WESTERN BIRDS

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Western Specialty:
Thick-billed Fox Sparrow

Photo by Roseanne Howard of Bishop, California:
Thick-billed Fox Sparrow (*Passerella iliaca megarhyncha*)
Methuselah Trail, White Mountains, Inyo County, California, 9 June 2020.
The Fox Sparrow is famed for its complex variation in both plumage and voice. Despite much study, disagreement remains over how that variation is best interpreted by a classification. In this issue of *Western Birds*, Edward R. Pandolfino, Lily A. Douglas, and Peter Pyle reassess the Fox Sparrows breeding in the Toiyabe Range of central Nevada and in the White Mountains, straddling the California/Nevada border. They found that the former are typical of *Passerella iliaca schistacea* in bill size, song, and call. But that the Fox Sparrows of the White Mountains have songs and calls much like those of *P. i. megarhyncha* of the Sierra Nevada while being intermediate between *schistacea* and *megarhyncha* in bill size. They recommend that *P. i. canescens*, described from the White Mountains, be considered a synonym of *megarhyncha*.

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Front cover photo by © Rodney Ungwiluk Jr. of Gambell, Alaska: Icterine Warbler (*Hippolais icterina*), Gambell, St. Lawrence Island, Alaska, 22 September 2022. Of the many astonishing birds new to Alaska that the Alaska Checklist Committee reports in this issue of *Western Birds*, among the most remarkable is the Icterine Warbler, a species of western Eurasia known to nest east only as far as Nazorovo, Krasnoyarsk Krai, Russia (56° 02′ N, 90° 23′ E)—5000 km from Gambell.

Back cover photo by © Gerardo Marrón of La Paz, Baja California Sur, Mexico: Mangrove Warbler (*Setophaga petechia castaneiceps*), El Conchalito, Ensenada de La Paz, Baja California Sur, 1 July 2014. The expansion of the breeding range of the Brown-headed Cowbird has now reached the tip of the Baja California Peninsula, where that brood parasite has been well established for only about 20 years. Thus the birds endemic to Baja California Sur, such as this subspecies of the Yellow Warbler, represent a new generation of naïve hosts confronting cowbird parasitism for the first time.

Western Birds solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. Send manuscripts to Daniel D. Gibson, P. O. Box 155, Ester, AK 99725; avesalaska@gmail.com. For matters of style consult the Suggestions to Contributors to *Western Birds* (at https://westernfieldornithologists.org/publications/journal).

WESTERN BIRDS

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FIFTH REPORT OF THE ALASKA CHECKLIST COMMITTEE, 2018–2022

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ABSTRACT: The fifth report of the Alaska Checklist Committee adds 21 species to the Checklist of Alaska Birds from the five years 2018–2022, a net total that includes the addition of two species formerly maintained as subspecies—Stejneger's Scoter (*Melanitta stejnegeri*) and the Short-billed Gull (*Larus brachyrhynchus*)—and the deletion of one species (Northwestern Crow) currently maintained as a subspecies of the American Crow, *Corvus brachyrhynchos caurinus*. At the close of 2022 we recognize 541 species and 118 additional subspecies as occurring, or having occurred, naturally in Alaska.

In this report the Alaska Checklist Committee updates the checklist of Alaska birds with additions, deletions, and changes in status, taxonomy, and nomenclature since our last report (Gibson et al. 2018). For species not included in the American Ornithologists' Union's *Check-list of North American Birds* (AOU 1998 and supplements through [Chesser et al.] 2022), scientific nomenclature, English names, and outlines of nesting ranges generally follow Vaurie (1959, 1965), Dickinson and Remsen (2013), and Dickinson and Christidis (2014). Twenty-one species were added to and one species was deleted from the Checklist of Alaska Birds during the period 2018–2022, resulting in a total of 541 species recognized by this committee as occurring,

or having occurred, naturally in Alaska through 2022. Three additional subspecies were added and two were deleted, and others were integrated, resulting in a total of 118 additional taxa. Organized in 2000, the committee currently comprises the eight authors of this report. We post a new edition of the Checklist of Alaska Birds early in each new year at the University of Alaska Museum Department of Ornithology website, where the 29th edition (January 2023) can be found at www.universityofalaskamuseumbirds.org.

Archived examples (voucher specimens) of avian species and subspecies make available manifold data that can only be inferred or conjectured from representations (photos, videos, etc.). Therefore we include here references to first Alaska specimens of species already known to have occurred in the state as well as to archived specimens brought to our attention, re-evaluated, or obtained during this period of coverage. Many of these represent the northwesternmost North American specimen records of Nearctic taxa or the easternmost specimen records of Palearctic taxa. Unless a species account includes an outline of subspecies, we regard the species as monotypic. Bracketed subspecies names are inferences based on characteristics of plumage, phenology, and/or geographic range. Maintained separately, the Alaska "unsubstantiated" list currently comprises 17 species for which there are on file (AKCLC) detailed reports but no specimen or readily identifiable photo.

Museum abbreviations in text are AMNH (American Museum of Natural History, New York), DMNS (Denver Museum of Nature and Science), LACM (Natural History Museum of Los Angeles County), MVZ (Museum of Vertebrate Zoology, University of California, Berkeley), UAM (University of Alaska Museum, Fairbanks), USNM (U.S. National Museum of Natural History, Smithsonian Institution, Washington, DC), and UWBM (University of Washington-Burke Museum, Seattle). Photos archived by the Macaulay Library, Cornell University, are identified by the letters ML.

ADDITIONS, OTHER CHANGES TO THE ALASKA LIST, AND FIRST ALASKA SPECIMEN RECORDS

Melanitta stejnegeri (Ridgway, 1887) {type locality: Bering Island, Commander Islands [Vaurie 1965:133; and see Gibson and Byrd 2007:278, footnote 8]}. **Stejneger's Scoter**. Breeds in Siberia and the Russian Far East, east to Anadyrland, Koryakland, and Kamchatka and south to Amurland, Sakhalin, and the Kuril Islands. **Re-evaluated Taxon**: Chesser et al. (2019) divided the White-winged Scoter *Melanitta fusca*, as then broadly defined, into three species: *M. fusca* (Velvet Scoter—Europe), *M. deglandi* (White-winged Scoter—North America), and *M. stejnegeri* (Stejneger's Scoter—Asia). For discussion of the casual occurrence of Stejneger's Scoter in Alaska, see Garner et al. (2004), Gibson et al. (2008), Dunn et al. (2012), and Gibson and Withrow (2015). Photos ML 342150931 and 287075131; published in Birding World 17:338–339 (2004) and Western Birds 43:222 (2012). No Alaska specimen.

Grus monacha Temminck, 1835 {Hokkaido and Korea}. **Hooded Crane**. Breeds in s Siberia, n China. **First Alaska record**: One bird was shot from a flock of Sandhill Cranes (*Antigone canadensis*) at Delta Junction during crane hunting on 29 Sep 2020 (UAM 45000, second-year ♂, M. Lenze; Withrow and Lenze 2021, incl. specimen photos). Notes: Its arrival date was not determined, but the bird had been present for several days. Recorded widely in Japan (OSJ 2012), where most of the

world's population winters on Kyushu and Honshu (Brazil 1991). For discussion of the four earlier North American records (in Idaho, Nebraska, Tennessee, and Indiana), see Pranty et al. (2014), Pranty (2015), and Pyle et al. (2021).

Charadrius nivosus (Cassin, 1858) {San Francisco, California}. **Snowy Plover**. Breeds in w, c, and s USA, c Mexico, Bahamas, Greater and Netherlands Antilles, and from coastal sw Ecuador to c Chile—in two or three subspecies (Dickinson and Remsen 2013). *Charadrius nivosus* [*nivosus*]. W, c, and s USA, etc. **First Alaska record**: One bird, estimated to be an adult female, was observed at Egg Island, Copper River delta, on 7 Jun 2019 (M. A. Bishop, K. Jurica, and A. Schaefer; photos AKCLC). No Alaska specimen. Notes: Before *nivosus* was elevated from subspecies to species status by Chesser et al. (2011), the Alaska checklist included *C. alexandrinus* (*sensu lato*). But Gibson et al. (2013) regarded the photos supporting the single Alaska record of that polytypic taxon (Nome River mouth, 23–24 May 1991) as insufficient to distinguish *alexandrinus* from *nivosus*, resulting in the AKCLC's decision to remove the "Snowy Plover *Charadrius alexandrinus*" from the Alaska checklist.

The Egg Island bird was distinguished from *C. a. alexandrinus* Linnaeus, 1758 (breeds east to China and s Japan) and from *C. a. nihonensis* Deignan, 1941 (breeds on Sakhalin and in s Kuril Islands) by being very pale-backed and having a very reduced pectoral band—both characteristics of this species and sex. Recent British Columbia records number almost 20 (Toochin and Cecile, undated), and an adult male occurred at Marsh Lake, Yukon Territory, 27–29 May 1998 (photographed; Eckert and Sinclair 1998, Sinclair et al. 2003).

Limosa fedoa fedoa (Linnaeus, 1758) {Hudson Bay}. **Marbled Godwit**. Breeds from e-c Alberta, s-c Saskatchewan, and s Manitoba east to Ontario and south to e Montana, North Dakota, ne South Dakota, and nw Minnesota. **Additional subspecies**: UAM 45800, ad. ♂, Fairbanks, 27–30 May 2019 (found dead and salvaged by C. Stuyck and P. Leonard). Larger measurements (diagonal tarsus 74.9 mm, flattened wing 227 mm, and culmen ~100 mm) point to the larger, mid-continent subspecies (see Gibson and Kessel 1989). Notes: A Marbled Godwit observed at Fairbanks 27 May–5 Jun 2004 (Tobish 2004) was tentatively inferred to be this subspecies because it occurred inland (Alaska's first inland Marbled Godwit) and long after the April to mid-May coastal migration of *L. f. beringiae* (see Gibson and Kessel 1989, Isleib and Kessel 1989, Ruthrauff et al. 2019), which breeds on the Alaska Peninsula. Also, it was accompanied by Wilson's Phalaropes (*Phalaropus tricolor*) (N. R. Hajdukovich, L. H. DeCicco, et al.); that species is a casual late-spring migrant from east of Alaska. Records of nominate *fedoa* west and north of its nesting range are scarce as far as e-c British Columbia (see Campbell et al. 1990); a Marbled Godwit at Marsh Lake, Yukon Territory, 18–19 May 1997 (Sinclair et al. 2003) fits the timing of the few birds found in interior Alaska.

Ichthyaetus ichthyaetus Pallas, 1773 {Caspian Sea}. **Pallas's Gull**. Breeds from sw Russia to w Mongolia and n China. **First Alaska record**: A lone adult was observed at Shemya Island, Aleutian Islands, 2–4 May 2019 (R. A. Fischer; photos AKCLC). The bird was found dead 10 days later and the specimen was salvaged (UAM 43000, ad. ♀, 14 May 2019 [R. A Fischer; Figure 1]). Notes: In e Asia recorded in Taiwan, Korea, and Japan (Brazil 2009), where accidental on Honshu, Kyushu, and Okinawa (OSJ 2012). A report from nearer Alaska—920 km west of Attu—is that of one bird at Khalaktirskoye Lake, Kamchatka, 18 Oct 2015 (S. Atkinson, https://ebird.org /checklist/S25456807).

Larus brachyrhynchus Richardson, 1831 {Great Bear Lake, Northwest Territories}. **Short-billed Gull**. Breeds in nw North America. **Re-evaluated Taxon**: Once again recognized as a separate, monotypic, North American species (Chesser et al. 2021b)—as originally named and described (see AOU 1886, 1895, 1910). For

Figure 1. Pallas's Gull: UAM 43000, ad. ♀, Shemya Island, Aleutian Islands, Alaska, 14 May 2019.

Photos by J. J. Withrow

many years (AOU 1931, 1957, 1983, 1998) this taxon was maintained as a subspecies of *L. canus* Linnaeus, 1758 {Sweden}, the Common or Mew Gull. Alaska collections of the Short-billed Gull include series (≥10 specimens) at AMNH, DMNS, MVZ, UAM, USNM, and UWBM. Notes: The Common Gull remains on the Alaska Checklist in subspecies *L. c. kamtschatschensis* Bonaparte, 1857 {Kamchatka}—Alaska specimens UAM (9). See Gibson and Withrow (2015).

Sternula antillarum Lesson, 1847 {Guadeloupe Island, West Indies}. **Least Tern**. Breeds on the Atlantic coast of North America from Massachusetts to Bermuda, the Caribbean Sea as far south as Belize and Curaçao; in the interior USA in river systems of e Great Plains and Mississippi River valley; and on the Pacific coast of North America in California and Mexico—in up to five subspecies (see Patten and Erickson 1996, Massey 1998), but "validity of races dubious … only clinal variation exists" (Malling Olsen and Larsson 1995:136; see also Pyle 2008). To our knowledge it remains true that "no quantitative data exist that would allow assessment of [the] reliability of these characters or their degree of overlap with other taxa" (Patten and Erickson 1996:888). **First Alaska record**: A second-year bird in first alternate plumage was observed at Anchorage from 21 Jul to 4 Aug 2022 (B. J. Lagassé, R. L. Scher, et al.; photos AKCLC, Figure 2). No Alaska specimen. Notes: On the west coast of North America, the Least Tern is a casual or accidental visitor north to Oregon, Washington, and British Columbia; the northernmost previous record is for Sandspit, Haida Gwaii, 24 Jun 2010 (Charlesworth 2010). The Alaska bird was a difficult identification (vote 6:1), corroborated by P. Pyle (in litt.). Of the species/pair *Sternula albifrons/S. antillarum*, we retain *S. albifrons*, the Little Tern, on the unsubstantiated list.

Thalasseus sandvicensis (Latham, 1787) {Sandwich, Kent, England}. **Sandwich**

FIGURE 2. Least Tern, Anchorage, Alaska, 21 Jul 2022.

Photos by R. L. Scher

Tern. Breeds in Europe and w Asia; in coastal e USA, Puerto Rico, and the Virgin Islands; and on islands off Venezuela and French Guiana and from coastal e Brazil to s-c Argentina—in three subspecies (Dickinson and Remsen 2013). *Thalasseus sandvicensis* [*acuflavidus*] (Cabot, 1847) {Quintana Roo}. Breeds from coastal e USA to the Caribbean. **FIRST ALASKA RECORD**: One bird was observed at Gustavus 10–11 May 2021 (N. Drumheller; photos AKCLC, Figure 3). No Alaska specimen. NOTES: Known in winter on the Pacific coast of Mexico and Panama (see Howell and Webb 1995); north of Oaxaca first found in Sonora in 1987 (Russell and Monson 1998), in Baja California in 1986 and 2008 (Velarde and Tordesillas 2009), and in California in 1980, 1982, 1985, 1987, and 1991 (see Schaffner 1981, Unitt 1984, Collins 1997, Hamilton et al. 2007).

Ardenna pacifica (Gmelin, 1789) {Kermadec Islands}. **Wedge-tailed Shearwater**. Breeds on islands off w Mexico, in the Hawaiian Islands, in the c and w Pacific Ocean, off s Australia and New Zealand, and in the Indian Ocean. **FIRST ALASKA**

FIGURE 3. Sandwich Tern, Gustavus, Alaska, 10–11 May 2021.

Photo by N. Drumheller

RECORD: A lone light-morph bird was observed 6 km west of Cape Edgecumbe, Kruzof Island, Alexander Archipelago, on 23 Jul 2022 (C. Goff; photos AKCLC). No Alaska specimen. NOTES: Occurs off the w coast of Middle and South America (AOU 1998); casual or accidental in California (Hamilton et al. 2007), Oregon (Marshall et al. 2006), and Washington (Wahl et al. 2005).

Buteo rufinus (Cretzschmar, 1827) {upper Nubia, Shendi, Sennar, and Abyssinia}. **Long-legged Buzzard**. Breeds from c Europe to c Asia, in n Africa, Cape Verde Is., and Socotra—in two (Vaurie 1965) or four (Dickinson and Remsen 2013) subspecies. *Buteo rufinus* [*rufinus*]. C Europe to c Asia. **FIRST ALASKA RECORD**: A light-morph adult was observed at St. Paul Island, Pribilof Islands, from 15 Nov 2018 to 2 Jan 2019 (B. Lestenkof, B. Pierce, R. B. Benter, and S. Clark; photos AKCLC, Figure 4). No Alaska specimen. NOTES: There would seem to be no record in e Asia east of Mongolia, >4500 km from the Pribilofs. See Orta et al. (2020) for this species' relationships within *Buteo* and for its hybridization with the Upland Buzzard (*B. hemilasius*).

Lanius collurio Linnaeus, 1758 {Sweden}. **Red-backed Shrike**. Breeds from Europe and w Siberia to Asia Minor, the Caucasus, the Levant, n and nw Iran, n Kazakhstan, and the Altai Mts. Monotypic (Dickinson and Christidis 2014, Shirihai and Svensson 2018)—but variation at the specific and subspecific levels and issues of hybridization in central Asian *Lanius* are complicated and probably not yet settled (e.g., see del Hoyo and Collar 2016 and citations therein). **FIRST ALASKA RECORDS**: Lone immatures were observed at Gambell, St. Lawrence Island, 3–22 Oct 2017 (Lehman 2019, Lehman et al. 2019—both incl. photos) and at Shemya Island,

FIGURE 4. Long-legged Buzzard, St. Paul Island, Pribilof Islands, Alaska, 15 Nov 2018–2 Jan 2019.

Photos by B. Lestenkof

Aleutians, 10–19 Sep 2022 (Z. M. Pohlen; photos, e.g., ML486368541, https://ebird.org/ak/checklist/ S119176579). No Alaska specimen. NOTES: In e Asia accidental in Japan on Shikoku, Kyushu, Hegura, and Yonaguni (OSJ 2012); reported from Korea (Brazil 2009). Elsewhere in North America, a Red-backed Shrike was present at Powell River, British Columbia, 23–30 Oct 2020 (https://bcfo.ca/brc-round-30-jan-to-nov-2021-accepted-records/); a shrike in Mendocino Co., California, 5 Mar–22 Apr 2015 was identified as a hybrid *L. collurio* × *L. phoenicuroides* (Pyle et al. 2015).

Corvus brachyrhynchos caurinus Baird, 1858 {Fort Steilacoom, Washington}. **American Crow**. Coastal resident from Kodiak Island to Puget Sound. **RE-EVALUATED TAXON**: Chesser et al. (2020) dismissed *Corvus caurinus*, the Northwestern Crow, as "a geographical trend, rather than a species or subspecies, and thus is treated as a junior synonym of *Corvus brachyrhynchos*" —a nomenclatural lapsus promptly corrected by stating instead that *caurinus* "is now considered a subspecies of *brachyrhynchos*" (Chesser et al. 2021a). The taxonomic status of *caurinus* has been a subject of continuous discussion for over 100 years (e.g., see Rhoads 1893, Ridgway 1904, Swarth 1912, Oberholser 1919, Brooks and Swarth 1925, Taverner 1928, Brooks 1942, Johnston 1961, Mattocks et al. 1976, Godfrey 1986, Madge and Burn 1994, Campbell et al. 1997, Chesser et al. 2020, 2021a, Slager et al. 2020, Butler 2021). In following the assessment of Chesser et al. (2021a), we recognize two subspecies of the American Crow in nw North America: *C. b. caurinus* and *C. b. hesperis* Ridgway, 1887 {Fort Klamath, Oregon}. The latter has reached Alaska—from adjacent interior British Columbia—only at Hyder (see Gibson and Withrow 2015). Alaska specimens of *C. b. caurinus* include series (≥10 specimens) at AMNH, LACM, MVZ, UAM, and USNM; of *C. b. hesperis* at UAM (9 specimens).

Hippolais icterina (Vieillot, 1817) {France}. **Icterine Warbler**. Breeds from c, n, and e Europe to sw Siberia, the Caucasus, and n Iran. **FIRST ALASKA RECORD**: One bird was observed at Gambell, St. Lawrence Island, on 22 Sep 2022 (R. Ungwiluk Jr.; photos AKCLC; see Figure 5 and this issue's front cover). No Alaska specimen. NOTES: "Presently unaccepted in Japan" (OSJ 2012:407). Svensson (2020) included no records from e Asia; indeed, the e limits of the currently understood breeding range lie >5000 km west of Alaska.

Helopsaltes certhiola (Pallas, 1811) {"in regionem ultra Baicalem" = mountainous regions between Onon and Borzya in eastern Transbaikalia [Vaurie 1959:234]}. **Pallas's Grasshopper Warbler**. Breeds from the Irtysh River in Kazakhstan and Siberia to Mongolia, n China, and the Russian Far East—in five subspecies (Kennerly and Pearson 2010). *Helopsaltes certhiola* [*certhiola*]. Russian Far East and ne China. **FIRST ALASKA RECORD**: One bird was observed at Gambell, St. Lawrence Island, 9–12 Sep 2019 (Lang and Heinl 2021, incl. photos). No Alaska specimen. NOTES: Recorded widely in Japan (OSJ 2012). Hybridizes extensively with *H. ochotensis* at the Sea of Okhotsk (e.g., see Kalyakin et al. 1993, Drovetski et al. 2015; UWBM specimens examined by Withrow).

Phylloscopus trochilus trochilus (Linnaeus, 1758) {England south of Thames} or ***P. t. acredula*** (Linnaeus, 1758) {Uppsala, Sweden}. **Willow Warbler**. **FIRST ALASKA SPECIMEN AND ADDITIONAL SUBSPECIES**: UAM 48000, immature ♀?, Shemya Island, Aleutians, 21 Sep 2021 (Z. M. Pohlen; Figure 6). NOTES: The species is casual in fall at St. Lawrence Island (see Gibson and Withrow 2015, Lehman 2019) and in the Pribilofs (2011–2018—D. Gochfeld, C. Gregory, W. S. Gibson; photos AKCLC); this first Alaska specimen provides the first Aleutian record. Photos of Alaska's first Willow Warbler, at St. Lawrence Island, were thought to "best fit within populations of easterly *acredula* or in the borderland between *acredula* and *yakutensis*" (L. Svensson *in* Lehman 2003:7). Photographs of subsequent individuals show a range of phenotypes, including grayish birds with dark legs/feet suggestive of *yakutensis*. Discussion of *yakutensis* in Gibson and Withrow (2015; cf. Gibson et

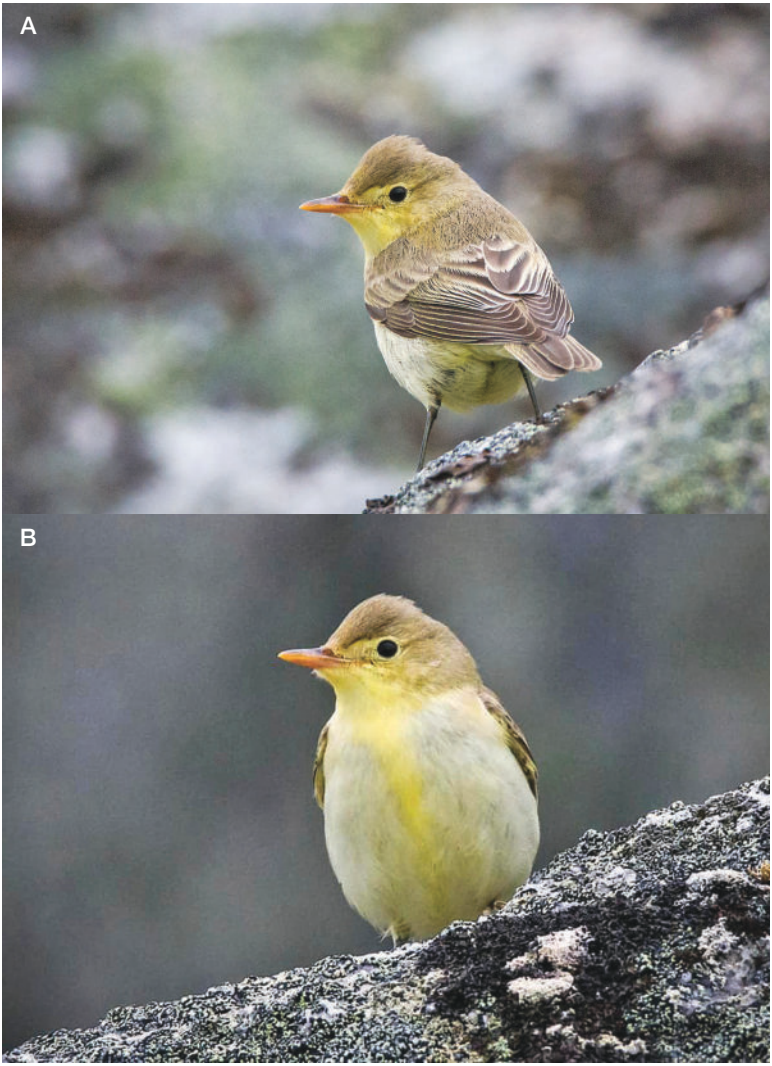

FIGURE 5. Icterine Warbler, Gambell, St. Lawrence Island, Alaska, 22 Sep 2022.

Photos by R. Ungwiluk Jr.

al. 2003) was an inference based on proximity. Geographic variation in the Willow Warbler is "predominantly clinal" (Vaurie 1959: 271), with only the extremes reliably diagnosed (Shirihai and Svensson 2018, Sokolovskis et al. 2019; see also Bensch et al. 2009), and individual variation is such that some authors have considered the species dimorphic (Ticehurst 1938, Williamson 1976). Parsing this complexity in North America awaits further collecting.

FIGURE 6. The North American specimen of Willow Warbler (*Phylloscopus trochilus*, UAM 48000; with partially spread wing) in comparison to two examples of *P. t. yakutensis*—from the Indigirka River, Russia (top, UAM 29477 and 29485; both mid-Jun) and an example of nominate *trochilus* or subspecies *acredula* from Ukraine (bottom, UAM 19571; Oct). Although this photo compares fall immatures (bottom two) with summer adults (top two), the Willow Warbler's two complete molts each year (Svensson 1992, Shirihai and Svensson 2018) serve to ameliorate color differences due to fading. Descriptions of *yakutensis* in first-fall plumage are few but make clear that the differences seen here are likely not due only to a difference in age (see Ticehurst 1938, Cramp 1992). Therefore we assess the Shemya bird as belonging to a subspecies other than *yakutensis*.

Photos by J. J. Withrow

Turdus naumanni Temminck, 1820 {Silesia and Austria … Hungary [Ripley 1964]}. **Naumann's Thrush**. Breeds in Siberia from mid-Yenisei valley to upper Lena basin, south to Lake Baikal and n Mongolia. **FIRST ALASKA RECORDS**: One bird was observed at Adak Island, Aleutians, on 22 Oct 1982 (C. F. and M. Zeillemaker; color sketch AKCLC); one bird at Attu Island, Aleutians, 20–22 May 2000 (S. C. Heinl et al.; digital photo by B. Carlson); one bird at Gambell, St. Lawrence Island, on 5 Jun 2015 (J. L. Dunn et al.; photos AKCLC, Lehman 2019, Birding 72[2]:14, 2021); one bird at Shemya Island, Aleutians, on 30 May 2021 (Z. M. Pohlen; Figure 7); and another at Adak, 24–26 Sep 2022 (A. J. Lang, F. A. Haas photos AKCLC). No Alaska specimen. NOTES: Following the elevation of *T. naumanni* from subspecies to species status by Chesser et al. (2020), the AKCLC—initially concerned that the possibility of hybrids, which are frequent, with the closely related Dusky Thrush (*T. eunomus*) could not be eliminated by the available photos—added this species to its unsubstantiated list on the basis of the first three reports above. That decision was superseded by a second vote in 2021—after additional photos were obtained of the St. Lawrence Island bird (above)—which added the species to the Alaska checklist. *Turdus naumanni* and *T. eunomus* hybridize extensively and were long considered conspecific.

Dement'ev and Gladkov (1954) reported *naumanni* breeding east only to the middle Maya River, in the se Lena River basin (2400 km west of the w Aleutians), but mentioned hybrids or intergrades occurring as far northeast as the Anadyr River, which drains into the nw Bering Sea. Recorded in Japan widely as a migrant and (OSJ 2012) in very small numbers in winter (Brazil 1991).

Turdus philomelos C. L. Brehm, 1831 {central Germany on migration [Vaurie 1959]}. **Song Thrush**. Breeds from Europe east through Siberia to s Lake Baikal—in four subspecies (Vaurie 1959, Shirihai and Svensson 2018). *Turdus philomelos* [*philomelos*] or [*nataliae* Buturlin, 1929 {Krasnoyarsk, c Siberia}]. C and e Europe

FIGURE 7. Naumann's Thrush, Shemya Island, Aleutian Islands, Alaska, 30 May 2021.
Photos by Z. M. Pohlen

east to c Siberia. **FIRST ALASKA RECORDS**: One bird was observed at Utqiaġvik on 9 Oct 2020 (T. Ficker, J. Cunningham, and M. Bell; photos AKCLC, Figure 8), and one bird was observed at St. Paul Island, Pribilofs, on 4 and 10 Oct 2022 (W. S. Gibson, M. Kramer; photos AKCLC). No Alaska specimen. NOTES: The nearest part of the known breeding range lies 5000 km from Utqiaġvik. Accidental in Japan (e.g., Aoki et al. 2014).

Saxicola maurus (Pallas, 1773) {Karassum [Ishim River, w Siberia]}. **Asian Stonechat**. **RE-EVALUATED SPECIES**: *Saxicola maurus*—including subspecies *stejnegeri* (Parrot, 1908) {Etorofu, Kuriles; and Hokkaido}, to which Alaska specimens have been referred (Gibson and Withrow 2015)—was split from *Saxicola torquatus* (Linnaeus, 1766) {Cape of Good Hope}, the African Stonechat, and from *S. rubicola* (Linnaeus, 1766) {France}, the European Stonechat, by Chesser et al. (2022). Thus *S. maurus* simply replaces *S. torquatus* on the Alaska list.

Monticola saxatilis (Linnaeus, 1766) {Switzerland}. **Rufous-tailed Rock-Thrush**. Breeds from nw Africa and s and c Europe east through sw and c Asia to trans-Baikal region of s Siberia and nw and n China. **FIRST ALASKA RECORD**: An

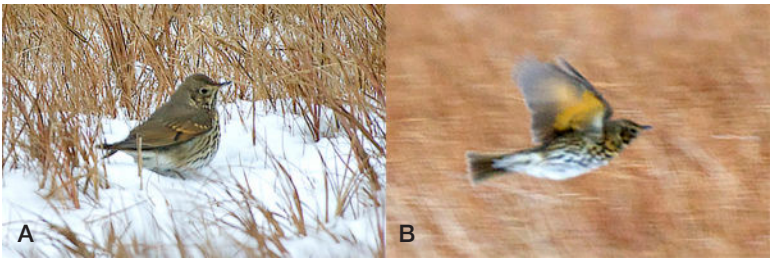

FIGURE 8. Song Thrush, Utqiaġvik, Alaska, 9 Oct 2020.
Photos by T. Ficker

imm. male was observed at Utqiaġvik from 24 to 26 Jun 2021 (K. A. Hansen, W. Klockner, W. S. Gibson, J. Myles, J. Benningfield, R. L. VanBuskirk, et al.; photo Birding 72[2]:15, 2021; Figure 9). No Alaska specimen. Notes: Accidental in Japan (Brazil 1991). The nearest part of the known breeding range lies some 4000 km from Point Barrow, Alaska.

Motacilla citreola Pallas, 1776 {"In Siberia orientaliore" (Mayr and Greenway 1960:135)}. **Citrine Wagtail**. Breeds from Finland east to n-c Siberia and south to the Himalayas. Polytypic in two (Alström and Mild 2003) or three (Dickinson and Christidis 2014) subspecies. *Motacilla citreola* [*citreola*]. Finland east across Russia to the upper Amur River and south to China. **First Alaska record**: An immature was observed at Seward on 15 Sep 2022 (J. Maniscalco, R. B. Benter; photos AKCLC, Figure 10). No Alaska specimen. Notes: Accidental, or scarce migrant, in Korea, Japan, and Taiwan (Brazil 2009, OSJ 2012). Recorded thrice previously in North America: in Mississippi (DeBenedictis et al. 1995), British Columbia (N. Am. Birds 67:144, 181, and 327, all 2013; and 507, 2014), and California (Singer et al. 2020).

Calcarius ornatus (Townsend, 1837), {near forks of Platte River, w Nebraska}. **Chestnut-collared Longspur**. Breeds from c-s Canada to ne Colorado, n Nebraska,

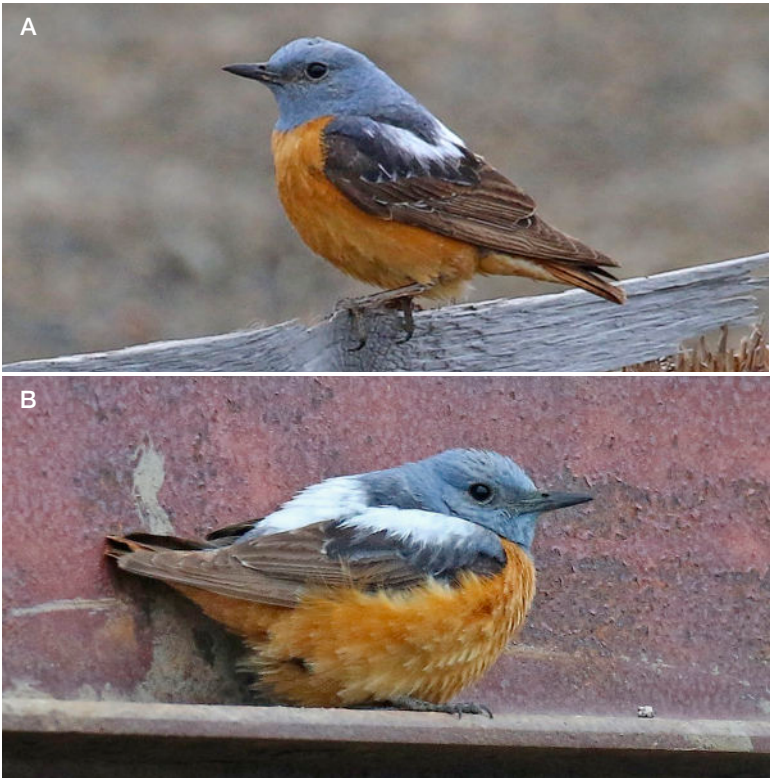

Figure 9. Rufous-tailed Rock-Thrush, Utqiaġvik, Alaska, 24–26 Jun 2021.

Photos by R. L. VanBuskirk (A) and J. Benningfield (B).

Figure 10. Citrine Wagtail, Seward, Alaska, 15 Sep 2022.

Photos by J. Maniscalco

and sw Minnesota. **First Alaska record**: A male flew aboard a vessel in Warren Channel, between Warren and Kosciusko islands, on 4 Jul 2022 (A. Montgomery, via G. B. vanVliet, W. S. Gibson; photos ML470802011, ML470827381). No Alaska specimen. Notes: Transferred from the unsubstantiated list, where long included on the basis of a single report from Juneau (of flocks of five and seven birds, 22 May and 29 May 1982, respectively, B. A. Wright, UAM files). Recorded repeatedly in sw British Columbia (Campbell et al. 2001), as far north and west as the Kispiox River valley (Swarth 1924).

Ammospiza leconteii (Audubon, 1844) {Fort Union, North Dakota}. **LeConte's Sparrow**. Breeds in w-c Canada (west to ne and e-c British Columbia), n-c USA. **First Alaska record**: One bird was observed at Sitka on 13 Oct 2018 (C. Goff; photo N. Am. Birds 72:48, 2021). No Alaska specimen. Notes: Casual or very rare in s British Columbia (Campbell et al. 2001).

FIGURE 11. Lucy's Warbler, Chena Hot Springs, Alaska, 27 Jul 2022.

Photo by M. Sopoliga

Leiothlypis luciae (Cooper, 1861) {Fort Mojave, Arizona}. **Lucy's Warbler**. Breeds from se California, s Nevada, s Utah, and sw Colorado to ne Baja California, s Arizona, n Sonora, sw New Mexico, and w Texas. **FIRST ALASKA RECORD**: One bird was observed at Chena Hot Springs, 82 km east-northeast of Fairbanks, on 27 Jul 2022 (M. Sopoliga; Figure 11). No Alaska specimen. NOTES: Accidental widely in North America, as far north as British Columbia (https://bcfo.ca/bc-bird-records-committee-sightings-database/; see also AOU 1998, Johnson et al. 2020) and Alberta (Hudon et al. 2009).

Setophaga castanea (Wilson, 1810) {Pennsylvania}. **Bay-breasted Warbler**. Breeds from ne British Columbia (Weber and Cannings 1990), sw Mackenzie, and n Alberta east to the Maritimes and south to n Minnesota, n Michigan, n New York, and Maine (Venier et al. 2020). **FIRST ALASKA RECORD**: A male was observed at Gambell, St. Lawrence Island, 6–8 Jun 2018 (Lehman 2019, incl. photos). No Alaska specimen. NOTES: Transferred from the unsubstantiated list, where long included on the basis of two reports (male, Fairbanks, 23 May 1951, Gabrielson and Lincoln 1959:830; and immature, Petersburg, 13 Aug 1994, P. J. Walsh [UAM files]).

Setophaga fusca (Statius Müller, 1776) {French Guiana}. **Blackburnian Warbler**. Breeds from w-c Canada (Alberta) east to the Maritimes and south to n-c USA, in the Appalachians to Georgia. **FIRST ALASKA RECORD**: One immature female was observed at Ketchikan on 28 and 29 Oct 2022 (S. C. Heinl, R. L. Scher, B. L. Limle; photos ML, Figure 12). No Alaska specimen. NOTES: Strays recorded in most western states (Morse 2020); well known as such in California, especially in fall (Hamilton et al. 2007). Accidental in British Columbia (Campbell et al. 2001).

Setophaga nigrescens (J. K. Townsend, 1837) {Fort William, Portland, Oregon}. **Black-throated Gray Warbler**. Breeds in sw Canada (coastal sw British Columbia), w USA, and nw Mexico. **FIRST ALASKA SPECIMEN**: UAM 43333, ad. ♂, Hyder, 5 Jun 2019 (J. J. Withrow). NOTES: First Alaska records in 2016 (see Gibson et al. 2018,

FIGURE 12. Blackburnian Warbler, Ketchikan, Alaska, 29 Oct 2022.

Photos by B. L. Limle

Tobish 2019; photos Western Birds 49:187, 2018; N. Am. Birds 70:371, 2019; 72:52, 2021), when the species was transferred from the unsubstantiated list, where it had been included based on a single report (male, Mitkof Island, 5 Jul 1989, Tobish and Isleib 1989).

ADDITION TO THE ALASKA UNSUBSTANTIATED LIST

Pterodroma ultima Murphy, 1949 {Oeno Island, South Pacific}. **Murphy's Petrel**. Breeds in the s-c Pacific Ocean in the Austral, Tuamotu, and Pitcairn islands;

"probably disperses … from c-s Pacific towards the w coast of North America, being recorded n to Hawaii (Oct–Nov) and to 54° N in Gulf of Alaska (mainly well offshore) … possibly regular off w North America (sometimes 100s) in Feb-Jun (mainly Apr-May), but also even more rarely in Jul … early Dec" (Carboneras et al. 2020). In Alaska waters, at least one bird was identified in the Gulf of Alaska east of Kodiak Island on 14 Jul 2019 (D. Cushing).

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VOCALIZATIONS AND BILL MEASUREMENTS MAY RESOLVE SOME QUESTIONS ABOUT TAXONOMIC RELATIONSHIPS WITHIN THE FOX SPARROW COMPLEX

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ABSTRACT: The many described subspecies of the Fox Sparrow (*Passerella iliaca*) have been parsed into four groups, the Red (*iliaca* group, two or three subspecies), Sooty (*unalaschcensis* group, seven subspecies), Thick-billed (*megarhyncha* group, five subspecies) and Slate-colored (*schistacea* group, four subspecies). Intermediate populations and contact areas between these groups play a role in answering the question whether any of the groups should be considered separate species. *P. i. canescens* of the Slate-colored group shows genetic characters of both the Slate-colored and Thick-billed groups. As currently classified it comprises two disjunct populations, one breeding in the White Mountains of California and Nevada, the other in the Toiyabe Range of central Nevada. We analyzed the vocalizations and bill sizes of these two populations to see if this might shed light on their taxonomic relationships. Our analyses of song, call, and bill measurements, along with a re-examination of previously published morphologic and genetic data, suggest that the two disjunct populations currently assigned to *P. i. canescens* represent different subspecies: the central Nevada population *P. i. schistacea* (in the Slate-colored group) and the White Mountains population *P. i. megarhyncha* (in the Thick-billed group), thus eliminating *P. i. canescens* as a synonym. Our findings may have implications for any future proposals to split the Fox Sparrow groups into distinct species. If that split results in the Slate-colored and Thick-billed groups assigned to separate species, our results would include the White Mountains population in the Thick-billed species and the central Nevada population in the Slate-colored species.

Multiple sources suggest that the Fox Sparrow (*Passerella iliaca*) may comprise three or four species (Zink 1986, 1994, 2008, Byers et al. 1995, Rising 1996, Dunn and Alderfer 2017). Beadle and Rising (2003) and Wright (2019) referred to these putative species, each polytypic, as the Red Fox Sparrow (*P. iliaca*), Sooty Fox Sparrow (*P. unalaschcensis*), Slate-colored Fox Sparrow (*P. schistacea*), and Thick-billed Fox Sparrow (*P. megarhyncha*). Here, for clarity, we refer to these groups of Fox Sparrow subspecies by these English names, while using the subspecific epithet for the component subspecies. The Xeno-canto archive of bird vocalizations (www.xeno-canto.org) also catalogs Fox Sparrow recordings into four different species with these same names. Nevertheless, the North American Classification Committee of the American Ornithological Society (AOS; Chesser et al. 2022), Weckstein et al. (2002), and Clements et al. (2021) still recognize only a single Fox Sparrow species consisting of four subspecies groups.

The disagreement is based on a lack of clarity about the evolutionary history of the subspecies groups and insufficient data on their interactions in areas

of contact. For example, *P. i. altivagans* has been variously placed in both the Red and Slate-colored groups because of its mix of morphologic and genetic characteristics. Also, Zink and Kessen (1999) and Zink (2008) reported evidence of interbreeding at points of contact between the ranges of the Thick-billed and Slate-colored groups in Nevada and eastern California. Floyd et al. (2007) considered the situation at the Thick-billed/Slate-colored contact zone to be "one of the few remaining impediments to the four-way split of the Fox Sparrow." Although there may be contact between *fulva* (Thick-billed group) and *schistacea* (Slate-colored group) in southeast Oregon and northwest Nevada, the primary issues involve the population breeding in the White Mountains along the California–Nevada border. Swarth (1918) described it as *P. i. canescens*, and it has been included in the Slate-colored group (Weckstein et al. 2002). Linsdale (1936) assigned a disjunct population in central Nevada in the Toiyabe Range to *canescens*, but that population has not been studied either genetically or morphologically. Therefore, we investigated both the White Mountains and Toiyabe Range populations further, focusing on the vocal and morphological characteristics of both populations to determine to which group (Slate-colored or Thick-billed) each is best assigned. We also assessed more broadly the patterns of differences in song and call between the Thick-billed and Slate-colored groups. Although the White Mountains population shows genetic evidence of interbreeding with the Thick-billed group (Zink 1994, 2008, Zink and Weckstein 2003), these authors concluded that the degree of genetic interchange did not preclude recognition of the Slate-colored and Thick-billed groups as distinct species.

A 2003 proposal to the AOU to split the Fox Sparrow into four species was rejected on a split vote by the checklist committee (T. Chesser, J. Dunn, pers. comm.), with those voting "no" citing the need for more data from the areas of possible interbreeding among subspecies groups. Garrett et al. (2000), Zink and Weckstein (2003), Floyd et al. (2007), and Wright (2019) all suggested that studies of the vocalizations of these taxa may shed light on their taxonomic relationships and help resolve questions about populations in the contact zones. Differences in vocalizations can help reveal the extent of interaction between populations or subspecies and possibly reveal early stages of speciation (Marler and Tamura 1962, Nottebohm 1969, Baker 1975, Slabbekoorn and Smith 2002, Dingle et al. 2010, Pandolfino and Pieplow 2015). Martin (1976, 1977, 1979) published a thorough treatment of Fox Sparrow songs, but his work was restricted to locations in Utah and Idaho, all within the range of the Slate-colored group. DeCicco (2021) noted qualitative differences between the songs of Red and Sooty groups at a contact zone in Alaska, and Pieplow (2019) noted that songs of the Slate-colored group include more buzzy syllables than do those of Red or Sooty groups. However, there are no quantitative comparisons of Fox Sparrow songs by subspecies group.

Garrett et al. (2000) found the primary contact call note used by the Thick-billed group to be distinct from the call notes of the Slate-colored and Sooty groups, and equally distinct from that of the Red group (Sibley 2014, Dunn and Alderfer 2017, Pieplow 2019). Dunn and Alderfer (2017) and Heindel and Heindel (in press) also note that, in the White Mountains of California, Fox Sparrows give calls associated with the Thick-billed group, not the Slate-colored group. Because the calls of songbirds have historically

been considered innate rather than learned (Thorpe 1961), this difference may be evidence of significant divergence. Subsequent studies, however, have revealed that, in several species, certain calls may be learned or at least influenced by learning (see Marler 2004, and citations therein).

Because there are no systematic comparisons of the vocalizations of Fox Sparrows in the contact area between the Slate-colored and Thick-billed groups, we analyzed recordings of songs and calls to search for diagnostic vocal differences between them. Bill size is the primary morphologic feature distinguishing the Slate-colored and Thick-billed groups, so we also measured the bills of specimens of the Toiyabe Range and White Mountains populations and compared them to specimens of *P. i. schistacea* from northern Nevada. We also re-examined most of the published morphologic and genetic work on the Thick-billed and Slate-colored groups to see if a combination of vocal, morphologic, and genetic factors might reveal more about differences between these groups.

METHODS

From 22 to 23 June 2022 Pandolfino visited the Toiyabe Range to record Fox Sparrow songs and calls, recording vocalizations of four different individuals. For the remainder of the ranges of both the Thick-billed and Slate-colored groups we used archived recordings from Xeno-canto and the Mark Robbins/Macaulay Library (www.macaulaylibrary.org) (Figure 1). Those recordings included more than 1000 examples of full song from 121 individuals of seven subspecies and an additional 18 recordings that included only call notes. The metadata for all recordings are in Appendix 1 at https://archive.westernfieldornithologists.org/archive/V54/Pandolfino-Fox_Sparrow-WB54-2-append.pdf. To ensure that the recorded individual was a breeder at that location, we analyzed only those songs recorded from 15 May to 31 July and included at least three consecutive examples of full song from the same individual. We excluded any recordings made after broadcast of pre-recorded song. We assumed any recordings from the same location and day were from a single individual unless the recordist indicated otherwise. We analyzed recordings from the White Mountains and Toiyabe Range separately to allow comparison with the vocal characteristics of other populations of the Slate-colored and Thick-billed groups.

We analyzed recordings with Raven Pro software (KLYCCB 2022), using the selection-box tool for quantitative analyses. All analyses were conducted in a blinded fashion to avoid any possible unintentional bias,. That is, all recordings were coded so that the individual doing the analyses did not know the location of the recording. Song characters compared included average song length, average number of syllables per song, singing rate (number of songs per unit of time), percent of songs including at least one buzzy syllable, percent of songs including a terminal buzzy syllable, percent of songs including more than one buzzy syllable, and percent of songs including at least one trilled syllable. For our purposes, we defined a buzzy syllable as a continuous trace on the spectrogram with very rapid modulation of frequency. We defined a trilled syllable as a rapid series of distinct repeated notes. Figure 2 shows a representative example with two consecutive songs

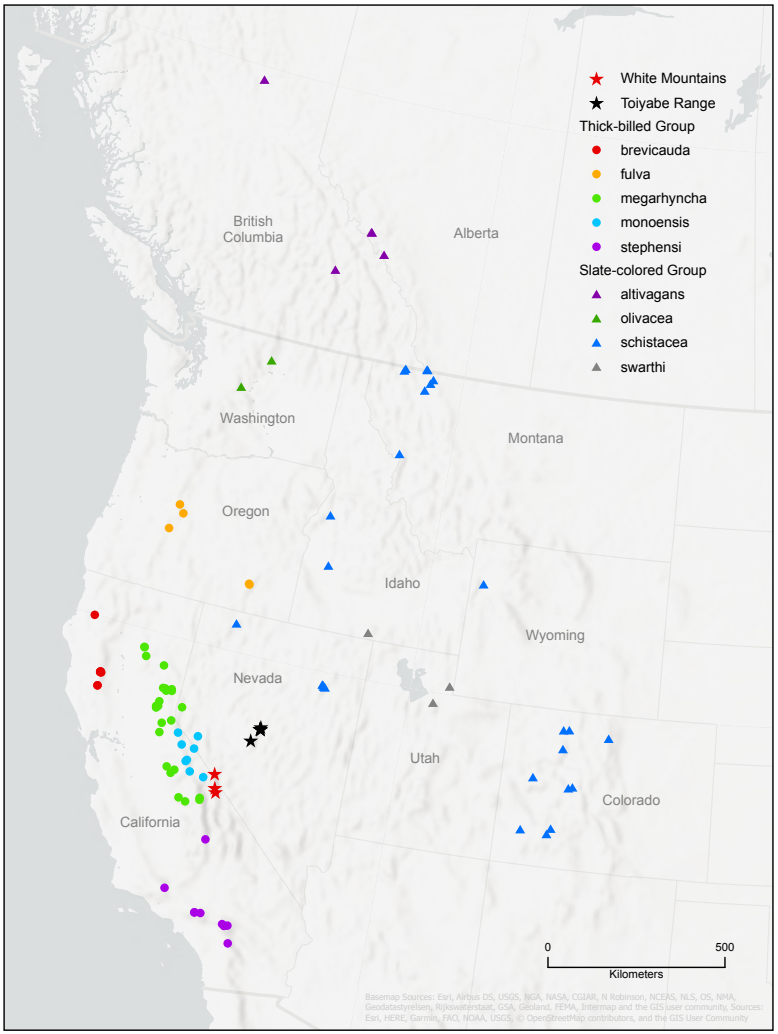

FIGURE 1. Locations of Fox Sparrow recordings used.

from an individual, the first with two buzzy syllables and the second with one buzzy syllable and one fast trill. Note that the key difference between the two is that a trill consists of discrete notes rather than a continuous modulated trace. In cases where the quality of a recording was insufficient to differentiate between a buzz and fast trill, we omitted that recording from the analysis. The possibility of a near-continuum between buzzes and very fast trills is one of the reasons such analyses should always be conducted blind.

Calls were compared qualitatively by ear and by spectrograms, also done in

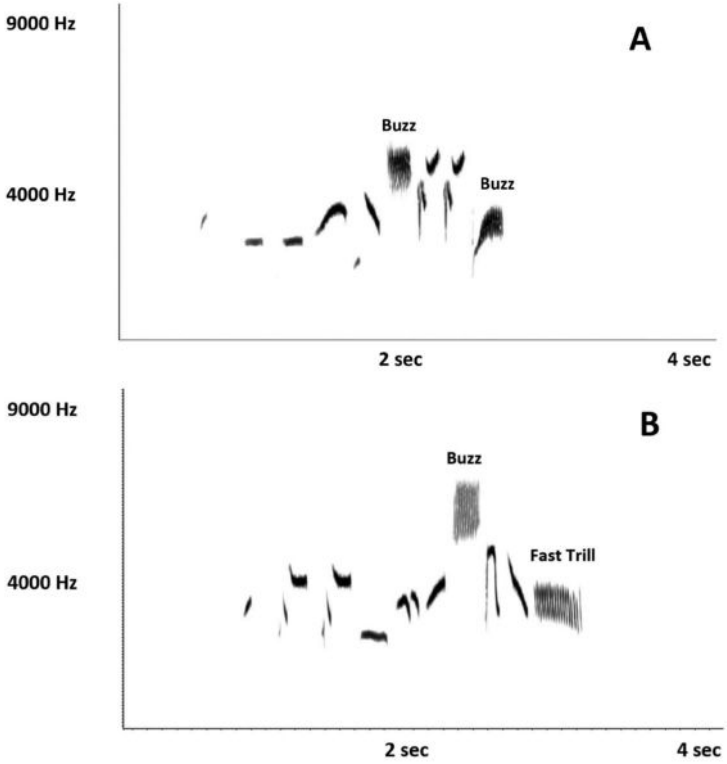

FIGURE 2. Two consecutive songs from a Fox Sparrow recorded by Randy Little 28 June 1961 in Glacier Park, Montana (xc15670). A, example of a song with two buzzy syllables; B, example of a song with one buzzy syllable and one fast trill.

a blind fashion. The difference between the typical sharp "smack" of the Slate-colored group and the metallic "tink" of the Thick-billed group is qualitatively obvious when heard. The calls can be differentiated on a spectrogram by the smeared appearance of the "tink" call, with the sound in the mid-frequencies extending up to 0.1 second after the main note. The "smack" call consists of one distinct vertical line on the spectrogram.

Pyle examined specimens in the collection at the Museum of Vertebrate Zoology at the University of California, Berkeley, from three disjunct regions (the White Mountains of eastern California and western Nevada in the west, the Toiyabe Range in central Nevada, and the Ruby Mountains in northern Nevada). Specimens of juveniles were excluded from our set. The exposed culmen was measured with a ruler scaled in millimeters from where the ridge of the culmen meets the cranial skin (often but not always the base of the feathers). Bill depth was measured with calipers perpendicularly at the anterior end of the nares ("depth at nares"). In order to compare our values with those of Swarth (1920), bill depths of specimens from the White Mountains

were also measured from the base of the exposed culmen to the angle at the rear of the mandible, to approximate Swarth's method. All measurements were taken by Pyle in a standardized manner, following Pyle (2022:8–9). Specimen catalog numbers, collection locations, dates, and measurements are tabulated in Appendix 2 at https://archive.westernfieldornithologists.org/archive/V54/Pandolfino-Fox_Sparrow-WB54-2-append.pdf.

RESULTS

Of the eight song characters measured, only the percent of songs including a buzzy syllable and the percent of songs including more than one buzzy syllable showed any promise for differentiating the Slate-colored and Thick-billed groups. Of the 272 songs (from 36 individuals) recorded in the Slate-colored range, 261 (97%) included at least one buzzy syllable, and 145 (53%) included more than one buzz. Among the 574 songs from 69 individuals of the Thick-billed group, 321 songs (53%) included at least one buzz and only 10 (less than 2%) included more than one buzzy syllable (Figure 3). A plot by subspecies of the number of songs with at least one buzz versus the number of songs with more than one buzz distinguishes the Thick-billed and Slate-colored groups well (Figure 4), with the presence of more than one buzz per song being particularly useful (Table 1). Birds of the Toiyabe Range are very similar in this respect to other Slate-colored subspecies. However, the White Mountains Fox Sparrow songs, though somewhat buzzier than other songs of the Thick-billed group, fit much better with that group than with the Slate-colored group.

We confirmed with recordings that the contact call note of the Thick-billed group (distinctly metallic "tink") is quite different and easily distinguished by visual inspection of the spectrograms and by ear from that of the Slate-colored group (sharp "smack"; six individuals). All eight individuals recorded in the White Mountains gave calls indistinguishable from those of the Thick-billed

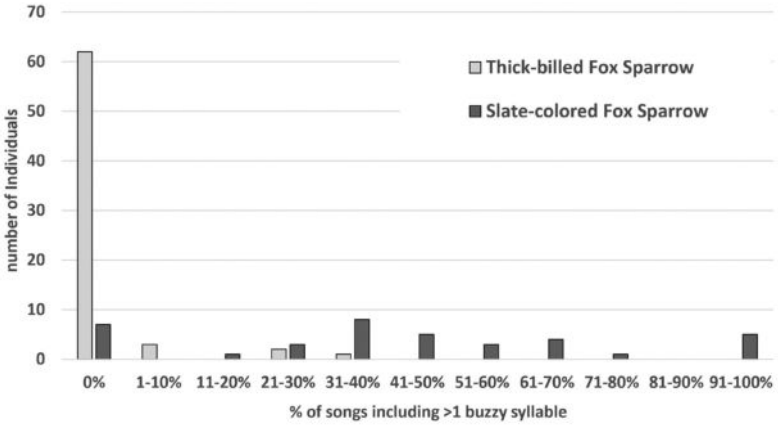

FIGURE 3. Histogram comparing the Thick-billed and Slate-colored groups of the Fox Sparrow by percent of individuals singing songs with more than one buzzy syllable.

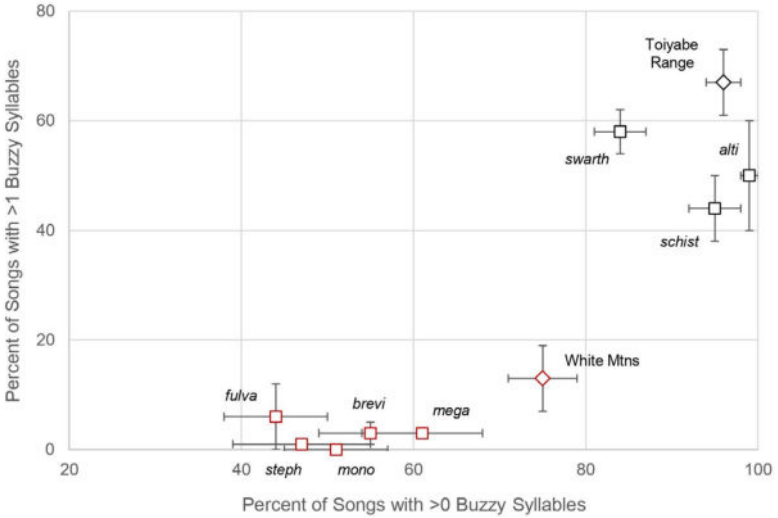

FIGURE 4. Comparison of the percent of individual Fox Sparrows singing songs containing at least one buzzy syllable (*x* axis) or more than one buzzy syllable (*y* axis) in the White Mountains (red diamond; $n = 9$) and Toiyabe Range (black diamond; $n = 7$) and by subspecies within the Thick-billed group (red squares; *brevi* = *brevicauda*, $n = 11$; *fulva*, $n = 5$; *mega* = *megarhyncha*, $n = 23$; *mono* = *monoensis*, $n = 12$; *steph* = *stephensi*, $n = 18$) and the Slate-colored group (black squares; *alti* = *altivagans*, $n = 8$; *schist* = *schistacea*, $n = 25$; *swarth* = *swarthi*, $n = 3$). Error bars represent 1 standard error.

group, whereas all six individuals recorded in the Toiyabe Range gave calls indistinguishable from those of the Slate-colored group (Figure 5).

The analysis of bill sizes of Fox Sparrows from three areas (Figure 6) showed that birds from central Nevada have bills smaller than those from the White Mountains but are similar to those of the Slate-colored group

TABLE 1 Main Vocal and Morphological Characters of Fox Sparrows from the White Mountains along the California–Nevada Border and the Toiyabe Range in Central Nevada, Compared to Reference Samples of the Slate-colored and Thick-billed Subspecies Groups

	Slate-colored	Thick-billed	White Mts.	Toiyabe Range
Song character				
n (no. individuals)	36 (272 songs)	69 (574 songs)	9 (63 songs)	7 (62 songs)
Songs with >0 buzz[a] (± SD)	96% ± 12	56% ± 35	75% ± 17	96% ± 10
Songs with >1 buzz (± SD)	51% ± 33	1% ± 6	13% ± 27[b]	76% ± 30[c]
Bill size				
n (no. individuals)	200	200	38	51
Exposed culmen (mm)	10.0–12.9[d]	11.3–16.0[d]	10.2–13.8	9.7–11.3
Depth at nares (mm)	6.2–8.4[d]	8.0–11.9[d]	6.9–9.9	6.7–8.9

[a]The term "buzz" refers to the number of buzzy syllables within a song.
[b]Seven of nine individuals included no songs with >1 buzzy syllables; range 0–75%.
[c]All seven individuals included >1 buzzy syllables in some songs; range 26–100%.
[d]Data from Pyle (2022).

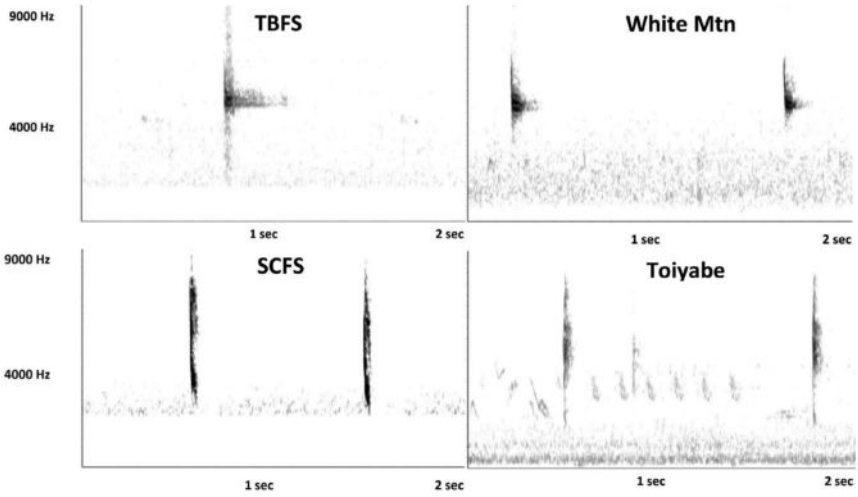

FIGURE 5. Examples of call notes. "Tink": TBFS, Thick-billed Fox Sparrow recorded by Richard Webster 5 July 1995 near Glacier Point in Yosemite National Park, California (xc125396); White Mtn, Fox Sparrow recorded by Richard Webster 3 June 1995 in Wyman Canyon, White Mountains, California (xc125411). "Smack": SCFS, Slate-colored Fox Sparrow recorded by Andrew Spencer 6 July 2007 near Stillwater Reservoir, Colorado (xc14880); Toiyabe, Fox Sparrow recorded by Pandolfino 22 June 2022 in Kingston Canyon in the Toiyabe Range, Nevada (xc734099).

from northern Nevada (Figure 7). The difference in exposed culmen was significant and the bill depth overlapped but averaged larger for the White Mountains specimens. The ranges of bill sizes for the White Mountains population fit well within those of the Thick-billed group, and the bill sizes for the Toiyabe Range birds fit well with those of the Slate-colored group (Table 1).

On the basis of proportion of buzzy syllables within songs, the Toiyabe Range Fox Sparrows sing a song typical of the Slate-colored group. In our small sample from the White Mountains, songs appear to be buzzier than typical for the Thick-billed group, but much less buzzy than typical for the Slate-colored group. The differences in our bill-size measurements of Nevada populations parallel the differences in vocalizations. By our measurements, the White Mountains birds have large bills, most comparable to the bills of the Thick-billed group. However, the central Nevada birds have bill sizes much more similar to those of the Slate-colored group of northern Nevada. Together, these characters suggest that these two disjunct populations may not be properly assigned to the same subspecies (*canescens*). Indeed, the songs, and, even more so, the call notes, suggest that the Toiyabe range birds fit well into the Slate-colored group, while the White Mountains birds fit best within the Thick-billed group.

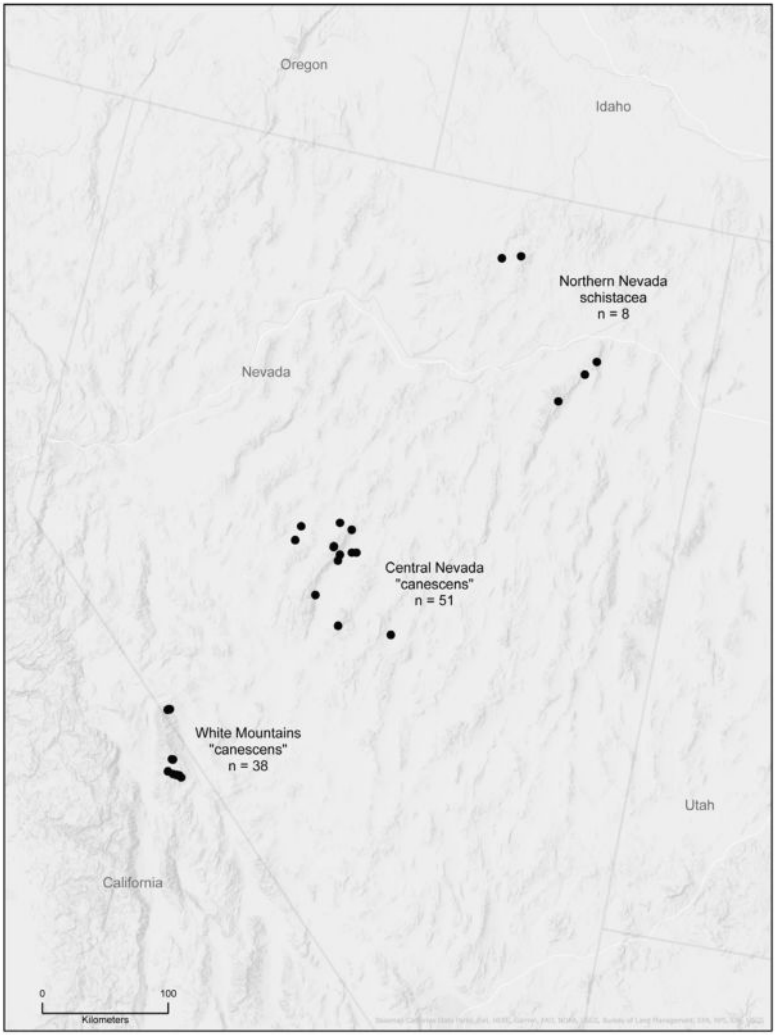

FIGURE 6. Locations and numbers of Nevada specimens compared in measurements of exposed culmen and bill depth.

DISCUSSION

It is possible that the taxonomy of the Fox Sparrow has been more thoroughly studied than that of any other North American bird species. Besides dozens of papers, three monographs (Swarth 1920, Linsdale 1928, Zink 1986) totaling a cumulative 410 pages are devoted to this issue. Yet, the number of species within this complex remains unclear enough that authors of two authoritative guides devoted to the sparrow family (Passerellidae), Beadle

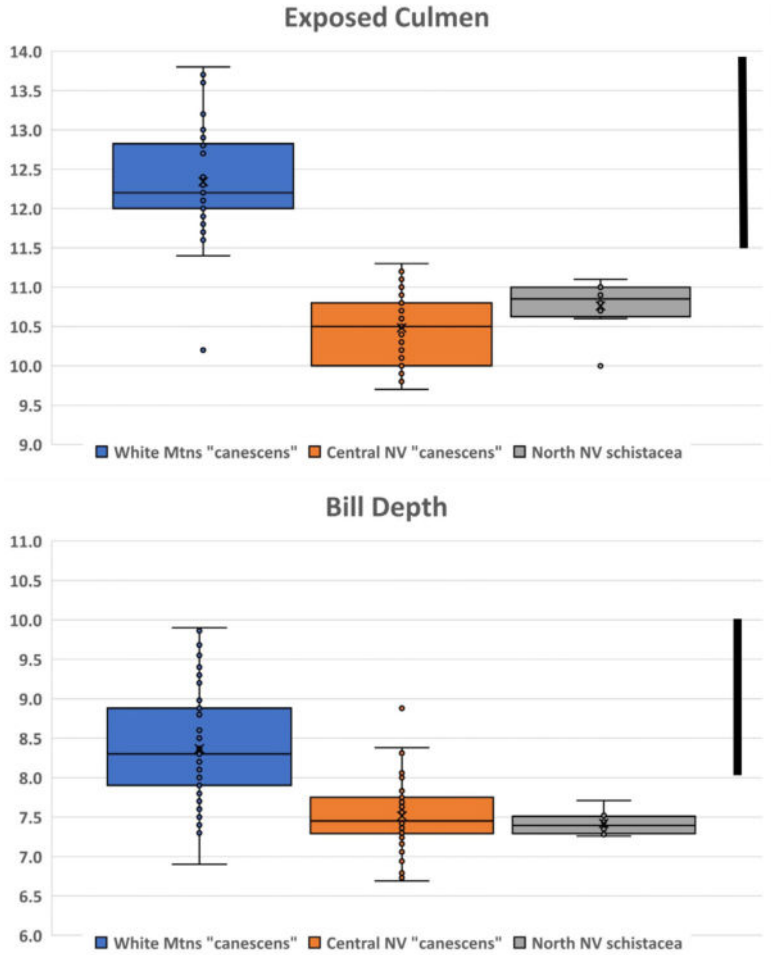

FIGURE 7. Bill measurements of specimens from three regions of Nevada: northern Nevada, *P. i. schistacea*; central Nevada, currently assigned to *P. i. canescens*; White Mountains, currently assigned to *P. i. canescens*. All measurements in millimeters. Black bars on the right represent the ranges of *P. i. megarhyncha* for these variables from Pyle (2022).

and Rising (2003) and Wright (2019), chose to split the Fox Sparrow groups into four species prior to any decision by the AOS. One primary area of controversy centers on the birds breeding in the White Mountains of California and Nevada (Zink and Kessen 1999, Floyd et al. 2007, Zink 2008). On the basis of specimens from that area Swarth (1918) described the subspecies *canescens*, then Linsdale (1936) concluded that the Fox Sparrows of central-eastern Nevada (the Toquima, Toiyabe, and Monitor ranges, east into White

Pine County) were also *canescens*, even though more than 160 km of inappropriate breeding habitat separates the White Mountains from the closest of those mountain ranges (Figure 1). This subspecies was placed within the Slate-colored group (American Ornithologists' Union 1998), despite the White Mountains population being closer to the ranges of two subspecies of the Thick-billed group, *monoensis* on the east slope of the Sierra Nevada near Mono Lake and *megarhyncha* elsewhere in the Sierra Nevada (Figure 1).

Zink (1994) and Zink and Weckstein (2003) found genetic evidence of introgression between the Fox Sparrows of the Thick-billed group and *canescens* of the White Mountains, which has been cited as evidence against splitting the Fox Sparrow complex into four species (Floyd et al. 2007). To date, the genetics of the *canescens* Fox Sparrows in central-eastern Nevada has not been studied.

Our analyses of vocalizations of Fox Sparrows of both the White Mountains and Toiyabe Range showed that those populations differ distinctly in both the primary contact call and song. The songs of the Toiyabe Range birds match well with those of the Slate-colored group, while the White Mountains Fox Sparrows sing most like the Thick-billed group. The pattern of difference in the contact call is the same. Interestingly, Linsdale (1938), in his monograph on the ecology of the Toiyabe Range area, mentioned a comment by Alden Miller (who accompanied Linsdale on his collecting trip to that area) that the call notes of the Fox Sparrow in that range sounded different from the ones he heard in the Sierra Nevada of California (in the Thick-billed range). And our bill-size measurements also showed better alignment of the White Mountains birds with the Thick-billed group and the Toiyabe Range birds with the Slate-colored group.

Our results prompted us to re-examine the published morphologic and genetic data on *canescens*. The data on morphology of Swarth (1918, 1920) and Linsdale (1928) were based solely on the White Mountains population, as was the morphologic and genetic work of Zink (1986, 1994, 2008) and Zink and Weckstein (2003). Behle and Selander (1951), in their description of *swarthi* (in the Slate-colored group) from Idaho and Utah, included some measurements of specimens from both disjunct populations assigned to *canescens*, but it is unclear what proportion of those specimens were from which population. Below we review some of these findings with regard to physical measurements and genetics.

Morphology

Swarth (1920) found that the wing, tail, and tarsus measurements of the White Mountains Fox Sparrows overlapped broadly with both those of *schistacea* of the Slate-colored group and other subspecies now considered in the Thick-billed group (*fulva*, *megarhyncha*, *brevicauda*, *monoensis*, and *stephensi*). Compared to birds of the Thick-billed group, Swarth's measurements showed that the White Mountains birds tended to be slightly smaller in most measures, however, and significantly smaller in exposed culmen, bill depth, and bill width. His measurements of bill length (exposed culmen) and bill depth were similar to those of the Slate-colored group (subspecies *schistacea*).

Swarth's (1920) values for bill depth for the various Fox Sparrow taxa are consistently larger than those of Pyle (2022). For example, values for the

Thick-billed from Pyle (2022) range from 8.0 to 11.9 mm, whereas Swarth's range from 10.5 to 15.5 mm. Values for the Slate-colored in Pyle (2022) range from 6.2 to 8.4 mm, Swarth's from 8.8 to 10.2 mm. As noted above, Swarth's method of measuring bill depth (from the base of the exposed culmen to the angle at the rear of the mandible) differs from Pyle's for depth at nares. Pyle also measured the bill depth of the White Mountains specimens by Swarth's method and found a range of values from 8.6 to10.8 mm, compared to the range of 6.9 to 9.9 mm in depth at nares. Of the specimens currently in the collection at the Museum of Vertebrate Zoology, only 12 were collected early enough (27 July to 18 August 1917) to have been included in Swarth's set of six. Of those 12 specimens, five were juveniles. Thus, in addition to a difference in method, it may be that Swarth's sample included one or more juvenile birds, which tend to have smaller bills.

Linsdale (1928) compared skeletal features (skull, mandibular rami, sternum, pelvis, tibiotarsus, humerus, radius, ulna, and furcula) in some detail and found broad overlap between the Fox Sparrows of the White Mountains and other Thick-billed subspecies. Measurements of the sternum, pelvis, and furcula were very similar; other measures tended toward the low end range of the various Thick-billed subspecies pooled but were very similar to those of subspecies *fulva*.

Zink (1986) examined specimens from California and Oregon, within the ranges of the Thick-billed subspecies *fulva*, *brevicauda*, *megarhyncha*, *monoensis*, and *stephensi*, and two sites in northern Nevada in the range of the Slate-colored subspecies *schistacea*. He included in his analysis specimens from the White Mountains but none from central-eastern Nevada. His morphology data were presented in a series of phenograms showing relationships among the samples based on measurements of the wing, tail, bill, tarsus, and toe as well as a set of skeletal measurements similar to those of Linsdale (1928). The results showed the White Mountains specimens more closely allied with other Thick-billed subspecies (in particular, *fulva*) than with *schistacea*. A phenogram based on external characteristics of males showed the White Mountains specimens nested with those from a site in central Oregon (range of *fulva*), within a larger set that included specimens from an eastern Oregon site (*fulva*) and those from the two northern Nevada sites (*schistacea*). A similar phenogram for females placed the White Mountains birds with those from northeastern California (*fulva*) and within a large set including a number of northern and central Sierra Nevada sites (all either *megarhyncha* or *monoensis* of the Thick-billed group). Phenograms based on skeletal data from males produced relationships for the White Mountains specimens essentially identical to those from external characters. Phenograms based on females' skeletons placed the White Mountains birds with those from northeastern California in the ranges of both *fulva* and *megarhyncha*.

Genetics

Zink (1986) also used protein electrophoresis to investigate genetic relationships among the same set of specimens used in his morphological analyses, but those data showed no evidence of relatedness among geographic neighbor populations. Zink (1994) and Zink and Weckstein (2003) used mitochondrial DNA to analyze relationships within the Fox Sparrow

complex, finding that, among the four subspecies groups, the Sooty and Slate-colored represented sister lineages. Zink (1994) found a mix of Slate-colored and Thick-billed haplotypes in specimens collected in eastern Oregon and California where the ranges of those two groups approach each other. Specimens from the White Mountains also showed a mix of haplotypes, those associated with the Thick-billed group outnumbering those associated with the Slate-colored group by a ratio of 7:4. Note that Figure 5 in Zink (1994) is mislabeled with the White Mountains abbreviation, WM, assigned correctly to site 11 and incorrectly to site 4. Site 4 should be designated RB, for the Ruby Mountains in the range of the Slate-colored group. Zink (1994) concluded that the data supported four separate phylogenetic and perhaps biological species. Data from microsatellite DNA (Zink 2008) also revealed a mix of the Thick-billed and Slate-colored Fox Sparrows. Interestingly, these data placed the White Mountains Fox Sparrows sampled in the Nevada portion of the range within a clade occupied exclusively by subspecies of the Thick-billed, rather than the Slate-colored group, while samples from the California areas of the range nested within a clade including a mix of locations associated with the Slate-colored, Thick-billed, and Red Fox Sparrow groups (see Figure 2 in Zink and Weckstein 2003).

Conclusions

Our data on songs, calls, and bill size suggest that the two disjunct populations (White Mountains of eastern California and Toiyabe Range of central Nevada) now assigned to *canescens* may not belong in the same subspecies, or even in the same subspecies group. The songs and calls of the Toiyabe Range birds fit perfectly with those of the Slate-colored group, while the White Mountains birds' songs and calls are more similar to those of the Thick-billed group. The bill sizes of these populations also support these relationships.

A review of morphological and genetic data suggests that the White Mountains population nests more naturally within the Thick-billed group than the Slate-colored group. The phenograms of Zink (1986) combining a broad set of physical traits generally nested the White Mountains birds within the Thick-billed rather than the Slate-colored group. While showing clear introgression between the Slate-colored and Thick-billed groups, DNA of the White Mountains birds, particularly their mitochondrial DNA, revealed a greater influence of the Thick-billed than of the Slate-colored genotype. Zink and Kessen (1999), in reviewing the status of this taxonomic puzzle, showed an interesting figure tracing both DNA and morphological data for various western Fox Sparrow populations. That figure showed the White Mountains Fox Sparrows notably distinct from Slate-colored populations in northern Nevada in terms of both morphology and genetics, and intermediate between two Thick-billed populations from eastern Oregon and Mono County, California (of subspecies *fulva* and *monoensis*).

Therefore, with regard to the Fox Sparrows currently assigned to *canescens*, we suggest:

1. The White Mountains Fox Sparrow population should be considered a member of the Thick-billed group. Bill size, call, and song clearly align better with that group, and the degree of DNA introgression from the Slate-colored group is similar to that observed for other subspecies within the Thick-billed

group (especially *fulva* and *monoensis*). The range and characteristics of this population suggest it fits best subsumed into the subspecies *megarhyncha*. The distribution of song and exposed culmen values shown in Figures 4 and 7 confirm that the White Mountains population fits within *megarhyncha* by the 75% rule proposed by Patten and Unitt (2002). While it is beyond the scope of this study, the same is likely the case for *fulva* and *monoensis*, as suggested by Pyle (2022) and Unitt (2004).

2. Fox Sparrows in the Toiyabe and other mountain ranges of central-eastern Nevada should be subsumed within subspecies *schistacea* of the Slate-colored group as their vocalizations and bill size are indistinguishable from those of other nearby populations of this subspecies.

These conclusions may affect decisions about splitting the Fox Sparrow complex into distinct species. The taxonomic realignment we suggest changes the issue regarding the White Mountains birds from one involving introgression between populations of two different putative species into a confident classification of these birds within one putative species.

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THE POTENTIAL IDENTIFICATION AND DISTRIBUTION OF AINLEY'S STORM-PETREL AT SEA BY TIMING OF MOLT

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ABSTRACT: In 2016, the American Ornithologists' Union split the Leach's Storm-Petrel into three species: Leach's Storm-Petrel (*Hydrobates leucorhous*), Townsend's Storm-Petrel (*H. soccoroensis*), and Ainley's Storm-Petrel (*H. cheimomnestes*). Leach's breeds around the Northern Hemisphere during the boreal summer, while both Townsend's and Ainley's breed on islets off Guadalupe Island, Mexico, the former in summer and the latter in winter. Although morphological differences between Leach's and Ainley's are slight at best, we hypothesized that the difference in breeding schedule may result in a difference between the species in molt schedule, allowing identification of some birds at sea. We examined 528 specimens and hundreds of photographs for molt of primaries, aging each bird by its having juvenile vs. basic flight feathers and the presence of molt clines, and scoring molt by the number of primaries replaced. Using threshold models, we identified ten birds whose timing of molt suggested Ainley's, most occurring off central-to-southern Mexico. In Leach's and/or Townsend's storm-petrels, primaries were being replaced in the second prebasic molt from 21 February (p2) to 15 December (p8) and in the definitive prebasic molt from 24 October (p3) to 22 February (p8). In the smaller sample of Ainley's, these dates were 23 November (p6) to 22 February (p8) and 11 June (p3) to 7 November (p8), respectively. Thus the timing of molt may help identify Ainley's at sea, important for the management of this vulnerable species. Genetic analysis of the specimens may confirm our identifications and the applicability of our technique.

As currently defined by the American Ornithological Society (Chesser et al. 2016), the Leach's Storm-Petrel (*Hydrobates leucorhous*) complex consists of three species: Leach's (*H. leucorhous*), Townsend's (*H. soccoroensis*), and Ainley's (*H. cheimomnestes*) storm-petrels, the last initially described as a subspecies by Ainley (1980). This split was recommended by Howell et al. (2010a) and, at least with respect to birds breeding around Guadalupe Island, Mexico, is supported by genetic evidence (Taylor et al. 2017, Wallace et al. 2017). Leach's Storm-Petrel breeds widely around the Northern Hemisphere, in the eastern Pacific from the Aleutian Islands, Alaska, to San Benito Island, Mexico. As now defined it consists of two subspecies, *H. l. leucorhous*, breeding through most of the range (including the Atlantic Ocean), and *H. l. chapmani*, breeding on the Coronado and San Benito Islands, Mexico (Ainley 1980, Howell et al. 2010a, Howell 2012, Pollet et al. 2021, Clements et al. 2022). The breeding range of both Townsend's and Ainley's storm-petrels is restricted to islets off Guadalupe Island, where the former breeds in summer (May to September) and the latter in winter (October to April). In the Pacific, the pelagic nonbreeding range of the Leach's Storm-Petrel complex extends from the North Pacific Ocean to equatorial latitudes, but the ranges of the

component species are not well known (Halpin et al. 2018, Kirwan 2020, Pollet et al. 2021). As far as known, Ainley's Storm-Petrel is morphologically indistinguishable from Leach's Storm-Petrel (Pyle 2008, Howell et al. 2010a, Howell 2012) and has heretofore not been identifiable as specimens or in photographs taken away from the breeding grounds. To our knowledge, no records of Ainley's Storm-Petrel away from Guadalupe Island have been confirmed. The pelagic distribution, ecology, and conservation requirements of this localized and potentially endangered species thus remain completely unknown.

In the definitive prebasic molt of adult Leach's and Townsend's storm-petrels, the primaries are replaced between July and April. In first-year birds undergoing the second prebasic molt they are replaced between May and December (Pyle 2008). The majority of adults and first-year birds molt from October to December (Spear and Ainley 2007). A second prebasic molt earlier than the definitive prebasic molt is common in bird species that do not breed as yearlings, including the Procellariiformes (Pyle 2008:249). Because Ainley's Storm-Petrel breeds in winter, Pyle (2008) and Howell et al. (2010a) hypothesized that it may molt on a schedule seasonally opposite that of Leach's Storm-Petrel, in which case adults should molt primaries between February and November and the second prebasic molt should occur between December and June. These potential species-specific differences in molt timing have yet to be confirmed but could prove useful for identifying birds at sea.

On the basis of specimens and photographs of storm-petrels taken in the Pacific Ocean, we examined whether or not reproductive asynchrony in these species could lead to asynchrony in molt timing and thus aid in field identification and our understanding of the nonbreeding range of Ainley's Storm-Petrel. We used double-hinge threshold models and box-and-whisker plots to assess the timing of the second and definitive prebasic molts and estimated the duration and phenology of the molt of Leach's and Townsend's storm-petrels combined, in order to find phenological outliers that may represent records of Ainley's Storm-Petrel at sea.

METHODS

We examined 528 specimens within the Leach's Storm-Petrel complex housed at the California Academy of Sciences (CAS), San Francisco; the Museum of Vertebrate Zoology (MVZ), University of California, Berkeley; the Natural History Museum of Los Angeles County (LACM), Los Angeles; the San Diego Natural History Museum (SDNHM), San Diego; the Western Foundation of Vertebrate Zoology (WFVZ), Camarillo; and the American Museum of Natural History (AMNH), New York. All specimens were collected in the Pacific Ocean from 57° N south to 4° S; 316 of the specimens were collected on the breeding grounds throughout the complex's range, and the remaining 212 were collected at sea. Specimens were reasonably distributed throughout the year, with all months being represented. We also examined hundreds of photographs of birds of this complex taken at sea south of latitude 40° N in the Pacific that we could locate in the Cornell Lab of Ornithology's Macaulay Library, that were part of the Cascadia Research

Collective's studies off Hawaii (Pyle et al. 2016), or that were provided to us by other photographers (Figure 1).

We categorized the age of each bird as first year or adult by the shape, wear, and condition of the remiges and rectrices. Juvenile and first-year birds, until the second prebasic molt commences, show unmolted juvenile remiges that are uniform in wear, with narrower, more tapered, and more worn outer primaries and rectrices; we include in this category birds undergoing the second prebasic molt on the basis of the unmolted feathers. Older birds ("adults") have broader, more truncated, and relatively fresher outer primaries and rectrices that show a "molt cline" (a gradual freshening of primaries distally and secondaries proximally, except for more worn tertials, along with the outermost secondary fresher than the innermost primary), reflecting protracted sequential feather replacement at sea (Pyle 2008). Molt clines and a contrast between an outermost secondary fresher than innermost primary, due to time elapsed between the replacement of these two feathers,

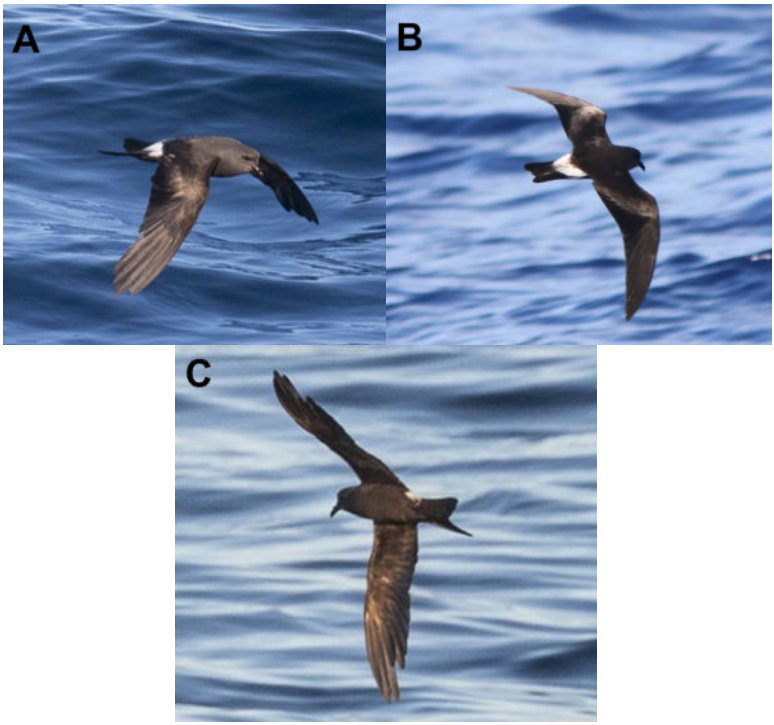

FIGURE 1. Three storm-petrels photographed off Mexico. A, Adult off Colima, 22 February 2017 (molt score 8). B, First-year bird off Colima, 21 February 2017 (molt score 0). C, First-year bird off Baja California Sur, Mexico, 2 Dec 2015 (ML 21803711). The birds in images A and B were on a molt schedule consistent with Leach's Storm-Petrel, whereas that in image C was not, so it may be an Ainley's Storm-Petrel.

Photos by Amy McAndrews (A, B) and Ken Chamberlain (C)

is proving a consistent method for assessing the ages of storm-petrels because of their protracted molt during the nonbreeding season (Pyle 2008). These characters, along with the shapes of the primaries and rectrices, allowed us to categorize the ages of both specimens and birds in photographs with a high degree of confidence. Nevertheless, assessing the level of wear can be difficult in adults because of damage to the remiges while nesting birds are entering and exiting their burrows.

We examined each specimen and photograph for active molt in the primaries, which are replaced sequentially from the innermost (p1) to the outermost (p10). We gave each specimen and photographed bird a molt score of p0 to p10 based on the number of primaries it had replaced or dropped. Following DeSante et al. (2019), we gave each specimen a wear score from 0 to 5, with 0 indicating extremely fresh outer primaries and 5 indicating extremely worn primaries. Although we identified some specimens as Townsend's Storm-Petrel from information on their labels and from measurements (Pyle 2008), for this analysis we pooled Leach's and Townsend's, as some specimens and many photographed birds were not distinguished with certainty. We identified breeding adults collected at Guadalupe Island from October to February or fresh juveniles collected from January to April as Ainley's Storm-Petrels.

In order to search for outliers in the timing of storm-petrel molt, we used a circular data-distribution approach for presence and absence of molt, and a double-hinge threshold model (Fong et al. 2017, Terrill et al. 2021) fit to molt-timing data. Because the annual cycle of birds can be best represented as a repeated circle, we used the package "circular" (Agostinelli and Lund 2017) in R version 3.6.1 (R Core Team 2019) for presence/absence data of molt and to search for outliers. First, we used a Rayleigh test (Wilkie 1983) for circular uniformity to test whether the seasonal distributions of molting and nonmolting birds were nonrandom. We then applied Watson's two-sample test of homogeneity (Mardia 1969) to determine whether the phenological distributions of molting and nonmolting birds differed significantly. Finally, we measured the circular mean and constructed a box-and-whiskers plot adapted from Tukey (1977) for circular data (Buttarazzi et al. 2018) to search for statistical outliers. We constructed these plots for both summer-breeding species (Leach's and Townsend's) lumped together. To estimate the onset and duration of molt, we excluded the outliers and fit a double-hinge threshold model with 1000 bootstrap replicates by using the package "chngpt" (Fong et al. 2017) in R (R Core Team 2019). We used the bootstrapping to generate 95% confidence intervals for adult Leach's Storm-Petrels (excluding potential Ainley's) on the basis of birds in active molt or with extreme wear scores (feathers either very fresh or very worn). By the same procedure we built a separate model for the potential Ainley's Storm-Petrels.

RESULTS

Among the 528 specimens analyzed, we categorized 442 as adults or birds undergoing the definitive prebasic molt (outermost primary basic) when collected, 86 as first-year birds or birds undergoing the second prebasic molt (outermost primary juvenile). Of the 528, we considered the 73 collected at

Guadalupe from 7 December to 11 February to be Ainley's Storm-Petrels, none of which were in molt. Of the remaining 455 specimens, 33 of 369 adults and 18 of 86 first-year birds were in active molt. Among the hundreds of storm-petrels we examined through photographs, we identified 39 undergoing molt. Of these, we categorized 8 as first-year and 7 as adults; we could not categorize the remaining 24 because of the photo's poor quality or angle.

Among specimens initially identified as Leach's or Townsend's Storm-Petrel, Rayleigh's test for circular uniformity confirmed that both molt (t = 0.55, p = 0.0002) and lack of molt (t = 0.43, $p < 0.001$) are seasonal. Watson's two-sample test of homogeneity confirmed that in adults these seasons are significantly different (t = 0.93, $p < 0.001$), with molt taking place primarily in late winter (Figure 2). Among first-year birds, however, the sample was too small for this test to distinguish the temporal distributions of molt and lack of molt (t = 1.5, $p > 0.1$).

In total, through our statistics and from examining the timing of molt in our sample, we identified eight specimens and two photographs of birds that were undergoing molt coinciding with the hypothesized schedule of Ainley's Storm-Petrel. These comprised five adults and five birds undergoing the second prebasic molt (Table 1, Figure 3). However, there were many outliers in the sample of adult storm-petrels not in molt, so we do not propose potential Ainley's Storm-Petrels among them, as the outliers have represented first-year birds that we had mis-categorized as adults.

When the molting adults of potential Ainley's Storm-Petrels were modeled, the double-hinge threshold model rejected a flat slope (p = 0.049) and recovered an initiation date for molt of the primaries of 12 May (95% CI: 20 March–2 July; Figure 3A). Dates of these adults' molt of primaries ranged from 11 June (p3) to 5 October (p9). The threshold model for adult Leach's Storm-Petrels in molt also rejected a flat slope (p = 0.002) and recovered an initiation date for molt of the primaries of 7 December (95% CI: 16 November–17 January). With respect to potential first-year Ainley's, the threshold

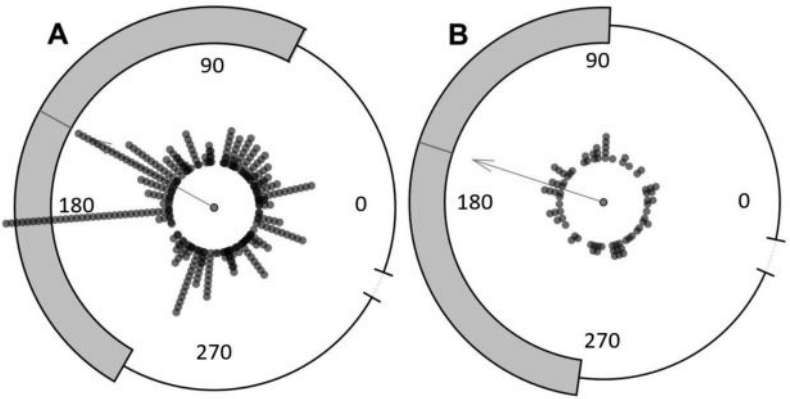

FIGURE 2. Timing of molt in Leach's and Townsend's Storm-petrels. A, adults; B, first-year birds. Each gray circle represents one individual at any stage of replacement of the primaries. 0, 1 January. Blue arrows and lines represent the mean dates of molt.

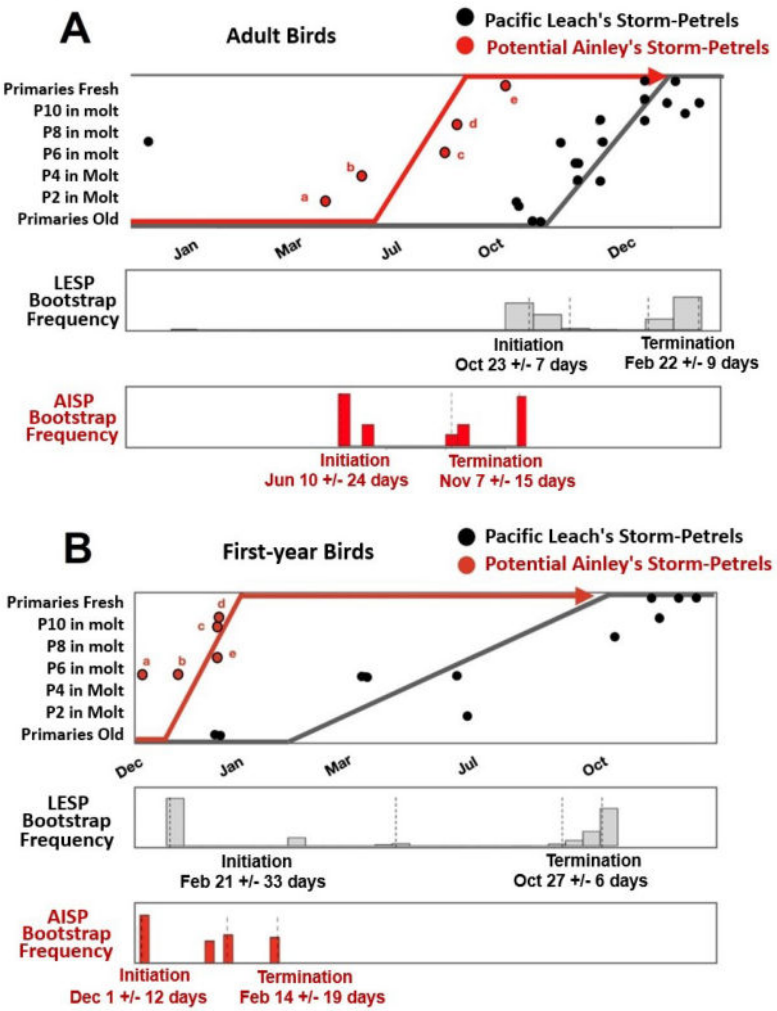

FIGURE 3. Threshold model fit to Leach's (black circles, model fit in gray line) and potential Ainley's (red, judged from outlier analysis) storm-petrels, with initiation and termination dates, as well as 95% confidence intervals generated from bootstrap replicates. Bootstrap histograms are shown beneath each plot. A, Threshold model fit to adult Leach's and potential adult Ainley's storm-petrels. B, Threshold model fit to first-year Leach's and potential first-year Ainley's storm-petrels.

model recovered an initiation date for molt of the primaries of 1 December (95% CI: 23 November–22 February [p8]; Figure 3B). The dates of these younger birds' primary molt ranged from 2 December (p6) to 15 February (p8). The threshold model for molt of the primaries in first-year Leach's Storm Petrels recovered an initiation date of 12 May (95% CI: 20 March–2 July).

Table 1 Ten Potential Ainley's Storm-Petrels Identified away from Guadalupe Island

Age and specimen or photo number[a]	Key to location plotted in Figure 5	Location	Date	Molt score	Wear score
Adult					
CAS 484	A	4.333° S, 93.5° W	11 Jun 1906	3	4
LACM 107383	B	0° N, 100° W	3 Jul 1988	5	2
MVZ 123467	C	45° N, 145° W	12 Sep 1950	6	4
LACM 20081	D	600 miles W of San Pedro, CA	22 Sep 1941	7	4
CAS 465	E	14.467° N, 107° W	5 Oct 1906	9	3
First year					
SDNHM 39176	F	13° N, 112° W	6 Jan 1975	6	4
SDNHM 39801	G	1° N, 127° W	19 Jan 1976	7	3
AMNH 528635	H	5.5° N, 102° W	17 Jan 1901	8	4
ML 21803711	I	24.930° N, 115.775° W	2 Dec 2015	6	4
2S8A8702-03[b]	J	95 miles WSW of Cabo San Lucas, Baja California Sur	13 Feb 2017	7	3

[a]See acknowledgments for definition of abbreviations for museums and photo archives.
[b]Photo courtesy Amy McAndrews and Jorge Montejo.

Because Watson's two-test sample was unable to distinguish the distributions of molting and nonmolting first-year birds, these birds may include some Ainley's, but no such identification is supported by our statistical analysis. In addition, because the sample of potential Ainley's is so small, the date ranges of our samples may not reflect the true or complete temporal distribution of the species' molt.

The patterns inferred from wear scores were not as definitive as those inferred from molt scores. We attribute this to wear being more difficult than molt to score consistently, and to wear varying with different degrees of solar exposure at different latitudes and with the birds' behaviors. For example, nesting adults can show flight feathers significantly more worn than do older nonbreeding birds, due to entering and exiting nest burrows.

After we identified these potential Ainley's Storm-Petrels, Pyle compared three of the specimens (CAS 465, 484, and MVZ 123467) with specimens of Leach's Storm-Petrels to see if there were any detectable differences in plumage (Figure 4). The potential Ainley's Storm-Petrels appeared darker and glossier-headed than Leach's Storm-Petrels collected at the same time of year and may also have differed in this way from with Leach's collected at the same stage of molt and wear (essentially six months offset). This difference could prove useful for identification at sea, especially in spring and summer, when Ainley's Storm-Petrels should be fresher and Leach's Storm-Petrels are more worn.

DISCUSSION

The timing of events in birds' life cycles is important to both breeding and adults' survival (Holmgren and Hedenström 1995, Cotton 2003, Borgmann et al. 2013). The topic of timing has received attention from the standpoint of

FIGURE 4. Potential Ainley's Storm-Petrel (CAS 484, collected 11 June 1906, left in each image) in comparison with presumed Leach's Storm-Petrels. A, Comparison with two Leach's Storm-Petrels collected at the same time of year, CAS 482 collected 11 June 1906 (middle) and CAS 87883 collected 15 June 1958 (right). B, Comparison with Leach's Storm-Petrels collected at the same stage of molt, CAS 478 collected 19 November 1906 (middle) and CAS 477 collected 19 November 1906 (right). All storm-petrels were categorized as adults. CAS 484 and 477 were molting p3, CAS 478 was molting p4, and CAS 482 and 87883 were not molting primaries. Note how the potential Ainley's Storm-Petrel appears much darker and fresher than the Leach's Storm-Petrels at the same time of year (A) but only slightly darker when compared to Leach's Storm-Petrels at the same stage of molt (B). A glossier head and darker (fresher) plumage in from May to October and paler (more worn) plumage from November to April may indicate Ainley's Storm-Petrel at sea.

life-history evolution (Martin 2004), including the potential consequences of phenological mismatches induced by climate change (Reed et al. 2013, Bowers et al. 2016). Differences in the timing of molt may aid in the identifications of species and populations of birds otherwise difficult to distinguish in the field (Pyle 2008, Howell et al. 2010b, Howell 2012), but no studies have formally analyzed molt-timing data. Here, we confirm the concept that molt timing may be useful in identifying some birds in the field; however, we caution that Ainley's Storm-Petrels at sea may ultimately need to be identified through an independent method, such as genetic sequencing or isotopic or other analysis of feathers grown at natal sites. Although the schedules of prebasic molt of most bird species, including the Procellariiformes, are reasonably well defined, the timing, location, and extent (but not sequence) of molt are rather plastic (Pyle 2013), so exceptions or outliers might be expected in the Leach's Storm-Petrel complex. Leach's broad breeding distribution in the eastern Pacific from Alaska to the San Benito Islands leads to significant variation in the timing of breeding, likely causing variation in the timing of molt. For example, fledging in British Columbia is nearly two months later

FIGURE 5. Distribution of the ten potential Ainley's Storm-Petrels identified away from Guadalupe Island (circled in red). Eight of these birds were collected or photographed well south of Guadalupe Island, of which four were collected near the equator.

than fledging in central California (Pollet et al. 2021). The somewhat recent discovery of Leach's-Storm Petrels breeding in the Southern Hemisphere (Underhill et al. 2002) could only exacerbate this problem.

Ainley's Storm-Petrel is listed as vulnerable with an estimated population of fewer than 10,000 individuals, and invasive species pose a serious threat to it (Kirwan 2020). To develop conservation strategies that will ensure the species' continued survival, knowledge of its distribution at sea is essential. Our results show that Ainley's Storm-Petrel may disperse south after the breeding season, as eight of the ten potential Ainley's we identified were found south of Guadalupe Island, perhaps indicating the species' primary nonbreeding range (Figure 5). On the other hand, the birds collected off Oregon on 12 September and off California on 22 September may indicate a broader nonbreeding distribution, or they could represent Leach's Storm-Petrels that had molted on an atypical schedule. These two birds were collected more than 200 nautical miles offshore and are therefore outside of areas considered by state records committees. Medrano et al. (2022) used tracking devices to follow foraging adult Ainley's Storm-Petrels during the breeding season, finding that they ranged south to the San Benito Islands and north to the ocean off southern California. Similar tracking of Ainley's during the nonbreeding season would provide a substantially clearer understanding of the species' pelagic distribution, including periods of molt. We also encourage observers to document and report any storm-petrels of the Leach's complex in molt.

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NOTES

FIRST RECORD OF THE BROWN-HEADED COWBIRD PARASITIZING THE MANGROVE WARBLER IN BAJA CALIFORNIA SUR

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In this paper we present the first record of parasitism by the Brown-headed Cowbird (*Molothrus ater*) on the Mangrove Warbler (*Setophaga petechia castaneiceps*), a subspecies of the Yellow Warbler endemic to Baja California Sur (Lowther 2020).

According to Lowther et al. (2020), the Yellow Warbler has 37 subspecies constituting four groups: the *aestiva* group with six migratory subspecies that breed in North America, the *aureola* group with a single subspecies found in the Galapagos Islands and Cocos Island, the *petechia* group with 16 subspecies distributed from the Gulf of Mexico to the Caribbean in South America, and the *erithachorides* group of Mangrove Warblers with 11 subspecies found from the Gulf of Mexico to Venezuela in the east and from northwestern Mexico to Peru in the west, including the Baja California Peninsula.

Because of the recency of the Brown-headed Cowbird's colonization of Baja California Sur (Erickson et al. 2018), knowledge of this obligate brood parasite's interaction with the local avian community is practically nonexistent, beyond a few known host species, such as the Blue-gray (*Polioptila caerulea*) and California (*P. californica*) gnatcatchers and Hooded Oriole (*Icterus cucullatus*) (pers. obs.).

The distribution of the Brown-headed Cowbird before European settlement centered on the open grasslands of central North America, but with the clearing of the forests and spread of agriculture, its distribution expanded widely both east and west (Mayfield 1965, Lowther 2020).

In far western North America, this species was confirmed breeding along the Colorado River at Needles, California, in the 1860s (Cooper 1870), but before 1910 it was rare or absent on the coastal slope of California (Cooper 1870, Willett 1912, Laymon 1987). In the cape region of the Baja California peninsula, it was collected at Miraflores in 1859 by János Xántus, and reported from San José del Cabo and Santiago by Belding (1883) and Brewster (1902), but only as a wintering bird (Grinnell 1928). Except for one specimen from Isla Cerralvo collected 1 June 1962 (California Academy of Sciences 63353), by the 1970s the most southerly summer report on the peninsula was from San Fernando Velicatá (29.971° N, 115.237° W; Wilbur 1987), where Anthony (1895) did not record the cowbird from 1887 to 1894.

In June 1991 Howell and Webb (1992) found Brown-headed Cowbirds at a num-

ber of localities in Baja California Sur, including San José del Cabo, but Howell et al. (2001) did not regard that information as certain evidence of breeding.

We recorded the parasitism on the Mangrove Warbler by the Brown-headed Cowbird in a mangrove swamp located to the west of "El Mogote" (24.171° N, 110.435° W). The swamp comprises Red Mangrove (*Rhizophora mangle*) and Black Mangrove (*Avicennia germinans*). The wetland has an area of 24.4 ha (Payan Alcacio 2013) and is one of the 16 mangrove swamps around the peninsular coast of the Bahía de La Paz (Mendoza-Salgado et al. 2011).

We visited the area on 1 August 2020 around 10:00 while scouting sites for future Mangrove Warbler monitoring. At the edge of a channel, we heard a call coming from Red Mangroves that sounded like a fledgling Brown-headed Cowbird. Over a period of 20 min the fledgling cowbird was fed by a male Mangrove Warbler on four occasions. The young bird waited for the adult to bring food the first three times, then followed the male warbler among the branches insistently, until the Mangrove Warbler went to another area of the wetland and the fledgling cowbird hid within the vegetation.

In southern Mexico on the Yucatan Peninsula, Salgado-Ortiz et al. (2008) reported parasitism of another subspecies of the Mangrove Warbler (*S. p. bryanti*) by the Bronzed Cowbird (*M. aeneus*), a species long resident in that area (Ellison and Lowther 2020).

Some populations of the Yellow Warbler (*S. p. aestiva* group) recently exposed to parasitism (as those in eastern North America) have developed some strategies to deal with Brown-headed Cowbird parasitism (Burgham and Picman 1989), such as aggression and persuasion calls toward parasitic females, ejection of the parasite egg, nest desertion, or egg burial (Clark and Robertson 1981, Hobson and Sealy 1989). The Mangrove Warblers, however, differ in ecological niche and reproductive biology, such as in their longer breeding season, smaller clutch size, and longer incubation and nestling periods (Salgado-Ortiz et al. 2008, Lowther et al. 2020), so it is unlikely that they will respond similarly, at least in the short term.

On the other hand, no matter how many strategies a host develops to counter parasitism, in the areas the Brown-headed Cowbird has recently invaded, the short time does not allow it to match the strategies that have emerged where the host has long experience with brood parasites. For example, while Salgado-Ortiz et al. (2008) found that the Bronzed Cowbird's parasitism of the Mangrove Warbler in Yucatan caused 8.5% of nesting failures, in eastern North America, Burgham and Picman (1989) found that the Brown-headed Cowbird's parasitism of the Yellow Warbler affected 41% of the nests.

The extent of mangroves in Mexico has decreased through loss to agriculture, livestock, and anthropogenic infrastructure (Valderrama et al. 2014), while the mangroves around the city of La Paz can be considered at risk due to factors such as pollution, logging, and modification of channels that carry water (Mendoza-Salgado et al. 2011). This reduction in habitat, compounded by other factors such as parasitism by the Brown-headed Cowbird, can pose a serious risk to the integrity of the warbler's population. The Mangrove Warbler could parallel the Least Bell's Vireo (*Vireo bellii pusillus*), a subspecies whose numbers decreased and whose distribution contracted dramatically because of habitat loss and parasitism by the Brown-headed Cowbird (Kus 1999, Kus et al. 2022).

Brown-headed Cowbird parasitism in Baja California Sur might have consequences not only for the Mangrove Warbler, but for other local, endemic species with current conservation problems, such as the Belding's Yellowthroat (*Geothlypis beldingi*, BirdLife International 2017) and the Baird's Junco (*Junco bairdi*, Mlodinow et al. 2021). Given this situation, a monitoring program to inform possible mitigation of the effects of the Brown-headed Cowbird on nesting birds in Baja California should be a priority.

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NEST-BOX USE AND APPARENT DOUBLE BROODING BY RED-BREASTED NUTHATCHES IN CALIFORNIA

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We documented Red-breasted Nuthatches (*Sitta canadensis*) in the Berkeley Hills of coastal central California successfully using a nest box in 2021 and 2022, and successfully double brooding in 2022. Although we can't be certain the individuals responsible for the two broods in 2022 were the same, we never saw more than two adults. In both years, we also observed the nuthatches applying resin to the outside of the box, most conspicuously to create a mass that included some grass at the base of the entrance hole, somewhat reducing its diameter (Figure 1).

Nest-box use and double brooding by the Red-breasted Nuthatch have rarely been documented. Dunn et al. (1975) described two nests in boxes designed for Black-capped Chickadees (*Poecile atricapillus*) in Ontario, Canada, where adults and nestlings were banded. Campbell et al. (1997) also noted two nests in boxes in British Columbia but did not report details on their success. Strauss (2007) documented mortality of a female stuck to resin around the oval entrance, 3.0 × 3.4 cm, of a nest box in Victoria, British Columbia; Kilham (1972) similarly noted a dead female stuck in the entrance of a nest in a natural cavity. Ghalambor and Martin (2020) referenced just two cases of double brooding (one in the wild and one in captivity), though Norris and Martin (2014) confirmed six cases of second clutches following fledging of first broods in British Columbia, likely associated with increased abundance of the Mountain Pine

FIGURE 1. Adult male Red-breasted Nuthatch delivering food to a nestling on 3 July 2022, two days before fledging. Note the abundant resin at the bottom of the entrance hole as well as surrounding it.

Photo by Phil Capitolo

Beetle (*Dendroctonus ponderosae*). Although Rand (1972) considered whether the Red-breasted Nuthatch's behavior of applying resin to a nest cavity's entrance and surrounding areas was a nonfunctional, evolutionary relic, related to the plastering of cavity interiors with mud by other nuthatch species (Pasquet 1998), its purpose is thought to be to deter potential competitors and predators from entering the cavity (Ghalambor and Martin 2020). The behavior is perhaps analogous to the maintenance of resin barriers by the Red-cockaded Woodpecker (*Dryobates borealis*) (Kappes and Sieving 2011).

In the other nuthatch species breeding in western North America, nest-box use and double brooding have likewise been documented uncommonly or never. Pygmy Nuthatches (*Sitta pygmaea*) are said to use nest boxes readily, though few opportunities exist. A few observations of double brooding have been reported (Kingery and Ghalambor 2020). White-breasted Nuthatches (*Sitta carolinensis*) may also use nest boxes "sparingly," but no records of double brooding are known (Grubb and Pravosudov 2020). The lack of observations of double brooding in nuthatches, however, may reflect the difficulty of detecting such behavior in species that do not often use nest boxes. Even for a species in which it should be easier to detect, Monroe et al. (2008) suggested double brooding in the Tree Swallow (*Tachycineta bicolor*), typically considered single brooded, may be underreported if nests boxes are not routinely checked after first broods fledge.

Double brooding is, however, well documented for several other nonmigratory passerine species in coastal central California (Geupel and DeSante 1990). White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*) may raise even three or four broods annually (Mewaldt and King 1977, Chilton et al. 2020). Nevertheless, the annual proportion of a population that double broods is not necessarily large and may be variable. For example, Geupel and DeSante (1990) estimated 20% of Wrentit (*Chamaea fasciata*) pairs double brooded from 1982 to 1985, but fewer during 1983, a year of late spring rains. A 12-year study of Western Bluebirds (*Sialia mexicana*) in California found second nests by fewer than 20% of pairs in eight of the years, and no second nests in the other four years (Dickinson et al. 1996). Furthermore, DeSante and Geupel (1987) found landbird productivity in coastal central California to be maximal following winters of average or slightly above-average rainfall. Rainfall in the Berkeley Hills during the 2021–2022 rain year (890 mm through 30 June), when the nuthatches double brooded, was indeed slightly above average (851 mm), according to data from a rain gauge maintained by the Contra Costa County Flood Control and Water Conservation District. Use of a nest box might also favor double brooding by the Red-breasted Nuthatch, given the savings of time and energy by not needing to excavate its own cavity, as it typically does.

We installed the nest box 17 April 2020. Interior dimensions are width 9.5 cm × depth front to back 10.2 cm × height 22.9 cm in front and 24.8 cm in back, as the roof has a 1.9-cm slope and 5.1-cm overhang in front. The circular entry hole is 3.5 cm in diameter and placed 15.2 cm above the floor. The nest box was placed on the north side of Doe's house, where a deck faces the open space of Tilden Regional Park immediately downslope of Wildcat Canyon Rd., which is the border between Alameda (upslope) and Contra Costa (downslope) counties. On the slope around our and nearby houses grow many trees of several native and introduced species, including the Coast Live Oak (*Quercus agrifolia*), Monterey Pine (*Pinus radiata*), Coast Redwood (*Sequoia sempervirens*), and Deodar Cedar (*Cedrus deodara*). An oak just west of the deck was typically where birds departing the nest box first landed. From 1998 to 2002, during field work for the breeding bird atlas for Contra Costa County, evidence of Red-breasted Nuthatch breeding was confined to the "fog belt" in the west, especially in the Berkeley Hills, with most foraging noted in stands of pine and redwood (Glover 2009).

The nest box was not used in 2020, though we noted Violet-green Swallows (*Tachycineta thalassina*) inspecting it in May of that year (in May of following years also). Chestnut-backed Chickadees (*Poecile rufescens*) were the first to use the nest

FIGURE 2. Red-breasted Nuthatch nest structures in 2021 (A; 15 July 2021) and 2022 (B; 1 June 2022). The 2021 nest was built by Chestnut-backed Chickadees, with redwood bark added on top by the nuthatches, whereas the 2022 nest was built by nuthatches only. Note the 4-egg clutch in 2022.

Photos by Barbara Doe

box in 2021. We first observed a chickadee entering the box on 29 March, first noted food deliveries and fecal sac removals on 23 April, and then first noted fledglings out of the nest in the morning on 12 May, sometime after 07:15. We then observed a Red-breasted Nuthatch enter the nest box on 1 June. By 12 June, a resinous mass containing plant matter was conspicuous at the bottom of the entrance hole. We heard nestlings on 28 June, and, in the morning on 15 July, we observed three young nuthatches fledge, although we could have missed others. We did not confirm clutch size for either species. The nuthatches had apparently added only a thin layer of redwood bark strips atop the mossy chickadee nest (Figure 2).

After we cleaned the box in the fall of 2021, we first noted activity there by Red-breasted Nuthatches on 1 March 2022. We noted resin at the entrance hole by mid-April and heard nestlings on 27 April. We saw two young fledge in the morning on 14 May; at least two additional nestlings remained in the box at the end of the day. We missed the fledging of the remaining young the next morning. We then saw an adult enter the box again on 20 May. Only with this second nuthatch clutch did we begin opening the nest box (when we knew both adults were away) to check for clutch size and hatching dates. We confirmed a 4-egg clutch on 1 and 2 June and four small, naked nestlings in the early evening on 15 June. On 26 June, four nestlings with erupted flight feathers were still alive (Figure 3). On 5 July, with the young about 20 days old, fledging had begun by 08:35, when we began observations. We saw only the final young depart to a nearby oak at 09:08, 26 minutes after the last visit by an adult. The nuthatches had built a nest about 3.8 cm deep, apparently mostly of redwood bark, with many fine pieces of mammal fur of unknown origin intermixed (Figure 2). Nuthatches continued to make occasional brief visits to the nest box through October, and to the deck railing on 26 October, when we removed the nest. The nest is now in the collections of the Museum of Vertebrate Zoology, University of California, Berkeley (MVZ:Egg:15008).

We cleaned the inside and outside of the nest box again in the fall of 2022. A Red-breasted Nuthatch was observed three times on 19 February 2023, entering the nest box once, but Oak Titmice (*Baeolophus inornatus*) had been exploring the nest box since early February. By 10 March an Oak Titmouse nest in the box appeared complete, though eggs had not yet been laid. If the purpose of the Red-breasted

FIGURE 3. Red-breasted Nuthatch nestlings on 26 June 2022, likely 11 days old.

Photo by Phil Capitolo

Nuthatch's applying resin to a nest cavity's entrance and surrounding surfaces is in fact to deter potential competitors and predators (Ghalambor and Martin 2020), the benefit may extend across years and not be limited to a single breeding season, given the possibly limited availability of trees with wood suitably softened for nuthatch excavation and possible competition for cavities with other taxa (e.g., Steeger and Hitchcock 1998, Robinson et al. 2005). Had we cleaned only the inside of the nest box, the larger Oak Titmice may not have occupied it. Red-breasted Nuthatches often reuse nest cavities from previous years (Norris and Martin 2012).

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APPARENT OBJECT PLAY IN THE NORTHERN HARRIER

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Animal play is notoriously difficult to describe, particularly in birds (Ficken 1977). Play is most common in the young of a species (Loizos 1966), a life stage when conflicting environmental pressures are reduced by parental care. In 11 of the 13 orders of birds for which play has been reported, the young are altricial (Ortega and Beckoff 1987). Beckoff and Byers (1981) classified avian play into three categories: locomotor play (primarily play in flight), object play, and social play. Play with objects, reported for eight avian orders (Ortega and Beckoff 1987), is widespread in wild populations of birds of prey (see Ficken 1977) and may involve manipulating prey animals or inanimate objects such as twigs or stones. During play, an object is often carried into the air, dropped, and then caught with the feet, with the act repeated many times (Ficken 1977). We report here on object play by the Northern Harrier (*Circus hudsonius*). Ours is not the first report of play in the Northern Harrier (Sumner 1931), nor of harriers playing with inanimate objects (Bildstein and Hamerstrom 1980, Bildstein 1992). We describe repeated acts that constitute the first report of play by a Northern Harrier with an unknown inanimate object, and speculate on why this activity may lend fitness to an individual harrier.

On 4 August 2022, within Point Reyes National Seashore in Marin County, California, we were examining coastal breeding habitat for the California Red-legged Frog (*Rana draytonii*). Afterward, along the Abbott's Lagoon Trail, we hiked over sand dunes along the western edge of the northern arm of the lagoon until we came to a cove. Within several minutes of our arrival, Myers interrupted a discussion to point out a juvenile Northern Harrier flying perpendicular to, and 50 meters to the north of us, carrying what appeared to be (as viewed through 8× binoculars) a small rodent in its talons. We aged the bird by its streaked breast and tawny wash over the ventral surface (Figure 1) (Smith et al. 2020). We first sighted it gliding (rectrices closed) east, descending and paralleling a low sand ridge (~5° slope). It braked slightly and dropped the object it had been carrying (Figure 2), which fell nearly straight, and at such velocity that we began to question whether it was a rodent or something offering less air resistance. A second after releasing the object, the harrier rolled into a stoop (Figure 3) to pursue the dropped object, assuming a steep descent and dropping out of sight behind willow trees (*Salix* sp.), which formed a dense canopy along the ridge about 10 meters below the harrier's flight path. Within seconds it was pumping back up to resume its altitude and flight path with the object in its grasp, apparently having retrieved it before it was lost in the dense, wind-stunted willows, or fallen to the ground. It repeated this drop-and-catch pattern 4 times over approximately 100 meters until it flew out of sight.

Sumner (1931) observed a Northern Harrier of unknown age manipulating a live Horned Lark (*Eremophila alpestris*) by repeatedly dropping it to the ground from a meter or two in the air. On a few occasions the harrier landed beside the Horned Lark and then pounced on it with one foot. After the harrier had picked up and dropped the lark seven to eight times, the two disappeared into tall grass. After waiting 10

FIGURE 1. Juvenile *Circus hudsonius* gliding along a low sand ridge holding an apparent stone with its right foot. Abbott's Lagoon, Point Reyes National Seashore, 4 August 2022.

Photo by Luc Myers

FIGURE 2. Juvenile *Circus hudsonius* braking to release an inanimate object before pursuing it as it falls. Note that it appears the object is being held in the left foot but it is in free-fall behind the left foot. Abbott's Lagoon, Point Reyes National Seashore, 4 August 2022.

Photo by Luc Myers

FIGURE 3. Juvenile *Circus hudsonius* mid-stoop, pursuing the object just released from its talons. Abbott's Lagoon, Point Reyes National Seashore, 4 August 2022.

Photo by Luc Myers

minutes, Sumner approached the spot and found the Horned Lark mostly consumed. Bildstein (1992) observed recently fledged juvenile Northern Harriers pounce on, and play with, inanimate objects, primarily corn cobs. Ultimately, our observation of object play by a Northern Harrier also involved an inanimate object. Although Myers's photos of the object leave its true nature a bit ambiguous, from study of the digital images and the apparent velocity at which the object fell when dropped, we conclude that it was most likely an oblong stone. Thus our observation differed from those described above in that during the time we witnessed the play behavior, the object was never allowed to hit the ground. In fact, that seemed to be the purpose of dropping and catching, and since the object was never grounded, we did not observe the pouncing behavior described by Sumner (1931) and Bildstein (1992).

In predatory birds, object play may be an important way by which the young acquire skills in catching and manipulating prey (Ficken 1977). For fledgling harriers, catching prey in flight is critical to obtaining food because parents feed fledglings by transferring prey to them in flight (Bildstein 1992). In fact, Bildstein observed that fledgling harriers spent little to no time hunting; he never observed a fledgling capture live prey. Instead, most flights were either for exercise, or directed toward returning parents carrying food. Thus repeatedly dropping and catching inanimate objects, especially those that fall quickly, may be a way for young to develop the motor skills needed for successful prey transfer. Such prey transfer increases fitness for young and adults alike and ensures juvenile harriers that survive to reproduce have acquired a skill necessary to feed their own offspring. Our observations of object play in harriers differ from those of Sumner (1931) and Bildstein (1992) in that

theirs seem to have been practice for killing prey, whereas the harrier we observed appeared to be focused solely on practicing prey transfer.

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COURSE REVIEW

Great Courses' National Geographic Guide to Birding in North America, a 24-part series of lectures produced and taught by James Currie for the Teaching Company's "Great Courses" and National Geographic. Available in various formats from https://www.thegreatcourses.com/courses/the-national-geographic-guide-to-birding-in-north-america. See website for current price.

[Editor's note: This series was reviewed via DVDs available for purchase through the Great Courses as a 4-DVD set. It is also available through the subscription streaming service Wondrium, through the free online library and streaming service Kanopy, YouTube, and other sources.]

The Great Courses' *National Geographic Guide to Birding in North America* takes on a very challenging task. Birding is a complex topic, but the presenter, James Currie, really does a great job distilling a daunting amount of information into easily digestible lectures. The information contained within this course is targeted at advancing one's ability to find and watch birds in the field. It provides the science aspect in as much detail as it applies to finding and identifying birds. The strength of this series is that it provides enough scientific background to make its points while not drowning the viewer in trivia.

Each disc begins with a table of contents and allows the viewer to select the lecture to be watched. However, the DVDs are accompanied by a book, and this book is the best resource for navigating the material contained throughout the series. Each lecture is approximately 40 minutes; the section that covers "tactics to be a better birder" is separate from the discussion of optics. These in turn are separate from the discussion of using behavioral cues, which is separate from the lecture on birding by habitat. All of these could logically be rolled into one continuous lecture, but the subjects would almost certainly be overwhelming.

The course series begins with a discussion of distribution, endemism, and status. This feels like a logical starting point and provides a great framework with which to learn the birds. Yet, if this introduction is overlooked, it can contribute to many identification problems. The course continues into a fairly basic discussion of habitat and explains how to learn which species to expect where. Like many of the lectures, this section could certainly be developed further, but instead it presents an easily digestible amount of information. For example, the discussion of habitat features a very brief section explaining that the two types of forest are evergreen and deciduous. Obviously, this is a gross oversimplification of the intricacies of North American woodlands. Nevertheless, the lecture then continues into a classic example of the Brown-headed Cowbird parasitizing nests of the threatened Kirtland's Warbler, connecting dots between edge habitat and forest specialists, while making a pointed remark about conservation.

After the course addresses some of the fundamentals of birding, it goes into several units on the identification of various taxonomic groups of birds. Again, rather than drowning the viewer with details for every single species—which would never fit anyway— it emphasizes groups with confusing species and how to distinguish them. For example, in his discussion of swans, Currie mentions the Mute Swan quickly but spends a few minutes on the field marks of the Tundra and Trumpeter Swans. For such a nuanced topic, riddled with exceptions to every rule, this lecture covers the bases very efficiently.

While new and intermediate observers of birds arguably stand to gain the most from these lessons, experienced birders can find useful information within them as well. Is it really important to know that the term "birdwatching" came from a 1901 book? Not critical to one's birding but interesting background just the same. The

difference between anisodactyl and zygodactyl? Maybe trivia to some, but not when you're tracking a roadrunner. Currie's discussions of the use of weather, topography, and digital resources like eBird for finding birds should help develop a well-rounded field ornithologist and birder, even one already with years of experience.

The entire course progresses logically and is sufficiently detailed. It serves its intended purpose of being a great aid to learning about birds in the field for a broad audience.

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Photo by Barbara Doe of Berkeley, California:
Red-breasted Nuthatch (*Sitta canadensis*)
Berkeley Hills, Alameda County, California, 3 July 2022.
The Red-breasted Nuthatch rarely uses nest boxes, but two years of use of a box in the Berkeley Hills was monitored by Phillip J. Capitolo and Barbara Doe, as they report in this issue of *Western Birds*. One year, the pair evidently raised two successive broods, also rarely confirmed in nuthatches. The material brought for the nest inside the box consisted largely of strips of redwood bark, and the birds applied resin around the box's entrance, as Red-breasted Nuthatches typically do.