-effort bird-banding station in fall migration with the objective of tracking the age classes and populations of birds using the site. This station is located in Los Alamos County, New Mexico, within the Pajarito Wetlands complex in Pajarito Canyon, 3.7 km west of New Mexico State Route 4, and is operated one day per week for 10 weeks each year from the second week of August to the middle of October. The dominant plants of these 3.4 ha of wetlands comprise Narrowleaf Cottonwood (*Populus angustifolia*), Narrowleaf Willow (*Salix exigua*), and Broadleaf Cattail (*Typha latifolia*); those of the adjacent uplands Ponderosa Pine (*Pinus ponderosa*), Pinyon Pine (*P. edulis*) and One-seed Juniper (*Juniperus monosperma*).

On 2 October 2014, we captured, banded, and released a male Spotted Towhee showing evidence of an incomplete eccentric preformative molt, which we had never previously observed. An incompletely pneumatized skull implied the bird was in its year of hatching. Primaries 7–9 on the right wing were darker than the other primaries and had been replaced, while primaries 1–6 were distinctly brown and were retained juvenile feathers. Primary coverts 8–9 on the right wing are blacker than the inner primary coverts and had been replaced (Figure 1). Primaries 7–8 on the left wing were darker than the other primaries and had been replaced, while primaries 1–6 and 9 were distinctly brown in comparison and were retained juvenile feathers.

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Figure 1. Right wing of Spotted Towhee captured at the Pajarito Wetlands, New Mexico, 2 October 2014, showing primaries 7–9 contrastingly darker on the outer web than the inner primaries. The two outer primary coverts are also contrastingly darker than the inner primary coverts.

Photo by Stephen M. Fettig

Primary covert 8 (second from the outermost) on the left wing was blacker than the other primary coverts and had been replaced (Figure 2). Secondaries 4–6 on both the right and left wings were replaced whereas secondaries 1–3 had been retained from the juvenile plumage. The secondary coverts, tertials, and alulae were all replaced. Rectrices were all retained.

Since loss and regrowth of the outer primaries and inner secondaries in the observed nearly symmetrical pattern is unlikely due to a loss of feathers in a brush with a predator or to other injury, we interpreted the nearly symmetrical pattern observed as an example of eccentric molt partially replacing the juvenile plumage.

In the passerines, the preformative molt is typically partial with only the head and body feathers being replaced (Pyle 1997b). The eccentric pattern of replacement of the outer primaries and inner secondaries in this molt is relatively uncommon, at least in the United States. Pyle (1997a) reported molt data on 288 species of passerines, in 46 of which some or all individuals replace the primaries and secondaries in the eccentric pattern during the preformative molt. He called for more observations, especially in live birds.

Pyle (1998) discussed hypotheses for the adaptive value of eccentric molts with respect to exposure to bright sunlight, abrasive vegetation, and distance of migration. Willoughby (1991) suggested an eccentric primary molt may be of adaptive value to first-cycle birds exposed to abrasive vegetation, as in the case of the Verdin (*Auriparus flaviceps*), Yellow-breasted Chat (*Icteria virens*), *Passerina* buntings, and several wrens, thrashers, and sparrows. On the basis of variations within the tyrannid flycatchers, Pyle (1998) suggested that species migrating short distances are likely to change fewer remiges in the preformative molt than do those migrating longer

NOTES



Figure 2. Left wing of Spotted Towhee captured at the Pajarito Wetlands, New Mexico, 2 October 2014, showing primaries 7 and 8 contrastingly darker on the outer webs than primary 9 and the inner primaries. One of the two visible outer primary coverts is also contrastingly darker than the inner primary coverts.

Photo by Stephen M. Fettig

distances. Since the Spotted Towhee often inhabits dry, abrasive habitats on or near the ground and migrates a relatively short distance, if at all, it seems reasonable to expect that an eccentric primary molt should occasionally be found in this species.

Johnson et al. (2013) reported finding eccentric molt patterns in 3 of 27 Eastern Towhees in formative plumage examined in Louisiana. Similarly, at the Pajarito Wetlands, we observed an eccentric molt pattern in 1 of 30 Spotted Towhees in formative plumage (Table 1). We know of no previous report of a Spotted Towhee having undergone an eccentric preformative molt.

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NOTES

Table 1 Numbers of the Spotted Towhee Captured at the Pajarito Wetlands, Los Alamos County, New Mexico^a

Year	Hatching-year birds	Older birds
2010	4	3
2011	0	3
2012	10	4
2013	6	3
2014	10	5

^aOver 10 weeks from the second week of August to the middle of October, 1 day per week. Recaptures excluded.

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