WESTERN BIRDS

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Western Specialty:
Yellow-billed Magpie

Photo by © Daniel Lee Brown of Sacramento, California:
Yellow-billed Magpie (*Pica nuttalli*), Discovery Park, Sacramento, California, 10 March 2021.

Previous studies of the biology of the Yellow-billed Magpie, a California endemic, have taken place principally in the oak woodlands of the Coast Ranges. So the study published in this issue of *Western Birds*, by Daniel Airola, Lily Douglas, and Layla Airola of the magpie's nesting ecology in urban Sacramento, provides a complementary perspective. The urban population around Sacramento region numbers at least 827 birds nesting in at least 22 colonies. The magpies nest in a variety of native and non-native trees and prefer to forage in low herbaceous habitats (irrigated turf and mowed or grazed annual grassland). The distribution of colonies is associated strongly not only with sufficient foraging habitat but also with nearby flowing rivers and streams.

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Front cover photo by © David Walker of Las Vegas, Nevada: Roseate Spoonbill (*Platalea ajaja*), Ash Meadows National Wildlife Refuge, Nye Co., Nevada, 3 September 2019, representing a fifth record of the species for Nevada. Two occurrences of the spoonbill in Nevada in 2019 were the first for that state since the irruption of 1977.

Back cover "Featured Photo" by © Larry Sansone of Los Angeles, California: Red-backed Junco (*Junco hyemalis dorsalis*), representing the first well-supported record for California of this subspecies that breeds largely in the mountains of Arizona and New Mexico and typically disperses only short distances from its breeding range.

Western Birds solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. Particularly desired are reports of studies done in or bearing on North America west of the 100th meridian, including Alaska and Hawaii, northwestern Mexico, and the northeastern Pacific Ocean.

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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NEVADA BIRD RECORDS COMMITTEE REPORT FOR 2019–2020

JEANNE TINSMAN, P.O. Box 752045, Las Vegas, Nevada 89136; philohela17@gmail.com

MARTIN MEYERS, c/o Great Basin Bird Observatory, 1755 E. Plumb Lane #256, Reno, Nevada 89502; NevadaBirdRecords@gbbo.org

ABSTRACT: In 2019 and 2020, the Nevada Bird Records Committee reviewed 79 reports from the period 4 November 1955 to 23 October 2020. Seventy of them were endorsed. It added three species to the state checklist, the Field Sparrow (*Spizella pusilla*), Mexican Duck (*Anas diazi*), and Pine Warbler (*Setophaga pinus*). Two of those (the Field Sparrow and Pine Warbler) were added to the review list. The Mexican Duck was elevated from subspecies to species status, and it, along with six other species, were removed from the review list. We also continued reviewing records that precede the committee's establishment in 1994.

The Nevada Bird Records Committee (NBRC) revised the Nevada review list in 2018 (Tinsman and Meyers 2020), reducing the number of species it reviews from 141 to 108. As a result, the committee received significantly fewer submissions and decided to reduce its reports' frequency to biennial. The NBRC began 2019 with 23 reports in the pending queue, and during 2019 and 2020 received a further 62 reports. In these two years, the committee completed reviews of 79 records, of which 70 were endorsed. Forty-nine were supported by photographs; one was also supported by video/audio, two by video, three by audio, and four by museum specimens. Of the nine reports not endorsed, five were supported by photos, and one of those was also supported by video. At the end of 2020, there were six reports in the pending queue, consisting of five that were received late in 2020 and one that required a third round of review. Since the founding of the NBRC in 1994, the committee has reviewed 1480 reports, of which 1330 (89.9%) have been endorsed.

At its founding in 1994, the committee decided not to review any sightings prior to that year, but reversed that decision several years later. Since 2007, the committee has reviewed 236 reports of sightings prior to the committee's founding date; 200 of those have been endorsed. Of the 79 reports reviewed in 2019 and 2020, 25 preceded 1994, and 22 of those were endorsed. Most of the pre-committee reports reviewed in the past two years were of species no longer on the current review list. In most cases, these early records were reviewed because, if endorsed, they would represent an earliest documentation date for Nevada.

The NBRC has six voting members, one of whom serves as chair, and a nonvoting secretary. At the beginning of 2019, the committee's voting members were Frank Fogarty, Alex Harper, Paul Hurtado, Justin Streit, Jeanne Tinsman, and Ben Zyla. In March of 2019, Paul Hurtado retired from the committee and was replaced by Greg Scyphers. The position of secretary continued to be held by Martin Meyers, and the position of chairperson continued to be held by Jeanne Tinsman. The committee's membership was unchanged in 2020.

The NBRC's website at https://www.gbbo.org/nbrc contains a statement of purpose, answers to frequently asked questions, links to a submission form that can be downloaded or completed online, the Nevada checklist, the review list, a list of current and past NBRC members, and the committee's bylaws. There is a link to a list of all submissions to the NBRC, with the status of each with respect to endorsement and, if available, a photograph. All previous NBRC reports are available through the website. Reports through 2007 (1994–1996, 1997, 1998, 1999, 2000, 2004, 2005, and 2007) appeared in *Great Basin Birds*, published by the Great Basin Bird Observatory. Reports for 2008 through 2010 are available only at the NBRC website. Beginning in 2011, regular reports have appeared in *Western Birds*.

REVISIONS TO THE NEVADA STATE LIST

One new species was added to the state checklist in 2019, the Field Sparrow (*Spizella pusilla*). In 2020, two new species, the Mexican Duck (*Anas diazi*) and the Pine Warbler (*Setophaga pinus*), were added. At the end of 2020, the Nevada list comprised 492 species, including the Arctic Warbler (*Phylloscopus borealis*) *sensu lato*, based on a bird identified only to the group comprising the Arctic, Kamchatka Leaf (*P. examinandus*), and Japanese Leaf (*P. xanthodryas*) Warblers (Tinsman and Meyers 2019).

REVISIONS TO THE NEVADA REVIEW LIST

At the end of 2018, the Nevada review list stood at 110 (108 species and two subspecies) after a major revision that removed any species for which the committee had endorsed at least five records in the preceding 15 years (Tinsman and Meyers 2020). This revision included language to allow for reinstatement by committee vote of any species meriting closer focus.

Within the first half of 2019, motions relating to the 2018 action were passed. The criterion for exclusion of species from the review list was updated to specify the removal of any species for which the committee had endorsed at least five records in the preceding 10 (vs. 15) years. As a result, three species that had met the "15 years" criterion but did not meet the new "10 years" criterion were reinstated: the Mississippi Kite (*Ictinia mississippiensis*), the Bronzed Cowbird (*Molothrus aeneus*), and the Worm-eating Warbler (*Helmitheros vermivorum*). Consequently, the review list was increased to 113 at that time.

The reinstatement of the Bronzed Cowbird on the review list was shortlived, however, as two records of that species were endorsed during the period covered by this report, bringing the total for that species up to the criterion of "five records in the preceding 10 years." Other changes to the review list from records reviewed in 2019 and 2020 included the addition of the Field Sparrow and Pine Warbler and the removal of five species: the Common Ground Dove (*Columbina passerina*), Arctic Tern (*Sterna paradisaea*), Rusty Blackbird (*Euphagus carolinus*), Prairie Warbler (*Setophaga discolor*), and Black-throated Green Warbler (*Setophaga virens*).

In addition, with the elevation of *Anas platyrhynchos diazi* to the rank of full species, as *Anas diazi* (Chesser et al. 2020), one subspecies was removed from the review list. Nevertheless, the Mexican Duck was not added to the review list (see species account). At the end of 2020, the review list stood at 108, including 107 species plus one subspecies, the Green-winged Teal (Eurasian), *Anas crecca crecca*.

SPECIES ACCOUNTS

Each species account is introduced with a header in the following format: English name; scientific name; and, in parentheses, the total number of endorsed records of the species (including those endorsed in this report), followed by the number of records endorsed in this year's report. An asterisk preceding the species' name signifies that the species is no longer on the review list. Two asterisks after the total of records denote that the number of records refers to a restricted review period, usually signifying that the species is no longer on the review list, or was added to the review list because of a perceived drop in frequency of occurrence in Nevada, or was exempt from review in some locations. The committee no longer maintains exemptions from review based on location/region.

After the heading for each species, each report of that species reviewed in 2019 or 2020 is provided in the following format: NBRC report number, location (county in parentheses), and date or range of dates of observations reported to the NBRC. If the report involved multiple birds, the number follows the date information. Then, for endorsed records, the name of each submitter, followed by the notation "(P)," "(V)," and/or "(A)" if a photo, video, and/or audio recording was provided, respectively. If there is no such annotation, only written documentation was provided. If the finder(s) sent documentation to the NBRC, their names are listed first. A semicolon follows the finders' names if other observers submitted additional documentation. Citations for previously published accounts to the journals *American Birds* (AB), *National Audubon Society Field Notes* (NASFN), *North American Birds* (NAB), and *Western Birds* (WB) are abbreviated in text.

In cases where specimens were the subject of review, either museum staff or an NBRC member provided photographs of them with associated tags for our records, and for presentation to the committee during the review process. The museums cited in this report are the Museum of Vertebrate Zoology (MVZ), University of California, Berkeley; the Museum of Natural History (UNR), University of Nevada, Reno; the Burke Museum (UWBM—collection formerly held at the Marjorie Barrick Museum at the University of Nevada,

Figure 1. Mexican Duck (*Anas diazi*), Henderson Bird Viewing Preserve, Clark Co., Nevada, 14 January 2017, one of the six the Nevada Bird Records Committee endorses in this report.

Photo by Edward Sivon

Las Vegas [MBM]); University of Washington, Seattle; and the Nevada State Museum (NSM), Carson City.

Multiple observations of a species are ordered chronologically. Any discussion of the species in general, not specific to an observation, concludes the account if warranted.

Figure 2. Groove-billed Ani (*Crotophaga sulcirostris*), Las Vegas Wash, Clark County Wetlands Park, Nevada, 5 December 2018–30 January 2019, representing a fifth record for Nevada.

Photo by Justin Streit

*MEXICAN DUCK *Anas diazi* (6, 6). 2011-008, Laughlin (Clark), 5–20 Feb 2011. D. Vander Pluym (P); R. Schlageter, J. Clarke, C. Titus, R. Titus (P, V). Fridell (2011) stated, "Mexican Duck intergrades were reported from *Clark*, NV, at Floyd Lamb Park, Las Vegas, 23–27 Dec (JT, CT) and Laughlin 5–20 Feb (ph. DV, LH, et al.)." Later documentation and discussion from D. Vander Pluym included his subsequent opinion that this bird was not an intergrade, and his photos, along with photos and videos from other observers, convinced the committee to endorse this record.

2011-070, Floyd Lamb Park at Tule Springs (Clark), 25 Feb 2011. NOT ENDORSED.

2011-076, Carson Lake (Churchill), 17 Sep 2011. C. Nicolai (P, NAB 66:143, 2012). Note that the publication in NAB lists the date as 18 Sep 2011, but Nicolai's submitted documentation states that the bird was captured and banded 17 Sep 2011.

2020-003, Boulder Beach, Lake Mead National Recreation Area (NRA) (Clark), 3 Jul 2015. J. Streit (P).

2016-026, Pahranagat National Wildlife Refuge (NWR) (Lincoln), 4 May 2016, two birds. R. Vinson (P).

2017-002, Henderson Bird Viewing Preserve (Clark), 14 Jan 2017. E. Sivon (P; Figure 1).

2020-004, Floyd Lamb Park at Tule Springs (Clark), 29 Mar 2020. NOT ENDORSED.

2020-006, Duck Creek Unit, Clark County Wetlands Park (Clark), 7 Apr 2020. C. Sanders (P).

The NBRC began accumulating documentation on Nevada occurrences of this taxon in 2011, but held off review until 2020. During that year, the committee reviewed eight reports and endorsed six, a number meeting the committee's criterion for removing a species or subspecies from the review list. With the taxonomic split of the Mexican Duck from the Mallard later in 2020 (Chesser et al. 2020), the NBRC added the species to the state checklist.

*COMMON GROUND DOVE *Columbina passerina* (9, 1). 2018-052, Las Vegas (Clark), 9 Oct 2018. A. Poe. This bird was temporarily stunned as a result of a window strike at a school in Las Vegas. It recovered quickly.

GROOVE-BILLED ANI *Crotophaga sulcirostris* (5, 3). 2019-003, Boulder City (Clark), 7 Dec 1964. P. Long, F. Poyser. Earliest NBRC-endorsed record.

2019-004, Floyd Lamb Park at Tule Springs (Clark), 4 Nov 1973. NOT ENDORSED.

2019-005, Logandale (Clark), 9 Nov 1974. M. V. Mowbray, J. O'Connell (AB 29:95, 1975).

2018-061, Las Vegas Wash, Clark County Wetlands Park (Clark), 5 Dec 2018–30 Jan 2019. L. Holmes (P); A. Ambos (P), D. Syzdek (P), J. Streit (P; Figure 2), P. Gaffey (P), M. Meyers (P). This bird remained along the Las Vegas Wash for almost two months.

BROAD-BILLED HUMMINGBIRD *Cynanthus latirostris* (9, 1). 2020-010, Cactus Springs (Clark), 27 Apr 2020. B. Miller (P). An adult female feeding in Prince's Plume (*Stanleya pinnata*) was chased away by a Black-chinned Hummingbird (*Archilochus alexandri*) after about 15 seconds, but Miller was able to obtain diagnostic photos.

PACIFIC GOLDEN-PLOVER *Pluvialis fulva* (3, 1). 2019-020, Stillwater NWR (Churchill), 24–27 Aug 2019. N. Rosen (P), D. Serdehely (P), G. Scyphers (P), P. Hurtado (P), M. Andrews, R. Strickland, D. Ghiglieri (P). Originally found by Rob Lowry. Many photos obtained show tips of three primaries extending past the long tertials. Plumage coloration also supported the identification as the Pacific rather than the American Golden-Plover (*P. dominica*).

UPLAND SANDPIPER *Bartramia longicauda* (3, 1). 2019-009, Henderson tailing ponds (Clark), 19 Apr 1970. C. S. Lawson. Earliest NBRC-endorsed record. The exact location of the Henderson tailing ponds has faded into obscurity; the only information available places the bird "in the lower tailing ponds in Las Vegas Wash 16 km southeast of Las Vegas" (Lawson 1977).

*RED PHALAROPE *Phalaropus fulicarius* (16**, 3). 2019-040, Ash Meadows NWR (Nye), 26 Nov 1988. P. E. Lehman (AB 43:142, 1989).

2019-041, Indian Springs (Clark), 26 Sep 1991, two birds. P. E. Lehman (AB 46:127–128, 1992).

2019-042, Ash Meadows NWR (Nye), 26 Sep 1991, five birds. P. E. Lehman (AB 46:127–128, 1992). In summarizing reports for fall 1991 from Nevada, Utah, Wyoming, and Colorado combined, Kingery (1992) commented, "the region had 16 Red Phalaropes—in 3 states, over twice as many as in any year this decade."

While the Red Phalarope is no longer on the review list and these three records were not candidates for earliest NBRC-endorsed record (earliest endorsed Red Phalarope was observed on 5 Jun 1971 at the Henderson tailing ponds), the committee chose to review them because there have been no other documented records of the species in southern Nevada since 1972. Anecdotal reports over the years suggest it has not really been that infrequent in the south, but the committee has not received supporting documentation. By endorsing these three records, we have a clearer understanding of the Red Phalarope's occurrence in Nevada.

*PARASITIC JAEGER *Stercorarius parasiticus* (17**, 1). 2019-032, former Lake Mead Marina, Lake Mead NRA (Clark), 23–24 Nov 1990. P. E. Lehman (AB 45:133, 1991). Earliest NBRC-endorsed record. Lehman noted, "this is a very late date for an interior Parasitic (in addition to being very rare-to-casual at any season), with Pomarine probably being the [jaeger] most likely inland so late in the fall." Of the 17 NBRC-endorsed records of the Parasitic Jaeger, this one falls latest in the year. There are two August records, 12 in September, and two in October.

ANCIENT MURRELET *Synthliboramphus antiquus* (6, 2). 2019-013, Elko (Elko), 14 Nov 1955, specimen (MVZ 133834, ♀, no fat, coll. G. Gullion). Earliest NBRC-endorsed record. Found in the yard of a lumber dealer following the first major winter storm of the season (Gullion 1956).

2019-014, south end Pyramid Lake (Washoe), 4 Mar 1961, specimen (MVZ 142632, ♂, testis 7 × l.5 mm, weight 140 g, coll. N. K. and V. K. Johnson).

The most recent endorsed record of the Ancient Murrelet in Nevada is from 19 Sep 1996, from Pyramid Lake, Washoe County (Cressman et al. 1998).

YELLOW-FOOTED GULL *Larus livens* (1, 0). 2019-026, former Lake Mead Marina, Lake Mead NRA (Clark), 28 Nov–12 Dec 1992. NOT ENDORSED. The only NBRC-endorsed record of the Yellow-footed Gull is of the bird known as "Old One-Foot," an adult first reported 3 Dec 1991 at Las Vegas Bay, Lake Mead NRA, and observed through 3 Jan 1998 (Eidel 2000). The documentation for 2019-026 was for a younger bird (likely in its second cycle). This record received two votes for endorsement, four against, with the negative votes based on the difficulty of eliminating a Western Gull (*L. occidentalis*) on the basis of the documentation provided.

*ARCTIC TERN *Sterna paradisaea* (8, 3). 2018-055, Washoe Lake (Washoe), 28–29 Sep 2001. M. Meyers (P, NAB 56:81, 2002). This bird was originally found by Kimball Garrett during the Western Field Ornithologists conference held that year in Reno.

2018-049, Boulder City (Clark), 28 Sep 2018. D. Mitev (P).

2018-054, Henderson Bird Viewing Preserve (Clark), 21 Oct 2018. J. Streit (P).

*RED-THROATED LOON *Gavia stellata* (15**, 1). 2019-035, Las Vegas Wash,

Figure 3. Roseate Spoobill (*Platalea ajaja*), Ash Meadows National Wildlife Refuge, Nye Co., Nevada, 3–11 September 2019, representing a fifth record for Nevada.

Photo by Martin Meyers

Figure 4. Mississippi Kite (*Ictinia mississippiensis*), Clark County Wetlands Park Nature Preserve, Nevada, 1 July–8 August 2020, the first known to have remained in Nevada for an extended period.

Photo by C. Gaffey

FIGURE 5. Dusky-capped Flycatcher (*Myiarchus tuberculifer*), Big Smoky Valley, Nye Co., Nevada, 31 May–1 June 2020, representing a third record for Nevada.

Photo by Adrian Hinkle

Lake Mead NRA (Clark), 23 Nov 1990, two birds. P. E. Lehman (AB 45:131, 1991). There is a 20-year gap in NBRC-endorsed records between 1977 and 1997. The committee chose to review this pre-committee record to expand documentation of this species' occurrence in the state.

*YELLOW-BILLED LOON *Gavia adamsii* (11**, 1). 2019-007, Incline Village (Washoe), 6 Jan 1973. D. DeSante. Earliest NBRC-endorsed record. This observation

FIGURE 6. Blue Jay (*Cyanocitta cristata*), Elko, Elko Co., Nevada, 29 October 2019–28 March 2020, representing a sixth record for Nevada.

Photo by Mark Ports

was the only one for Nevada between 1956 and 1974 (Remsen and Binford 1975). The next sighting that the NBRC has endorsed did not follow until 1991.

GLOSSY IBIS *Plegadis falcinellus* (5, 2). 2019-011, Bowman Reservoir (Clark), 21 Apr 2019. B. Miller (P).

2019-025, Amargosa Valley (Nye), 25 May 2019. NOT ENDORSED. The bird in question appeared to be a hybrid with the White-faced Ibis (*P. chihi*).

2020-016, east of Duck Creek Unit, Clark County Wetlands Park (Clark), 27–29 Jun 2020. B. Zyla (P, V); J. Streit (P), C. Sanders (P).

ROSEATE SPOONBILL *Platalea ajaja* (5, 4). 2018-050, Overton Wildlife Management Area (Clark), 28 Jun 1977, two birds (AB 31:1166–1167, 1977), one collected (UNR 1838, imm. ♀, ovary 16 × 6 mm, no molt, light fat, coll. C. S. Lawson).

2018-051, Gunsight Pass, 48 km north of Las Vegas on US Highway 93 (Clark), 1 Jul 1977, four birds (AB 31:1166–1167, 1977). Two specimens; each in a different collection (UWBM 96833/MBM 175, imm. ♀, weight 1208 g, no molt, no fat, coll. R. Voss; NSM B-1655, imm. ♀, ovary 18 × 8 mm, no molt, no fat, coll. R. Voss). Late on the night of 1 July, Richard Voss saw four spoonbills standing in the middle of the highway. As he observed them, a passing truck struck and killed two, which he retrieved.

Records 2018-050 and 2018-051, along with Nevada's first record on 5 Jun 1977 (Meyers 2010), were part of a large flight of this species into Arizona, California, and Nevada. Several other sightings were reported during summer 1977, but we do not have reviewable documentation (Lawson 1979).

2019-021, east of Duck Creek Unit, Clark County Wetlands Park (Clark), 31 Aug 2019, two birds. D. Crowe (P).

2019-022, Ash Meadows NWR (Nye), 3–11 Sep 2019. D. Feener (P); P. Gaffey (P), M. Andrews, R. Strickland, D. Walker (P), G. Scyphers (P), J. Tinsman (P), M. Meyers (P; Figure 3), D. Dodson (P). Three days after Dorothy Crowe found the two Roseate Spoonbills at the Clark County Wetlands Park (where they were not seen subsequently), a single bird was discovered at Ash Meadows NWR, approximately 120 km to the west-northwest. This bird, often accompanied by a Great Egret (*Ardea alba*), remained for over a week.

MISSISSIPPI KITE *Ictinia mississippiensis* (12**, 1). 2020-014, Clark County Wetlands Park Nature Preserve (Clark), 1 Jul–8 Aug 2020. C. Gaffey (P; Figure 4), P. Gaffey, J. Streit (P), S. Page (P), D. Mitev (P), B. Zyla, J. Tinsman (P), A. Harper (P). Originally observed by D. Van Dooremolen, and first reported by C. Sanders. An amazingly cooperative second-year bird, it remained in the same location for over a month and a half, with reports to https://ebird.org continuing through 22 August. None of Nevada's 11 previous Mississippi Kites were reported for longer than a single day.

*YELLOW-BELLIED SAPSUCKER *Sphyrapicus varius* (13**, 1). 2019-034, Dyer (Esmeralda), 12 Oct 1990. P. E. Lehman (AB 45:133, 1991). Earliest NBRC-endorsed record.

CRESTED CARACARA *Caracara cheriway* (5, 1). 2019-002, Dyer (Esmeralda), 19 Sep 2018–7 Jan 2019. R. Fridell (P); E. Pratt. The sightings on these two dates were at the same location, and an anecdotal report from a local resident supported the committee's decision to consider the January sighting as representing a continuing individual.

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer* (3, 1). 2020-011, Big Smoky Valley (Nye), 31 May–1 Jun 2020. A. Hinkle (P; Figure 5). This species breeds as close to Nevada as southeast Arizona and regularly occurs in coastal California in fall, often overwintering, with over 100 records. One in San Diego County occurred as late as 1 June, and by 2017, when the California committee discontinued reviewing the Dusky-capped Flycatcher, only 12 had extended into May. It is much rarer in the interior of California, with approximately a dozen records, the latest of which is 2 March (Hamilton et al. 2007, Tietz and McCaskie 2021). We infer that the bird in the Big Smoky Valley had probably wintered in Nevada—the location is one that is very rarely birded, especially in winter. Nevertheless, the observation at the end of May and beginning of June is remarkable. Nevada's two other endorsed Dusky-capped Flycatchers occurred in December and in April.

TROPICAL KINGBIRD *Tyrannus melancholicus* (3, 1). 2018-046, Primm (Clark), 5 Sep 2018. NOT ENDORSED.

2020-012, Corn Creek, Desert NWR (Clark), 17 Jun 2020. B. Zyla (P, A); J. Tinsman (P). Excellent photos were accompanied by a recording of the bird's characteristic twittering call. The NBRC has received eight reports of the Tropical Kingbird but has endorsed only three, all between 6 and 17 June and all including audio recordings or written descriptions of the twitter from multiple observers. The reports not endorsed did not include audio recordings, nor were diagnostic vocalizations reported in the documentation.

In many ways, the occurrence of the Tropical Kingbird in California parallels that of the Dusky-capped Flycatcher (above). The kingbird also breeds in southeastern Arizona, albeit uncommonly. Even more so than the Dusky-capped Flycatcher, the Tropical Kingbird regularly visits coastal California, as well as locations farther north on the west coast, in the fall and winter (Dunn and Alderfer 2017).

Note that there is one endorsed record of the very similar Couch's Kingbird in Nevada, a long-staying, very cooperative bird at the Clark County Wetlands Park Nature Preserve in winter 2015 (Tinsman and Meyers 2016).

*EASTERN PHOEBE *Sayornis phoebe* (8**, 1). 2019-008, Corn Creek, Desert NWR (Clark), 24 Nov–30 Dec 1973. M. V. Mowbray, C. S. Lawson (P, AB 28:85, 1974). Earliest NBRC-endorsed record.

BLUE JAY *Cyanocitta cristata* (6, 2). 2019-031, Elko (Elko), 31 Jan–16 Feb 1997. M. Meyers (NASFN 51:777, 1997).

2019-030, Elko (Elko), 29–31 Oct 2019. L. Ports, M. Ports (P; Figure 6), M. Andrews, D. Serdehely (P). Reports of this bird to https://ebird.org continued through 9 Mar 2020, but none of those were submitted to the NBRC.

Review of two additional reports of the Blue Jay in Elko County in November 2020 is still pending.

WINTER WREN *Troglodytes hiemalis* (4, 1). 2018-058, Corn Creek, Desert NWR (Clark), 10 Nov 2018. A. Harper (A), G. Scyphers (P, V, A); C. Gaffey (P), P. Gaffey (P). Audio (recorded with video) was diagnostic for this species, distinguishing it from the very similar, and much more likely, Pacific Wren (*T. pacificus*).

GRAY-CHEEKED THRUSH *Catharus minimus* (0, 0). 2019-016, Miller's Rest Stop (Esmeralda), 13 May 2019. NOT ENDORSED.

WOOD THRUSH *Hylocichla mustelina* (8, 2). 2018-053, Floyd Lamb Park at Tule Springs (Clark), 17 Oct 2018. B. Zyla (P); P. Gaffey (P).

2020-007, Henderson (Clark), 13 May 2020. A. Crinigan (P; Figure 7).

*GRAY CATBIRD *Dumetella carolinensis* (4**, 1). 2019-038, Corn Creek, Desert NWR (Clark), 11 Oct 1990. P. E. Lehman (AB 45:134, 1991). Earliest NBRC-endorsed record.

WHITE WAGTAIL *Motacilla alba* (2, 1). 2019-010, Bowman Reservoir (Clark), 12 Apr 2019. A. Harper (P); P. Gaffey (P; Figure 8), C. Gaffey (P). Committee members did not reach consensus on the bird's subspecies, although the majority favored *lugens* (Black-backed). The full black bib with a completely white chin suggested

Figure 7. Wood Thrush (*Hylocichla mustelina*), Henderson, Clark Co., Nevada, 13 May 2020, representing an eighth record for Nevada.

Photo by Amanda Crinigan

lugens, and the back color also suggested that taxon, but the amount of white in the wing was somewhat intermediate between that expected for *lugens* and *ocularis* (Sibley and Howell 1998).

CASSIN'S SPARROW *Peucaea cassinii* (5, 2). 2019-012, Wee Thump Joshua Tree Wilderness (Clark), 27 April 2019. J. Streit (P).

Figure 8. White Wagtail (*Motacilla alba*), Bowman Reservoir, Clark Co., Nevada, 12 April 2019, representing a second record for Nevada.

Photo by Patrick Gaffey

Figure 9. Cassin's Sparrow (*Peucaea cassinii*), Beatty, Nye Co., Nevada, 13–30 May 2019. In spring 2019 Cassin's Sparrow irrupted west of its normal range, yielding the fourth and fifth records for Nevada.

Photo by Justin Streit

Figure 10. Field Sparrow (*Spizella pusilla*), Corn Creek, Desert National Wildlife Refuge, Clark Co., Nevada, 9 November 2018, the first to be recorded in Nevada.

Photo by Jeanne Tinsman

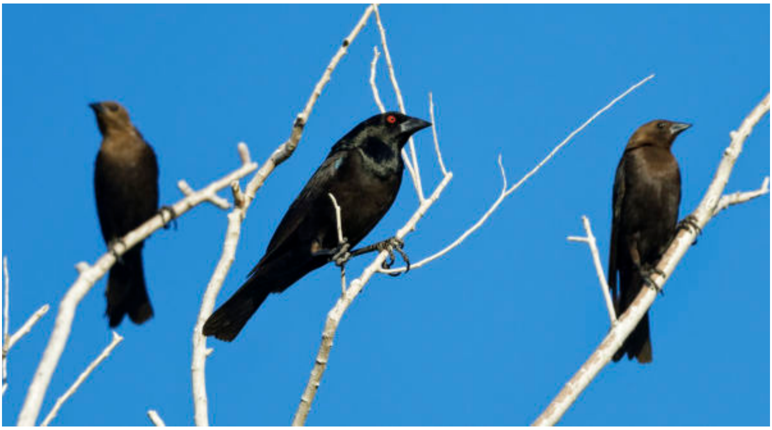

Figure 11. Bronzed Cowbird (*Molothrus aeneus*), with two Brown-headed Cowbirds (*M. ater*), Clark County Wetlands Park Nature Preserve, Nevada, 3 July 2020, representing a seventh record for Nevada.

Photo by Scott Page

2019-015, Beatty (Nye), 13–30 May 2019. J. Streit (P; Figure 9).

The year 2019 was the first year in which more than one Cassin's Sparrow was found in Nevada. Earlier records are widely dispersed, one each in 1989, 1998, and 2015. But 2019 was a major irruption year for Cassin's Sparrow in California: "Forty-one years after an irruption of Cassin's Sparrows reached the Mojave Desert in the spring of 1978, history repeated itself after another wet winter. In the spring of 2019 at least two dozen Cassin's Sparrows were found in the same area of the Mojave Desert as in 1978" (WB 50:57, 2019; Benson et al. 2021).

Figure 12. Blue-winged Warbler (*Vermivora cyanoptera*), Carson River Diversion Dam, Churchill Co., Nevada, 28 May 2020, representing a sixth record for Nevada.

Photo by Nick Rosen

Figure 13. Mourning Warbler (*Geothlypis philadelphia*), Cactus Springs, Clark Co., Nevada, 1–2 June 2019, representing a fourth record for Nevada (and preceding the fifth by a single day).

Photo by Brandon Miller

Figure 14. Pine Warbler (*Setophaga pinus*), Arroyo Grande Sports Complex, Clark Co., Nevada, 22–23 October 2020, representing a first record for Nevada.

Photos by Tim Almond

FIELD SPARROW *Spizella pusilla* (1, 1). 2018-056, Corn Creek, Desert NWR (Clark), 9 Nov 2018. J. Tinsman (P; Figure 10); P. Gaffey (P), C. Gaffey (P), N. McDonal (P). First record for this species to be endorsed by the committee, and the only report of it ever reviewed. "West of the continental divide, this sparrow is known from only a smattering of records in Arizona, western Colorado, and northern Utah, in addition to California's" (Hamilton et al. 2007:415).

*BRONZED COWBIRD *Molothrus aeneus* (7, 2). 2019-017, Bowman Reservoir (Clark), 18 May 2019. J. Streit (P).

2020-015, Clark County Wetlands Park Nature Preserve (Clark), 3 Jul 2020. D. Mitev (P), S. Page (P; Figure 11).

*RUSTY BLACKBIRD *Euphagus carolinus* (13**, 7). 2019-036, Lida (Esmeralda), 26 Oct 1990. S. Finnegan; P. E. Lehman.

2019-037, Miller's Rest Stop (Esmeralda), 19 Nov 1990. P. E. Lehman, S. Finnegan.

2018-059, Pahrump (Nye), 11–12 Nov 2018. D. Feener (P); C. Gaffey (P), P. Gaffey (P).

2018-062, east of Duck Creek Unit, Clark County Wetlands Park (Clark), 21 Dec 2018–18 Jan 2019, two birds. J. Streit (P); P. Hurtado (P), M. Meyers (P), B. Zyla, J. Tinsman (P).

2018-063, Hidden Valley (Clark), 30 Dec 2018. J. Streit (P), B. Zyla.

2020-001, Las Vegas Wash between East Vegas Valley Drive and East Rochelle Ave. (Clark), 3 Jan 2020. J. Streit (P).

2020-002, Moapa Valley Corn Maze (Clark), 4 Jan 2020. J. Streit (P).

WORM-EATING WARBLER *Helmitheros vermivorum* (14**, 1). 2020-009, Wheeler Camp Spring, Red Rock Canyon National Conservation Area (Clark), 24 May 2020. D. Mitev (P, A); B. Zyla (P).

LOUISIANA WATERTHRUSH *Parkesia motacilla* (6, 1). 2020-005, Dyer (Esmeralda), 17–19 May 1988. B. Daniels (AB 42:469, 1988). Earliest NBRC-endorsed record.

GOLDEN-WINGED WARBLER *Vermivora chrysoptera* (7, 1). 2019-028, Indian Springs (Clark), 14–15 Oct 1990. P. E. Lehman (AB 45:134, 1991).

BLUE-WINGED WARBLER *Vermivora cyanoptera* (6, 1). 2020-008, Carson River Diversion Dam (Churchill), 28 May 2020. N. Rosen (P, A; Figure 12). Most of the vagrant eastern warblers in Nevada are found at desert migrant traps, most of which are from Esmeralda County south. It is thus somewhat surprising that two of the state's six Blue-winged Warblers have been found in riparian areas in northern Nevada. The other one was found near Reno along the Truckee River in 2009 (Meyers 2010). Of the 13 species of warblers on the NBRC's current review list, seven have never been noted north of Esmeralda County, while all 13 are known from the southern portion of the state.

CONNECTICUT WARBLER *Oporornis agilis* (5, 1). 2018-047, Floyd Lamb Park at Tule Springs (Clark), 7 Sep 2018. R. Aracil (P).

MOURNING WARBLER *Geothlypis philadelphia* (5, 2). 2018-023, Miller's Rest Stop (Esmeralda), 6 Jun 1992. NOT ENDORSED.

2019-018, Cactus Springs (Clark), 1–2 Jun 2019. B. Zyla; B. Miller (P; Figure 13), P. Gaffey.

2019-019, Lathrop Wells RV Park (Nye), 2 Jun 2019. A. Hinkle.

2019-023, Ruby Mountains (Elko), 9 Aug 2019. NOT ENDORSED.

CAPE MAY WARBLER *Setophaga tigrina* (9, 3). 2019-027, Dyer (Esmeralda), 12 Oct 1990. P. E. Lehman (AB 45:134, 1991).

2018-048, Primm (Clark), 24 Sep–2 Oct 2018. B. Zyla (P); C. Gaffey (P), P. Gaffey (P), B. Miller (P), M. Meyers (P).

2019-001, Clark County Wetlands Park Nature Preserve (Clark), 5 Oct 2018. L. Holmes (P).

PINE WARBLER *Setophaga pinus* (1, 1). 2020-017 Arroyo Grande Sports Complex (Clark), 22–23 Oct 2020. D. Mitev (P); T. Almond (P; Figure 14), B. Zyla (P). Long-awaited first record for Nevada. "The Pine Warbler is almost strictly a late fall and early winter visitor to California. About half the records (37 of 69) involve fall vagrants, most between 13 October and 22 November" (Hamilton et al. 2007:381). Nevada's first record fits comfortably within that date range. The same source mentions several winter records from New Mexico, seven winter records from Arizona, a winter record from Idaho, and a fall record from southwestern Oregon.

*PRAIRIE WARBLER *Setophaga discolor* (9, 1). 2020-013, Corn Creek, Desert NWR (Clark), 18 Jun 2020. A. Lee (P).

*BLACK-THROATED GREEN WARBLER *Setophaga virens* (5, 1). 2018-060, Corn Creek, Desert NWR (Clark), 12 Nov 2018. D. Roorda (P).

CANADA WARBLER *Cardellina canadensis* (9, 1). 2019-024, Corn Creek, Desert NWR (Clark), 11 Sep 2019. C. Lange; D. Mitev.

*DICKCISSEL *Spiza americana* (13**, 1). 2019-033, Indian Springs (Clark), 24–26 Sep 1990, two birds. P. E. Lehman. Earliest NBRC-endorsed record.

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REQUIEM FOR THE TRICOLORED BLACKBIRD IN MEXICO?

RICHARD A. ERICKSON, San Diego Natural History Museum, P.O. Box 121390, San Diego, California 92112; richard.erickson@lsa.net

HORACIO DE LA CUEVA, Departamento de Biología de la Conservación, Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Carretera Ensenada-Tijuana No. 3918, C.P. 22830, Ensenada, Baja California, México; cuevas@cicese.mx

ENRIQUE D. ZAMORA-HERNÁNDEZ, B. Botaris 286, Punta Banda III, C.P. 22897, Ensenada, Baja California, México; zugunruhe@gmail.com

ABSTRACT: We summarize existing literature and document a recent steep population decline and range contraction in the Tricolored Blackbird (*Agelaius tricolor*) at the southern end of its range, in Baja California, the only state of Mexico in which the species occurs. From >1000 nesting birds using at least 14 sites south to 30° N around the turn of the 21st century, the population declined and contracted northward and upward in elevation to a single colony of ~150 nesting birds near the international border in 2019. Chronic drought, rising temperatures, and habitat losses due primarily to intensification of agriculture in Mexico are largely responsible for the decline, as in the core of the species' range in California. Because of the reduction of breeding and foraging habitat, we fear the imminent extirpation of the species in Mexico.

RESUMEN: Presentamos una síntesis de la bibliografía existente y documentamos el declive agudo y reciente de la población del tordo tricolor (*Agelaius tricolor*) en la porción sur terminal de su ámbito en Baja California, el único estado de México en el que se encuentra la especie. De >1000 aves anidantes en al menos 14 sitios rumbo al sur hasta los 30° N a principios de siglo XXI, la población disminuyó y se redujo para el norte y hacia arriba en elevación hasta quedar en 2019 una sola colonia de ~150 aves cerca la frontera internacional. La sequía prevalente, el aumento en las temperaturas y las pérdidas de hábitat debidas principalmente a la intensificación de la agricultura en México son en gran parte las causas de esta disminución, como en Alta California, en el núcleo del ámbito de distribución de la especie. Dados la reducción de los hábitats de reproducción y alimentación, tanto a nivel local como en todo su ámbito de distribución, tememos la inminente extirpación de esta especie en México.

The highly gregarious and colonial Tricolored Blackbird (*Agelaius tricolor*) is largely restricted to lowland regions of cismontane California, where it is nonmigratory but nomadic. Indeed, >99% of the global population occurs in California, the great majority in the Central Valley (Beedy et al. 2018), but the range extends from central Washington and extreme western Nevada to northwestern Baja California.

The Tricolored Blackbird is but one of many species under threat in Baja California, especially within the blackbird's range in the northwest (many others covered by Ceballos and Márquez Valdelamar 2000 and SEMARNAT 2010). Associated with an expanding human population are increasing threats from habitat loss due to residential, industrial, and agricultural development. The pressures of climate change are also weighing heavily on the region (Ackerly et al. 2010, Cavazos et al. 2020, Del-Toro-Guerrero and

Kretzschmar 2020). Wetland-dependent species are especially imperiled (Contreras-Balderas et al. 2008, Peralta-García et al. 2016, Pérez Navarro et al. 2019, Harper et al. 2020), and in Mexico all known sites of Tricolored Blackbird nesting have been in wetlands, emergent marsh almost exclusively (this study). Monitoring population levels of species at risk should be an important component of continuing conservation efforts in the state. For this effort we monitored Tricolored Blackbirds in Baja California from 1991 to 2019 and reviewed all existing reports of the species in Baja California. These data lead us to conclude the species is in imminent danger of extirpation in Mexico.

METHODS

Our study of the Tricolored Blackbird in Mexico began in 1991 with research for a monograph devoted to the distribution of birds in the states of Baja California and Baja California Sur (Erickson and Howell 2001, Wurster et al. 2001). From 2000 it continued with editing the quarterly reports from the same area for the journal *North American Birds* (Erickson et al. 2008, 2013, 2020). In most years, our observations of blackbirds at colonies and elsewhere were opportunistic. During this period, we reviewed all relevant literature and specimen data pertaining to the species in Mexico.

Surveys that focused on the nesting season (March–June) were conducted by us in 2007 (Erickson et al. 2007), 2008 (Erickson and de la Cueva 2008), 2016 (Erickson et al. 2016), 2017, 2018, and 2019 and by Jonathan Feenstra in 2013 (Feenstra 2013). Travel restrictions associated with the covid-19 pandemic precluded surveys in 2020. Ground-based surveys in these years covered all known nesting sites throughout the current and historical range of the species in Baja California (Figure 1). The number of possible colony sites visited over the seven years of surveys ranged from 26 to 50 (Table 1). Multiple visits to many sites were made each year, so the total number of site visits amounted to 603. Baja California is arid, so people are where water is, and roads are where people are, so access to wetlands is generally easy. In early April 2019 we surveyed these and additional areas by aircraft, so we could evaluate known nesting locations and attempt to find additional areas potentially suitable for nesting or foraging. We followed up with ground surveys of many areas of prospective habitat previously unknown to us.

To ensure that the decline in Tricolored Blackbirds we document is independent of search effort we quantify the observed number of nesting birds per year, and the number of nesting birds per visit (sighting effort) (Table 1).

Beginning in 2018, we investigated ownership and other land-use issues at occupied sites and additional areas that may be important for the species.

RESULTS

Literature Review and Pre-survey Efforts

Table 2 lists all reports of the Tricolored Blackbird in Mexico through 1989. Grinnell (1928) summarized all that was known of the Tricolored Blackbird in Mexico at that time, roughly outlining the breeding range and considering the species a “fairly common resident.” That assessment was based in part on

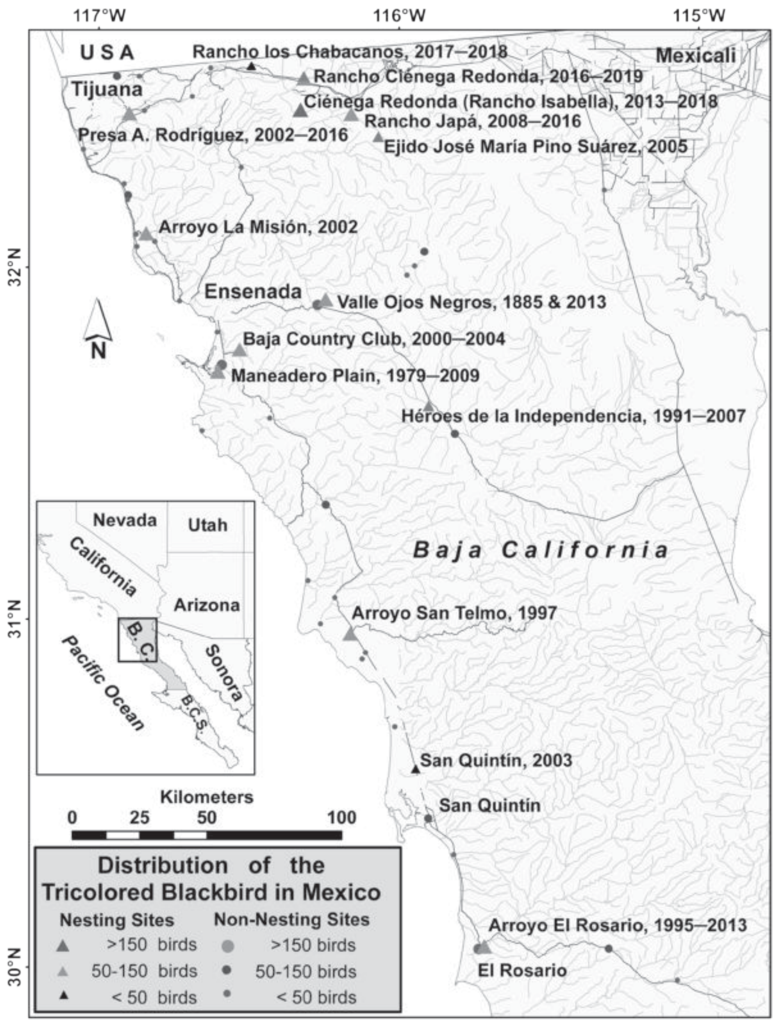

Figure 1. Historical and recent distribution of the Tricolored Blackbird in Mexico.

A. W. Anthony's report of the species as "rather common along the northwest coast, breeding in all freshwater marshes; and in San Rafael Valley [= Valle de Ojos Negros]. Mr. L. Belding found a large colony nesting in tules, May, 1885" (quoted by Bryant 1889 and Bendire 1895). Specific information on nesting sites was not provided. Laurence M. Huey (field notes at San Diego Natural History Museum) saw approximately 500 birds on the Maneadero Plain on 31 January 1928. No more information was provided by Neff (1937), AOU (1957), or Miller et al. (1957).

Table 1 Numbers of Surveys for the Nesting of the Tricolored Blackbird in Northwestern Baja California by Year, 2007–2019[a]

Location	2007	2008	2013	2016	2017	2018	2019
Presa Rodríguez	2	**1**	2	**5**	1	4	5
Arroyo La Misión	5	1	3	1	2	2	2
Baja Country Club	4	2	1	1		1	1
Maneadero Plain	6	2	3	3	4	2	5
Arroyo San Telmo	1	1	1	1	1	2	4
San Quintín	3	1	1	1	3		2
Arroyo El Rosario	2	**1**	**1**	3	1	1	4
Rancho Los Chabacanos					**4**	**2**	2
Rancho Ciénega Redonda	1			**3**	**2**	**4**	**6**
Ciénega Redonda			**1**	**3**	**2**	**4**	6
Rancho Japá	2	**1**	2	**3**	3	3	4
Ejido José María Pino Suárez	1	1					2
Valle de Ojos Negros (multiple sites)	6	1	**2**	3	3	6	6
Héroes de la Independencia	**4**	**2**	1	1	1	2	3
Total visits to known nesting sites	37	14	18	28	27	33	52
Number of known nesting birds	80	440	280	875	300	250	150
Nesting birds per visit (search effort)	2.16	31.43	15.56	31.25	11.11	7.58	3.00
Visits to additional sites/ number of sites	71/33	25/17	35/21	39/14	49/15	75/21	100/36
Nesting birds per all visits	0.74	11.28	5.28	13.06	3.95	2.31	0.99

[a]Boldface highlights years when Tricolored Blackbirds actually nested at the site. The slopes calculated for year vs. number of nesting birds and year vs. search effort (nesting birds/visits to known colony sites) were not correlated, indicating that the reduction in the Baja California population is independent of sampling effort.

Table 2 Timeline of Reports of the Tricolored Blackbird in Mexico

Years of observation	Locations	Sources
1885	northwest coast, Ojos Negros Valley	Bryant (1889), Bendire (1895)
1894	Carrizo Valley	Grinnell (1928)
1906	El Rosario	Thayer and Bangs (1907)
1910	San Quintín	Howell (1911)
1925	San Antonio del Mar	Huey (1926)
1928	Maneadero Plain	L. M. Huey field notes
1929–1972[a]		
1973, 1979, 1980	Maneadero Plain	Anderson and Kelly (1980), Wurster et al. (2001)
1981	Colonet	Wilbur (1987)
1984	Ojos Negros, San Vicente	Wurster et al. (2001)
1986, 1989	Arroyo San Telmo	eBird, Howell and Pyle (1990)
1988	Maneadero Plain	Wurster et al. (2001)
1989	El Descanso	Wurster et al. (2001)
1990s–2010s	throughout range	Erickson et al. (2008, 2016); this study

[a]45-year gap in reports of the Tricolored Blackbird in Mexico.

Table 3 Summary of Numbers of the Tricolored Blackbird Known Nesting in Mexico by Year, 1995–2019

Year	Nesting adults	Colony sites known occupied	Potential colony sites visited	Southernmost colony (°N)	References
1995	700	1		30.0	Anderson et al. (1997)
1997	1350	2		30.0	Anderson et al. (1997)
2000	20	1		31.8	Wurster et al. (2001)
2001	350	2		31.6	N. Am. Birds 55:360
2002	1100	2		32.1	N. Am. Birds 56:490
2003	40	2		30.6	N. Am. Birds 57:407, eBird, NAB database
2004	100	1		31.8	eBird, NAB database
2005	50	1		32.4	N. Am. Birds 59:658
2006	—	—		—	N/A
2007	80	1	44	31.6	Erickson et al. (2007), N. Am. Birds 61:646
2008	440	4	26	30.0	Erickson and de la Cueva (2008), N. Am. Birds 62:622
2009	175	1		31.7	N. Am. Birds 63:659
2010	—	—		—	N/A
2011	—	—		—	N/A
2012	—	—		—	N/A
2013	280	3	20	30.0	Feenstra (2013), N. Am. Birds 67:654
2014	—	—		—	N/A
2015	—	—		—	N/A
2016	875	4	21	32.4	Erickson et al. (2016), N. Am. Birds 70:392
2017	300	3	17	32.5	pers. obs., eBird
2018	250	3	16	32.5	pers. obs., eBird
2019	150	1	49	32.5	pers. obs., eBird

Wilbur (1987) considered the Tricolored Blackbird a "local resident" and noted only two reports since Grinnell's (1928). Additional information from the 1970s and 1980s has since come to light but still leaves a 45-year gap in records from 1928 to 1973 (Table 2). Howell and Webb (1995) cited earlier literature but considered the species "now apparently local."

With recognition of the blackbird's increasingly imperiled status, more attention was paid to the species. Table 3 includes what is known of nesting from 1995 to 2006. Seven nesting sites along the coast extended south to El Rosario, and two inland sites were the first to be found at elevations >1000 m. A detailed map of the blackbird's Mexican range prepared by Erickson et al. (2008) was based primarily on data from these years. The largest numbers reported were at nesting colonies along the Arroyo El Rosario (700 in 1995 and 1997) and Arroyo San Telmo (650 in 1997) (all per Anderson et al. 1997). All specific reports of the species in Mexico are summarized in

Appendices 1 and 2 (see https://archive.westernfieldornithologists/archive/V52/Erickson_Appendices).

Surveys (2007–2019) and Other Recent Efforts

Results of focused surveys during the nesting season of 2007 were summarized by Erickson et al. (2007, also N. Am. Birds 61:646), for 2008 by Erickson and de la Cueva (2008, also N. Am. Birds 62:622), for 2013 by Feenstra (2013, also N. Am. Birds 67:654), and for 2016 by Erickson et al. (2016, also N. Am. Birds 70:392). In addition, Erickson et al. (2016) summarized the results of all surveys through that year. Table 3 and Appendix 1 augment those results with those for 2017–2019.

Of the 14 sites (7 coastal, 7 inland) where nesting has been confirmed in Baja California, all but five (4 coastal, 1 inland) were occupied during at least one of the survey years (Figure 1). Four, all inland, were first found during this period, suggesting a population shift from the coast to higher elevations inland. However, inland sites were rarely, if ever, surveyed in earlier years. After 2013, nesting was not recorded anywhere south of Rancho Japá, only 20 km south of the international border. An average of 2.6 sites were occupied during the seven years of surveys, but only a single site was occupied in 2019.

Although the number of nesting birds seen during this interval varied widely from year to year, a steady decline is apparent (Figure 2), despite an increase in survey effort. One of the most populous colonies, Ciénega Redonda, was not even discovered until 2013. In 2019, only 150 nesting birds were observed, all at a single site. Linear regression implies that within the study period the number of nesting birds declined at a rate of 15.9 per year while the number of nesting birds per visit to colony sites declined at 0.6 birds/visit per year. Given the small number of points, these relationships are not statistically significant ($p > 0.05$), but the trend is clear. Numbers at nonbreeding sites have also fallen markedly since 2000 (Figure 3).

The aerial surveys gave us a better understanding of the region and revealed wetlands and potential foraging areas, but they disclosed no blackbirds, breeding or otherwise, not already known to us.

Phenology

Dates for observed nesting activity in Mexico ranged from late March (19 March 2019, singing on territory, Rancho Ciénega Redonda; 26 March 2000, singing on territory, and 27 March 2004, carrying nest material, Baja Country Club) to early July (7 July 2003, carrying food, and 14 July 2003, downy-headed young, Baja Country Club).

Land-Use Issues

Of the 14 nesting sites known to have been used since 1997, three have been in natural arroyos, ten have been in wetland vegetation associated with water impoundments, and one has been undocumented (Valle de Ojos Negros, exact location unknown). The suitability of the sites in natural arroyos (La Misión, San Telmo, El Rosario) changes dramatically from year to year in response to highly variable precipitation. They were last occupied in 2002, 1997, and 2013, respectively. All known Mexican nesting sites have been in emergent marshes except at Presa Abelardo Rodríguez, where the birds used flooded tamarisk (*Tamarix* sp.) in 2002 and possibly 2008 but not in 2016, when emergent marsh was available.

The habitats in which nesting Tricolored Blackbirds forage in Mexico have been poorly studied. We observed most birds to forage in grassland or grassland mosaics within a kilometer or two of nesting sites, but have also seen them foraging in active agricultural fields (e.g., pastures, alfalfa, row crops), dairies, and feedlots. Outside of the nesting season, Tricolored Blackbirds are most often seen in agricultural settings, especially around cattle. Throughout the year many birds have joined multi-species blackbird roosts in densely vegetated freshwater marshes.

Almost all sites of nesting and foraging are on private property, although technically all open water and wetlands in Mexico are under federal jurisdiction, with concessions to private landowners. Only the lands surrounding Presa Abelardo Rodríguez are public, under control of the city of Tijuana.

DISCUSSION

In Upper California, the Tricolored Blackbird has been intensively studied for decades, and efforts to document and monitor its status have been continuous since at least the 1960s (DeHaven et al. 1975, Meese 2015). Two thorough syntheses were recently produced in response to petitions to list the species under the United States Endangered Species Act (USFWS 2019) and the California Endangered Species Act (CESA) (Clipperton 2018). Much information is also available at https://tricolor.ice.ucdavis.edu/. Unitt (2004) thoroughly reviewed the status of the species in adjacent San Diego County, California. Far less work has been done in Baja California, with information gaps spanning decades, and only in the past 20 years have efforts to monitor the species become regular (Table 2).

The intensity and geographic scope of our monitoring efforts have varied greatly over the years because of the constraints of available time, weather, and funding and changes in access to private property. Similarly, we have incorporated the sporadic observations of many others who used widely different methods to survey and present their findings. The itinerant and episodic nesting behavior known in California (Hamilton 1998) would have further compromised our findings but has not been documented in Baja California. Neither has double or triple brooding been confirmed in Mexico, though known north of the border. However, most areas the Tricolored Blackbird occupies in Baja California are also frequented by naturalists, and the birds are generally conspicuous at nesting sites. Thus we are confident that the numbers we report here accurately reflect a contraction in the species' distribution and a steep decline in abundance.

Primarily on the basis of A. W. Anthony's report that the Tricolored Blackbird was "rather common along the northwest coast, breeding in all freshwater marshes" (Bryant 1889), we infer the population in Mexico in the late 1800s may have numbered on the order of 10,000 birds nesting at 100 sites. We have little knowledge of the extent of coastal wetlands at that time; however, many permanent and ephemeral wetlands, both coastal and inland, have been destroyed by agricultural and urban expansion since then (Rangel

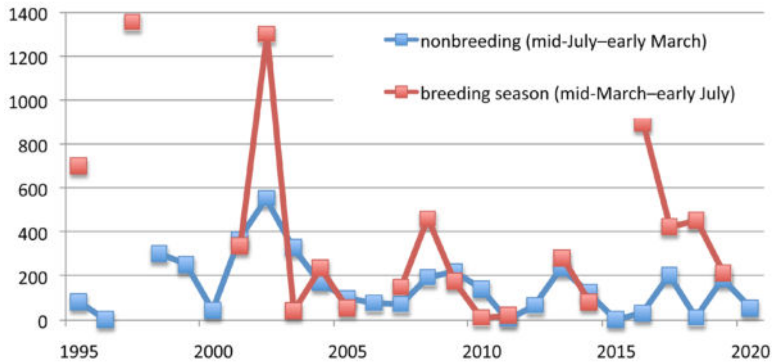

FIGURE 2. Annual number of Tricolored Blackbirds recorded in Baja California during the breeding season (mid-March–early July) and nonbreeding season (mid-July–early March), 1995–2020. The unevenness of data collection during this period must be emphasized. Many important areas (particularly Valle de Ojos Negros) were not visited annually, and several of the largest nesting colonies were not discovered until 2005 or later.

and Riemann 2015, Harper et al. 2020, pers. obs.). Cooper (1870) considered the Tricolored Blackbird "the most abundant species near San Diego" during his stay there from November 1861 to May 1862. As recently as the winter of 1979–1980, the Tricolored Blackbird was one of the nine most numerous species reported on Los Angeles County Christmas Bird Counts (Garrett 1980).

Baja California is more arid and may be more subject to variation in precipitation than southern California, so we believe the species was never abundant there. Although the livestock industry is not as widespread or as intensive in Baja California as it has been in California, we believe that the

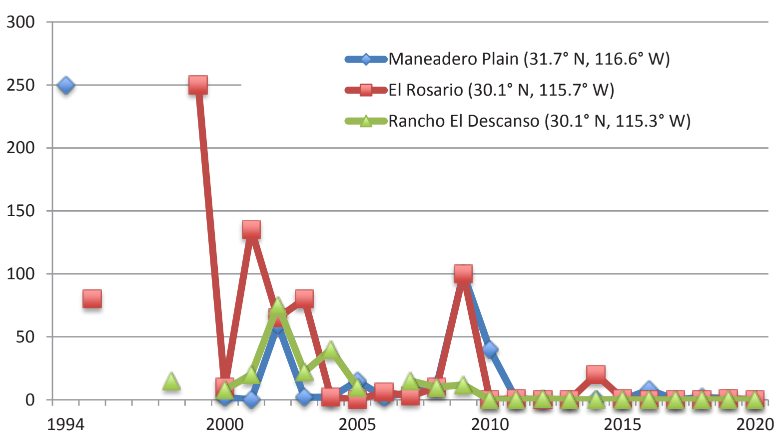

FIGURE 3. Maximum counts of the Tricolored Blackbird (during the nonbreeding season at three sites visited most years in northwestern Baja California, 2000–2020 (with selected earlier data).

initial addition of cattle to the landscape may have benefited the blackbird by promoting grasslands for grazing, providing more food in the form of grains fed to livestock, and creating more opportunities for breeding in response to the building of stock ponds and other water impoundments that provide both water and nesting vegetation. The vast majority of Tricolored Blackbird observations during our surveys were in direct association with agriculture, especially involving livestock.

The increase in the level of survey and monitoring effort since 1995 led to an apparent increase in the number of Tricolored Blackbirds in Baja California. This enhanced effort also led to an increase in the number of known colony locations: of the largest colonies observed since 2015, all were discovered this century. Likewise, the overall outline of the nesting range remained intact through 2013 (Erickson et al. 2018: 29), with nonbreeding individuals seen through 2019. Moreover, the records of widest dispersal ever are from 2012 (Rancho El Águila II) and 2016 (Mexicali Valley) [Appendix 2 (see https://archive. westernfieldornithologists/archive/V52/Erickson_ Appendices), Figure 1].

But the steep decline in the Tricolored Blackbird population in the core of its range in California has been well documented (Beedy et al. 2018, Clipperton 2018, Robinson et al. 2018, Goldfarb 2019, USFWS 2019) and led to the listing of the species as threatened under CESA in 2018. The status of the blackbird in southern California in particular has worsened dramatically this century, with most coastal and lowland areas now vacated entirely (Unitt 2004, Allen et al. 2016, Clipperton 2018). Unitt (2004), summarizing San Diego County atlas data for 1997–2001, listed seven nesting sites in the southern half of the county. Subsequent reports to https://ebird.org confirm nesting at only one of those sites, Jacumba, where the number of nesting birds has remained relatively stable since the 1970s. The largest south county colony during the atlas period (~1000 birds) was 4 km north of the international border at Campo, where by 2018 no trace remained of the marsh in which the blackbirds had nested (P. Unitt pers. comm.).

In a mark–recapture study from 2007 to 2016, Robinson et al. (2021) estimated a 51.7% annual decline in southern California and concluded "that a significant portion of the south population is lost due to emigration [to central California] each year." We infer the same or worse is true of Mexican birds. A loss of social cohesion and population collapse in this most gregarious species may be linked.

Because the Tricolored Blackbird is highly mobile and nomadic, consisting of multiple interconnected populations (Robinson et al. 2018), its status in Mexico appears to primarily reflect forces acting more broadly than a response to local conditions. However, persistent drought and temperature rise (Cavazos et al. 2020) have exacerbated the situation, especially as it affects groundwater (Del-Toro-Guerrero and Kretzschmar 2020), and further projected warming and drying (Moser et al. 2012, Cavazos et al. 2020) will only degrade conditions further. Considering this, Erickson et al. (2018: Table 2) found many more northward range contractions (44) and expansions (28) among the native birds of Baja California and southern California than southward contractions (3) and expansions (23).

Although the introduction of livestock may have originally benefited the

Tricolored Blackbird in Mexico, we have no reason to believe that the species was "one of the passerines best adapted to utilize the abundant supply of insects in agricultural lands" [as in] "the valleys of California during the breeding season" (Orians 1961). Now in Mexico, more "efficient" and industrial agricultural practices such as increased groundwater pumping, plastic lining of ponds to the exclusion of marshy vegetation, and the extensive conversion of open fields to greenhouse farming have greatly reduced the amount of potential habitat available for the species (pers. obs.). The continuing conversion of grazing land to vineyards is also harmful. The problems facing the Tricolored Blackbird are just the sort predicted by Stoleson et al. (2005) in discussing human population growth, habitat loss, and groundwater depletion in northern Mexico. We believe it is only a matter of time before the Tricolored Blackbird occurs in Mexico no more.

May 2021 Update

2021 nesting season: Successful nesting of approximately 250 adults underway in May at Rancho Ciénega Redonda (https://ebird.org/checklist/S88464198), but no other active colonies found. The good news of this increase over the 150 in 2019 is tempered by the blackbirds' failure to nest in 2021 at the closest colony to the north in California (Jacumba, where 300 birds nested in 2019), though 700 birds nested at the Rancho Jamul Ecological Reserve (Anita Hayworth pers. comm.), 14 km north of the international border.

Maximum winter count, 2020–2021: 50 in Valle de Ojos Negros 20 January 2021 (https://ebird.org/checklist/S79626512; see also Appendix 1).

RECOMMENDATIONS

Others have suggested to us that we be more positive about the blackbird's prospects and advocate more for the conservation of freshwater wetlands in Baja California. We fully support such conservation efforts, but this unique nomadic species is not the best for making that case. We believe scarce funding and resources are better directed to other less mobile wetland species, some of which are endemic to the region, such as fairy shrimp (Anostraca), the western spadefoot (*Spea hammondii*), and California vole (*Microtus californicus*). Nevertheless, should conservation measures for the blackbird in Mexico be pursued, we offer these recommendations, without regard to funding, all for northern and high-elevation sites, prioritized as follows.

1. Valle de Ojos Negros has long been the most important location for the Tricolored Blackbird in Mexico, but opportunities for nesting have been limited in recent decades. It is quick and relatively easy to establish emergent marsh vegetation suitable for nesting blackbirds, so efforts to secure multiple impoundments for this purpose are our primary recommendation. Impoundments need not be dedicated for this purpose permanently, so long as there are multiple impoundments, or locations for impoundments, available to provide marsh somewhere every year. To the extent practicable, impoundments should be located near existing dairies or other cattle operations. The swale at Rancho La Campana, often overrun with cattle, would be a great place to start. This process should be codified in some fashion. The maintenance of food resources is also critical and must not be neglected in local land-use planning.

2. In the high country near the California border, the marsh at Ciénega Redonda supported some of the largest blackbird colonies in the 2010s, but the marsh was almost entirely cleared prior to the 2019 season and no nesting occurred that year. Not coincidentally, the valley to the east (formerly used by foraging blackbirds) was also cleared and graded for a planned subdivision. Allowing the marsh to reestablish itself and thereafter protecting and managing it would benefit the blackbird. In addition, foraging areas nearby need to be identified and protected.

3. Close to Ciénega Redonda is Rancho Ciénega Redonda, a private recreation area also home to many nesting blackbirds in the 2010s. The current owners are sympathetic to the blackbird—although partial clearing of the marsh was underway in November 2020—so their continued support should be secured and management for the marsh should be recommended. Foraging areas may be shared with blackbirds from Ciénega Redonda.

4. Another high-elevation site that has been important for nesting blackbirds is Rancho Japá. It is currently in wild country with abundant opportunities for nesting and foraging, but the owners have not been cooperative. Protecting habitat there for the long term should be a high priority.

5. Presa Abelardo Rodríguez has provided nesting sites for blackbirds on occasion since at least 2002, but varying water levels have made suitable conditions fleeting. Although the reservoir is located in an increasingly urban and industrial setting on the outskirts of Tijuana, sufficient foraging areas may continue to be available within the reservoir basin itself, especially with restoration. Establishment, protection, and management of marsh at the reservoir could also provide nesting habitat for several other species of conservation concern such as the Least Bittern (*Ixobrychus exilis*), White-faced Ibis (*Plegadis chihi*), and Clark's Marsh Wren (*Cistothorus palustris clarkae*) (N. Am. Birds 70:392), whether or not blackbirds colonize. It should be noted, however, that the reservoir is situated at a relatively low elevation, something that may not bode well for the Tricolored Blackbird in the long run.

6. Nesting in the pond at Ejido José María Pino Suárez (also known as Tres Pozos) has been documented only once (2005), but the area has been visited rarely. Conditions at this high-elevation site appear good for the Tricolored Blackbird, and 12 birds were observed there in 2019. Maintenance of the marsh's suitability for nesting blackbirds and nearby areas for foraging blackbirds would be beneficial.

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YELLOW-BILLED MAGPIE POPULATION STATUS AND HABITAT CHARACTERISTICS IN URBAN SACRAMENTO, CALIFORNIA

DANIEL A. AIROLA, Conservation Research and Planning, 114 Merritt Way, Sacramento, California 95864; d.airola@sbcglobal.net

LILY A. DOUGLAS, Central Valley Joint Venture, 2800 Cottage Way, W-1916, Sacramento, California 95825

LAYLA AIROLA, 114 Merritt Way, Sacramento, California 95864

ABSTRACT: Most research on the ecology of the Yellow-billed Magpie (*Pica nuttalli*) has been focused in oak woodlands and savannas in California's Coast Ranges; urban and suburban populations, some of which are sizable, have received little attention. In 2020, we studied eight colonies in six parks around Sacramento and in 2021 expanded the survey to 43 sites, detecting 827 breeding magpies. Population estimates based on nest counts were generally higher than those from direct counts, and nest counts were more repeatable and efficient. Counts of recently fledged young in family groups yielded reproductive rates similar to those observed near the coast before arrival of West Nile virus in 2003, suggesting that the virus is not currently affecting nestlings' survival. Sacramento magpies nested in the upper canopy of a wide variety of large trees, both native and non-native. They foraged preferentially in low herbaceous habitat—irrigated turf and unirrigated annual grassland that was mowed or grazed. The presence of rivers and streams influenced occupancy strongly. Colony size was strongly related to the amount of low herbaceous foraging habitat within 0.5 km of colony sites with nearby flowing water. Our results suggest that at least 4 ha of low herbaceous foraging habitat is needed to support a small nesting colony. Retention of herbaceous habitat near large trees and flowing water, plus mowing or grazing to keep herbaceous growth low, should benefit urban Yellow-billed Magpies.

The Yellow-billed Magpie (*Pica nuttalli*) is a California endemic whose range is limited to the Central Valley and Central Coast regions (Koenig and Reynolds 2009). Following the arrival of West Nile virus in California in early 2003 (Reisen et al. 2004), mortality of Yellow-billed Magpies was extensive (Ernest et al. 2010), and the population declined substantially (Airola et. al. 2007, Koenig et al. 2007, Crosbie et al. 2008, Smallwood and Nakamoto 2009). Unlike other species affected by the West Nile virus, magpies apparently have not developed immunity to the disease, and population decline continues (Pandolfino 2013, 2018, 2020) as West Nile virus persists in the Sacramento region (Snyder et al. 2020). Because of its limited range, the species is also considered highly vulnerable to climate change (https://www.audubon.org/field-guide/bird/yellow-billed-magpie).

The most recent assessment of the Yellow-billed Magpie's population, based on surveys in 2007 and 2008, yielded an estimate of "396,399" (95% confidence interval [CI] 319,891–491,206; Crosbie et al. 2014). An evaluation of numbers reported on Christmas Bird Counts (CBCs) in the Central Valley has shown substantial subsequent decline through 2019 (Pandolfino 2020). The magpie is recognized as a species of conservation concern by the U.S. Fish and Wildlife Service (https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php) and is on the North American Bird Conservation Initiative's (2014) watch list as a species with limited range or significant threats.

 Western Birds 52:222–239, 2021; doi 10.21199/WB52.3.3

The Yellow-billed Magpie occupies primarily oak woodlands and savanna (Koenig and Reynolds 2009). The range-wide survey found that nearly all of the population occurred in lands characterized as rural (62%) or agricultural (37%), while only 1% (5347, 95% CI 2962–9652) occurred in urban areas (Crosbie et al. 2014). Population decline in many areas in the mid-1900s was attributed to deliberate poisoning (Lyndell 1962, Koenig and Reynolds 1987), more recently to urbanization, although the species has persisted in some urban areas (Koenig and Reynolds 2009). In particular, Koenig and Reynolds (2009) considered the persistence of rather large (though unquantified) breeding populations in the Sacramento–Davis metropolitan region in Sacramento and Yolo counties anomalous.

Nearly all recent ecological research on the Yellow-billed Magpie has taken place at or near the Hastings Reservation, a University of California Natural Reserve with oak woodland, oak savanna, and grasslands in the Carmel Valley, Monterey County, in the Central Coast region of California (Verbeek 1972, 1973, Reynolds 1990, Bolen 1999, Bolen et al. 2000, Koenig and Reynolds 2009). Other than the statewide or regional population surveys (Smallwood and Nakamoto 2009, Crosbie et al. 2014), research on magpies in the Central Valley and in urban and suburban areas has been limited to characterizing a few winter roosting sites and population trends at those roosts (Crosbie et al. 2006). Given the species' decline, the Central Valley's continuing urbanization (Teitz et al. 2005), and uncertainty regarding the factors that allow persistence in these areas, more research is needed on the Yellow-billed Magpie's population status and basic natural history in urban and suburban areas (Koenig and Reynolds 2009).

The Yellow-billed Magpie has several characteristics that facilitate ecological research: it is large, boldly colored, noisy, builds large nests, feeds in open areas, and is nonmigratory. Several aspects of its natural history, however, inhibit study. Magpies occur in groups that are often widely dispersed, which can make it difficult to locate flocks to estimate population sizes. They place their spherical stick nests mainly in tall, inaccessible trees, which inhibits assessing reproductive success. Also, the tendency of fledged young to gather in multi-brood creches shortly after fledging and the lack of a distinctive juvenile plumage make it difficult to assess a pair's productivity (Koenig and Reynolds 2009).

Efforts to assess the size and trend of Yellow-billed Magpie populations have included a generalized formulaic estimate (Rich et al. 2004), short-term highly intensive sampling (Crosbie et al. 2014), and analyses based on results of the Breeding Bird Survey (Koenig et al. 2007) and Christmas Bird Count (Airola et al. 2007, Crosbie et al. 2008, Pandolfino 2013, 2020). The species' decline has led to recommendations for additional population monitoring and studies of genetic diversity, population structure, and population viability (Koenig and Reynolds 2009).

We initiated this study to acquire information on the population size and habitat use of a Yellow-billed Magpie population in metropolitan Sacramento. Our objectives were to evaluate the abundance of the species at important sites in Sacramento, quantify nests' productivity, identify nest characteristics and foraging habitats, and evaluate the relationship between the extent of foraging habitats and the size of breeding colonies. We use the term *urban* to refer to areas of metropolitan Sacramento that are dominated not only by dense commercial and residential development but also areas of low-density residential housing that include smaller enclaves of parks and recreation areas, schools, and vacant land.

STUDY AREA

2020 Study Areas

In 2020, we used our knowledge of the regional avifauna and https://ebird.org to locate areas with high numbers of Yellow-billed Magpies in the Sacramento region. On the basis of numbers reported from January 2017 to January 2020 at 50 eBird "hotspots," areas accessible to the public and frequently visited by birders, we selected for study the five hotspots where high counts exceeded 30 magpies, each in or near a park or recreation area (Figure 1): Discovery Park and Del Paso Regional Park within the city of Sacramento, and Ancil Hoffman Park, William B. Pond Recreation Area, and Oak Meadow Park within unincorporated areas of Sacramento County. We recorded one colony within each park, except Del Paso Regional Park supported three, each >0.5 km from the others: Horsemen's Club (located west of Watt Avenue), Renfree Field and nearby park areas, and Park Road East (encompassing the eastern portion of Del Paso Regional Park and an adjacent rural residential area). In addition, we also counted nests at Phoenix Park in Sacramento County.

All colonies surveyed in 2020 supported large trees and extensive areas of managed turf or unirrigated annual grassland that was mostly mowed, but some was grazed or unmowed. Major canopy trees included the native valley oak (*Quercus lobata*) and non-native London plane (*Platanus ×acerifolia*), among many others, both native and non-native. All sites were adjacent to or within 0.5 km of creeks or rivers, including Arcade Creek (Del Paso Regional Park sites), the Sacramento and American rivers (Discovery Park), and American River (all other sites). Much of the land surrounding the colonies consisted of residential or commercial development.

2021 Study Areas

In 2021, we repeated surveys of the eight 2020 colony sites and initiated surveys of 35 other areas, selected after analysis of the previous year's results showed the importance of tall trees, low herbaceous vegetation, and water within 0.5 km of a colony (Figure 1, Table 1). The additional sites were centered mostly around urban parks with tall trees and irrigated turf, mowed levees, and other vacant areas supporting herbaceous vegetation that was maintained at a height <15 cm. The extent of such foraging habitat ranged from 1.5 to 20 ha.

METHODS

In 2020, we surveyed the eight colonies, quantified habitat use, and developed a model to predict the colonies' size on the basis of habitat conditions. In 2021, with results from the 35 additional sites, we refined the model and evaluated the extent of herbaceous vegetation as well as the influence of water bodies on the magpie's abundance.

Population Estimates

To control for potential differences among observers, D. Airola conducted all magpie and nest surveys. Beginning in mid-December 2019, before nesting, we counted magpies when they were flocked together and highly visible, with a minimum of four counts per site through early April 2020. We also counted the magpie's large, domed stick nests during one or more visits from 21 February to 28 March 2020, before deciduous foliage emerged and reduced the nests' detectability.

In 2021, during the nest-building period but before deciduous trees leafed out (15 February–22 March), D. Airola counted magpies and nests at the 8 previously surveyed sites (including Phoenix Park where we counted nests but not birds in 2020) and 35 new sites.

Magpie nests may persist for several years (Verbeek 1973, pers. obs.), but the domed portion generally degrades after the nesting season. Therefore, we identified nests as occupied only if they were domed or if adults were seen building the nest or attending within 10 m of the nest. Throughout the season, nests in dense-foliaged evergreen trees were more difficult to detect and may have been under-represented in our surveys. To estimate the nesting population, we multiplied the number of occupied nests by 2, as magpies are monogamous (Koenig and Reynolds 2009).

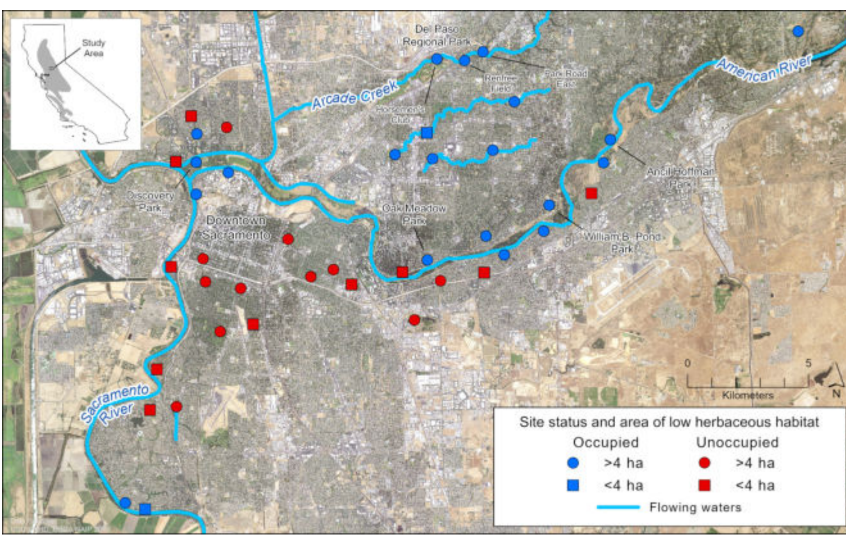

FIGURE 1. Sites in the Sacramento metropolitan area surveyed for Yellow-billed Magpies in 2020 and 2021, showing occupied and unoccupied sites in relation to sources of flowing water and extent of low herbaceous habitat for foraging. Inset map shows the species' geographic range (source: https://apps.wildlife.ca.gov/bios/?al=ds94).

Table 1 Critical Habitat Characteristics and Numbers of Yellow-billed Magpies Recorded at Sites Surveyed around Sacramento in 2020 and 2021

Water condition[a] and survey site	Survey years	Area of low herbaceous habitat (ha)	Population from nest counts[b]
Flowing			
Discovery Park	2020–21	20.0	173
William B. Pond Recreation Area	2020–21	17.1	30
Howe–Santa Ana Parks	2021	14.8	86
Hagan Community Park	2021	12.8	28
East Park Rd.	2020–21	11.8	86
Township Station 9	2021	11.2	26
El Camino HS–Del Paso Manor Park	2021	10.4	50
River Walk/Matsui Park	2021	9.9	58
Renfree Field	2020–21	9.8	39
Larchmont Park	2021	8.0	52
Oak Meadow Park	2020–21	7.5	19
Ancil Hoffman Park	2020–21	7.5	25
Mission North Park	2021	7.4	22
Horsemen's Club	2020–21	7.2	12
Garcia Bend Park	2021	6.0	12
Cottage Park and neighborhood	2021	4.8	46
Riviera East Park	2021	4.4	6
Seymour Park	2021	4.0	0
Miller Park	2021	3.9	0
Shore Park	2021	3.7	10
Tretheway Oak Preserve	2021	3.3	0
Creekside Park	2021	2.5	2
University Park	2021	1.5	0
Lake/pond			
Phoenix Park	2020–21	14.0	23
William Land Park	2021	10.4	0
Granite Park	2021	8.4	0
McKinley Park	2021	6.6	0
Southside Park	2021	5.4	0
Reichmuth Park	2021	4.5	0
No perennial water			
Sacramento City Cemetery	2021	22.1	0
East Lawn Cemetery	2021	12.2	0
Jefferson Elementary School	2021	2.7	0
Bannon Slough/S. Natomas Community Park	2021	7.8	14
Northgate Park	2021	7.1	0
Glenbrook Park	2021	5.9	0
Ashton Park/Estates Dr.	2021	5.2	8
St. Joseph's Catholic Cemetery	2021	5.2	0
East Portal Park/Kit Carson School	2021	4.8	0
William Curtis Park	2021	3.2	0
Taylor Park	2021	3.0	0
Bahnfleth Park	2021	2.6	0
Phoebe Hearst/St. Francis Schools	2021	2.5	0
Isador Cohen School	2021	2.0	0
Total			827

[a]Within 0.5 km of site.
[b]For sites surveyed in both 2020 and 2021, the number is the average of the two years.

We compared the average and maximum numbers of magpies estimated from bird counts and nest counts at each colony in 2020. That year, we selected the highest number from either direct counts or nest counts as the basis for a population estimate. After the surveys in 2021, we used population numbers derived from nest counts in both years in creating the habitat–population model. To assess evidence for short-term population changes, we compared estimates from the eight sites surveyed in both years.

Nesting Productivity

Because of the nests' heights, screening foliage, and domes, we could not observe eggs or chicks directly. Therefore, we quantified productivity in 2020 by counting the number of young in family groups that included recent fledglings. This assessment, conducted by D. Airola, was confined to 20–27 May when recent fledglings could be readily identified by their shorter tails and higher-pitched begging calls but before multi-family creches formed (Koenig and Reynolds 2009, D. Airola pers. obs.). We considered counts complete where we were able to locate both adults and were confident of having detected all young in the group visually or aurally.

Nest Locations, Sites, and Characteristics

We characterized the general location of each nest as a park, golf course, school ground, urban residential area (>2 dwelling units per ha), or rural residential area (≤2 dwelling units per ha with livestock present). We characterized water bodies within 0.5 km of each colony's centroid as flowing water (permanent streams or rivers) or lakes/ponds (still waters ≥0.1 ha in size).

For nests discovered in 2020, we identified the species of tree or other supporting substrate and measured the diameter at breast height (dbh) of a sample of those trees that we could access, mainly on public lands. We described the composition of two nests that fell to the ground during the early (pre-laying) nesting season in 2020. We counted the larger sticks (>0.5 cm diameter) constituting the exterior portion of these nests and estimated the total mass of sticks by weighing a sample of nest sticks and multiplying the average mass per stick by the number of sticks in each nest. We dried and weighed the central mud portion of the nests. We calculated the number of individual billfuls of mud ("dabs") used in nest construction by selecting and weighing a sample of 20 individual dabs, then dividing the total mass of mud by this average mass of an individual dab. We visually inspected and described the inner nest component.

Use of Foraging Habitat

We classified and mapped eight land-cover types within and near the colonies surveyed in 2020 according to the definitions in Table 2. From mid-December 2019 through mid-April 2020, we recorded the numbers of magpies foraging within each land-cover type within each study area. We used the chi-squared statistic (χ^2) to compare the use (i.e., number of magpies observed foraging within each cover types) to the number expected number if use of each cover type were proportional to its extent within 0.5 km of the centroid point of nests within each colony. Cover types where magpie

Table 2 Land-Cover Types Characterizing Locations of Foraging Yellow-billed Magpies around Colonies in the Sacramento Region

Land-cover type	Description
Irrigated turf	Irrigated lawns generally >0.25 ha in size, primarily in parks and schools
Mowed or grazed annual grassland	Unirrigated annual grassland mowed or grazed to a height <15 cm throughout the winter and spring
Unmanaged annual grassland	Unirrigated annual grasslands and fallow areas that were not mowed or grazed with vegetation generally ≥15 cm height
Golf course	Irrigated golf course
Pavement	Asphalt-covered areas generally >0.75 ha (most roads were included within the Residential land cover type)
Residential	Residential neighborhoods (including yards and roads) and adjacent commercial areas (office parks, etc.)
Woodland	Riparian and oak woodland >1 ha in size with >20% canopy cover
Water	Rivers and ponds

use significantly exceeded values ($p < 0.05$) expected from availability were considered *selected*, whereas those where magpie use was significantly less than the expected values were considered *avoided*.

Relationship between Types of Foraging Habitat and Colony Sizes

In 2020, we quantified the area of the eight land-cover types within three increments of distance (0.5 km, 1.0 km, and 1.5 km) around each colony's centroid with ArcGIS Pro 2.5.2 (ESRI, Redlands, CA). On the basis of locations of observed foraging, we hypothesized these distances as defining circles within which most foraging of the colony's magpies may occur.

We used Microsoft Excel to calculate correlation coefficients (r) between the area within the three distance classes of various land-cover types (and combinations of types) that could be used for foraging and the population estimates for each site surveyed in 2020. The land-cover groups with the strongest correlations to populations (irrigated turf and mowed and grazed annual grassland combined; see Results) were then analyzed by regression (https://www.graphpad.com/quickcalcs/linear2/) to predict the population at a site from the extents of these two cover types (collectively "low herbaceous habitat") across the three distance classes.

The results of the 2021 survey suggested a role of the availability and type of water in determining the magpie's occurrence and abundance. Therefore, we modeled the relationships among these water and habitat variables with linear multiple regression. The number of breeding Yellow-billed Magpies was our response variable, and the extent (hectares) of low herbaceous habitat and type of water source (flowing, standing, or none) within 0.5 km of the centroid of the colony's nests were included additively as the predictor variables. We followed this with a similar analysis restricted to the 23 sites with flowing water within 0.5 km in order to estimate the minimum amount of habitat required to support a small magpie colony (defined as 3 pairs because >90% of colonies consisted of >3 nesting pairs). For sites surveyed in both 2020 and 2021, we used the average population size in these models.

We modeled these relationships in R (R Core Team 2021) and considered results to be biologically meaningful at $\alpha = 0.05$.

RESULTS

Comparison of Population Estimates from Counts of Birds and Counts of Nests

In 2020, on the basis of counts of adults and nests, the number of nesting magpies at the seven colonies surveyed ranged from 10 to 174 individuals (Table 3). At four of the seven colonies the population according to nest counts was higher than the maximum number of birds observed during any count of that colony. For all sites combined, the total population estimated from the number of nests exceeded the total from high counts of birds by 51% (384 versus 250; Table 3).

Occupancy Determinants and Populations at 2021 Survey Sites

In 2021, we observed nesting magpies at 22 of the 43 sites surveyed (Table 1), including the seven colonies fully surveyed in 2020 plus Phoenix Park where we counted nests only. On the basis of nest counts (including averages of counts in both years at eight sites), the population at occupied sites ranged from 2 to 187 individuals (median = 26 individuals) and totaled 827 individuals. All sites included ≥0.5 ha of low herbaceous habitat (irrigated turf at most areas) and trees >15 m tall within 0.5 km of the colony's centroid (Table 1). Nineteen (83%) of the 23 sites with flowing water within 0.5 km supported nesting magpies, including all 17 sites with >4 ha of herbaceous habitat. In contrast, only one of six (17%) sites with natural ponds or vernal pools but no flowing water was occupied, and only two (14%) of 14 sites that lacked permanent water were occupied. The distribution of occurrence among sites with flowing water, standing water, and no water differed significantly from the values expected if occupancy of each category were proportional to its representation in the sample ($\chi^2_{4\text{d.f.}} = 20.66$, $p < 0.001$).

Table 3 Counts of Adults and Nests and Estimated Population of the Yellow-billed Magpie at Colonies in Urban Sacramento Surveyed in 2020

	Counts of adults				Counts of nests		
Colony location	*n*[a]	Mean	SD	High count	Nests	Estimated population	Highest population estimate[b]
Park Road East	10	20	9.6	40	43	86	86
Renfree Field	14	24	16.3	57	18	36	57
Horsemen's Club	4	3	2.6	5	5	10	10
Discovery Park	6	48	9.3	56	87	174	174
Oak Meadow Park	15	14	5.4	24	11	22	24
William B. Pond Park	11	17	14.9	49	13	26	49
Ancil Hoffman Park	5	13	5.0	19	15	30	30
Total	65	139		250	192	384	430

[a]Number of surveys.

[b]Highest number derived from either counts of adults or numbers of nests.

Changes in the populations estimated at the eight sites where we counted nests in 2020 and 2021 ranged from a 33% decline to a 40% increase. The overall population across these eight sites, however, remained essentially unchanged (404 in 2020 and 406 in 2021).

Productivity of Successful Nests

In 2020, we observed 28 family groups with recent fledglings at six colonies surveyed for reproduction. These successful pairs were accompanied by an average of 2.8 young (SD ±0.9, range 1–4). All family groups except two contained at least two young.

Nest Locations, Sites, and Characteristics

At the 22 colonies occupied in 2020 and 2021, we found 618 nests. Most (65%) were within parks. Dense residential and rural residential areas supported 25% and 7% of nests, respectively. Only two colonies, Park Road East and Ashton Park–Estates Drive, had areas grazed by livestock within 0.5 km of a colony. Only seven nests (1%) were at schools, but six (27%) of the 22 sites with nesting colonies had a school within 0.5 km. At the two study sites with a golf course within 0.5 km of a colony, we did not find any nests on the courses.

The vast majority (97.5%) of the nests we found were in trees, with the others in light standards at an abandoned baseball field (2.0%) or on cellphone towers (0.5%). The 168 nests for which we identified the supporting tree in 2020 included 16 species, with nearly half each located in native (52%) and non-native species (48%). A large majority (89%) of these nests were in deciduous trees. Valley oak was the predominant native tree with nests (31%); fewer nests were in native western sycamore (*Platanus racemosa*, 9%), interior live oak (*Quercus wislizenii*, 6%), or Fremont cottonwood (*Populus fremontii*, 4%), and <1% each were in Oregon ash (*Fraxinus latifolia*), white alder (*Alnus rhombifolia*), and blue oak (*Q. douglasii*).

The London plane was the predominant non-native nest tree, supporting 35% of all tree nests. Most nests in London plane trees were at Discovery Park, site of the largest colony surveyed (Table 1). Forty-nine (83%) of the 59 nest trees identified to species at this site were London planes. A few nests were found in a wide variety of other trees not native to Sacramento, including coast redwood (*Sequoia sempervirens*, 3%), sweetgum (*Liquidambar styraciflua*, 2%), and <2% each in red oak (*Q. rubra*), white mulberry (*Morus alba*), Modesto ash (*Fraxinus velutina*), and Chinese elm (*Ulmus parvifolia*). We found 14 nests (2%) associated with oak mistletoe (*Phoradendron villosum*) or broadleaf mistletoe (*P. macrophyllum*). Most nests in mistletoe were in large Fremont cottonwoods along the Sacramento River.

Nests were placed near the tops of large trees at each colony. The 102 nest trees that we measured averaged 80 cm in dbh (SD ±32 cm, range 28–234 cm). The largest trees used for nesting were Fremont cottonwoods (dbh 81–234 cm; n = 5) and coast redwoods (dbh 81–117; n = 4). Most nest trees (83%) contained a single magpie nest; 13% supported two nests, 3% had three nests, and 2% had four nests. We did not measure nest heights but estimated most nests to be at 15–25 m above ground.

Of the three nests found fallen from trees, one, at Park Road East in Del Paso Regional Park, fell when its supporting valley oak toppled after a flood.

Table 4 Composition and Mass of Two Fallen Yellow-billed Magpie Nests Recovered at Sacramento Colonies

Location	Outer stick layer: No. sticks	Outer stick layer: Mass (kg)	Central mud layer: No. mud dabs	Central mud layer: Mass (kg)	Inner nest mass (kg)	Total nest mass (kg)
Park Rd. East	920	5.7	302	1.9	0.6	8.2
Discovery Park	661	4.1	221	1.4	0.7	6.2

A second nest fell from a London plane in Discovery Park, and the third (not collected or described) fell from a coast redwood in a residential area near Oak Meadow Park. The outer part of the two nests analyzed was constructed of sticks up to about 60 cm in length and 2 cm in diameter, weighing an average of 4.9 kg (Table 4). The central mud portion of the nests weighed an average of 1.7 kg and contained an average of 262 individually transported mud dabs. The inner portion of the nests was composed of many smaller plant stems and fibers that became progressively finer from the exterior to the interior and weighed an average of 0.64 kg. The total mass of the two nests averaged 7.2 kg.

Foraging Habitat Use

Over 80% of the 730 observations of foraging Yellow-billed Magpies we recorded during 2020 were in low herbaceous vegetation (encompassing irrigated turf and mowed or grazed grassland; Figure 2). Over half were in large (>2 ha) expanses of irrigated turf areas in parks, while 30% were in mowed or grazed annual grassland. Turf and grazed or mowed grassland were used at levels significantly greater than expected from their relative availabilities within 0.5 km of the colony ($\chi^2_{1 d.f.}$ = 1418 and 692, respectively, $p < 0.001$). Foraging on turf, especially in the winter, was mainly in areas where fallen deciduous leaves were not regularly removed. There, magpies often flipped over leaves, presumably to locate invertebrates or seeds. Unmowed and ungrazed grasslands, which were used in proportion to their availability ($\chi^2_{1 d.f.}$ = 0.05, $p = 0.82$; Figure 2), were used almost entirely in the early spring growing season when the grass was <15 cm tall. Areas of residential or commercial development and pavement were strongly avoided for foraging, relative to their availability ($\chi^2_{1 d.f.} = 198$, $p < 0.001$ and $\chi^2_{1 d.f.} = 11$, $p < 0.001$, respectively; Figure 2). At the two sites with golf courses (Ancil Hoffman and Horsemen's Club), we observed only two instances of magpies using them. No foraging was observed in the other land-cover types.

Relationship between Foraging Habitat and Colony Size

Amounts of certain land-cover types were associated strongly with the numbers of breeding magpies. Among the colonies surveyed in 2020 (all of which had flowing water), the strongest correlation was with the extent of low herbaceous cover (irrigated turf and grazed-mowed grassland combined) within 0.5 km of the colony's centroid ($r = 0.83$). The relationship between population (y) and the area of low herbaceous cover (x) within 0.5 km was statistically significant ($F_{1, 5} = 11.1$, $p = 0.021$). The relationship was weaker and not statistically significant when the radius was increased to 1.0 km (r =

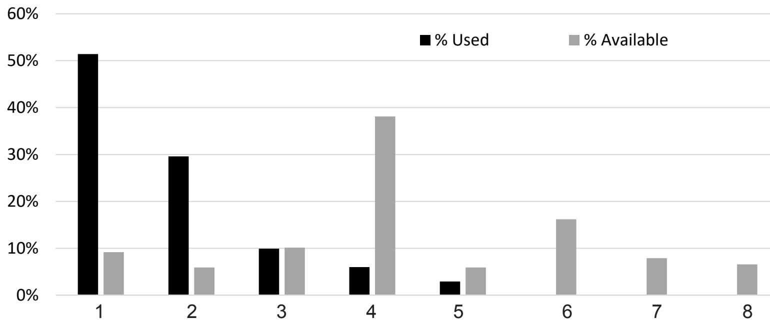

FIGURE 2. Proportions of land-cover types used by and available to foraging Yellow-billed Magpies in urban Sacramento, California, 2020, as measured within 0.5 km of nesting colonies. 1, irrigated turf; 2, mowed/grazed annual grassland; 3, unmanaged grassland; 4, residential; 5, pavement; 6, woodland; 7, golf course; 8, water.

0.34; $F_{1,5} = 0.52$, $p = 0.52$) and 1.5 km ($r = 0.69$; $F_{1,5} = 4.64$, $p = 0.084$). This result is consistent with our unquantified observations that during the nesting season most foraging was near the nest.

The multivariate model including the 2021 results from all 43 survey sites that predicts the number of breeding Yellow-billed Magpies from the extent of low herbaceous habitat and type of water within 0.5 km of a colony was biologically meaningful ($R^2 = 0.47$, $F_{3,39} = 13.36$, $p < 0.001$). The regression equation describing this relationship is $y = 4.07 + 3.63$(hectares low herbaceous cover) – 25.66(water type: none) – 27.92(water type: lake/pond), where the value of the water-type variables is 1 for present and 0 for absent. For instance, this model predicts that an expanse of low herbaceous habitat of 15 ha within 0.5 km of a lake or pond should support 31 magpies (i.e., 4.07 + [3.63 × 15] – 27.92) whereas 15 ha within 0.5 km of flowing water should support 58 magpies (4.07 + [3.63 × 15]). Thus the greatest numbers of magpies were found at sites with large expanses of low herbaceous habitat near flowing water (Figure 3). At sites with flowing water, there was a strong relationship between the amount of low herbaceous habitat within 0.5 km of a colony's centroid and size of the population ($R^2 = 0.60$, $F_{1,21} = 34.45$, $p < 0.001$; Figure 3). The regression equation describing this relationship is $y = 6.51x - 19.66$, implying that 3.3 ha of low herbaceous habitat is needed to support a single breeding pair of magpies, and 3.9 ha to support a minimal-sized colony of three pairs.

DISCUSSION

Population Status

Our 2021 estimated population of 827 Yellow-billed Magpies at the 22 identified nesting colonies in the metropolitan Sacramento area is approximately 23% of the 5300 individuals that Crosbie et al. (2014) estimated within urban habitats rangewide in 2007 and 2008. Since then, however, the population has declined by one-third because of West Nile virus infection (Pandolfino 2020). If this rate of decline also applied to urban populations, our 2021 estimate

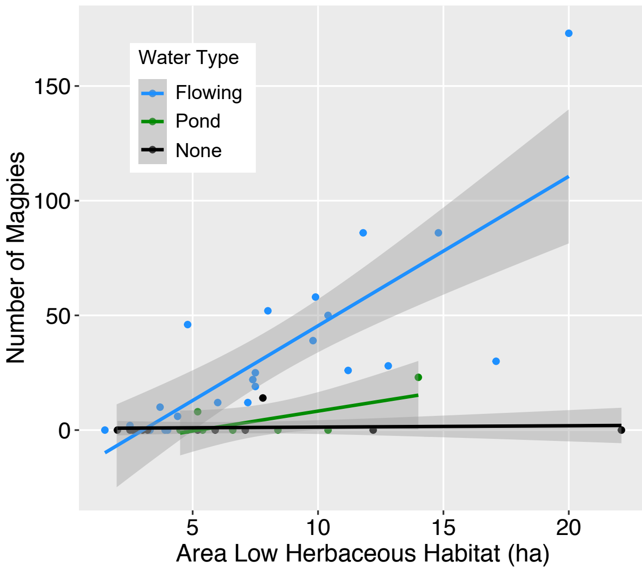

FIGURE 3. Relationship between the number of breeding Yellow-billed Magpies in a colony (estimated from counts of nests; see Methods) and extent of low herbaceous cover (irrigated turf and mowed or grazed annual grassland) and water source within 0.5 km of the colony's centroid in urban Sacramento, California, 2021. Results from 43 sites (Table 1) are colored by type of water source within 0.5 km, and solid lines depict least-squares regressions for each water type; gray shading reflects the 95% confidence interval on the regressions.

confirms the persistence of a relatively high population in the Sacramento region, as first noted over a decade ago by Koenig and Reynolds (2009).

Absence of past data from surveys using consistent methods precludes a robust characterization of changes in the Sacramento region's Yellow-billed Magpie population since arrival of West Nile virus. Observations recorded at eBird are largely limited to years after 2006 (https://ebird.org/news/ebird-2018-year-in-review), concurrent with the arrival of the West Nile virus (Reisen et al. 2004). This leaves Christmas Bird Count (CBC) data as the only consistent data source for assessing long-term population trends since the virus's arrival (Airola et al. 2007, Crosbie et al. 2008, Pandolfino 2020). On the basis CBC data from the three count circles closest to our study areas (Sacramento, Folsom, and Rio Cosumnes), within two years of the arrival of West Nile virus the magpie population (as quantified by birds/party-hour) had declined by about 40%, and by 2019 it had cumulatively declined by >80% in the local area and surrounding Central Valley (https://netapp.audubon.org/cbcobservation/, Airola et al. 2007, Pandolfino 2020).

The lack of a decline in the magpie population according to nest counts at the eight sites we surveyed in both 2020 and 2021 offers only modest encouragement regarding the effects of West Nile virus. Most of the regional population's decline took place soon after the virus's arrival; subsequently the population has fluctuated but not recovered (Pandolfino 2020). Our 2020 and 2021 population estimates (Table 1) provide a baseline for consistent and repeatable future monitoring.

Population Assessment Methods

The disparity between our population estimates based on maximum counts of birds and those based on counts of occupied nests indicates the challenges inherent in surveys for the Yellow-billed Magpie. Our observations and those of Birkhead et al. (1992) confirm that magpies congregate before the nesting season and are comparatively dispersed while nesting. Their congregating complicates surveys, as the groups may move over large areas and thus may be difficult to detect. Winter congregations may include birds from multiple nearby colonies (Koenig and Reynolds 2009), which complicates attribution of numbers observed to any specific colony.

Counts of nests as a basis for estimating populations appears to be more effective than direct counts of birds, but this method also poses challenges. We observed nest-building from 15 January through 29 March. Early in this period, however, before the dome is added to a nest, it can be challenging to distinguish nests that are under construction from nests left over from previous years (Verbeek 1973). Leafing out of deciduous trees, which begins in late March or early April, obstructs visibility and can lead to incomplete nest counts. Within this period, nests are easily visible from long distances because of their large size and placement at the tops of tall trees, allowing an efficient and accurate count of nesting birds. For these reasons, in the more extensive 2021 surveys, we relied on nest counts from late January though late March as the basis for estimating populations, and we recommend it generally. Notably, however, this technique does not count non-nesting birds, which may include some portion of the one-year-old and two-year-old cohorts (Verbeek 1973, Koenig and Reynolds 2009).

Productivity of Successful Nests

Our estimate of productivity provides a general indication of success but is not a true measure of the population's productivity (i.e., the number of young fledged per nesting pair; Steenhof and Newton 2007) because it does not account for pairs whose nests failed. Lack of data on productivity prior to the arrival of West Nile virus in Sacramento precluded us from determining if the virus has affected reproduction. Our productivity rate of 2.8 young per successful nest, however, is consistent with studies in the Coast Range that found most successful nests produced 2 or 3 fledglings (Koenig and Reynolds 2009).

It is possible that productivity at the colonies we studied was exceptional rather than representative of the regional population. That the populations at the seven colonies where we recorded productivity in 2020 were higher than elsewhere in Sacramento could be an indication of better habitat quality or lower rates of infection. Dead magpies infected with West Nile virus, however, were reported near our study areas only from mid-June through mid-September ($n = 27$, https://www.fightthebite.net/media/west-nile-virus-activity/), after the nesting season, when mosquitoes are more abundant (Elnaiem et al. 2008, Macedo et al. 2010). Thus our demonstration of apparently normal reproductive rates suggests that mortality from West Nile virus during summer and fall, not reduced reproduction, is preventing the Yellow-billed Magpie's population recovery.

Nest Locations, Sites, and Characteristics

We found that larger parks with large trees, and irrigated turf and other low herbaceous vegetation, appear to support larger Yellow-billed Magpie colonies. Although described as nesting primarily in a few species of native trees, i.e., oaks and cottonwoods (Linsdale 1937, Koenig and Reynolds 2009), in urban Sacramento Yellow-billed Magpies are not highly selective by species in their use of nest trees and use a wide variety of trees, both native and non-native.

Our characterization of tree species used for nesting may be slightly biased toward deciduous trees because of nests' reduced visibility in evergreens. The overwhelming use of deciduous trees, however, indicates that this effect was probably minimal. Despite the prevalence of mistletoe at our study sites, mainly in native oaks and cottonwoods, we observed little use of mistletoe clumps as nest sites (2% of nests), in contrast to its use in 36% of nests in coastal oak woodlands (Koenig and Reynolds 2009). Although we did not formally assess the height of the trees in which the magpies nested, nearly all nests were in large, tall trees. Nest trees' diameters in Sacramento averaged slightly smaller (80 cm, SD ±32) than reported in the Coast Range by Reynolds (1990; mean = 91 cm, SD ±42, n = 64).

The composition of the Yellow-billed Magpie nests that we examined from Sacramento is generally similar to that described previously (Linsdale 1937, Verbeek 1973). The Sacramento nests, however, had only about half as many sticks as those described from the Coast Range, and the Sacramento nests weighted about one-third less. These differences may simply reflect that the Sacramento nests were not fully completed, as they fell before egg-laying began, or that portions of the fallen nests remained in trees or were scattered during their falls. Given that we quantified only two nests, we cannot draw substantive conclusions from these comparisons, but our results nonetheless add to the limited information on the characteristics of Yellow-billed Magpie nests.

Importance of Flowing Water

Several factors may explain the magpie's occupying areas with low herbaceous vegetation within 0.5 km of rivers and streams at a rate substantially higher than of areas with ponds or lacking any permanent water source. Yellow-billed Magpies drink regularly (Linsdale 1937, Koenig and Reynolds 2009) and may prefer or require cleaner moving water rather than water in the more stagnant ponds of parks. Streams and rivers also provide more open areas for gathering mud for nests than do ponds, which were either lined with concrete (n = 3) or had emergent vegetation (n = 3) obstructing access to mud. Association with flowing water could also reflect that mosquito populations in these areas may be lower than in areas with still water (Collins and Resh 1989).

The several occupied sites that lacked moving water had alternative sources of water of higher quality than in park ponds. Phoenix Park, with vernal pools that were shallow and accessible but that dried during the nesting season in drier years, supported fewer magpies (20 and 26 each year) than the habitat model predicted from its extent of low herbaceous vegetation (14 ha). At Ashton Park/Estates Drive the magpies used a permanent source of clean water for livestock. Bannon Slough was the only other occupied site that lacked a source of flowing water nearby. The slough itself is a vestigial drainage that no longer transports water. Bannon Slough supported fewer nesting magpies (14) than predicted from its extent of low herbaceous habitat (7.8 ha). We suspected, but were unable to locate, an alternative water source that served this colony.

Relationship between Population Size and Extent of Foraging Habitat

The irrigated turf and mowed and grazed annual grasslands on which Yellow-billed Magpies foraged in urban Sacramento were similar in height to the vegetation in areas used in more natural settings (Linsdale 1937, Koenig and Reynolds 2009). The birds' abundance was also associated with the extent of these low herbaceous habitats. Our results strongly indicate that periodic mowing or grazing to keep this vegetation low (<15 cm tall) promotes the habitat's suitability for magpies. Furthermore, the need for at least 4 ha of low herbaceous foraging habitat to support a nesting colony of three pairs may be useful in identifying areas suitable for the species and in planning for conservation and management. One factor that we did not examine that could influence the magpie's occurrence is the variable character of residential areas, especially lot sizes and associated amounts of available lawn turf. Residential areas with larger lots would be expected to support more of the irrigated turf (i.e., lawn space) foraging Yellow-billed Magpies prefer and therefore higher populations.

Our results support the conclusion that the total area of both irrigated turf and mowed or grazed annual grassland is important to nesting Yellow-billed Magpies. First, magpies foraged in these two cover types selectively. Second, the strongest relationship between colony size and habitat characteristics was with the combined abundance of irrigated turf and grazed or mowed grassland. Third, magpies were absent from many urban parks, even near flowing water, with <4 ha of low herbaceous vegetation (Table 1). Explanations for the magpie's use of areas with shorter herbaceous vegetation height deserve further study, but may include greater availability or visibility of prey, increased efficiency of locomotion, or easier detection of predators. Anecdotally, the necessity of a minimum area of low herbaceous habitat to breeding magpies is also demonstrated at the Tretheway Oak Preserve (formerly Natomas Oaks Park), a site that D. Airola surveyed in 2006, 2020, and 2021. In 2006, 6.5 ha of low herbaceous foraging habitat was present, and 15 pairs of Yellow-billed Magpies nested there. By 2020 and 2021, however, following construction of an office park that reduced foraging habitat to 3.3 ha, the colony had disappeared. The advent of the West Nile virus may also have contributed to this decline.

Although we did not quantify human activity in the parks we surveyed, we observed many instances of park users unintentionally disturbing foraging magpies. Thus it is possible that a certain level of human activity and its associated disturbance makes the more popular parks unsuitable for magpies. For instance, high levels of human use may explain the general lack of Yellow-billed Magpies at golf courses, which were heavily used during the covid-19 pandemic, or it could be due to other factors (see next section).

One potential source of inaccuracy in our habitat–population model is the omission of all residential and commercial areas. We observed magpies foraging on residential lawns in some areas, particularly where lot sizes and areas dedicated to lawns were greater, such as at the College Park neighborhood site where lots averaged about 0.1 ha. As lot sizes increase, residential areas become more rural, offer more foraging habitat, and support more nesting magpies.

Conservation Implications

The results of our study on population status and habitat use provide a robust explanation for why certain urban areas support larger Yellow-billed Magpie populations than others. Our study does not, however, address the central issue of what is causing the broader decline in the magpie's population: the effects of West Nile virus infection on this nonresistant species (Airola et al. 2007, Crosbie et al. 2008, Pandolfino 2020). Nonetheless, our results provide novel and useful information for the conservation of this and other Yellow-billed Magpie populations in urban areas of the Central Valley, including the identification of areas that may support magpie populations in the event of population recovery. Characterizing the importance of rivers, streams, and other high-quality water sources and the relationship between the extent of foraging habitat and size of nesting colonies also can inform management for the species in urban areas or in rural areas that are undergoing rapid urbanization (Teitz et al. 2005).

The magpie's intensive use of irrigated turf raises conservation issues. Restoration of these areas to more natural woodland conditions may benefit most native plant and animal species but would appear to be detrimental to the Yellow-billed Magpie. Our results linking foraging habitat to population size suggests caution in converting areas of low herbaceous vegetation to other uses (i.e., development or wooded habitats). The magpie's light use of turf on golf courses suggests that these areas have limited value as habitat. Potential causes of the magpie's avoidance of golf courses may include high levels of human disturbance, risk of injury from golf balls, and more intensive management, including frequent low mowing and use of pesticides that may reduce prey abundance and be toxic to the birds.

Given the strong role of the West Nile virus in depressing Yellow-billed Magpie populations (Pandolfino 2013, 2018, 2020), our results are surprising in showing that water availability and habitat conditions appear to regulate Sacramento's urban magpie population. One interpretation of our results is that the virus operates in a density-independent fashion to reduce each colony by a similar proportion to a level below which it is ultimately regulated by habitat-related factors. Alternatively, although monitoring of both roosts and carcasses has documented the virus's effects on Sacramento's urban magpie population (https://www.fightthebite.net/media/west-nile-virus-activity/, Crosbie et al. 2006), it may be that areas where we found larger magpie populations (especially at sites with flowing water and no standing water) may have mosquito populations and infection rates (Collins and Resh 1989) lower than elsewhere within the magpie's range. If so, then these areas may serve as refugia from the virus where populations can be determined by habitat conditions. Regardless of the threat the West Nile virus poses to the Yellow-billed Magpie, our information on the species' habitat use in relation to population size can help guide its conservation, especially in urban environments.

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TOWARD CLARIFYING THE WYOMING RANGES OF THE *VIREO GILVUS* COMPLEX

M. RALPH BROWNING, 2728 W. Main St., #113, Medford, Oregon 97501; sjs96@outlook.com

ABSTRACT: The Warbling Vireo (*Vireo gilvus*), generally recognized as one polytypic species, is widely distributed across North America, but differences in morphology, song, genetics, and ecology suggest the western and eastern populations may represent two species. Understanding their distributions enables tracking of range changes and other factors that might affect the conservation of populations. Therefore, I studied museum specimens, specimen data, and identifications provided by investigators recording songs to help clarify the ranges of the two taxa in Wyoming. Of 18 specimens in the U.S. National Museum collected from 1858 to 1930, I identify 15 as the western species *V. swainsoni*. These are spread over most of Wyoming, east to Crook and Albany counties. Only three represent the eastern species *V. gilvus*, two from Greybull, Big Horn Co., and one from Cheyenne. Whether the overlap represents sympatry of breeding populations in eastern Wyoming or overlap in migration remains to be determined.

The Warbling Vireo (*Vireo gilvus sensu* AOU 1998) is frequently recognized as consisting of a polytypic western species and a monotypic eastern species (e.g., Phillips 1991, Voelker and Rohwer 1998, Mountjoy and Leger 2001, Rohwer et al. 2005, Browning 2019, Lovell et al. 2021), a treatment I follow in this study. The Western Warbling Vireo, *V. swainsoni*, differs from the Eastern Warbling Vireo, *V. gilvus*, in morphology (e.g., Browning 1990, Phillips 1991, Dunn and Alderfer 2017), genetics (Lovell 2010, Slager et al. 2014, Lovell et al. 2021), breeding strategies (Voelker and Rohwer 1998), voice (e.g., Floyd 2014, Pieplow 2019), and response to cowbird parasitism (e.g., Sealy 1996, Browning 2019).

The three subspecies of *V. swainsoni* breeding north of Mexico and recognized by Browning (2019) are nominate *swainsoni* (breeding from southeastern Alaska and British Columbia to Alberta and in the contiguous U.S. west of the Cascade/Sierra Nevada divide), *leucopolius* (breeding in the Great Basin from southeastern Oregon to southern Idaho and in most of Nevada), and *brewsteri* (breeding from the eastern slope of the Rocky Mountains of the U.S. south into mainland Mexico). Birds breeding in the Rocky Mountain range of *brewsteri* were formerly included under the name *leucopolius* (Phillips 1991). The bill of these three subspecies of *V. swainsoni* is thinner than the more robust bill of *V. gilvus*. Variation within *V. swainsoni* is most noticeable in back and crown color, with *leucopolius* being the palest, nominate *swainsoni* being the most olivaceous above, and *brewsteri* having the darkest crown (Browning 2019). *Vireo swainsoni* breeds in deciduous forests and along riparian corridors at all elevations in the Rocky Mountains, whereas *Vireo gilvus* is unknown as a breeding species in montane forests of the Rocky Mountains. Several mountain ranges in Wyoming, all including some deciduous forest (Knight et al. 2014), lie east of the Rocky Mountains. In addition, cottonwood forests similar to the known breeding habitat of *V. gilvus* in South Dakota (Tallman et al. 2002) and Nebraska (Silcock and Jorgensen 2020) occur along rivers in the eastern part of Wyoming.

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The poorly known breeding ranges of the Warbling Vireos in Wyoming are based on some decades-old specimens, primarily in the National Museum of Natural History (USNM), that were either misidentified or suspected to have been misidentified (Faulkner 2010). The breeding ranges, whether the taxa are recognized as constituting one species or two, thus need clarification. Much of the confusion about the inexact breeding ranges of the component taxa of the Warbling Vireo stems from the lack of specimens from Wyoming, from confusion resulting from past identifications, and from the subtlety of the physical differences (Browning 2019) between the taxa.

Oberholser (1932) named the interior subspecies *leucopolius*, which he confined to the Warner Valley in southeastern Oregon. Despite Sibley's (1940) and Miller's (1941) having extended its range as far east as western Wyoming, the AOU (1957:476) considered that *swainsoni* occurred in "central Wyoming (Ft. Sheridan)" and did not mention either *leucopolius* or *V. g. gilvus* for the state. The range of *leucopolius* was later confined to the Great Basin (Browning 1990, Phillips 1991), a region including part of southeastern Oregon, southern Idaho, most of Nevada, and western Utah. Confining the range of *leucopolius* to the Great Basin implies a northward extension of the breeding range of *brewsteri*. Sibley (1940) and Miller (1941) had not considered *brewsteri* to breed in the Rocky Mountains, as Phillips (1991) and Browning (2019) recognized. Thus the birds once identified as *leucopolius* in Wyoming are currently known as *brewsteri*. Other sources (e.g., Phillips 1991, Gardali and Ballard 2000) likewise lack details on the distribution of the subspecies of Warbling Vireos in Wyoming.

The first report of a warbling vireo (here in lower case meaning either species) in Wyoming was its listing under the heading *V. gilvus* by Knight (1902). Grave and Walker (1913:69) considered *swainsoni* common and widespread in Wyoming while casting doubt on the occurrence of *gilvus*. Fuller and Bole (1930) listed three specimens (two adults, one juvenile) collected near Chugwater (Platte County) on 1 September 1923 that had been identified as *V. g. swainsoni* by H. C. Oberholser (Steve Rogers pers. comm.). According to Phillips (1991), on the basis of a specimen from Cheyenne, *V. gilvus* "possibly" breeds in southeastern Wyoming. Although this specimen was collected in early June, Phillips (pers. comm., ca. 1990) was uncertain of its breeding status. The specimen lacked fat, implying it was not migrating, although the absence of migration does not confirm breeding. On the basis of unpublished genetic data (Carpenter 2019), *V. s. brewsteri* breeds on the eastern slope of the Laramie Mountains approximately 190 km north-northwest of Cheyenne. Voelker and Rohwer (1998) plotted on their range map only *V. swainsoni* as breeding in Wyoming.

In the latest detailed treatment of the birds of Wyoming, Faulkner (2010) concluded that all of the specimens in various museums identified as *gilvus* from the western half of the state had been misidentified. Furthermore, some specimens collected during the breeding season from the same location were sometimes identified as *V. gilvus* and later reidentified as *V. swainsoni*, or identified as *V. swainsoni* and later reidentified as *V. gilvus*.

Two major mountain ranges in eastern Wyoming are the Bighorn Mountains and the Black Hills, both of which are surrounded by lower elevations that might support distributional enclaves of one of these species. A distributional enclave is a peripherally isolated population completely surrounded by populations of a close relative (Arntzen 1978). The Bighorn Mountains, a spur of the Rocky Mountains, extend 320 km northwest/southeast in south-central Montana and north-central Wyoming. Much of the Bighorn Mountains in Wyoming straddles the boundary between Bighorn and Sheridan counties. The Black Hills straddle the South Dakota and Wyoming border in Crook and Weston counties (Figure 1). Canterbury et al. (2013) considered 71% of the avifauna of the Bighorn Mountains to consist of western-oriented species, 22% of eastern-oriented species, and the relative frequency of western-oriented species in the Bighorn Mountains and Black Hills to be fundamentally similar. Populations of *V. s. brewsteri* breed east of the Rocky Mountains in the Black Hills (AOU 1957, Browning 2019, and references therein) and the Pine Ridge area of western Nebraska (Silcock and Jorgensen 2020). A disjunct population of *V. swainsoni* also occurs in the Cypress Hills of southeastern Alberta (Lovell 2010, Lovell et al. 2021).

Because of confusion in identifications of specimens and sometimes of audio recordings, here I present information toward clarifying the geographic breeding ranges of these two cryptic species of vireo.

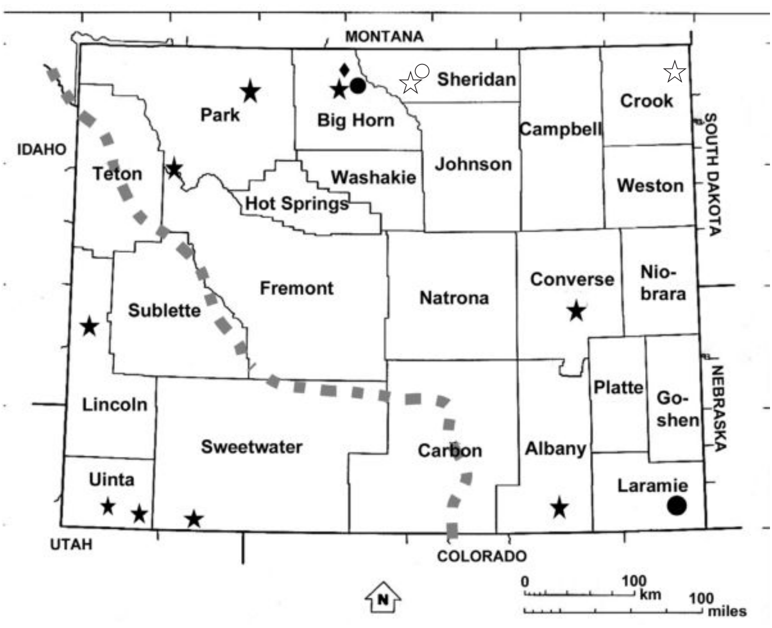

FIGURE 1. Locations of Wyoming specimens of the Warbling Vireo in the U.S. National Museum of Natural History: stars, *Vireo swainsoni*; circles, *V. gilvus*. Filled symbols, verified specimens; open symbols, unverified specimens. Filled diamonds. territorial singing of *V. swainsoni*; open diamonds territorial of singing *V. gilvus*. Dashed gray line, approximate location of Continental Divide.

METHODS

Queries in March and July 2019 of www.vertnet.org, a website through which specimen data on organisms held in hundreds of museum collections can be searched, yielded 65 specimens from Wyoming collected in June and July, the months the species breeds in Wyoming (Faulkner 2010). Of these 65, 44 were collected from 1858 to 1950, whereas 11 were collected after publication of Faulkner's (2010) *Birds of Wyoming*. Because of the difficulty of distinguishing the taxa composing the warbling vireo and lack of a detailed accounting of the basis for the identifications, annotations of subspecies on these specimens' labels are unreliable.

To assess the situation independently, I examined 18 specimens of adult warbling vireos from Wyoming borrowed from the National Museum of Natural History (USNM), all collected from 1858 to 1930 on dates from 24 May to 21 July. Three had been collected in late May, the rest in June and July. These specimens were not examined by Faulkner (pers. comm., 2021). I compared their crown and back colors with those of three specimens of *V. gilvus* from New Jersey and Wisconsin and three of *V. swainsoni leucopolius* from Nevada and Idaho. I assessed colors visually at a northeast-facing window on a sunny day in indirect sunlight. This technique yields results comparable to quantitative methods (Aldrich 1951, Browning 1993, 1994, Armenta et al. 2008, Lovell 2010, Paxton et al. 2010). Using dial calipers, I measured each specimen's wing chord, bill width, and bill depth at the anterior edge of the nostril to the nearest tenth of a millimeter.

I identified specimens to species on the basis of a suite of characters (Lovell 2010) including back color and especially crown color and measurements of wing and bill (e.g., see Gardali and Ballard 2000, Browning 2019). One or two characters, especially mensural ones, could be insufficient for conclusive identification (e.g., Browning 2019). Measurements of bill width from the eastern U.S. (= *V. gilvus*) were equal to or greater than 4.0 mm, whereas those of males from the western U.S. (= *V. swainsoni*) were less than 3.7 mm. Except for extremes, measurements of bill depth (e.g., Gardali and Ballard 2000, this study) are not as reliable a distinguishing feature as bill width. According to Phillips (1991:156), the species differ in the relative lengths of certain primaries: in *V. swainsoni*, "primary 9 is usually near the length of #4 (sometimes shorter); #10 variable, sometimes over 15 mm," whereas in *V. gilvus*, "primary 9 often as near to length of #5 (or nearer) as to #4; #10 ca. 13–15 mm long." Fortunately, most specimens of *V. gilvus* can be distinguished from all subspecies of *V. swainsoni* by back color, especially crown color, and the shape of the bill (slender in *V. swainsoni*, broad and deep in *V. gilvus*; Figure 2).

In earlier studies (Browning 1974, 1990), I examined specimens then available to Allan Phillips. While visiting the USNM, he borrowed breeding specimens held by major U.S. and Canadian museums. During that time, and in studies of other species, I agreed (Browning 1990) with most of Phillips's (1986) identifications, including those of vireos (Phillips 1991). Identification of audio recordings are based on determinations by the recording investigators D. Faulkner and N. Pieplow.

Figure 2. Comparison of the bill shapes of *Vireo gilvus* (broader, left, San Diego Natural History Museum [SDNHM] 25628, Lexington, Lafayette Co., Missouri) and *V. swainsoni* (narrower, right, SDNHM 25643, Hart Mt., Lake Co., Oregon).

RESULTS

Identifications of the 18 specimens from Wyoming I examined are listed in Table 1. The specimens I examined from near and west of the Continental Divide represent *V. s. brewsteri*. Specimens from localities farther east in Wyoming include those from Fort Steele, Greybull and the Big Horn Mountains, and the Black Hills (Table 1).

Fort Steele and Region

While employed by the Biological Survey from 1910 to 1911 (Sterling et al. 1997), Harold Elmer Anthony collected birds in Wyoming. At Ft. Steele (Carbon County) along the North Platte River in south-central Wyoming, he collected one male vireo on 25 May 1911 (USNM 228537) and another on 30 May 1911 (USNM 228538). Oberholser (1974) designated the latter as the holotype of *V. g. petrorus*, a name synonymized by Browning (1974).

In color USNM 228537 is similar to examples of *V. s. brewsteri*. In bill size, it is in the low end of the range for bill depth and width (3.2 and 3.4 mm, respectively) of specimens of *V. s. leucopolius* or *brewsteri*.

Greybull and the Bighorn Mountains

In June 1910, during his first year working for the Biological Survey (Banks 1995), Alexander Wetmore collected birds (Table 1) from Greybull (Bighorn County), a small river town southwest of the Bighorn Mountains of north-central Wyoming. He collected five (USNM) warbling vireos that are perhaps the most troublesome set of specimens from Wyoming. On 8 June 1910, Wetmore recorded in his field journal collecting two adult males that he identified as *swainsoni* near the bridge crossing the Bighorn River at Greybull

Table 1 Wyoming Specimens of the Warbling Vireo in the U.S. National Museum of Natural History

USNM number	Date	Sex	Locality	Species identification
230019	8 June 1910	♂	Greybull, Big Horn Co.	*swainsoni*
230022	10 June 1910	♂	Greybull, Big Horn Co.	*swainsoni*
230024	8 June 1910	♂	Greybull, Big Horn Co.	*swainsoni*
230021	9 June 1910	♀	Greybull, Big Horn Co.	*gilvus*
230023	10 June 191	♂	Greybull, Big Horn Co.	*gilvus*
228537	30 May 1911	♂	Ft. Steele, Carbon Co.	*swainsoni*
228538[a]	30 May 1911	♂	Ft. Steele, Carbon Co.	*swainsoni*
137815	11 June 1894	♂	Bear Lodge Mountain, Crook Co.	*swainsoni*
455069	2 June 1888	♂	Cheyenne, Laramie Co.	*gilvus*
242510	21 July 1915	♂	Laramie, Albany Co.	*swainsoni*
228540	1 July 1910	♂	8 km N Cody, Big Horn Basin Co.	*swainsoni*
A11065	3 June 1858	♀	Ft. Bridger, Uinta Co.	*swainsonii*
137813	24 May 1890	♂	Ft. Bridger, Uinta Co.	*swainsoni*
302025	2 July 1930	♂	Two Ocean Lake, Teton Co.	*swainsoni*
228541	11 July 1910	♂	Valley, Park Co.	*swainsoni*
228542	29 June 1910	♂	Pat O'Hara Creek, Park Co.	*swainsoni*
228539	12 June 1911	♂	Riverside, Carbon Co.	*swainsoni*
227034	19 July 1904	?	Sundance, Crook Co.	*swainsoni*

[a]Holotype of *Melodivireo gilvus petrorus* Oberholser (1974) examined in earlier studies (Browning 1974, 1990).

(Figure 1), and he collected three more birds in the vicinity of Greybull on 10 and 11 June 1910, all of which he also identified as *swainsoni*.

I found that three of these specimens (USNM 230019, 230022, 230024) have the dorsal color and bill size and shape (small and slender) of *V. swainsoni*, in agreement with J. W. Aldrich's previous identification of them as western warbling vireos. But the other two specimens (USNM 223021 and 230023) are near the high end of the range for bill depth (4.0, 3.7 mm) and wing chord (71.0, 72.5 mm) for a warbling vireo so are more typical of *V. gilvus*. Measurements of *V. s. brewsteri* and *V. gilvus* overlap, but the crown and back color of these two specimens agree with specimens of typical *V. gilvus* from east of Wyoming. Aldrich had also identified them as *gilvus*. There are no reports of warbling vireos from Greybull via https://ebird.org, but recently the area has drawn only light attention from birders (no hotspot at eBird and no hotspot with over eight checklists or a warbling vireo within 36 km).

Sheridan County

According to AOU (1957:476), subspecies *swainsoni* breeds in "central Wyoming (Ft. Sheridan)." I presume this was a mistake for the town of Sheridan in north-central Wyomng, as there is no evidence for a locality named Fort Sheridan anywhere in Wyoming (T. Rea, pers. comm., 2020). (A Camp Sheridan was established in 1886 near the northern boundary of Yellowstone National Park, in far northwestern Wyoming. That site was renamed Fort Yellowstone in 1891 and abandoned in 1918 [Frazer 1965]. Fort Yellowstone is about 354 km west of Sheridan.) The only specimens of warbling vireo from Sheridan County are two collected by Aldrich at Smiths Creek, about 6 km northwest of Dayton, on 31 July 1930 (Carnegie Museum of Natural History P162981 and P162982). That locality, at 1370 m in the eastern foothills of the Bighorn Mountains, is 24 km northwest of Sheridan. Aldrich (1935) mentioned the more unusual species he collected in the Bighorn Mountain region, apparently omitting the warbling vireo because of its abundance. The specimens, which I have not examined, are annotated as "*swainsoni* W.E.G." (Stephen P. Rogers pers. comm., 2020). The initials are those of W. Earl Godfrey, who worked under H. C. Oberholser at the Cleveland Museum of Natural History (Andy Jones pers. comm., 2020) from 1942 through 1945 (Houston and Gosselin 2003), when Godfrey likely identified the Dayton specimens as *swainsoni*. Whether the undated identifications were made before or after 1944, when *leucopolius* was recognized by the AOU (1944), is unknown.

Black Hills

A possibly disjunct population of *V. swainsoni* breeds in the Black Hills of Wyoming and South Dakota (e.g., Browning 2019). Carpenter (2019) reported the alleles of vireos from the Black Hills to be more similar to those of *brewsteri* and stated that birds from there do not represent a hybrid population of *V. swainsoni brewsteri* and *V*. *gilvus*. I tentatively identify as *V. swainsoni brewsteri* a specimen from Sundance (Crook County) in the Black Hills (Table 1).

Other Wyoming Localities

Between the Black Hills and Big Horn Mountains, Faulkner (pers. comm., 2020) recorded singing *V. gilvus* at Gillette (Campbell County). Whether or not the population of *V. swainsoni* breeding in the Bighorn Mountains is disjunct from *V. gilvus* can not be said until the species breeding immediately adjacent to those mountains can be ascertained. Specimens from west of the Bighorn Mountains are *V. s. brewsteri* (Figure 1). For example, those from Pat O'Hara Creek (USNM 228542) and Cody (USNM 238540), both in Park County, owing to their small bills and coloration, represent *V. s. brewsteri*, contrary to Aldrich's 1945 identifications. A specimen (USNM 228541) from Valley, a locality southwest of Cody and at 2133 m elevation near the Continental Divide, is more similar to *gilvus* in size but in color to *V. s. brewsteri*. Though Aldrich identified it as *gilvus*, I tentatively consider it an example of *V. s. brewsteri*.

DISCUSSION

On the basis of my identifications of USNM specimens and audio recordings by others, I infer that *V. gilvus* most likely breeds in southeastern Wyoming and probably in the regions below the Black Hills west to at least Campbell County. Breeding of *gilvus* in the Sheridan region and elsewhere in the vicinity of the Bighorn Mountains is suspected on the basis of sound recordings but unsubstantiated. The breeding range of *brewsteri* includes the Black Hills in northeastern Wyoming, the Bighorn Mountains, and eastern and western slopes of the Rocky Mountains across Wyoming (Figure 1). Nevertheless, representation by specimens is geographically spotty and most specimens are decades old, lacking information on molt, reproduction, habitat, and other data that would allow breeding ranges to be described more precisely.

Western Wyoming

Sibley (1940) and Miller (1941) referred to an unspecified number of specimens from western Wyoming in the Museum of Vertebrate Zoology (MVZ), University of California, Berkeley. The only specimens from Wyoming in MVZ are an adult and an immature from South Pass in Fremont County and one immature from near Green River Lakes in Sublette County, all collected in late August or early September 1939, thus outside the months of breeding (Faulkner 2010), a fact perhaps considered by the AOU (1944) when it defined the breeding range of *leucopolius*. I have not verified the identity of the three MVZ specimens, but it is unlikely that Sibley or Miller was mistaken in assigning the specimens to a western subspecies.

Fort Steele and Region

One documented change in habitat is deforestation through cutting of the lodgepole pine used by the railroad for lumber, fences, and other structures for the former Ft. Steele. The affected regions later regrew with aspen and second-growth pine (Cary 1917). Changes in habitat at Fort Steele and elsewhere may have led to changes in breeding distributions but are beyond the scope of this paper.

Greybull and the Bighorn Mountains

Greybull represents a site of apparent contact through migration or breeding where the interaction between the eastern and western taxa might profitably be studied. Aldrich did not publish on the Greybull specimens, but it is plausible that he left notes on them. Files in the office of the Biological Survey in the Division of Birds (USNM) were customarily maintained by investigators who often stored measurement sheets and notes to be consulted by anyone at some later date. Unfortunately, through multiple reorganizations and chronic under-funding, those files have been disrupted (T. Chesser pers. comm., 2020) so it is no longer possible to know what Aldrich might have noted. Furthermore, the significance of the Greybull specimens has apparently gone unappreciated by investigators after Aldrich, including Browning (1974, 1990) and Phillips (1991), both whom had ample access to USNM specimens.

Was early June too early for the Greybull birds to be breeding? Late May to mid-July is the interval reported for egg dates from an unspecified location in Montana (Gardali and Ballard 2000) and unspecified localities in Montana and Wyoming (Johnsgard 2009) that might represent either western or eastern vireos. In the Bighorn Mountains, warbling vireos are fairly common from May to October, with breeding confirmed by young begging on 11 July 1976 at Tongue River Canyon (Canterbury et al. 2013).

Might the birds Wetmore collected at Greybull have been migrants or representatives of a population breeding along the Bighorn and Greybull rivers? Unfortunately, the labels on Wetmore's specimens do not offer clues about reproduction. Some may have been on their way to breed in the nearby Bighorn Mountains where *V. swainsoni* is currently reported (https://ebird.org) or to Sheridan County, where *V. gilvus* breeds (see beyond), or still farther north.

Sheridan County

In 2019, warbling vireos at Sheridan were singing songs typical of *V. gilvus* (J. L. Canterbury pers. comm., 2019) but in 2020 were recorded singing songs typical of *V. swainsoni brewsteri* (D. W. Faulkner pers. comm., 2020). The number and behavior of the individuals singing is unknown. The situation might be an example of sympatry or overlap in migration.

Black Hills

A possibly disjunct population of *V. swainsoni* breeds in the Black Hills of Wyoming and South Dakota (e.g., Browning 2019). Carpenter (2019:36) reported the alleles of vireos from the Black Hills to be more similar to those of *brewsteri* than to those of *gilvus* and that the birds there do not represent a hybrid population.

Most specimens available for distributional and taxonomic studies are not recently collected and frequently many decades old. A better understanding of any species of bird, including the warbling vireos, requires newer specimens for many reasons (e.g., Remsen 1995, Peterson and Navarro-Sigüenza 2017), including filling geographic gaps with specimens accompanied by data on habitat, reproduction, and other information, including audio recordings.

Several regions of Wyoming clearly need further study, especially those where both species have been detected. Specifically, information from the Bighorn Mountains would be instructive. Likewise, it would be useful to confirm what species of vireo breeds between Sheridan and the Black Hills and to clarify the situation in the Black Hills. Information on the birds and breeding habitat from localities south of the Black Hills to Laramie County and west to at least western Sweetwater County would fill some gaps.

Collecting genetic samples and recording vocalizations along with voucher specimens would be very helpful. Study of specimens in the Denver Museum of Nature and Science (mostly collected in Fremont County) could contribute to understanding the two species of vireo. Combining genetic, vocal, and morphological information would also help identify problematic birds, such as any originating from the narrow hybrid zone (Lovell 2010, Lovell et al. 2021) in Alberta (which might migrate through Wyoming).

Establishing a baseline for the distribution of the warbling vireos in Wyoming will help in clarifying their taxonomic relationships as well as provide basic information for management of habitat and conservation (e.g., Gill 2007, Tietze 2018, Winker 2018).

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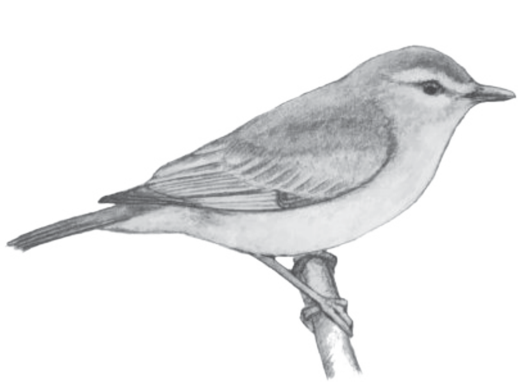

Warbling Vireo

Sketch by Bryce Robinson

UPDATE ON THE STATUS AND BREEDING PHENOLOGY OF THE TIMBERLINE SPARROW (*SPIZELLA BREWERI TAVERNERI*) IN ALASKA

CLAIRE M. STUYCK and PAUL B. LEONARD, 2835 King Arthur Way, Fairbanks, Alaska 99709; clairestuyck@gmail.com

GERALD V. FROST, 1887 Fiddle Way, Fairbanks, Alaska 99709

MICHELLE L. S. LAKE, 1718 Roosevelt Street, Fairbanks, Alaska 99709

JEFFREY D. WALTERS, 2454 Killarney, Fairbanks, Alaska 99709

ABSTRACT: In July 2020 we located 10 singing Timberline Sparrows [*Spizella* (*breweri*) *taverneri*] in the region of Gold Hill, Nutzotin Mountains, east-central Alaska. All birds were on southeast-facing slopes in the ecotone between subalpine scrub and alpine tundra, to which habitat breeding Timberline Sparrows seem narrowly confined. The population's estimated density of 0.77 birds/km^2 was similar to that at the time of its discovery in 1994. We located the first active nest of the Timberline Sparrow reported for Alaska, ~0.3 m above the ground in a shrubby resin birch (*Betula glandulosa*). An observation of young fledged on 11 or 12 July 2020 implies egg laying in the third week of June, later than the beginning of the breeding season of *Spizella* (*breweri*) *breweri*.

Originally described as a species (Swarth and Brooks 1925) and maintained as such by a number of contemporary authorities (see Sibley and Monroe 1990, Klicka and Zink 1997, Klicka et al. 1999, Johnson and Cicero 2004), the Timberline Sparrow remains poorly known, especially at the northern limit of its range, in Alaska. The paucity of information is in part due to its specific habitat associations in remote areas, since it breeds in subalpine and alpine shrublands from extreme east-central Alaska (Doyle 1997) to northwestern Montana (Griffin et al. 2003), while nominate *breweri* breeds in sagebrush and shrub-steppe habitats across the contiguous western United States (Rotenberry et al. 1999).

The Timberline Sparrow was first recorded in Alaska on 22 June 1992 by J. J. Bouton, following which discovery Doyle's (1997) field study from 1993 to 1996 described the species' status, occurrence, habitat associations, and vocalizations around Gold Hill and in the Upper Cheslina drainage in the Mentasta Mountains about 75 km to the northwest. Doyle (1997) reported observations of singing males, and an adult feeding recently fledged young and two adults gathering food provided the first evidence of breeding in Alaska. There have been few observations elsewhere, and little is known about the species' abundance, distribution, or phenology in Alaska.

STUDY AREA AND METHODS

From 25 to 29 July 2020 we searched approximately 13 km^2 in the Gold Hill area of the Nutzotin Mountains (vicinity of 62° 06′ N, 141° 54′ W), about 10 km northeast of Chisana, Alaska. Two other groups also visited the Gold Hill area in 2020 (Table 1). Dominant habitats in the area consist of low shrublands on lower slopes and foothills and dwarf shrub tundra and partially vegetated scree in alpine terrain. Subalpine low shrub habitats reached elevations of ~1500 m

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Table 1 Observations and Evidence of Breeding of the Timberline Sparrow in Alaska[a]

Date	Number and breeding status[b]	Location[c]	Observer/reference[d]
22 June 1992	1 (S)	Gold Hill (B)	J. J. Bouton (*in* Doyle 1997)
17 July 1993	2 (FY)	Gold Hill (B)	Doyle 1997
18 June 1994	3 (S, T)	Gold Hill (B)	Doyle 1997
18 June 1994	3 (S)	Gold Hill (Ch)	Doyle 1997
19 June 1994	1 (S)	Gold Hill (B)	Doyle 1997
24 June 1994	1 (S)	Upper Cheslina R., Mentasta Mts.	Doyle 1997
25–26 June 1995	2 (S)	Gold Hill (B)	Doyle 1997, incl. UAM 6669 and UAM 6670
3–5 June 1996	1 (S)	Hyder	Doyle 1997, incl. UAM 6939
2–4 July 1996	4 (S, CF)	Gold Hill	Doyle 1997
7 June 1997	1 (S)	Hyder	UAM 7048, D. D. Gibson and R. W. Dickerman
16 June 2001	3 (S)	Gold Hill (B)	P. Pourchot et al.
25–26 October 2001	1	Ketchikan	Heinl and Piston 2009
18 June 2002	1 (S)	Ptarmigan Lake, Nutzotin Mts.	D. W. Sonneborn
21 June 2003	5 (S)	Gold Hill (B)	D. Chaffin, E. W. Clarke, J. Dearborn, and J. D. Levison
10 June 2007	1 (S)	Juneau	P. M. Suchanek et al.
28 June 2012	2 (S)	Gold Hill (B)	P. Pourchot et al.
23 June 2020	3 (S)	Gold Hill (B)	R. B. Benter, S. Gibson, and N. R. Hajdukovich
25 June 2020	1 (S)	Gold Hill (B)	This study
26 June 2020	4 (S)	Gold Hill (Ch)	This study
27 June 2020	4 (S, T, ON, NE)	Gold Hill (P)	This study
27 June 2020	2 (S)	Trail Creek, Mentasta Mtns.	T. DiMarzio
29 June 2020	1 (S)	Gold Hill (B)	This study
10 July 2020	1 (S)	Gold Hill (Ch)	Z. Pohlen and C. Gesmundo
10 July 2020	1 (CF)	Gold Hill (Ch)	Z. Pohlen and C. Gesmundo
10 July 2020	3 (FL, FY)	Gold Hill (Ch)	Z. Pohlen and C. Gesmundo
10 July 2020	1	Gold Hill (Ch)	Z. Pohlen and C. Gesmundo
12 July 2020 AM	4 (FY)	Gold Hill (Ch)	Z. Pohlen and C. Gesmundo
12 July 2020 PM	6 (UN, FY)	Gold Hill (Ch)	Z. Pohlen and C. Gesmundo
17 October 2020	1	Ketchikan	B. Limle and S. C. Heinl

[a]Unsubstantiated reports from elsewhere in Alaska include one bird on 26 July 1995 at Brushkana Creek, Denali Hwy., Alaska Range (R. B. Benter and C. Dooley); one bird on 3 May 2002 at Juneau (R. J. Gordon); and one bird on 27 June 2014 at Skagway (R. Taylor).

[b]Abbreviations: S, singing bird; T, territorial defense; UN, used nest; ON, occupied nest; FL, recently fledged young; CF, carrying food; FY, feeding young; NE, nest with eggs.

[c]Abbreviations: B, southeast-facing hillsides above intersection of Bonanza and Canyon Creeks; Ch, southeast-facing hillside above Chathenda Creek; P, southeast-facing hillside above Paulsen Creek.

[d]UAM, University of Alaska Museum.

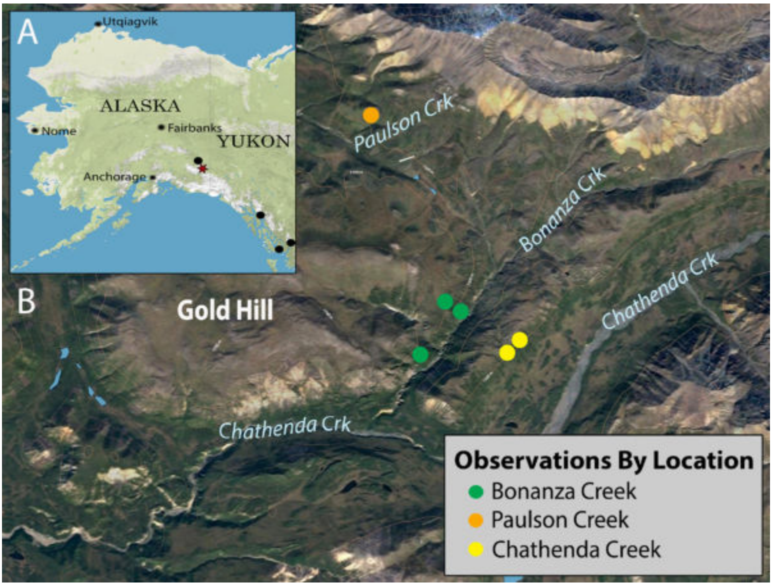

Figure 1. (A) Sites of documented reports of the Timberline Sparrow in Alaska. (B) Sites of observations near Gold Hill. Green dots, southeast-facing hillsides above the confluence of Bonanza and Canyon creeks; yellow dots, southeast-facing hillside above Chathenda Creek; orange dot, southeast-facing hillside above Paulsen Creek.

Figure 2. Timberline Sparrow nest found near Chisana, Alaska, on 27 June 2020.

Photo by Michelle L. S. Lake

on south-facing slopes, but the subalpine/alpine ecotone was much lower on north-facing slopes. Subalpine habitats on south-facing slopes consisted of a mosaic of low and medium willows (e.g., *Salix glauca*, *S. richardsonii*, and *S. pulchra*), with resin birch (*Betula glandulosa*) common in the understory. Gaps in the canopy were dominated by Altai fescue (*Festuca altaica*), arctic lupine (*Lupinus arcticus*), and other herbaceous plants. Temperatures ranged from daytime highs above 15° C to lows around 5° C. Rain showers were sporadic and local, with various types of frozen precipitation falling at higher elevations.

In addition to searching the two sites previously known for the Timberline Sparrow near Gold Hill on the southeast-facing slopes above Bonanza and Chathenda creeks (Figure 1B), we searched other similar habitat in the general area. We did not broadcast recordings of the species' song. The sparrows sang most frequently during calm, sunny conditions; we often failed to detect them when we passed through known occupied habitat during windy, overcast, and cool periods that were still adequate for standard avian survey and census protocols. Similarly, Walker (2000) excluded data from days of song recording when the weather was windy, cool, or rainy, as song levels then decreased dramatically. Detecting Timberline Sparrows by sight alone is difficult because they appear to spend much of their time below the shrub canopy.

Figure 3. A closer look at the Timberline Sparrow nest and eggs found in the Paulsen Creek drainage of the Gold Hill area on 27 June 2020.

Photo by Gerald V. Frost

RESULTS

We detected 10 singing birds (Table 1) and inferred that they were males, as female Brewer's Sparrows are not known to sing (Rotenberry et al. 1999). The birds were gregarious, commonly seen associating with other passerellids including the American Tree Sparrow (*Spizelloides arborea*), Dark-eyed Junco (*Junco hyemalis*), White-crowned Sparrow (*Zonotrichia leucophrys*), and Savannah Sparrow (*Passerculus sandwichensis*). We observed an antagonistic interaction with another Timberline Sparrow after an intruding bird sang at the Paulsen Creek drainage, behavior perhaps consistent with reports that the species tolerates territorial transgressions for feeding (Rotenberry et al. 1999). Documentation of Timberline Sparrows in the Paulsen Creek drainage, 3.5 km from the Bonanza Creek site (Figure 1B), represents a new site for the species. There we detected three singing birds, observed territorial defense, and discovered an active nest.

At ~10:00 on 27 June 2020, Stuyck observed a Timberline Sparrow alternate between singing and foraging just below the crowns of medium-sized willows on a southeast-facing slope above Paulsen Creek. A second individual joined, probably pushed into the area by persons in our group, and the two foraged in close proximity until the second individual rose to the crown of a willow and sang. That action prompted the first bird to defend its territory by quickly chasing away the intruder. Shortly thereafter, this second bird was heard singing again, ~25 m to the east. The first bird's pattern of behavior—foraging, self-maintenance, and singing—suggested a core area of use and attention. Noting that the bird made soft contact calls from middle heights and lower in the vegetation, Stuyck searched the area more thoroughly and flushed a bird from a nest that was well hidden in the branches of a birch shrub ~0.3 m above the ground (Figure 2)—the first Timberline Sparrow nest with eggs found in Alaska.

The nest was located on the upper third of a steep south-facing slope with habitats similar to those found at other areas of Gold Hill with Timberline Sparrows. An open cup ~7 cm in diameter composed of finely woven dried grasses (mostly Altai fescue), it contained four blue-green eggs. The smooth, subelliptical eggs were adorned with moderate burnt umber speckles (Figure 3). Our observation is broadly consistent with other observations of nest size and composition, clutch size, and egg characteristics of Brewer's Sparrow, in the context of the Timberline Sparrow's habitat (see Baicich and Harrison 1997, Doyle 1997, Rotenberry et al. 1999).

Brewer's Sparrows are typically monogamous though some are polyterritorially polygynous (Walker 2000). Both males and females are known to incubate and raise multiple broods (Mahony et al. 2001, Halley et al. 2015). Therefore, the sex of the incubating bird we observed cannot be immediately inferred. Incubating males rarely sing or respond to broadcast of their songs (Walker 2000), and females may chase away males that are not their mates if they venture too close to the nest (Rotenberry et al. 1999). However, the first bird that cued us did sing, and it engaged in territorial defense behavior in response to another singing bird. Males likely stay near their incubating mate to provision and maintain territory, which assessment is consistent with the location of the antagonistic behavior near the nest.

By their long trilling songs, we easily detected Timberline Sparrows under favorable listening conditions from as far as 100–200 m; one bird detected was heard across the Bonanza Creek canyon from about 500 m away. Singing was sporadic but heard throughout the day, often consisting of several bouts of song followed by periods of silence. Brewer's Sparrows sing two types of song, a long and short song, that reflect pairing status, nest stage, and social context (Walker 2000). Both the intruder and nest-associated male we encountered sang long songs, which are more commonly used in aggressive encounters between paired males (Walker 2000). Perhaps a second nest was active at the Paulsen Creek site. Brewer's Sparrows have small breeding territories, and they have been suggested to be loosely colonial, with densities driven in part by conspecific cueing (Walker 2000, Harrison et al. 2009) and by local weather variables (Best and Petersen 1985, Cody 2008).

DISCUSSION

To date, the Timberline Sparrow has been reported in Alaska primarily in the 6-week period from June to mid-July. However, there are several reports of migrants at sea level in southeast Alaska in early June and in late October (Figure 1A). The only fall reports in Alaska, at Ketchikan (Heinl and Piston 2009; B. Limle pers. comm.) are notably late, as Brewer's Sparrows have not been seen in nearby British Columbia after 1 October (https://ebird.org).

Though undetermined at the landscape scale, suitable breeding habitat is likely distributed broadly if patchily across east-central Alaska. Aerial surveys of 4600 km^2 in the 1990s identified 61 km^2 of habitat (Doyle 1997). In the absence of repeated surveys, most of our current knowledge of the species in Alaska is based on repeated visits to the Nuzotin Mountains and Gold Hill area. However, these observations are beginning to clarify this population's breeding phenology. Previous observations of breeding behavior, our discovery of a nest with eggs on 27 June 2020, and observations of fledged young from 10 to 12 July, likely from a used nest found above Chathenda Creek (Z. Pohlen pers. comm.), allow the inference of breeding chronology. Brewer's Sparrows incubate for 10–12 days (Reynolds 1981), followed by a nestling period of 6–9 days before the young fledge, though many days before they achieve flight (Rotenberry et al. 1999). Back-dating from a known fledging date of 11 or 12 July 2020 suggests the eggs in the Chathenda Creek nest hatched between 2 and 6 July, with incubation and egg laying beginning as early as 20 June and 16 June, respectively. Doyle (1997) did not detect singing after 4 July, and Pohlen (pers. comm.) heard one distant bout of singing, and then primarily contact and agitated alarm calls, from 10 to 12 July 2020. In other parts of their range Brewer's Sparrows are known to double-brood or renest after a failure. But in the north the breeding season appears to be compressed, and double-brooding might not occur, as for other widely distributed songbirds nesting at high latitudes (Böhning-Gaese et al. 2000).

The timing of breeding in the Gold Hill area appears to be much later than to the south. Below 50° N the breeding season of Brewer's Sparrow begins in mid-May (Rotenberry et al. 1999) and at the southwest margin of its range in mid-April (Willett 1933). The earliest report of a Timberline Sparrow in the Gold Hill area is 16 June 2001 (P. Pourchot pers. comm.), and Doyle

(1997) detected none from 3 to 5 June 1995. Though these observations are few, reports of the species at Hyder and Juneau (Table 1) suggest that some Timberline Sparrows are still on migration during this period.

If Timberline Sparrows are responding to local weather conditions during migration and nest-site selection, their population density and timing likely vary from year to year. Moreover, the timing of snowmelt might be a primary driver of the birds' preference for south-facing slopes at high elevations in northern latitudes; in Alaska, the snow in the Timberline Sparrow's habitat typically melts before the end of April, at least one month earlier than on north-facing slopes and in alpine areas, according to Landsat satellite data, resolution 30 m (Macander et al. 2015). These conditions likely maintain preferred breeding habitat by controlling the vegetation's structure and phenology, leading to leaf-out around the time of first arrival in June. Cody (2008) reported both the density and timing of Brewer's Sparrow in shrub-steppe habitats at Jackson Hole, Wyoming, to be influenced by snow melt. Though unable to control for bias and inconsistency in effort (in terms of area covered, number of observers, and seasonal timing of observations), we note the similarity of the density of Timberline Sparrows in 1994 (0.75 birds/km^2) and in 2020 (0.77 birds/km^2). Taken together, with the continued availability of preferred habitats over this interval, it appears that the Gold Hill population is currently stable.

In the 1990s the Timberline Sparrow was considered uncommon and local in Alaska, while from 1979 to 2004 the nominate subspecies experienced a rangewide population decline of 50% (Holmes and Johnson 2005). The Timberline Sparrow's strong association with a narrow elevational band at the subalpine–alpine transition might place it at particular risk of decline because of habitat loss from climate change (Griffin et al. 2003) and spread of shrubs, as has been observed in the nearby Kluane region of southwestern Yukon (Myers-Smith and Hik 2018). As global temperatures rise, as much as 69% of current breeding habitat is projected to be lost and only 12% gained at higher latitudes and elevations across North America (Bateman et al. 2020). However, these models are not based on data sufficient to project changes in Alaska and the remote areas that Timberline Sparrows likely inhabit. Further study to separate the role of habitat plasticity from climate-driven adaptive response might identify fine-scale habitat preferences and add clarity to existing models.

Observations in 2020 suggest that habitat in the Gold Hill area remains suitable for breeding, but also highlight the fidelity of this species to this area and to its narrow habitat requirements. Using these traits in predictive modeling might help pinpoint current and potential future breeding localities (Griffin et al. 2003). Further investigation of the Timberline Sparrow's nesting ecology at the northern end of its range might reveal life-history traits that are vulnerable to disruption. Understanding the roles of philopatry and migratory connectivity would improve our understanding of this population's relationship with other northern populations, as well as with the nominate subspecies. These advancements in our foundational knowledge, in the perspective of the whole life cycle, would allow targeted conservation management during critical life stages.

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NOTES

FIRST RECORD OF THE PALLAS'S GRASSHOPPER WARBLER IN ALASKA

AARON J. LANG, 40208 Alpenglow Circle, Homer, Alaska 99603; aaron@wildernessbirding.com

STEVEN C. HEINL, 2603 Fourth Avenue, Ketchikan, Alaska 99901; stevencheinl@gmail.com

The Pallas's Grasshopper Warbler (*Helopsaltes certhiola*) is common over much of its central and eastern Palearctic breeding range, which extends from the middle Irtysh River, in western Siberia, east to the Sea of Okhotsk and south to eastern Kazakhstan, northern China, and the northern coast of the Sea of Japan in the Primorskiy region of Russia (Kennerley and Pearson 2010). It winters from Sri Lanka and eastern India east through much of southeast Asia, including Sumatra and Borneo. This species is also recorded nearly annually as a fall vagrant to northwestern Europe (ibid.), and it is an irregular visitor to Japan, where at least six fall records extend from September to November (OSJ 2012). Here we report the first record of the Pallas's Grasshopper Warbler in Alaska.

On 9 September 2019 at Gambell, St. Lawrence Island, Alaska, our birding group flushed a small, buff-colored passerine with a long, rounded tail in the "near boneyard." The several boneyards at Gambell are midden sites that support dense thickets of wormwood (*Artemisia* sp.), which, in the fall, provide the only tall vegetative cover for migrant landbirds at Northwest Cape (Lehman 2019). Coincidentally, this bird flushed from the spot where on the previous day we had photographed a Middendorff's Grasshopper Warbler (*H. ochotensis*). We flushed the Pallas's several times—in each instance it flushed only when nearly under foot, then flew low over the vegetation before dropping back into cover. Upon landing, the bird moved quickly through the vegetation, requiring coordinated effort to be relocated. Given its behavior, size, and coloration we assumed we had relocated the Middendorff's from the previous day; however, Lang obtained a photograph of the bird in flight that clearly showed it had a rufous rump and strongly streaked back and lower rump, characteristics that did not fit Middendorff's.

For the next several hours our group, which now included most of the birders present at Gambell (about 16 people), worked together to obtain more views and photographs. We eventually identified the bird as a Pallas's Grasshopper Warbler, on the basis of its unmarked, yellowish-buff underparts, black-streaked crown and back, rufous or warm brown lower rump with black streaks, and brown tail with whitish tips and subtle, but broad, blackish subterminal band. In addition, the bird's face was marked by a thin dark malar streak, prominent yellow-buff supercilium, and thin brown eyeline, and the tertials were marked with small but prominent white spots on the tips of the inner webs of the feathers. Some of these features were apparent in the field, even when the bird was seen briefly in flight (Figures 1 and 2), but we were unable to obtain prolonged views of the bird on the ground. On 10 September, R. Brad Benter obtained a series of photos at close range that allowed us to eliminate similar species (Figure 3). The yellowish face and underparts identified the bird as in its year of hatching. Although three to five subspecies of Pallas's Grasshopper Warbler are recognized by various authorities, the plumage of hatching-year birds is variable and away from breeding areas such immatures cannot be identified to subspecies (Kennerley and Pearson 2010, P. Kennerley in litt., C. Goodie in litt.). The bird at Gambell was last observed on 12 September.

Figure 1. Pallas's Grasshopper Warbler at Gambell 9 September 2019. The bird's white-tipped tail is broad and rounded and marked by a subtle blackish subterminal band. Note the overall buff-brown coloration of the upperparts, which contrast with the rufous or warm brown lower rump and uppertail coverts. The back and uppertail coverts are coarsely streaked with black, contrasting with the unmarked rump. The bird's wing coverts are blackish with contrasting narrow buff edges.

Photo by Aaron J. Lang

Figure 2. Pallas's Grasshopper Warbler at Gambell 9 September 2019. The extensive yellowish color on the underparts and face indicate a hatching-year bird. Note the prominent yellowish supercilium and lack of streaking on the undertail coverts.

Photo by Aaron J. Lang

FIGURE 3. Pallas's Grasshopper Warbler at Gambell 10 September 2019. This photo nicely illustrates the small but prominent white spots on the inner webs of the tips of the tertials—an important field mark and the origin (along with the white-tipped tail) of the nickname "PG Tips" coined for this species by British birders. Note also the head and face pattern, including the streaked crown, prominent pale yellowish supercilium, brown eyeline, and fine dark malar line. The edges of the crown feathers are dull grayish and contrast with the warmer buff-brown back.

Photo by R. Brad Benter

The Gambell bird's streaked brownish plumage and skulking behavior immediately suggested that it was one of several migratory Palearctic warblers in the genera *Locustella*, *Helopsaltes*, or *Acrocephalus*, many of which can be difficult to identify. We leaned heavily on the authoritative work *Reed and Bush Warblers* (Kennerly and Pearson 2010) for information on identification of species in this group.

The Grasshopper (*Locustella naevia*) and Lanceolated (*L. lanceolata*) warblers are both somewhat similar in size and structure to Pallas's Grasshopper Warbler, and both are similarly well streaked on the upperparts. *Locustella naevia* ranges from Europe east to western China and western Mongolia, but it has been recorded as close to Alaska as the Kuril Islands (ibid.). The Lanceolated Warbler ranges from western Russia east to the Sea of Okhotsk and western Kamchatka; it is a casual visitant to the western Aleutian Islands (Gibson and Withrow 2015), where it has nested once (Andersen et al. 2008), and it has been reported twice in fall at Gambell (Lehman 2019). We eliminated those two species by their lack of rufous tones on the lower rump and uppertail coverts, plainer face patterns (shorter, less contrasting supercilium), plainer rectrices (lacking blackish subterminal band and white tips), and, in particular, their streaked undertail coverts and lack of white tips on the inner webs of the tertials. Unlike *Helopsaltes certhiola* and *L. lanceolata*, *L. naevia* has back feathers with buff fringes; thus the black centers of its back feathers do not extend to the tips of those feathers. Lanceolated Warblers are also crisply streaked on the chest and flanks, whereas those areas are unmarked in Pallas's Grasshopper Warbler.

The Sedge Warbler (*Acrocephalus schoenobaenus*) is similar in size to Pallas's Grasshopper Warbler and shares its prominent supercilium, streaked back, and warm brown rump (Kennerley and Pearson 2010). It ranges from Europe east through western Siberia to the Yenisey River and has been recorded twice in fall at Gambell (Rosenberg and Lehman 2008, Lehman 2019). The Sedge Warbler differs from the Pallas's Grasshopper Warbler in having a more boldly patterned crown (with bold, black lateral crown stripes), more diffuse back streaking, unstreaked rump and uppertail coverts, and a shorter tail that lacks the blackish subterminal band and white tips of Pallas's. One additional species of *Helopsaltes*, the Japanese Swamp Warbler (*H. pryeri*), and two additional species of *Acrocephalus*, the Aquatic (*A. paludicola*) and Streaked Reed (*A. sorghophilus*) warblers, have streaked backs but are otherwise quite different from Pallas's Grasshopper Warbler (Kennerley and Pearson 2010). We eliminated other species of *Locustella*, *Helopsaltes*, and *Acrocephalus* by their lack of streaks on the back, rump, and uppertail coverts.

The closely related Middendorff's Grasshopper Warbler breeds in northern Hokkaido, Sakhalin, and the Kuril Islands, and along the coasts of the Sea of Okhotsk and Kamchatka (ibid.). It is a casual visitant to the western Aleutian and Bering Sea islands (Gibson and Withrow 2015). Although Middendorff's is similar in size and shape to Pallas's, and it shares that species' white-tipped tail feathers, its plumage is much plainer and lacks the rufous lower rump and uppertail coverts and coarse streaking of Pallas's Grasshopper Warbler. Some Middendorff's, particularly those breeding in the northern Kuril Islands, northern Sea of Okhotsk, and Kamchatka, have more conspicuous darker centers to the back feathers and, in some cases, ill-defined crown streaks; some also exhibit a tertial pattern with white spots at the tips of the inner webs similar to the pattern of Pallas's (Kennerley and Pearson 2010). In all respects, however, they are still much less distinctly marked than Pallas's (ibid.).

The main identification problem presented by Middendorff's is the potential for hybrids with Pallas's. The two species hybridize where their ranges overlap along the lower Amur River and in northern Sakhalin, at the northeastern edge of the range of Pallas's. The plumage of up to 70% of the breeding birds in those areas is reported to vary from almost pure Pallas's to almost pure Middendorff's, and they form a self-sustaining intergrade population (Kalyakin et al. 1993—see Kennerley and Pearson 2010:255, 264). In addition, the distribution of Pallas's and Middendorff's along the Sea of Okhotsk is uncertain, and some individuals in this range cannot be safely assigned to species. Indeed, of the three extant specimens on which A. T. von Middendorff (1853) based his original description of *Sylvia* (*Locustella*) *ochotensis*, all juveniles, two are somewhat intermediate toward *certhiola* (Loskot 2002). The taxonomic treatment of Pallas's and Middendorff's grasshopper warblers has evolved over the years from their original descriptions as separate species to treatment, along with Styan's Grasshopper Warbler (*H. pleskei*), as conspecific (Vaurie 1959, Williamson 1968), to the separation of Middendorff's and Pallas's, with Styan's being retained as a subspecies of Middendorff's (Dement'ev and Gladkov 1954), to the current arrangement of the three being maintained, as originally described, as separate species. We follow the recent taxonomic proposal to remove *H. certhiola* and *H. ochotensis* from the genus *Locustella* to *Helopsaltes* (Alström et al. 2018, Chesser et al. 2020, Praveen et al. 2020).

Despite the taxonomic ambiguity, identification of *H. ochotensis* and *H. certhiola* is straightforward, and any difficulty in distinguishing them most likely reflects a boldly marked Middendorff's versus a poorly marked Pallas's, or a hybrid (Kennerley and Pearson 2010). The boldly marked and richly colored plumage of the Gambell bird, however, was typical of Pallas's Grasshopper Warbler "in every respect" (P. Kennerley in litt.), and its plumage markings were not subdued or diffuse as expected of a hybrid. The occurrence at Gambell was accepted as the first Alaska record of the Pallas's Grasshopper Warbler by the Alaska Checklist Committee (see University of Alaska Museum Department of Ornithology https://www.universityofalaskamuseumbirds.org/bird-collection/).

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EGG RETRIEVAL BY TRUMPETER SWANS

PAIGE C. MILLER, Idaho State University, Department of Biological Sciences, Pocatello, Idaho 83209; paigemiller@isu.edu

DAVID J. DELEHANTY, Idaho State University, Department of Biological Sciences, Pocatello, Idaho 83209; daviddelehanty@isu.edu

The Trumpeter Swan (*Cygnus buccinator*), endemic to North America and its largest species of waterfowl, approached extinction in the 1930s (Banko 1960). But by 2015, following nearly a century of conservation, its population had rebounded to some 63,000 wild birds (Groves 2017). Enhanced population size has provided increased opportunity for scientific study, and previously unreported behaviors now are being observed. Here we report egg retrieval—the act of a bird moving eggs from outside the nest bowl into the nest bowl—by nesting Trumpeter Swans for the first time. Egg retrieval is an important behavior that serves to restore reproductive opportunity after disturbance at the nest.

Trumpeter Swans breed in temperate lakes and marshes where they construct large nests of mounded vegetation surrounded by shallow water. Nest mounds are 1.2–3.6 m in diameter and 0.3–0.9 m in height. At the center of the mound, the swans form a nest bowl 25–40 cm in diameter and 10–20 cm deep (Mitchell and Eichholz 2019). Nest mounds, constructed by both members of a breeding pair (Hansen et al. 1971, Cooper 1979), consist of piled emergent and submerged aquatic vegetation, and occasionally grasses and sedges (Hansen et al. 1971, Mitchell and Eichholz 2019). Trumpeter Swans typically lay eggs at intervals of ~36–48 hr (Cooper 1979, Lumsden 2002), and clutch size averages 4–6 eggs (Mitchell and Eichholz 2019). As is typical of waterfowl, Trumpeter Swans initiate incubation just prior to completing a clutch (Banko 1960, Cooper 1979, Mitchell and Eichholz 2019) and incubate for 32–37 days (Banko 1960, Hansen et al. 1971, Mitchell and Eichholz 2019). Trumpeter Swans are sexually monomorphic, so sexing birds at a distance is difficult, but apparently the female is responsible for incubation almost exclusively (Banko 1960, Cooper 1979, Mitchell and Eichholz 2019).

Egg retrieval in the Graylag Goose (*Anser anser*) was described by Lorenz and Tinbergen (1938) in a classic paper conceptualizing instinctive behavior in birds. It has since been documented in many ground-nesting birds across a broad range of taxa (Poulsen 1953, Giesen 1978), including other waterfowl species (Sowls 1955, Prevett and Prevett 1973, Duncan 1984, Zaun and Weathers 2009). Among waterfowl, the adult retrieves eggs by standing on or near the nest bowl, reaching over the egg with its bill and drawing the egg toward its breast, sliding and rolling the egg into the nest bowl. Among the six extant species of swans (Eo et al. 2009), egg retrieval has been documented for the Mute Swan (*Cygnus olor*) and the Black Swan (*Cygnus atratus*), in both cases in captivity (Poulsen 1953). To our knowledge, ours is the first report of egg retrieval for the Trumpeter Swan or any swan in the wild.

The capacity to return eggs to the nest bowl after displacement can improve a bird's fitness when it rescues eggs that otherwise would fail. Disturbance of swan nests is probably frequent enough that response to disturbance has been shaped by natural selection, as in other waterfowl species (Duncan 1984, Zaun and Weathers 2009).

We observed egg retrieval by the Trumpeter Swan opportunistically while studying the thermal dynamics of the species' incubation during May and June 2020 at Red Rock Lakes National Wildlife Refuge in southwestern Montana. As part of the thermal study, we monitored six nests round the clock by video. The video systems were described by Bush (2018) in detail. Briefly, the cameras were mounted 1–2 m from swan nests and camouflaged; battery-powered recording equipment was housed 20–25 m from the cameras.

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We placed three auxiliary eggs for thermal logging at each of six swan nests. By auxiliary, we mean eggs that we added in addition to the natural clutch. Thermal-logging auxiliary eggs consisted of natural, but evacuated, eggs from Trumpeter Swans, or Mute Swans when Trumpeter Swan eggs were unavailable, equipped with a Thermochron iButton (model DS1922L, Maxim Integrated Products, Sunnyvale, CA) temperature logger mounted to the inside surface of the eggshell (the hole created patched with smooth putty). At each nest, we simultaneously placed one auxiliary egg in the nest bowl with the natural clutch of eggs, one auxiliary egg on the surface of the nest mound ~50–70 cm south of the edge of the nest bowl, and one auxiliary egg buried to a depth of ~10–12 cm in the nest mound material and ~50–70 cm south of the edge of the nest bowl. To anchor each auxiliary egg placed on the surface of the nest mound, we glued a 20-cm length of wooden dowel to the egg to serve as an anchoring spike that we then inserted into the nest mound.

At each of the nests, a swan egg on the surface of the nest outside of the nest bowl elicited a strong and rapid response. After we placed the auxiliary eggs, adult swans initiated egg retrieval between ~2 and 23 min after returning to the nest (Table 1), usually before resuming incubation. While standing over or near the nest bowl, adults reached over exposed eggs with the bill and began attempting to draw exposed eggs toward their breasts, and thus toward the nest bowl in a manner similar to other waterfowl (Lorenz and Tinbergen 1938, Poulsen 1953, Sowls 1955). The birds' attempts to roll the eggs were hampered by the attached wooden dowels, however. Each adult took two to five short breaks from its efforts at retrieval to survey its surroundings, preen, or incubate the clutch. At all six nests the attending adult grasped the wooden dowel with the bill to dislodge it partially or fully from the nest vegetation. In five cases, swans detached dowels from the eggs with their bills and feet. In one case, a swan broke the dowel from the egg by wedging the egg and dowel with its body, leaving the auxiliary egg intact. After an auxiliary egg was detached from the dowel, the swan rolled the egg to the edge of the nest bowl, then rearranged the eggs already in the nest bowl before incorporating the new egg into the clutch.

Surprisingly, four swans also discovered the auxiliary eggs buried within the nest mound and successfully drew those auxiliary eggs up into the clutch. Swans appeared to discover the eggs while repairing the nest mound's surface that we had disturbed ($n = 3$) or during general nest maintenance ($n = 1$). The auxiliary eggs that we buried within the nest mounds were not anchored with wooden dowels. Swans were able to retrieve these auxiliary eggs more rapidly than the eggs anchored on the surface ($t = 3.96$, $p = 0.0042$; Table 1). Egg-retrieval times for the unanchored auxiliary eggs buried within the nest mounds likely represent swans' natural efficiency in egg retrieval. The short latency (time elapsed between discovery of eggs outside the nest bowl and initiation of retrieval behavior) of the Trumpeter Swans in our experiment was consistent with other species, such as the White-tailed Ptarmigan (*Lagopus leucura*), which typically respond to displaced eggs immediately (Giesen 1978).

We video-documented Trumpeter Swans retrieving 10 swan eggs, nine Trumpeter Swan eggs and one similarly sized Mute Swan egg, all of which were placed <1 m from the nest bowl, six on top of the nest mound and four buried within

Table 1 Mean Latency, Egg-Retrieval Times, and Number of Pauses of Trumpeter Swans Attempting to Retrieve Eggs Experimentally Placed at Six Nests

Behavior	Buried egg mean ± SE ($n = 4$)	Anchored egg mean ± SE ($n = 6$)
Latency time (min)	0.20 ± 0.03	3.38 ± 0.25
Retrieval time (min)	3.44 ± 0.20	25.70 ± 1.82
Number of pauses	0.0 ± 0.0	3.0 ± 0.2

the mound. This propensity to retrieve eggs that were not their own indicates a strong instinct to rescue displaced eggs and perhaps could be a pathway for as yet undocumented nest parasitism as well. Further investigation of the effects of egg displacement (distance and relative timing) during incubation are needed to clarify the context of egg retrieval-behavior in the Trumpeter Swan.

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BOOK REVIEW

Birds of Phoenix and Maricopa County, Arizona, Third Edition, by Janet Witzeman, Troy Corman, Tommy DeBardeleben, and Laurie Nessel. 2017. Maricopa Audubon Society, Phoenix. Paperbound, spiral binding, with maps, color photography, illustrations. $26.95. ISBN: 978-0-9654566-1-6.

Note: Proceeds from the sale of this publication support the conservation activities of the Maricopa Audubon Society.

Now that covid-19 may soon pass into our rear-view mirrors, maybe we can begin traveling again for work and pleasure. Even if we are still reticent to cross our thresholds, there is always planning our next trips, and this gem of a book is one for anyone interested in western birds. For those of us who are bound to spend time in place, this book would be a thoughtful addition to our libraries to familiarize ourselves with this wonderfully described southwest birding location.

As a guide and introduction to birding or locating birds within Arizona's fastest growing region, *Birds of Phoenix and Maricopa County, Arizona* is excellent. Whether you are sitting in your vehicle or sitting in your chair, it is an easy-to-read, easy-to-open reference for finding birds in this bird-rich region. Whether you are a professional setting out to study a species of bird in this region or a local or traveling birder seeking birds to see, photograph, or record, this book serves admirably.

The book also addresses the past 25 years of changes in avian populations, ranges, and the status of birds around Phoenix. The changes summarized in this section of five pages reflect important themes that resonate far beyond Arizona, such as the decimation of the Red-faced Warbler, Red-breasted Nuthatch, Brown Creeper, Steller's Jay, and Mountain Chickadee by fire, and a surge of many waterbirds, including nesting Neotropic Cormorants and Bald Eagles, with establishment of new ponds and lakes.

Birds of Phoenix and Maricopa County is divided into three major sections: specific birding areas with descriptions and the birds that might be found there, descriptions of habitats for the entire county, and species accounts with bar graphs depicting each species' seasonal occurrence. There is also a section updating and photographically documenting the species new to Maricopa County since publication of the second edition in 1997. The briefer sections (acknowledgments, foreword, etc.) detail the motivation for the original and subsequent editions of the book and changes in the region in the last 25 years. Another brief section describes two major nearby birding areas in abutting Pinal County (a thoughtful touch) with a thorough alphabetical index to those areas and expected species.

The maps in *Birds of Phoenix and Maricopa County* are excellent and have well contrasting backgrounds and print. The roads are well marked. The fold-out map of the county's major road systems is easy to read, and the major routes are clearly and accurately depicted. It also melds accurately with the maps within the text that divides the area covered into seven regions: Phoenix and Scottsdale, Southeast of Phoenix, Northeast of Phoenix 1, Northeast of Phoenix 2, Southwest of Phoenix, Northwest of Phoenix, and Pinal County. Directions for reaching each area are clear, and the specific locations are easily located on the corresponding map for that section. The authors have also included a map of the entire state of Arizona, depicting and naming all counties, an aid to geographic orientation that is sometimes overlooked in state and county birding guides. Two color maps depict Maricopa County's topography and habitats. The major and some minor roads and waterways are included in these maps too, but, unfortunately, some lettering on these maps, including the road numbers, has been reduced to a size difficult for some of us to read. Also, for those who thrive on using GPS coordinates, there are none.

The text in the section describing the region's habitats is well organized and well written, accompanied by photographs of both the habitat and representative birds. The descriptions allow the readers to visualize where they should park and the terrain over which they will walk. The authors address what is important to the local, seasoned traveler, or newcomer to Arizona. Trails, facilities, accessibility, hours, directions, fees, and phone numbers, if pertinent, are included. [Restrictions for the covid-19 pandemic may have affected operating hours.] The species accounts, bar graphs, and their legends are likewise clear, concise, and easy to read. The bar graphs, about 8 to 10 per page, are in easily readable short lists, with the species account on the facing page or below, so the information is unified conveniently.

Notably, the authors, themselves experts in their fields, sought out leaders in western field ornithology for pre-publication review, and their careful attention to detail shows. The sections some readers might frequently skip are just as carefully written and as descriptive as the main text. The photography, in nearly all instances, is well reproduced. The reader should keep it in mind that some of these photographs were taken for documentation and not as portraits. The book's interior pages are printed on heavy, coated paper meant to stand years of handling, and so is the cover (with its original cover art of a Le Conte's Thrasher by Narca Moore-Craig).

Maricopa Audubon is to be congratulated to have published such a fine book and guide that describes its area so well in terms of the birds, the landscape the birds live in, and how the avian life of the area has fared in the unparalleled urban/suburban growth that Maricopa County has become. This publication was an act of love for those who volunteered to work on it and their devotion shines through on every page.

Catherine Waters

FEATURED PHOTO

AN APPARENT RED-BACKED JUNCO, *JUNCO HYEMALIS DORSALIS*, IN CALIFORNIA

KIMBALL L. GARRETT, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007; kgarrett@nhm.org

The Dark-eyed Junco (*Junco hyemalis*) is a highly variable songbird found over much of North America. Winter junco flocks in California are dominated by birds of the Oregon Junco subspecies group (with *J. h. thurberi* being the most widespread), but small numbers of Slate-colored Juncos (*J. h. hyemalis* and *J. h. cismontanus*) and more rarely Pink-sided Juncos (*J. h. mearnsi*) and Gray-headed Juncos (*J. h. caniceps*) also occur; the White-winged Junco (*J. h. aikeni*) has been documented at least four times (Patten et al. 1998, Wright 2019). Different mixes of these same subspecies groups, all of which had been considered full species at times in the past, can be found in winter over much of western North America.

A particularly interesting junco taxon is the Red-backed Junco (*J. h. dorsalis*). Originally described by Henry (1858) as a full species, *Junco dorsalis*, it has subsequently been treated as a subspecies of the Yellow-eyed Junco, *J. cinereus*, now *J. phaeonotus* (AOU 1886), as one of two subspecies of the Gray-headed Junco, *J. caniceps* (AOU 1945, 1957), or as part of the highly variable Dark-eyed Junco (AOU 1982 to present). *Junco h. dorsalis* breeds from the Hualapai Mountains of northwestern Arizona (pers. obs; Corman and Wise-Gervais 2005) across the Mogollon Rim region to the mountains of central and southern New Mexico and the Guadalupe Mountains of far western Texas (Miller 1941). An area of intergradation between *dorsalis* and *caniceps* is known from the Kaibab Plateau and south rim of the Grand Canyon in Arizona (Miller 1941, Monson and Phillips 1981), and intergrades are also recorded in the Zuni Mountain region of northwestern New Mexico (Miller 1941). This subspecies is generally sedentary or a short-distance elevational migrant, but it occasionally moves from fall through early spring into mountain ranges up to 300 km away from the breeding range. These include the Santa Catalina, Santa Rita, Pajarito, Huachuca, and Chiricahua mountains of southeastern Arizona, the Sandia Mountains of New Mexico, and the Chisos Mountains of western Texas (AOU 1957, Monson and Phillips 1981); such movements involve the crossing of expanses of lowland habitat. Sightings within the lowlands well away from the breeding range appear to be rare, but photo-documented occurrences include two birds south of Tubac, Santa Cruz Co., Arizona, 20 November 2020 (https://ebird.org/checklist/S76472005), one in urban Tucson, Pima Co., Arizona, 15 December 2020 (https://ebird.org/checklist/S77534915), one in the northwestern Tucson suburbs 30 November–1 December 2009 (https://ebird.org/checklist/S5596517), and at least five in El Paso, El Paso Co., Texas, between 4 October and 15 November 2020 (e.g., 25 October 2020; https://ebird.org/checklist/S75395142).

On 6 November 2020 I observed and photographed a bird that showed the traits of *dorsalis* at an urban park in Palmdale, Los Angeles Co., California. Domenic Massari Park (elevation 811 m; 34° 34′ 15″ N, 118° 01′ 50″ W) consists almost exclusively of lawns and turf-covered athletic fields, with numerous planted pines (*Pinus* sp.), plane trees (*Platanus* sp.), and other non-native landscape trees. The park is surrounded on three sides by housing tracts, with an expanse of disturbed native creosote bush–Joshua tree desert woodland to the north.

The junco associated loosely with a flock of Lark (*Chondestes grammacus*), Chipping (*Spizella passerina*), White-crowned (*Zonotrichia leucophrys gambelii*), Savannah (*Passerculus sandwichensis*), and up to three Clay-colored (*S. pallida*)

Figure 1. The pale throat is evident in this image from 6 November 2020, as is the entirely blackish culmen.

Photo by Kimball L. Garrett

Figure 2. A few chestnut feather tips are visible on the top of the crown, a feature that Miller (1941) found in only 1.7% of the specimens of *dorsalis* he examined.

Photo by Mark Scheel

sparrows along fence lines bordering turf athletic fields that were closed to entry and not closely mown. During the time it was present it was the only junco in the park. Additional photos were obtained by a number of observers between 6 and 9 November (see this issue's back cover, as well as Figures 1 and 2). It was looked for by several birders but not seen on 10 November or thereafter. The bird may have been present before the initial date, as this park received no coverage reported via https://eBird.org earlier in the fall of 2020.

This individual was clearly a Gray-headed Junco (in the sense of AOU 1957, including the subspecies *caniceps* and *dorsalis*) given the entirely gray body and bright reddish patch on the back. However, it differed clearly from the regularly occurring subspecies *caniceps* as follows and as shown in the photo on this issue's back cover and in Figures 1 and 2: (1) the bill was relatively large and long and extensively slaty along the entire culmen and upper sides of the maxilla; the remainder of the maxilla and the mandible varied in appearance from pale gray to pale pinkish-gray, depending on the lighting. (2) The shade of gray on the underparts was relatively pale, especially on the throat and lower belly, which could appear almost whitish in some lighting. (3) Perhaps because the head was a relatively pale gray, the blackish loral region was especially conspicuous. (4) The back patch appeared to be a brighter shade of red than in a typical *caniceps* and perhaps more extensive. In the field and various photographs the eyes appeared dark brown. Not assessed on this bird were additional morphological characters examined in specimens by Miller (1941), including overall size and the extent of white on the rectrices.

The Palmdale bird showed no rufous on the tertials and greater secondary coverts, but Miller (1941) found this character in only 3.9% of specimens of *dorsalis*; Miller showed that this occurrence of red in the wings is not the result of hybridization with the Yellow-eyed Junco, which always shows extensive rufous there. A few chestnut feather tips were visible on the crown (Figure 2); Miller (1941) found this character in 1.7% of *dorsalis*, but more frequently (6.2%) in *caniceps*.

Although the subspecies determination must remain putative in absence of a specimen, the characters shown by this bird suggest it represents the first well-documented occurrence of *dorsalis* in California. But there are two prior unpublished reports from California that might represent it. A bird reported in eBird at Lee Vining, Mono Co., on 28 May 2010 (but apparently found earlier) was documented with photos that suggest *dorsalis* but are insufficient to verify it (see https://ebird.org/checklist/S21744704). Another was photographed by Callyn D. Yorke at Glen Helen Regional Park in Devore, San Bernardino Co., 29 December 2014 (http://avconline.avc.edu/cyorke/fieldnotes/SanBernardinoCounty.html#dec29) without any accompanying description. Both of these individuals appear to show dark along the culmen, exceeding the extent expected in *caniceps* or *caniceps* × *dorsalis* intergrades (Miller 1941), but the photographs do not show sufficient detail of the bill, and other plumage characters are inconclusive.

In contrast to *dorsalis*, *caniceps*, the most morphologically similar taxon, is a rare but regular winter visitor over much of California, and has summered in easternmost California in the Grapevine Mountains of Inyo Co. and on Clark Mountain, San Bernardino Co. (Grinnell and Miller 1944). A hybrid Gray-headed × Oregon population from these ranges as well as the Argus, White, Inyo, and Panamint mountains, and portions of adjacent southwestern Nevada was given the name *mutabilis* by van Rossem (1931). Note that breeding range of *dorsalis* comes within 65 km of the California border in the Hualapai Mountains of Mohave County, Arizona, where it has been noted since at least 1993 (pers. obs.; Corman and Wise-Gervais 2005). This range also hosts a small population, established since 2009, of another bird species that has yet to be found in California—the Olive Warbler (*Peucedramus taeniatus*; https://ebird.org/checklist/S57573006; https://ebird.org/checklist/S23447783)—not to mention numerous Canyon Towhees (*Melozone fusca*), also unrecorded in California. It is of interest that most of the well-documented lowland records of *dorsalis* in southern Arizona and westernmost Texas are from October and November of 2020, an interval encompassing the occurrence at Palmdale. This could be due to a rapid increase in observers' awareness of this taxon, but more likely it suggests an environmental component to this vagrancy. National Weather Service data show the summer 2020 monsoon season to have been the driest on record across the breeding range of *dorsalis* (https://www.weather.gov/psr/2020MonsoonReview).

Recent molecular studies confirm an interesting position of the Red-backed Junco within the genus. Mila et al. (2007) and Friis et al. (2016) showed that the ancestral *Junco* was Central American, with the divergence of Yellow-eyed Juncos occurring as juncos spread northward through Mexico. The more northerly Dark-eyed Juncos (now all subsumed under *J. hyemalis*) then diverged, beginning with *dorsalis*, followed by *caniceps*, then by a rapid divergence and spread of the northern forms, including the widespread *oreganus* and *hyemalis* groups. In several plumage and structural traits (pale gray ventral plumage, bright reddish dorsal patch, extensive dark on maxilla of large bill, contrasting dark loral region) the Red-backed Junco is closer to the Yellow-eyed than to other Dark-eyed Juncos. Additionally, its relatively complex songs more closely resemble the songs of *phaeonotus* than the simpler trills of most of the Dark-eyed Juncos (Pieplow 2019). The close relationship of *dorsalis* to the Yellow-eyed Junco is further suggested by recent hybridization between the two taxa in the Big Burro Mountains in Grant Co., southwestern New Mexico, an area the Yellow-eyed has only recently colonized (M. Baumann pers. comm). No matter the taxonomic status of the Red-backed Junco, the documentation provided here adds a distinctive new taxon to California's avifauna.

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Photo by © Jonathan Vargas of Ensenada, Baja California, Mexico:
Tricolored Blackbird (*Agelaius tricolor*), Rancho Ciénega Redonda, Baja California, Mexico, 26 May 2021.

A sight that may not be possible in Mexico much longer: a female Tricolored Blackbird with food for its young, at the single site in the country where the species still nested in 2019. In this issue of *Western Birds*, Richard A. Erickson, Horacio de la Cueva, and Enrique D. Zamora-Hernández summarize the blackbird's history in Baja California, including the results of seven years of surveys encompassing 603 visits to 50 sites, of which 14 were occupied at various times. Factors associated with the steep decline include intensifying cycles of drought and changing agricultural practices. Food items identified from this and other photos taken the same day, by San Diego Natural History Museum entomologist Michael A. Wall, include grasshoppers (Acridoidea), antlions (Myrmeleontidae), and walking sticks (*Timema*).

“Featured Photo” by © Larry Sansone of Los Angeles, California: Red-backed Junco (*Junco hyemalis dorsalis*), representing the first well-supported record for California of this subspecies that breeds largely in the mountains of Arizona and New Mexico and typically disperses only short distances from its breeding range.