NOTES

SECOND PREBASIC MOLT OF A RING-BILLED GULL AT ANCHORAGE, ALASKA

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ABSTRACT: The extended stay of a Ring-billed Gull (*Larus delawarensis*) at Anchorage, Alaska, where the species is casual, provided the opportunity for observation of the second prebasic molt of a single individual. That molt was at an early stage when the bird was first found on 9 July 2024 and was completed by mid-October, in agreement with the schedule reported from the Ring-billed Gull's normal range. Growth of the outermost primary was slower than that of the others, perhaps related to that feather's greater mass and variable density along its length, or because the focus of the bird's biophysical systems had begun to shift from molt to preparation for migration and winter.

A second-year Ring-billed Gull (*Larus delawarensis*) remained at Anchorage, Alaska, from 9 July to 10 November 2024 (ebird.org/checklist/S186225668, /S202112251), providing a unique opportunity to document all but the early stage of a known individual's second prebasic molt (Figures 1–3). The Ring-billed Gull is an uncommon to rare migrant in southeast Alaska and a casual visitor in the south-central (including Anchorage) and interior regions of Alaska (Gibson and Withrow 2015). I tracked the progress of its primary molt by using the scoring method described by Ginn and Melville (1983)—summing the score of each primary quantified as 0 for an old feather, 1 for an apparently missing or not visible feather, 2 for a visible feather less than about one-third grown, 3 for a feather between about one- and two-thirds grown, 4 for a feather more than about two-thirds but less than fully grown, and 5 for an apparently fully grown feather—which produces a total score ranging from zero for a bird that has not yet started to molt its primaries (all primaries present and old) to a maximum of 50 when all primaries are new and fully grown. Terminology and feather-numbering schemes follow Pyle (2008).

When first seen in July, the bird was in its second year (late first plumage cycle) on the basis of its wearing both definitive-like and juvenile flight feathers, plus brown or dusky marginal coverts on the leading edge of the wings (Figure 1) (Dwight 1925, Malling Olsen and Larsson 2004, Howell and Dunn 2007, Pyle 2008). Furthermore, by September, when all the flight feathers were grown or growing, only primary (p) 5 showed a white tip, and only the proximal vane of p10 showed a small white subterminal spot (Figure 3), both consistent with a Ring-billed Gull in its second plumage cycle (Blokpoel et al. 1987).

When first observed this Ring-billed Gull had already begun its prebasic molt, although visual backward extrapolation of my estimated molt scores suggests it possibly started molting primaries in late April or early May. Furthermore, by 27 October the Anchorage gull's outermost primary (p10) was fully regrown (ebird.org/checklist/S200529203). That feather's growth was possibly completed in early or mid-October, given a projection of growth slowing from 5 September (ebird.org/checklist/S194096962), to 20 September (Figure 3), to 26 September (ebird.org/checklist/S196584786). This apparent total duration of molt, from late April/early May to early/mid-October, is consistent with the calendar dates reported for second prebasic molt in the Ring-billed Gull as a species (e.g. Malling Olsen and Larsson 2004, Howell and Dunn 2007, Pyle 2008).

As reflected in my scores, molt of the Anchorage gull's primaries progressed

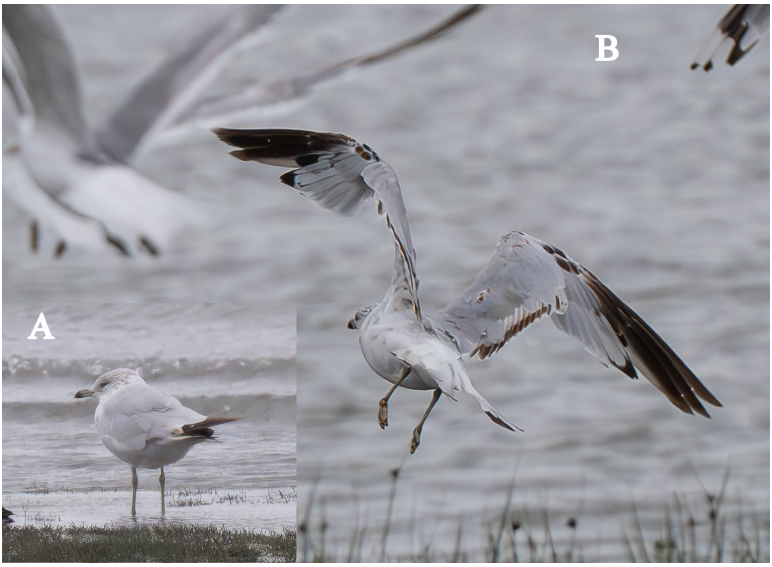

FIGURE 1. Ring-billed Gull in second prebasic molt at Anchorage, Alaska, on 26 July 2024. (A) The dusky mottling on head and nape appears somewhat more extensive than on 14 July (ebird.org/checklist/S187060654). (B) Primaries p1–5 have been replaced, p6 is growing, p7 is missing and p8–10 are juvenile (old), producing a net primary-molt score of about 27–29. Additionally, secondaries s1–3 on both wings, s5 (at least on the left wing), and all the tertials have been dropped (but are possibly regrowing), leaving at least 14 juvenile secondaries remaining. Rectrix pair r1 appears nearly fully grown, r2 is about half grown, r3 is short or missing, and r4–5 on the left side and r4–6 on the right side are juvenile with broad continuous subterminal spots or band. The left r6 also appears to have been dropped. Additional photos on this date are at ebird.org/checklist/S188975368.

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rather linearly from early June through early September, but then gradually slowed. Using distant photos taken by Josiah Verbrugge, I scored the bird's primary molt on 9 July at about 20–22. Subsequently, the scores increased linearly from 27–29 on 26 July (Figure 1) to 36–38 on 19 and 20 August (Figure 2), to 44–45 on 5 September. After that the scores increased at a declining rate, going from 48 on 20 September (Figure 3), when p8 appeared fully regrown, to 49 on 27 September, to the maximum score of 50 on 27 October. A similar pattern of primary molt, with scores increasing linearly at first but then decreasing in a nonlinear manner once the outermost primaries are almost regrown, has been demonstrated in many birds, both passerines and nonpasserines (e.g., Ginn and Melville 1983, Dawson and Newton 2004, Scher 2024).

The sequence of molt in the Anchorage Ring-billed Gull's secondaries and rectrices, and the timing relative to the progression of primary molt, were consistent with those aspects as described by Dwight (1925) for gulls in general, and by Howell and Corben (2000) for the Western Gull (*Larus occidentalis*). Specifically, the bird started to molt these feathers in mid-July, first shedding the outer secondaries (s1 to s3), s5, and tertials, and inner rectrix pairs r1 to r3, after primaries p6 and p7 were dropped (Figure 1). The secondaries also appeared to be shed in groups of three

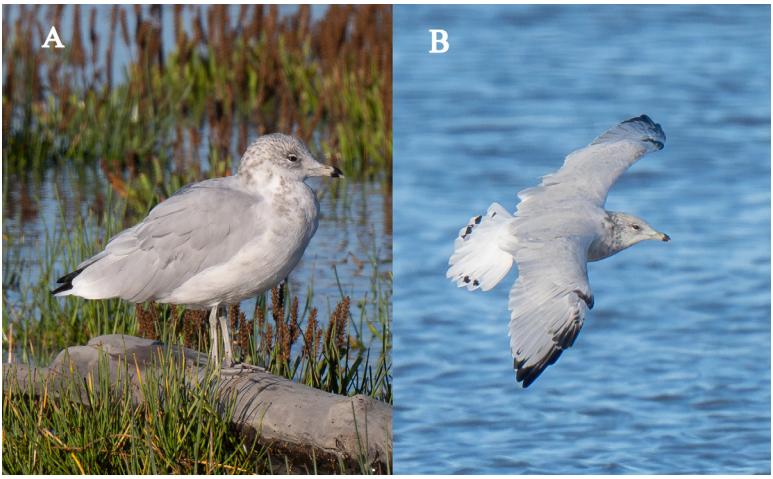

FIGURE 2. Ring-billed Gull in second prebasic molt at Anchorage, Alaska, on 20 August 2024. (A) The dusky mottling on the head and nape is much more extensive and intense than on 26 July (Figure 1), suggesting continued molt of those feathers. (B) Primary p6 is regrown, p7 is nearly regrown, p8 is growing, and p9 and p10 are missing, resulting in the short-winged profile in (A) and producing a net primary-molt score of about 36–38; p4 and p5 also each show a small white tip. All secondaries and rectrices now appear new, with secondaries among s3–4 and s9–13 and the left r5 still growing. Note that the tail band of the bird's second plumage cycle is broken and appears asymmetric, being broader on the left. Other photos taken on this date are at ebird.org/checklist/S192198570.

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to possibly five feathers at a time. The tertials had regrown by mid- to late August (Figure 2), and the last secondaries to be replaced, among s11 to s14, were regrown by mid-September, at which time only p10 was still growing (Figure 3). The rectrices were replaced somewhat erratically, with the inner pairs (r1 to r3) shed more or less synchronously, while the left outermost feather (r6) was shed before the adjacent inward r5 (Figure 1). All the rectrices were fully replaced by late August (only left r5 was still growing on 20 August, Figure 2), before molt of the secondaries was completed and while primaries p8 to p10 were still growing. Finally, pairs r2 to r5 of the second plumage cycle's rectrices were marked with variably sized dark subterminal spots, broader on the left side and with only a tiny spot on right r5, forming a broken, asymmetric-appearing tail band.

The unusually long time taken for growth of the Anchorage gull's outermost primary, about 4–6 weeks, might be explained by considering the following aspects of feather mass. First, although very few studies have tracked the progression of primary molt of an individual bird, Dawson and Newton (2004) showed that in five passerine species the net mass of new feathers grown by caged individuals increased at a linear rate but then slowed in a nonlinear manner at the very end of the molt cycle. Underhill and Summers (1993) also demonstrated that the total duration of primary molt in some migratory shorebirds, as populations, could be more closely modeled by accounting for the mass of each feather and by presuming the rate at which feather mass is produced is linear. Second, Underhill and Joubert (1995) and

FIGURE 3. Ring-billed Gull nearing completion of second prebasic molt at Anchorage, Alaska, on 20 September 2024. The primaries have been replaced to p8, p9 is nearly fully regrown, and p10 is still growing (on the underside, note the small white mirror on the inner vane of p10), producing a net primary-molt score of about 48. By this date all secondaries and rectrices had been fully replaced. Other photos taken on this date are at ebird.org/checklist/S195843215.

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Underhill and Summers (1993) showed, for a wide range of migratory shorebirds and several terns, that the masses of the two outermost primaries, p9 and p10, the longest, stiffest, and densest, are typically four or more times greater than the masses of the shorter and less dense innermost primaries. In many gulls, including the Ring-billed, the relative lengths of the primaries (e.g., p1:p10) closely match those ratios in shorebirds (www.fws.gov/lab/featheratlas/). Therefore, I presume the mass of the outer primaries in gulls is also notably greater than the mass of the inner primaries. Third, Redfern (1998) reported that in several birds, including the Black-legged Kittiwake (*Rissa tridactyla*), the mass per unit length along a single primary decreases from the base to the tip, such that the final 15–20 % of feather growth (i.e., the basal portion) may account for over one-quarter of that feather's net mass. Therefore, the combination of these factors—the densest portion of the longest primary with the greatest mass being produced at the end of the molt cycle, at a fixed or possibly diminishing rate of mass per unit of time—may account for why complete growth of the Anchorage Ring-billed Gull's p10 appeared to take so long after p9 was regrown. However, as a slowing rate of primary molt toward the end of the molt cycle has been documented in other birds (Ginn and Melville 1983, Dawson and Newton 2004, Scher 2024), the apparent slowing in growth of the Anchorage Ring-billed Gull's p10 may also reflect the focus of the bird's biophysical systems starting to shift from molting to preparing for the next phases of its life cycle, such as migration and winter (P. Pyle pers. comm.).

I would be remiss not to acknowledge Josiah Verbrugge, who provided me with his original photo files of the Anchorage Ring-billed Gull on 9 July, the first day it was seen, as well as the time Peter Pyle shared discussing the finer aspects of the molt I had documented but failed to recognize or appropriately describe in the original manuscript.

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