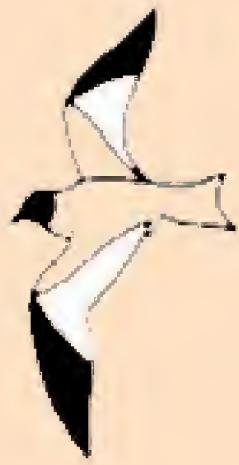


# WESTERN BIRDS



Vol. 45, No. 1, 2014

# *Western Specialty:* Western Screech-Owl



Photo by © Lance Benner of Altadena, California:  
Fledgling Western Screech-Owl (*Megascops kennicottii*)  
San Gabriel Mountains, Los Angeles County, California, 6 August 2013  
In the Western Screech-Owl, molt from this juvenile plumage into basic  
plumage may begin as early as late June and be concluded as late as early  
September.

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Front cover photo by © Randall Bruce of North Las Vegas, Nevada: immature Harris's Hawk (*Parabuteo unicinctus*), Boulder City, Nevada, 15 January 2012, one of four Harris's Hawks in the area that winter. A pair nested the following summer, the first known nesting of Harris's Hawk in Nevada.

Back cover "Featured Photo" by © Ken R. Schneider of San Francisco, California: hypermelanistic American Pipit (*Anthus rubescens*) at Menlo Park, California, 8 December 2013. Such excessive melanin in the plumage is an abnormality much less frequent than abnormal deficiency of melanin.

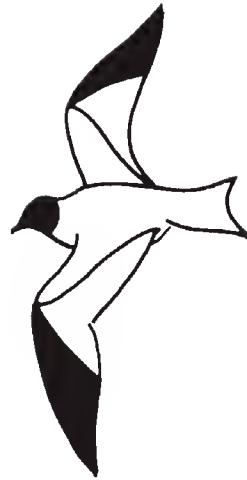
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*Western Birds* solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. The journal welcomes contributions from both professionals and amateurs. Appropriate topics include distribution, migration, status, identification, geographic variation, conservation, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for censusing, sound recording, and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but 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](mailto:avesalaska@gmail.com). For matters of style consult the Suggestions to Contributors to *Western Birds* (at [www.westernfieldornithologists.org/docs/journal\\_guidelines.doc](http://www.westernfieldornithologists.org/docs/journal_guidelines.doc)).

Good photographs of rare and unusual birds, unaccompanied by an article but with caption including species, date, locality and other pertinent information, are wanted for publication in *Western Birds*. Submit photos and captions to Photo Editor. Also needed are black and white pen and ink drawings of western birds. Please send these, with captions, to Graphics Manager.

# WESTERN BIRDS



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## 2012 NEVADA BIRD RECORDS COMMITTEE REPORT

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**ABSTRACT:** This report covers the 99 records reviewed by the Nevada Bird Records Committee in 2012, of which 87 were endorsed. These 99 records cover sightings from 1 June 1954 through 27 August 2012. One species is added to the Nevada list (and to the committee's review list): the Red-bellied Woodpecker (*Melanerpes carolinus*). Two species are removed from the review list because of the high number of records or regularity of occurrence. The Nevada state list now stands at 489 species, of which 164 are currently on the review list.

In 2012, the Nevada Bird Records Committee (NBRC) added 108 reports to its database. The committee completed reviews of 99 records during the year. Since the founding of the NBRC in 1994, 888 records have been reviewed, of which 813 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. Fortunately, founding secretary James Cressman and his wife Marian continued to accumulate documentation for "pre-committee" records. That accumulated documentation has been provided to the current committee, and one of our long-term goals is to organize and review as many of those records as possible. Of the 108 "new" reports received and added to the database in 2012, 13 precede the committee, dating as far back as 1 June 1954.

Of the 99 records reviewed by the committee in 2012, 37 were of birds found during 2012, 45 were of birds found in 2011, 12 preceded the committee's founding, and the remaining five were of birds found between 13 May 1995 and 22 December 2011. Reviewed records thus extended from 1 June 1954 to 27 August 2012. Of the 87 endorsed records, 71 were supported by photographs. Twelve records failed to gain endorsement. Of those 12, half were supported by photographs.

The NBRC has six voting members and a nonvoting secretary. In 2012, the committee welcomed new member Will Richardson, who joined continuing members John Klicka, Tim Lenz, Carl Lundblad, Dennis Serdehely, and Jeanne Tinsman. The position of secretary continues to be held by Martin

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Meyers. At the close of 2012, John Klicka and Tim Lenz rotated off the committee. They are replaced for 2013 by new member Aaron Ambos and returning member Greg Scyphers, who had rotated off the committee at the end of 2011. In addition, although Dennis Serdehely had reached the limit of his term at the end of 2012, the committee voted to reappoint him to a special two-year extension. This has the desired effect of balancing the terms so that in the future two members' three-year terms will expire each year.

The NBRC's website at <http://gbbo.org/nbrc> contains a statement of purpose, links to a downloadable submission form, the committee's bylaws, the Nevada state checklist maintained by the NBRC, the state review list, and answers to frequently asked questions. There is a link to a list of all submissions to the NBRC, with each record's status with respect to endorsement and, if available, a photograph. All previous NBRC reports are available through the website as PDF files. The 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. Beginning with the 2011 report, annual reports appear in *Western Birds*.

### REVISIONS TO THE NEVADA STATE LIST IN 2012

During the period covered by this report, one new species was added to the Nevada list, the Red-bellied Woodpecker (*Melanerpes carolinus*). This change brought the count of species recorded in Nevada to 489 at the end of 2012.

### REVISIONS TO THE NEVADA REVIEW LIST IN 2012

The only species the NBRC added during 2012 to the list of species it reviews was the one new to Nevada, Red-bellied Woodpecker. During 2012, the NBRC removed the Tennessee Warbler (*Oreothlypis peregrina*) and Swamp Sparrow (*Melospiza georgiana*) from the review list on the basis of total number of endorsed records, regularity of sightings, status in adjoining states, and the judgment of the members. There are currently 164 species on the Nevada review list, of which seven are exempt from review in some limited geographic area. Six of those seven exemptions are for very localized breeding populations. The seventh, the Broad-winged Hawk, is exempt in the Goshute Mountains, where multiple birds are observed annually in fall migration from a hawkwatch (Smith et al. 2008).

In addition, two subspecies are currently on the review list, the Eurasian Green-winged Teal (*Anas crecca crecca*) and Mexican Mallard (*A. platyrhynchos diazi*). Although the committee has reviewed (and endorsed) four records of *A. c. crecca*, we have not, as yet, reviewed any of the accumulating records for *A. p. diazi* and have decided to wait until there is more clarity on its issues of taxonomy and identification.

### SPECIES ACCOUNTS

For each species, the format is English name, scientific name, and (total number of endorsed records of the species, number of records endorsed in this year's report). Two asterisks after the total of records signify that the

## 2012 NEVADA BIRD RECORDS COMMITTEE REPORT

number of records refers to a restricted review period, usually that the species is no longer on the review list, was placed on the review list as a result of a perceived drop in population, or is exempt from review in some locations. Note that the total number of records for a species is not necessarily the total number of individual birds reported.

After the heading for the species comes each record of that species reviewed in 2012, in this format: NBRC record number, name of each submitter, date or range of documented dates, and location (county in parentheses). If the record involved multiple birds, the number follows the county designation. "(P)," "(V)," or "(A)" following a submitter's name indicates that he or she provided a photo, video, or audio recording, respectively. Discussion of a particular record follows that record's data. If there are multiple records of the species, the records are ordered by date of first sighting. Any discussion of the species in general, not specific to a record, concludes the account.

Certain records are noted as "establishing records," designating the first NBRC-endorsed record of a species. Early in its history, the NBRC adopted an existing checklist (Titus 1996) based on numerous sources that constituted the most reliable information available at the time. All but 28 of the species on the review list now have at least one endorsed record. The committee is pursuing documentation of these 28, and we have had some major success in this quest. However, it will probably be a few years before we conclude that we have exhausted all possibilities. At that time, we will reevaluate the status of those species still without an endorsed record.

BLACK-BELLIED WHISTLING-DUCK *Dendrocygna autumnalis* (4, 1). 2012-042, Marian Cressman (P), James Cressman, 18–31 May 1993, Henderson Bird Viewing Preserve (Clark). One of several examples in this year's report of our continuing effort to incorporate the wealth of "pre-committee" data into the NBRC's database.

BRANT *Branta bernicla* (4, 1). 2012-045, Bob Goodman (P), 18 May 1992, Anaho Island, Pyramid Lake (Washoe). While the very limited documentation on this bird was convincing as to species, the single distant photo did not permit determination of the subspecies. The Black Brant (*B. b. nigricans*) is the expected subspecies. The committee also has documentation of a sighting of Brant from Ash Meadows National Wildlife Refuge (NWR) (7 April 1996) that has yet to be reviewed. For perspective, Arizona endorsed two records of the Brant between 2005 and 2009 (Rosenberg 2011), while the Utah Bird Records Committee ([www.utahbirds.org/RecCom/RareBirdsIndex.html](http://www.utahbirds.org/RecCom/RareBirdsIndex.html)) lists a total of nine reports (1872 through 31 August 2008), of which it has endorsed three.

LONG-TAILED DUCK *Clangula hyemalis* (6\*\*, 2). 2011-096, NOT ENDORSED. 10 November 2011, Walker Lake (Mineral). This relatively distant, brief sighting by a single observer failed to convince two members on the first and second rounds.

2012-062, Michael Todd (P), Randall Michal (P), 11–13 November 2011, Henderson Bird Viewing Preserve (Clark).

2011-093, Edward Sivon (P), Deb Vogt, Randall Michal (P), 13–18 November 2011, Henderson Bird Viewing Preserve (Clark). The committee reviewed records 2012-062 and 2011-093 as a single record but on careful study of photos and written descriptions unanimously decided that they represented two different birds. Two members commented that 2011-093 was an adult female, while one stated that 2012-062 appeared to be an immature female.

RED-THROATED LOON *Gavia stellata* (5, 2). 2011-088, Randall Michal, Babette d'Amours (P), Aaron Ambos (P, Figure 1), 4–14 November 2011, Henderson Bird

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Figure 1. Juvenile Red-throated Loon in the Duck Creek area of the Clark County Wetlands Park, photographed 25 November 2011, one of three Red-throated Loons documented in Nevada in 2011.

*Photo by Aaron Ambos*

Viewing Preserve (Clark), juvenile. The bird was found dead on 14 November but collection was not possible.

2011-094, Debbie van Dooremolen (P), Aaron Ambos (P), 16–25 November 2011, Duck Creek section, Clark County Wetlands Park (Clark), juvenile.

BLUE-FOOTED BOOBY *Sula nebouxii* (2, 1). 2012-060, Bryan Wuerker (P, Figure 2), 21 August 2012, Boulder Canyon (Virgin Basin), Lake Mead National Recreation Area (NRA) (Clark). This bird was well photographed as it swam up to the observer's boat but was never seen again. The only previous NBRC-endorsed record is of one on 27 August 1971, also at Lake Mead NRA (Meyers 2011).

BROWN PELICAN *Pelecanus occidentalis* (5, 1). 2011-040, NOT ENDORSED. 24 June 2011, Smith Creek Dry Lake (Lander). Although all members considered it very unlikely that the observer misidentified a Brown Pelican, two members considered the documentation insufficient on the record's first round, and the final vote was 2–4.

2011-075, Andrew Lee (P), Randall Michal (P), Dennis Serdehely, Dave DesMarais (P), 18 September–22 October, 2011, Las Vegas Bay, Lake Mead NRA (Clark).

Las Vegas Bay at Lake Mead has been the location of three of Nevada's five endorsed records of the Brown Pelican. On 17 July 2004, there were 23 at that location (Meyers 2008). The committee also has on file unreviewed documentation of at least three other occurrences of the Brown Pelican at Lake Mead, in 1971, 1975, and 1992.

WHITE-TAILED KITE *Elanus leucurus* (12\*\*, 2). 2012-005, Morgan Peters, 10 January 2012, Pahrump (Nye).

2012-057, Bill Henry (P), 27 August 2012, Stillwater NWR (Churchill).

With this species continuing to breed successfully in the Pahranagat Valley (where it is exempt from review), and reports from around the state coming in regularly, the committee is considering removing it from the review list.

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Figure 2. This cooperative Blue-footed Booby (2102-060) was in the Boulder Canyon section of Lake Mead on 21 August 2012. It represents only the second record of the Blue-footed Booby the NBRC has endorsed, following the first in 1971 (Lawson 1973).

*Photo by Bryan Wuerker*

MISSISSIPPI KITE *Ictinia mississippiensis* (7, 2). 2011-080, Rick Fridell (P), 21 May 2003, Corn Creek (Clark).

2012-013, Debbie van Dooremolen (P), 16 May 2012, Clark County Wetlands Park (Clark).

Four of the seven endorsed records of this species are for May. There is one record each for June, July, and August.

HARRIS'S HAWK *Parabuteo unicinctus* (7, 2). 2011-014, Brian Day (P), 27 March 2011, Dufurrena Ponds, Sheldon NWR (Humboldt). Although the identification was never in question, this record required two rounds to achieve endorsement, as two members questioned the bird's origin on the first round. Excellent photos showed a juvenile with no signs of jesses or bands and no obvious feather damage. However, the location is in the extreme northwest corner of Nevada, quite far north for this species. No California record is nearly as far north (Hamilton et. al. 2007). However, there are records from locations in the interior of the U.S. at a latitude similar to that of Sheldon NWR, e.g., Stateline Island, Nebraska (Sharpe et.al. 2001), even slightly farther north. Furthermore, Sheldon NWR is in an extremely remote, very sparsely populated area where an escaped falconer's bird should be less likely than a natural wanderer. On the second round, it received five votes for endorsement.

2011-105, Maureen J. Kammerer (P), Randall Michal, Babette d'Amours (P), Aaron Ambos (P), Donna Crail-Rugotzke (P), Randall Bruce (P, Figure 3), Rob Lowry (P), Martin Meyers (P), Christina Nycek, 14 December 2011–17 January 2013, Boulder City (Clark), four birds (photographed together on 14 January 2012), two adults and two juveniles. On 10 May 2012, Nycek observed nestlings in a nest she had been following, the first known successful nesting of Harris's Hawk in Nevada.

2011-106, NOT ENDORSED. 20 December 2011, Las Vegas Wash (Vegas Valley Dr. to E. Rochelle) (Clark). The NBRC considered the documentation of this sighting too brief, although most thought it likely represented one of the birds from Boulder City.

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BROAD-WINGED HAWK *Buteo platypterus* (5\*\*, 1). 2012-037, Greg Scyphers (P), 23 September 2011, Pahranagat NWR (Lincoln).

AMERICAN GOLDEN-PLOVER *Pluvialis dominica* (3, 2). 2012-007, Greg Scyphers (P), 5 September 2011, Key Pittman Wildlife Management Area (WMA) (Lincoln).

2011-084, Ken Drozd (P), Martin Meyers, 8–9 October 2011, University Farms, Reno (Washoe).

The only American Golden-Plover endorsed by the committee before these two was found on 26 April 1997 (Baepler et.al. 1999). Three records for fall 2012 await review, as do some sightings antedating the committee's formation.

RUDDY TURNSTONE *Arenaria interpres* (4, 1). 2012-066, Jack Walters (P), 13 May 1995, Carson Lake (Churchill), 11 birds.

STILT SANDPIPER *Calidris himantopus* (7\*\*, 2). 2012-012, Andrew Lee (P), Greg Scyphers (P), 15–18 May 2012, Duck Creek area, Clark County Wetlands Park (Clark).

2012-014, Andrew Lee (P), 19 May 2012, Overton WMA (Clark).

This species was previously exempt from review in southern Nevada, defined as Clark, Esmeralda, Lincoln, and Nye counties (Elphick 2001). In September 2009, the committee voted to remove the exemption because of a dearth of reports in the south. Since then, three records from southern Nevada have been endorsed, and three more are still pending review.

RED PHALAROPE *Phalaropus fulicarius* (9, 2). 2011-107, Greg Scyphers (P), 25 August 2011, private property at Silver Peak (Esmeralda).

2011-098, G. Scott Clemson, Paul Lehman, Rose Strickland, 25–26 November 2011, Pahranagat NWR (Lincoln).

HEERMANN'S GULL *Larus heermanni* (10, 2). 2012-051, Hugh Judd (P, Figure 4), 19 May–8 June 1990, Lahontan Reservoir east (Churchill). Truly an amazing record! On 19 May 1990, the late Hugh Judd found an adult Heermann's Gull sitting on a nest with two eggs at Lahontan Reservoir. Returning on 26 May, he observed an adult California Gull (*L. californicus*) sitting on the nest, with the Heermann's nearby. On 3 June, Judd and Lynda Booth found both gulls attending one chick. The second egg was not present. On 8 June, the chick was not present, and no sign of it was ever seen after that. The only other known attempts of Heermann's Gull to nest north of Mexico, apparently unsuccessful, were at Alcatraz Island in San Francisco Bay 1979–1981 and at Shell Beach in San Luis Obispo County, California, in 1980 (Howell et. al. 1983). Hybridization of Heermann's Gull with any species is previously unreported, except for the mention of this observation by Chisholm and Neel (2002) and Howell and Dunn (2007).

2012-008, Fred Petersen (P, Figure 5), 19 April 2012, Virginia Lake, Reno (Washoe).

Six of Nevada's Heermann's Gull records are from spring, four from fall.

LESSER BLACK-BACKED GULL *Larus fuscus* (12, 2). 2012-003, Andrew Lee (P), Aaron Ambos (P), 14–29 January 2012, Las Vegas Bay, Lake Mead NRA (Clark).

2012-004, Andrew Lee (P), 27 January 2012, Las Vegas Bay, Lake Mead NRA (Clark).

GLAUCOUS GULL *Larus hyperboreus* (8, 1). 2011-103, Randall Michal, James Hulsey (P), 5 December 2011, Henderson Bird Viewing Preserve (Clark). Only the second southern Nevada record.

BLACK-LEGGED KITTIWAKE *Rissa tridactyla* (5, 2). 2012-033, Tracy Kipke (V), 18 April 2011, private property at Silver Peak (Esmeralda).

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2011-097, Greg Scyphers (P), Deb Vogt (P), 18–19 November 2011, Boulder Beach, Lake Mead NRA (Clark).

LEAST TERN *Sternula antillarum* (15, 3). 2012-021, Guadelupe Varela, Randall Michal (P), 26 May 2012, Henderson Bird Viewing Preserve (Clark).

2012-023, Anne Pelligrini (P), 30 May 2012, Overton WMA (Clark).

2012-031, William Pratt (P), 8 July 2012, Henderson Bird Viewing Preserve (Clark).

All Nevada records for this species fall between 29 April and 20 July.

POMARINE JAEGER *Stercorarius pomarinus* (2, 1). 2012-046, Bob Goodman (P), 26 June 1993, Lahontan Reservoir east (Churchill). The bird was initially thought to be a Parasitic Jaeger, but the photographs convincingly documented Nevada's second Pomarine Jaeger.

COMMON GROUND-DOVE *Columbina passerina* (4, 1). 2012-041, John Rogers (P), Sue Rogers, 27 July 2012, Caliente (Lincoln), 2 birds. This species was much more regular in southern Nevada through about the mid-1970s (Alcorn 1988). Multiple photos of 2012-041 permitted the committee to eliminate the similar Ruddy Ground-Dove (*C. talpacoti*) from consideration. While there are only two endorsed records of the Ruddy in Nevada, we have documentation of five additional older records still to review.

BLACK SWIFT *Cypseloides niger* (3, 1). 2012-038, Rick Fridell, 24 May 2012, Corn Creek (Clark). The three endorsed records of the Black Swift for Nevada extend from 27 April to 26 May.

RED-BELLIED WOODPECKER *Melanerpes carolinus* (1, 1). 2012-030, Leslie Scopes Anderson (P), 12 June 2012, Ruby Lakes N.W.R. north (Elko). Surely the biggest surprise of the year! Burton and Anderson (2013) published a complete account of this first record for Nevada.

YELLOW-BELLIED SAPSUCKER *Sphyrapicus varius* (7, 1). 2011-090, Paul Lehman, 30 October 2011, Pahranagat NWR (Lincoln).

GYRFALCON *Falco rusticolus* (1, 1). 2012-001, Bill Henry (P), Greg Scyphers (P, Figure 6), Meg Andrews, Rose Strickland, 13–16 January 2012, Stillwater NWR (Churchill). Although Titus (1996) listed the Gyrfalcon from Nevada on the basis of unpublished reports, this record is the first documented for the NBRC. Excellent photos and written reports from multiple observers made for a convincing establishing record.

GREATER PEWEE *Contopus pertinax* (1, 0). 2012-017, NOT ENDORSED. 20 May 2012, Henderson Bird Viewing Preserve (Clark). All the committee members agreed that the multiple photos and written description failed to eliminate other more likely, similar species.

LEAST FLYCATCHER *Empidonax minimus* (6, 0). 2012-002, NOT ENDORSED. 22 June 2004, Cottonwood Ranch (Elko). In early 2012, the observer provided the NBRC a paper he had written at the time of the observation that includes (but does not concentrate on) the sighting of a Least Flycatcher. He wrote some additional documentation in 2012, eight years after the sighting, and submitted a video that had some very faint sounds that were, according to the observer, vocalizations of the flycatcher. Even with considerable amplification of the vocalizations, however, most members thought that the video was unsatisfactory as evidence, and four members did not find the written documentation sufficient to endorse the sighting. Two of Nevada's six endorsed records of the Least Flycatcher are for the breeding season (Santa Rosa Mountains, 13 July 2010, and Ruby Valley, 19 June 2011) and featured a video recording of a singing bird (Meyers 2011, 2012).

WHITE-EYED VIREO *Vireo griseus* (5, 1). 2012-020, Meg Andrews, Andrew

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Figure 3. The first documentation of these Harris's Hawks was on 14 December 2011, although residents of the area in Boulder City related that at least two of the birds had been present well before that date. This photo was taken 14 January 2012. Christina Nycek monitored the birds throughout their stay and reported young in a nest on 10 May 2012, the first confirmed nesting of Harris's Hawk in Nevada.

*Photo by Randall Bruce*

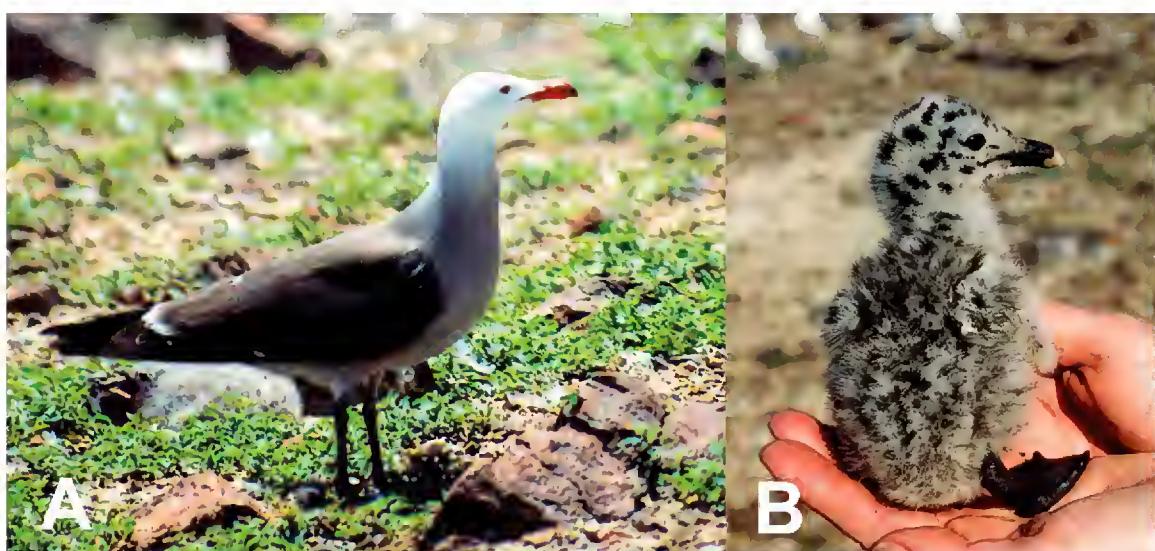


Figure 4. (A) Adult Heermann's Gull that mated with a California Gull at Lahontan Reservoir, Churchill County. The pair laid two eggs, but only one hybrid chick (B) was seen. It disappeared within a few days. This is the first evidence of hybridization of Heermann's Gull with any other species, far from its normal breeding range in Baja California.

*Photos by Hugh Judd*

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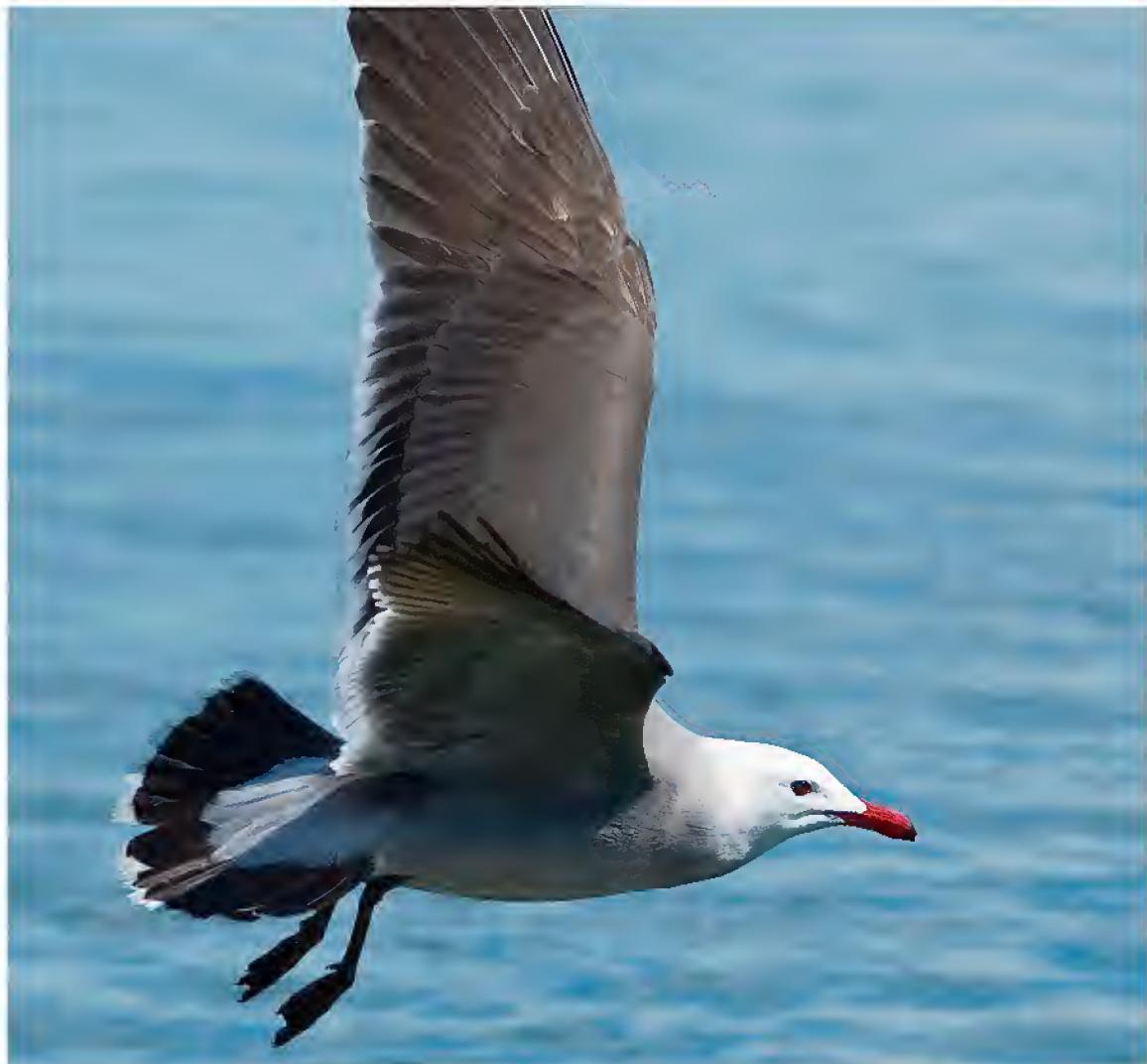


Figure 5. Heermann's Gull at Virginia Lake, Reno, 19 April 2012.

*Photo by Fred Petersen*

Howe, Andrew Lee (P), Rob Lowry (P), Rose Strickland, Dennis Ghiglieri (P), Randall Michal (P), 26–28 May 2012, Floyd Lamb Park (Clark). All five of Nevada's endorsed records of the White-eyed Vireo are from late May (18–28 May).

YELLOW-THROATED VIREO *Vireo flavifrons* (5, 1). 2011-036, Martin Meyers (P), 12 June 2011, Miller's Rest Stop (Esmeralda).

WINTER WREN *Troglodytes hiemalis* (2, 1). 2011-092, Rick Fridell (P,V), Greg Scyphers (P), Martin Meyers (P, Figure 7, V), Rose Strickland, Dennis Ghiglieri (P), Paul Lehman, 9–26 November 2011, Pahranagat NWR (Lincoln). This very cooperative bird was near at least three Pacific Wrens (*T. pacificus*), providing excellent opportunities to compare plumage and vocalizations. Submitted documentation included video recordings along with 14 photos and four written descriptions. The bird was found 11 years, to the day, after Nevada's first endorsed record of the Winter Wren (Meyers 2012).

BROWN THRASHER *Toxostoma rufum* (12, 1). 2012-027, Fred Welden (P), Greg Scyphers (P), 15–18 June 2012, Miller's Rest Stop (Esmeralda). This is the third endorsed record of the Brown Thrasher from Miller's Rest Stop, a well-known migrant trap, and another report from the same location is pending review. The most surprising of these records was from 4 July 2011, as this location rarely holds any

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birds beyond the House Sparrow (*Passer domesticus*) and Rock Pigeon (*Columba livia*) during the heat of midsummer.

McCOWN'S LONGSPUR *Rhynchophanes mccownii* (4, 1). 2011-063, Greg Scyphers (P), 25 February 2011, Dyer (Esmeralda).

SNOW BUNTING *Plectrophenax nivalis* (2, 1). 2011-099, Kerry Ross, 23 October 2011, Mt. Pisgah, Goshute Mts. (Elko). Excellent written description and field sketch resulted in a unanimous vote for endorsement of this bird, which flew past the Goshutes Hawk Watch with a small flock of Gray-crowned Rosy-Finches (*Leucosticte tephrocotis*).

WORM-EATING WARBLER *Helmitheros vermivorum* (12, 2). 2012-044, John Brack (P), Jane Thompson (P), 14–16 October 1993, Miller's Rest Stop (Esmeralda). 2012-034, Greg Scyphers (P), 18 May 2012, Corn Creek (Clark).

GOLDEN-WINGED WARBLER *Vermivora chrysoptera* (4, 1). 2012-053, found by Richard Yank (former *American Birds* regional editor for Quebec), reported by Michael Patten and Paul Lehman, 27–29 May 1990, Dyer (Esmeralda). For some years, Dyer and Lida (both in Esmeralda County) were on the route of many vagrant-seeking California birders visiting the Death Valley region over the Memorial Day weekend.

BLUE-WINGED WARBLER *Vermivora cyanoptera* (5, 1). 2012-018, Andrew Lee (P), 24 May 2012, Floyd Lamb Park (Clark). Four of the five records for this species are from spring (17 May to 12 June); the lone fall record is dated 19 September.

PROTHONOTARY WARBLER *Protonotaria citrea* (14\*\*, 1). 2011-087, Rick Fridell (P), 16 September 2004, Lida (Esmeralda). This species was removed from the review list in September 2009, but the committee continues to review sightings preceding the removal date.

TENNESSEE WARBLER *Oreothlypis peregrina* (17\*\*, 7). 2011-029, Andrew Lee (P), 23 May 2011, Red Rock Canyon National Conservation Area (Clark).

2011-108, Greg Scyphers (P), 30 May 2011, Dyer (Esmeralda).

2011-109, Greg Scyphers (P), 8 September 2011, Floyd Lamb Park (Clark).

2011-113, Greg Scyphers, 11 September 2011, Dyer (Esmeralda).

2011-112, Greg Scyphers, 8 October 2011, Dyer (Esmeralda).

2012-039, Rick Fridell (P), 25 May 2012, Miller's Rest Stop (Esmeralda).

2012-022, Andrew Lee (P), 30 May 2012, Floyd Lamb Park (Clark).

Species removed from review list, 7 December 2012.

CONNECTICUT WARBLER *Oporornis agilis* (3, 1). 2011-068, Andrew Lee (P), Chris Ruiz-Gardner (V), Greg Scyphers (P, Figure 8), 3–4 September 2011, Floyd Lamb Park (Clark). While the identification was overwhelmingly supported by the written descriptions and excellent photos, the video of this chunky bird walking around on the ground snatching food from the leaf litter and low branches made the review process more enjoyable than usual.

CAPE MAY WARBLER *Setophaga tigrina* (4, 1). 2012-043, James Cressman, Marian Cressman (P), 3 October 1992, Corn Creek (Clark).

CERULEAN WARBLER *Setophaga cerulea* (1, 1). 2012-061, Mrs. E. Boyland (P), 1 June 1954, Boulder Beach, Lake Mead NRA (Clark). This is the establishing record of the Cerulean Warbler for Nevada, based on specimen 2427 at the Barrick Museum of Natural History (University of Nevada Las Vegas). The bird was found dead along the shore of Lake Mead, but the specimen is in reasonably good condition, apparently found fairly soon after its death (G. Scyphers pers. comm.)

2012-015, NOT ENDORSED. 19 May 2012, Corn Creek (Clark). Although the written description included some features that suggested the Cerulean Warbler, the details were insufficient to support the identification of this extreme, and declining, rarity.

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Figure 6. Adult Gyrfalcon of the gray morph found by Bill Henry at Stillwater NWR, 15 January 2012.

*Photo by Greg Scyphers*



Figure 7. Nevada's second endorsed Winter Wren was extensively photographed and audio and video recorded during its stay in a heavily wooded area at the north end of Pahranagat NWR (photo 11 November 2011). The overall paler color, especially of the throat and breast, helped to distinguish the bird from several Pacific Wrens present in the same area, but the opportunity to compare call notes provided the best identification criterion.

*Photo by Martin Meyers*

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Figure 8. Nevada's third endorsed Connecticut Warbler at Floyd Lamb Park, Las Vegas, 3–4 September 2011, the first to be documented with video.

*Photo by Greg Scyphers*



Figure 9. Third Bronzed Cowbird documented for Nevada, near Beatty, Nye County, 19 May–21 June 2011. A male, it displayed repeatedly to the many female Brown-headed Cowbirds in the area.

*Photo by Deb Vogt*

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BLACKBURNIAN WARBLER *Setophaga fusca* (5, 1). 2011-102, Greg Scyphers (P), Martin Meyers (P), 23–25 September 2011, Pahranagat NWR (Lincoln).

CHESTNUT-SIDED WARBLER *Setophaga pensylvanica* (16\*\*, 1). 2011-071, Diane Wong, 13 September 2011, Pahranagat NWR (Lincoln). Species dropped from the review list 11 days after this sighting.

PALM WARBLER *Setophaga palmarum* (16\*\*, 1). 2011-073, Fred Petersen (P), 16 September 2011, Miller's Rest Stop (Esmeralda). Species removed from the review list eight days after this sighting.

YELLOW-THROATED WARBLER *Setophaga dominica* (5, 1). 2011-035, Martin Meyers (P), 11 June 2011, Dyer (Esmeralda). Of the five previously endorsed records, three are from spring (22 April 1977, 18 May 2003, and 11 June 2011), one is from fall (24 October 1979), and one is from midwinter (2–8 January 2011.)

PRAIRIE WARBLER *Setophaga discolor* (7, 2). 2012-050, John Brack, 16 May 1993, Lida (Esmeralda).

2011-072, Fred Petersen (P), 13 September 2011, Dyer (Esmeralda). Birders who frequent the California coast in fall, where this species occurs annually, might be surprised at its extreme scarcity in Nevada. However, the bird is also casual in the interior of California. “The great majority of California records involve fall vagrants along the coast” (Hamilton et. al. 2007), and Utah has only three endorsed records ([www.utahbirds.org/RecCom/RareBirdsIndex.html](http://www.utahbirds.org/RecCom/RareBirdsIndex.html)).

BLACK-THROATED GREEN WARBLER *Setophaga virens* (3, 1). 2012-032, Greg Scyphers (P), 22 October 2011, Pahranagat NWR (Lincoln). All three NBRC-endorsed records are from fall, between 30 September and 6 November.

CANADA WARBLER *Cardellina canadensis* (4, 1). 2012-047, John Brack, 8 September 1993, Dyer (Esmeralda). Three of the four NBRC-endorsed records are from September, the fourth being a spring record (30 May 2009). In California, roughly 90% of the 250+ records are from the fall, and of those, “coastal records strongly predominate” (Hamilton et. al. 2007). Utah has only one endorsed record ([www.utahbirds.org/RecCom/RareBirdsIndex.html](http://www.utahbirds.org/RecCom/RareBirdsIndex.html)).

PAINTED REDSTART *Myioborus pictus* (7, 2). 2011-025, Carolyn Titus, Dennis Ghiglieri (P), 7 May 2011, Corn Creek (Clark).

2012-028, John C. Ruckdeschel, 16 June 2012, Summerlin (Las Vegas) (Clark).

CLAY-COLORED SPARROW *Spizella pallida* (11, 3). 2012-025, Deb Vogt (P), 27 April 2012, Henderson Bird Viewing Preserve (Clark).

2012-011, Andrew Lee (P), 12 May 2012, Floyd Lamb Park (Clark).

2012-019, Andrew Lee (P), 24 May 2012, Floyd Lamb Park (Clark).

SWAMP SPARROW *Melospiza georgiana* (14\*\*, 2). 2012-010, Van Remsen, Jeanne Tinsman, Greg Scyphers, 19 February–19 March 2012, Duck Creek area, Clark County Wetlands Park (Clark).

2012-035, Greg Scyphers (P), 20 May 2012, Corn Creek (Clark).

2012-055, NOT ENDORSED. 17 August 2012, Ruby Mountains (Elko).

Species removed from the review list, 7 December 2012.

HEPATIC TANAGER *Piranga flava* (1, 0). 2011-034, NOT ENDORSED. 7 June 2011, Henderson Bird Viewing Preserve (Clark). Video of this bird was insufficiently clear to identify the Hepatic Tanager. Several members and some outside experts thought the voice recording in the video to match the Summer Tanager better than the Hepatic.

2012-024, NOT ENDORSED. 5 May 2012, Spring Mountain Ranch State Park (Clark), 2 birds. The documentation made a stronger case for the Summer Tanager (expected at that location) than for the Hepatic.

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2012-026, NOT ENDORSED. 5 May 2012, Corn Creek (Clark). Although the written documentation suggested the Hepatic Tanager, the accompanying photograph, taken in deep shade, did not provide enough additional support for the record to receive endorsement.

Nevada still has only one endorsed record of the Hepatic Tanager, one photographed at the famed migrant trap Miller's Rest Stop on 29 September 2002 (Cochran 2006). Though Austin and Bradley (1971) described the Hepatic Tanager as a "summer resident," and Alcorn (1988), on the basis of notes of C. S. Lawson, called it an "uncommon to rare breeding species," it went totally unrecorded during field work for the Nevada breeding bird atlas (Floyd et.al. 2007). The committee has documentation for four old records yet to be reviewed.

SCARLET TANAGER *Piranga olivacea* (7, 2). 2011-086, Andrew Lee (P), 16 October 2011, Spring Mountain Ranch S. P. (Clark).

2011-095, Paul Lehman (P), 26 November 2011, Coyote Springs (Lincoln).

With the exception of one in May, all of Nevada's seven endorsed records of the Scarlet Tanager are for fall,

NORTHERN CARDINAL *Cardinalis cardinalis* (2, 0). 2011-089, NOT ENDORSED. 22 December 2010, Shantytown, Ruby Lake NWR (Elko). None of the committee members questioned the identification, as photographs clearly established the bird's identity as a male Northern Cardinal and ruled out the similar Pyrrhuloxia (*C. sinuatus*), for which there is one NBRC-endorsed record. Two committee members voted not to endorse this record because of concerns about the bird's possibly being an escapee. Although the location is remote and sparsely populated, it is far from any known wild population. If the documentation had been sufficient to identify the subspecies, that might have influenced some members. Five (of six) votes are needed for endorsement. A record receiving four votes for endorsement on the first round is circulated for a second round. If there is no change in the vote totals (or a change away from endorsement), the record is considered complete and not endorsed.

PAINTED BUNTING *Passerina ciris* (8, 2). 2011-062, Greg Scyphers, 30 May 2011, Dyer (Esmeralda).

2011-110, Greg Scyphers (P), 11 September 2011, Dyer (Esmeralda). Endorsed records of this species are evenly divided between spring and fall.

DICKCISSEL *Spiza americana* (5, 2). 2011-023, Andrew Lee (P), 22 April 2011, Floyd Lamb Park (Clark).

2011-111, Greg Scyphers (P), 10 September 2011, Ash Meadows NWR (Nye).

COMMON GRACKLE *Quiscalus quiscula* (14, 3). 2012-049, Robert Rucker, 13 September 1992, Pahranagat NWR (Lincoln).

2012-048, John Brack, 15 May 1993, Warm Springs township (Nye).

2011-114, Rob Lowry (P), 29 December 2011, Riverview Park (Carson City).

BRONZED COWBIRD *Molothrus aeneus* (3, 1). 2012-016, Laura Cunningham (P), Darlene Feener (P), Rob Lowry (P), Deb Vogt (P; Figure 9), Dennis Serdehely, Martin Meyers (P), 19 May–21 June 2012, Parker Ranch (private) (Nye). This very cooperative male displayed to surrounding Brown-headed Cowbirds (*M. ater*) for over a month, providing opportunities for many Nevada birders to observe and photograph it. Thanks to Laura Cunningham for providing birders with access to the property while the bird was present.

ORCHARD ORIOLE *Icterus spurius* (8, 1). 2011-074, NOT ENDORSED. 17 September 2011, Floyd Lamb Park (Clark). This record was supported by five photographs and considerable written detail. However, two members thought that such critical identification features as bill length/shape and tail length were somewhat ambiguous, failing to eliminate a female or juvenile Hooded Oriole (*I. cucullatus*) completely. Juvenile Hooded Orioles are a source of confusion in late summer and early fall.

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2012-029, Randall Michal, 19 June 2012, Henderson Bird Viewing Preserve (Clark). A written description of a male Orchard Oriole received unanimous support.

COMMON REDPOLL *Acanthis flammea* (4, 2). 2011-104, Jesse Swift (P), 8 December 2011, Apex (Clark).

2012-006, Dennis Serdehely, Greg Scyphers (P), 10 January 2012, Fernley (Lyon).

These two records in winter 2011–2012 were the first of the Common Redpoll in Nevada since December 2003. They turned out to be a mere hint of things to come, as the winter of 2012–2013 brought eight submitted records documenting 35 individual birds (pending review). Similar invasions were noted in neighboring states as well.

### CORRIGENDA

Corrections to 2011 Annual Report: Thayer's Gull (*Larus thayeri*, 2011-007): date range should be 8–19 February 2011. Arctic Tern (*Sterna paradisaea*, 2010-084): date range should be 11–14 October 1990. Prairie Warbler (*Setophaga discolor*, 2010-064): date range should be 31 October–6 November 2010. Lark Bunting (*Calamospiza melanocorys*, 2011-077): date range should be 17–18 September 2011. Lawrence's Goldfinch (*Spinus lawrencei*, 2010-048) date range should be 5–19 September 2010. The statement, "There are currently 167 species on the Nevada review list" should be "There are currently 165 full species on the Nevada review list, plus two subspecies."

### ADDENDUM

To 2011 Annual Report: Worm-eating Warbler (*Helmitheros vermivorum*, 2011-010): date range is expanded to 26 September–8 October 2010 because of the committee's decision to consider the sighting on 8 October (Rick Fridell, Pahranagat NWR) to represent persistence of the individual initially reported 26 September.

### ACKNOWLEDGMENTS

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# ELEVATIONAL RANGES OF BIRDS ALONG CALIFORNIA'S PACIFIC CREST TRAIL

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**ABSTRACT:** Climate change is predicted to affect the ranges of montane birds differently, depending on their ecological adaptations to regional conditions. Detailed regional data on species' distributions from a systematic survey are crucial for tracking these range shifts and for guiding conservation decisions. We systematically completed 3578 point counts along a 2736-km mega-transect by following the Pacific Crest Trail (PCT) from 2 April to 8 September 2006. On this basis, we describe the elevation ranges of 74 common bird species and their habitats along the PCT by five segments: southern California, southern and northern Sierra Nevada, southern Cascade Range, and Klamath Mountains. We also identify potential sampling bias caused from seasonal variation in the detectability of birds by region. This assessment of bird distributions over a wide range can permit future efforts to gauge the responses of large numbers of common birds to land use and climate change.

California is a state with great topographic relief, dominated by mountain ranges oriented largely north–south, and supports a rich avifauna. The elevational ranges of montane species are determined by many factors, including past and present climate, topography, biological interactions, habitat distribution, and patterns of human disturbance (Lee et al. 2004, Ruggiero and Hawkins 2008, Tingley et al. 2009). Many of these factors vary across California's distinctive mountain regions, so many birds' ranges are determined by intrinsic regional conditions.

Data over the past 100 years show that birds of the California cordillera are particularly sensitive to climate changes (Tingley et al. 2009). Depending on their climate niche, many species have moved upslope or downslope in response to changes in temperature and precipitation, and this response may vary in neighboring regions (Tingley et al. 2012). By the end of the 21<sup>st</sup> century, the average annual temperature throughout California is expected to increase by 2 to 5 °C (Snyder et al. 2002, Cayan et al. 2012). Additionally, although there is less agreement among climate modelers about the direction of change in precipitation (IPCC 2007), rain is expected to be more frequent than snow, resulting in a reduced snowpack, especially in the Sierra Nevada (Hayhoe et al. 2004, Cayan et al. 2012). This reduction is expected to change vegetation structure and plant-species composition profoundly, a change already underway (Thorne et al. 2008, Dolanc et al. 2013). Hayhoe et al. (2004) predicted a conversion of 50 to 90% of subalpine and alpine habitats by the year 2099.

In addition to climate change, change in human land use can shape the patterns of species' distributions on mountains (Lee et al. 2004, Nogues-Bravo et al. 2008). On the California cordillera, habitat alteration has played a significant role in reducing species richness, particularly at the lower elevations (Forister et al. 2010). As California's population expands

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from 37.3 million (2010) to a projected 59.3 million in 2050 (Sanstad et al. 2009), continued development of housing, roads, and resources will likely further stress montane birds (Strasser and Heath 2013) already coping with climate change.

These disturbances increase the need for systematically recorded data on bird distributions to inform management (Tingley and Beissinger 2009). As yet, few studies have documented the occurrence of birds in remote mountainous regions systematically (Siegel et al. 2011, 2012). We recorded birds by point counts and assessed habitat along a single, continuous mega-transect and documented their elevational ranges and habitats by five adjoining segments of the Pacific Crest National Scenic Trail (PCT).

## METHODS

### Study Area

The PCT extends along mountain ranges from Mexico to Canada, traversing California, Oregon, and Washington. It is a recreational and scenic trail reserved for hiking and equestrian use that crosses remote areas. We hiked the California portion of the PCT (2736 km), which served as a mega-transect for a survey of birds every 10 minutes walked. This route spanned nine degrees in latitude ( $32.58^{\circ}$  N to  $42.00^{\circ}$  N) and elevations from 365 m (San Gorgonio Pass in southern California) to 4020 m (Forester Pass in the southern Sierra Nevada). Varying locally with elevation, precipitation generally increases from south to north along the PCT. The Transverse and Peninsular Ranges of southern California receive the least amount of precipitation, where annual precipitation ranges from 15 to 102 cm. In the Klamath Mountains of northwestern California, annual precipitation ranges from 46 to 305 cm (Miles and Goudey 1997). We used topographic, climatic, and biogeographic features to divide this PCT mega-transect into five segments: southern California mountains ("SoCa"), southern Sierra Nevada ("SoSN"), northern Sierra Nevada ("NoSN"), southern Cascade Range ("Casc"), and Klamath Mountains ("Klam") (Figure 1). With some modification, this delineation agrees with boundaries of natural regions defined by Schoenherr (1992), Small (1994), and Miles and Goudey (1997). The wide range of habitats along the PCT is due to the trail's elevation as well as the mountains' topography. The extent of the elevation gradient sampled differed for each region, so our transect should not be considered representative of the entire range of elevations but only of the habitats along the PCT.

### Data Recording

Stopping at 10-minute intervals while walking along the PCT, McGrann counted birds for 5 minutes within a radius of 50 m, estimated visually, and avoided counting any bird that may have been recorded at a previous plot. The distance between plots, ~500–700 m, depending on terrain, was greater than the 250-m minimum recommended by Ralph et al. (1995), reducing the potential for duplicate counts of individuals. We excluded from analysis all birds observed beyond 50 m and those flying above the vegetation canopy, apparently not foraging, displaying, or behaving in a way that

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Figure 1. The route of the Pacific Crest Trail (black line) through California, showing the five regions by which the results of point counts are analyzed and their dates of survey in 2006.

suggested use of the habitat below. By visual assessment, Amy McGrann classified the habitat in each plot according to the scheme of the California Wildlife Habitat Relationship System (CWHR; [www.dfg.ca.gov/biogeodata/cwhr/wildlife\\_habitats.asp](http://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp)). Additionally, we recorded the time, date, and geographic coordinates of each point count. We did not count in inclement weather, and on one occasion a snow storm forced the observers off the PCT, resulting in a gap of approximately 15–20 km along the transect in southern California. Otherwise, our mega-transect was complete in a single field season, yielding 3578 plots along the PCT in California.

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### Timing of Surveys

To maximize our data, we followed the recommendations for point counts of Ralph et al. (1995) except for time of day and season. Instead of being restricted to the morning, surveys extended from dawn to dusk. As birds' singing generally declines in the late morning and afternoon, our counting through the day may introduce a source of bias. However, the influence of any such bias on our calculations of species' distributions by region should be minimal because the proportion of counts before 10:30 in each region was similar (SoCa: 30%, SoSN: 31%, NoSN: 31%, Casc: 30%, and Klam: 32%). Furthermore, seasonal variation in vocalizing may have influenced the detectability of species in different regions because we did not restrict counts to the breeding season but instead continued them from 2 April to 8 September. To complete surveys when the PCT was mostly free of snow, we surveyed each region separately: SoCa (2 April–27 May), SoSN (29 May–20 June), NoSN (8 August–8 September), Casc (26 June–20 July), and Klam (20 July–4 August). By reviewing Small (1994) and [www.ebird.org](http://www.ebird.org), we assessed whether each species' observed distribution along the PCT represented its summer range, or may have been significantly reduced by cryptic post-breeding behaviors, may have represented primarily latitudinal or elevational migrants, or may have represented primarily birds in their winter ranges.

### Data Analysis

We used the spatial analyst extension in ArcGIS (version 10, Environmental Systems Research Institute, Redlands, CA) to extract elevation from the National Elevation Dataset (resolution 10 m; U. S. Geological Survey, <http://ned.usgs.gov>) for each GPS-recorded survey point.

We calculated birds' elevational distribution in each region by methods similar to those of Siegel et al. (2011, 2012). The basis was data from 1126 plots in SoCa (mean elevation of point counts 1495 m, range 363–3195 m), 486 in SoSN (mean 2286 m, range 1164–3661 m), 877 in NoSN (mean 2735 m, range 1904–3662 m), 687 in Casc (mean 1584 m, range 662–2312 m), and 402 in Klam (mean 1771 m, range 428–2331 m).

Next, we categorized each species detected at least 20 times in at least one region as detected or not detected at each plot in that region. We then calculated summary statistics to describe the elevations at which the species was detected in each of the five regions, including the mean elevation of detection as well as the range encompassing 95% of the detections (lowest and highest 2.5% of detections excluded), calculated with the quantile function (Hyndman and Fan 1996) in R version 2.15.1.

Using the “beanplot” package in R (Kampstra 2008), we graphed the distributions of survey plots with and without detections for common species (at least 20 detections in at least one region) to ensure a sample large enough for a beanplot to be built (Siegel et al. 2011, 2012). Beanplots employ a density trace and depict a species' distribution along an elevational gradient. The density trace illustrates the relative difference in the density of detections or non-detections along the elevation gradient. The width of the density trace (the x axis) is determined by the sample size, the spread

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of data points along the gradient, and a bandwidth parameter, whose value we determined by the method of Sheather and Jones (1991). The asymmetrical beanplots display the distribution of plots with detections next to the distribution of plots without detections. The differing shapes of the density traces on either side of the beanplot's *y* axis are not complementary and thus do not represent the ratio of detections to non-detections. Rather, they represent the proportion of detection or non-detections with respect to entire distribution of locations (of detection or non-detection pooled) along the elevation gradient (Siegel et al. 2011).

We employed an identical procedure to illustrate the distributions of the habitats noted at each plot. Again, the only habitats analyzed are those recorded at least 20 times in one region.

## RESULTS

### Bird Distributions

Many California birds commonly move upslope after breeding (Grinnell 1908, Siegel et al. 2011). We made no attempt to locate nests and could not verify whether birds detected on point counts were local breeders. Thus our results should be interpreted as birds' summer ranges rather than strictly breeding ranges. Figure 2 depicts the densities of detection and non-detection by elevation for each species meeting our criterion of 20 plots with detections in at least one region. Seventy-four species met this criterion, including 69 in SoCa, 65 in SoSN, 47 in NoSN, 59 in Casc, and 49 in Klam (see Table 1 for mean elevations and ranges). The observed distributions of 12 species may have been influenced by the timing of the survey, detections of migrants, or detections of birds still in their winter ranges (Figure 2). These species excluded, 30 species occurred in all regions, and of these 30 species, the elevational means of 24 (80%) were higher across all three southern regions (SoCa, SoSN, NoSN) than in either of the two northern regions (Casc and Klam). In part, these differences are due to regional variation in the elevations sampled and may also reflect the distributions of forest habitats optimal for these birds (see Habitat Distributions below).

The ranges of several lower-elevation species lay primarily below the mean elevation of all point counts along the PCT (1954 m), while several higher-elevation species occurred primarily above this elevation. These included eight low-elevation species detected only in the two most southern regions (SoCa and SoSN): the California Quail, Costa's Hummingbird, California Thrasher, California Towhee, Black-chinned Sparrow, Lark Sparrow, Black-throated Sparrow, and Bell's Sparrow (see Figure 2 for scientific names); their ranges tended to correspond with distributions of desert scrub and chaparral (Figure 3). Additionally, we detected the Horned Lark only in SoCa at low elevations, in association with annual grassland—none in the Sierra Nevada along the PCT, perhaps reflecting the species' negative trend in Sierra Nevada according to data from the Breeding Bird Survey over 45 years (Sauer et al. 2012). Bewick's Wren and Wrentit, common in chaparral in SoCA, were also confined to lower elevations but occurred across a wider latitudinal range along the PCT, being noted in regions SoCa, SoSN,

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and Casc. The ranges of the Acorn Woodpecker and Oak Titmouse, also restricted to lower elevations in these regions, corresponded with montane hardwood-conifer and montane hardwood habitats. Three species were restricted to high elevations; the range of Clark's Nutcracker corresponded with subalpine conifers, particularly in SoCa, and the Gray-crowned Rosy-Finch and American Pipit (*Anthus rubescens alticola*) were confined almost entirely to the alpine dwarf-shrub and barren habitats at the highest elevations of regions SoSN and NoSN. The American Pipit was detected on just 14 plots so is not included in Figure 2.

### Habitat Distributions

Twenty-one CWHR habitats met our criterion of occurring on 20 survey plots in at least one region (Figure 3). The xeric grass and shrub habitats (annual grassland, desert scrub, chamise-redshank chaparral, mixed chaparral, and sagebrush) occurred most frequently below 1954 m (the mean elevation of all points) in the two southernmost regions (SoCa and SoSN), whereas woodland and more mesic habitats (montane hardwood, montane hardwood-conifer, and Douglas-fir) occurred more frequently below 1954 m in the two northernmost regions (Casc and Klam). Montane riparian forest was frequent along streams and at springs below 1954 m in the SoCa region and sporadic elsewhere along the PCT. Where the PCT traversed drier and east-facing slopes, frequent woodland habitats were juniper, pinyon-juniper, and Joshua tree. At middle to upper elevations of all five regions, montane chaparral and several forest habitats were common (Jeffrey pine, mixed conifer, white fir, red fir, lodgepole pine, and subalpine conifer); their mean elevations in the two northernmost regions were lower than in the three southernmost regions. The alpine dwarf-shrub and barren (i.e., devoid of vegetation) habitats were found only at the highest elevations along the PCT, predominantly in regions SoSN and NoSN, to a lesser extent in Klam.

## DISCUSSION

Systematic surveys of California's mountains, including Grinnell's historic transects (e.g., Grinnell 1908, Grinnell and Storer 1924) and the recent efforts of Siegel et al. (2011, 2012), have proven invaluable to avian ecology and conservation. Our mega-transect represents the first systematic survey of bird diversity along the entire PCT in California. In the five regions we defined, species' distributions differed notably. Furthermore, certain species had narrow elevational ranges at both extremes of the gradient. Elevational range is an important predictor of montane species' risk of extinction (Seker-cioglu et al. 2008, La Sorte and Jetz 2010). Low-elevation species with limited ranges may be more susceptible to land-use change (Lee et al. 2004, Forister et al. 2010) but may have an opportunity to disperse to higher elevations in response to climate change. Of particular conservation concern are species confined to high elevations, generally much smaller in extent than low-elevation zones (McCain 2007). Species restricted to these areas may have limited opportunities to disperse laterally to neighboring alpine habitats (La Sorte and Jetz 2010). Because of their narrow and isolated ranges, two

ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL

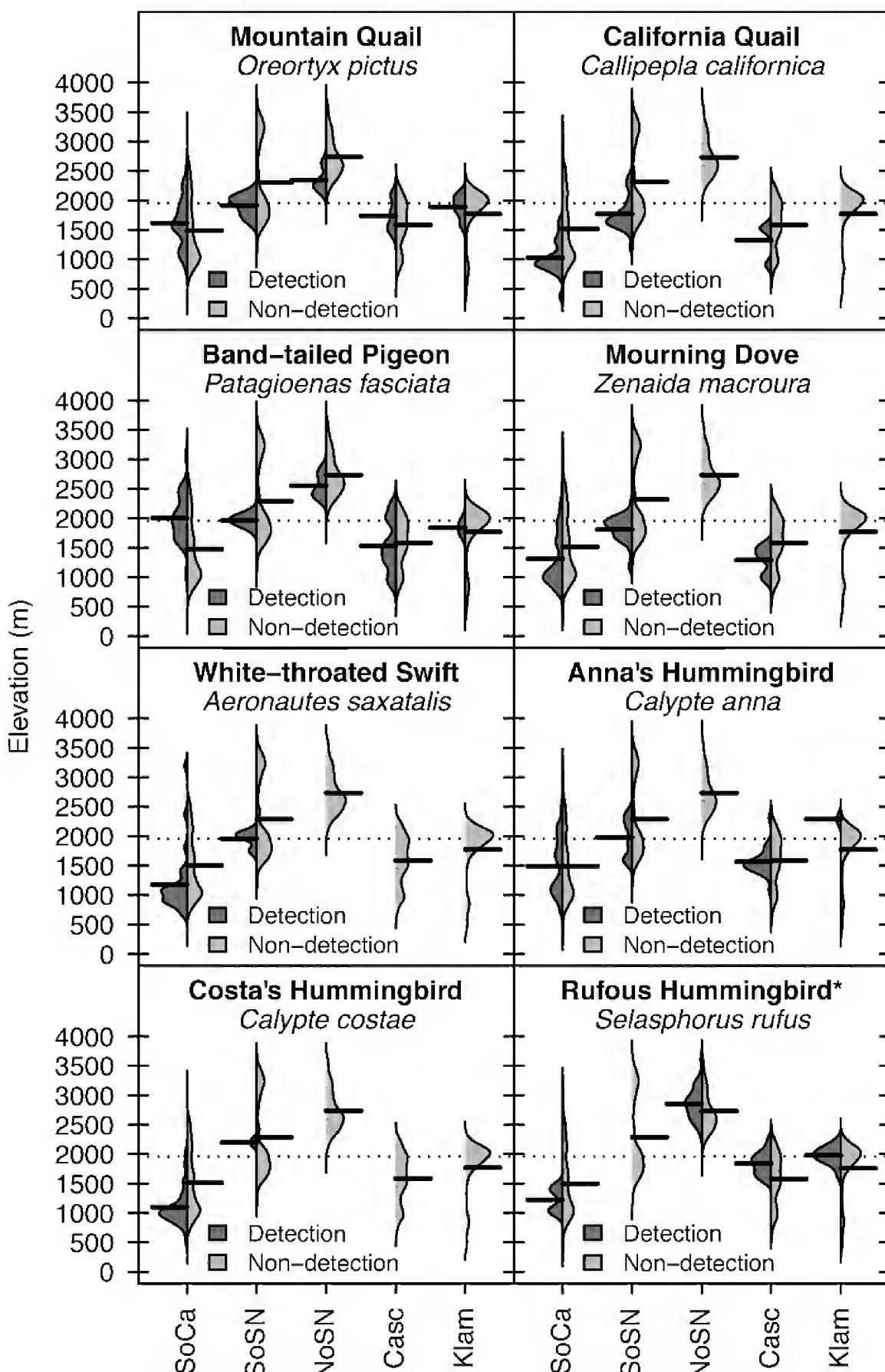
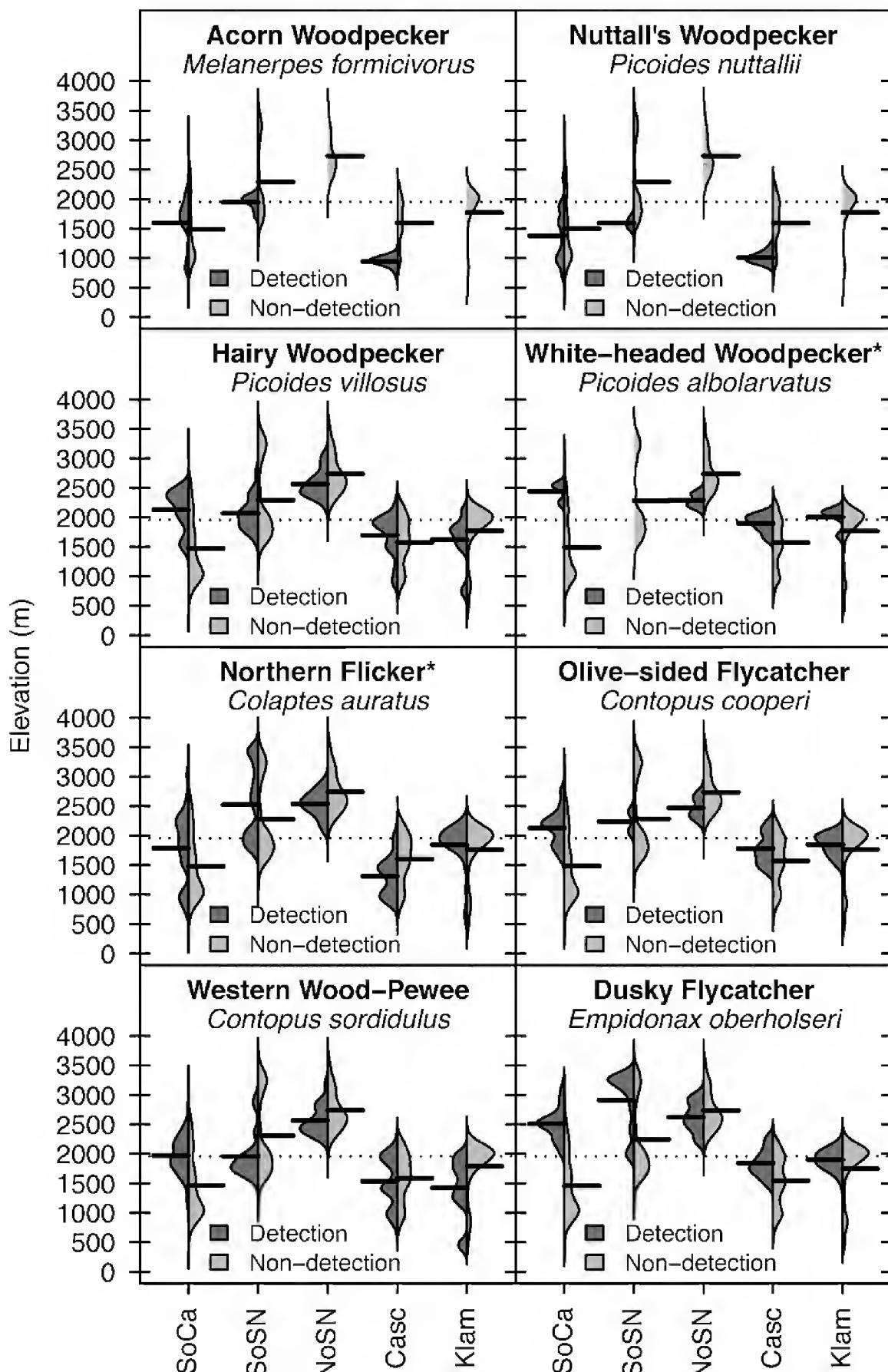


Figure 2. The elevational distribution of plots with and without detections of 74 species detected on at least 20 plots along the Pacific Crest Trail. Dark gray regions to the left of the center line represent density traces of detections; light gray regions to the right of the center line represent density traces of points without detections. Black horizontal lines show mean elevations of points where a species was detected

ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL



(left of center) and not detected (right of center). The dashed line indicates the mean elevation of all points, all five regions pooled. An asterisk after a species' English name indicates that at least one form of seasonal detection bias may have influenced the range observed; see text for details. See Figure 1 for definitions and dates of survey of the five segments of the trail.

ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL

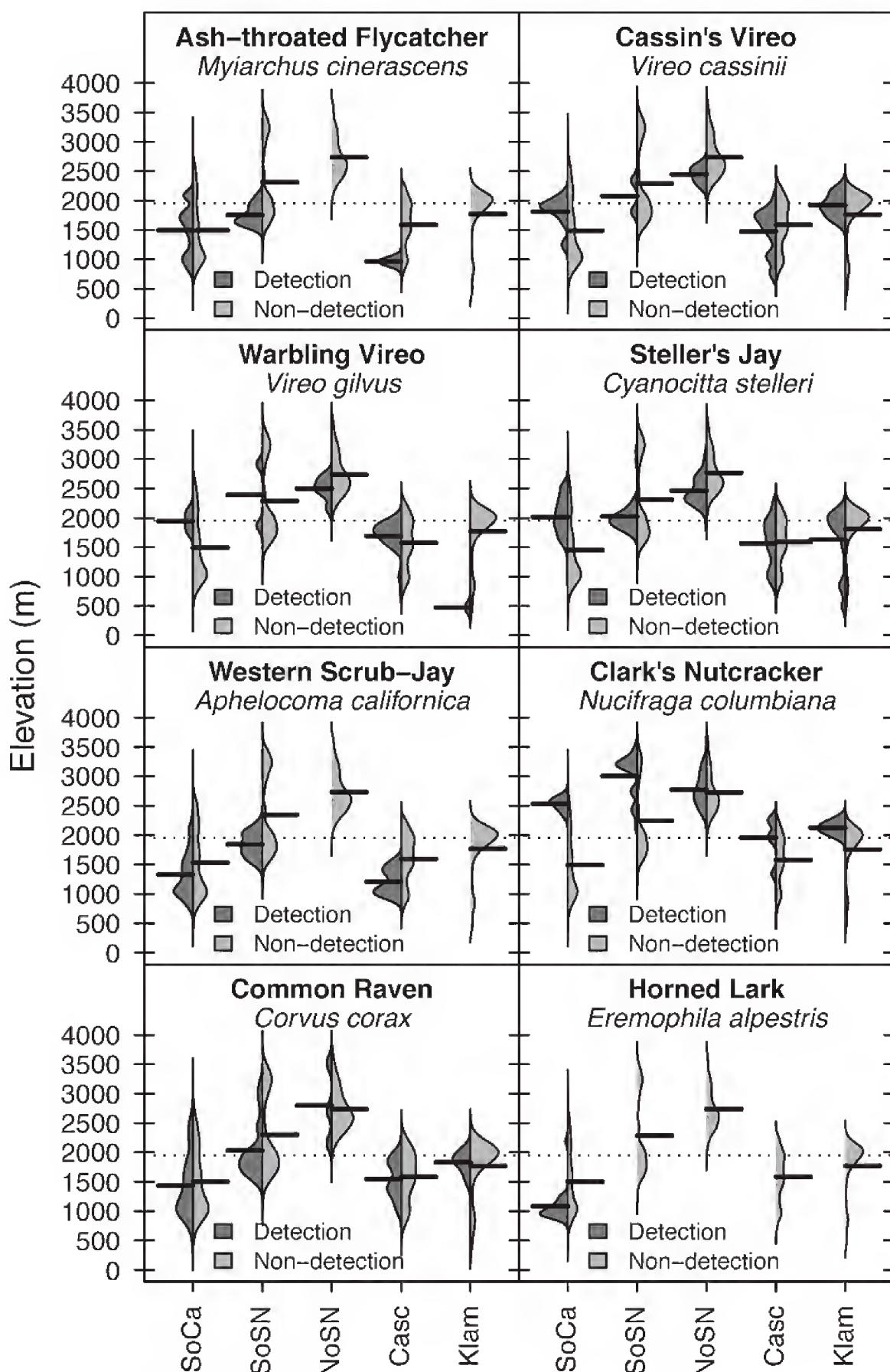


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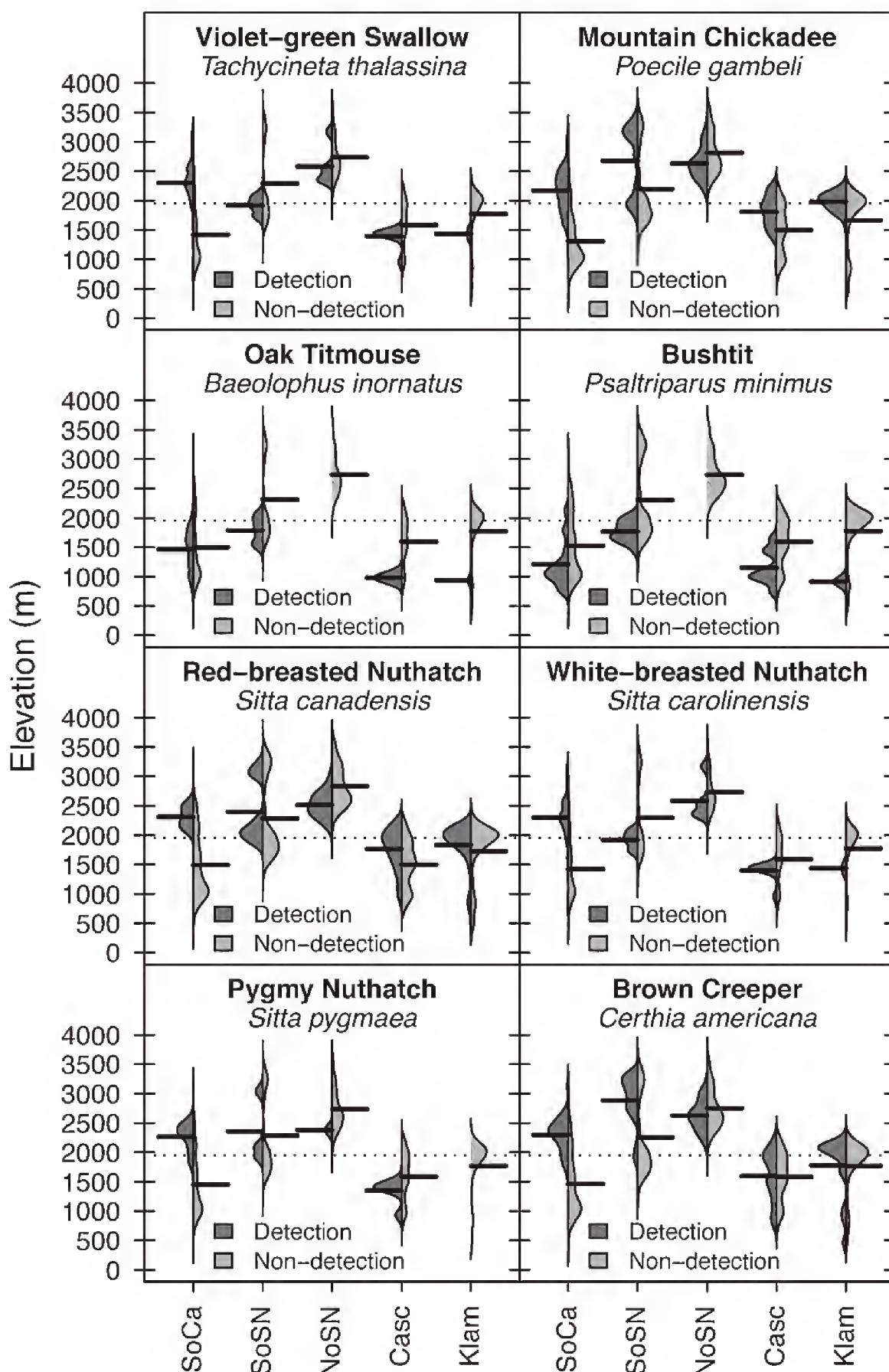


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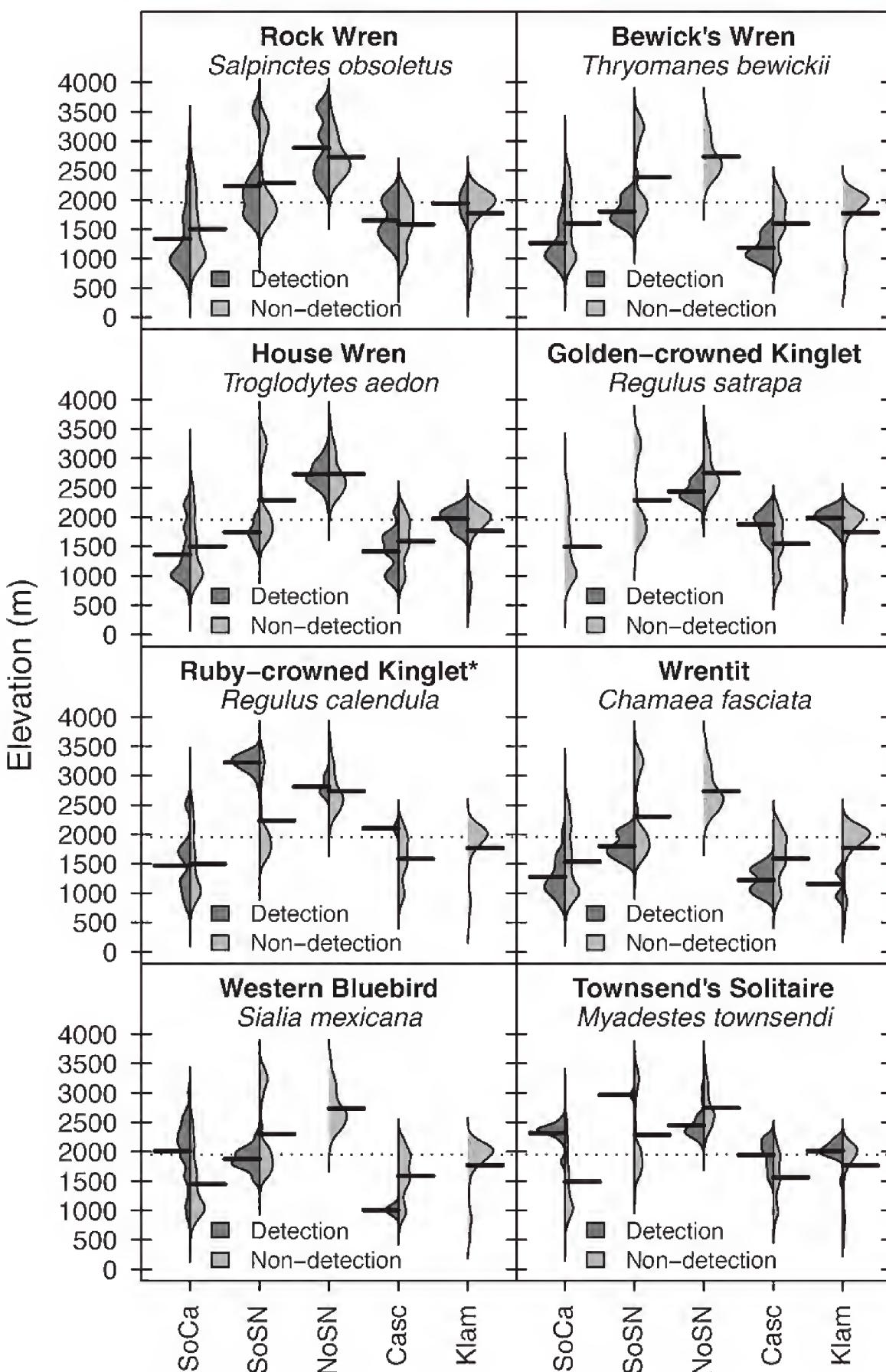


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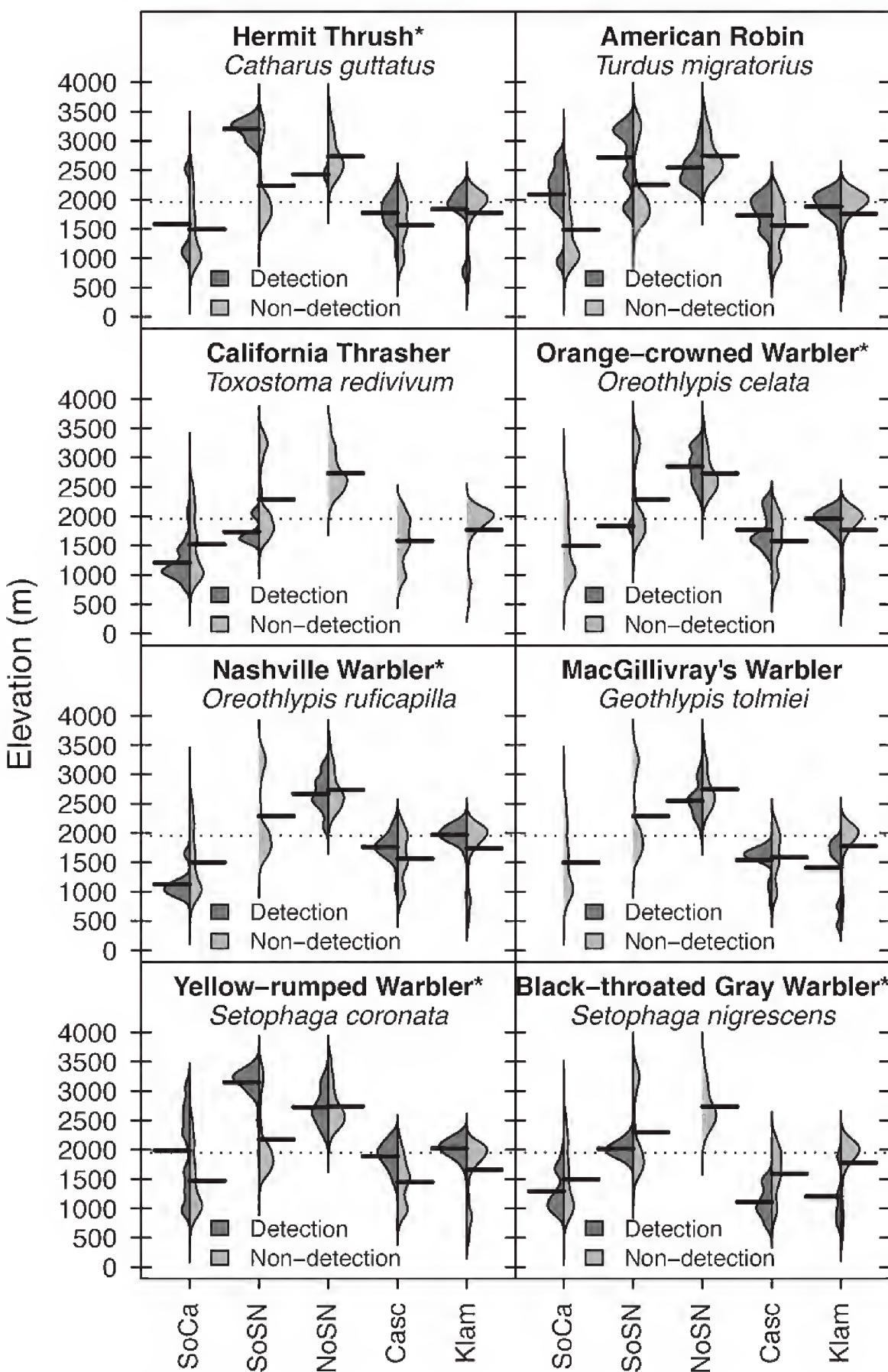


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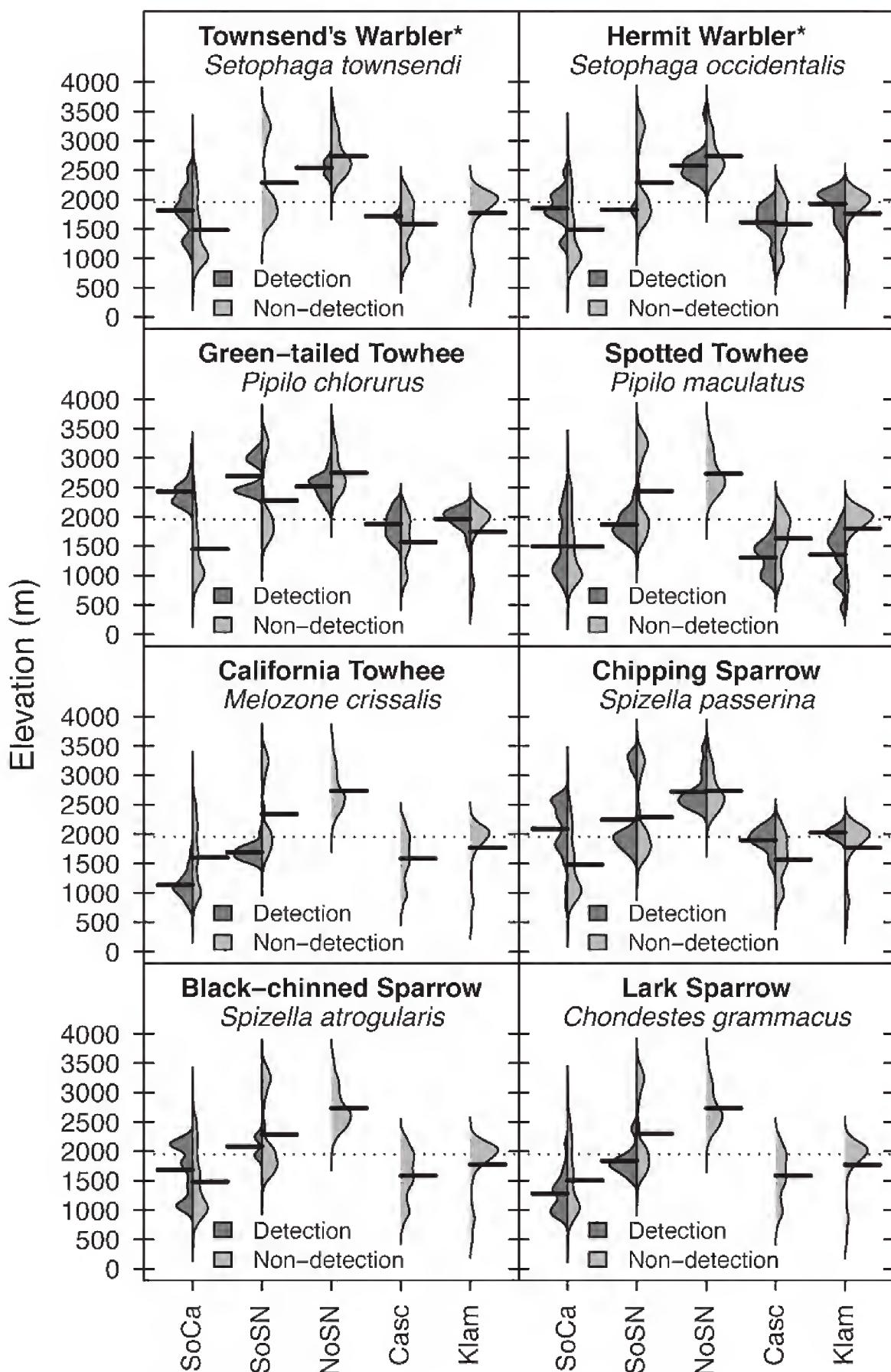


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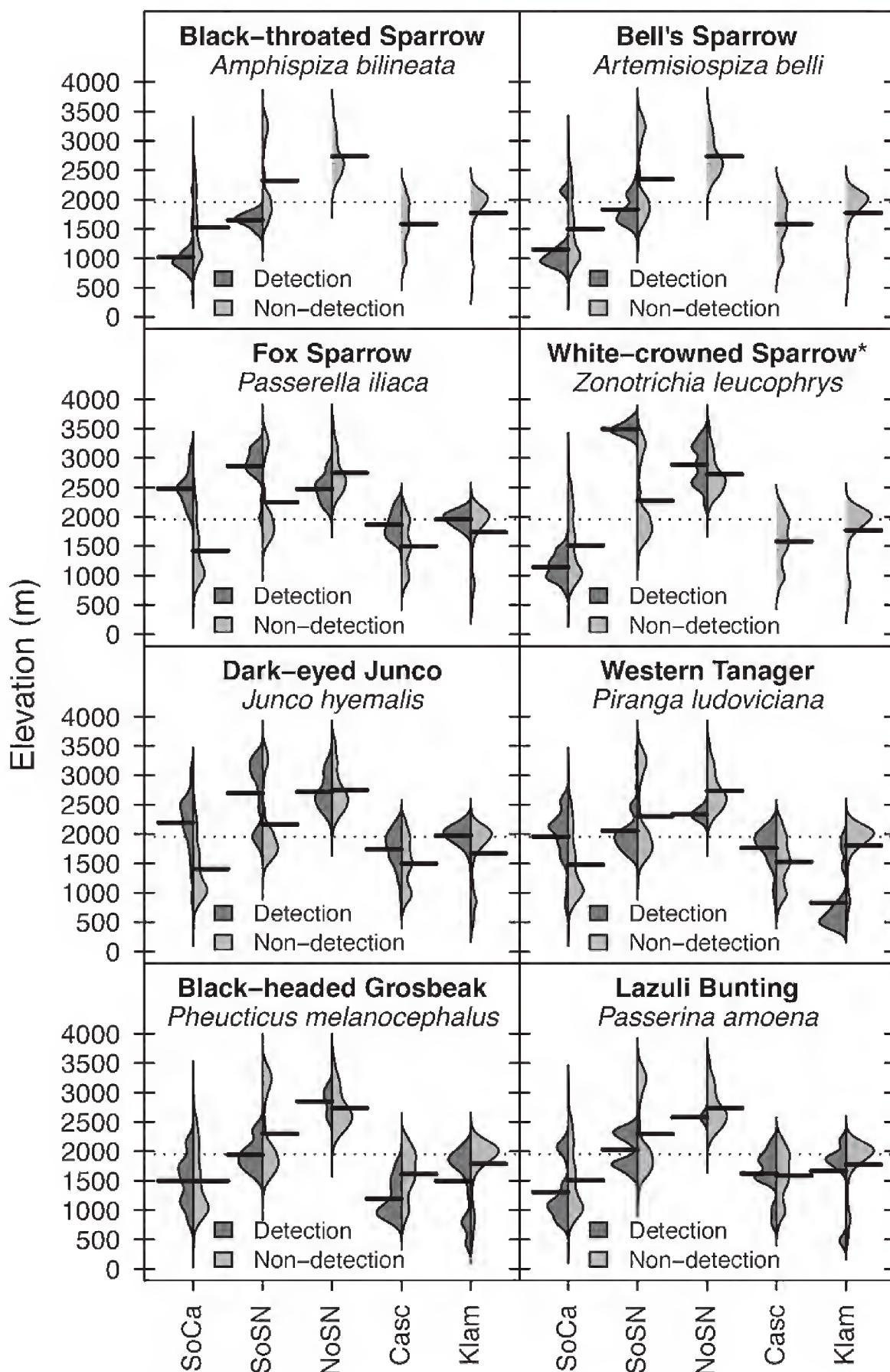


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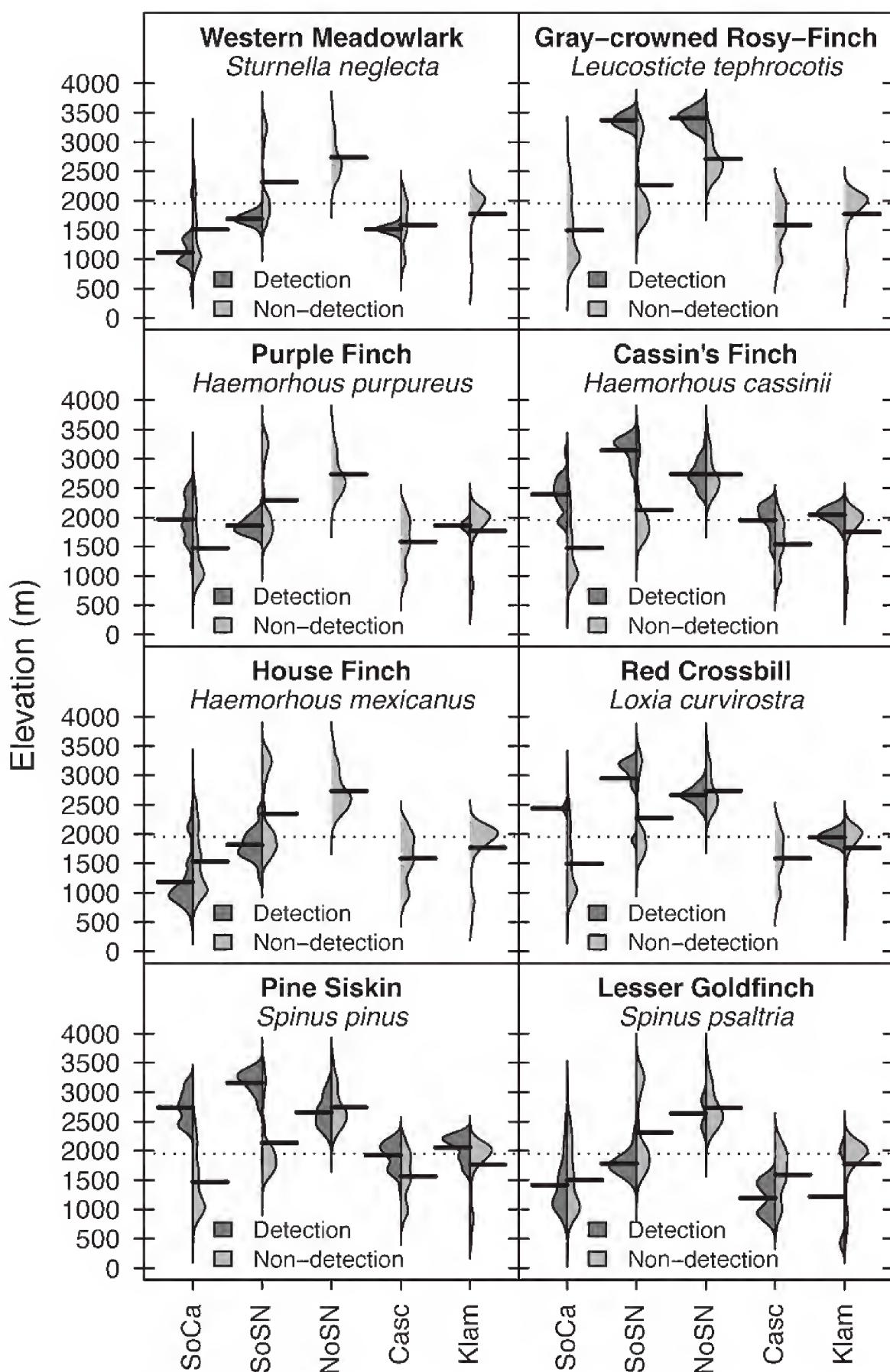


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## ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL

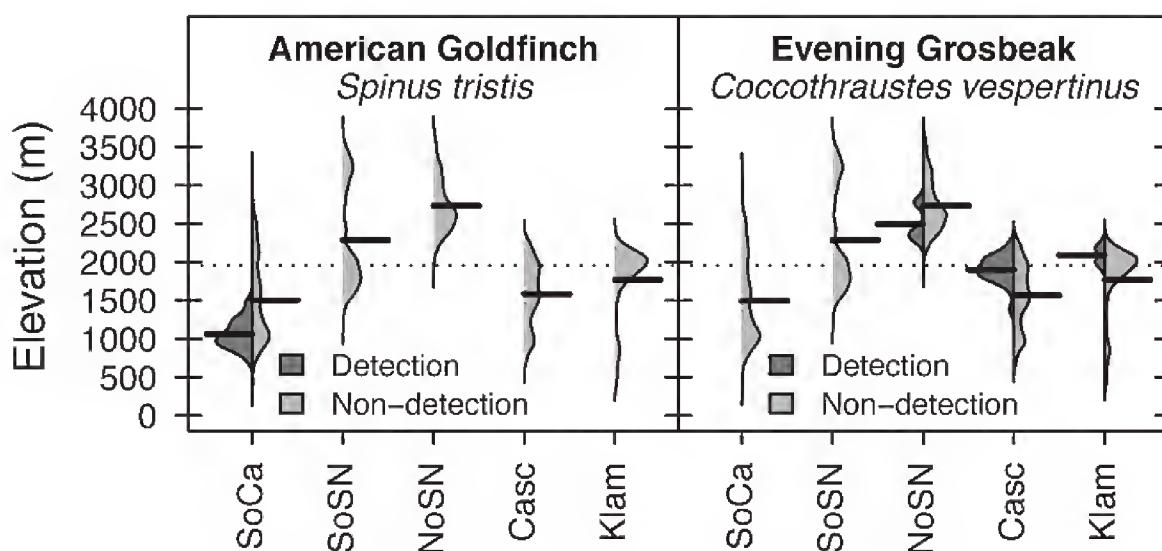


Figure 2 (continued).

high-elevation specialists, the American Pipit and Gray-crowned Rosy-Finch in the Sierra Nevada, may be especially at risk of extirpation. The pipit may have vanished from the Sierra Nevada in the past, about 5000–2900 years ago, as a result of warming of the climate that dried its mesic tundra habitat. It recolonized the Sierra Nevada only recently, perhaps about 45 years ago (Miller and Green 1987)

### Detections of Migrants

Some species' distributions, in certain regions, were likely influenced heavily by detections of migrants (Figure 2). Surveys in SoCa were completed early in the season, and many or all of the Hermit Thrushes and Nashville, Black-throated Gray, Townsend's, and Hermit warblers seen were likely spring migrants. Furthermore, the Northern Flicker, Ruby-crowned Kinglet, Yellow-rumped Warbler, and White-crowned Sparrow all have complex patterns of seasonal movement within California (Small 1994); detections of these species, especially at low elevations in SoCa, could be of either wintering individuals or migrants. The White-crowned Sparrows in SoCa were likely of subspecies *gambelii* and had not yet departed for their breeding range in Alaska and Canada, while the high-elevation detections of this species in the Sierra Nevada were of subspecies *oriantha* on their breeding territories (Small 1994). Rufous Hummingbirds were detected at low elevations in SoCa, as they were migrating north, and at high elevations in regions NoSN, Casc, and Klam, as they were migrating south. Orange-crowned Warblers were detected mostly at upper elevations in regions NoSN, Casc, and Klam, largely reflecting upslope movements after breeding. Surveys of NoSN and Klam were completed rather late in the season, and because of more cryptic behavior after breeding, the number of detections of the White-headed Woodpecker appeared to be relatively low, given the amount of suitable habitat available. The number of plots with detections of the Ruby-crowned Kinglet was particularly low in NoSN (3 plots) and Casc (1 plot). In addition, we detected no Horned Larks in either Sierra Nevada region, perhaps reflecting the long-term, negative trend for these two species. Both

**Table 1** Elevational Distributions of the 74 Species Most Frequently Detected<sup>a</sup> on Point Counts by 5 Regions of the Pacific Crest Trail, 2006

Species <sup>c</sup>	Region <sup>b</sup>						Region <sup>b</sup>									
	SoCa			SoSN			NoSN			Casc			Klam			
n <sup>d</sup>	Mean	Range <sup>e</sup>	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range		
Mountain Quail	76	1616	901-2385	26	1917	1625-2124	4	2341	2171-2608	4	1738	1474-2068	5	1890	1620-2085	
California Quail	40	1025	379-1644	26	1769	1342-2373	0	1322	939-1550	0	1322	939-1550	0	1839	1754-1925	
Band-tailed Pigeon	33	2004	1438-2692	6	1966	1870-2017	5	2556	2371-2825	10	1529	920-2191	2	1839	1754-1925	
Mourning Dove	119	1311	737-2338	34	1812	1200-2102	0	6	1292	965-1530	0	1292	965-1530	0	0	0
White-throated Swift	27	1179	697-2661	4	1955	1766-2050	0	0	0	0	0	0	0	0	0	
Anna's Hummingbird	88	1494	748-2448	6	1982	1590-2383	0	19	1568	1225-2098	1	2288	2288-2288	1	2288	2288-2288
Costa's Hummingbird	51	1100	664-1920	1	2197	2197-2197	0	0	0	0	0	0	0	0	0	
Rufous Hummingbird	6	1222	1021-1459	0	46	2854	2433-3304	14	1840	1570-2186	21	1976	1670-2203	21	1976	1670-2203
Acorn Woodpecker	75	1601	785-2154	7	1949	1741-2048	0	13	944	789-1016	0	944	789-1016	0	0	0
Nuttall's Woodpecker	41	1381	724-2333	3	1592	1523-1679	0	10	1009	939-1170	0	1009	939-1170	0	0	0
Hairy Woodpecker	34	2127	1482-2509	20	2069	1682-2625	21	2566	2275-3039	42	1697	884-2193	7	1620	862-2059	
White-headed Woodpecker	3	2445	2263-2546	0	5	2287	2170-2418	24	1897	1624-2088	5	2006	1721-2135	5	2006	1721-2135
Northern Flicker	58	1786	762-2845	15	2524	1786-3459	27	2537	2144-2863	43	1311	882-1947	34	1844	720-2210	
Olive-sided Flycatcher	15	2132	1667-2680	2	2239	2082-2396	5	2472	2283-2692	37	1779	1415-2248	11	1846	1537-2058	
Western Wood-Pewee	58	1972	1362-2518	28	1960	1582-2908	20	2566	2261-3054	76	1536	843-2095	20	1421	444-1997	
Dusky Flycatcher	38	2507	2040-3074	30	2909	1957-3370	21	2625	2219-2985	91	1843	1451-2288	62	1901	1566-2177	
Ash-throated Flycatcher	52	1494	821-2116	24	1755	1535-2090	0	4	963	947-996	0	947-996	0	0	0	
Cassin's Vireo	8	1813	1319-2070	2	2078	1828-2329	5	2446	2270-2583	25	1475	742-1968	20	1920	1633-2235	
Warbling Vireo	3	1944	1781-2107	2	2392	1894-2889	6	2499	2201-2706	42	1694	982-1992	1	475	475-475	
Steller's Jay	86	2016	1477-2557	42	2023	1746-2917	96	2461	2132-2997	136	1569	885-2267	84	1632	477-2195	
Western Scrub-Jay	210	1326	783-2154	59	1843	1506-2208	0	17	1209	936-1556	0	1209	936-1556	0	0	0
Clark's Nutcracker	6	2528	2365-2621	27	3006	2273-3448	165	2772	2306-3314	5	1957	1403-2275	14	2125	1977-2274	
Common Raven	137	1435	716-2554	29	2035	1557-3105	3	2797	2187-3477	7	1550	1108-1937	5	1830	1572-2007	
Horned Lark	21	1082	879-1727	0	0	0	0	0	0	0	0	0	0	0	0	
Violet-green Swallow	94	2299	1062-3104	10	1918	1721-2089	10	2582	2340-3188	10	1396	1055-1478	2	1436	1368-1503	
Mountain Chickadee	242	2173	1504-2952	87	2679	1732-3453	372	2629	2167-3212	192	1810	1328-2265	133	1983	1680-2223	

Species <sup>c</sup>	Region <sup>b</sup>							Region <sup>b</sup>							
	SoCa			SoSN			NoSN			Casc			Klam		
	n <sup>d</sup>	Mean	Range <sup>e</sup>	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range
Oak Titmouse	157	1465	814-2091	23	1789	1501-2089	0			12	984	914-1070	1	939	939-939
Bushtit	112	1207	742-2142	19	1769	1482-2039	0			9	1153	789-1612	2	915	887-943
Red-breasted Nuthatch	5	2308	2100-2529	9	2398	1888-3179	271	2515	2134-2989	223	1762	963-2250	158	1835	749-2211
White-breasted Nuthatch	65	1785	832-2571	35	2073	1660-3462	51	2553	2249-2960	24	1104	904-1671	2	1989	1880-2098
Pygmy Nuthatch	59	2263	1787-2599	6	2356	1911-3074	2	2382	2347-2416	13	1349	924-1531	0		
Brown Creeper	44	2299	1773-2724	24	2887	1909-3338	125	2630	2151-3104	80	1595	749-2240	16	1780	614-2174
Rock Wren	57	1340	663-2597	13	2235	1631-3549	15	2885	2224-3634	17	1653	1223-2104	3	1940	1746-2129
Bewick's Wren	352	1264	677-2135	86	1801	1471-2174	0			21	1185	926-1555	0		
House Wren	37	1364	826-2253	4	1743	1535-1969	39	2729	2337-3122	12	1413	915-1986	15	1973	1738-2184
Golden-crowned Kinglet	0			0			36	2436	2144-2773	79	1876	1487-2235	41	1990	1709-2196
Ruby-crowned Kinglet	18	1467	786-2515	24	3222	2955-3383	3	2814	2717-2974	1	2102	2102-2102	0		
Wrentit	168	1280	781-2029	20	1798	1516-2105	0			11	1223	937-1523	2	1154	955-1354
Western Bluebird	99	2009	911-2887	18	1875	1541-2201	0			2	1008	998-1017	0		
Townsend's Solitaire	10	2316	1912-2508	1	2963	2963-2963	19	2447	2181-2997	37	1945	1466-2254	15	2014	1646-2225
Hermit Thrush	3	1583	1066-2453	23	3200	2951-3405	1	2426	2426-2426	63	1769	1088-2227	8	1836	955-2178
American Robin	16	2090	936-2744	31	2719	1814-3356	49	2544	2176-3168	101	1729	867-2198	38	1880	1173-2199
California Thrasher	86	1208	783-2052	4	1735	1599-2025	0			0			0		
Orange-crowned Warbler	0			1	1833	1833-1833	36	2852	2334-3270	14	1767	1360-2287	13	1959	1711-2141
Nashville Warbler	8	1124	940-1562	0			18	2668	2108-3159	81	1760	1076-2176	59	1968	1614-2208
MacGillivray's Warbler	0			0			49	2550	2028-3124	18	1539	918-1763	7	1408	478-1857
Yellow-rumped Warbler	51	1987	916-3109	57	3149	2494-3466	343	2727	2209-3332	217	1885	1381-2251	127	2021	1676-2265
Black-throated Gray Warbler	16	1293	935-1863	20	2016	1846-2239	0			12	1109	721-1494	4	1202	763-1837
Townsend's Warbler	40	1816	1142-2539	0			2	2540	2439-2640	1	1721	1721-1721	0		
Hermit Warbler	15	1848	1253-2363	1	1826	1826-1826	20	2575	2282-3148	29	1614	983-1985	15	1926	1504-2203
Green-tailed Towhee	50	2431	2137-3079	14	2692	2414-3127	44	2519	2141-2914	34	1873	1500-2251	47	1962	1552-2156
Spotted Towhee	360	1501	781-2431	129	1865	1511-2388	0			96	1308	885-1794	28	1356	461-1973
California Towhee	250	1134	739-1708	41	1688	1527-2028	0			0			0		
Chipping Sparrow	27	2086	970-2626	19	2243	1655-3353	14	2719	2434-3371	38	1897	1472-2181	4	2025	1979-2104
Black-chinned Sparrow	62	1684	1000-2229	2	2085	1934-2236	0			0			0		

(continued)

**Table 1** (continued)

Species <sup>c</sup>	SoCa						SoSN						Region <sup>b</sup>					
	n <sup>d</sup>	Mean	Range <sup>e</sup>	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range
Lark Sparrow	38	1279	863-2093	18	1835	1531-2393	0	0	0	0	0	0	0	0	0	0	0	0
Black-throated Sparrow	66	1017	597-1910	28	1650	1446-1805	0	0	0	0	0	0	0	0	0	0	0	0
Bell's Sparrow	15	1150	812-2151	57	1829	1482-2306	0	0	0	0	0	0	0	0	0	0	0	0
Fox Sparrow	78	2482	1990-3127	29	2864	1992-3228	44	2471	2135-2915	155	1865	1546-2282	62	1960	1721-2149			
White-crowned Sparrow	59	1145	767-1521	6	3495	3375-3645	63	2889	2241-3420	0	0	0	0	0	0	0	0	0
Dark-eyed Junco	129	2197	964-3062	112	2694	1799-3393	436	2719	2206-3317	246	1744	956-2237	132	1975	1545-2263			
Western Tanager	39	1955	823-2621	40	2054	1599-3152	3	2335	2287-2412	166	1764	885-2228	14	832	428-1877			
Black-headed Grosbeak	51	1497	785-2169	21	1942	1577-2401	3	2849	2615-3052	41	1190	821-1797	22	1495	432-2098			
Lazuli Bunting	40	1307	755-2143	10	2027	1637-2392	1	2578	2578-2578	42	1621	759-2173	6	1666	630-2140			
Western Meadowlark	44	1118	506-2053	24	1688	1512-1836	0	0	0	6	1515	1465-1551	0	0	0	0	0	0
Gray-crowned Rosy-Finch	0			7	3369	3233-3521	27	3404	3166-3647	0	0	0	0	0	0	0	0	0
Purple Finch	44	1968	1228-2538	10	1863	1721-2080	0	0	0	0	0	0	0	0	0	0	0	0
Cassin's Finch	19	2391	1895-2944	77	3146	2521-3464	58	2737	2382-3174	71	1952	1414-2277	27	2044	1771-2221			
House Finch	129	1184	641-2246	56	1816	1300-2401	0	0	0	0	0	0	0	0	0	0	0	0
Red Crossbill	1	2440	2440-2440	8	2948	2055-3253	56	2665	2396-2909	0	0	0	9	1946	1838-2077			
Pine Siskin	23	2740	2364-3186	73	3162	2740-3433	83	2657	2230-3206	39	1923	1579-2222	14	2056	1670-2265			
Lesser Goldfinch	112	1416	788-2452	26	1784	1486-2263	2	2640	2426-2854	17	1195	796-1549	2	1221	468-1974			
American Goldfinch	27	1063	777-1460	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Evening Grosbeak	0			3	2495	2307-2761	41	1901	1382-2235	2	2092	2002-2181						

<sup>a</sup>≥20 detection in at least one region.<sup>b</sup>SoCA: the southern California (2 April–27 May), SoSN: southern Sierra Nevada (29 May–20 June), NoSN: northern Sierra Nevada (8 August–8 September), Casc: southern Cascade Range (26 June–20 July), and Klam: Klamath Mountains (20 July–4 August).<sup>c</sup>See Figure 2 for scientific names.<sup>d</sup>Numbers of point count stations at which we detected the species in each region.<sup>e</sup>Range encompassing 95% of the detections.

## ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL

were once numerous throughout Sierra Nevada according to the Breeding Bird Survey and the Grinnell Resurvey Project (Moritz 2007, Sauer et al. 2012, Beedy and Pandolfino 2013).

### Conclusion

The stereotypic perception of the PCT is of a scenic route along rugged mountain ridgelines. While this is true in some places, the PCT is a trail of extremes, and the route actually crosses a wide range of landscapes, including desert, plateaus, broad valleys, and deep canyons. Habitats range from sparsely vegetated deserts scrub to dense forests. Over the decades the trail took to construct, the planners and field crews who scouted out the route considered many factors in addition to scenic value (Schifrin et al. 2003), including property ownership, water access, proximity to human development, and topography. Furthermore, the trail was often built on gentle grades to facilitate equestrian use, and some sections follow contours or ascend through river valleys to mountain passes. For this reason, a significant proportion of our count points were not only along riparian corridors but also in a diversity of upland habitats. The ownership of lands crossed by the PCT is also diverse, including private lands, state and federal parks, national forests, and wilderness areas. Similarly, the range of human land uses, including recreation, housing, logging, and energy production, is also wide.

Habitat alteration on the cordillera will likely continue as California's human population continues to grow, but the extent and magnitude of land-use change will vary with local policies (Beardsley et al. 2009). Furthermore, climate change will affect species' distributions on the California cordillera differently depending on regional conditions and a species' climate niche (Tingley et al. 2012). Thus region-specific knowledge of montane birds' distributions is needed to inform prudent conservation decisions. This mega-transect may serve as a benchmark for future assessments of shifts in species' ranges in response to changes in climate and land use.

### ACKNOWLEDGMENTS

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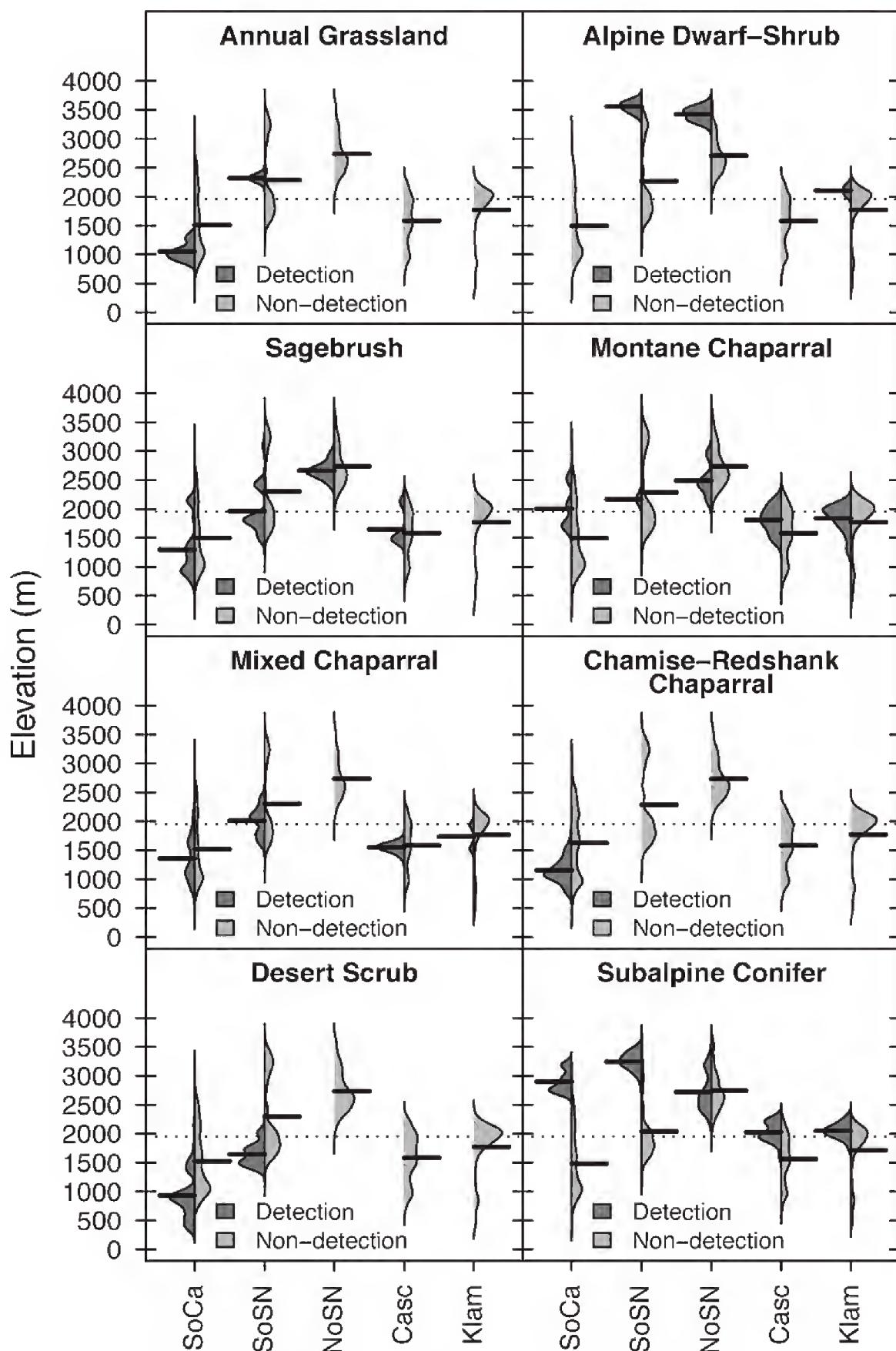
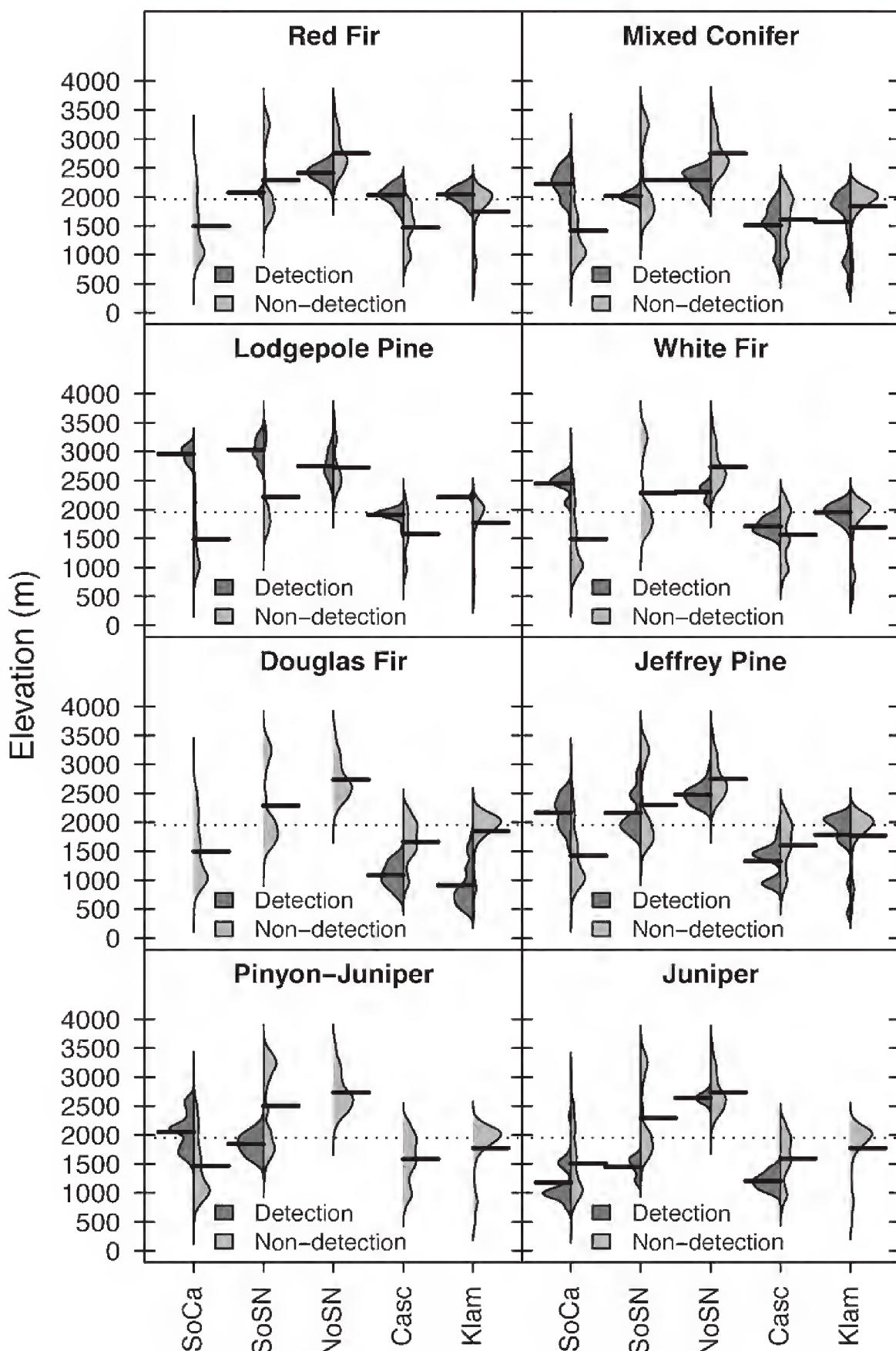


Figure 3. The elevational distribution of plots with and without 21 habitat types defined by the California Wildlife Habitat Relationships System and recorded on at least 20 plots along the Pacific Crest Trail. Dark gray regions to the left of the center line represent density traces of points with the habitat; light gray regions to the right of the

## ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL



center line represent density traces of points without the habitat. Black horizontal lines show mean elevations of points with the habitat (left of center) and without it (right of center). The dashed line indicates the mean elevation of all points, all five regions pooled. See Figure 1 for definitions and dates of survey of the five segments of the trail.

ELEVATIONAL RANGES OF BIRDS ALONG THE PACIFIC CREST TRAIL

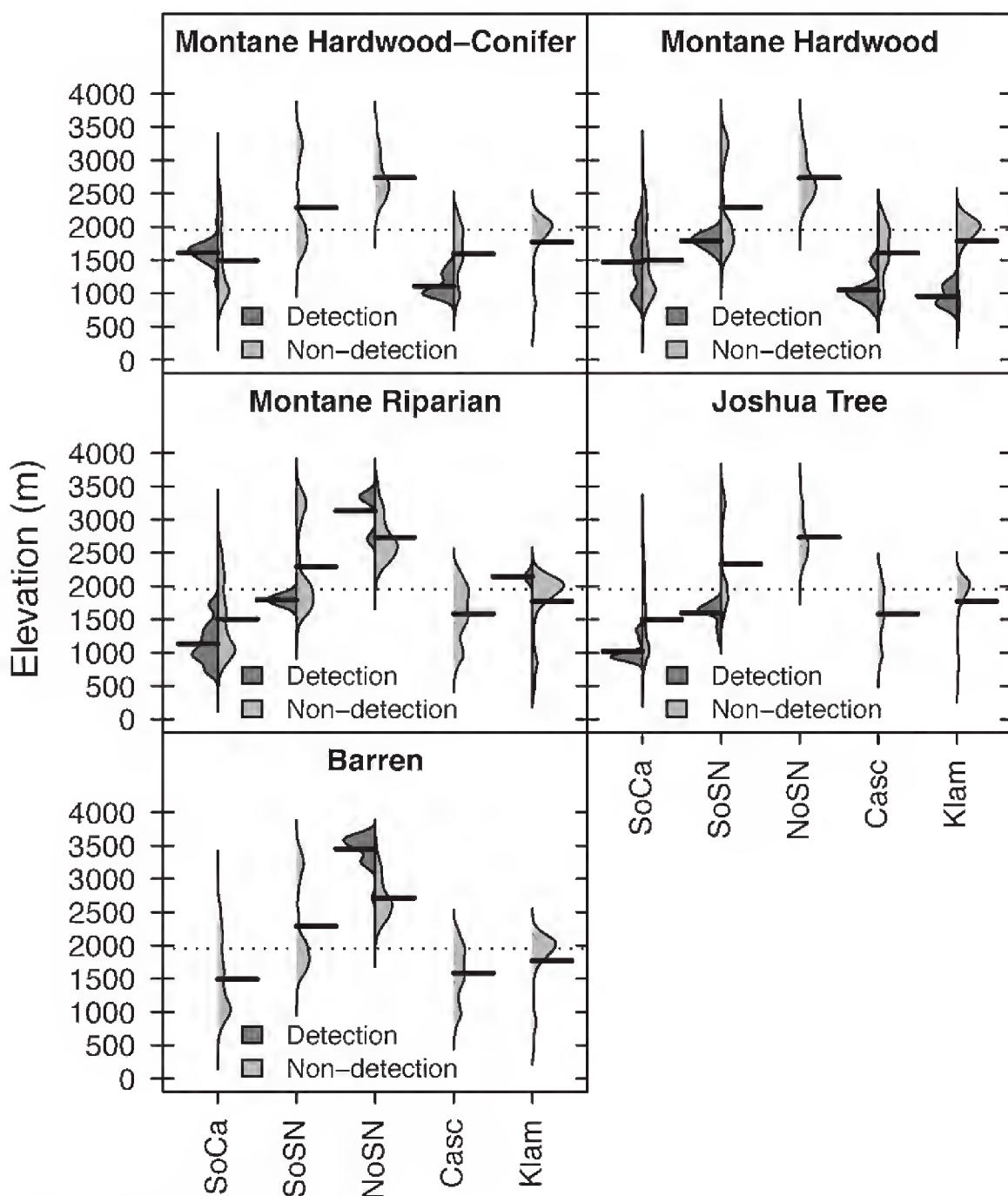


Figure 3 (continued).

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Gray-crowned Rosy-Finch

Sketch by George C. West

# A POPULATION CENSUS OF THE CACTUS WREN IN VENTURA COUNTY, CALIFORNIA

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**ABSTRACT:** The Cactus Wren (*Campylorhynchus brunneicapillus*) is a polytypic species widespread in the southwestern U.S. and northern Mexico. Though closer in plumage characteristics to the desert subspecies *anthonyi*, populations resident in coastal sage scrub on the coastal slope of Ventura County and Los Angeles County occupy an ecological niche more similar to that of the more southerly subspecies *sandiegensis*. Because of fragmentation of habitat associated with urbanization, the populations on southern California's coastal slope are almost entirely isolated from those of the deserts, and apparently from each other. They are declining precipitously for reasons not entirely understood but certainly related to loss, fragmentation, and degradation of suitable habitat. In 2012, we organized a volunteer effort to map the entire population in Ventura County and found 111 active, accessible territories with at least one adult or a fresh nest. Additional areas to which we did not have access could raise this total number to 166 territories county-wide. While historically the species occurred somewhat more widely in the eastern portion of the county, all active territories now appear to be restricted to a narrow band of cactus-rich scrub at the far western edge of the Santa Monica Mountains and Simi Hills, from Point Mugu northeast through Thousand Oaks to the west side of Simi Valley, roughly tracking the distribution of large patches of prickly-pear (*Opuntia* spp.) and coast cholla (*Cylindropuntia prolifera*).

During spring 2012, the California Department of Fish and Game (CDFG, now California Department of Fish and Wildlife) contracted with us to organize a volunteer-based survey to develop a baseline estimate of the number and distribution of the Cactus Wren (*Campylorhynchus brunneicapillus*) in Ventura County (Cooper and Hall 2012). The effort was modeled after similar recent surveys for the species elsewhere in coastal southern California (Mitrovich and Hamilton 2007, Cooper et al. 2012). Here we present an updated distribution map and population estimate of the wren, along with a historical overview of the species' range and former status in Ventura County.

All known populations of the Cactus Wren in Ventura County may be considered the "coastal Cactus Wren;" interior populations extending west from the Mojave Desert occur (or recently occurred) near Gorman, Los Angeles County ([www.ebird.org](http://www.ebird.org)), but these noncoastal birds are not known to extend into neighboring Ventura County. As recently summarized by Hamilton et al. (2011), coastal Cactus Wrens are confined to extensive stands of mature prickly-pear (*Opuntia* spp.) or cholla (*Cylindropuntia* spp.) cactus in cismontane southern California and adjacent Baja California, Mexico, occur mainly below 600 m elevation, are extremely sedentary, and are now largely isolated from desert populations. The San Diego Cactus Wren (*Campylorhynchus brunneicapillus sandiegensis*) is considered a California bird species of special concern (Unit 2008), affording it some measure of protection under the California Environmental Quality Act (CEQA). Although not all coastal

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populations are attributable to *sandiegensis*, as discussed by Cooper et al. (2012), many land managers and regulatory agencies in the region nonetheless treat all coastal Cactus Wrens as having special status under CEQA. Today, the coastal Cactus Wren is essentially confined to sites dominated by mature, native coastal sage scrub near large tracts of open space; while the species may persist in small habitat patches within suburban development near these open spaces, it is highly prone to extirpation from such areas and unlikely to recolonize them quickly once extirpated (see Soulé et al. 1988 and Crooks et al. 2001; pers. obs.). Reflecting concern about the conservation of these populations, the coastal Cactus Wren has been proposed for listing under the Endangered Species Act (USFWS 1994) and has been identified as a focal species in local and regional conservation and management plans.

## METHODS

### Study Area

Ventura County is located in coastal southern California, just north and west of Los Angeles County. Development is concentrated in the southern half of the county; the rugged canyons and ridges of the San Rafael Mountains dominate the northern portion. The Santa Monica Mountains, a range of coastal hills rarely exceeding an elevation of 900 m, enter the county from the southeast, terminating at the Oxnard Plain near Point Mugu. The Santa Clara River bisects the county from east to west and is separated from the southern portion of the county by several ranges of hills, including the Santa Susana Mountains. Agriculture is still a major land use in the county; row crops occupy large areas of the Santa Clara River valley and Oxnard Plain in the south, while orchards (especially avocado and citrus) cover the low hills across the middle of the county.

We searched for Cactus Wren habitat by using Google Earth to locate suitable vegetation, identifiable from the distinct signature of large cactus patches in recent (>2005) aerial photographs (i.e., pale green, roughly circular areas within coastal sage scrub and chaparral, typically on south-facing slopes). We reviewed the literature to establish where Cactus Wrens had been observed or collected in Ventura County in the past, drawing from more recent sources such as [www.ebird.org](http://www.ebird.org), as well as records of nests and specimens from museums (Table 1). Ultimately, we divided the study area into six subregions and selected 28 moderately to highly experienced birders to serve as observers (Table 1). We encouraged volunteers to form their own survey groups and coordinate visits, and we sent each volunteer aerial photographs (as JPEG files) of potentially suitable cactus patches, with instructions to print out these maps and check for access points prior to surveys.

### Survey Methods

Survey methods followed Cooper et al. (2012), which were adapted from those developed for Cactus Wren surveys in the Nature Reserve of Orange County (Mitrovich and Hamilton 2007); however, we quickly realized that the cactus scrub in Ventura County presented unique challenges not anticipated from past experience. In some areas, such as north of the Conejo Grade

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**Table 1** Specimens, Nests, and Egg Sets of the Cactus Wren Collected in Ventura County, California

Region and location	Type	Year	Institution and catalog number <sup>a</sup>
Santa Clara River valley			
Santa Paula	Eggs	1905	WFVZ 64142/85200
“Sespe”	Skin	1922	UWBM 27262
Oxnard Plain			
Pt. Mugu, “Broome Ranch”	Eggs	1935	WFVZ 64135/93129
2.9 mi. ESE Camarillo, E bank	Skin	1986	SDNHM 44455
Conejo Creek			
Conejo Creek, 2.9 mi. ESE	Skin	1986	SDNHM 44691
Camarillo			
3.0 mi. ESE Camarillo	Skin	1989	SDNHM 45699
Moorpark/Simi Valley			
“Simi”	Skin	1898	USNM 9180
Simi Valley	Eggs	1898	WFVZ 64128/101263
Simi Valley	Eggs	1901	WFVZ 64129/101187
Simi Valley	Eggs	1902	WFVZ 64131/100956
Simi Valley	Eggs	1906	WFVZ 64130/74537

<sup>a</sup>SDNHM, San Diego Natural History Museum; USNM, U. S. National Museum of Natural History; UWBM, University of Washington Burke Museum; WFVZ, Western Foundation of Vertebrate Zoology.

into the Hill Canyon area, cactus was simply too extensive to be viewed or mapped from the ground, so here our first priority became having volunteers cover enough ground on foot or bicycle to intersect a wren territory (as suggested by a calling bird). By contrast, in other areas such as near Moorpark, wren habitat was highly fragmented and sometimes impossible to access, often hidden within gated residential areas where access was difficult to obtain. Ultimately, the priority shifted mid-season from careful mapping of the boundaries of suitable cactus patches to simply searching for birds and nests throughout the study area, mapping patches only in the vicinity of detections of the species as we went. On both public and private properties we surveyed potential habitat from trails, roads, utility rights-of-way, and “neighborhood trails” used by dog-walkers.

We mapped large, contiguous areas of cactus scrub (“polygons”) only if they were found to hold either wrens or nests (of any age). We further divided polygons into multiple (occupied) “sites;” in general, each site represented a single wren territory, and a group of sites constituted a polygon (occasionally, a polygon had just a single site, particularly if it was small or isolated). Volunteers categorized each site on the basis of the extent and height of its cactus, and used colored pens to outline areas of cactus scrub directly on aerial photos. Volunteers also recorded up to four dominant shrub species within each site. We considered initial mapping to be “round one” of a minimum of three total visits to be made in April, May, and June, with visits spaced at least two weeks apart. All Cactus Wrens observed or heard, and all nests found during the first visit, were recorded directly on aerial photos and noted on data sheets; surveyors also recorded whether nests appeared

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to be old or fresh. In subsequent visits, surveyors mapped only the locations of birds and nests where they had *not* been detected on prior visits (see Cooper et al. 2012 for further discussion of methods).

We did not ask our volunteers to assess and map the extent of cactus in areas where nests or birds were not observed during initial mapping, but we encouraged participants to visit all accessible habitat in their subregions whenever possible during the survey, to ensure that any new territories established later in the spring were detected. We encouraged volunteers to conduct surveys with at least one other partner, and we recommended that all visits be done during the morning, although this was not always possible. However, we found wrens to be active throughout the day, foraging and calling frequently (pers. obs.). Broadcast recordings were not used during the survey, since a CDFG collecting permit would have been necessary for all volunteers; instead, volunteers relied on “pishing” and visual scans of cactus habitat. We encouraged volunteers to record incidental observations of the California Gnatcatcher (*Polioptila californica*), which shares habitat with the Cactus Wren in the region, as well as sightings of potential predators such as Cooper’s Hawk (*Accipiter cooperii*). We gave clear instructions for not disturbing gnatcatchers or wrens during observations.

In our population estimate, we considered “active territories” to be sites where we found at least one adult and at least one nest of any condition or age. “Probable territories” were sites where we found either an adult but no nest, or a fresh or recent nest but no adult. “Possible territories” were sites where we found only a nest that appeared either old or of unknown age. We based our estimate of the number of territories in areas to which we could not gain access on the apparent extent of cactus as observed in aerial imagery for each subarea and on the number of territories found in similar habitat elsewhere in the region.

## RESULTS

### 2012 Survey

Including a handful of incidental sightings, we and our volunteers detected 69 active Cactus Wren territories (adult birds and nests), 35 probable territories with adults but no nests of any kind, 7 probable territories with freshly built nests but no adults, and 6 possible territories with no adults but with at least one nest that appeared to be old or of unknown age, for a total of 117 potential territories. Of these, we considered 111 as likely active in 2012, excluding the 6 sites with no birds and only old/unknown nests. In addition to these documented sites, we estimated an additional 55 potential territories elsewhere in the county on lands that were inaccessible to our surveys, either because of exclusion from private property or because of steep terrain (Table 2). This latter number should be seen as very preliminary; we did not attempt to map habitat within these inaccessible areas but only estimated a rough number based on our findings in apparently similar (in aerial photos) habitat in the area.

Figure 1 shows the locations of adult Cactus Wrens or their nests in Ventura County found during the survey (solid circles), locations of seemingly suitable habitat in which we found no birds despite multiple visits (open

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**Table 2** Active Cactus Wren Territories in Ventura County, 2012

Region and subregion	Nearest cities	Active territories (2012 survey)		
		Documented	Estimated (additional)	Total
Santa Clara River valley				
Lower	Santa Paula	0	0	0
Upper	Fillmore	0	0	0
Moorpark				
“Moorpark Grasslands” (north of state route 118)	Moorpark, Simi Valley	0	0	0
Tierra Rejada/Las Posas Hills (south of state route 118)	Moorpark, Simi Valley	15	15	30
Thousand Oaks				
Mountclef Ridge/Wildwood Park	Thousand Oaks	26	10	36
Hill Canyon/Camarillo Springs (north of S.R. 101)	Newbury Park, Camarillo	40	10	50
Oxnard Plain (including Point Mugu)				
CSU Channel Islands and vicinity (south of state route 101)	Camarillo	30	20	50
Total		111	55	166

circles), locations we failed to gain access to but that appeared suitable (question marks), and locations where birds were known historically but where we found no evidence of current occupation (x). For a variety of reasons (including private-property concerns), we intentionally do not show the exact locations of territories, or areas where we searched for additional birds, but these can be found in our original report to the California Department of Fish and Wildlife (Cooper and Hall 2012). From information provided by our volunteers as well as from incidental sightings forwarded to us, the entire population of the Cactus Wren in Ventura County appears to be restricted to a narrow band of mostly volcanic soils with strong coastal influence from the western edge of Simi Valley (near Tierra Rejada Rd.), southwest through the western edge of the city of Thousand Oaks, and southwest along the western flank of the Santa Monica Mountains to the coast near Point Mugu. The entire area does not exceed 240 km<sup>2</sup>.

Cactus Wrens were found widely on both public and private lands. On the basis of available maps (COSCA 2008), of the 111 active territories, 44 were on public lands, and 22 were on lands whose ownership we could not determine but that were otherwise accessible, mainly near the campus of California State University Channel Islands. The largest concentration we confirmed on known private lands was in the Hill Canyon ranchland near the Conejo Grade north of state route 101 (west of Thousand Oaks/Newbury Park), which we had permission to survey; however, it is possible that other large concentrations exist, particularly at the southeastern edge of the Oxnard Plain and north of Thousand Oaks, where fairly extensive cactus scrub was visible on private ranchland but inaccessible to us.

On the basis of our survey, the largest aggregations of wren territories lie in three main areas. From north to south, they are

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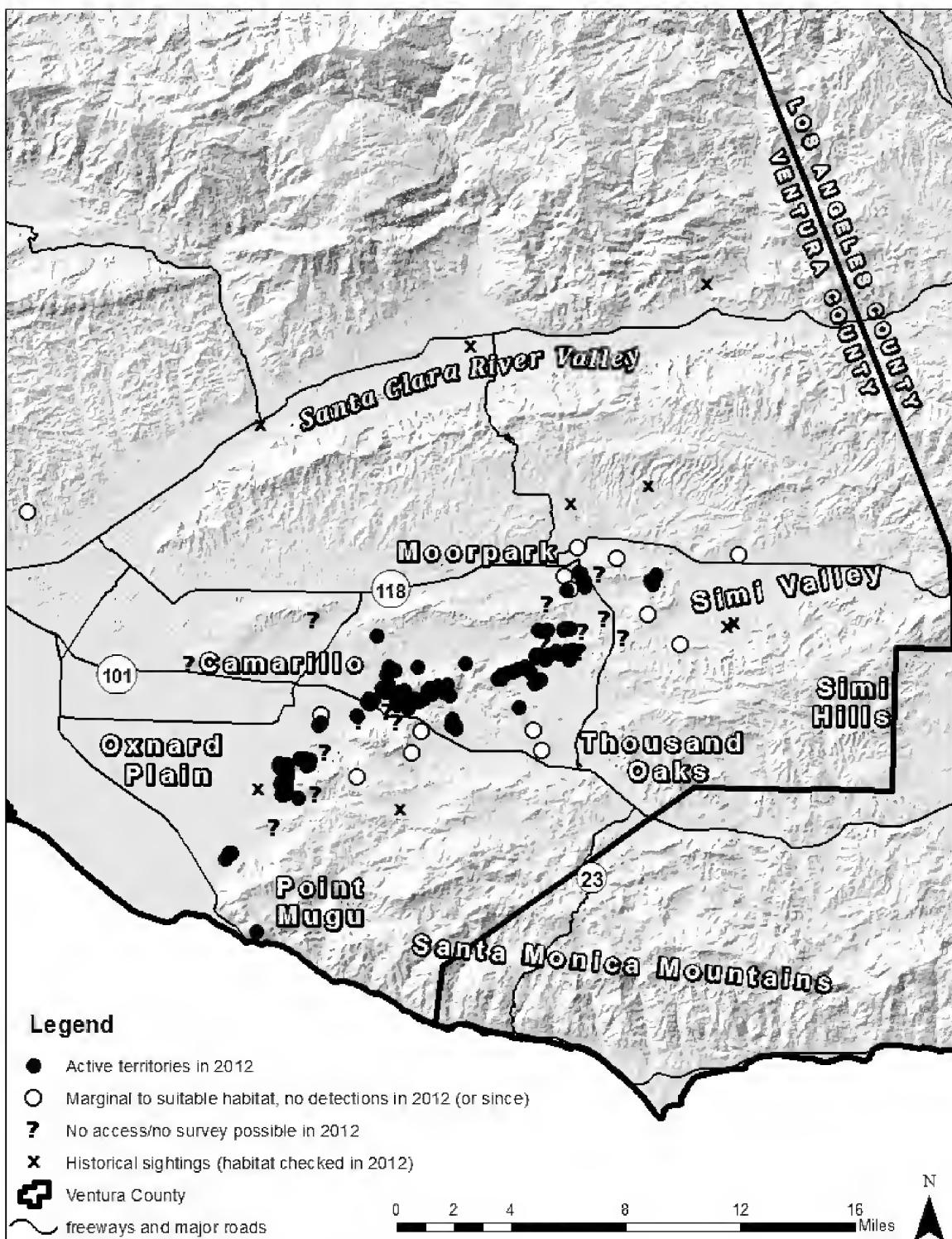


Figure 1. Current and historical range of the Cactus Wren in Ventura County.

- Mountclef Ridge/Wildwood Park on the northwestern edge of Thousand Oaks,
- The Hill Canyon area along the Conejo Grade west of Thousand Oaks/ Newbury Park, and
- Near California State University Channel Islands at the edge of the Oxnard Plain southeast of Camarillo.

Countywide, all active territories were found within 5 km of these three main areas, with the exception of a small number of pairs in the eastern

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Tierra Rejada valley area at the border of Simi Valley and Moorpark and a single pair just north of Point Mugu. We should note that even these “outliers” were within 5 km of other occupied territories; they were just more distant from the three main concentrations. Additional surveys on private property between known territories (especially at the eastern edge of the Oxnard Plain and in the Moorpark area) may show that no pair is more than about 2 km from any other pair in the county.

Although a majority of territories were in extensive blocks of open space, such as in the Hill Canyon area, numerous isolated subpopulations were in habitat surrounded by agriculture (especially on the southeastern Oxnard Plain) or in undeveloped patches within residential development (especially in Thousand Oaks and Moorpark). Several of these isolated subpopulations included fewer than five pairs, and at least one (at Monte Vista Nature Park in Moorpark) apparently consisted of a single pair in about 2 hectares of open space surrounded by residential development. However, even this site was within 1 km of other pairs just to the east, at Miller Park, also in Moorpark.

### Past Distribution

We located historical records of wrens from an area wider than the current known range in Ventura County—perhaps twice its current extent, if one considers the amount of alluvial scrub and other suitable habitat in the pre-agricultural Santa Clara River valley. The distribution continued to contract through the late 1900s, when the last Santa Clara River valley subpopulation was last detected; birds occurred along the Santa Clara River valley until the early 1980s, apparently isolated from subpopulations elsewhere in the county. Paul Lehman (in litt. to D. Guthrie, 1988) wrote, “we used to get one or two every year on the Sespe Christmas (Bird) Count...in an isolated hillside patch of prickly pear just east of the town of Piru on the road to Lake Piru. It was last gotten in 1981–1982.” One hundred years prior, Evermann (1886:86–87, 185), writing about the “village of Santa Paula” described the area:

“Along the river are small, isolated groves of cottonwoods and willows, with here and there an occasional sycamore. Scattered irregularly over the valley in its narrow portion are clumps of live-oaks, which are still more numerous in the cañons and on the adjacent foothills. Further up the sides of the mountains are dense growths of chaparral. At many places in the valley are large patches of prickly pear (*Opuntia tuna*), where the Cactus Wren, Mockingbird, Roadrunner, etc., are most numerous.”

Evermann (ibid.) termed the Cactus Wren “a common summer resident where cacti are abundant” in Ventura County, but by the early 1900s, it was apparently already in decline in the Santa Clara River valley. Willett (1933:126) considered it “apparently much less plentiful in that section at present time, as land has been largely cleared for agricultural purposes.” Interestingly, Willett [ibid.: “S. B. Peyton (MS)’] mentioned “at least two pairs still nesting near Sespe,” and a 1922 specimen from “Sespe” (University of Washington Burke Museum specimen 27262, also attributable to Peyton) suggests that the area mentioned by Lehman decades later may have been the same long-occupied locale noted by early ornithologists. Unfortunately, this site no longer supports any large stands of cactus, apparently because of frequent fire (D. S. Cooper, pers. obs.).

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We found no evidence (historical or recent) to suggest that Cactus Wrens ever occurred farther downstream along the Santa Clara River than Santa Paula (nor in the Ventura River drainage to the northwest). During our 2012 survey, the most promising area of habitat remaining along the Santa Clara River, cactus patches in Harmon Canyon north of Saticoy (a tributary of the Santa Clara River), were surveyed for the Cactus Wren on several days without success (D. Blankenship, CDFW, pers. comm.). Otherwise, so little cactus scrub habitat remains along the river and its tributaries that we could not locate a suitable area to include in the survey.

Another large area from which the Cactus Wren has been extirpated recently is the “Moorpark Grasslands,” a region of formerly cactus-rich coastal scrub and oak savanna at the southwestern edge of the Santa Susana Mountains between Moorpark and Simi Valley, just north of state route 118. Prior to devastating wildfires in the early 2000s that converted the scrub to annual grassland and eliminated essentially all mature cactus here, this area apparently supported a fairly large population of Cactus Wrens, with up to eight birds recorded by Mike San Miguel during surveys in November 2001 ([www.ebird.org](http://www.ebird.org)). In the western part of this area north of Moorpark, the birds occurred in Happy Camp Canyon at least through the late 1990s ([www.ebird.org](http://www.ebird.org); D. Pereksta, Bureau of Ocean Energy Management, pers. comm.). Today, cactus patches in this area are small, isolated, and not robust (i.e., pads appear desiccated, and many patches are invaded with weeds).

Several early specimens and nest records refer to “Simi” or “Simi Valley.” Since this is such a large area, it is not possible to determine where the records might have originated. A population remains at the extreme western edge of Simi Valley, including the vicinity of Tierra Rejada Park and on the Reagan Foundation property (on opposite sides of Tierra Rejada Rd., C. Dellith, USFWS, pers. comm.; pers. obs.), and a small population of Cactus Wren was apparently resident southeast of here in the vicinity of Azure Hills Dr. on the south side of Simi Valley until about the year 2000, after which time birds were no longer seen (M. Campbell pers. comm.). Some robust cactus habitat remains here, including at least one patch strongly dominated by cholla, as well as in the Wood Ranch area to the west, although the latter has public access blocked by gated communities and could not be surveyed. However, this area is at the far eastern edge of the known range in the county, and in two visits to the Azure Hills Dr. area we found no birds and no nests in 2012, so the species is probably no longer present east of Madera Rd. in Simi Valley, which likely marks the current northeastern edge of its local range.

The southeastern edge of the range appears to lie just west of Newbury Park, but a single Cactus Wren was observed at Rancho Sierra Vista/Satwiwa, a National Park Service property within the western Santa Monica Mountains south of Newbury Park (Figure 1), in May of 1987 and 1988 ([www.ebird.org](http://www.ebird.org), K. L. Garrett; J. Nash, in litt. to D. Guthrie, 1988). Whether it represented a vagrant, a pioneering individual, or the last remnant of a historical population is not known, but this record is as far east as we could find evidence of the species in the Santa Monica Mountains proper. The area still has patches of cactus scrub (pers. obs.), and it is possible that future visits will reveal a very small number of birds here.

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### Cactus Wren Habitat in Ventura County: Vegetation and Soils

Because vegetation data were not collected uniformly (volunteers varied in ability to identify plants and to assess percent cover), and because we recorded vegetation data only at sites that had either wrens or nests, we cannot analyze the Cactus Wren's habitat selection in Ventura County at this time. However, we can assess broad trends in breeding-habitat use that add to our understanding of the needs of this species. For example, at the 101 sites for which we have some vegetation data, prickly pear was present at all, and coast cholla was noted at 42. "Type I cactus scrub" (i.e., the category of tallest, most extensive cactus) was noted at 88 sites. As for other plant species, lemonadeberry (*Rhus integrifolia*) was at 85 sites, blue elderberry (*Sambucus mexicana*) at 68 sites. Shrub species most often cited as either the first or second most dominant species (after cacti) were California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), and ashy-leaf buckwheat (*E. cinereum*). While just one of the active sites found during the survey was within view of the ocean (near Point Mugu), nearly all sites were within the zone of coastal breezes coming up the canyons of Calleguas Creek and Arroyo Simi, and most, but not all, were on slopes with southern exposures.

The rocky "Conejo Volcanics" soil type that is dominant within the distribution of the Cactus Wren in Ventura County deserves comment, as it likely contributes to the presence of cactus and, therefore, the Cactus Wren. This substrate occurs throughout the western Santa Monica Mountains from near Calabasas (Los Angeles Co.) south and west to Point Mugu and thence northeast to the Moorpark-Simi Valley area via Mountclef Ridge (which terminates just south of Simi Valley, near state route 23 and Olsen Rd.) (National Park Service 2007). Inland (east) and coastward (south) of this zone of volcanic soils, the soil type shifts to the sandstones and shales found widely in the Santa Susana Mountains and Simi Hills, or the elevation increases, and both the wren and extensive cactus are absent. Elsewhere, volcanic soil is replaced by fine alluvium in several "interior coastal" valleys in the area, including the Conejo Valley, which includes much of the flatter areas of Thousand Oaks and Newbury Park. While now intensively developed, these alluvial soils would have supported oak savanna or, locally, oak woodland unsuitable for the Cactus Wren. At a slightly greater elevation (most of the Cactus Wren territories located in 2012 were below 300 m), coastal sage scrub is replaced with chaparral, and cacti become rare. Therefore, the vegetation supporting the Cactus Wren in Ventura County appears to be dependent on both soil type and elevation, and perhaps numerous other interrelated factors, such as proximity to the coast and aspect of slope.

Historically, Cactus Wrens were found in two distinct habitat types in Ventura County. In addition to cactus-dominated scrub on south-facing slopes, they inhabited alluvial sage scrub, which they use heavily where it remains in neighboring Los Angeles County (Cooper et al. 2012) and southwestern San Bernardino County (e.g., Santa Ana River wash, pers. obs.). In Ventura County, this habitat occurred along the Santa Clara River, Arroyo Simi, and in Happy Camp Canyon as well, where relict occurrences persist. However, alluvial scrub is now largely gone from the county, at least

## A POPULATION CENSUS OF THE CACTUS WREN IN VENTURA COUNTY

in areas near known Cactus Wren populations, so the species is largely dependent on a relatively narrow band of “upland” coastal scrub, underlain by Conejo Volcanics.

### California Gnatcatcher

Though not a target of this survey, the California Gnatcatcher (designated as threatened by the USFWS) was detected incidentally by volunteers at 14 Cactus Wren sites, mostly in the eastern part of Mountclef Ridge near Moorpark Rd. Other observations came from near Tierra Rejada Rd. on the border of Simi Valley and Moorpark (C. Dellith, USFWS, pers. comm.), the eastern slope of the Conejo Grade west of Newbury Park, and from the vicinity of California State University Channel Islands. However, neither the species nor its preferred habitat (which often lacks cactus) was the focus of our study. On the basis of historical specimens and recent sightings (WFVZ, [www.ebird.org](http://www.ebird.org)), the distribution of the California Gnatcatcher in Ventura County appears to be virtually identical to what we now know is that of the Cactus Wren. Similarly, it is essentially absent from areas historically occupied by both species, such as the Santa Clara River valley.

## DISCUSSION

Unlike that in many parts of coastal southern California (e.g., the Palos Verdes Peninsula in Los Angeles County), most of the open space in this portion of Ventura County is at least tenuously connected, even if across a busy road, to other open space. So, currently, ecological connectivity between subpopulations around Ventura County appears to be relatively good (though future development may change that). However, at a larger scale, the Ventura County population as a whole is very isolated, separated by a distance of roughly 45 km from the nearest population in Los Angeles County (at Big Tujunga Wash in the northeastern San Fernando Valley) and roughly 70 km from the nearest population with more than 10 pairs, located south along the coast on the Palos Verdes Peninsula. Little cactus scrub—almost none of it suitable for Cactus Wrens—is found in the intervening areas between the Ventura County populations and those in Los Angeles County.

As discussed by Cooper et al. (2012), prior to the 2009 census in Los Angeles County, the northern range of the coastal Cactus Wren was imperfectly known and therefore poorly represented in the published literature, often depicted as contiguous with populations in the Los Angeles Basin (Garrett and Dunn 1981). Although the population in Ventura County was likely contiguous with that in Los Angeles County along the upper Santa Clara River, this population was apparently itself isolated, both from others in Ventura County and from the nearest Los Angeles County population in the San Fernando Valley, cut off from both by the Santa Susana Mountains. In any event, the Santa Clara River population is now apparently extirpated, and so Ventura County wrens appear to be even more geographically isolated from interior birds than they were historically.

The question of how the Cactus Wren, largely a desert species, came to occur in coastal Ventura County involves several possible scenarios. While Atwood and Lerman (2007) did not detect vocal differences among coastal

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populations of the species, Barr et al. (2013), in multiple genetic analyses, found that in the genes analyzed Ventura County birds were more similar to other northerly populations from across the Los Angeles Basin into southwestern San Bernardino County (including the Palos Verdes Peninsula on the coast) than they were to those in Orange County and San Diego County south. Further analysis of genetic substructures identified three distinct clusters within this northernmost population: birds in Ventura County, those in Diamond Bar/Chino Hills, and the remainder of the Los Angeles/San Bernardino County populations. Cactus Wrens could have spread coastward from the western Mojave Desert down the Santa Clara River into the Oxnard Plain, and then back northeast toward the Santa Monica Mountains and Simi Hills via the Calleguas Creek watershed, where they persist today. They could also have arrived from the San Fernando Valley, perhaps over Santa Susana Pass into Simi Valley, or along the northern base of the Santa Monica Mountains into the Conejo Valley. Or, wrens could have dispersed north along the coast from the Palos Verdes Peninsula along the southern face of the Santa Monica Mountains and northwest to Point Mugu, with extirpation over time eliminating them from the intervening areas.

Today, large areas of cactus-rich coastal scrub are limited in these intervening areas on the Ventura/Los Angeles County border (which are dominated by chaparral or are completely urbanized); however, cactus is found along the southern face of the Santa Monica Mountains, from Point Mugu east to near Arroyo Sequit just inside Los Angeles County. Although this cactus is relatively short in stature and becomes increasingly patchy east of Arroyo Sequit, it may still allow for occasional dispersal of wrens. However, despite regular coverage of this area by birders for decades (including Big Sycamore Canyon and Leo Carrillo State Park), the Cactus Wren has never been confirmed (e.g., by photograph or voice recording) along this stretch of coast (*fide* K. L. Garrett), nor east of here into Malibu (Cooper et al. 2012).

With a few exceptions, such as on the immediate coast east of Pt. Mugu where cactus, but not the Cactus Wren, is present, the wren's distribution in Ventura County closely tracks the distribution of the largest patches of mature cactus within large, unfragmented blocks of open space. Although we did not compare the sizes of patches of cactus with and without wrens quantitatively, we encountered very few occupied sites in patches located in smaller areas of open space (<5 ha) that were entirely surrounded by development or that were farther than about 1 km from another active territory, a pattern similar to that seen elsewhere in the region (e.g., Cooper et al. 2012). However, we did note that patches of cactus in habitat fragments were often occupied by wrens if close enough to the main population clusters (e.g., in the Wildwood Park, Hill Canyon, and adjacent areas). Away from these areas, the Cactus Wren apparently reaches both a natural distributional limit, with tall cactus scrub becoming scarce at higher elevations and with greater distance from coastal breezes, as well as an anthropogenic limit implying that wrens are unable to persist in small fragments of habitat isolated by development. Where these two factors coincided, such as at isolated interior sites (as in the north Moorpark area), Cactus Wrens were predictably absent.

The Cactus Wren faces a variety of threats in Ventura County. Development, including wholesale clearing of cactus-rich scrub for agricultural,

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residential, and commercial use, continues each year, even despite downturns in the economy. Aggressive clearing for fire control is also a potential threat; we noted occupied Cactus Wren habitat near several areas where all vegetation had been cleared (to dirt) along “fuel modification zones” around development and below power lines. In contrast to Los Angeles County and most of Orange County, in Ventura County agriculture is adjacent to many occupied Cactus Wren territories, and we observed numerous examples in Ventura County where a hillside might support robust, native cactus scrub and wrens on one side, and a hard line where an orchard began and extended across the remainder of the slope.

Even if cactus patches are maintained and preserved, the deleterious effects on the Cactus Wren of both isolation and proximity to the urban edge are likely to increase if development continues without providing corridors of open space with suitable habitat between these patches (Preston and Kamada 2012). Encouragingly, we noted several cases where birds were maintaining adjacent territories split by fairly busy roads (e.g., along Moorpark Road south of Tierra Rejada Rd.) or adjacent to yards and houses (as near Wildwood Canyon Park). But we also noted fairly large patches of cactus scrub that appeared to be too far from the main concentration of territories to support the wrens (as near Azure Hills Dr. on the southwestern edge of Simi Valley). Thus conservation of habitat patches would probably be most effective near existing large populations of birds, as south of Moorpark and to the north and west of Thousand Oaks.

Notably, we found that a single entity, the Conejo Open Space Conservation Authority (COSCA), manages nearly 40% of the known Cactus Wren territories in Ventura County, mainly near Thousand Oaks (44 active territories in 2012). This proportion would have been somewhat lower had we been able to access private lands, but it still is a remarkable number, and there is no other similar public entity with anything close to that degree of representation in the county. It is likely that a similar proportion of California Gnatcatcher territories also lie on COSCA lands.

Several potential improvements to our survey, and to future surveys, involve the management and training of volunteers. We recommend that similar volunteer-based projects not require volunteers to map cactus patches, but that such mapping be completed in advance where possible, as it proved beyond the ability of most of our volunteers (and so was never completed). And, we recommend that volunteers use a checklist of conspicuous indicator species of plants, rather than trying to identify the dominant scrub species and their relative cover, since plant identification was not a skill of many volunteers. This problem particularly affected sites lacking easy access and having to be observed from a long distance away, through binoculars. Thus the utility of the data on vegetation structure and composition is limited. Ultimately, we concluded that too much of the volunteers’ time was devoted to locating both promising habitat and determining access points (which could also have been done in advance), and this detracted from the total time spent actually surveying and mapping locations of birds and nests. Thus our plan of having each volunteer commit to three survey days stretched into many more days for several participants, since so much time was spent navigating various neighborhoods and open spaces. Finally, we would not recommend

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that observers survey in groups, but rather in pairs, or even individually if their skill level is sufficient; it became difficult to coordinate multiple persons' schedules. These "lessons learned" could be incorporated into guidelines for future surveys, particularly those relying heavily on volunteers.

As ours was the first attempt to map the range of the Cactus Wren in Ventura County, the dearth of information on such variables as nesting success or dispersal should not detract from the value of a baseline distributional map, which will allow for future calculations of population fluctuation. Our finding that around 40% of the known territories are reasonably secure on protected open space (mainly COSCA lands), and agencies charged with recommending and enforcing mitigation for development being more aware of the wren's conservation needs than they were just a decade ago, should help conserve this important population. However, there is no legal prohibition against a landowner's removing habitat suitable for the Cactus Wren (or any protected species) on his or her private land in Ventura County, and cactus scrub continues to be lost away from parkland, potentially affecting more than half the known territories. So, while a Ventura County population of the Cactus Wren could persist for many years, its boundaries could continue to contract as pockets of habitat and their birds are lost in this piecemeal fashion. How small an isolated population can become and remain viable remains an open question; that in Big Tujunga Wash in Los Angeles County was down to just seven pairs in 2009, and that in the Baldwin Hills, never more than around 5–10 pairs, vanished, apparently permanently, by the mid-1990s (Cooper et al. 2012).

Fire presents another, probably more immediate threat; Preston and Kamada (2012) documented declines of >80% in reserves in south Orange County after major wildfires in the past 20 years. On the morning of 2 May 2013 (after the end of our survey), the devastating Springs Fire burned more than 9700 hectares at the far southwestern edge of the Santa Monica Mountains, including most of the Cactus Wren habitat south of state route 101 ([http://cdfdata.fire.ca.gov/incidents/incidents\\_details\\_info?incident\\_id=780](http://cdfdata.fire.ca.gov/incidents/incidents_details_info?incident_id=780)). An estimated 24 territories were affected, or 22% of the known population in Ventura County (per K. Miner, CDFW). We hope to investigate the actual effect of this fire and to assess the Cactus Wren's recovery within the area burned.

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# DOCUMENTATION BY SOUND SPECTROGRAM OF A CRYPTIC TAXON, VIREO G. GILVUS, IN BOULDER COUNTY, COLORADO

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**ABSTRACT:** During June and July 2011, I audio-recorded eight Warbling Vireos (*Vireo gilvus*) at widely scattered sites in eastern Boulder County, Colorado, immediately east of the steep foothills of the Rocky Mountains. All eight sang songs like those of the eastern subspecies, *V. g. gilvus*; immediately to the west, in the steep foothills of the Rocky Mountains, Warbling Vireos sing songs like those of the western subspecies, *V. g. swainsonii*. The results of these observations suggest both the presence of nominate *gilvus* farther west in Colorado than previously documented and a sharp demarcation between the breeding ranges of *swainsonii* and *gilvus*.

The polytypic Warbling Vireo (*Vireo gilvus*) is common across much of its extensive North American breeding range. Species limits are uncertain (AOU 1998), but the general consensus is that two groupings are represented: a monotypic eastern *gilvus* group and a polytypic western *swainsonii* group. The eastern and western populations—the Eastern Warbling-Vireo and Western Warbling-Vireo, respectively—are recognized by some authorities (e.g., Pyle 1997, Gardali and Ballard 2000) as subspecies groups, whereas others (e.g., Sibley and Monroe 1990, Phillips 1991) have treated them as separate species. Of particular interest is a recent study from Alberta (Lovell 2011) employing molecular, morphometric, and acoustic methods to test hypotheses about species limits within the warbling-vireo complex.

The Eastern and Western warbling-vireos are exemplary “cryptic taxa.” They are literally cryptic, drab and small, moving about slowly in dense foliage in treetops, where they are hard to study closely. Moreover, morphological differences between the two groups (summarized by Pyle 1997, Gardali and Ballard 2000) are relatively slight: Eastern Warbling-Vireos are proportionately larger-billed, larger overall, and brighter (less gray, more olive-yellow) than Western Warbling-Vireos. Unsurprisingly, the limits of the ranges of the Eastern and Western warbling-vireos have not been precisely established in the literature. According to the AOU (1998), Eastern Warbling-Vireos range west in the central Great Plains to eastern Nebraska, Kansas, and southeastern Colorado, whereas Western Warbling-Vireos occur east to southwestern South Dakota, central Wyoming, and western Nebraska.

The literature addressing the status and distribution of the Eastern Warbling-Vireo in Colorado is imprecise. Bailey and Niedrach (1965) cited probable occurrences in the eastern tier of counties and anticipated that the taxon would be shown to breed in the southeastern part of the state. Andrews and Righter (1992) did not distinguish between Eastern and Western warbling-vireos in Colorado. And Barrett (1998) cited only one report of an Eastern Warbling-Vireo, from Prowers County in southeastern Colorado, during field work for the Colorado Breeding Bird Atlas, 1987–1995.

The specimen record tells a similar story. The Denver Museum of Nature and Science (DMNS) houses 80 Colorado specimens of the Warbling Vireo (*sensu lato*), four of which have been identified at some point as

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*V. g. gilvus*. Of those four, however, A. R. Phillips reassigned three to *V. g. swainsonii*. Thus only one of the 80 Colorado specimens in the DMNS collection is currently attributed to *V. g. gilvus*. It is certainly possible that additional Colorado specimens of *V. g. gilvus* are represented—but as yet undetected—in the DMNS collection. Greater resolution of the Warbling Vireo's status in Colorado would be achieved by examining specimens in other collections as well.

Although weakly differentiated morphologically (see Lovell 2011), Eastern and Western warbling-vireos are well separated in other respects, including habitat (Fisher and Acorn 1998, Lovell 2011), genetics (Murray et al. 1994), molt schedule (Voelker and Rohwer 1998), and song (summarized by Gardali and Ballard 2000, Sibley 2000). Differences in song may be described as follows: (1) the song of the Western Warbling-Vireo is burrier or “less musical” overall than the relatively clear and “musical” song of the Eastern Warbling-Vireo; (2) the song of the Western Warbling-Vireo often has a break at the beginning, and the overall phrasing is choppier than that of the Eastern Warbling-Vireo; (3) the lowest-frequency phrases in the Western Warbling-Vireo’s song average slightly higher-pitched than the analogous phrases in the Eastern Warbling-Vireo’s song; and (4) the song of the Eastern Warbling-Vireo tends to end with a squeaky and relatively high-pitched note (“squirt!”), whereas the Western Warbling-Vireo’s song often ends on a buzzy and/or relatively low-pitched note. I have provided a tutorial comparing audio recordings and sound spectrograms of the songs of presumed Western and Eastern warbling-vireos in Boulder County, Colorado, at <http://tinyurl.com/Floyd-Warbling-Vireos> (Floyd 2010a).

It has been remarked by many writers (e.g., W. M. Tyler in Bent 1950) that warbling-vireos are as easy to hear as they are hard to see. Thus audio recordings of warbling-vireos might serve as a useful proxy for occurrence data based on photographic or specimen records. In particular, differences in song—if spectrographically diagnosable and verifiably correlated with geographic variation in morphology—could provide a means for better resolution of the range limits of the two groups. Additionally, spectrographic analysis of song in the contact zone, assuming a contact zone exists, could be useful for determining taxonomic limits within the warbling-vireo complex.

Boulder County, Colorado, provides an especially propitious venue for studying variation and contact between populations in the warbling-vireo complex. From west to east, the county drops an impressive 2700 m. The transition between “eastern” and “western” landscapes is abrupt and dramatic, with typical “eastern” and “western” bird communities occurring within a few kilometers of one another.

## METHODS

Applying the method of convenience sampling (see McCormack and Hill 1997), I searched for and attempted to make audio recordings of presumed Eastern Warbling-Vireos in Boulder County. I made the recordings depicted in Figures 1 and 2 with a “flower pot mic” (see Evans 2005), and those depicted in Figures 3–9 with an Olympus VN-8100PC recorder (see Floyd 2012b). I analyzed the songs on the basis of sound spectrograms generated

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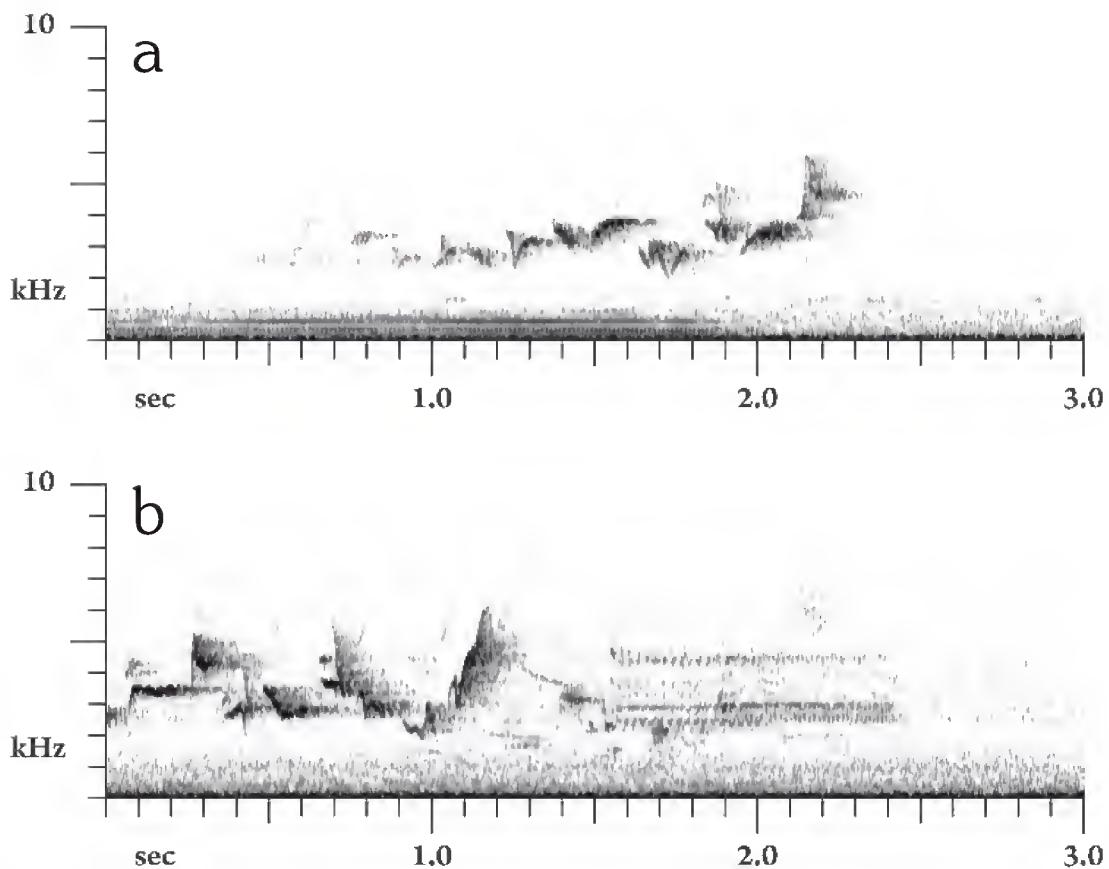


Figure 1. Songs of a warbling-vireo recorded at 40.0449° N, 105.1923° W at Walden Ponds, near Boulder Creek, Boulder County, Colorado, 11 June 2011. (a) This song is a bit less “exuberant” than that often uttered by the Eastern Warbling-Vireo but otherwise typical. Note the relatively smooth and continuous song delivery, the relatively low-pitched baseline phrases in the song (compare with Figure 9), and the high-pitched terminal note. (b) Song cut off at the beginning, but the terminal 1.25 sec, shown here, is entirely typical of the Eastern Warbling-Vireo; note especially the vigorous delivery and the high-pitched terminal note. The sound beginning at 1.40 sec is the song of a distant Red-winged Blackbird (*Agelaius phoeniceus*).

by Audacity (<http://audacity.sourceforge.net>), but the sound spectrograms reproduced here were generated by Raven (<http://birds.cornell.edu/brp/raven>).

## RESULTS

### Field Observations from and Sound Recordings Obtained in the Lowlands of Boulder County, Colorado

In June and July of 2011, I made the following observations in the lowlands of eastern Boulder County.

At Walden Ponds on the afternoon of 9 June 2011, I saw a warbling-vireo that, on the basis of visual characters, I tentatively identified as an Eastern Warbling-Vireo. Within a minute of the initial detection, the bird began to sing; its song sounded to me like that of the Eastern Warbling-Vireo. I returned to the site on the morning of 11 June 2011 and obtained audio recordings of two warbling-vireos, one of which sounded typical of the Eastern

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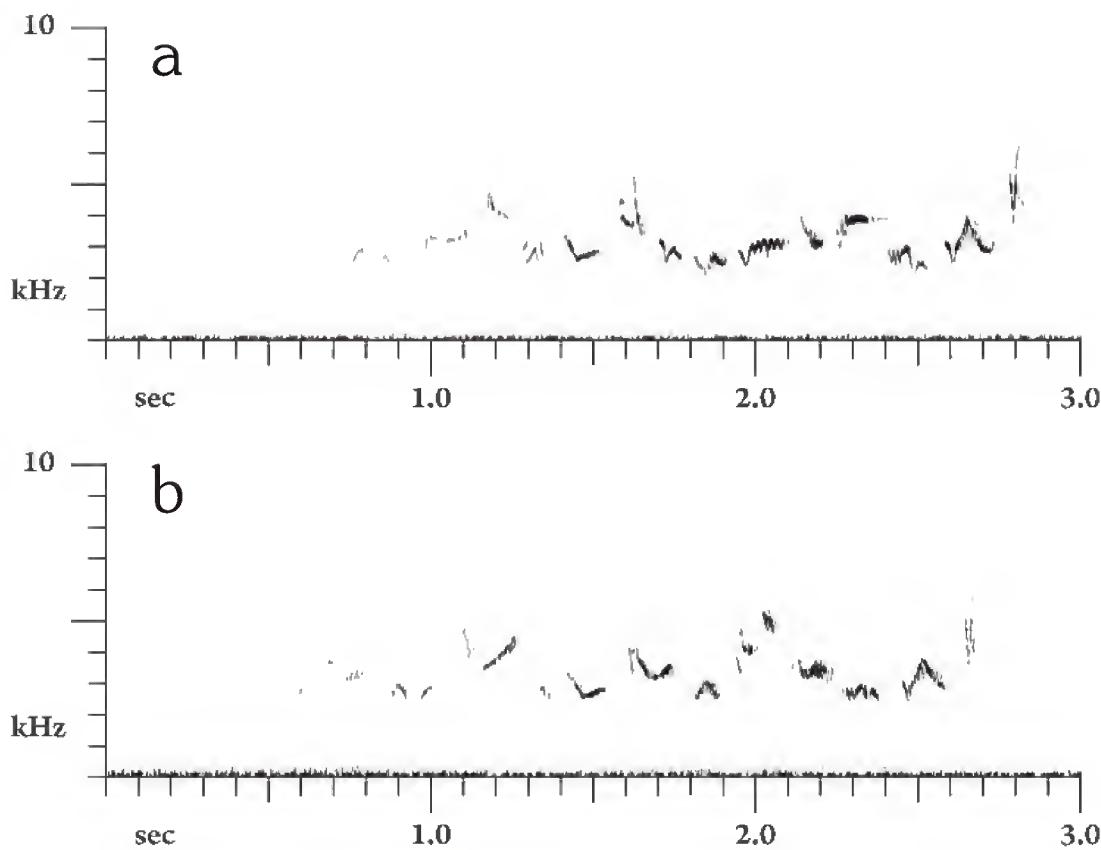


Figure 2. Songs of a warbling-vireo recorded at 40.0435° N, 105.1890° W at Walden Ponds, near Boulder Creek, Boulder County, Colorado, 11 June 2011. Both songs are typical of the Eastern Warbling-Vireo, consisting of “sweet” phrases (appearing as relatively thin traces) given in rapid succession; in the field, the aural impression is of nearly continuous song delivery. In both examples, the baseline phrases in the song are relatively low pitched, and both songs end abruptly with a high-pitched terminal note.

Warbling-Vireo, the other atypical. Sound spectrograms of the apparently atypical songs show a mix of slightly aberrant (Figure 1a) and typical (Figure 1b) Eastern Warbling-Vireo song-types. M. O’Brien and N. Pieplow (pers. comm.) identified the songs as those of the Eastern Warbling-Vireo, despite my equivocation when I heard the bird in the field. Sound spectrograms of the other bird’s songs (Figures 2a, b) are typical of the Eastern Warbling-Vireo, consistent with my impressions from the field.

At White Rocks on the morning of 19 June 2011, I heard two warbling-vireos whose songs seemed a perfect match for the Eastern Warbling-Vireo. I returned to the site on the morning of 22 June and obtained an audio recording of what I assume was the first bird I had heard on 19 June (on both mornings, a bird was singing from the same perch). Sound spectrograms of this bird’s song (Figures 3a, b) are consistent with the song of the Eastern Warbling-Vireo. I did not obtain audio recordings of the other warbling-vireo I had heard there on 19 June.

Near Greenlee Preserve on the morning of 21 June 2011, I heard a warbling-vireo whose song sounded typical of the Eastern Warbling-Vireo. I briefly heard what I presumed to be the same bird on the morning of 23 June. I did not hear the bird again after that date, despite repeated visits to the site, and I did not obtain an audio recording of it.

VIREO GILVUS GILVUS IN COLORADO

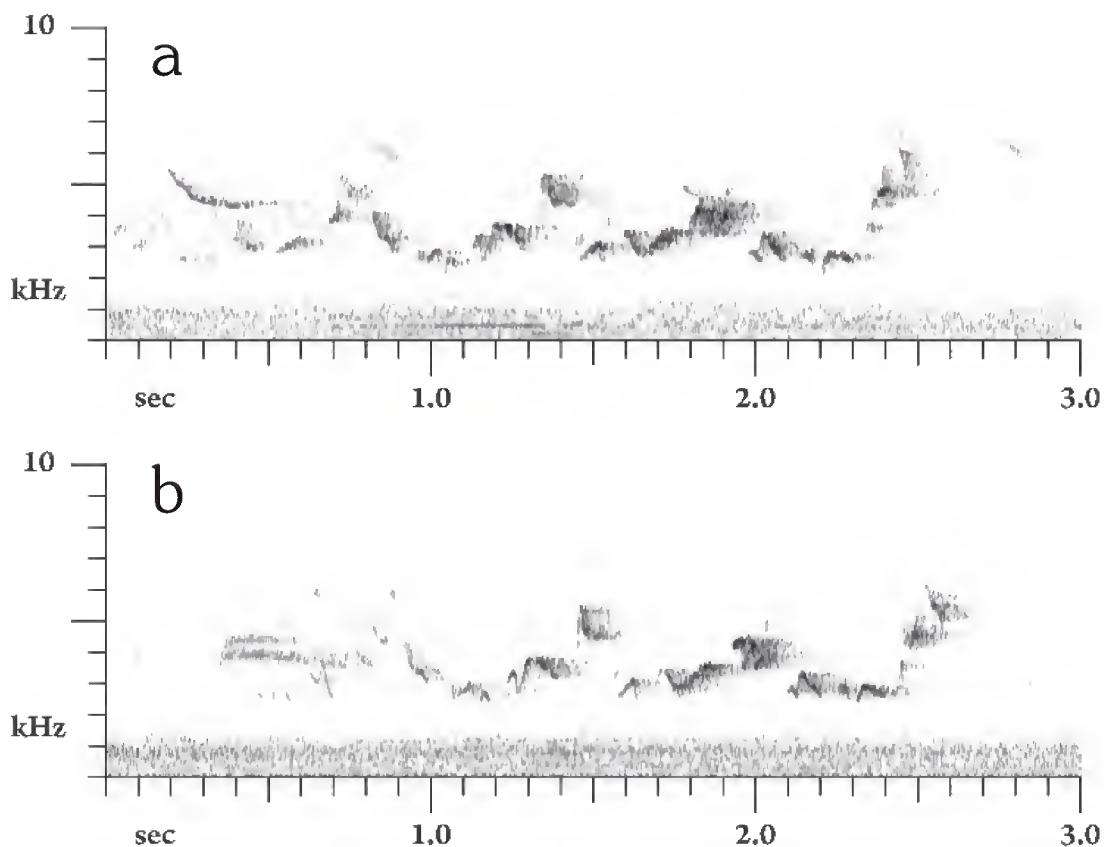


Figure 3. Songs of a warbling-vireo recorded at 40.0465° N, 105.1446° W at White Rocks, near Boulder Creek, Boulder County, Colorado, 22 June 2011. Both songs are typical of the Eastern Warbling-Vireo. (a) Includes calls of a Red-winged Blackbird (whistled down-slur beginning at around 0.20 sec) and an Eastern Kingbird (*Tyrannus tyrannus*; buzzy notes at around 0.80 sec and 2.75 sec); (b) includes song of a Western Wood-Pewee (*Contopus sordidulus*), extending from around 0.35 to 0.85 sec.

At Pella Crossing on the morning of 25 June 2011, I heard and recorded two warbling-vireos. In the field, the song of the first bird sounded typical of the Eastern; I thought the second bird was an Eastern Warbling-Vireo, too, although I judged its song to be less typical than that of the first bird. Sound spectrograms of the first bird's song (Figures 4a, b) are consistent with the song of the Eastern Warbling-Vireo. Sound spectrograms of the second bird's songs reveal some that are typical of Eastern Warbling-Vireo (Figure 5a) as well as others that are less typical but probably within the eastern subspecies' range of variation (Figure 5b).

Along South Boulder Creek on the morning of 26 June 2011, I recorded two warbling-vireos. My experiences with these two birds were analogous with my experiences the morning before at Pella Crossing. The first bird I heard along South Boulder Creek sounded typical of the Eastern Warbling-Vireo, and sound spectrograms of that bird's songs (Figures 6a, b) are consistent with it. The second bird sounded more problematic in the field, but sound spectrograms of that bird's songs reveal that my assessments in the field may have been affected by substantial noise from the nearby creek. Spectrographically, this bird's songs are either typical of (Figure 7a) or only somewhat aberrant for (Figure 7b) the Eastern Warbling-Vireo.

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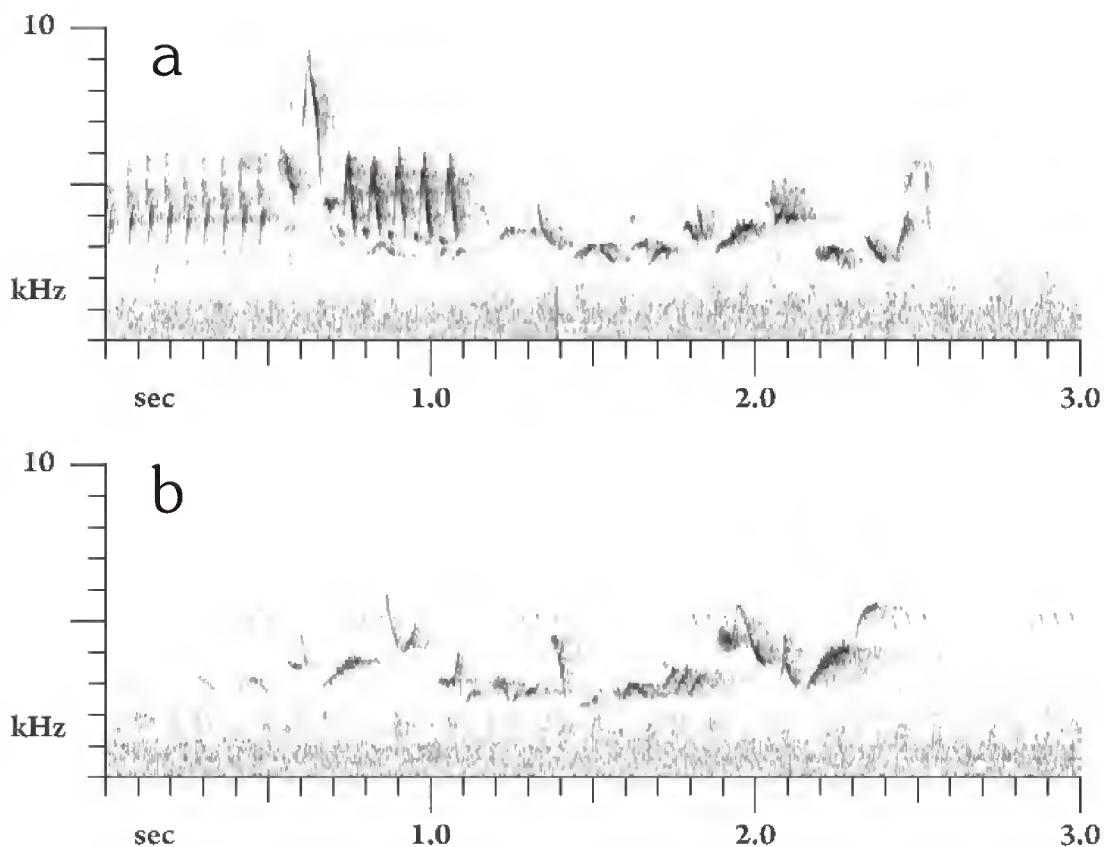


Figure 4. Songs of a warbling-vireo recorded at 40.1810° N, 105.1844° W at Pella Crossing, near St. Vrain Creek, Boulder County, Colorado, 25 June 2011. Both songs are typical of the Eastern Warbling-Vireo. (a) The beginning of the vireo's song is partially obscured by a House Wren (*Troglodytes aedon*) song that ends at around 1.10 sec.

Along Coal Creek on the morning of 2 July 2011, I recorded a warbling-vireo which sounded to me like an Eastern. Sound spectrograms of its songs (Figures 8a, b) confirm that they are consistent with the Eastern Warbling-Vireo.

The locations of these presumed Eastern Warbling-Vireos (ten birds heard, of which I obtained audio recordings of eight) are shown in Figure 10. Note that all ten were in riparian habitat just east of the steep foothills of the Rocky Mountains. Nine birds were along or within 500 m of creeks, and one was in wooded habitat near the edge of a lake. Four of the ten birds were along or near Boulder Creek; two were along or near South Boulder Creek; two were along or near St. Vrain Creek; and two were in the Coal Creek drainage (including the one at Greenlee Preserve). Thus I documented two or more apparent Eastern Warbling-Vireos within all four of the primary drainages of Boulder County.

### Field Observations in the Mountains of Boulder and Teller Counties, Colorado

For comparative purposes, I recorded a presumed Western Warbling-Vireo in spruce-fir habitat at an elevation of 2750 m in mountainous Teller County on the morning of 28 June 2011. In the field, the bird sounded like

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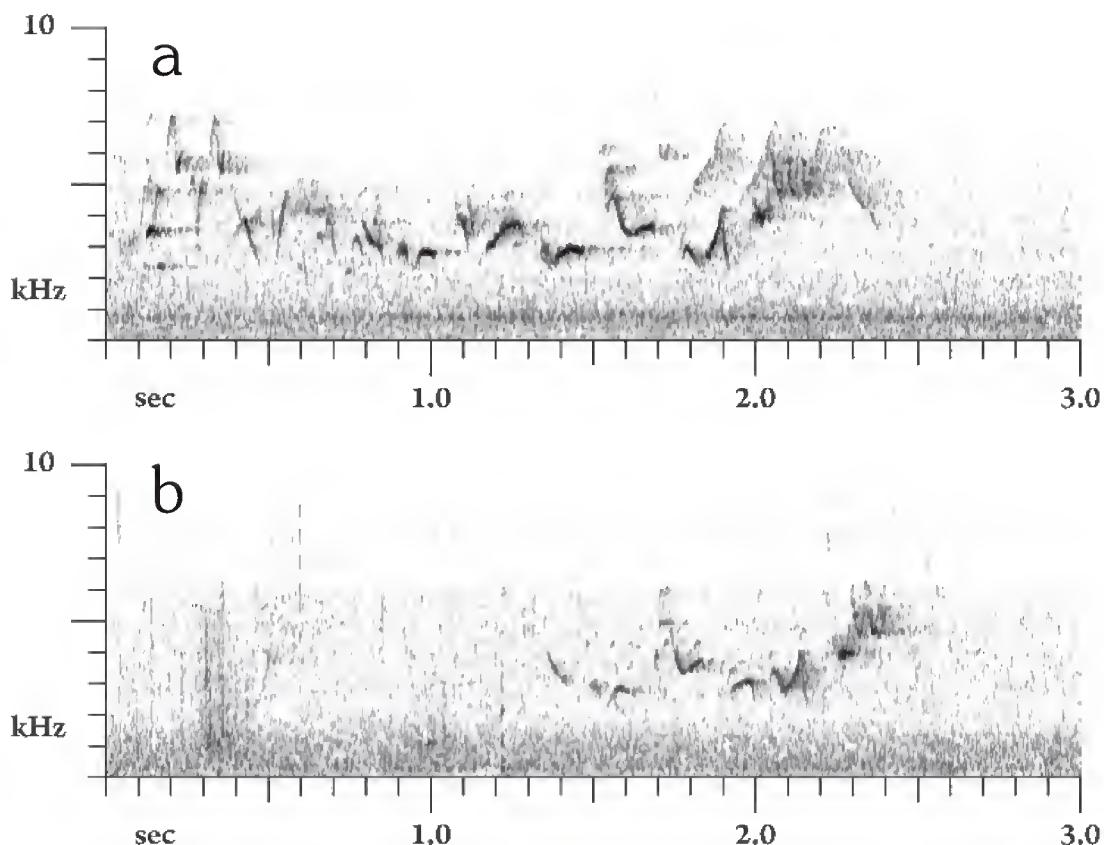


Figure 5. Songs of a warbling-vireo recorded at 40.1833° N, 105.1860° W at Pella Crossing, near St. Vrain Creek, Boulder County, Colorado, 25 June 2011. (a) The song is typical of the Eastern Warbling-Vireo; note that the song of a House Wren runs to around 0.40 sec, and that the end of the vireo's song (around 2.10 sec) overlaps with the song of a Yellow Warbler (*Setophaga petechia*) ending at around 2.35 sec. (b) The song is somewhat short (around 1.10 sec) for an Eastern Warbling-Vireo but is otherwise typical, showing a fairly continuous trace of "sweet" (relatively thin) phrases and a relatively high-pitched terminal note.

a Western Warbling-Vireo. Sound spectrograms of its songs (Figures 9a, b) confirm that they are consistent with that form.

On various occasions during June and July 2011, in Boulder County's mountains and steep foothills I heard or saw warbling-vireos that I assumed were Western. Their songs were indistinguishable to my ears from those of the individual from Teller County (Figures 9a, b); if seen well enough, they looked like Western Warbling-Vireos (per Pyle 1997). In Boulder County, the boundary between the eastern lowlands (consisting of grasslands and broadleaf riparian woodland) and western foothills (consisting of pine, spruce, and fir forests) is abrupt and dramatic; see Figure 10. The Boulder County landscape thus differs from that described by Lovell (2011), who studied Eastern and Western warbling-vireos across a more gradual ecotone from aspen parkland (favored by the Eastern) to mixed conifer woodlands (preferred by the Western).

In late May and early June 2012 (i.e., nearly one year following the detections reported above), I audio-recorded several Western Warbling-Vireo songs in the mountains and foothills of western Boulder County (Floyd 2012a–c), as well as additional Eastern Warbling-Vireo songs in the lowlands

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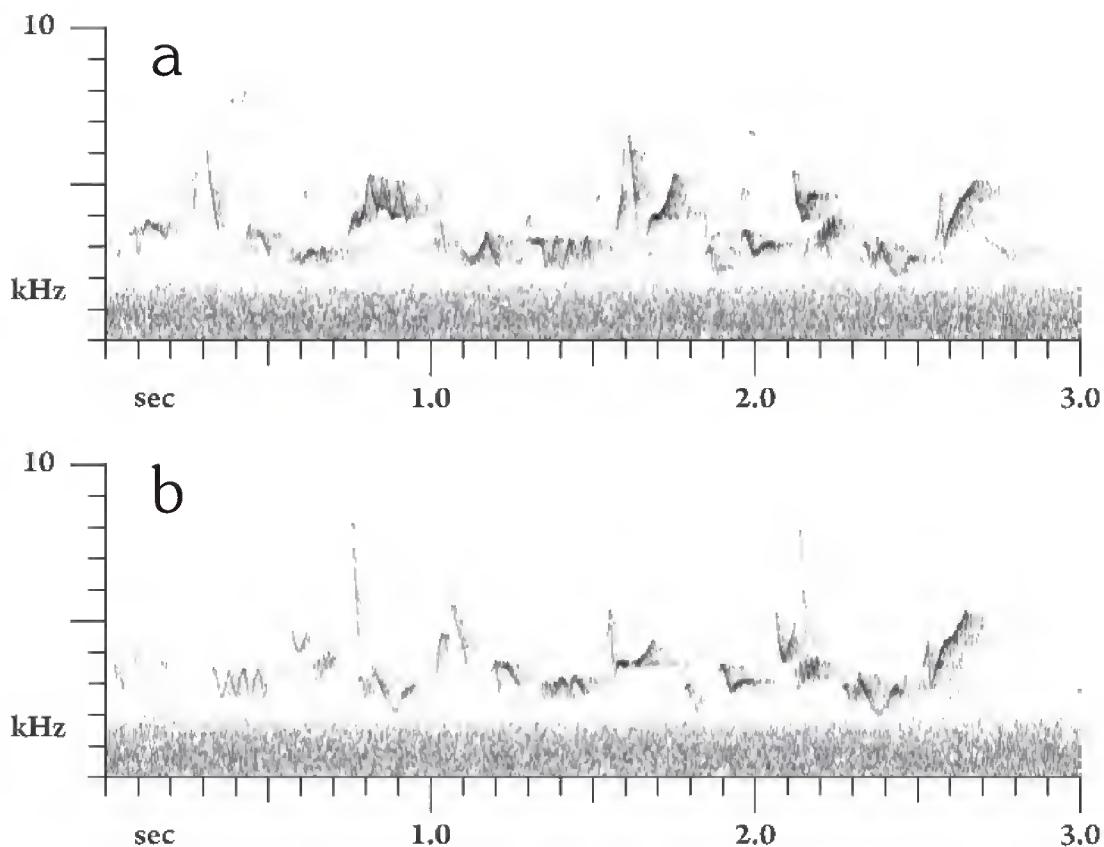


Figure 6. Songs of a warbling-vireo recorded at 39.9754° N, 105.2239° W in the South Boulder Creek Management Area, near South Boulder Creek, Boulder County, Colorado, 26 June 2011. Both songs are typical of the Eastern Warbling-Vireo. (a) A Cedar Waxwing (*Bombycilla cedrorum*) calls briefly at around 0.40 sec, and an unidentified sound—perhaps that of a Cedar Waxwing, as well—can be heard at around 1.90 sec. (b) The call note of a Yellow Warbler is audible at around 0.75 sec and again at around 2.15 sec.

just east of the Boulder County foothills (Floyd 2012a–c). These very anecdotal detections in 2012 further support an abrupt demarcation between the two subspecies’ ranges at the interface of the central Rocky Mountains and southern Great Plains.

## DISCUSSION

My observations confirm the widespread occurrence in the lowlands of Boulder County, Colorado, of birds that sound like Eastern Warbling-Vireos. In the middle latitudes of the continental United States, the western limits of the range of the Eastern Warbling-Vireo have been characterized only imprecisely (e.g., Bailey and Niedrach 1965, AOU 1998); nevertheless, the prevailing published consensus has been that Eastern Warbling-Vireos, if present at all in Colorado, are limited to the southeastern part of the state (Bailey and Niedrach 1965; see Barrett 1998; cf. DMNS data). More recently, an emerging online “gray literature”—consisting, in the present case, of data submitted to eBird.org, xeno-canto.org, and groups.google.com/forum/#!forum/cobirds—has pointed to the occurrence of Eastern Warbling-Vireos across the eastern tier of Colorado counties and west spar-

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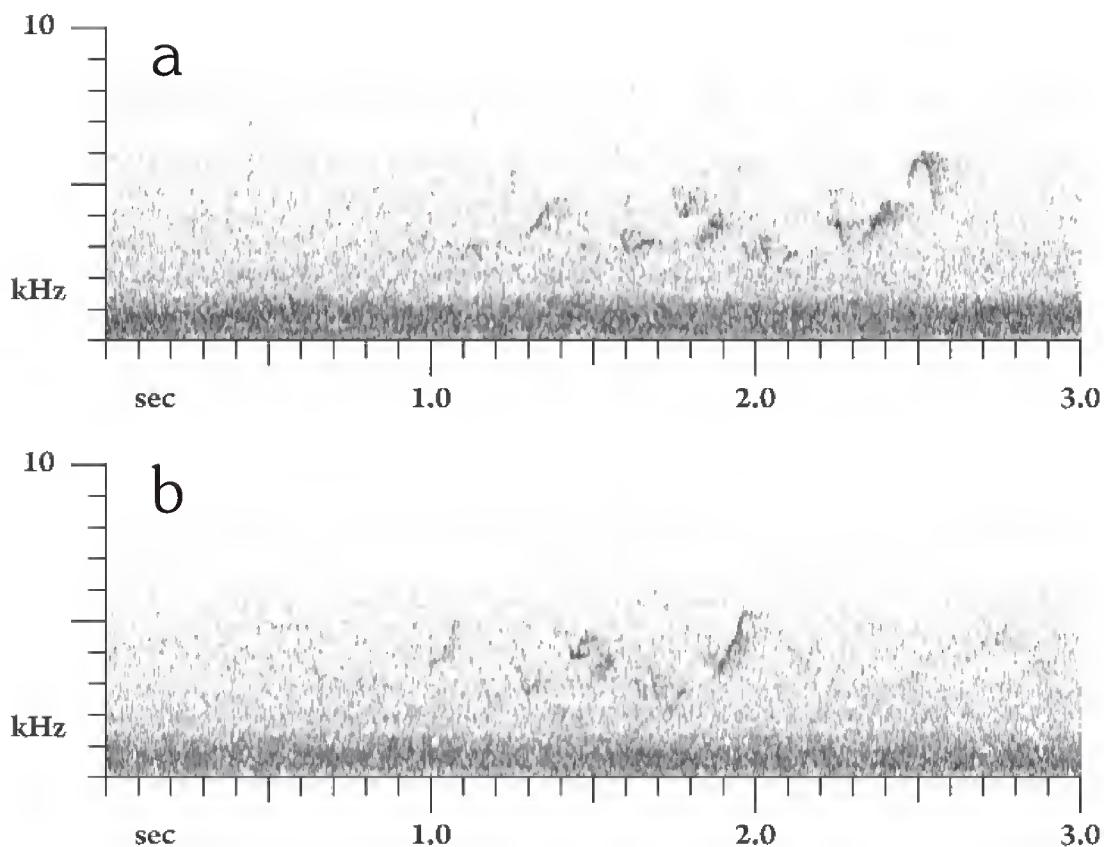


Figure 7. Songs of a warbling-vireo recorded at 39.9784° N, 105.2224° W in the South Boulder Creek Management Area, near South Boulder Creek, Boulder County, Colorado, 26 June 2011. In both examples, excessive background noise (broadband “splattering,” heaviest at low frequencies) is the sound of South Boulder Creek; the bird was singing from a perch just above the creek. (a) Although obscured somewhat by creek noise, the song appears to be typical of an Eastern Warbling-Vireo. (b) The song may be atypically short for an Eastern Warbling-Vireo, but background noise may obscure the beginning of the bird’s song. In other respects, however, the song is typical of the Eastern Warbling-Vireo, consisting of sweet, continuous phrasing with a relatively low-pitched baseline and a high-pitched and ascending terminal note.

ingly toward the Denver–Front Range metropolitan region.

In any event, the occurrence of at least ten presumed Eastern Warbling-Vireos, eight of which I audio-recorded, is without precedent in the lowlands immediately east of the Rocky Mountains in northern Colorado. Their presence in Boulder County raises an ontological question: are they “really” Eastern Warbling-Vireos, or are they birds that merely sound like Eastern Warbling-Vireos? Either outcome would have bearing on our understanding of geographic variation and taxonomic limits in the warbling-vireo complex.

The typical songs of warbling-vireos from well within their described ranges are distinct. Thus an Eastern Warbling-Vireo in New Jersey sounds different from a Western Warbling-Vireo in Nevada. In regions of contact, however, one must be wary of two complications. First, because vireos are oscines and develop their songs in part through learning, a “good” Western Warbling-Vireo might learn the “wrong” song, i.e., that of an Eastern Warbling-Vireo singing nearby; conversely, an Eastern might sing the song of a Western. Second, there might be intermediate song types, just as one might expect

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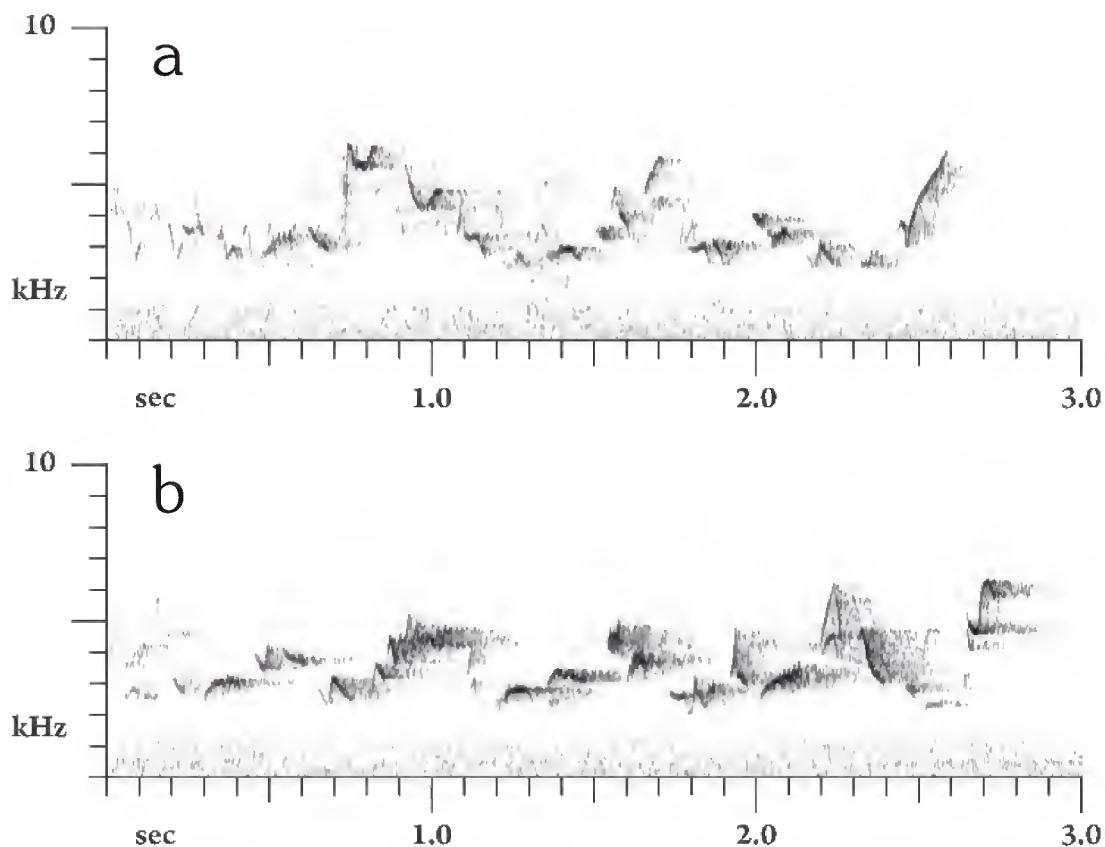


Figure 8. Songs of a warbling-vireo recorded at 39.9776° N, 105.1139° W in the Coal Creek Open Space, near Coal Creek, Boulder County, 2 July 2011. Both songs are typical of the Eastern Warbling-Vireo. (a) A fairly faint House Wren song ends at around 0.25 sec.

intermediate morphologies in zones of overlap; in this regard, it is worth noting that geographic variation in song phrases in the Solitary Vireo complex (*Vireo solitarius sensu lato*) appears to be clinal (James 1981). Unpublished field observations and playback experiments from Choteau, Teton County, Montana, suggest the local warbling-vireo population may be intermediate with regard to song type (D. A. Sibley, pers. comm.) In a zone of overlap zone in Alberta, however, Lovell (2011) detected no intermediate song types.

Regardless, the songs of warbling-vireos are complex and variable (Howes-Jones 1985). It might be expected that a variant or atypical song of an otherwise “normal” Western Warbling-Vireo approaches or overlaps that of the Eastern Warbling-Vireo, and vice versa.

Better understanding of the Eastern and Western warbling-vireos in or near the contact zone will require specimen-based studies. On the one hand, my study establishes the occurrence near the foothills of the Rocky Mountains of birds that sound like Eastern Warbling-Vireos. On the other, its results cannot be taken as proof that such birds “really” are Eastern Warbling-Vireos. Audio recordings alone are inadequate, in most instances, for establishing taxonomic limits in birds; evidence adduced only from audio recordings may appear persuasive, but such “proof” is based on circular reasoning. A recent and relevant case study involves the question of the taxonomic status of the “South Hills Crossbill” (*Loxia sinesciuris* Benkman), rejected as a full species by the AOU (2009) in part because audio recordings purported to refer to

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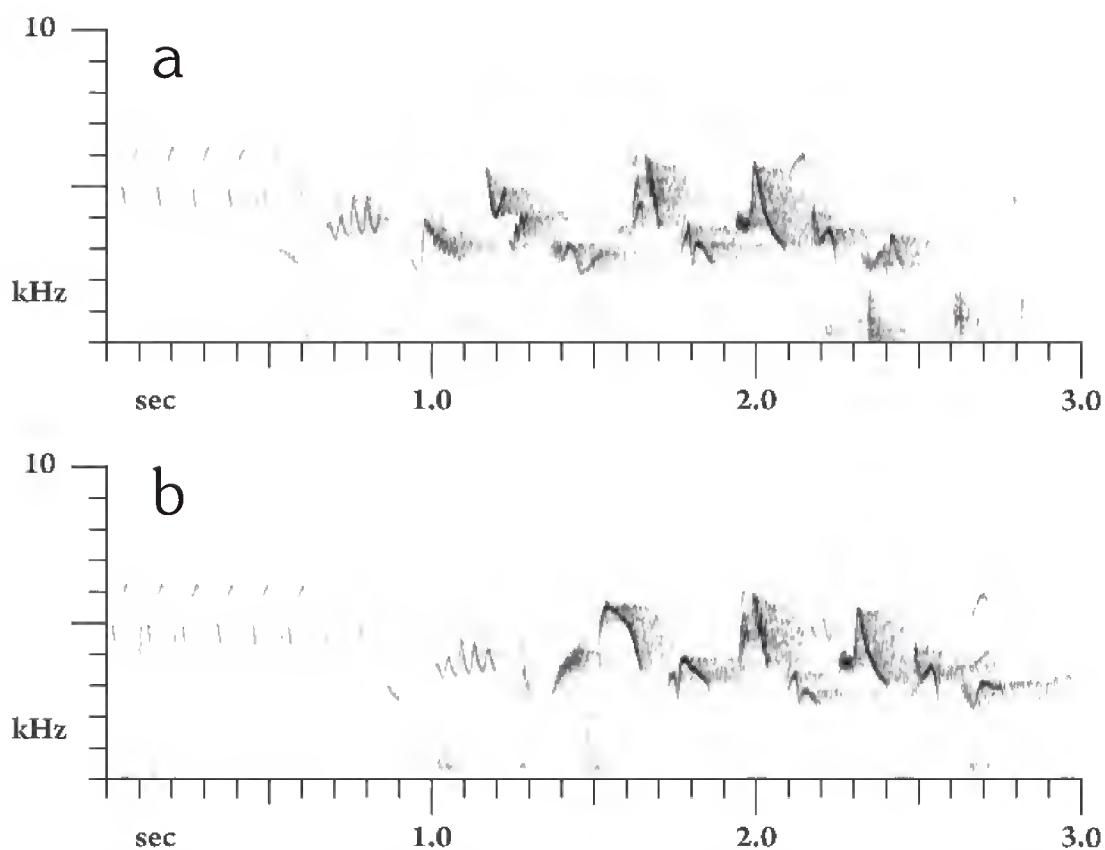


Figure 9. Songs of a warbling-vireo recorded at 38.9268° N, 105.1005° W in spruce-fir forest in Woodland Park, Teller County, Colorado, 28 June 2011. Both songs are typical of the Western Warbling-Vireo, differing in various ways from the songs of the Eastern Warbling-Vireo. In both examples, note the break after the first phrase in the song, followed by irregular phrases with a baseline frequency slightly higher pitched than that of the Eastern Warbling-Vireo; note further that both songs peter out at the end, ending on a low-pitched note, the opposite of the high-pitched and emphatic terminal note of the Eastern Warbling-Vireo. The effect on a human listener is of a burry tone quality and a “relaxed” quality to the phrasing; also, the absence of an emphatic terminal note (“squirt!”) is characteristic. (a) The song of a Dark-eyed Junco (*Junco hyemalis*) runs to about 0.75 sec; the sounds at about 2.35 and 2.65 sec are of a wooden screen door being shut. (b) The song of a Dark-eyed Junco runs to about 0.95 sec.

the taxon were not convincingly matched to specimens, i.e., vouchers of verifiable identity.

In Boulder County and elsewhere in Colorado, high-quality digital photographs of audio-recorded birds might help to clarify the range limits of the Western and Eastern warbling-vireos. Specimens and mist-netted birds would be better, however, as the relatively slight morphological differences between these cryptic taxa are difficult to quantify from digital photographs. Moreover, specimens of audio-recorded birds would provide genetic data that digital photographs cannot; of particular value would be nuclear DNA for determining the extent of introgression, if any, in the contact zone. The recent monograph by Lovell (2011) affirms the importance of specimen-based research for acoustic studies aimed at resolving species limits within the warbling-vireo complex.

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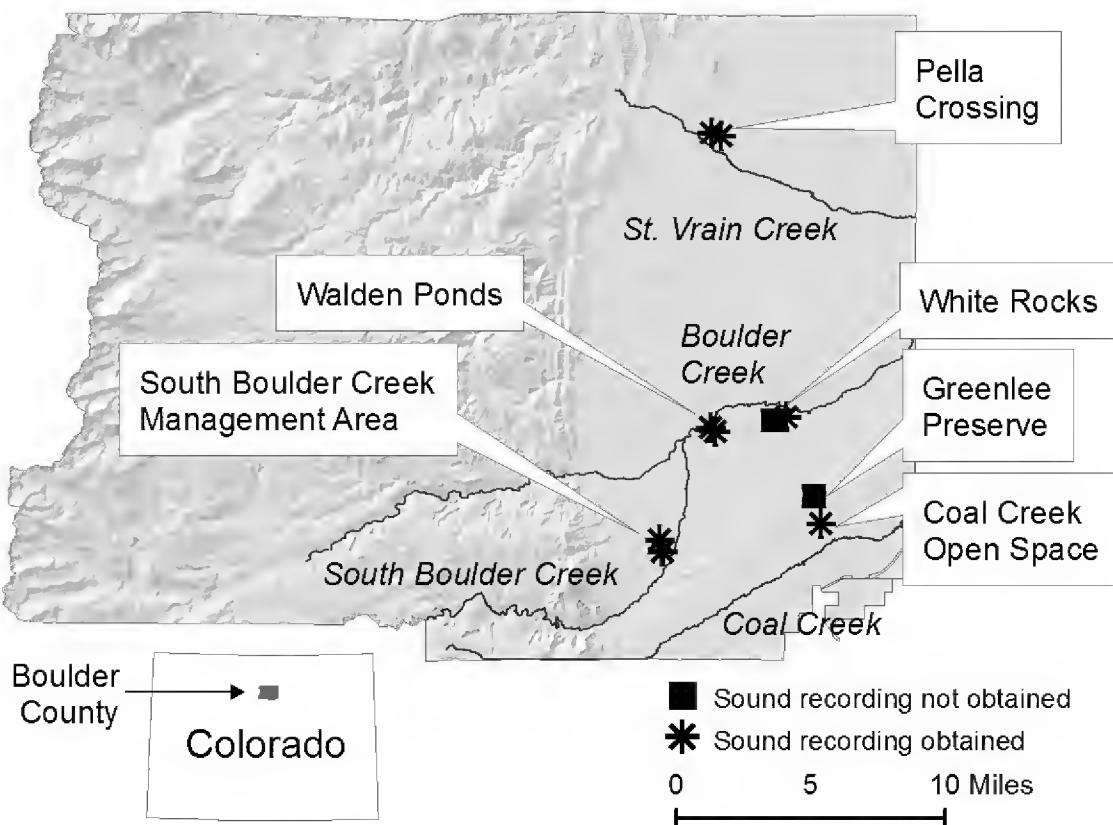


Figure 10. Locations of 10 presumed Eastern Warbling-Vireos in Boulder County, June–July 2011. Eight of these birds were audio-recorded. Note that all 10 were in the lowlands of eastern Boulder County. The boundary between the Great Plains and Rocky Mountain biomes is stark in Colorado, as attested by the hill-shading on the map.

Another unresolved matter is the status in Boulder County prior to 2011 of birds that sound like Eastern Warbling-Vireos. My field notes indicate no such occurrences prior to 2011. Likewise, Boulder-based natural-sounds expert N. Pieplow (pers. comm.) is unaware of occurrences prior to 2011. The summer of 2011 brought numerous “Midwestern” breeders to Boulder County; Cassin’s Sparrows (*Peucaea cassinii*) were widespread, multiple Red-headed Woodpeckers (*Melanerpes erythrocephalus*) were reported, and, most notably, Eastern Phoebe (*Sayornis phoebe*) bred or were suspected of breeding at several locations (Such and Such 2012). Perhaps the occurrence in 2011 of presumed Eastern Warbling-Vireos was linked to the broader arrival of such “Midwestern” bird species in an unusual breeding season. However, Eastern Warbling-Vireos might have been present in previous summers but simply undetected as such.

An obvious next step is to continue to monitor the status of presumed Eastern Warbling-Vireos in Boulder County and elsewhere along the eastern foothills of the southern Rocky Mountains. Such monitoring would benefit from a two-pronged approach, involving both audio recording and capture. In this scenario, individual birds would first be recorded and then collected or captured for measurements, photos, and blood-sampling; next, sound

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spectrograms would be matched to individuals that could be identified by plumage, measurements, and genes. Such a sampling design is essential for avoiding the trap of circular reasoning that an Eastern Warbling-Vireo song can come only from an Eastern Warbling-Vireo.

Such an approach will also permit determination of the extent of interbreeding, if it exists, in the contact zone. That finding, in turn, would substantially advance our understanding of taxonomic limits within the warbling-vireo complex. It would also answer the question of whether song can reliably be used to identify warbling-vireos in field studies such as breeding bird atlases, point-count surveys, and the Breeding Bird Survey.

### ACKNOWLEDGMENTS

I thank Jon L. Dunn, Kimball L. Garrett, Daniel D. Gibson, Scott F. Lovell, Van Remsen, David A. Sibley, and Philip Unitt for their helpful comments on an earlier draft of this paper, and I thank Michael O'Brien and Nathan Pieplow for help with analysis of the sound spectrograms. Jeff Stephenson, Zoology Collections Manager with the Department of Zoology at the Denver Museum of Nature and Science (DMNS), kindly granted me access to specimens of warbling-vireos in his care. I am especially grateful to Nathan Pieplow for creating Figures 1–9, and to Kei Sochi for creating Figure 10.

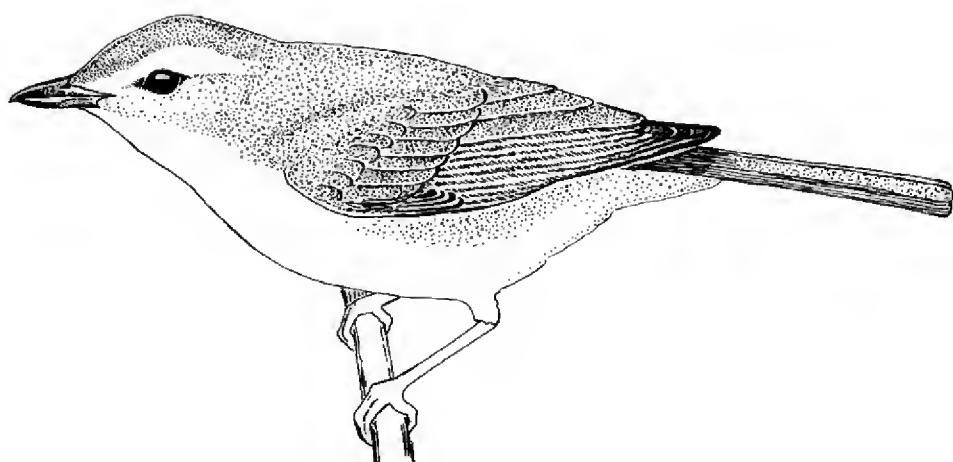
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Warbling Vireo

*Sketch by Kenn Kaufman*

# FORAGING INTERACTIONS OF THE GREAT EGRET IN UPLAND HABITATS

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**ABSTRACT:** Great Egrets (*Ardea alba*) foraging in grassy uplands near Arcata, California, used multiple strategies, foraging solitarily or in groups and commensally or noncommensally, in any of the four possible combinations. Egrets foraging commensally with cattle apparently benefited from the association on eight of the 21 observed occasions. Solitary foragers tended to use microhabitats along ditches and fences and were generally less active, made fewer errors, and captured larger prey than did group and commensal foragers. But group foragers, commensal and noncommensal foragers combined, captured more prey. Tidal fluctuations, prey types, and habitat structures likely modified foraging behaviors. There was no clear difference in rate of food intake, handling time, or foraging success by foraging strategy: a higher rate of capture of small prey by egrets foraging in groups compensated for the lower rate of capture of larger prey by solitary birds.

The Great Egret (*Ardea alba*) is commonly associated with wetlands but also forages in uplands, occasionally commensally with grazing mammals (Caldwell 1956, Kushlan 1978b, Herring and Herring 2007) and in aggregations with others of its species (Kushlan 1978a, Wiggins 1991). In northern California's Humboldt Bay, Great Egrets nest colonially on islands within the bay and often fly to the nearby mainland to feed (Ives 1972). Humboldt Bay was historically surrounded by freshwater marshes, but 95% of these were diked and drained for agriculture in the late 1800s and early 1900s (Long and Ralph 2001). These agricultural areas contain rich sources of food for foraging egrets (Schlorff 1978). Given that food is a limiting factor for predatory birds (Lack 1946) and that individuals may vary in their ability to exploit resources (Reid et al. 2003), different behaviors may return better results in different habitats (Kushlan 1972, 1976, Maccarone and Brzorad 2007). The Great Egret's feeding behavior, aggression, and sociality may be expressed and interact differently in different habitats (Kushlan and Hancock 2005). Interspecific and intraspecific interactions may contribute to the Great Egret's various feeding behaviors (Kushlan 1976).

The goal of my study was to compare the Great Egret's behaviors and success when foraging in groups of various sizes and commensally or noncommensally in upland habitats. I aimed to identify functions of the Great Egret's social system and how various habitats contribute to the species' ecology.

## METHODS

### Study Area

My study took place in an area of ~2415 ha in the Arcata Bottoms (40.9° N, 124.1° W) north of Humboldt Bay, Humboldt Co., California, from 25 January to 27 March 2010. The upland landscape consists of pastures for dairy and beef cattle (Monroe 1973). The fields ( $n = 92$ ) vary in size, shape,

## FORAGING INTERACTIONS OF THE GREAT EGRET IN UPLAND HABITATS

and composition and are separated by roads, ditches, fences. They are vegetated with ryegrass (*Lolium perenne*), dandelion (*Taraxacum officinale*), plantain (*Plantago lanceolata*), velvet grass (*Holcus lanatus*), Kentucky bluegrass (*Poa pratensis*), meadow fescue (*Festuca arundinacea*), bentgrass (*Agrostis* spp.), clover (*Trifolium* spp.), and buttercup (*Ranunculus repens*) (Black et al. 2003). The Arcata area receives 1000–1300 mm of rainfall annually, mainly in winter and spring, and it may be foggy year round. Temperatures seldom dip below  $-1^{\circ}\text{ C}$  in winter and rarely climb above  $21^{\circ}\text{ C}$  in summer. Tidal sloughs connected to Humboldt Bay wind through the study area and are used for irrigation. Consequently, some upland areas had characteristics of wetlands, being variably saturated and supporting mainly hydrophytic plants. As my study focused on the egret's use of uplands, I excluded observations in wetlands.

### Foraging Behaviors and Interactions

For this study I defined "foraging" as an egret standing, pacing, or probing with its head and bill down. "Feeding" was a successful strike, capture, and swallowing of prey. I defined foraging strategies as "solitary" (individual  $>10$  m from another Great Egret or other species) or "grouped" (individual  $\leq 10$  m from another Great Egret or other species). I categorized the size of a group as 2–15, 16–30, or  $\geq 31$  egrets and identified foraging as commensal or noncommensal. Egrets foraging both noncommensally and commensally could be feeding either solitarily or in groups. "Commensal foraging" consists of one species inadvertently displacing potential food items, making them available to an "attendant" species, thus aiding the attendant's foraging while receiving no benefits and paying no cost (Wiens 1989). I identified commensal foraging of a Great Egret by its following, in the same direction, at a similar pace, and at a distance  $<2$  m, another animal such as a grazing cow.

After selecting a specific egret ("focal animal sampling," Altmann 1974) for observation, I recorded its foraging behavior for 20 minutes or until it left the habitat. During these observations, through a spotting scope, I recorded the number of birds present, capture tactics (e.g., neck wobble, stand and wait, bill clapping, fast/slow walk; see Krebs 1974, Kushlan 1976, Kelly et al. 2003), prey type, prey size (in relation to the bill; Bayer 1985), steps, "errors" (drops, a strike at an item other than prey, or an unsuccessful strike), time spent handling prey, probes (moving debris with the bill without striking), strikes, and captures. I also noted interference with foraging such as conspecific aggression when another bird was  $<5$  m from a foraging egret or when another individual flew into a field with a solitary egret. "Aggression" consisted of an egret raising its feathers, chasing another bird, attempting kleptoparasitism, or engaging in combat, displacing the other bird. I excluded the time such a bird was in flight from the observation time. "Relocations" consisted of a bird moving from one location to another within the same field and continuing foraging. Before and after sampling I recorded the presence of other animals and sources of disturbance (e.g., loud noise, motor vehicles, or human interference) that noticeably altered an egret's behavior.

To randomize sampling, I randomized observations by time of day, spread observations among the various agricultural habitats, observed foraging birds

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at randomly selected sites within a habitat, and chose only one bird per site for focal observation, limited to birds close enough for me to identify their food, generally <100 m. I ensured that timed observations were independent and avoided repeated sampling of individuals and groups by moving to a different location for each observation. In cases where my arrival disturbed a foraging egret noticeably, I allowed it 1–20 minutes to adjust. If weather such as high wind, fog, heat distortion, or rain impaired the accuracy of an observation, I terminated it. For each 20-min observation, I recorded the time, tide (as flood or ebb and as low or high), wind speed, wind direction, percent cloud cover, and precipitation (<http://www.noaa.gov/wx.html>).

### Diet

Possible prey items, which I assumed to be similar across the habitats sampled, included earthworms, the Northern Red-legged Frog (*Rana aurora*), Pacific Treefrog (*Pseudacris regilla*), and voles (*Microtus* spp.). I left an item unidentified if it was captured and ingested in <1 sec. From the size of an item, I estimated its biomass on the basis of Siegfried (1969), Ricklefs (1974), and Schlorff (1978), and from these estimates I calculated intake rates (g/min), total energy content (kcal/g wet mass), and total energy content per individual (kcal). With reference to the average exposed culmen of 12 specimens of the Great Egret at Humboldt State University (109.1 mm, sexes combined), I categorized prey as small ( $\leq 1/4$  bill length or  $\leq 27$  mm), medium ( $1/4$ – $3/4$  bill length or 28–81 mm), or large ( $> 3/4$  bill length or  $\geq 82$  mm).

### Habitat Characteristics

The habitats surveyed varied in vegetation height, providing prey with a varying degree of cover. Adapting the method of Burger and Gochfeld (1993), I categorized the height of vegetation in comparison to the length of a foraging bird's tarsus (mean 148.2 mm, sexes combined; Herring et al. 2008) as short (<1/3 tarsal length or <50 mm), medium (1/3–2/3 tarsal length or 50–75 mm) and tall ( $\geq 2/3$  tarsal length or  $> 75$  mm).

### Statistical Analysis

I expressed the rates of strikes, errors, captures, pace, and probes per minute over a 20-min observation period and capture success as the number of successful captures divided by the total number of strikes. Using SAS, version 9.1.3, I calculated Pearson correlation coefficients between total time foraging, strike rates, probe rates, error rates, capture rates, and capture success to test correlation strengths. I defined highly correlated measures as those with the absolute value of  $r > 0.40$  and  $P < 0.0001$ . To estimate the effect of foraging strategies (commensal or not, group or solitary, and interaction), I ran a multivariate analysis of covariance on correlated measures and analysis of covariance on uncorrelated measures, with observation time and flock size as covariates. I estimated least-squares means and standard errors (SE) for these comparisons and in all analyses set the threshold of significance at  $\alpha = 0.01$ .

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### RESULTS

#### Foraging Behaviors and Success

I observed foraging egrets in 123 sessions over the 52 days of sampling, totaling 2069 min. The average length of an observation was 16.82 min ( $SE = 0.50$ ), range 2–20 min. Groups contained up to 80 birds. I observed solitary noncommensal egrets ( $n = 50$ ) for a total of 826.37 min ( $16.53 \pm 0.89$ ) and group-foraging noncommensal egrets ( $n = 44$ ) for a total of 723.26 min ( $16.44 \pm 0.89$ ). For egrets foraging commensally these times were 143.00 min ( $15.89 \pm 1.88$ ) for solitary egrets ( $n = 9$ ) and 376.31 min ( $18.82 \pm 0.86$ ) for group-foraging egrets ( $n = 20$ ). Egrets foraged in association with solitary cows and herds of up to 84. Of the 29 instances of commensal foraging, 21 were with cattle, four were with gulls, and four were with Aleutian Cackling Geese (*Branta hutchinsii leucopareia*). Commensal foragers received apparent rewards on eight occasions of foraging with cattle (38%), one occasion with gulls (25%), and on three occasions with Aleutian Cackling Geese (75%).

During the 123 observations, I noted 18 instances of aggression between egrets foraging noncommensally (15%). Of these, 7 involved groups, 11, solitary birds. Among egrets foraging commensally, I noted conspecific aggression on only two occasions, once from a solitary bird and once in a flock of 12 birds. Conspecific aggression included chases on foot (16 instances), flight chases (one instance), and attempted kleptoparasitism (one instance). Flights and relocations were observed a total of 114 times. Egrets foraging in groups, whether they were foraging commensally (0.16 times per minute,  $\pm 0.09$  SE) or noncommensally ( $0.16 \pm 0.06$ ), relocated more often than did solitary egrets ( $0.07 \pm 0.13$  and  $0.06 \pm 0.06$ , respectively). But the difference was not statistically significant.

Table 1 summarizes measures of foraging effort and success. Pearson correlations confirmed strong associations among strike rate, pace rate, error

**Table 1** Measures of Foraging of Great Egrets in Uplands of the Arcata Bottoms, Humboldt Co., California, 25 January–27 March 2010<sup>a</sup>

Metric	Noncommensal		Commensal	
	Solitary	Grouped	Solitary	Grouped
<i>n</i>	50	44	9	20
Total time foraging (min)	$48.0 \pm 8.0$	$51.1 \pm 8.5$	$77.0 \pm 18.1$	$67.2 \pm 12.3$
Strike rate (per min)	$0.31 \pm 1.78$	$5.30 \pm 1.88$	$0.32 \pm 4.00$	$2.46 \pm 2.73$
Probe rate (per min)	$0.01 \pm 0.39$	$1.09 \pm 0.41$	$0.00 \pm 0.88$	$0.41 \pm 0.60$
Pace rate (per min)	$2.60 \pm 7.81$	$23.88 \pm 8.23$	$3.14 \pm 17.53$	$13.55 \pm 11.96$
Error rate (per min)	$0.04 \pm 0.11$	$0.28 \pm 0.12$	$0.05 \pm 0.25$	$0.22 \pm 0.17$
Capture rate (per min)	$0.24 \pm 1.68$	$5.02 \pm 1.77$	$0.28 \pm 3.77$	$2.28 \pm 2.57$
Relocation rate (per min)	$0.06 \pm 0.06$	$0.16 \pm 0.06$	$0.07 \pm 0.13$	$0.16 \pm 0.09$
Intake rate (g/min)	$0.87 \pm 0.12$	$0.55 \pm 0.13$	$0.55 \pm 0.27$	$0.99 \pm 0.18$
Handling time (sec)	$22.3 \pm 4.6$	$6.8 \pm 4.9$	$9.2 \pm 10.4$	$4.8 \pm 7.1$
Foraging success (%)	$94 \pm 2$	$96 \pm 2$	$95 \pm 4$	$93 \pm 3$

<sup>a</sup>Values are least-square means  $\pm$  standard error.

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rate, and capture rate (all values  $>0.9$ ). Correlations of these measures with relocation rate, handling time, prey-intake rates, capture success, and total time foraging were weaker to none. Wilks' lambda ( $\Lambda$ ) from multivariate analysis of covariance indicated no overall difference between commensal and noncommensal foraging ( $\Lambda = 0.97$ ,  $F = 0.71$ ,  $P = 0.62$ ) and none between solitary and group foraging ( $\Lambda = 0.97$ ,  $F = 0.63$ ,  $P = 0.68$ ). In addition, there was no interaction between whether or not foraging was commensal and whether or not it was in a group ( $\Lambda = 0.98$ ,  $F = 0.37$ ,  $P = 0.87$ ). The covariates of flock size ( $\Lambda = 0.89$ ,  $F = 2.83$ ,  $P = 0.02$ ) and observation time ( $\Lambda = 0.92$ ,  $F = 2.02$ ,  $P = 0.08$ ) were not significant. Furthermore, there was no difference by strategy in rates of error ( $P = 0.27$ ), strike ( $P = 0.22$ ), probe ( $P = 0.22$ ), pace ( $P = 0.22$ ), or capture ( $P = 0.22$ ). Neither was there any difference by strategy in relocation rate ( $F_{1,117} = 1.0$ ,  $P = 0.32$ ), capture success ( $F_{1,117} = 1.24$ ,  $P = 0.30$ ), or total time foraging ( $F_{1,117} = 0.06$ ,  $P = 0.80$ ). For egrets in flocks, flock size had no effect on capture success ( $F_{3,114} = 1.15$ ,  $P = 0.14$ ). Mean success by three categories of flock size was  $95.5 \pm 1.9\%$  for 2–15 birds,  $87.4 \pm 3.4\%$  for 16–30 birds, and  $90.6 \pm 5.3\%$  for 31–84 birds.

The capture rate of grouped foragers was 10 to 20 $\times$  the rate of solitary foragers, a significant difference (multivariate analysis of variance,  $P = 0.005$ ). Yet the intake rate (g/min) differed by a factor of less than 2, and among noncommensal foragers the intake rate of solitary foragers was greater even though their capture rate was only 5% that of the grouped foragers. So the few voles caught by the solitary foragers more than made up for all the earthworms and frogs caught by the grouped foragers.

### Diet

By number of prey items, the diet of solitary commensal foragers consisted 54% of invertebrates (mainly earthworms), 11% of frogs, 1.5% of voles, and 34% unidentified. The diet of Great Egrets foraging commensally in a group was 55% invertebrates, 7% frogs, 0% voles, and 38% unidentified. Of egrets foraging noncommensally, the diet of those in flocks was 61% invertebrates, 7% frogs, 0.1% voles, and 33% unidentified, while that of solitary foragers was 33% frogs, 25% earthworms, 4% voles, and 38% unidentified. The voles, up to 10 cm long and 28 g in weight, were rich sources of energy. I noted 13 captured by solitary foragers but only one by group foragers (Table 2). Both strategies combined, group foragers captured more total prey ( $F_{1,118} = 21.99$ ,  $P < 0.001$ ) (Table 2). Solitary and grouped foragers did not differ in mean time handling prey ( $P = 0.94$ ) or mean intake rate ( $P = 0.76$ ).

### Habitat Characteristics

Usage of vegetation heights differed by foraging strategy ( $\chi^2_6 = 19.48$ ,  $P = 0.003$ ). Solitary foragers used taller vegetation more frequently (40/50 instances or 80%) than did group foragers (20/44 instances or 45%). Solitary egrets feeding commensally were mainly in tall vegetation (7/9 instances or 78%), whereas groups feeding commensally used vegetation heights nearly evenly (50% short, 45% tall). The difference between commensal and noncommensal foragers in use of upland habitat by tide level was nearly

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**Table 2** Numbers of Prey Captured by Great Egrets near Arcata, California, 25 January–27 March 2010, by Type, Size, and Mode of Foraging

Mode and prey	n <sup>a</sup>	Size			Total	Percent
		≤27 mm	28–81 mm	≥82 mm		
Noncommensal solitary	50					
Earthworms		28	25	20	72	25%
Frogs		42	53	0	95	33%
Voles		0	1	11	12	4%
Unidentified		99	9	0	108	38%
Noncommensal grouped	40					
Earthworms		396	109	101	606	61%
Frogs		36	30	0	66	7%
Voles		0	0	1	1	0.1%
Unidentified		323	3	0	326	33%
Commensal solitary	9					
Earthworms		27	8	0	35	54%
Frogs		4	3	0	7	11%
Voles		0	0	1	1	1.5%
Unidentified		21	1	0	22	34%
Commensal grouped	20					
Earthworms		261	90	46	397	55%
Frogs		40	8	0	48	7%
Voles		0	0	0	0	0%
Unidentified		276	1	0	277	38%

<sup>a</sup>Number of egrets observed, for up to 20 min per individual.

significant ( $\chi^2_3 = 10.03$ ,  $P = 0.018$ ). Commensal foragers used upland areas more often at low tide (total of 17/29 instances or 59%, grouped and solitary foragers combined), while noncommensal foragers tended to prefer high tide (total of 67/94 instances or 71%, grouped and solitary foragers combined). Over the study, foraging egrets were associated with characteristics of wetland habitat 22% of the time.

## DISCUSSION

While foraging, Great Egrets often gathered into groups of various sizes, and they arrived and departed feeding sites more or less simultaneously. Krebs (1974) proposed that birds nesting colonially may follow one another to discover food sources. Birds may also be attracted to feeding areas by seeing another feeding (Poysa 1992). The egrets I studied likely exploited these strategies. Interactions such as competition and aggression that arise during foraging in a group likely make group foraging more costly (Goss-Custard and Durell 1987). Of the egrets I observed, group foragers did suffer a greater rate of striking errors, which were possibly the result of increased competition. But group foraging also enhances the mean rate of food intake (Beauchamp 1998) by decreasing the time each individual must devote to vigilance (Sullivan 1984), enabling herding of mobile prey (Swynnerton 1915), and allowing imitation of behaviors of other individuals

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(Krebs 1973, Morse 1978). Because of the large number of unidentified prey, I did not evaluate the data on energy intake. Therefore, my results may not reflect differences in how the birds managed their time or achieved energy balance. But I found no detectable differences in mean intake rate by foraging strategy, possibly because food was abundant in the habitats I surveyed. Beauchamp (1998) proposed that the rate of food intake increases when resources are more concentrated in space and that food dispersal may influence group size. Gawlik (2002) suggested that Great Egrets typically remain at a site until they deplete the prey. So the birds I observed likely switched tactics as needed to increase intake rates and success.

Solitary egrets foraging along fence rows and ditches defended their space more than did group foragers. Thus solitary foragers suffered costs from displacement and aggression. Prey are likely larger, more concentrated, or more available along fence rows and ditches prey than in the open fields in which groups foraged. As a result, egrets could defend these areas, precluding groups from forming. Attempts to capture large prey occasionally entailed the increased effort of capture in flight, by diving, by fast running, extended handling times, and long periods of stalking or waiting. On average, birds that were less active (i.e., solitary foragers) took prey larger than that taken by group and commensal foragers, possibly because of the lack of competition.

By displacing prey and disturbing the substrate, cattle made prey more available to egrets following them. Though published reports of Great Egrets foraging commensally with mammals are few (Dean and MacDonald 1981, Ruggiero and Eves 1998, Herring and Herring 2007), this behavior may increase foraging success (Kushlan 1978b), as it does for the Cattle Egret (*Bubulcus ibis*) (Heatwole 1965, Dinsmore 1973 and Grubb 1976). Burger and Gochfield (1982) found that in the Cattle Egret selectiveness for a mammal ("host") and availability of prey are positively correlated; the egret forages in the way that maximizes efficiency. In my study I could not ascertain selectiveness for a host. The assumption that prey captured by commensal foragers was a direct "reward" of associating with other birds or cattle may not be fully justified. Rather, solitary egrets foraging noncommensally may have been trying to discourage the competition from another bird. In contrast, when feeding primarily with grazing cattle, a solitary egret would have no added competitive pressure and thus receive unrestricted benefit from cattle flushing prey.

Behavioral plasticity may have improved foraging success. The Great Egrets I studied often modified their behavior as they shifted among micro-habitats differing in prey and vegetation height. Characteristics of a wetland and level of the tide contribute to plasticity of foraging (Erwin et al. 2006). Although the risk of predation may have influenced the egrets' foraging behavior, that risk was presumably low across the study area. Despite different behaviors used to capture prey, the rate of success of all strategies was similar (Table 1). Two different strategies, solitary foraging that occasionally yielded a few large prey and grouped foraging that frequently yielded many small prey, gave similar returns, and the egrets had the behavioral plasticity to pursue either.

Great Egrets often behaved socially, competing, interacting aggressively or territorially, forming groups, and arriving and departing feeding sites at the

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same general time. Sexual, age, genetic, and environmental differences may all contribute to the Great Egret's diversity of behaviors (Lott 1984). Since I had no data on the egrets' sexes, ages, or genetics, these factors likely biased the results. Lott (1984) proposed several possible sources of such variation: experience (including learning during a critical period), imitation, culture, classical conditioning, demography, niche breadth, environmental stability, social system, psychological complexity, and hormones. The observed behavioral variation could be caused by frequency-dependent selection or selection for an adaptive plasticity that permits individuals to adjust their behavior in response to abiotic variables (Lott 1984). Given my results, I hypothesize that the Great Egret's social system varies intraspecifically. Such variation could be adaptive (Eisenberg 1966), relevant to attempt to manage or predict changes in a species' social system.

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Great Egret

Sketch by Narca Moore-Craig

## BOOK REVIEWS

**Birds of the Sierra Nevada: Their Natural History, Status, and Distribution**, by Edward C. Beedy and Edward R. Pandolfino; illustrated by Keith Hansen. 2013. University of California Press. 446 pp., over 250 paintings, three tables, five regional maps, 12 color photographs. Hardcover, \$75; paperback, \$39.95. ISBN 978-0-520-27494-5.

The Sierra Nevada's varied habitats of forest, chaparral, and alpine meadows, combined with its splendid mountainous scenery, have made this range a favored destination for tourists and bird watchers. For over a century, professional ornithologists and amateur field naturalists have studied the rich avifauna of this region, but until now a comprehensive guide to the full expanse of the Sierra Nevada did not exist. In 1977, David Gaines wrote the *Birds of the Yosemite Sierra: A Distributional Survey*, which covered both the western and eastern slopes of the Sierra Nevada but was limited to the area around Yosemite—it was updated in 1988 as *Birds of Yosemite and the East Slope*. Published in 1985, *Discovering Sierra Birds*, by Edward Beedy and Stephen Granholm, covered the western slope only and focused on Yosemite, Kings Canyon, and Sequoia national parks. The need for a book covering the entire Sierra Nevada, with additional information on natural history, population status, and conservation, was expressed by the late Steve Medley, former president of the Yosemite Association, in 1998. And now, after 15 years of devoted labor, the *Birds of the Sierra Nevada: Their Natural History, Status, and Distribution* has been completed. It includes many passages from *Discovering Sierra Birds*, but with so much additional information and entirely new illustrations, it is much more than just an update.

The physical boundaries of the Sierra Nevada are somewhat ambiguous as steep mountains transition to rolling foothills and foothills gradually flatten to plains. The authors' approach to this issue was to include all the ecological communities directly influenced by the Sierras and to use unambiguous boundaries, such as highways and elevation contours, when feasible. Using this system, the authors recognized 442 species that have been documented within the region at least once. Of these, they considered 276 species sufficiently common to warrant full accounts in the main section of the book, and covered the status and occurrence of the remaining 166 rare species briefly in an appendix. In comparison, *Discovering Sierra Birds* has accounts for 191 species and a list of 103 rare species.

Several well-written introductory chapters precede the main species accounts and are worth reading to gain a fuller appreciation of the Sierra's biotic diversity and status. The chapter on Ecological Zones and Bird Habitats describes seven distinct zones, with major habitat types defined within each zone; the authors then use these habitat types and zones within each species account to describe distributional patterns. Seven "special habitats," such as riparian forest, are also characterized and their importance to birds described. Overall, these zones accurately portray the Sierra landscape. However, in the section on Mountain Chaparral, there is no mention of chaparral in mesic areas, which is an important habitat type in the southern Sierra but apparently not present in the north (Ryan Burnett pers. comm.). This habitat is frequently composed of cherry, willow, and whitethorn and may constitute a dense shrub layer in the understory of coniferous forest or in north-facing openings. This habitat provides important nesting habitat not only for several shrub-dwelling species, such as the Dusky Flycatcher, Fox Sparrow, and MacGillivray's, Yellow, and Wilson's warblers, it is also the habitat in which these species appear to reach their highest densities.

The chapter Recent Trends in Bird Populations and Ranges is a nice addition that provides analyses of data from Breeding Bird Surveys (BBS) and Christmas Bird

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Counts (CBC). A few surprising results stood out, such as positive population trends for the Dusky Flycatcher and Warbling Vireo and negative trends for the Mountain Chickadee, Purple Finch, and Cassin's Finch. While the analyses are rather cursory, they provide readers with a long-term historical perspective and a better understanding of population trends. The sections on Range Expansions and Contractions also rely on BBS and CBC data but were seemingly supplemented by anecdotal observations. In the future, observations from eBird should play a larger role in documenting changes in bird distribution. The next chapter asks the reader several Unanswered Questions about the range and status of 18 species, which will hopefully motivate amateur and professional ornithologists to seek out these species and to enter their sightings into eBird, to publish their findings in peer-reviewed journals, or to post them to an Internet site dedicated to the birds of the Sierra Nevada. The final introductory chapter addresses Bird Conservation in the Sierra by reviewing historical human activities like market hunting and mining as well as contemporary issues such as fire suppression, dams, pollution, housing development, and climate change.

The bulk of this book consists of Family and Species Accounts. The family accounts precede the species accounts for each family and within a few paragraphs provide the reader with the distinctive features of the family's anatomy and behavior. The species accounts contain sections on the Origin of Names, Natural History, Status and Distribution on the West Side and East Side, and Trends and Conservation Status. I found the Origin of Names section particularly enlightening, as it provides a historical context for some of the lesser-known people who have had birds named after them, such as Robert Williamson who was so honored with a beautiful sapsucker. A military engineer and Civil War veteran, Robert Williamson just happened to be a leader on a survey party to Oregon when the first male of this species was collected. I also enjoyed learning the English translations of the scientific names from the various contemporary and antiquated European languages, fascinating details that have certainly improved my memory of many of these birds' scientific names.

The Natural History section is full of interesting anecdotes, many of which are from the authors' collective personal experiences in the Sierra with others supplemented from the scientific literature. This section includes a wealth of information on behavior, vocalizations, foraging, habitat selection, courtship, nesting, and seasonal patterns. One of the more intriguing behaviors I learned about is the communal food sharing by the Cedar Waxwing and Mountain Chickadee. The only detractor in this section is some inconsistency in the amount of material presented for different taxa. For example, all the woodpecker accounts have extensive details about each species' life history, yet for some other species such as swifts information is scant. Regrettably, the spectacular courtship fall of the White-throated Swift is not even mentioned.

The Status and Distribution section provides general information about elevational limits and the ecological zones within which the species is expected to occur. This section is further refined by dividing the Sierra Nevada along its crest into the west and east sides. Because of the ecological differences between the two sides, this distinction is critical, as birds often occur at different elevations and occupy different habitats on each slope. Within these subdivisions the authors provide more precise location details for localized species. The complex distribution patterns of several sparrows that have multiple subspecies within the region are well described. For instance, the thorough treatment of the Sage Sparrow's subspecies was rather prescient considering its subsequent split into the Sagebrush and Bell's sparrows. For a few other species, as discussed in the introductory section on Unanswered Questions, the exact range limits are still being determined. For the two subspecies of the White-breasted Nuthatch that occur in the Sierra Nevada, the authors considered the ranges and habitats to be "non-overlapping," but since both subspecies occur in the vicinity of Shaver Lake where I live, perhaps it would be better if their ranges were described as mostly non-overlapping. I was also curious that there was no mention of upslope dispersal

## BOOK REVIEWS

of the House Wren; in the Sierra, this species seems to be uncommon at mid to high elevations during May and June but then becomes abundant during July and August.

For most species with significant positive or negative population trends, or for species listed by federal or state agencies as endangered, threatened, or of concern, a Trends and Conservation section details the species' changing population status and provides information about the perceived threats or enhancements that may be influencing this change. In general, I believe this section will prove valuable as another resource to land managers in the Sierra, as it helps to elucidate many current conservation issues and covers species in addition to those in *California Bird Species of Special Concern* (W. D. Shuford and T. Gardali, 2008, WFO Studies of Western Birds 1). However, I was a bit dissatisfied that no attempt was made to quantify the magnitude of the population changes from the Breeding Bird Survey or Christmas Bird Count data. In addition, this section was absent from some accounts that probably should have contained it. For example, although the chapter Recent Trends reports that populations of the Mountain Chickadee, Purple Finch, and Cassin's Finch are declining, there is no mention of these declines in the accounts. I also question a few of the conclusions in this section, such as why the recovery of the Bald Eagle in the Sierra was considered limited and whether this species actually nested historically throughout the Sierra. In the Natural History section it states that Bald Eagles "require sizeable bodies of water," but where did large bodies of water occur in the Sierra before reservoirs? Prior to the dam-every-river era we live in now, there were only a few large bodies of water in the Sierra that could have sustained Bald Eagles. Historically, most natural lakes in the Sierra Nevada were relatively small and at high elevations. Typically these lakes have sparse or no forest surrounding them, are frozen during spring when eagles start nesting, and had no fish. Only Lake Tahoe and Eagle Lake come to mind as natural lakes that would have been large enough and had suitable nesting habitat. For the Osprey, though, whose requirement for nesting are similar to those of the Bald Eagle, the authors stated that the creation of reservoirs increased its population and range in the Sierra. The reason for a discrepancy between these two accounts is unclear.

The illustrations in *Birds of the Sierra Nevada* easily surpass those in most other books on the regional status and distribution of birds. Although *Birds of the Sierra Nevada* is not meant to be a guide to identification, the beautifully realistic illustrations do more than just capture the essence of the species; in most instances, field observations should easily match those in the book. For all species, an illustration of the adult is provided, with a second or third illustration included for significant plumage differences by sex or age. For species frequently seen in flight, such as raptors and swallows, another illustration depicts the bird in this pose. My favorite illustrations in the book are of the woodpeckers. In particular, the exquisite detail and accuracy of the Lewis's and Acorn woodpeckers are so realistic that they appear to fly right off the page. There are, however, a few species with minor flaws of proportion, such as the small diameter of the eye on the Canyon Wren and the thin depth of the bill on the Northern Rough-winged Swallow. But overall the illustrations present a delightful visual complement to the text while also providing an instructional tool for readers not already familiar with some of the species covered.

For anyone with an interest in the birds of the Sierra Nevada, whether you live in these mountains, are studying birds anywhere in the range, or are just visiting for a few days, I strongly recommend this book, as it will not only help you find the birds you are looking for, it will give you a much fuller appreciation of the feathered mountaineers of the Sierra. Despite the few minor issues mentioned in this review, I found *Birds of the Sierra Nevada* to be a superb book on the birds in this region that should become a standard for other natural history guides for many years to come.

James R. Tietz  
Point Blue Conservation Science

## FEATURED PHOTO

### HYPERMELANISM IN AN AMERICAN PIPIT

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On 1 December 2013, I observed an unusual pipit in a flock of American Pipits (*Anthus rubescens*) at Bedwell Bayfront Park in Menlo Park, San Mateo County, California. The bird appeared structurally similar to the other pipits in the flock, but its plumage was much darker overall (see this issue's back cover). The whitish to buff areas on the face, underparts, and tips of the median and greater wing coverts of a normally pigmented pipit were replaced by dark brown. The legs and bill were also darker than the corresponding bare parts of the nearby pipits. The bird did show what appeared to be normal pale edges on the tertials, but brief glimpses of the rectrices failed to reveal the expected white in the outer tail feathers. I observed this individual again at the same location on 8 December 2013 and obtained several photographs. Although I initially considered the possibility of a vagrant pipit species, the structural characteristics and other field marks identify the bird as an aberrantly colored American Pipit, the only species of pipit expected in the area. In particular, the essentially concolorous upperparts and underparts of this bird rule out even dark pipit species such as the Rock Pipit (*Anthus petrosus*), which still have a contrastingly lighter breast and belly.

Melanin pigments in feathers and other tissues are responsible for most of the black, gray, brown, buff, and chestnut colors that we perceive in birds (McGraw 2006). Melanins are complex and incompletely characterized organic polymers derived from the amino acid tyrosine. Melanins can be divided into eumelanin, responsible for blackish coloration, and phaeomelanin, responsible for reddish brown coloration. Hypermelanism (sometimes simply called melanism) has been defined as "abnormally high melanin concentrations in the plumage, skin, eyes, or all three areas" (Davis 2007). Although chemical analysis of this bird's feathers would be required for the nature of the plumage aberration to be characterized definitively, the diffuse increase in both dark gray and brown in the feathers and bare parts suggests that concentrations of both eumelanin and phaeomelanin were elevated in this hypermelanistic pipit. The cause of such hypermelanism is unclear, but recent molecular studies have shown that mutations in the melanocortin-1 receptor gene (MC1R) are responsible for the dark morphs of several species, including the Snow Goose (*Chen caerulescens*) and Parasitic Jaeger (*Stercorarius parasiticus*) (Mundy 2005). Although the increase in melanin concentration in hypermelanistic birds is abnormal by definition, the mechanism responsible for the increase may be the same as that for normal dark morphs.

In birds, hypermelanism appears to be substantially less common than the abnormal lack of pigment (variously called leucism, amelanism, or albinism) (Sage 1963, 1964, Gross 1965). I am not aware of any recent summary of hypermelanism in birds. In an older review on the subject involving birds in the British Isles, Sage (1964) noted instances of "melanism" in two species of wagtail, which are in the same family (Motacillidae) as the pipits. I am unaware of published records of hypermelanism in North American motacillids or of published cases of melanism in *Anthus* pipits in general (Gross 1965, Deane 1876, 1879, 1880).

The presence of a molt limit (two generations of feathers) in the greater coverts, with the inner three replaced, indicates that the bird was in its first year. Little is known about either the survival of aberrantly plumaged birds or fidelity to wintering sites in this species (Hendricks and Verbeek 2012). It will therefore be of some interest if this "marked" individual returns to this location the following winter.

I thank Jeff Davis, Peter Pyle, and Paul Hendricks for their comments on the images.

## FEATURED PHOTO

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This year the science sessions will feature a symposium on avifaunal change in western North America with papers to be published subsequently as a new volume of WFO's monograph series *Studies of Western Birds*.

Field trips will include two pelagic trips, as well as visits to a wide diversity of San Diego's many birding hot spots. In addition, we are offering a two-day field trip Sunday and Monday (12–13 October) to the Salton Sea and Imperial Valley area led by Guy McCaskie and Jon Dunn.

There will be workshops on field identification of warblers (Jon Dunn and Kimball Garrett), vireos (Peter Pyle), sparrows (Homer Hansen), molt (Peter Pyle), specimen preparation (Phil Unit), and bird sound identification (Nathan Pieplow). The Saturday evening banquet will feature a celebration of the rich 44-year history of WFO. Ed Harper and Nathan Pieplow will again offer their ever-popular sessions on bird identification by sight and sound. In addition to our regular reception Friday evening at the hotel, we are offering a pre-conference reception Wednesday evening at the magnificent San Diego Natural History Museum.

Registration for the conference will open in mid-June with the exact date to be announced via a future WFO News e-mail. If you are NOT currently on our electronic mailing list, please send a message to [erpfromca@aol.com](mailto:erpfromca@aol.com), include your full name and city and state of residence, and we'll put you on.

We look forward to seeing you in San Diego!

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The board of Western Field Ornithologists and the editorial team of *Western Birds* thank the following generous contributors who gave to WFO's publication, scholarship, and general funds in 2013. The generosity of our members in sustaining WFO is an inspiration to us all.

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# **Rare Birds of California**

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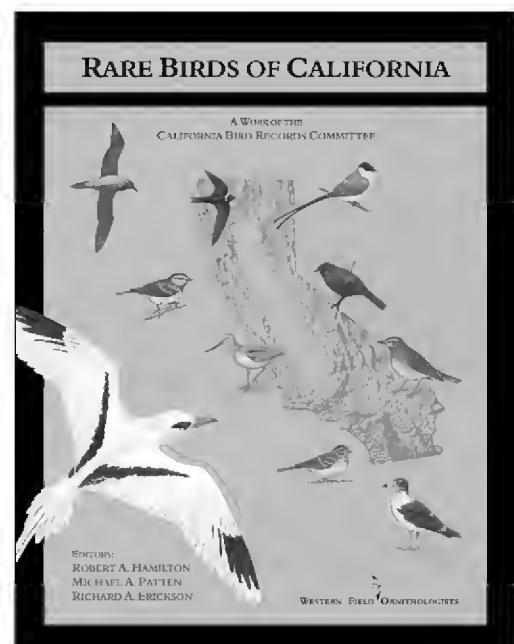
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- Besides including all the text, figures, and maps from the original print version, this format allows one to explore for specific information much more easily.
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***Rare Birds of California***, the California Bird Records Committee's opus devoted to documenting the birds rare to California, was originally published in 2007 by Western Field Ornithologists (edited by Robert A. Hamilton, Michael A. Patten, and Richard A. Erickson). The book is now out of print and no longer available from WFO on paper.

This format fulfills the 2009 commitment of the WFO Board to make the book available digitally as a benefit to our membership and to the ornithology community in general, and to continue to acknowledge the efforts of the CBRC and the hundreds of volunteers and donors who made the original volume possible. Funds from WFO's Mike San Miguel publications fund were used to reformat the book and make it available in this format from both the Western Field Ornithologists website, [westernfieldornithologists.org](http://westernfieldornithologists.org), and the CBRC's website, [californiabirds.org](http://californiabirds.org).



Western Field Ornithologists is very proud of this accomplishment and we hope you enjoy the result. We wish to acknowledge the contributions of the ***Rare Birds of California***'s editors, the CBRC, and, more recently, the efforts of Tim Brittain, in bringing this book to you in a digital format.

# WESTERN BIRDS

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Photo by © Gary L. Woods of Fresno, California:

Blue-footed Boobies (*Sula nebouxii*)

Salton Sea, Riverside County, California, 20 October 2013

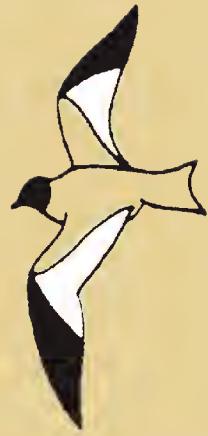
The fall of 2013 brought the largest invasion of the Blue-footed Booby north of the Mexican border yet recorded. Over 100 individuals were counted around the Salton Sea, and at least that number were seen along the California coast, where very few had been recorded previously. The northernmost was found as far north as the north end of Vancouver Island in British Columbia.



"Featured Photo" by © Ken R. Schneider of San Francisco, California: hypermelanistic American Pipit (*Anthus rubescens*) at Menlo Park, California, 8 December 2013. Such excessive melanin in the plumage is an abnormality much less frequent than abnormal deficiency of melanin.



# WESTERN BIRDS



Vol. 45, No. 2, 2014

# *Western Specialty:* Puget Sound White-crowned Sparrow



Photo by © Peter LaTourrette of Los Altos, California:  
White-crowned Sparrow (*Zonotrichia leucophrys pugetensis*)  
Redwood Shores, San Mateo County, California, 7 December 2010. The two subspecies  
of the White-crowned Sparrow breeding along the Pacific coast, *pugetensis* and *nuttalli*,  
differ most conspicuously from the other three subspecies of the White-crowned Sparrow,  
*gambelii*, *oriantha*, and nominate *leucophrys*, in their backs striped blackish and tan  
(rather than chestnut and silver gray) and yellowish bills (see J. L. Dunn, K. L. Garrett,  
and J. K. Alderfer, 1995, *Birding* 27:182–200 for a thorough analysis). Subspecies  
*pugetensis* breeds primarily west of the Cascade Range from southwestern British  
Columbia south to northwestern California and is a partial migrant south to southern  
California. In this issue of *Western Birds*, Eugene S. Hunn and David Beaudette report  
contact of *pugetensis* and *gambelii* at multiple sites in the Washington Cascades during  
the breeding season with little if any evidence of interbreeding.

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**Front cover photo by © Tom Greer of Sacramento, California: Yellow-billed Magpie (*Pica nuttalli*), Florin area, Sacramento County, California, 10 July 2003.** Analyzed by habitat, the results of surveys in 2007 and 2008 imply a population of about 400,000 birds and substantial retraction of the range in the San Joaquin Valley.

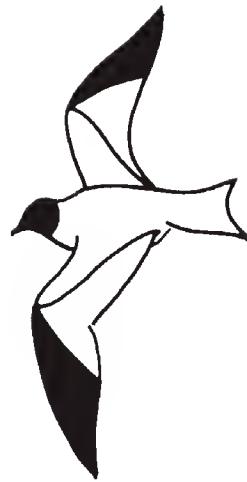
**Back cover: “Featured Photo” by © Vic Murayama of Chula Vista, California: Mangrove Yellow Warbler (*Setophaga petechia*, possibly of subspecies *castaneiceps*), near the mouth of the San Diego River, San Diego County, California, 13 January 2009,** representing the second record of the Mangrove Warbler for California and third for the western United States of these subspecies normally restricted to mangroves along tropical coasts north to Baja California Sur and Sonora. The entirely chestnut head and a single generation of feathers in the wings indicate a definitive-plumaged male.

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*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](mailto:avesalaska@gmail.com). For matters of style consult the Suggestions to Contributors to *Western Birds* (at [www.westernfieldornithologists.org/docs/journal\\_guidelines.doc](http://www.westernfieldornithologists.org/docs/journal_guidelines.doc)).

# WESTERN BIRDS



Volume 45, Number 2, 2014

## FIRST OCCURRENCE OF AN ATLANTIC COMMON EIDER (*SOMATERIA MOLLISSIMA DRESSERI*) IN THE PACIFIC OCEAN

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**ABSTRACT:** The circumpolar Common Eider (*Somateria mollissima*) has six or seven recognized subspecies, females of which differ in size, overall coloration, and bill characters. An adult female observed 20–29 November 2011 in the harbor at Crescent City, Del Norte County, California, was apparently not the Pacific subspecies, *S. m. v-nigrum* (Pacific Eider). We analyzed photographs, published information, and specimens, and the Crescent City bird's intensely rufous plumage as well as qualitative and quantitative bill morphology, especially the distance from the tip of the frontal lobe to the proximal end of the nares divided by total bill length, indicated that it was an example of *S. m. dresseri* (American or Atlantic Eider), of the northwest Atlantic Ocean.

On 20 November 2011 Barron discovered a female Common Eider (*Somateria mollissima*) in the harbor at Crescent City, Del Norte County, California. The bird was seen daily in the same general area until 29 November 2011. Accepted by the California Bird Records Committee (Nelson et al. 2013: record 2011-182), this record is the second of a Common Eider in California. The first was of an adult male seen 5–18 July 2004, also at Crescent City (McCaskie and Vaughn 2004).

On 26 November 2011 Able, Dunn, and Sansone observed the bird for several hours, and Sansone obtained numerous high-resolution photographs. We were struck by the bird's very intense rusty brown coloration (Figure 1). Characteristics of the wing indicated an adult female in fresh

ATLANTIC COMMON EIDER IN THE PACIFIC OCEAN



Figure 1. Adult female Common Eider, Crescent City, Del Norte Co., California, 26 November 2011, photographed under solid, relatively thin, high overcast. A, portrait showing fresh basic plumage and deep rufous coloration; B, head and bill detail showing shape and proportions of the bill and frontal lobes.

*Photos by Larry Sansone*

basic plumage (Pyle 2008; P. Pyle in litt., 2012). Adult females of the Pacific subspecies, *S. m. v-nigrum*, are dull grayish brown, very unlike the Crescent City bird. Using Sansone's photographs, descriptions and analyses of subspecific identification from the literature, photographs of females of all Common Eider subspecies available through the Internet as well as those

## ATLANTIC COMMON EIDER IN THE PACIFIC OCEAN

provided by other photographers, and examination of specimens at the U. S. National Museum of Natural History by Omland, we set out to determine if the Crescent City eider could be identified to subspecies.

### SUBSPECIES OF THE COMMON EIDER

Most authors recognize six or seven subspecies of the Common Eider (Palmer 1976, Goudie et al. 2000). The Pacific Eider (*S. m. v-nigrum*) breeds across the Arctic from the Northwest Territories west to the New Siberian Islands, including the Bering Sea, Kamchatka, the Commander and Aleutian islands, and east in Alaska to the Kodiak archipelago. It overwinters in ice-free areas in the Bering Sea, Kamchatka, the Commander and Aleutian Islands, and Alaska Peninsula (Gibson and Kessel 1997). Anywhere east of Cook Inlet it is a vagrant (Isleib and Kessel 1973; S. C. Heinl and J. Staab in litt., 2013). Vagrants of *v-nigrum* have occurred in British Columbia (two records, Campbell et al. 1990), Washington (three records, Mlodinow and Aanerud 2008 and S. G. Mlodinow in litt., 2012), Oregon (N. Strycker in litt., 2012; D. Irons in litt., 2013), California (McCaskie and Vaughn 2004), Saskatchewan, Manitoba (three), North Dakota, Minnesota, Iowa, Kansas, western Greenland, and Newfoundland (American Ornithologists' Union [AOU] 1957, 1998, Mlodinow 1999). This is the most strongly differentiated subspecies, both morphologically (Livezey 1995) and genetically (Sonstagaen et al. 2011), and Livezey (1995) proposed elevating it to species rank.

The Northern Eider (*S. m. borealis*) breeds from Southampton Island and Ellesmere Island to Labrador and Greenland and overwinters from southwestern Greenland and southern Labrador to Newfoundland and the Gulf of St. Lawrence. It has occurred as a vagrant to Alaska (Gibson and Kessel 1997), Saskatchewan (three records), South Dakota, and the United Kingdom (Mlodinow 1999).

Subspecies *dresseri* (American or Atlantic Eider) breeds from south-central Labrador, where it interbreeds with *S. m. borealis* (Mendall 1980), south to Maine and overwinters along the Atlantic coast, commonly to New England and New York waters. Vagrants of *dresseri* have been reported from the United Kingdom (Farrelly and Charles 2010), western Greenland, Ontario/New York (Niagara River), Illinois, Wisconsin, and Colorado (twice) (AOU 1957, 1998). Subspecies *sedentaria* (Hudson Bay Eider), closely related to and weakly differentiated from *dresseri*, is resident almost entirely within Hudson and James bays but has reached the Niagara River (Ontario/New York) (Beardslee and Mitchell 1965) and Nebraska (Mlodinow 1999, Sharpe et al. 2001).

Sites of additional records of vagrant Common Eiders in western North America, of birds that were not identified to subspecies, include Manitoba, Saskatchewan (six), Alberta, British Columbia (two), North Dakota (three), and South Dakota (Mlodinow 1999).

In the Old World, the widespread *S. m. mollissima* (European Eider) breeds across northern Europe from Novaya Zemlya and Franz Josef Land to the Baltic Sea, British Isles, and northern France. It overwinters primarily in the Baltic and North seas and along the Atlantic coasts of Britain and northern France, but individuals have wandered casually east along the Russian arctic coast to the Kara Sea and south to the Mediterranean,

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Figure 2. Females of the four North American subspecies of the Common Eider. A, *Somateria mollissima dresseri*, December, Massachusetts; B, *S. m. borealis*, June, Svalbard; C, *S. m. v-nigrum*, June, Russia; D, *S. m. sedentaria*, July, Hudson Bay, Canada. Note that B, C, and D show birds in more worn alternate plumage, which tends to be duller and more cryptic than fresh basic plumage of early winter. We were unable to locate photographs of these subspecies in fresh basic plumage.

Photos by Jim Fenton (A), Tony Morris (B), Tuomo Jaakkonen (C), and Joel Heath (D)

Adriatic, Aegean, and Black seas (Goudie et al. 2000). The closely related *S. m. faeroensis* (Faroe Eider) is resident on the Faroe Islands. Variable *S. m. islandica* is now generally merged in *borealis*, but Icelandic breeders have sometimes been lumped with nominate *mollissima* (Palmer 1976, Boertmann 1994).

### IDENTIFICATION OF FEMALE COMMON EIDERS TO SUBSPECIES

Adult female Common Eiders in basic plumage can be identified with caution to subspecies on the basis of plumage color and bill characters (Figure 2). The latter involve primarily the shape and size of the bilateral frontal processes that extend up onto the forehead toward the eyes, and the relative proportion of these to the rest of the bill. Especially in *borealis*, *dresseri*, and, to a lesser extent, *sedentaria*, there is considerable variation in the color of the female's basic plumage, so it should be used with caution and in combination with other characters (Mendall 1980, Knapton 1997).

Subspecies *v-nigrum* (Figure 2C) has a long, attenuated head shape and bill processes that are relatively short, narrow, and acutely pointed. They are positioned higher, more toward the midline of the forehead, than in other subspecies (Goudie et al. 2000). Adult females in basic plumage are

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Figure 3. Heads and bills of *S. m. dresseri* (A, December, Massachusetts) and *S. m. sedentaria* (B, July, Hudson Bay), showing the bill and frontal lobes, the shape of the malar feathering and its distal terminus relative to the naris. In *dresseri*, the feathered area typically extends forward under the naris; in *sedentaria*, it typically ends just short of or even with the proximal tip of the naris.

Photos by Jim Fenton (A) and Joel Heath (B)

typically dull, dark gray-brown. In *S. m. borealis* the frontal processes are relatively short, narrow, and pointed (Cramp et al. 1977). The color of the basic plumage in females varies from gray-brown to rufous. Basic-plumaged females of *borealis* overlap in color with those of *sedentaria* at the paler, grayer end of the spectrum, with those of *dresseri* at the rufous end. Some of this variation may reflect interbreeding of *borealis* with *sedentaria* or

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*dresseri* where their breeding ranges meet (Mendall 1980). Nominate *mollissima* manifests narrow frontal processes that are basically pointed, but less acutely than in *v-nigrum*. Adult females in basic plumage show dull, but warm brown coloration with little individual variation (Cramp et al. 1977).

Subspecies *sedentaria* and *dresseri* differ from the others in having long, relatively broad bill processes that are distinctly rounded at their tips. In *dresseri* these lobes average longer and broader than those in *sedentaria*, but there is overlap (Mendall 1986). Basic-plumaged females of *sedentaria* are typically washed-out gray or grayish-buff, paler than the females of the other subspecies in comparable plumage (Goudie et al. 2000), but there is variation, and some proportion of female *sedentaria* are more brownish. Knapton (1997:134) noted, however, that “a rufous or rufous-brown bird is not *sedentaria*.” Females of *dresseri* are typically reddish-brown, but can range from gray to rufous, and those at the rufous end of the spectrum are the most richly colored of all female Common Eiders (Knapton 1997).

Because of the shape of a Common Eider’s bill, feathering in the malar region extends distally along the sides of the bill and can be used as a character distinguishing the subspecies (e.g., see Sibley 2000, Pyle 2008, Dunn and Alderfer 2011). The malar feathering of female *v-nigrum* is broad and rounded at its distal margin (Goudie et al. 2000, Pyle 2008) and does not extend forward of the proximal end of the naris. In nominate *mollissima*, the malar feathering is not so broad, is bluntly pointed distally, and extends forward beneath the naris (Cramp et al. 1977). In *borealis* the malar feathering is moderately pointed (Pyle 2008) and usually does not extend forward below the naris (Cramp et al. 1977). In *dresseri* the malar feather extension is long, narrow, and pointed and typically extends forward beneath the naris (Figure 3A). The malar feathering extension in *sedentaria* is short and quite pointed (Pyle 2008) and, on the basis of our examination of photos and specimens, usually falls short of or just reaches the proximal tip of the naris (Figure 3B). There is individual variation in this character, especially with regard to the shape of the distal end of the feathered area, and it must be used with caution and in combination with other criteria (Mendall 1980).

The most definitive means of identifying Common Eiders to subspecies involves measurements of the bill and frontal processes, which reflect the consistent differences among the subspecies in the overall bill sizes and shapes. From an extensive study of specimens and live birds (trapped for banding) of *borealis*, *sedentaria*, and *dresseri*, Mendall (1986) concluded that employing such measurements would permit racial identification of most Common Eiders in eastern North America. Pyle (2008) extended Mendall’s analysis to include *v-nigrum*.

## IDENTIFICATION OF THE CALIFORNIA EIDER

The Crescent City Common Eider showed intense rufous-brown coloration (Figure 1A, B), at the extreme even for basic-plumaged females of *dresseri*. Even the most rufous females of *borealis* rarely if ever approach the color of this bird, which was quite unlike females of the other subspecies.

The Crescent City eider possessed long, broad, and conspicuously rounded

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**Table 1** Ratios of Bill Measurements of Adult Females of the Subspecies of the Common Eider<sup>a</sup>

	n	Nostril extension (mm)	Total bill length (mm)	Ratio (nostril extension:total bill length)
<i>v-nigrum</i>	88	24.0–33.0	58.0–70.0	0.41–0.47 <sup>b</sup>
<i>borealis</i>	86	22.0–32.5	62.0–72.0	0.37–0.45
<i>borealis-dresseri</i>	47	27.5–36.0	62.0–72.0	0.44–0.50
intergrades				
<i>sedentaria</i>	22	31.0–39.0	67.5–74.0	0.46–0.53
<i>dresseri</i>	163	32.0–41.5	68.0–80.0	0.47–0.52
Crescent City eider				0.51 ± 0.01 <sup>c</sup>

<sup>a</sup>Computed from Data in Mendall (1986) and Pyle (2008)

<sup>b</sup>Ratios computed for the smallest and largest measurements of each of the bill characters for each taxon.

<sup>c</sup>Mean ± standard deviation of 12 ratios computed from three repeated measurements of nostril extension and total bill length taken from each of four photographs of the Crescent City eider.

frontal lobes that extended well onto the forehead (Figure 1B). The lobes' ventral edges were gently curved where they met the feathering of the malar region on the side of the face. The malar feathering extended distally to a blunt point that reached slightly, but obviously, past the proximal tip of the naris. These features of bill morphology are typical of *dresseri* and, by themselves, virtually eliminate most of the other subspecies from consideration. Even in intergrades between *S. m. borealis* and *dresseri*, described and illustrated by Mendall (1980, 1986), the frontal lobes are not nearly as long, broad, or rounded as those of *dresseri* or the Crescent City bird.

Subspecies *dresseri* and *sedentaria* have the most similar bill morphology. The Crescent City eider exhibited frontal lobes that were longer and broader than in *sedentaria*, and the malar feathering extended past the proximal tip of the naris, characteristic of *dresseri* (compare Figures 1A, 3A, and 3B).

It is, of course, impossible to obtain absolute measurements of a free-flying bird. However, with high-resolution images and a lateral view, it is feasible to take relative measurements of the bill processes of the Crescent City eider. From these measurements, ratios can be calculated that reflect bill shape and proportion, and these can be compared with similar ratios calculated from published measurements taken from live birds in the hand and from specimens.

Mendall (1986) found that the metrics most useful for discriminating Common Eider subspecies were (1) nostril extension—the distance from the tip of the frontal lobe to the proximal end of the nasal opening (signified distance a–b in Fig. 85 of Pyle 2008:127) and (2) total length of the bill measured from the tip of the frontal lobe to the tip of the bill (distance a–c in Pyle 2008:127, Fig. 85). Using values of these measures from Mendall (1986) and Pyle (2008), we computed the ratio of nostril extension/total bill length for adult females of each of the four North American subspecies (similar data for nominate *mollissima* are not available). These computed

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values are shown in Table 1 and compared with the ratio estimated for the Crescent City eider.

The ratio of nostril extension/total bill length of the Crescent City eider falls outside the range of values for *S. m. v-nigrum*, *borealis*, and *borealis-dresseri* intergrades. It falls within the range of values for *S. m. dresseri* and *sedentaria*.

We have thus concluded that the Crescent City Common Eider was consistent with an adult female American or Atlantic Eider (*S. m. dresseri*) in fresh basic plumage. The bird's plumage color was atypical of females of any of the other races. Bill morphology, especially the size and shape of the frontal lobes, the extension of the malar feathering distally to beneath the nostril, and a quantitative characterization of bill proportions also supported *dresseri*.

### THE QUESTION OF ORIGIN

Occurrences of waterfowl outside normal ranges always raise the question of origin. The date and locality were consistent with a natural origin, as were the appearance and behavior of the bird. Both of its legs were unbanded, its plumage was in superb condition, and it was observed flying strongly. The bill appeared normal with no overgrowth or abrasions. Although there was considerable human activity nearby, the eider showed neither signs of tameness nor interest in people and did not approach them as if looking for a food hand-out. It dove actively and had a high rate of success at harvesting crabs and mussels. As the tide went out, the bird moved in under a pier where it pulled tightly attached mussels off the wooden pilings.

Records of vagrant Common Eiders are not numerous, but the species clearly has the potential to travel long distances on occasion. All four North American subspecies have been documented far outside their nominal ranges (no records of nominate *mollissima* exist for North America). We can only speculate on how an individual of *S. m. dresseri* might naturally reach the northern California coast. Birds of this subspecies occur regularly in the St. Lawrence River and enter the Great Lakes casually, and two occurrences in Colorado suggest that the occasional bird continues west, potentially reaching the west coast (AOU 1957, 1998).

Perhaps a more likely scenario is that increased open water in the Arctic during summer and early fall has facilitated the exchange of birds between the Atlantic and Pacific across arctic Canada and Alaska. Arctic sea ice reached a record minimum in September 2011 [Heygster 2011; National Snow and Ice Data Center (2012) shows a data-based animation of September ice minima from 1979 to 2012], creating a substantial, continuous passage of open water from Labrador and Greenland to the Bering Sea. Recent occurrences in Alaska of birds such as a Common Eider of subspecies *borealis* (Gibson and Kessel 1997), a Northern Gannet (*Morus bassanus*) (Gibson et al. 2013), and a Great Black-backed Gull (*Larus marinus*) (Day et al. 2013) and a Northern Gannet in California (Rottenborn et al. 2013) are consistent with the movement of water birds through the Northwest Passage, a pattern that is likely to increase in the future.

That said, the possibility that the bird was an escapee from captivity cannot be entirely excluded. Eiders of any species are expensive to purchase

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and to maintain, and are not numerous in captivity. Zoos and similar public facilities currently have very few (Keith Lovett, American Zoo and Aquarium Association, in litt., 2012): one male *dresseri* in the Central Park Zoo, New York City, and one in the Emporia Zoo, Kansas. The Montreal Biodome has three males and two females of unknown subspecies. It is impossible to determine the numbers and location of Common Eiders in private collections, but the consensus is that only serious collectors maintain eiders. There are at least two collections in Washington state that contain numbers of *dresseri* (S. G. Mlodinow in litt., 2012). Most birds are kept under netting, and individuals outside some sort of enclosure are likely to be pinioned. Jeff Sailer, captive-waterfowl expert with the Wildlife Conservation Society, said (in litt., 2012), “it would be a very unique circumstance in which an eider would escape from a captive setting.” Thus it seems most likely that the Crescent City bird was a vagrant wild *dresseri* that arrived in California naturally from the Atlantic Ocean.

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# ABUNDANCE AND DISTRIBUTION OF THE YELLOW-BILLED MAGPIE

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**ABSTRACT:** In 2007 and 2008, we evaluated the distribution of the Yellow-billed Magpie (*Pica nuttalli*) and estimated habitat-specific densities and abundances with point-transect surveys. We found possible contractions since the mid-20th century, with reductions from Fresno south to Bakersfield, in the Sacramento delta, and in southern portions of the Coast Ranges of central California. Over the species' entire range, its population density was 6.1 birds/km<sup>2</sup> and approximately  $4.0 \times 10^5$  birds (percent coefficient of variation [%CV] 13.1%). Density was greatest in agricultural habitats (8.2 birds/km<sup>2</sup>, 17.4% CV) and least in urban habitats (1.3 birds/km<sup>2</sup>, 36.9% CV). Abundance was greatest in rural habitats ( $2.5 \times 10^5$  birds, 17.0% CV) and least in urban habitats ( $5.3 \times 10^3$  birds). Further monitoring of temporal trends in the abundance of this bird endemic to central California and studies of its population genetics, habitat usage, and demography are warranted.

The Yellow-billed Magpie (*Pica nuttalli*), on the National Audubon Society's "watch list" (<http://birds.audubon.org/species-by-program/watchlist>), is restricted to the Central Valley and sections of the Coast Ranges of central California (Reynolds 1995). In the two years following the establishment of West Nile virus throughout California in 2004, the species suffered high mortality. Of the 818 dead magpies tested for this virus by the California Department of Public Health Services' Dead Bird Surveillance Program in 2004 and 2005, 81% were found to be positive for it (Koenig et al. 2007). These data, and review of Christmas Bird Count (CBC) data from throughout the species' range, suggest a 42–49% decrease in abundance from 2004 to 2006 (Airola et al. 2007, Crosbie et al. 2008, Pandolfino 2013).

The only published estimate of the magpie's total population is 180,000, derived from 1990s Breeding Bird Survey (BBS) data (Rich et al. 2004). But low sample size, small portion of range sampled, inappropriate sampling methods/bias, and high variance in counts may degrade the estimate's accuracy. Historically, threats to the magpie have included direct persecution

<sup>†</sup>This work is dedicated to Dr. Scott Crosbie, who died 2 December 2012. Scott was a brilliant ecologist and fervent advocate for the conservation of wildlife (and the Yellow-billed Magpie in particular) and wildlife habitats. He was a kind, patient, and gentle teacher, as well as a treasured friend and colleague. A friend wrote this in Scott's honor: "There will be brilliantly feathered birds where you are going who will sing their lovely and welcoming songs and you'll call them by name."

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in agricultural habitats (Lynda 1962), habitat conversion, and accidental poisoning with Compound 1080 intended for the California ground squirrel (*Spermophilus beecheyi*) (Reynolds 1995). Concern over the species' viability in light of the recent mortality from West Nile virus prompted the need for rangewide information on its distribution and abundance. Here we report the results of rangewide point-transect surveys in 2007 and 2008.

### METHODS

#### Study Area

Our study area was based on the range map generated by California Partners in Flight ([www.prbo.org/calpif/htmldocs/mapdocs/oak/2002/ybmamap2002.html](http://www.prbo.org/calpif/htmldocs/mapdocs/oak/2002/ybmamap2002.html)), which depicts both what is considered to be the "historical" (Grinnell and Miller 1944) and "current" (CWHR 1995) ranges of the magpie (Figure 1A). Using ArcView 3.2 and geographic information system (GIS) layers provided by the California Department of Fish and Game, we merged these two GIS layers to delimit our entire survey area prior to defining point transects randomly (Figure 1B).

We obtained GIS data on habitat types throughout the study area from a GIS layer (Multi-source Land Cover Data v02\_2), resolution 100 m, available from the California Department of Forestry and Fire Protection Fire and Resource Assessment Program at <http://frap.cdf.ca.gov/data/frapgisdata/select.asp>. This layer depicts habitat types as defined by the California Wildlife Habitat Relationship (CWHR). To assess the magpie's density and abundance by coarse but specific categories, we combined these habitats into three broad types, "rural," "agricultural," and "urban." Rural habitats

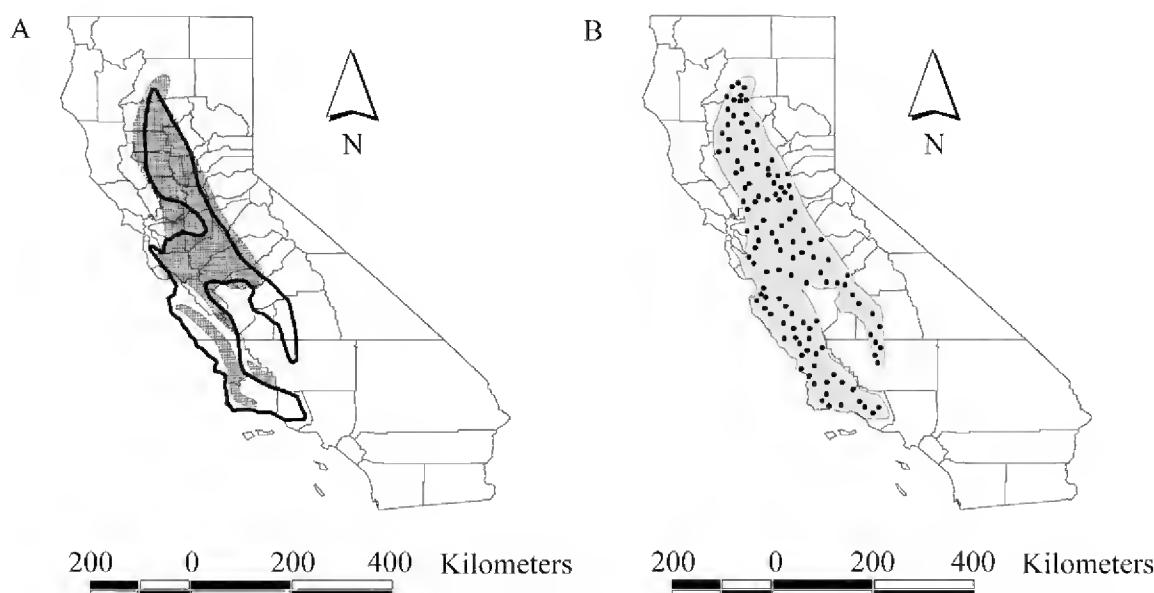


Figure 1. (A) Historical (thick outline), and current (gray shading) distributions of the Yellow-billed Magpie. See text and references in it for definitions of "historical" and "current." Adapted from maps created by the California Department of Fish and Game and California Interagency Task Group. (B) Gray shading, study area; dots, randomly located points upon transects (transect lines omitted for clarity) surveyed in 2007 and 2008.

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comprised the CWHR layers valley oak woodland, blue oak–foothill pine, coastal oak woodland, annual grassland, perennial grassland, valley foothill riparian, blue oak woodland, mixed chaparral, chamise–redshank chaparral, coastal scrub, freshwater emergent wetland, and eucalyptus. Agricultural habitats comprised the layers deciduous orchard, evergreen orchard, vineyard, irrigated row and field crops, rice, irrigated hayfield, irrigated grain crops, dryland grain crops, and non-irrigated pasture. Urban habitat was the same as that defined by the CWHR.

This simplified habitat-classification scheme is not without limitation, as rural, agricultural, and urban habitats are not mutually exclusive with respect to land use. For example, some points in rural CWHR habitats such as valley oak woodland and annual grassland clearly had light seasonal grazing, albeit at a level much lower than that of agricultural areas designated as pasture. Similarly, some points within rural and agricultural habitats also had nearby housing development or ranchettes, but the human population density in such areas was clearly much lower than in urban areas. Nevertheless, because no prior information was available on habitat-specific magpie densities, our goal was to obtain baseline estimates of density by coarse habitat categories.

### Point-Transect Surveys

We used ArcView GIS 3.2 to randomly establish 23 point transects (with a range of 4–8 points per transect and a total of 127 points) throughout the species' range (Figure 1B). Points were no closer than 5 km and were generally >10 km from their nearest neighbor. Points were stratified by habitat type, and the number of points per transect was determined by logistics (such that an observer could survey one transect per day within the time restrictions outlined below). Prior to starting surveys, we reviewed aerial photographs and visited each site to ensure points were in the correct habitat (rural, agricultural, or urban) and to obtain the landowner's permission for access where necessary. Transects were surveyed quarterly in both 2007 and 2008: once each in February, May, August, and November, corresponding with the winter (pre-breeding), spring (breeding), summer (fledging), and fall (post-fledging). After waiting for 1 minute after arriving at each point, a single observer (either Crosbie or Souza) counted for 6 minutes, recording the number of clusters of magpies (relatively tight flocks/groups), distance(s) from the point (measured with a laser rangefinder) and estimated the number of individuals within each cluster. A pilot study suggested that 6 minutes was generally sufficient for the observer to detect all magpies immediately at the point while limiting the amount of time available for any significant movement of birds within, into, or out of the area surveyed (see assumptions of point transects in Buckland et al. 2001). We recorded the time after sunrise and ambient weather including temperature (°C), estimating cloud cover to the nearest 10% and wind velocity on the Beaufort scale. Surveys were confined to the first 4 hours of local daylight and were not conducted in heavy rain or fog, or if wind velocity exceeded a value of 3 on the Beaufort scale, as prescribed for the BBS (Sauer et al. 2002). Points within transects were generally surveyed in a different order on each successive survey to reduce any potential bias of time of day on probability of detection at points within a transect.

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The differences between Grinnell and Miller's (1944) map of the Yellow-billed Magpie's range and that of the CWHR (1995) may reflect actual changes in the species' range and/or the data on which these maps were based. The most significant differences in the latter map include a decreased range in the San Joaquin Valley and Coast Ranges, an increased range in the Sacramento delta, and a slightly increased range in the northern Sacramento Valley. For our purposes we defined our study area as the combined coverage of both maps (gray polygon in Figure 1B).

The accuracy of density and abundance estimates depends on the accuracy of the estimated range (area of occupancy) of the species in question, including the areas of each habitat for which density may be calculated separately. Furthermore, because we suspect the magpie's range may have contracted recently, it was necessary to estimate the species' distribution during the study period and compare this with historical estimates of its distribution. To define the magpie's range for the estimate of density, we plotted the locations of all our detections whether during a survey or not (observations while we were traveling between points). We noted three main differences between the distribution of magpie sightings and the study area: we saw no magpies from Fresno County south to Kern County in the San Joaquin Valley, in Ventura County or eastern Santa Barbara County in the Coast Ranges, or in northwestern Contra Costa County in the delta. A search of records from these three regions in database of the BBS from 1966 to 2008 for magpie detections in these three regions turned up none, and a search at [www.ebird.org](http://www.ebird.org) yielded no more than one or two sightings in those regions over the same interval, suggesting a long-standing absence. Therefore, we assumed the species' distribution during our study period was consistent with the area defined in Figure 2, and we used this range for extrapolating abundance. This distribution resembles a compromise between those of the CWHR (1995) and Grinnell and Miller (1944), being broader in the Coast Ranges and more restricted in the San Joaquin Valley and delta. Adopting this range as the basis for our estimates necessitated removing three transects (19 points) from our analyses (each of the three regions excluded had one transect). The 21 remaining transects (108 points) were used for all analyses (Table 1).

### Statistical Analyses

For the analysis of ungrouped data we used the program Distance 5.0 version 2 (Thomas et al. 2006) and the methods detailed in Buckland et al. (2001) and Buckland (2006). We fit all recommended combinations of key functions and series expansions to the observed distribution of bird distances: the uniform, half-normal, and hazard-rate key functions with cosine or polynomial series expansions (Buckland et al. 2001). For this analysis, we excluded observations at distances >270 m, at which the probability of detection was approximately 0.1 (see Buckland et al. 2001), although we noted magpies at distances up to ~600 m. This exclusion eliminated approximately 19% of our detections. In all analyses we used the method of size-biased cluster-size estimation, regressing  $\ln(\text{cluster size})$  against the detection function to estimate mean cluster size at distance zero. For estimating variance in encounter rate, we used the transect as the independent, randomly selected unit of sampling.

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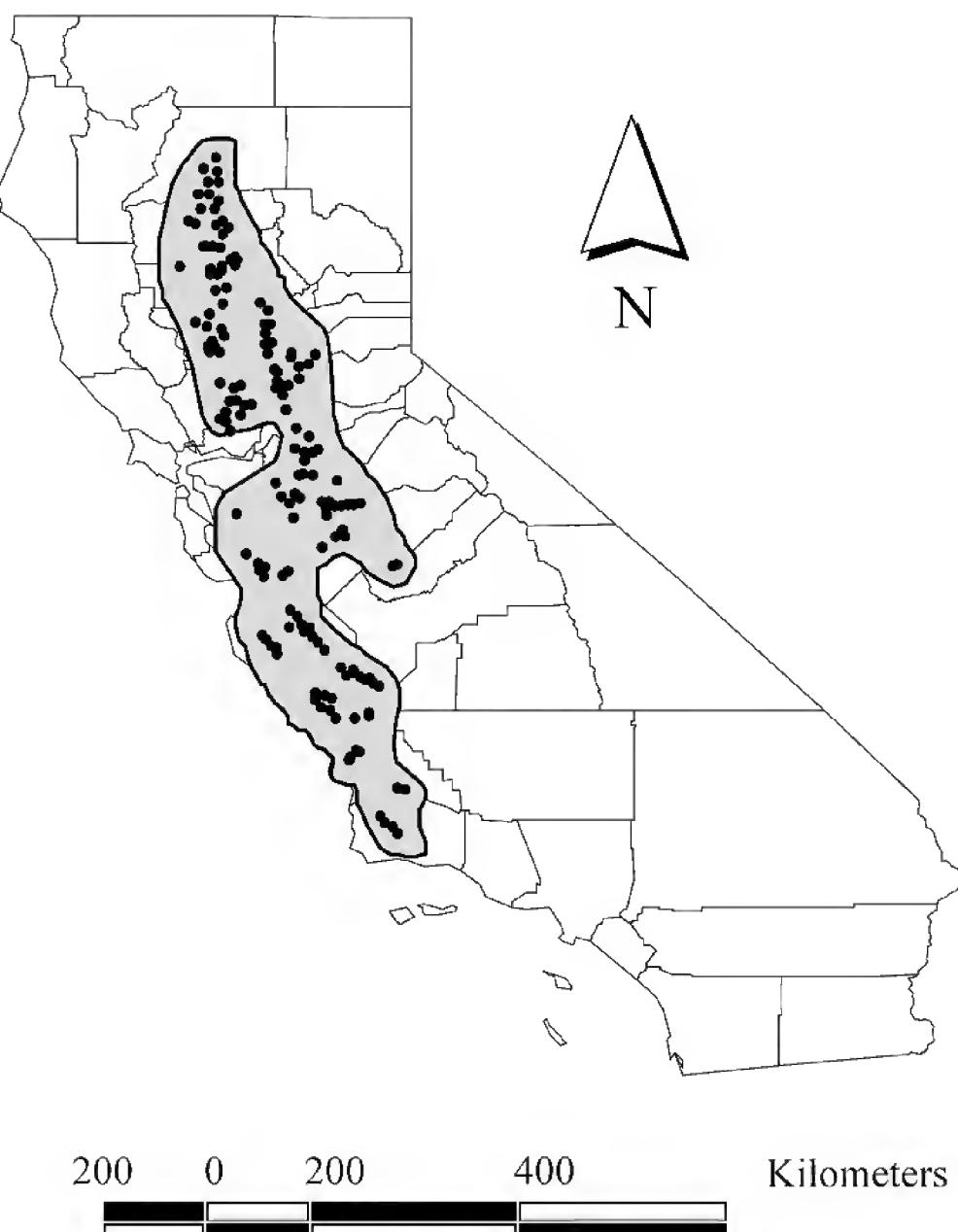


Figure 2. Clusters of Yellow-billed Magpies detected during point transects surveyed once per season (whether during formal surveys or incidentally) in 2007 and 2008. Total number of clusters detected, 416; total number of individuals detected, 1350 (many dots represent multiple sightings at the same or nearby locations). Gray shading represents the species' approximate core distribution during the study period.

In addition to using conventional distance sampling, in which the probability of detection is modeled as a function of a bird's distance alone, we also evaluated the inclusion of several covariates, using multiple-covariate distance-sampling (MCDS) methods (see Buckland et al. 2004, Marques et al. 2007). The MCDS methods can be used to evaluate the influence of covariates (in addition to bird distance) on the detection function and whether including covariates increases the precision of density and abundance estimates. The MCDS methods allow the entire data set to provide information about the shape of the detection function, while covariate-level data are allowed to affect

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**Table 1** Survey Effort for the Yellow-billed Magpie in 2007 and 2008

Habitat	Land cover (km <sup>2</sup> )	Number of transects	Number of points
Rural	46,806	11	60
Agricultural	19,759	5	23
Urban	4,215	5	25
Total	70,780	21	108

the scale—such methods may be preferred observations are too few to produce stratum-specific detection functions (Marques et al. 2007). We included both factor and nonfactor covariates that may have influenced the detection function. Nonfactor covariates included temperature, cloud cover, wind velocity, and minutes after sunrise (“time”), while factor covariates included observer, habitat type (used only when observations were stratified by season), and season (used only when observations were stratified by habitat type). We evaluated the models generated by Akaike’s information criterion (AIC), provided that goodness-of-fit tests [ $\chi^2$ , Cramér-von Mises (both uniform and cosine weighted) and Kolmogorov-Smirnov] all showed adequate fit and diagnostic plots (detection function and probability-density function) were biologically reasonable.

Because the number of detections in all strata of interest (seasons and habitat types) was insufficient for producing stratum-specific detection functions, we pooled the data for modeling the detection function. Upon selecting one detection-function model for the whole data set, we analyzed two separate stratifications of the data (Distance 5.0 will conduct only one stratification at a time): by season to examine changes in abundance over the study and by habitat type to examine habitat-specific densities and abundances. We estimated density over the magpie’s entire range by taking the mean of the weighted habitat-specific estimates.

To evaluate the temporal trend in magpie abundance through the study, we fit a least-squares linear regression to (log-transformed) seasonal abundance estimates with Systat 11.0. Examination of the residuals indicated a log transformation of seasonal abundance estimates was necessary to meet the distributional assumptions of normality and homogeneity of variance. Because we sampled at the same points over time, and because we used a pooled detection function for all analyses, we assumed the detection function remained constant over time and by habitat type. In other words, our density estimates were not independent, but estimating a temporal trend necessitated that we assume they were.

## RESULTS

## Modeling of the Detection Function

The number of detections of magpie clusters ranged from 12 to 31 per season and from 17 to 96 per habitat type. Estimated cluster size ranged from 1.39 to 3.92 per season and from 1.32 to 2.40 per habitat type. A half-normal key function provided the best fit with conventional distance

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sampling (AIC 2030.47), but the MCDS approach with the covariate of time improved the model slightly (AIC 2029.12). Because the AIC values were so similar (<2 points apart), as were goodness-of-fit statistics, we considered these models to be quite comparable. Nevertheless, we selected the hazard-rate MCDS model with the covariate of time for presentation on the basis of its minimizing the AIC score, a shoulder appreciably wider than that of the competing half-normal models, and a coefficient of variation in probability of detection (0.09–0.06) lower than that of the model based on conventional distance sampling (e.g., reducing variance in the detection function by accounting for time of day). The quandary of having two multiple models with similar scores was negated by examining the resulting density estimates, which were quite similar.

While all distances of detection were recorded where the birds were first observed, the detection-function histogram (Figure 3A) shows a spike at about 70 m, suggesting some evasive movement of magpies away from observers. Such evasive behavior was occasionally apparent during surveys, but we nevertheless conclude the model's fit was adequate, as judged by the probability-density function (Figure 3B; results of goodness-of-fit tests:  $\chi^2 = 0.53$ , Kolmogorov-Smirnov  $P = 0.60$ , Cramér-von Mises uniform and cosine weighted  $P = 0.70$  and 0.60, respectively). Detection-function plots for two levels of covariate time (Figure 4) show substantial difference in the scale of the detection function based on time of day, with probability of detection being appreciably greater earlier in the morning.

The variance (error) associated with habitat-specific estimates of density may be broken down into three components: the probability of detection, encounter rate, and cluster size. The component percentages of variance attributed to each of these three factors was generally consistent from season to season, averaging 4.0% due to the detection function, 23.6% to cluster size, and 72.4% to encounter rate.

### Magpie Density and Abundance by Season

Estimated density (birds/km<sup>2</sup>), abundance, 95% confidence limits, and coefficients of variation by season are shown in Table 2. The estimates of density and abundance ranged from a high of 8.8 birds/km<sup>2</sup> ( $5.7 \times 10^5$  birds) in November 2007 to a low of 3.0 birds/km<sup>2</sup> ( $2.0 \times 10^5$  birds) in August 2008 (Table 2).

### Magpie Density and Abundance by Habitat Type and Rangewide

Estimates of the magpie's density and abundance varied appreciably by habitat type: density was highest in agricultural habitat and lowest in urban, whereas abundance was greatest in rural habitat and lowest in urban (Table 2). Over the entire study, density, calculated as a mean of density estimates weighted by habitat type, was 6.1 birds/km<sup>2</sup> (95% CI = 5.0–7.6; percent coefficient of variation, 13.0%). Extrapolated, this density yields a total population of  $4.0 \times 10^5$  birds (95% CI 3.2–4.9  $\times 10^5$  birds).

Like that for the season-specific estimates, the variance (error) associated with the population density estimated by habitat may be broken down into the same three components: detection probability, encounter rate, and

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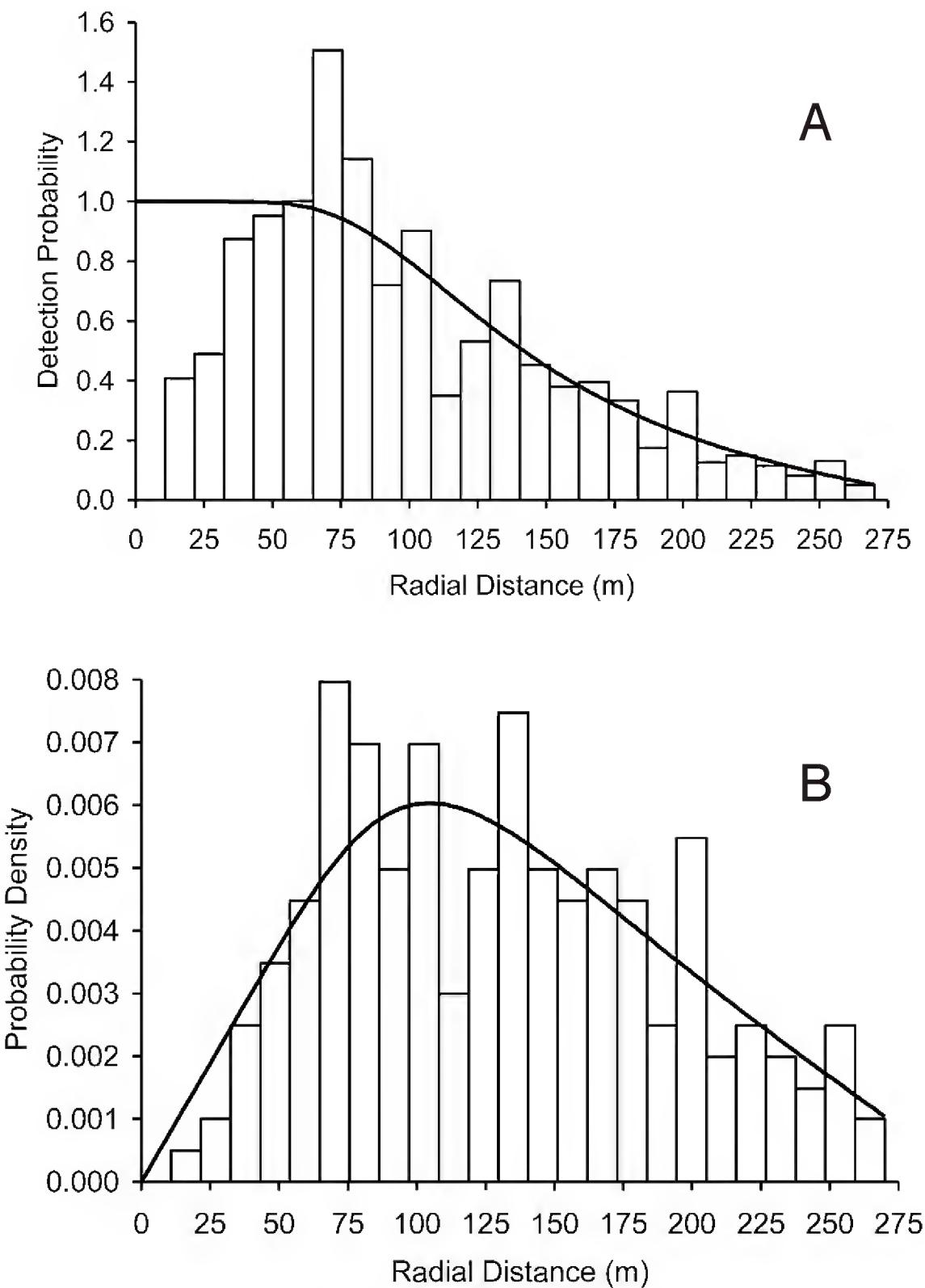


Figure 3. Histograms of distances of detection of the Yellow-billed Magpie during seasonal point-transect surveys, 2007–2008, with (A) fitted detection function and (B) probability-density function.

cluster size. Again, the component percentages of variance attributed to each of these three factors was generally consistent in all three habitats, averaging 10.2% due to the detection function, 16.3% to cluster size, and 73.5% to encounter rate.

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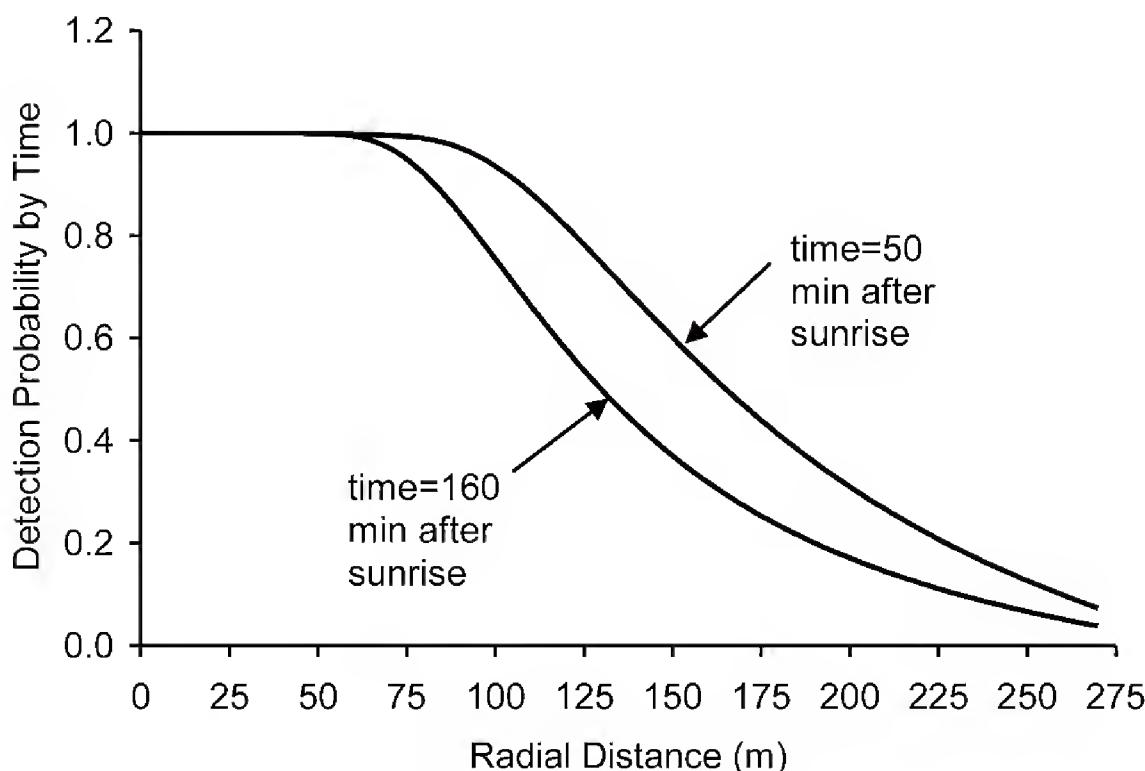


Figure 4. Two functions for detection of the Yellow-billed Magpie by distance, differing in number of minutes after sunrise, based on eight seasonal point transect surveys in 2007 and 2008.

## DISCUSSION

The Yellow-billed Magpie is common but patchily distributed in the Central Valley and central Coast Ranges of California. During our 2007–2008 surveys we recorded it throughout the Sacramento and northern San Joaquin valleys and associated foothills, and in much of the central Coast Ranges (Figure 2). Lehman (1994) stated the species had been extirpated from Ventura and southern Santa Barbara counties, and we found no magpies in these areas. Since 1996, there have been eight reports from the south coast of Santa Barbara County, but at least some of these may represent escapees from captivity (P. E. Lehman pers. comm.). Furthermore, we found none in the core of the Sacramento Delta or from the Fresno area south to Bakersfield (Figure 2). Although our point transects were limited to two years of data and their coverage of the species' range was rather coarse, our data suggest contraction of the range in Fresno, Tulare and Kern counties, as the CWHR (1995) range map implies. Why the magpie remains extant, or in higher densities, in other areas also dominated by agriculture and development is perplexing. Range contraction in the southern San Joaquin Valley is likely due, in part, to the types and intensities of agricultural land use. Much of the former range in Fresno, Tulare, and Kern counties has been developed for intensive production of beef, dairy, vineyard, citrus, and row crops; these counties regularly rank at the top for agricultural productivity in California (California Department of Food and Agriculture; <http://www.cdfa.ca.gov/statistics/>) and currently may no longer be able to sustain the magpie. We caution, however, that our survey's coverage of the species'

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**Table 2** Estimated Density and Abundance of the Yellow-billed Magpie from Point Transects Surveyed Eight Times 2007–2008

Stratum	Density (per km <sup>2</sup> )			Abundance			
	Estimate	LCL <sup>a</sup>	UCL <sup>b</sup>	Estimate	LCL <sup>a</sup>	UCL <sup>b</sup>	%CV <sup>c</sup>
<b>Season</b>							
Winter 2007	6.8	4.4	10.6	437,620	281,390	680,580	28.0
Spring 2007	4.9	2.9	8.2	317,620	189,890	531,260	32.3
Summer 2007	5.2	2.4	11.5	336,480	152,600	741,920	50.0
Fall 2007	8.8	5.0	15.5	565,670	321,290	995,930	34.6
Winter 2008	4.2	2.7	6.5	268,630	171,600	420,530	26.3
Spring 2008	4.6	2.7	7.8	296,430	174,690	503,010	37.3
Summer 2008	3.0	1.5	6.0	195,450	98,849	386,460	40.0
Fall 2008	6.3	4.1	9.6	405,400	265,800	618,300	29.1
<b>Habitat</b>							
Rural	5.8	4.4	7.6	245,221	185,750	323,730	17.0
Agricultural	8.2	6.1	10.8	145,831	109,730	193,800	17.4
Urban	1.3	0.7	2.4	5,347	2,962	9,652	36.9

<sup>a</sup>Lower 95% confidence limit.

<sup>b</sup>Upper 95% confidence limit.

<sup>c</sup>Percent coefficient of variation.

range was coarse, so the layout of transects and points in the study area may not be suitable for a fine-grained assessment of range occupancy.

Estimates of magpie abundance by season varied considerably over the course of the study, but the confidence intervals for all monthly estimates overlapped (Table 2). While numerous studies corroborate the magpie's high susceptibility to West Nile virus (Ernest et al. 2010) and a decline in abundance in the first few years of exposure to it (see Airola et al. 2007, Koenig et al. 2007, Crosbie et al. 2008, Wheeler et al. 2009), our data limited to 2007 and 2008 do not provide evidence sufficient to indicate whether the decline continued.

The magpie's population density was highest in agricultural habitat and lowest in urban habitat but not significantly higher in agricultural than in rural (Table 2). Within agricultural habitats, 87% of the magpies detected were in nut orchards, pastures, and feedlots. Why these densities differ by habitat type is unknown (and not addressed with the methods of our study) but is likely due to differences in the supply of food, water, nest sites, and roost sites, resource competition, persecution or predation rates, density dependence, densities and feeding preferences of mosquitoes, rates of transmission of West Nile virus, diversity of mosquito hosts, and the mortality from the virus preceding our study.

Because of the recent mortality from West Nile virus, one might expect our estimates of the magpie's population to be considerably lower than the previous estimate of 180,000 (Rich et al. 2004). Yet even our smallest single-season estimate of 195,000 birds (summer 2008) exceeded it. We believe that this inconsistency is partly explained by the methods and associated assumptions used by Rich et al. (2004), who derived their estimate from 1990s BBS data. Their methods included the assumption of distances of

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detection constant for each species (among others), but these assumptions were not based upon recorded distance data from field surveys. For the magpie, detectability was assumed constant up to a distance of 400 m (T. Rich pers. comm.). Our results suggest that detectability remains constant for only 100 m at best (see Figure 3), so the assumption that it was constant for up to 400 m would result in severe underestimation of density and abundance. We stress the importance of estimating probabilities of detection and, where possible, avoiding tenuous assumptions about constant detectability without verification in the field. Unless the calculations are based on estimates of detectability validated with field data, estimated densities and extrapolated abundances may be substantially erroneous and mislead management.

### ACKNOWLEDGMENTS

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# RARE BIRDS OF UTAH: THE NINETEENTH REPORT OF THE UTAH BIRD RECORDS COMMITTEE (2010–2012)

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**ABSTRACT:** This 19<sup>th</sup> published report of the Utah Bird Records Committee summarizes 160 records of 71 species reported between 15 June 2010 and 31 December 2012. The committee accepted 134 records. Noteworthy records include four species new to the Utah state list, the Purple Sandpiper (*Calidris maritima*), Gilded Flicker (*Colaptes chrysoides*), Tropical Kingbird (*Tyrannus melancholicus*), and Pyrrhuloxia (*Cardinalis sinuatus*), which bring the state list to 450 species; the state's second Roseate Spoonbill (*Platalea ajaja*), Pomarine Jaeger (*Stercorarius pomarinus*), Curve-billed Thrasher (*Toxostoma curvirostre*), Canyon Towhee (*Melozone fusca*), and Northern Cardinal (*Cardinalis cardinalis*); second, third, and fourth Iceland Gulls (*Larus glaucopterus*); third Prairie Warbler (*Setophaga discolor*) and Baltimore Oriole (*Icterus galbula*); and third and fourth Philadelphia Vireos (*Vireo philadelphicus*). The Cackling Goose (*Branta hutchinsii*) was removed from the state review list in January 2012 because sufficient documented sightings confirm it is a regular winter visitor to Utah.

This is the 19<sup>th</sup> published report of the Utah Bird Records Committee (UBRC), which was originally established as a committee of the Utah Ornithological Society in 1985. This report summarizes the UBRC's evaluation of 160 records of 71 species reported since the last published report (Tripp et al. 2010), i.e., between June 2010 and December 2012. We accepted 134 records (84%); 25 reports were not accepted because the specific identification was not established, and one was not accepted because the species was not believed to be established in Utah or to be a natural vagrant from an established population. Four species were added to the Utah state list: the Purple Sandpiper, Gilded Flicker, Tropical Kingbird, and Pyrrhuloxia. Other than the four new species added to the state list, no new species were added to the list of review species. The Cackling Goose was removed from the review list in January 2012 on the basis of a sufficiently large number of documented sightings.

## RARE BIRDS OF UTAH: THE 19TH REPORT OF THE UBRC (2010–2012)

In the records presented below, in parentheses following each species' common and scientific names is the number of records accepted for the species in the 10 years preceding the period covered in this report (i.e., 15 June 2000–15 June 2010), to show recent patterns, followed by the total number of previously accepted records for Utah in parentheses (through 15 June 2010). (We define a “record” as the occurrence of a species at a location, so a record may represent multiple individuals.) The following information is included with each record: UBRC record number, the number of birds observed along with age and sex if determined, location, date (including range of observation dates), observers’ initials with the initial finder listed first when known, observer(s) who submitted written documentation, observer(s) who submitted photographs, videos, or audio recordings (indicated by “†,” “v,” and “a,” respectively), and the final vote of the UBRC with the first number being the number of votes to accept (Y), the second the number to not accept (N), and the third the number of abstentions (A), if any. UBRC bylaws require that UBRC members abstain from voting on records they submitted. Votes decided in the second or third round are indicated as such. The total number of votes varies between five and nine according to the bylaws of the UBRC (<http://utahbirds.org/RecCom/Bylaws.htm>). The Utah state list, the list of species for which documentation is requested, a form for submission of records online, and complete content of all records submitted for review are available at the UBRC website ([www.utahbirds.org](http://www.utahbirds.org)).

The UBRC encourages all observers to document and submit a report of unusual sightings. Multiple documentation of sightings is more valuable than a single report, since one observer may notice key field marks not reported by other observers; those field marks may contribute significantly to the value of the record. We strongly encourage the submission of photographs and recordings of songs or calls, along with the written documentation.

### SPECIES ACCOUNTS

#### Cackling Goose (*Branta hutchinsii*). (8/8)

2011-05. One was at the Logan River Golf Course (Cache Co.), 12 December 2010 (RO†). This individual was not identified to subspecies but was most consistent with either *B. h. hutchinsii* or *B. h. taverneri*. Accepted: 7Y–0N

2011-12. One was at Salt Creek Wildlife Management Area (WMA; Box Elder Co.), 27 February 2011 (KP). Identified by the observer as a Cackling Goose *sensu stricto* (*B. h. minima*) given its dark coloration, very small bill, and rounded head shape. Accepted: 7Y–0N

2011-67. Five were on the Logan River Golf Course (Cache Co.), 17 December 2011 (RO† and GP). Four of them were identified as probable *B. h. hutchinsii*; the fifth appeared to be *B. h. taverneri*. At least one remained through 17 January 2012. Accepted: 7Y–0N–1A

#### Black Swan (*Cygnus atratus*). (0/0)

2011-10. NOT ACCEPTED. One was at Utah Lake State Park (SP; Utah Co.), 10 February 2011 (JE†, SD, and WB). The bird was banded on its right leg. The UBRC did not doubt the identification but does not consider the Black Swan a naturally occurring or established species in Utah. 0Y–6N

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### Harlequin Duck (*Histrionicus histrionicus*). (0/5)

2010-46. A female or immature bird was at the confluence of the Virgin River and La Verkin Creek (Washington Co.), 2 November 2010 (MD†, N. Am. Birds 65:136). Accepted 9Y-0N

2011-44. A female or immature was along the causeway to Antelope Island SP (Davis Co.), 28 September 2011 (BO†, GJ, NJ et al.). By 11 or 12 October 2011, a second Harlequin Duck had joined the first, as reported by multiple observers (N. Am. Birds 66:143). On 10 November 2011, a third Harlequin Duck (2011-44b) had joined the other two (RY†). One of the ducks began to molt into alternate male plumage; the other two birds appeared to be females (Evans 2012). The last reported sighting of the three ducks was 26 November 2011. Accepted: 8Y-0N

2012-43. A female or immature was again along the causeway to Antelope Island SP (Davis Co.), 23 October 2012–8 January 2013 (TS†, DWhi et al.). Accepted: 8Y-0N-1A

### Black Scoter (*Melanitta americana*). (9/14)

2011-64. A female or immature was along the causeway to Antelope Island SP (Davis Co.), 19 November 2011 (RO† et al.). Two Black Scotters were reported from this location to www.eBird.org between 4 November 2011 and 16 December 2011; the UBRC did not evaluate these reports. The Common Scoter (*M. nigra*) was excluded by range only. Accepted: 8Y-0N-1A

### Red-throated Loon (*Gavia stellata*). (8/10)

2010-26. NOT ACCEPTED. One was reported from Strawberry Reservoir (Wasatch Co.), 22 June 2010 (JMy†), but photographs were consistent with an immature Common Loon (*G. immer*). 2<sup>nd</sup> round: 0Y-8N

2011-71. A juvenile was at Quail Creek SP (Washington Co.), 12–19 November 2011 (RF† et al.). Accepted: 8Y-0N-1A

### Yellow-billed Loon (*Gavia adamsii*). (2/8)

2010-38. An immature was at Quail Creek SP (Washington Co.), 1 December 2009–12 March 2010 (RF†, N. Am Birds 64:353). Accepted: 7Y-0N-1A

### Red-necked Grebe (*Podiceps grisegena*). (9/12)

2010-47. An immature was at Jordanelle SP (Wasatch Co.), 23 October–11 November 2010 (EH, JC†, JBit† et al.). Accepted: 8Y-0N-1A

2011-29. An adult was at Hyrum SP (Cache Co.), 18–27 June 2011 (BA, RO† et al.). Accepted: 8Y-0N-1A

2012-60. One was at Quail Creek SP (Washington Co.), 13 October 2012 (RF†). Accepted: 8Y-0N-1A

2012-61. One in its first winter was at Otter Creek SP (Piute Co.), 13 November 2012 (RF†). Accepted: 8Y-0N-1A

### Neotropic Cormorant (*Phalacrocorax brasiliianus*). (5/5)

2010-27. A juvenile was at the Kennecott Nature Center (Salt Lake Co.), 23–24 August 2009 (KP, RY†). Accepted: 9Y-0N

2010-31. One adult and two juveniles were at Bear River Migratory Bird Refuge (Box Elder Co.), 15 August 2010 (KP, JM†). Accepted: 8Y-0N

2011-26. An adult was at Millrace Park Pond, Taylorsville (Salt Lake Co.), 13 May 2011–21 May 2011 (RY†). Accepted: 7Y-0N

2011-25. One adult was at Buffalo Ranches Pond, Farmington (Davis Co.), 15 May 2011 (KP). Accepted: 7Y-0N

2011-30. One adult and two immature birds were in Murray (Salt Lake Co.), 18–21 June 2011 (RY†, CS, SS). Accepted: 9Y-0N

2012-03. NOT ACCEPTED. An adult was reported from Buffalo Ranches Pond, Farmington (Davis Co.), 20 March 2012 (BO†). Committee members believed the

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Double-crested Cormorant (*P. auritus*) was not adequately eliminated by the photos or description. 2<sup>nd</sup> round: 2Y–7N

2012-05. One adult was at Millrace Park Pond (Salt Lake Co.), 4 April 2012 (RY†). Accepted: 9Y–0N

2012-06. Two individuals were at the Sandy Urban Fishery (Salt Lake Co.), 20 September–17 October 2010 (RY, NB, JC† et al.). Accepted: 9Y–0N

2012-08. One of two at Millrace Park Pond (Salt Lake Co.), 10 April–20 May 2012 (RW†, RY†) may represent a continuation of record 2012-05. Accepted: 9Y–0N

2012-10. Four were at Millrace Park Pond (Salt Lake Co.), 18 April 2012 (RY†); two of these were presumably also documented in records 2012-05 and 2012-08. Accepted: 9Y–0N

2012-56. A subadult was at Ivins Reservoir (Washington Co.), 3 September–4 December 2012 (RF† et al.). Accepted: 8Y–0N–1A

Together these records reflect a dramatic and continuing expansion by the Neotropic Cormorant. Fifteen records have been accepted for Utah since the species was first documented in the state in 2007. This expansion has been noted widely in the United States, as in Mississippi (Hanson et al. 2010), Arkansas (Coldren et al. 1998), Colorado (Leukering 2008), and Arizona (Radamaker and Corman 2008).

### Little Blue Heron (*Egretta caerulea*). (0/5)

2011-36. One was at Ouray National Wildlife Refuge (NWR; Uintah Co.), 29–30 July 2011 (CE†). Accepted: 8Y–0N

2012-34. NOT ACCEPTED. The described features of a reported adult in Glen Canyon National Recreation Area (Kane Co.), 9 September 2012 (GN, JN†) were consistent with an immature Reddish Egret, not with a Little Blue Heron. The record was resubmitted as of a Reddish Egret (2012-50). 2<sup>nd</sup> round: 0Y–9N

### Reddish Egret (*Egretta rufescens*). (3/3)

2012-50. An immature was at Glen Canyon National Recreation Area (Kane Co.) 9 September 2012 (GN, JN†). Accepted: 9Y–0N

### Glossy Ibis (*Plegadis falcinellus*). (8/8)

2011-18. One was along the Provo River Parkway (Utah Co.), 20–22 April 2011 (NB; sketch by EH). Accepted (2<sup>nd</sup> round): 6Y–1N

2011-17. One was along the road to the Bear River Migratory Bird Refuge (Box Elder Co.), 24–25 April 2011 (NJ†, JBit, N. Am. Birds 64:478). Accepted: 7Y–0N

2012-13. One was along Swede Lane, Palmyra (Utah Co.), 4 May 2012 (EHT). Accepted (2<sup>nd</sup> round): 8Y–1N

2012-20. NOT ACCEPTED. One was reported from Farmington Bay WMA (Davis Co.), 12 May 2012 (IR, TR). The written description did not address details of the bare parts necessary to distinguish this species from the White-faced Ibis (*P. chihi*). 0Y–9N

### Roseate Spoonbill (*Platalea ajaja*). (0/1)

2012-30. A juvenile was along the Colorado River in Cataract Canyon (San Juan Co.), 6 July 2012 (NR v. et al.). Presumably the same bird was at the mouth of Sheep Canyon on 26 July 2012 (DD†, JO'D) and continued to 15 September 2012 (DS† et al.; Figure 1). The only well-supported previous record of this species for Utah is of one collected of five seen at Wendover, Tooele Co., 2 July 1919 (Barnes 1919). The UBRC considers several reports from the 1960s (Spence et al. 2011) unsubstantiated. Accepted: 9Y–0N

### White-tailed Kite (*Elanus leucurus*). (1/7)

2011-73. A single immature was in the Washington Fields near St. George (Washington Co.), 12 December 2011–20 March 2012 (RF† et al., N. Am. Birds 66:372). Accepted: 8Y–0N–1A

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Figure 1. This juvenile Roseate Spoonbill (*Platalea ajaja*), the second recorded in Utah and the first since 1919, was photographed at the mouth of Sheep Canyon on Lake Powell 26 July 2012.

*Photo by Derek Dalrymple*

### Zone-tailed Hawk (*Buteo albonotatus*). (8/11)

2012-15. NOT ACCEPTED. The written description of one from Brigham Young University in Provo (Utah Co.), 10 May 2012 (DKe, JOW, AM) was most consistent with a Turkey Vulture (*Cathartes aura*). 0Y-9N

### Pacific Golden-Plover (*Pluvialis fulva*). (2/2)

2012-33. NOT ACCEPTED. A *Pluvialis* plover along the causeway to Antelope Island SP (Davis Co.), 29 August 2012 was reported as the Pacific (BO†, v., ND), but the UBRC concluded that neither the description nor the photographs were sufficient to eliminate other species of *Pluvialis*. 0Y-9N

### Mountain Plover (*Charadrius montanus*). (0/8)

2012-58. Two were at Harold S. Crane WMA (Weber Co.), 25–26 December 2012 (MHe†). Accepted: 9Y-0N

### Upland Sandpiper (*Bartramia longicauda*). (2/6)

2012-14. NOT ACCEPTED. One reported from Antelope Island SP (Davis Co.), 28 April 2012 (DWe) was not photographed, and the UBRC found the description insufficient to eliminate similar species. 2<sup>nd</sup> round: 3Y-6N

### Hudsonian Godwit (*Limosa haemastica*). (5/13)

2011-53. One was at Farmington Bay WMA (Davis Co.), 6–12 November 2011 (JBe, KBe). The first written record submitted described a Hudsonian Godwit clearly, but a subsequent record by another observer included a photograph of a Marbled Godwit (*L. fedoa*) and confused matters somewhat. Accepted (2<sup>nd</sup> round): 9Y-0N

### Purple Sandpiper (*Calidris maritima*). (0/0)

2010-48. One was at Sand Hollow SP (Washington Co.), 28 November 2010



Figure 2. Utah's first Purple Sandpiper (*Calidris maritima*), and a first for the contiguous western United States, was found 28 November 2010 at Sand Hollow State Park (Washington Co.) and continued through 4 December 2010.

Photo by Rick Fridell

(RF†, KC, JFr, N. Am. Birds 65:193; Figure 2). It was subsequently seen by several hundred additional observers through 4 December 2010, representing the first record for Utah and the contiguous western United States. The westernmost previous inland records of this Atlantic species are from Manitoba, Iowa, Minnesota, and Oklahoma (Payne and Pierce 2002). Subsequently, one was photographed at Calgary, Alberta, 9–10 May 2013 (e.g., [www.birdscalgary.com/tag/purple-sandpiper/](http://www.birdscalgary.com/tag/purple-sandpiper/)). Even farther west, one was collected at Point Barrow, Alaska, 29 September 1990 (Gibson and Kessel 1992). Accepted: 8Y-0N-1A

Ruff (*Calidris pugnax*). (4/4)

2010-30. An adult female was along the causeway to Antelope Island SP (Davis Co.) 1–16 August 2010 (JBe, KBe). Accepted: 8Y-0N

Red Phalarope (*Phalaropus fulicarius*). (4/12)

2011-42. One was at Sand Hollow SP (Washington Co.), 24–30 November 2010 (RF†, JFr). Accepted: 7Y-0N-1A

2011-65. One in basic plumage was along the causeway to Antelope Island SP (Davis Co.), 19 November 2011 (RO† et al.). Accepted: 7Y-0N-1A

Western Gull (*Larus occidentalis*). (3/3)

2010-40. An adult was at Farmington Bay WMA (Davis Co.), 25 February 2009 (RF†, SS, CS, et al.). Unsubmitted reports of a Western Gull from this location as early as 7 February 2009 likely represent the same individual. Accepted: 7Y-0N-1A

2011-08. This second-winter gull with an obviously injured leg was at the Bountiful Landfill (Davis Co.), 11 January 2011 (CW v., NJ†, CC†, SGM†). It moved to Farmington Bay WMA (Davis Co.; record 2011-14) where it stayed from 20 January to 23 February 2011 (SGM†, RF†, et al., N. Am. Birds 65:324). Accepted: 7Y-0N

2011-15. One in its first winter was at Farmington Bay WMA (Davis Co.), 18 February 2011 (SGM). Accepted: 7Y-0N

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2011-43. An adult was at Sand Hollow SP (Washington Co.), 31 May–3 June 2011 (RF†, *N. Am. Birds* 65:671). Accepted: 7Y-0N-1A

2011-69. One in its third winter was at Farmington Bay WMA (Davis Co.), 28 December 2011–27 February 2012 (BO† et al.). From its age and distinctive limping gait, it was likely the same individual reported from the previous winter in records 2011-08 and 2011-14. Accepted (2<sup>nd</sup> round): 9Y-0N

Iceland Gull (*Larus glaucopterus*). (1/1)

2011-01. NOT ACCEPTED. Photographs of a first-winter gull at the South Shore Marina, Great Salt Lake (Salt Lake Co.), 8 January 2011 (CI, JBl†, RO† et al.) showed relatively dark tertials and primaries consistent with Thayer's Gull (*L. thayeri*). 2<sup>nd</sup> round: 2Y-5N

2011-06. A single adult was at the Lee Kay Ponds (Salt Lake Co.), 3 January 2011 (CW, LW). A bird that was likely the same individual was at Farmington Bay WMA 22 January to 1 February 2011 (CC†, TAv†). Accepted (2<sup>nd</sup> round): 5Y-2N

2011-07. NOT ACCEPTED. A gull in its first winter was reported from Farmington Bay WMA (Davis Co.), 22 January 2011 (NJ†). Photographs were judged insufficient to rule out Thayer's Gull or Glaucous-winged Gull, and no written details were provided. 2<sup>nd</sup> round: 2Y-5N

2011-45. Record 2010-42 was split into 2011-45 and 2011-46 because it represented two individuals and UBRC members wanted to vote on each individual separately. Two first-cycle gulls were at Farmington Bay WMA (Davis Co.), 25 February 2009 (RF†); this gull was likely the same individual previously reported 22 February 2009 (SS, CS, PH†). Accepted: 7Y-0N-1A

2011-46. This was the second record split from 2010-42; another first-cycle bird that was at Farmington Bay WMA (Davis Co.), 25 February 2009 (RF†). Accepted (3<sup>rd</sup> round): 6Y-2N-1A

Lesser Black-backed Gull (*Larus fuscus*). (14/16)

2010-36. NOT ACCEPTED. This first-cycle gull was at Sand Hollow SP (Washington Co.), 22 May 2009 (RF†, KC, and RDo, *N. Am. Birds* 63:482). To some UBRC



Figure 3. This light-morph adult Pomarine Jaeger (*Stercorarius pomarinus*) was found at Sand Hollow State Park (Washington Co.), 25–30 April 2010, representing the second record from Utah.

*Photo by Rick Fridell*

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Figure 4. This adult male Gilded Flicker (*Colaptes chrysoides*) was seen in Zion National Park (Washington Co.), 24 February (when this photograph was taken) and again on 10 March 2012. This is the first accepted record of this species in Utah.

*Photo by Rick Fridell*



Figure 5. Utah's first Tropical Kingbird (*Tyrannus melancholicus*) was found 11 September 2012 on the Provo Airport Dike (Utah Co.). Bill size and shape and flight-feather shape and structure eliminated the similar Couch's Kingbird (*T. couchii*).

*Photo by Eric Huish*

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members, its rather large size suggested several potential hybrid combinations, such as Lesser Black-backed Gull × Herring Gull (*L. argentatus*), Kelp Gull (*L. dominicanus*) × Herring Gull, and Great Black-backed Gull (*L. marinus*) × Herring Gull. Others voted to accept, some considering the bird possibly of the Asian subspecies *L. f. heuglini*. 3<sup>rd</sup> round: 4Y–3N–1A

2010-41. One adult was at Farmington Bay WMA (Davis Co.), 25–26 February 2009 (RF†). Accepted: 7Y–0N–1A

2011-13. Four adults were at Farmington Bay WMA (Davis Co.), 18 February 2011 (SGM†). Counts of Lesser Black-backed Gulls ranging from 1 to 4 were reported from this location from 15 January to 5 February 2011, but most reports did not specify the birds' ages. Accepted: 7Y–0N

2011-70. One adult was at Farmington Bay WMA (Davis Co.), 28 December 2011–21 February 2012 (BO† et al.). Accepted: 8Y–0N

2011-72. An adult was at Quail Creek SP (Washington Co.), 9–10 December 2011 (RF†). Accepted (2<sup>nd</sup> round): 8Y–0N–1A

2012-02. A third-cycle individual was at Lee Kay Ponds (Salt Lake Co.), 23 January 2012 (BO†). Accepted: 9Y–0N

2012-04. One adult was in Pleasant Grove (Utah Co.), 30 March 2012 (JCT). Accepted: 9Y–0N

2012-48. One adult was at the Logan Landfill (Cache Co.), 17 November 2012 (RO†, AK†, et al.). Accepted: 8Y–0N–1A

### Pomarine Jaeger (*Stercorarius pomarinus*). (0/1)

2010-44. An adult at Sand Hollow SP (Washington Co.), 25–30 April 2010 (RDo, MHu, RF†, N. Am. Birds 64:532; Figure 3) is only the second Pomarine Jaeger well documented for Utah, following one at Utah Lake, Utah Co., 3–6 November 1991 (Sorensen et al. 1993). Accepted 7Y–0N–1A

### Common Ground-Dove (*Columbina passerina*). (3/4)

2011-52. A window-killed carcass was found in Bluff (San Juan Co.), 5 November 2011 (JP). The bird was taken to JH for identification, but we are unaware of the specimen's current status. Accepted: 9Y–0N

### Yellow-billed Cuckoo (*Coccyzus americanus*). (0/3, returned to review list in 2010)

2011-04. A desiccated dead cuckoo was found at Fish Springs NWR (Juab Co.), 13 July 2010 (JSk, JD, TS†). The specimen was discarded after it was photographed. This species was removed from the review list in 2000 but returned to the list in 2010 because of a perceived decrease in occurrence throughout Utah. Accepted: 7Y–0N–1A

2011-35. A single bird flew into a window in Sandy (Salt Lake Co.), 29 June 2011 and became dazed (JVM†). It was taken to the Hogle Zoo where it eventually recovered; it was released in Sandy. Accepted: 8Y–0N

2012-36. One was at Springdale River Park (Washington Co.), 3 June 2012 (MHe, TAB). Accepted (2<sup>nd</sup> round): 7Y–1N

### Snowy Owl (*Bubo scandiacus*). (0/9)

2012-01. One was along the causeway to Antelope Island SP (Davis Co.), 2 December 2011 (EN†, CN). Attempts by others to relocate it were not successful. Accepted: 9Y–0N

### Eastern Whip-poor-will (*Antrostomus vociferus*). (0/0)

2011-68. NOT ACCEPTED. One was reportedly calling in Trin-Alcove Canyon, about 15 miles south of the town of Green River (Grand Co.), 1 and 2 October 2011 (BH). The record was originally submitted as a "Whip-poor-will" (*A. vociferus/arizonae*) but was later assigned to the Eastern Whip-poor-will (*A. vociferus*) after consultation with the observer. Because the observer had not considered the Mexican Whip-poor-will at the time of the observation or in the submission of the initial report,

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the UBRC concluded that the observation was too uncertain to be accepted as a first state record. UBRC bylaws prescribed voting on full species only, not on taxonomic levels above or below the species. 2<sup>nd</sup> round: 2Y–7N

### Vaux's Swift (*Chaetura vauxi*). (4/13)

2011-19. Two were at Kaysville Ponds (Davis Co.), 9 May 2011 (KP, PF). Accepted: 7Y–0N

2011-21. A flock of 12 was at the Little Bear River bridge on Mendon Road (Cache Co.), 9 May 2011 (DKo, KK†). Accepted: 7Y–0N

2011-24. One was flying over the American Fork Boat Harbor (Utah Co.), 11 May 2011 (EH, EP†, KCC). Accepted: 7Y–0N

2011-50. One was flying above the Provo Airport Dike (Utah Co.), 9 October 2011 (EH, KM, LB, MM). Accepted (2<sup>nd</sup> round): 7Y–1N

### Magnificent Hummingbird (*Eugenes fulgens*). (1/7)

2012-32. NOT ACCEPTED. A large hummingbird was at a feeder in Holladay (Salt Lake Co.), 26 August 2012 (SC). Although this bird may well have been a Magnificent Hummingbird, the UBRC concluded that the lack of a direct size comparison, differences in described versus known structural details, and the observer's description of the bird as 15–20% larger than a Black-chinned Hummingbird were insufficient for the record to be accepted. 3<sup>rd</sup> round: 1Y–5N

### Broad-billed Hummingbird (*Cynanthus latirostris*). (1/5)

2010-35. An adult male was at a feeding station in New Harmony (Washington Co.), 27 September–1 October 2010 (JJ, RF†, N. Am. Birds 65:194). Accepted: 8Y–0N–1A

### Yellow-bellied Sapsucker (*Sphyrapicus varius*). (3/3)

2011-03. NOT ACCEPTED. Two males of unknown age were reported from near Oakley (Summit Co.), in August 2009 (date not specified; LLe†). The photographs and description were consistent with adult Red-naped Sapsuckers (*S. nuchalis*). 2<sup>nd</sup> round: 0Y–7N

2011-09. One immature male was at Boots Cox Park (Washington Co.), 13 February 2011 (NJ†). Accepted (2<sup>nd</sup> round): 7Y–0N

2011-51. A hatch-year female was mist-netted and banded at the Rio Mesa Center along the Dolores River (Grand Co.), 22 October 2011 (KBut†). Accepted (2<sup>nd</sup> round): 9Y–0N

2011-62. An adult female was in Beaver Dam Wash, upstream from Lytle Ranch (Washington Co.), 21 October 2011 (RF†). Accepted: 7Y–0N–1A

### Red-breasted Sapsucker (*Sphyrapicus ruber*). (3/7)

2010-34. An adult was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 30 September to 2 October 2010 (RF†, JBit†). Accepted (2<sup>nd</sup> round): 8Y–0N–1A.

2011-02. NOT ACCEPTED. The UBRC concluded that the report of a male at Olympus Cove (Salt Lake Co.), 31 December 2010 (MDa, HR), did not eliminate a hybrid Red-naped × Red-breasted sapsucker. 2<sup>nd</sup> round: 2Y–5N

2011-41. An adult of the nominate subspecies (*S. r. ruber*) was in Zion National Park (Washington Co.), 12 December 2010–16 January 2011 (RF†, N. Am. Birds 65:382). Accepted: 7Y–0N–1A

2012-26. An adult was in Beaver Dam Wash, downstream from Lytle Ranch (Washington Co.), 22 January 2012 (RF†). Accepted: 8Y–0N–1A

### Gilded Flicker (*Colaptes chrysoides*). (0/0)

2012-27. An adult male was at the South Campground of Zion National Park (Washington Co.), 24 February and 10 March 2012 (RF†; Figure 4). The second sighting was close to a Red-shafted Northern Flicker (*C. auratus, cafer* group), which

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Figure 6. This Philadelphia Vireo (*Vireo philadelphicus*) was photographed at the International Center, Salt Lake City (Salt Lake Co.), 17 September 2011.

*Photo by Jeff Cooper*



Figure 7. Utah's second Curve-billed Thrasher (*Toxostoma curvirostre*) visited feeders at a private residence in Castle Valley (Grand Co.), 14–16 February 2011.

*Photo by Jeff Foott*

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Figure 8. This Tennessee Warbler (*Oreothlypis peregrina*) was photographed 30 September 2011 in St. George (Washington Co.). This is the second Utah record accepted by the UBRC, but this species was not on the review list until 2005.

*Photo by Rick Fridell*



Figure 9. This extremely late Blackpoll Warbler (*Setophaga striata*) was found in Clawson (Emery Co.), 24 November 2012. Although this is the fourteenth Blackpoll Warbler recorded in Utah it is by far the latest documented in the state.

*Photo by Wade Reed*

allowed for careful comparison of the two. Although two UBRC members and three outside experts thought this could be an intergrade Northern Flicker, a majority of the committee supported the identification as a Gilded Flicker, citing yellow in the tail, tail pattern, the observer's report of relative size, and contrast between the face and nape. This is the first record of the Gilded Flicker accepted for Utah. This species is resident approximately 200 km to the southwest of this location. There are approximately five

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other records from southwest Utah that have either not been submitted to the UBRC for evaluation, were or submitted and not accepted, but otherwise the species is not known as a vagrant. Accepted (2<sup>nd</sup> round): 6Y–2N–1A

Yellow-bellied Flycatcher (*Empidonax flaviventris*). (0/0)

2012-40. NOT ACCEPTED. A first-fall *Empidonax* was reported as this species from Garr Ranch, Antelope Island SP (Davis Co.), 23 September 2012 (JB†, KB†). Some UBRC members believed many characters including eye-ring shape, head size and shape, primary extension, and coloration were more consistent with the Western Flycatcher complex (*E. occidentalis* or *E. difficilis*). 2<sup>nd</sup> round: 0Y–9N

Least Flycatcher (*Empidonax minimus*). (3/5)

2011-27. An adult was on the Provo Airport Dike (Utah Co.), 25 May 2011 (TS†). Accepted: 7Y–0N–1A

2011-31. NOT ACCEPTED. A single individual was reported from Rock Canyon above Provo (Utah Co.), 22 June 2011 (JLin). The UBRC judged the written description of the song to be inconsistent with that of the Least Flycatcher. 2<sup>nd</sup> round: 0Y–7N

2012-24. One singing individual was along the Weber River in Ogden (Weber Co.), 13–24 June 2012 (KP, PH†). Accepted: 9Y–0N

2012-25. One singing individual was near the 21<sup>st</sup> Street Pond in Ogden (Weber Co.), 16–28 June 2012 (KP). Accepted: 9Y–0N

Pacific-slope Flycatcher (*Empidonax difficilis*). (0/0)

2011-47. NOT ACCEPTED. Two hatch-year birds were captured in a mist net and measured at the Rio Mesa Center (Grand Co.), 16 September 2011; one was recaptured 17 September 2011 (KBut†). Measurements calculated according to Pyle (1997) strongly suggested this species, but variation between the measurements made during the original capture and during recapture of the same individual, as well as several measurements falling outside the 95% confidence interval in Pyle (1997), left doubt about the precision of the measurements and whether the Cordilleran Flycatcher (*E. occidentalis*) could be excluded. 2<sup>nd</sup> round: 1Y–6N

Eastern Phoebe (*Sayornis phoebe*). (8/14)

2011-16. One was at the Provo Airport Dike (Utah Co.), 18–21 October 2010 (JBl, EH, RW† et al.). Accepted: 7Y–0N

2012-12. One was in Red Butte Canyon (Salt Lake Co.), 20 April 2012 (JSk, JGa, JSo). Accepted: 8Y–0N

2012-46. One probable hatch-year bird was along Canyon Road near Fish Springs NWR, (Juab Co.), 12 October 2012 (JSk†, HB). Accepted: 8Y–0N–1A

Tropical Kingbird (*Tyrannus melancholicus*). (0/0)

2012-35. A silent kingbird was on the Provo Airport Dike (Utah Co.), 11 September 2012 (EH† et al.; Figure 5). Several outside experts were consulted and all agreed, on the basis of bill size and shape and flight-feather shape and structure, that the bird was more consistent with the Tropical Kingbird than with the similar Couch's Kingbird (*T. couchii*). This is the first Utah record of the Tropical Kingbird. Accepted (2<sup>nd</sup> round): 6Y–2N.

Scissor-tailed Flycatcher (*Tyrannus forficatus*). (2/8)

2011-28. One was on the Provo Airport Dike (Utah Co.), 6–9 June 2011 (EH, BO†, KB† et al.). Accepted: 8Y–0N

Yellow-throated Vireo (*Vireo flavifrons*). (1/3)

2012-57. One was at the Red Hills Golf Course in St. George (Washington Co.), 12 October 2012 (RF†), representing the first accepted Utah record of this species documented with more than a written description. Accepted: 8Y–0N–1A

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### Philadelphia Vireo (*Vireo philadelphicus*). (2/2)

2011-38. One was at the International Center, Salt Lake City (Salt Lake Co.), 17 September 2011 (EH, JC†, N. Am. Birds 66:144; Figure 6). Although there was discussion among the UBRC, and three outside experts suggested that this was either a hybrid vireo of unknown parentage or a Yellow-green Vireo (*V. flavoviridis*), the majority of the UBRC supported the identification as a Philadelphia Vireo. Accepted (2<sup>nd</sup> round): 6Y-1N

2012-44. One was at a private residence in St. George (Washington Co.), 2 October 2012 (JLo†). Accepted: 8Y-1N

### Brown Thrasher (*Toxostoma rufum*). (2/17, added back to the review list in 2007)

2010-45. One was in Salt Lake City (Salt Lake Co.), 10 October 2010 (JLigt, SL). Accepted: 8Y-0N

2011-55. One was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 30 September–4 October 2011 (RF†, SS, CS). Accepted: 7Y-0N-1A

2012-37. One was just below Ivins Reservoir (Washington Co.), 2 June 2012 (MHe). Accepted: (2<sup>nd</sup> round) 7Y-1N

### Curve-billed Thrasher (*Toxostoma curvirostre*). (1/1)

2011-11. One was at feeders in Castle Valley (Grand Co.), 14–16 February 2011 (JFo†; Figure 7). This is the second Utah record. Accepted: 7Y-0N

### McCown's Longspur (*Rhynchophanes mccownii*). (3/11)

2010-37. Two birds, a male and a female, were in Blue Creek Valley, southwest of Howell (Box Elder Co.), 25 February 2010 (RF†). Accepted: 7Y-0N-1A

### Ovenbird (*Seiurus aurocapilla*). (2/14)

2012-22. One was singing at the campground in Willard Bay SP (Box Elder Co.), 25 May 2012 (DWhe, LLo a.). Accepted: 9Y-0N

2012-29. One was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 27–28 May 2012 (RF†). Accepted: 8Y-0N-1A

2012-42. One was at the Dugway Proving Grounds (Tooele Co.), 9 October 2012 (KM†). Accepted: 9Y-0N

### Prothonotary Warbler (*Protonotaria citrea*). (6/7)

2010-39. An adult was at the Red Hills Golf Course, St. George (Washington Co.), 28 September 2010 (RF†). Accepted 7Y-0N-1A

2011-61. A hatch-year male was at Tonaquint Park, St. George (Washington Co.), 5–7 October 2011 (DT, RF† et al., N. Am. Birds 66:144). Accepted: 7Y-0N-1A

2012-23. An adult was at Fort Buenaventura, Ogden (Weber Co.), 10 June–1 July 2012 (KP, PHi†, DWhe, JBi, N. Am. Birds 66:716). Accepted: 8Y-0N-1A

2012-28. An adult was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 22 May 2012 (RF†, N. Am. Birds 66:571). Accepted: 8Y-0N-1A

2012-38. One was at River Lane (Utah Co.), 19–22 September 2012 (EH†, KCC). Accepted: 9Y-0N

### Tennessee Warbler (*Oreothlypis peregrina*). (1/1, added to review list in 2005)

2011-57. One was in St. George (Washington Co.), 30 September 2011 (RF†; Figure 8). It represents the second Utah record accepted by the UBRC, but this species was not on the review list until 2005. Accepted: 7Y-0N-1A

2012-18. A second-year female was captured and examined in hand at a banding station in Red Butte Canyon (Salt Lake Co.), 19 May 2012 (JSk†, JGa). Accepted: 9Y-0N

### Northern Parula (*Setophaga americana*). (9/12)

2011-23. An adult male was on the Provo Airport Dike (Utah Co.), 14–15 May 2011 (KCC, EH†). Accepted: 7Y-0N

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Figure 10. This adult male Northern Cardinal (*Cardinalis cardinalis*), photographed in Ivins (Washington Co.), 27 June 2010 furnished Utah's second record of this species.

*Photo by Bill Bates*

2011-40. A first-winter female was at Tonaquint Nature Park (Washington Co.), 24–28 December 2010 (RF†). Accepted: 7Y-0N-1A

2011-48. A singing male was in City Creek Canyon (Salt Lake Co.), 18 June 2011 (BO† a.). Accepted: 8Y-0N

2011-58. A hatch-year bird was in St. George (Washington Co.), 2 October 2011 (RF†, RDo, MHu, SS, CS). Accepted: 7Y-0N-1A

2012-16. An adult was on the Provo Airport Dike (Utah Co.), 14 May 2012 (EH†). Accepted: 9Y-0N

2012-21. An adult was on the Dixie Red Hills Golf Course (Washington Co.), 27 May 2012 (DT). Accepted (2<sup>nd</sup> round): 9Y-0N

2012-52. One, thought to have been a first year female, was at the Provo City Cemetery, Provo (Utah Co.), 18 December 2012–1 January 2013 (EH†). Accepted: 9Y-0N

Chestnut-sided Warbler (*Setophaga pensylvanica*). (8/13)

2011-54. A hatch-year female was in St. George (Washington Co.), 16 September 2011 (RF†, KWh, DT, RDo, N. Am. Birds 66:145). Accepted: 7Y-0N-1A

2011-59. A hatch-year female was at Tonaquint Park, St. George (Washington Co.) 5–7 October 2011 (RF†). Accepted: 7Y-0N-1A

2011-60. A hatch-year male or adult female was at Tonaquint Park, St. George (Washington Co.), 5–7 October 2011 (RF†). Accepted: 7Y-0N-1A

2012-39. A hatch-year female was at Garr Ranch, Antelope Island (Davis Co.), 15 September 2012 (KWa, PH†). Accepted: 9Y-0N

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Figure 11. Utah's first Pyrrhuloxia (*Cardinalis sinuatus*) was discovered at Lytle Ranch, Beaver Dam Wash (Washington Co.), on 29 September 2010, and continued for a month.

*Photo by Lu Gidding*

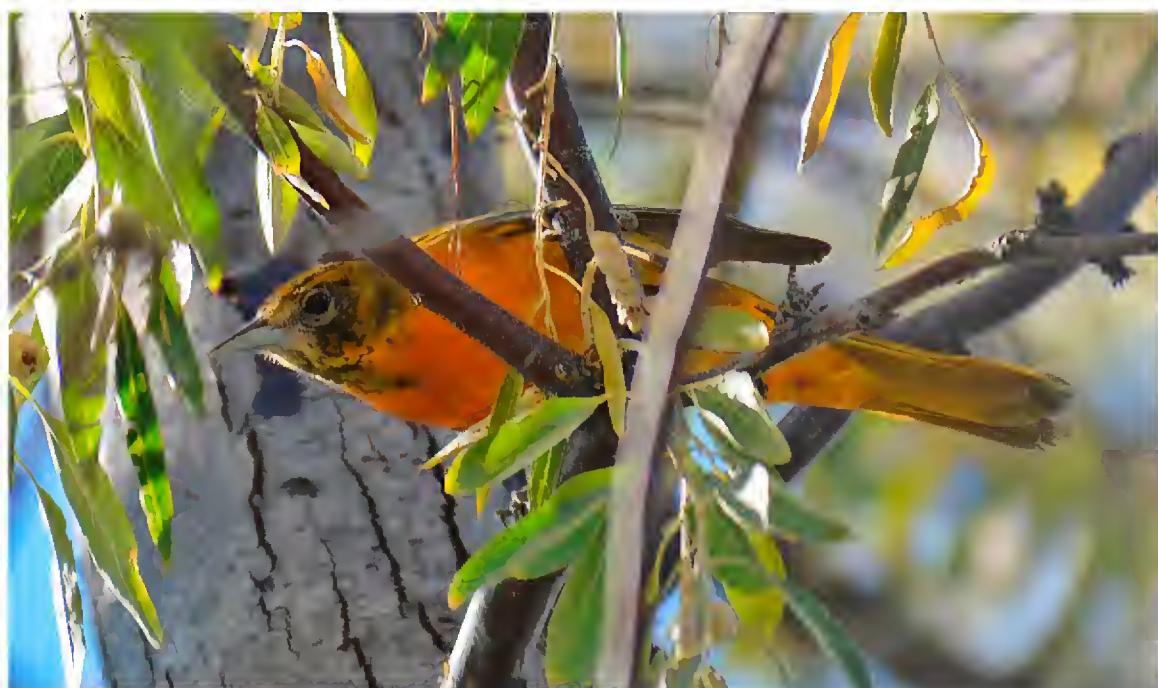


Figure 12. The Baltimore Oriole (*Icterus galbula*) photographed on 1 October 2012 at the International Center, Salt Lake City, constituted Utah's third record, and the first since 1982.

*Photo by Stephanie Greenwood*

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### Blackpoll Warbler (*Setophaga striata*). (4/11)

2010-32. One in its first fall was at Garr Ranch, Antelope Island SP (Davis Co.), 29 August 2010 (JBit et al.). Accepted 9Y-0N

2011-49. One in its first fall was along the Provo Airport Dike (Utah Co.), 11 October 2012 (EH and BS). Accepted (2<sup>nd</sup> round): 5Y – 2N

2012-51. A hatch-year female was in Clawson (Emery Co.), 24 November 2012 (WR†; Figure 9). Accepted: 9Y-0N

### Black-throated Blue Warbler (*Setophaga caerulescens*). (7/16)

2011-39. A male was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 11–12 October 2010 (RF†, LT). Accepted: 7Y-0N-1A

2012-07. A male was at River Front Park along the Jordan River in South Jordan (Salt Lake Co.), 19 May 2011 (JC). Accepted (2<sup>nd</sup> round): 9Y – 0N

2012-55. A female was at Tonaquint Park, St. George (Washington Co.), 7 October 2012 (RF†). Accepted: 8Y-0N-1A

### Palm Warbler (*Setophaga palmarum*). (5/12)

2011-20. An adult was in Salt Lake City (Salt Lake Co.), 9–12 May 2011 (DWhe, NJ†, RMT). Accepted: 7Y-0N-1A

2011-22. An adult, probably male, was at Fish Springs NWR (Juab Co.), 10 May 2011 (JSk). Accepted: 7Y-0N-1A

2012-31. NOT ACCEPTED. One was reported from near the Ruth Lake trailhead in the Uinta Mountains (Summit Co.), 31 July 2012 (BO†). UBRC members found that the photograph and description were consistent with an Orange-crowned Warbler (*Oreothlypis celata*). 0Y-9N

### Prairie Warbler (*Setophaga discolor*). (2/2)

2011-56. A hatch-year male was in St. George (Washington Co.), 23–25 September 2011 (RDot, RF, N. Am. Birds 66:145). The photo represents the first record of this species for Utah based on more than a written description. Accepted: 7Y-0N-1A

### Canyon Towhee (*Melozone fusca*). (1/1)

2010-25. One adult was in Grand Staircase-Escalante National Monument (Kane Co.), 12–14 May 2008 (RO). This second Canyon Towhee recorded in Utah likely moved up the Colorado River from established populations in the Grand Canyon area, approximately 170 km southwest. Accepted (2<sup>nd</sup> round): 8Y-1N

### Grasshopper Sparrow (*Ammodramus savannarum*). (N/A)

2010-43. One was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 9 October 2009 (RF†). This species is expected in the northern part of Utah and is not on the UBRC's statewide review list. There is only one previous record accepted by the UBRC for southern Utah. The Grasshopper Sparrow was removed from the statewide review list in 2002 and added to the south region review list in 2007. Accepted: 7Y-0N-1A

### Hepatic Tanager (*Piranga flava*). (0/0)

2010-29. NOT ACCEPTED. An adult male was reported from Lytle Ranch, Beaver Dam Wash, (Washington Co.), 27 July 2010 (ED, RDet, EDu, FD, RL). The UBRC judged the photograph provided to be consistent with the Summer Tanager (*Piranga rubra*), a species expected at this location. 0Y-9N

### Scarlet Tanager (*Piranga olivacea*). (2/4)

2011-37. A male was along the Provo Airport Dike (Utah Co.), 30 May 2011 (KCC, EH†). Accepted: 7Y-0N

2011-63. One adult female was at Beck Spring, Snake Valley (Millard Co.), 14 October 2011 (RF†, KWh). Accepted: 7Y-0N-1A

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Northern Cardinal (*Cardinalis cardinalis*). (0/1)

2010-28. An adult male was in Ivins (Washington Co.), 27 June–5 July 2010 (BB†, BHu, et al.; Figure 10). The UBRC discussed the bird's potential to have originated from captivity, but given nearby records accepted by the Nevada Bird Records Committee (Alcorn 1988, Eidel 2002) and the proximity to the species' native range about 250 km south, the committee judged it to be a natural vagrant. Accepted (2<sup>nd</sup> round): 6Y–2N

Pyrrhuloxia (*Cardinalis sinuatus*). (0/0)

2010-33. An adult male was at Lytle Ranch, Beaver Dam Wash (Washington Co.), 29 September–29 October 2010 (RF† et al.; Figure 11), representing a first Utah record. Accepted: 8Y–0N–1A

Dickcissel (*Spiza americana*). (2/3)

2011-33. A singing male was in Farmington (Davis Co.), 26 June–21 July 2011 (TJ†, RM†, PH†, RO a., N. Am. Birds 65:582). Accepted: 8Y–0N–1A

Tricolored Blackbird (*Agelaius tricolor*). (0/0)

2012-11. NOT ACCEPTED. An adult male was reported from Farmington Bay WMA (Davis Co.), 21 April 2012 (AV†). The written description and photograph showed the bird had a red and white pattern to the epaulet suggesting the Tricolored Blackbird. But UBRC members noted a number of features inconsistent with the Tricolored, such as bill shape and feather sheen, and that in Utah Red-winged Blackbirds (*A. phoeniceus*) occasionally have red epaulets bordered by white instead of the usual yellowish. 2<sup>nd</sup> round: 0Y–9N

Eastern Meadowlark (*Sturnella magna*). (0/0)

2012-17. NOT ACCEPTED. One was reported at Saratoga Springs Mitigation Wetlands (Utah Co.), 14 May 2012 (JGo†). The report lacked description of vocalizations or of plumage characters distinguishing the Eastern and Western Meadowlarks, such as face and tail pattern. 0Y–9N

Rusty Blackbird (*Euphagus carolinus*). (3/7)

2010-49. An adult male was in Torrey (Wayne Co.), 14 December 2010 (TS, TW†). Accepted: 9Y–0N–1A

Bronzed Cowbird (*Molothrus aeneus*). (3/5)

2012-19. An adult male was between Grafton and Rockville (Washington Co.), 29 May 2012 (BO†). Accepted: 9Y–0N

Baltimore Oriole (*Icterus galbula*). (0/2)

2012-41. One was at the International Center, Salt Lake City (Salt Lake Co.), 1–4 October 2012 (SG† et al.; Figure 12). Accepted (2<sup>nd</sup> round): 7Y–0N

Purple Finch (*Haemorhous purpureus*). (1/1)

2011-32. NOT ACCEPTED. One was reported from Nibley (Cache Co.), 9 June 2010 (RH and PHe). UBRC members felt that insufficient details were provided to eliminate Cassin's Finch. 2<sup>nd</sup> round: 0Y–7N

2011-34. NOT ACCEPTED. One was reported from Logan (Cache Co.), 30 May 2011 (VG). Again, details provided were insufficient to eliminate Cassin's Finch. 2<sup>nd</sup> round: 0Y – 7N

Common Redpoll (*Acanthis flammea*). (4/12)

2011-66. An adult was at Garr Ranch, Antelope Island (Davis Co.), 25 November 2011 (CF and EJR†). Accepted: 9Y–0N

2012-09. One was in Spanish Fork (Utah Co.), 28 March 2012 (KJB†). Accepted: 9Y–0N

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2012-45. One was at the mouth of Steel Canyon, northwest of Clarkston (Cache Co.), 8 November 2012 (RO†, AD, JDW). Accepted: 8Y-0N-1A

2012-47. Five were near the mouth of Steel Canyon, 6 km north-northwest of Clarkston (Cache Co.), 12 November 2012 (MT†). Accepted: 9Y-0N

2012-49. Two were at the Powder Ridge Condominiums, 8 km northeast of Eden (Weber Co.), 23 November 2012 (KP, JR†, MHe, TAB). Accepted: 9Y-0N

2012-53. A flock of 16 was at the Dairy Fork WMA, in Spanish Fork Canyon (Utah Co.), 8 December 2012 (EH). Accepted: 9Y-0N

2012-62. A flock of 80–120 was near Silver Creek Junction (Summit Co.), 10–31 December 2012 (NG†). Accepted: 9Y-0N

Most of these Common Redpolls were part of an irruption in 2012–2013 that was unprecedented in Utah's ornithological history. This irruption was also noted elsewhere in the United States, and on the Great Backyard Bird Count the Common Redpoll was reported in more states (36) than in any previous year (<http://www.audubon.org/newsroom/press-releases/2013/global-great-backyard-bird-count-shatters-records>).

Hoary Redpoll (*Acanthis hornemannii*). (0/1)

2012-54. NOT ACCEPTED. One individual was reported from near Park City (Summit Co.), 19 December 2012 (NG†). UBRC members believed that the plumage characteristics (including flank streaking, upperpart streaking, and streaking on the undertail coverts) were consistent with the Common Redpoll and not the Hoary. Two members also noted that photographs provided as documentation showed two different birds. 0Y-9N

Lawrence's Goldfinch (*Spinus lawrencei*). (5/5)

2012-59. A male was at Tonaquint Park in St. George (Washington Co.), 7 October 2012 (RF†). Accepted: 8Y-0N-1A

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# APPARENT SYMPATRY OF TWO SUBSPECIES OF THE WHITE-CROWNED SPARROW, *ZONOTRICHIA LEUCOPHrys PUGETensis* AND *GAMBELII*, IN WASHINGTON STATE

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**ABSTRACT:** White-crowned Sparrows (*Zonotrichia leucophrys pugetensis*) breed throughout the lowlands of western Washington, but before 1953 there was just one record of this subspecies east of the Cascade Range. Over the last 35 years, however, because of logging and development, *pugetensis* has spread and now occurs at and east of the Cascade crest, with definite evidence of nesting by 1988 on the eastern slopes of the Cascades. Gambel's White-crowned Sparrow (*Z. l. gambelii*) was first recorded nesting in the Cascades of northern Washington in 1957. Beaudette confirmed its nesting in the central Washington Cascades at Naches and Stevens passes in 1994 and 1996, when he observed singing males of both *pugetensis* and *gambelii* in close proximity to each other. In 2006 Hunn recorded songs of both subspecies in such a situation near Naches Pass. More recent reports extend the area of apparent sympatry south to White Pass in Yakima County and east of the Cascade crest in Kittitas and Yakima counties. The situation suggests that the White-crowned Sparrow as now defined might include two (or more) species.

The White-crowned Sparrow includes five recognized subspecies (Dunn et al. 1995), which constitute two clearly defined groups: (1) a boreal/montane group, which includes *Z. l. leucophrys*, breeding in eastern Canada; *Z. l. gambelii* of western Canada to Alaska (and now south in the Cascade Range in Washington State); and *Z. l. oriantha* of the Rocky Mountains, Great Basin ranges, and the Sierra Nevada and southern Cascades—all of which are migratory; and (2) a Pacific coastal lowland group, which includes *Z. l. nuttalli* of central coastal California and *Z. l. pugetensis*, breeding from northwesternmost California to southern coastal British Columbia. Within these groups, the subspecies intergrade where their ranges come in contact (Chilton et al. 1995). Until recently the two groups were geographically isolated.

Subspecies *nuttalli* is rather strictly coastal and sedentary. Subspecies *pugetensis* has a wider habitat tolerance, and it occurs throughout the coastal lowlands of its range; it is partly migratory, wintering south to southern California. Both these subspecies share short primary projections reflecting their more sedentary habits. The other three subspecies migrate considerable distances to their wintering grounds and share longer primary projections (Dunn et al. 1995).

Sixty years ago Jewett et al. (1953:648) characterized *Z. l. pugetensis* as a “common migrant and summer resident... in clearings and prairies in the Transition Zone west of the Cascade Mountains.” The examples they cited included a single exception, a summer record at Goose Prairie near Bumping Lake (elevation 1000 m), high on the eastern slopes of the Cascades in Yakima County. Subspecies *Z. l. gambelii* was not known to

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breed in Washington, but was judged, rather, a “common spring... and fall... migrant... from the plains of eastern Washington to the parks near timber line in the Cascade Mountains ... wintering casually in the eastern part of the state” (op. cit.:647). The AOU (1957) concurred. Field work over the past 35 years has shown that the current status and distribution of these two subspecies in Washington is today quite different from those assessments, and we report here the first known case of apparent sympatry between these well-marked forms.

The first record of *gambelii* nesting in the state was from Hart’s Pass, ~30 km south of the Canadian border, elevation 1900–2100 m (Farner 1958; see Figure 1 for location). A third subspecies, *Z. l. oriantha*, was added to the list of forms breeding in Washington in 1968, when Dennis Paulson found a nest in subalpine habitat at Salmo Pass, Pend Oreille County. Philip Mattocks (in litt. and *Audubon Field Notes* 24:702) collected a male in breeding condition at this site, at ~1800 m, in 1970. The report by Booth (1952) of nesting by the nominate subspecies, *Z. l. leucophrys*, in the Blue Mountains of southeastern Washington is attributable instead to *oriantha*. Presumably that population had simply been overlooked previously (Smith et al. 1997:470). Richard E. Johnson collected specimens in 1977 at 1830 m elevation on Mt. Misery, Blue Mountains (Connor Museum, Washington State University 77-548 and 77-630), and Dennis Paulson and John Wingfield observed territorial males there in 1996. The first breeding of *Z. l. pugetensis* on the east slope of the Cascades was recorded in 1988 along Morrison Creek in Kittitas County, at 700 m (loc. cit.). Territorial birds had been noted at Snoqualmie Pass (950 m) in the 1970s (Hunn 1982), however, and we noted singing male *pugetensis* regularly on the Cascades’ east slope from Leavenworth, Chelan County (350 m), south to Conboy Lakes National Wildlife Refuge, Klickitat County (580 m), 1986–2003. This range expansion of *pugetensis* over the Cascade crest is no doubt mostly

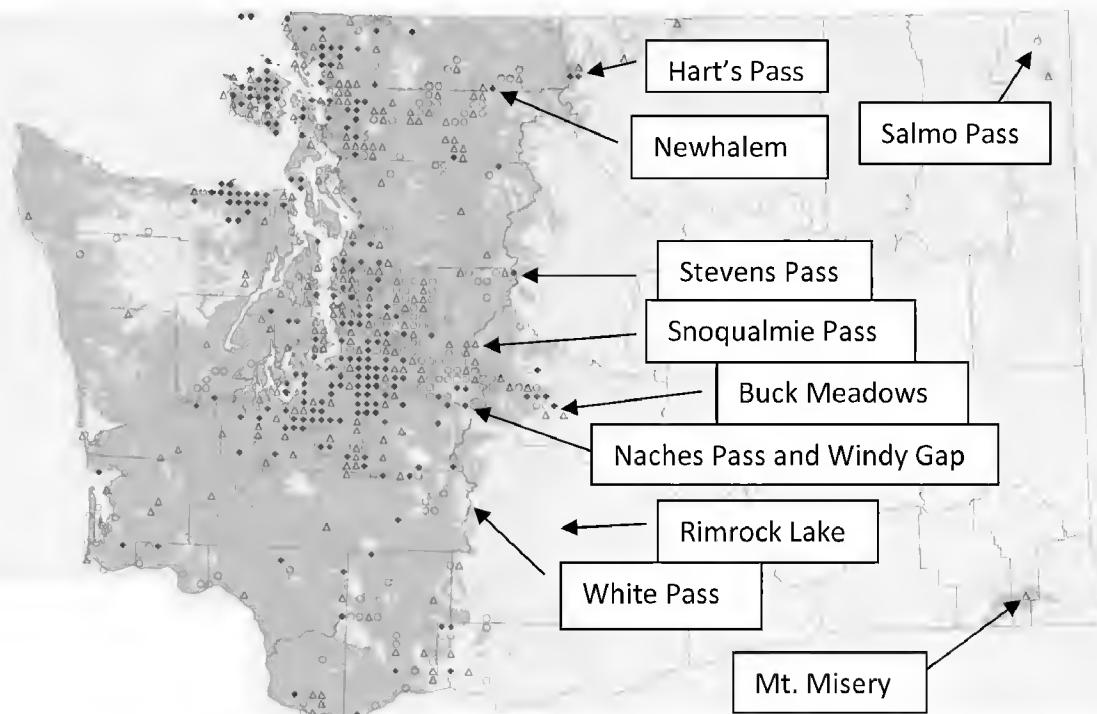


Figure 1. Locations cited in the text (base map from Smith et al. 1997:470).

SYMPATRY OF WHITE-CROWNED SPARROW SUBSPECIES



Figure 2. *Zonotrichia leucophrys pugetensis*, Cooper Mountain Nature Park, Washington Co., Oregon, 13 May 2011.

*Photo by David Irons*



Figure 3. *Zonotrichia leucophrys gambelii*, Eugene, Lane Co., Oregon, 17 April 2010.

*Photo by David Irons*

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attributable to extensive clear-cut logging, which had reached fever pitch by the 1980s (Smith et al. 1997; see also Addis et al. 2011).

### METHODS

We reviewed our personal notes for the nesting season in the Washington Cascades, for Hunn since 1980, when he first noted the subspecies of singing White-crowned Sparrows, and for Beaudette since 1994. Hunn obtained audio recordings (analog with a Marantz PMD221 with a Sennheiser microphone and 13-inch parabolic reflector and digital with a Sony ICD-P330F with a Sennheiser K6 directional microphone), which we illustrate here with sonograms, of territorial males of both forms from the zone of apparent sympatry. Neither of us is an accomplished photographer, so our identifications have relied primarily on songs and observations of plumage tone, whether more or less brown or gray, particularly about the nape and flanks, and back striping, whether blackish on tan (*pugetensis*) or chestnut on gray (*gambelii*) (Figures 1 and 2).

Hunn reviewed the relevant literature (Jewett et al. 1953, Farner 1958, Chilton et al. 1995, Dunn et al. 1995, Wahl 1995, Smith et al. 1997, Stepniewski 1999, Beadle and Rising 2003, Wahl et al. 2005, Herlyn and Contreras 2009) and the Sound to Sage website ([www.soundtosage.org](http://www.soundtosage.org)), which summarizes data for King and Kittitas counties from the Washington Breeding Bird Atlas, much of which was recorded subsequent to that on which Smith et al. (1997) is based. Beaudette compiled his detailed written accounts of relevant observations from his participation in the atlas. Hunn then solicited reports and commentary from other local birders via [www.tweeters.com](http://www.tweeters.com), the Washington bird chat line, and received several additional reports and clarifications.

### RESULTS

Beaudette documented several nests attended by pairs of *Z. l. gambelii* near Naches Pass, King County, 19 June and 3–7 July 1994 (see Figure 3). He wrote in his notes: “In the summer of 1994 I located a pair ... in King County, Washington, ... about 2 miles west of Naches Pass and in a clearcut at about 4500 [1372 m] feet elevation. They were observed on three dates [see below]. They were apparently double brooded. These are observations and not a formal study. No birds were banded or photographed; 19 June 1994, SE King County. T19N R11E section 33, el. 4550' [1387 m]. A singing male *gambelii* present. A female *gambelii* at times just a few feet away. Both of these adults had food in bill and were agitated. They were observed feeding mobile young. Habitat: a regenerating clearcut with 4 foot to 15 foot tall Noble Fir [*Abies procera*] and Pacific Silver Fir [*A. amabilis*] with openings; 3 July 1994, at the same site listed on 19 June 1994, a singing male *gambelii* present. A female was observed nearby ... on a nest ... a cup in a small clump of fireweed, huckleberries, and other herbaceous plants. Nest was about three feet from two Pacific Silver Firs that were about 6 feet tall. Eggs, 3, greenish with reddish brown blotches—heaviest at the large end. Nest is 8 feet from a small rivulet. Nest elevation: 4540 feet [1384 m]....; 7 July 1994, female on the nest noted above, 3 eggs. Male singing nearby.”

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He noted the presence of territorial *Z. l. pugetensis* nearby at the same time and subsequently observed nests of both subspecies at Stevens Pass, on the King/Chelan County border on several dates between 15 June and 16 July 1996. "June 15, 1996, 4 singing males, Stevens Pass Ski Area, 3 singing male *pugetensis* and 1 singing male *gambelii*..., a singing male *pugetensis* was just 150 feet east of the *gambelii*; June 29, 1996, Stevens Pass Ski Area, a male *gambelii* singing just downhill from where it [presumably] was seen on 15 June 1996..., bill is orangish, back pale gray w/ reddish stripes; July 3, 1996, Stevens Pass Ski Area, 1 male *gambelii* singing,... a male *pugetensis* well upslope from the *gambelii*; at another location on the ski slope was a pair; both birds were very agitated and were seen just a few feet from each other, the male was carrying food in bill; the male looked to be a typical *gambelii*; [compare] the female: breast and flanks with a brown wash, back tan with blackish-brown stripes; the back was grayish along the outside edge, bill dull yellowish [thus apparently *pugetensis*]; July 4, 1996, nest, Stevens Pass Ski Area; adults are typical *gambelii*, male singing typical *gambelii* song, female on the nest; 4 eggs in nest, 4400' [1341 m]...; nest on the ground in grass, forbs and low brush habitat, open area; July 16, 1996, nest, Stevens Pass Ski Area, y[oun]g in nest."

Hunn noted both subspecies singing on territories in close proximity to each other for several summers between 2006 and 2010 above and just below Government Meadows at Naches Pass in King County (at 1400–1525 m) and north of Windy Gap on the King–Kittitas County line (at ~1650 m). Identification was based solely on song. Hunn obtained digital audio recordings here of both subspecies on 12 June 2006 (Figures 4 and 5).

Since both subspecies favor open, brushy environments, territories have shifted somewhat as clearcuts have matured. Most recent reports are from an old burn and salvage-logged area at the crest just north of Windy Gap, ~4 km north of Naches Pass, at 1640 m (Figure 6). The most recent reports of apparent sympatry are of singing males of both forms at Buck Meadows, Kittitas County, 28 June 2012, by G. Shugart, who collected specimens (Slater Museum of Natural History, University of Puget Sound, Tacoma, Washington—PSM 25897 is *Z. l. pugetensis*, PSM 25763 is *Z. l. gambelii*). His notes are as follows (in litt., 2013): "Elevation was 4205-4210' [1282–1283 m] at Buck Meadows in nets next to South Fork Manastash Creek [47.0358° N, 120.9478° W]. I hadn't expected *pugetensis*, but there were at least two birds singing at once. Probably more. ... They were singing down along the creek in the flat [47.03668° N, 120.9505° W]. One *gambelii* was singing up on the hill side in rocky/scrub vegetation [47.0365° N, 120.9464° W], but it or another must have come down along the creek to the net. This was in last week of June 2012." D. Paulson (in litt., 2013) examined the specimens and concluded the following: "one specimen with *gambelii* song [is] typical *gambelii*, the other with *pugetensis* song [is] possibly intermediate.... This could well constitute evidence that they are interbreeding, at least at that place, which wouldn't be surprising if a *gambelii* of either sex found itself in a place surrounded by nothing but *pugetensis*."

In addition, there are reports of singing males of both forms north of Windy Gap (E. Houston, 5 July 2013), White Pass (G. McWethy, 13–14 July 2013), and near Rimrock Lake, Yakima County, 24 km east of White Pass,

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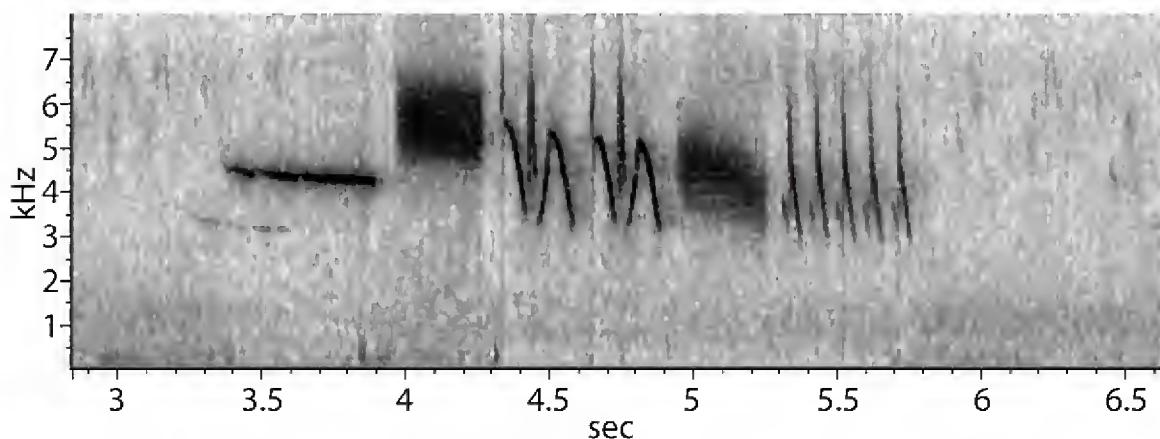


Figure 4. Song of *Zonotrichia leucophrys pugetensis*, 12 June 2006, Naches Pass trail head, 1400 m, King County, Washington.

Recording by Eugene Hunn

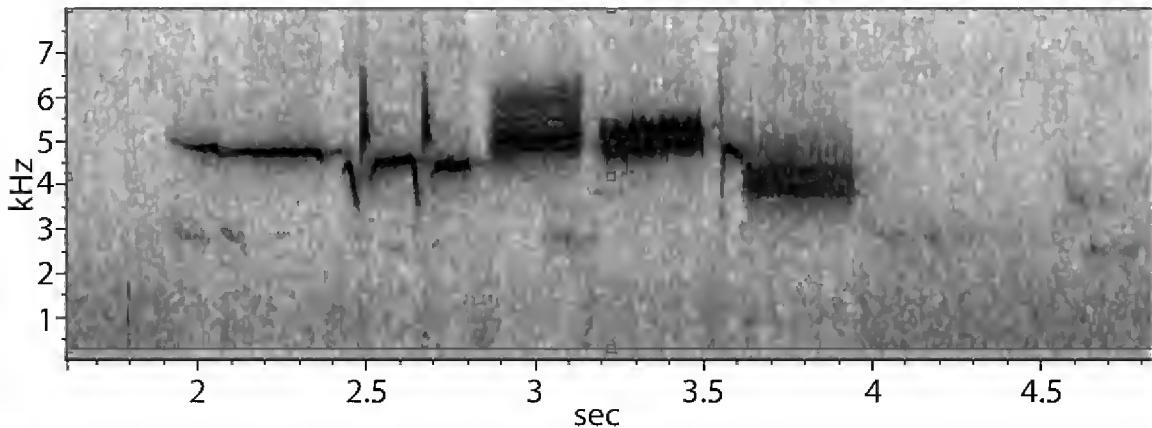


Figure 5. Song of *Zonotrichia leucophrys gambelii*, 12 June 2006, Naches Pass trail head, 1400 m, King County, Washington.

Recording by Eugene Hunn

at the unusually low elevation of ~800 m (W. Tweit, 6 July 2013; *gambelii* audio recorded). Away from Rimrock Lake, records of territorial *gambelii* are restricted to subalpine areas of the Cascades between 1300 and 2100 m. Wahl's (1995) report of *gambelii* from Newhalem, Whatcom County, at just 169 m elevation along the Skagit River ~40 km west of Hart's Pass, is likely an error, as Hunn recorded *pugetensis* there 21 June 1991, and a local observer, Hope Anderson (in litt., 2013), reported that *pugetensis* is common in summer at Newhalem, with no indication of *gambelii*. Subspecies *pugetensis* has not been documented on territory above ~1650 m, so the elevational zone of contact is limited.

## DISCUSSION

Because of habitat alteration, the range of *pugetensis* now extends through several Cascade Mountain passes to the lower eastern slopes of that range. That subspecies apparently is adapting physiologically to mid-elevations in the central Cascades of Washington (Addis et al. 2011), and, elsewhere, it has been recorded in southern southeast Alaska since 2000

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Figure 6. Habitat on the Cascade crest north of Windy Gap, site of frequent recent observations of both singing *Z. l. gambelii* and *Z. l. pugetensis*.

*Photo by Eugene Hunn*

(Gibson et al. 2013). Given the extensive clear-cut logging of coastal forests in British Columbia in recent years, this coastwise expansion of the range might have been anticipated.

The range of *Z. l. gambelii* now extends south along the Cascade crest to central Washington. Where the expanded breeding ranges of *pugetensis* and *gambelii* overlap, the two forms now nest in close proximity to each other with limited evidence of interbreeding, and they have done so for at least the past 20 years. This is in effect a “natural experiment” in which two long-isolated populations long considered to constitute a single species have now come in direct contact.

It is noteworthy that there is as yet no evidence of contact between *pugetensis* and *gambelii* on the Cascade crest north of Stevens Pass. Hunn noted singing *gambelii* but not *pugetensis* near Slate Peak north of Hart’s Pass 11 July 1986 and 7 August 1992. Observers for the Breeding Bird Atlas noted what were presumably *gambelii* there also (see Wahl 1995, Smith et. al. 1997). In southwestern British Columbia, *Z. l. pugetensis* breeds from sea level up the Fraser River as far as the Sumallo Valley southeast of Hope at ~600 m, while *Z. l. gambelii* breeds in subalpine meadows above 900 m on the drier, more open eastern slopes of the northernmost Cascades in Manning Provincial Park (D. Cannings, in litt., 2013). Perhaps nesting *pugetensis* is largely absent north of Stevens Pass in part because of the rugged, timbered subalpine terrain characteristic of the northern Cascade

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crest, an area that is for the most part protected from logging. The two forms thus remain isolated by unlogged forest in the northernmost Cascades.

The songs of *Z. l. nuttalli* and *Z. l. pugetensis*, in spite of their extensive dialect variation, have a distinctive structure, particularly in the opening phrases, which to our ears involve, for *pugetensis* at least, a melodic line beginning low, then high, followed by mid-level trills. The songs of *Z. l. leucophrys* and *Z. l. gambelii*, by contrast, share a melodic line beginning mid-level, followed by a lower trill, then high, and then descending notes (see Figures 4 and 5). Curiously, *Z. l. oriantha* sings both patterns: Rocky Mountain and Great Basin populations have songs reminiscent of *gambelii*, but those of Sierra Nevada populations more closely resemble the coastal pattern (Baptista and King 1980). On 26 July 2013, above 2600 m in the Ruby Mountains of northeastern Nevada, Hunn observed numerous examples of *oriantha* singing songs reminiscent of *gambelii*.

Distinguishing between these two White-crowned Sparrow subspecies groups on sight involves subtle but consistent characters. *Zonotrichia l. pugetensis* and *nuttalli* differ from *gambelii*, *oriantha*, and nominate *leucophrys* in at least four features: short versus long primary projection, reflecting shorter migrations or sedentariness; brown versus gray flanks, sides, and nape; black and tan versus chestnut and gray back striping; and white versus yellow bend of wing (Dunn et al. 1995). A combination of morphology, vocalizations, habitat preference, and pattern of migration clearly set these two forms of the White-crowned Sparrow apart.

How *Z. l. oriantha* fits within this complex remains uncertain. It breeds in the subalpine zone of “most mountain ranges throughout the e. part” of Oregon (Herlyn and Contreras 2009:253). It might come in contact with *pugetensis* in the Cascades of northern Oregon, as the latter has expanded its range into the mountains around Mt. Hood. Oregon observers report no evidence that *oriantha* breeds in the Cascades north of Willamette Pass, 190 km south of Mt. Hood, however (D. Irons in litt., 2013, contra Dunn and Alderfer 2011).

White-crowned Sparrow subspecies are suspected of having evolved in isolated refugia during the Pleistocene glacial advances (see Rand 1948). It seems reasonable to assume that the Pacific coastal forms were more completely isolated from the boreal/montane forms by a combination of continental and montane ice sheets than were the subspecies within each of the two groups.

A systematic study of the contact zone is needed to document the interactions of these two taxa along the crest of the Cascade Mountains more thoroughly. A wider sample of songs is desirable, as is photographic documentation of nesting pairs and, ideally, genetic comparisons of them. Our visual identification of subspecies was less than comprehensive, as we were not fully aware of the range of visible morphological contrasts during the period of our observations, relying primarily on gray versus brown coloration of flanks, sides, nape, and back. Also there are conspicuous gaps in coverage of potential contact sites, such as at Cascade Pass (1650 m), Rainy Pass (1500 m), and Washington Pass (1700 m) south of Hart’s Pass and north of Stevens Pass, locations that would appear to be suitable for nesting by both *pugetensis* and *gambelii*. We hope that our initial summary will inspire such additional research.

## SYMPATRY OF WHITE-CROWNED SPARROW SUBSPECIES

### ACKNOWLEDGMENTS

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# **RECENT TRENDS IN YELLOW-BILLED CUCKOO OCCURRENCES IN SOUTHERN CALIFORNIA, WITH OBSERVATIONS OF A FORAGING CUCKOO IN SAN DIEGO COUNTY**

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**ABSTRACT:** We observed a Yellow-billed Cuckoo (*Coccyzus americanus*) remaining in southern San Diego County from 20 to 28 July 2012. The bird made extensive use of upland habitats as well as the adjacent riparian area. Away from the two known breeding populations, the 82 Yellow-billed Cuckoo observations in southern California since 2000 peak from 15 June to 3 July. Observations made later in summer likely consisted of migrants perhaps in poor condition, lingering individuals prospecting for breeding habitat, or possibly scattered breeding pairs. Eight locations have had multiple occurrences since 2000, and these sites may support breeding birds. Though a relatively large number of cuckoos was detected in the region in 2011, no trend is apparent in numbers of detections since 2000. Annual variation in cuckoo numbers regressed on El Niño–Southern Oscillation climate data produced a strongly predictive model ( $r^2 = 0.54$ ,  $P = 0.004$ ). Given the Yellow-billed Cuckoo's urgent conservation needs in the western United States in general, and in California in particular, focused attention is needed, including systematic surveys to determine if there are additional breeding pairs in the region.

The Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) is listed as endangered by the California Department of Fish and Wildlife, and it has been proposed as a threatened species by the U.S. Fish and Wildlife Service (2013). The history of the cuckoo in southern California is one of a dramatic decline from a common breeder in riparian habitats in the late 1800s and early 1900s (Grinnell 1898, 1915, Jay 1911, Willett 1912, Hanna 1937, Grinnell and Miller 1944), to catastrophic crash and virtual elimination as a breeder from the 1930s to 1950s, to rare and irregular migrant and vagrant ever since. Jay (1911) found over 40 nests in coastal Los Angeles County in the early 1900s, as well as several pairs in about 40 acres of willows in Wilmington, but mentioned that "much of this has been cut away of late years." Hanna (1937) wrote of 24 nests found in the vicinity of Colton along the Santa Ana River in San Bernardino and Riverside counties, but declared that he had not seen any there since before 1932. Hamilton and Hamilton (1965) searched the Santa Ana River again from 1 to 11 June 1963 and could not find a cuckoo, although these dates are before the bulk of cuckoos arrive in southern California.

We report on an apparently territorial individual detected over an 8-day period in riparian habitat in southern California, and summarize and map the sightings of cuckoos in southern California since 2000.

## **METHODS**

In order to compile a table and map of sightings of Yellow-billed Cuckoos in the region, we searched several compendiums of information, including

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online sources such as [www.eBird.org](http://www.eBird.org) and regional list-serves. The majority of these list-serves were established in 1999 or 2000 (Table 1), so we used the summer of 2000 as a starting year to compare sightings across years. We also reviewed regional reports in *North American Birds* beginning in 2000 (vols. 54–66) and searched collected specimens by using the ORNIS search engine ([www.ornisnet.org](http://www.ornisnet.org)) and the San Diego Natural History Museum (SDNHM) collection. Reports by multiple observers of what was very likely the same bird at a given location and year were combined into one record to prevent double counting. Sightings that were reported as unsure or questionable were discarded. The region searched was southern California as defined in *North American Birds*.

We obtained data on El Niño–Southern Oscillation (ENSO) from the multivariate ENSO index (MEI) produced by the National Oceanic and Atmospheric Administration (Wolter 2013). We averaged monthly values from May to April to produce a 12-month average (Anders and Post 2006), then analyzed the results by linear regression in SYSTAT 12 (SYSTAT Software, Inc.).

## RESULTS

### 2012 San Diego County Yellow-billed Cuckoo Observation

On 20 July 2012, Clark saw and heard a Yellow-billed Cuckoo in riparian woodland along the Otay River below Otay Lakes Dam. The bird was observed for approximately 45 minutes as it foraged in willows (*Salix* spp.) in the riverbed and laurel sumac (*Malosma laurina*) on adjacent slopes. It gave the “kowlp” call, which is associated with a mated pair (Hughes 1999), but a second bird was not detected. This single cuckoo was seen again on 22 July by Clark and Procsal, who observed it for approximately one hour, during which time it spent at least 30 minutes in a eucalyptus grove on a nearby ridge. It called repeatedly (the “kowlp” call) as it foraged throughout the area. On 28 July, after broadcasting the Yellow-billed Cuckoo’s song, the three of us again found the bird but observed it for less than 5 minutes.

**Table 1** Sources of Recent Observations of the Yellow-billed Cuckoo in Southern California

Database or publication searched	Date range included
Internet list-serves	
SDBirds (now San Diego Region Birding)	2000–2012
LA Co birds	2000–2012
Inland County Birds	2000–2012
Orange County Birds	2000–2012
Santa Barbara County Birds	2000–2012
Kern County Birds	June 2001–2012
San Luis Obispo County Birds	2000–2012
www.eBird.org	2000–2012
<i>North American Birds</i>	2000–2012; vols. 54–66
<a href="http://www.ornisnet.org">www.ornisnet.org</a>	2000–2012
California Natural Diversity Database	All to 2012

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA



Figure 1. Yellow-billed Cuckoo along the Otay River, San Diego County, 20–28 July 2012 (here 28 July).

*Photo by Mark Dodero*

After 15 minutes it gave a short, repetitive “kek” call, like the first part of a “kowlp” series. It was viewed briefly in a tall willow before it flew far downriver. On two subsequent visits, 31 July and 4 August, the bird was not detected again, despite our broadcasting the song.

The Yellow-billed Cuckoo is thought to have been extirpated from San Diego County as a breeding species for many decades (Unitt 1984, 2004). There have been several recent sightings of possibly territorial birds along San Felipe Creek near Scissors Crossing in Anza-Borrego Desert State Park in the eastern portion of the county, as well as along the San Luis Rey River at Bonsall in northern San Diego County (see further discussion below). The appearance of our apparently territorial bird was therefore significant, especially on the coastal slope, though it is unclear whether it was paired or ever attempted to breed.

It was interesting to watch this cuckoo forage for long periods in nonriparian habitats. Hatch (1896) reported two cuckoos in laurel sumacs in Escondido, San Diego County. Whether this large broad-leaved shrub provides some attraction other than being a convenient perch in otherwise low scrub habitat is unknown. McNeill et al. (2012) reported that along the Colorado River peak nesting and peak cicada (*Magicicada sp.*) abundance coincide. Cicadas are frequently found in laurel sumacs in summer (Clark pers. obs.), and this may explain the attraction of this shrub. Approximately 11 km to the northwest of this Otay River site, a female (SDNHM 31381) collected at Bonita along the Sweetwater River on 3 July 1915 by A. Casaben and prepared by Laurence Huey is labeled as having the stomach contents as a

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA

"goldfinch, egg shells, and a large bug," presumably a cicada. Hamilton and Hamilton (1965: 426) mentioned small caterpillars taken from graythorn (*Condalia*) shrubs in upland habitats as a principal food item fed to nestlings. Cuckoos flew several hundred yards from the river bottom to forage in these shrubs. The Otay River cuckoo's extended use of a eucalyptus grove for calling and foraging was also a surprise. Beason (2012) reported cuckoos foraging away from riparian habitats in broad-leaved trees in residential areas. Corman and Wise-Gervais (2005) also mentioned the species found nesting in exotic shade trees in Arizona.

### Trends in Yellow-billed Cuckoo Observations in Southern California

A search of available public databases and published resources revealed 82 cuckoo sightings since June 2000 outside of the known breeding areas along the South Fork of the Kern River and along the lower Colorado River (Figure 2). Graphing the sightings by date reveals a peak in sightings between about 15 June and 3 July (Figure 3). Some of the sightings after this

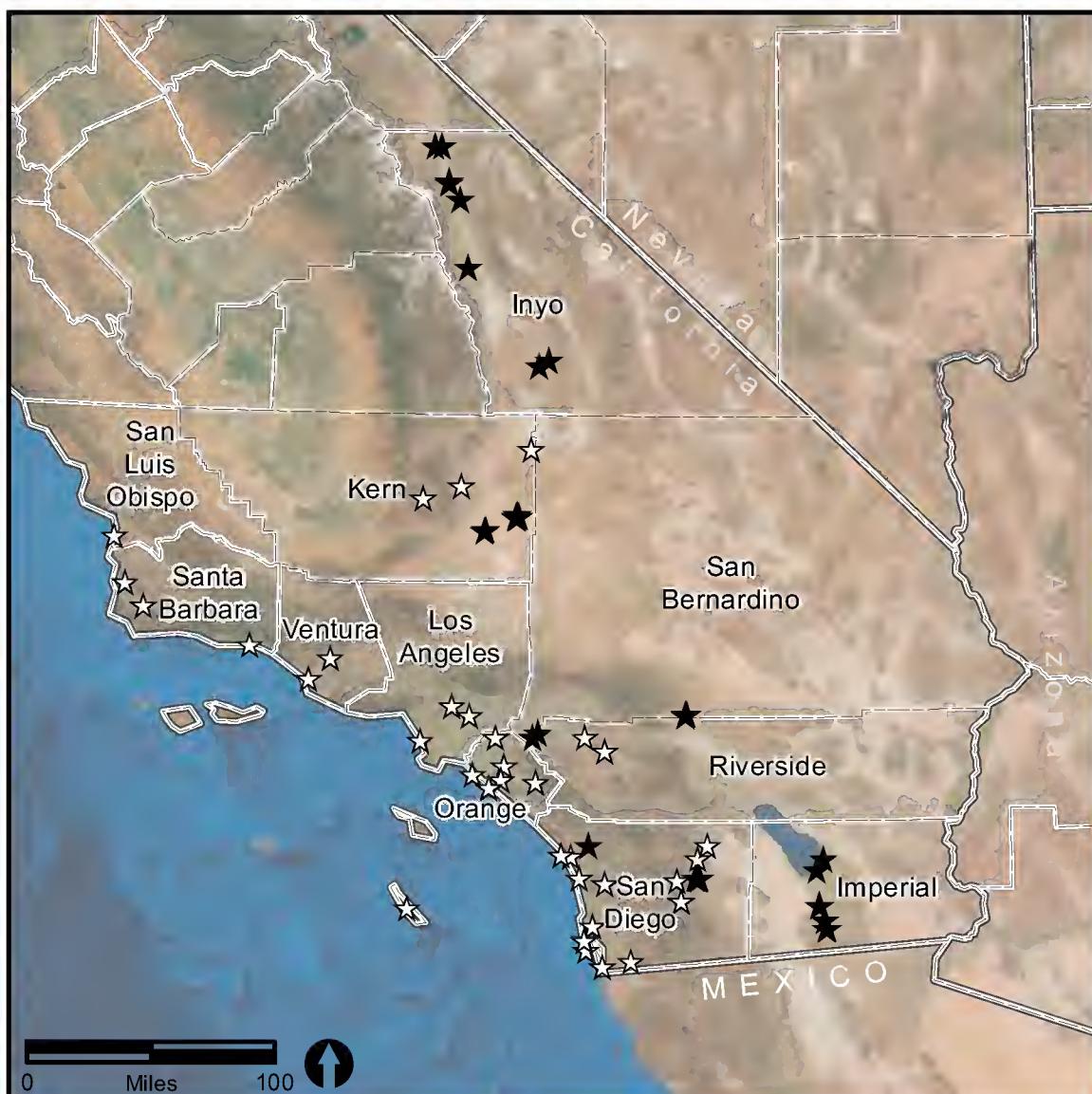


Figure 2. Yellow-billed Cuckoo observations in southern California, outside of known breeding areas, since 2000. Black stars represent sites or watercourses with multiple observations reported; white stars, single observations.

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA

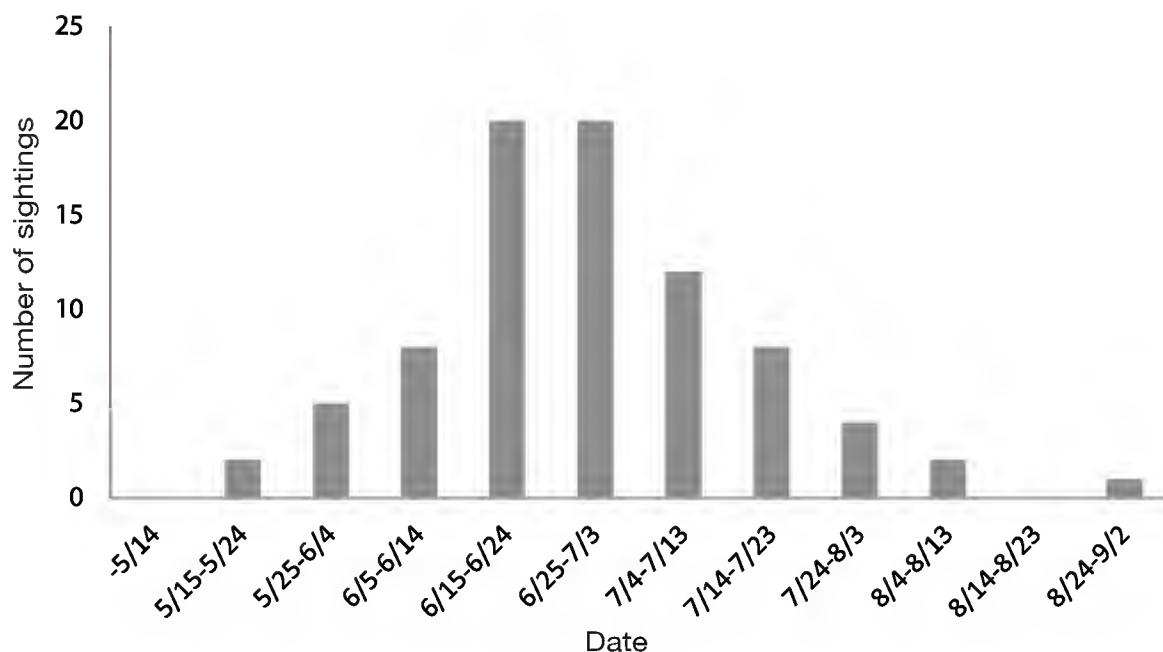


Figure 3. Number of Yellow-billed Cuckoo observations by date in southern California, outside of known breeding areas, since 2000. Sightings by date show a peak in late June and early July.

period may be of individuals in poor condition, as two of the four museum specimens collected were of emaciated individuals found in coastal suburban areas on 16 and 20 July (SDMH 53583 and Los Angeles County Museum of Natural History 112121, respectively). However, many of these sightings are from localities with suitable breeding habitat. Suitable breeding habitat in the western U.S. typically includes riparian habitats with mature cottonwood (*Populus* spp.) and willow trees (Hamilton and Hamilton 1963, Hanna 1937).

Graphing the sightings by year reveals no sustained trend over the 13-year period (Figure 4). Higher numbers in 2000, 2001, 2006, and 2011 were counteracted by lower numbers during the intervening periods. Whether this variation reflects actual population fluctuations in California's breeding populations is unclear.

Anders and Post (2006) found a relationship between ENSO ocean patterns, the North Atlantic Oscillation, local temperature measurements, and Yellow-billed Cuckoo densities in the eastern U.S. Their results indicate that both the North Atlantic Oscillation and ENSO have affected the cuckoo's population densities across much of its breeding range, most strongly in regions in which these climate systems have the strongest effects on local temperatures. Their analyses also implied that the strength of the effect of local temperatures on cuckoo populations predicted long-term population decline, with populations more negatively affected by warm temperatures experiencing steeper declines.

We performed a linear regression of the multivariate ENSO index (MEI) against the number of southern California cuckoo sightings by year and found an inverse relationship between cuckoo numbers and MEI. Years with sea-surface temperatures cooler than average (i.e., La Niña conditions, such as years 2000 and 2011 in Figure 5) correspond with a higher number of

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA

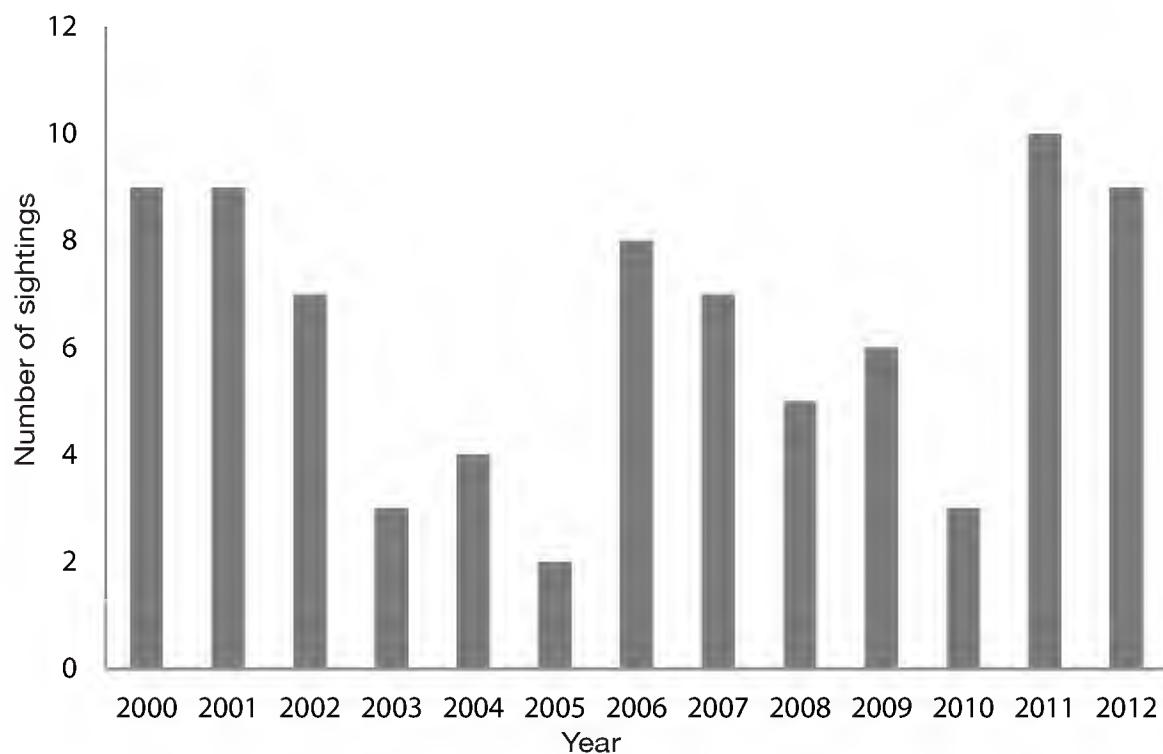


Figure 4. Yellow-billed Cuckoo sightings in southern California by year, 2000–2012. The number was greatest in 2011, but no clear trend is apparent.

cuckoo sightings, whereas El Niño years with warmer temperatures correspond with fewer sightings (e.g., 2003–2005, 2010). The resulting linear regression model was strongly predictive ( $r^2 = 0.541$ ,  $P = 0.004$ ; Figure 6). Fifty-four percent of the variation in cuckoo numbers is explained by MEI index data alone.

The mechanisms behind this relationship are not clear. Anders and Post (2006) found that fluctuations in caterpillar numbers at sites where the Yellow-billed Cuckoo breeds in the eastern U.S. covaried with local rainfall and temperature and were correlated with cuckoo productivity. They also speculated that the cuckoo's winter survivorship may be affected by ENSO

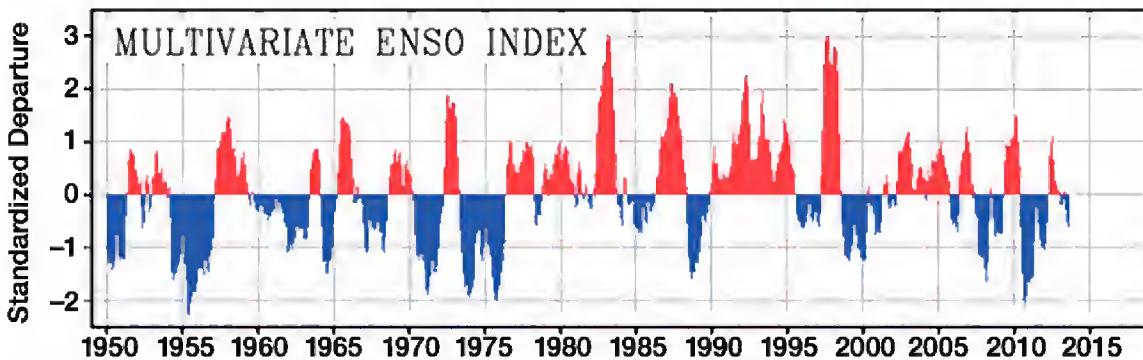


Figure 5. Variation in the multivariate ENSO index since 1950. Index values since 2000 tend to have an inverse relationship with Yellow-billed Cuckoo sightings in southern California. Years with sea-surface temperatures cooler than average (e.g., 2000, 2011) correspond with a higher number of cuckoo sightings, whereas years with warmer temperatures tend to correspond with a reduced number of sightings (e.g., 2003–2005, 2010).

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA

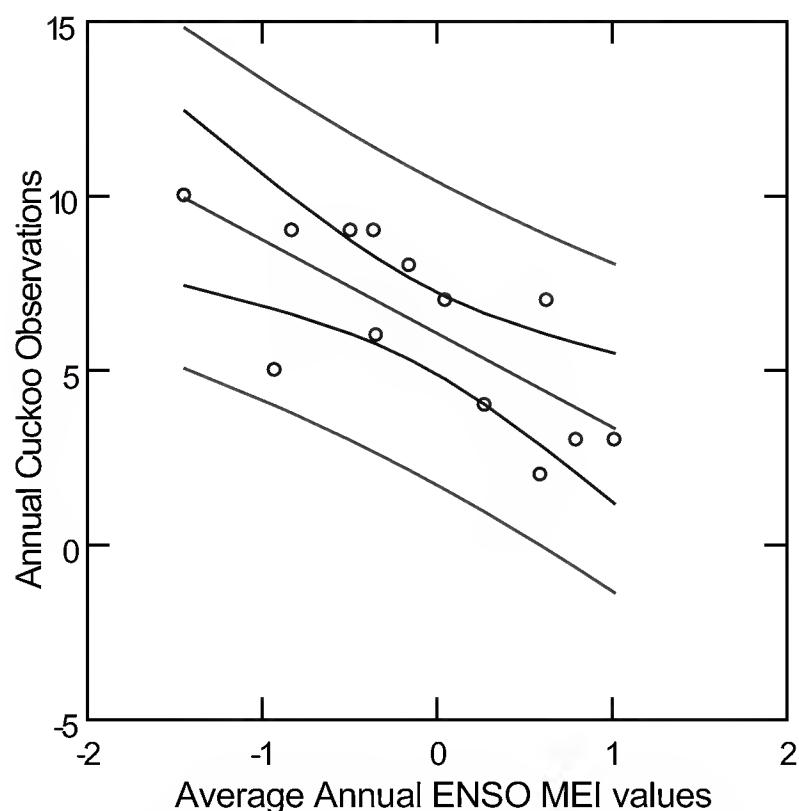


Figure 6. Linear regression of numbers of the Yellow-billed Cuckoo detected in southern California annually and average annual values of multivariate ENSO index. An inverse relationship is apparent, with cooler sea-surface temperatures corresponding with larger numbers of cuckoos seen in the region. Fifty-four percent of the variation in cuckoo numbers is explained by this index alone ( $P = 0.004$ ).

patterns and could contribute to resulting population fluctuations detected on the breeding grounds. El Niño tends to induce drought in central South America, potentially limiting food supplies in the region that Yellow-billed Cuckoos may inhabit for more than five months of the year (Holmgren et al. 2001, Sechrist et al. 2012). A third possibility is that climate-driven variations in food availability during migration influence the number of cuckoos reaching southern California.

Locations with repeated sightings over multiple years away from known breeding areas are listed in Table 2. Several of these locations have also supported birds remaining for extended periods in the breeding season. These locations should be surveyed by current established protocols to ascertain whether the birds are breeding.

The exceptional number of cuckoo sightings along the New River in Imperial County is surprising. Since 2000, cuckoos have been noted at least seven times along the river between El Centro and the Salton Sea—and this despite very few observers in the area during June, July, and August, coupled with very limited access due in part to private property. The habitat along the river is mostly dense salt cedar; mesquite, willows, and cottonwoods are scattered. The cuckoo's status in this area is unclear, needing focused surveys, though one location in Brawley hosted a bird on both 15 July and 13 August 2011 (*N. Am. Birds* 65:688), implying residency. The cuckoo's rapid occupancy and nesting within planted riparian habitat along the Colorado River (2 or 3

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA

**Table 2** Sites of Multiple Occurrences of the Yellow-billed Cuckoo in Southern California since 2000

Site	Selected Reports
Upper Owens River from Bishop to Tinemaha Reservoir, Inyo County	Pair detected near Big Pine 17–28 June 2007. Multiple sightings in Baker Creek southwest of Big Pine in 2007–2009. Two birds 17 July 2003 at Tinemaha Reservoir. Sightings in both tributaries and along main Owens River. Additional bird 27 July 2012 at Hogback Creek north of Lone Pine.
Amargosa Canyon and China Ranch, Inyo County	Two records: 4 July 2008 and 24 June 2012. Single bird reported 20 June 2000 from nearby China Ranch. Good habitat.
Galileo Hill Park/Silver Saddle Country Club, Kern County	Two or three individuals reported 17 June 2000, with one remaining through 30 July. Other reports 23 June 2001 and 12 June 2002. Most recent record is 24 June 2012. Site is cottonwood-lined park and golf course.
Central Park Lake, California City, Kern County	Two records: 17 June 2000 and 18 July 2012. Site is cottonwood-lined park and golf course.
Big Morongo Canyon Preserve, San Bernardino County	Four records: 13 June 2000, 14 June 2003, 14 June 2004, and 3 July 2011. Latest report was of a calling bird. Good habitat.
Prado Basin, Riverside/San Bernardino County	Two birds reported in June 2000. A second-hand report of bird seen 23 June 2011. Good habitat.
San Luis Rey River, Bonsall, San Diego County	One bird seen and heard 7 July 2011. Two birds seen and heard 14 July 2011, with photos. One bird seen and heard 11 July 2012, with photos. Good habitat.
San Felipe Creek, San Diego County	At least eleven separate sightings since 2000. 2–3 birds heard calling 4 July 2006. One bird detected 6–12 July 2001. One bird reported 24 June–13 July 2009. Good habitat.
New River, Imperial County	Seven separate sightings since 2000. Bird seen at river in Brawley on 8 July 2007, and on 15 July and 13 August 2011. Two other sightings in El Centro and two at south end of Salton Sea.

years after planting; Bommarito 2012) shows that riparian restoration can pay very quick dividends in the desert Southwest.

In Inyo County, a series of sightings has been reported along the upper Owens River in the vicinity of Bishop and Big Pine. This includes a pair observed in Big Pine 17–28 June 2007 and two birds reported from Tinemaha Reservoir on 17 July 2003 (*N. Am. Birds* 61:642, and 57:545, respectively). Baker Creek, 3 km west of Big Pine, had reports of two birds breeding in 2007 and 2008 (California Natural Diversity Database). The upper Owens River from Bishop in the north to Tinemaha Reservoir south of Big Pine encompasses a distance of about 40 km and appears to warrant further surveys. Gaines and Laymon (1984) reported breeding cuckoos at

## TRENDS IN THE YELLOW-BILLED CUCKOO IN SOUTHERN CALIFORNIA

scattered locations throughout this region during the late 1970s. By 1986, only one pair was found at Tecopa (Laymon and Halterman 1987), and by 1999, no cuckoos were found in the Owens Valley, at Tecopa, or along the Amargosa River (Halterman et al. 2001).

The site in southern California with the most sightings away from the two known areas of breeding is San Felipe Creek near Scissors Crossing in eastern San Diego County. Sightings here have spanned the years 2001 to 2011, and include a pair detected on 3 and 4 July 2007 and two or three birds calling on 4 July 2006. Intensive survey and spot-mapping of riparian birds in 2002 and 2003 revealed only one bird 11–12 July 2002 (P. D. Jorgensen), so the cuckoo's status and possible breeding at this site are still unclear.

A few single records were notable because of the late date on which the bird was reported, generally after the cuckoo's main arrival in the region, which may imply a bird lingering in breeding habitat. On 12 August 2006 one was reported from San Timoteo Creek, Redlands, San Bernardino County. On 14 July 2009, one was heard calling on the River Ridge Golf Course, Santa Clara River, Oxnard, Ventura County. On 25 July 2011, one was seen along the San Dieguito River above Lake Hodges in San Diego County. On 3 August 2006, one was heard along the San Luis Rey River near the Oceanside Airport in San Diego County.

Collectively, all of these sightings imply a complex status in southern California, with several sites potentially supporting breeding cuckoos. Despite their rather large size and loud calls, Yellow-billed Cuckoos are notoriously difficult to detect, frequently remaining silent and inhabiting dense vegetation. In western Colorado, recent focused surveys using broadcast calls resulted in an increase in the number of sites known to be occupied by cuckoos, including sites at elevations far higher than previously known (Beason 2012). Given the Yellow-billed Cuckoo's urgent conservation needs in the western United States in general, and in California in particular, focused attention is needed on sites away from the areas of previously known breeding. This includes systematic surveys at the above-mentioned sites in southern California to determine if there are breeding pairs at these locations.

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## NOTES

### NESTING OF THE PEREGRINE FALCON IN THE DESERT SOUTHWEST

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The Peregrine Falcon (*Falco peregrinus*) is found almost worldwide, but few have been documented nesting in southwestern Arizona or southeastern California. Here we report on Peregrine Falcon nests discovered at two locations, both suspected in 2012 and confirmed in 2013. One is the first documented Peregrine Falcon nest on the lower Colorado River south of Parker, Arizona, and a first record for Imperial County, California (Guy McCaskie, California Bird Records Committee, pers. comm.), and the other is the first recorded for Yuma County, Arizona, at Kofa National Wildlife Refuge (NWR). The eyrie along the Colorado River was more easily accessible than the Kofa eyrie, so we observed it at a much closer range, enabling recording of more detailed information, and we were able to visit it more frequently, two to six times per month from March through September.

The eyrie along the lower Colorado River was located within a recessed ledge facing north, near Picacho State Recreation Area, bordering Imperial NWR and ~35 km north of Yuma, Arizona. It was within the top third of a near-vertical cliff, 39 m above water level, at an elevation of ~101 m.

We observed the pair of falcons beginning courtship in mid-March 2013 and confirmed successful nesting on 9 June, when three nestlings were first observed at the eyrie ledge. On the basis of plumage development as described by White et al. (2002) and the behavior of the adults throughout our observations, we estimate egg laying from 6 to 10 April and hatching on 12 or 13 May. Fledging occurred ~18 June 2013, when the young were 5 weeks old.

We continued weekly observations for approximately 6 weeks after fledging. The fledglings remained near the nest cliff, and we observed them on every visit until they reached independence at ~80 days of age. We saw only one young and one adult on our visits on 1 and 4 August. Deliveries of prey to the young were observed through 1 August. We observed only the two adults on subsequent visits on 2 and 9 September, 6 October, and 14 December.

Although this is the most southerly Peregrine Falcon nest recorded on the Colorado River, published references to suspected nesting in the area date back several decades. Rosenberg et al. (1991) reported that Peregrine Falcons nested near Parker Dam at least until 1954 and "probably" also at Imperial NWR in 1942. Monson (1944) saw Peregrines in small numbers along the lower Colorado River from Yuma north ~72 km in almost every month of the year, though he stated that evidence for breeding was lacking. Phillips et al. (1964) mentioned the Peregrine Falcon along the lower Colorado as a wintering species only. Comrack and Logsdon (2008) reported the species as rare in arid southeastern California with no nesting records south of Parker,

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Figure 1. Two Peregrine Falcon fledglings on cliff below eyrie, Imperial County, California, 16 July 2013.

*Photo by Brenda J. Zaun*

Arizona. No Peregrine Falcon nest or breeding behavior was detected in southwestern Arizona along the lower Colorado or in Kofa NWR during the 8-year survey period for the Arizona Breeding Bird Atlas, 1993–2000 (Burger 2005).

The Kofa eyrie was on a north-facing nearly vertical cliff face in the Castle Dome Mountains, ~60 km northeast of Yuma, at an elevation of ~662 m. We visited the site three times from 9 May to 26 June 2013 and observed from a nearby ridge. On 9 May we observed two adult Peregrine Falcons. One landed in a hole in the cliff and assumed what appeared to be an incubating position. On 7 June we observed one nestling in the eyrie when an adult landed at the nest ledge with prey. From its plumage development, we estimated the nestling was approximately 15 days old. We returned on 26 June and observed the nestling in the eyrie and two adults nearby.

Burger (2005) reported that few Peregrine Falcons nest in mountain ranges of the Sonoran and Mojave deserts away from large bodies of water. The Kofa eyrie in the Castle Dome Mountains, however, was 44 km from the nearest such feature, Martinez Lake on the lower Colorado River. The Castle Dome Mountains receive ~13.8 mm of annual rainfall, based on the past 16 years' precipitation measured at three weather stations in surrounding valleys (Gabriel Langbauer, U.S. Army Yuma Proving Ground, pers. comm.). Sonoran Desert vegetation is typical for this arid region. Bond (1946) and Enderson and Craig (1979) considered availability of a site for bathing and proximity to a perennial water source a requisite for Peregrine nesting. There are ~20 water catchments developed for wildlife and some ephemeral natural tinajas and springs within an estimated foraging distance of 11 km from the Kofa eyrie (Enderson and Kirven 1983, White et al. 2002). Arnold (1942) documented a pair of falcons hunting White-throated Swifts (*Aeronautes saxatalis*) near a water catchment in the Castle Dome Mountains, and trail cameras placed by staff at Kofa NWR photographed Peregrine Falcons at modified water sources. We think these sites are beneficial to falcons for drinking and foraging and perhaps enable them to breed

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in areas that would otherwise be too arid. The successful nestings reported here in areas not previously documented suggest continued recovery of this once-endangered species, particularly in the arid Southwest.

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## BOOK REVIEWS

**The Sibley Guide to Birds** (2<sup>nd</sup> ed.), by David Allen Sibley. 2014. Alfred A. Knopf. 624 pages, nearly 7000 paintings, more than 700 maps. Flexibound, \$40.00. ISBN 978-0-307-95790-0.

When David Sibley first released his concept of a bird guide into the wild at the turn of the century, Jon Dunn and colleagues had already demonstrated how a formidable team of experts working under the auspices of a first-rate organization, the National Geographic Society, could outshine even the legendary suite of talents of a Roger Tory Peterson. Featuring the work of numerous talented artists and including all of the rarities that drive so many birders to go birding in the first place, the National Geographic guide seemed invincible. The upstart *Sibley Guide to Birds* represented one inspired person's singular vision of what a field guide should look like and the topics it should cover, and, shockingly, it just said "no" to all those fancy strays from abroad. The layout, with its family/group accounts, flight silhouettes, in-flight depictions of each species, and extensive depictions of seasonal and geographic variation, as well as hybrids, was unlike any other North American guide. The artwork was distinctive and instantly recognizable, incorporating Sibley's refined eye for structure and detail only where it needed to be. As everyone now knows, there was more than enough room for both approaches. In the 14 years that have passed, Sibley has kept himself busy putting out two regional bird guides, books on birding basics and bird behavior, a birding app (now being updated to the new standard), and even a well-received guide to the trees of North America, all while maintaining a useful and eclectic web site ([www.sibleyguides.com](http://www.sibleyguides.com)). Oh, and completing a painstaking makeover and expansion of his magnum opus.

The second edition's cover, emblazoned with a lip-smacking Magnolia Warbler in place of the familiar Red-tailed Hawk, announces that this is more than an incremental update, including "600 new paintings and 111 rare species added, new information on habitat and behavior, and more tips on finding species in the field." This new cover-bird, a classic "eastern" species, actually harkens back to the Point Reyes Bird Observatory, where noted ornithologist Fred Sibley mist-netted a male Magnolia Warbler and revealed it to his precocious son, seven-year-old David, before releasing the brilliant gem back into the woods. Intimate touches like this help maintain the "personal quest" aspect of Sibley's work even as his name continues to evolve into a powerful and diversified corporate brand.

In a nod to the team concept, Sibley collaborated on the look of the second edition with Charles Nix of the nature-oriented design firm of Scott & Nix. The columnar organization remains, but it has been opened up and softened by removing the bar of text across the tops of the accounts, increasing the size of the images, removing the boxes from around the range maps, eliminating most of the pointers, reducing the fonts, breaking up solid blocks of text and allowing the birds to form looser flocks. At last, the pages breathe. The birds, 15–20% larger and printed on brighter white paper, pop. In virtually every respect, the new guide's design aesthetic surpasses the original. The range maps, Achilles' heel of the first edition, have been upgraded to Paul Lehman's industry-standard depictions. No longer must the distribution of every species be shown in relation to the entire continent. In all respects—clarity, level of detail, and degree of accuracy—these maps are truly impressive. I take issue only with the portrayal of the Canada Goose as a winter visitor in coastal southern California; eBird data demonstrate residency south to at least Orange County.

Sibley's dedication to teaching comes through more clearly than ever in this edition. By my count, the number of educational sidebars has increased from 56 to 69, and they now cover such topics as "Snowy Egret vs. Little Blue Heron" and "Taxonomic Outliers," the latter reviewing how modern DNA studies have resolved some vexing

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questions of classification. The revised and expanded discussions of populations, habitat preferences, species associations, and other topics add depth to the treatment of many species, providing additional identification clues without crossing the line into something closer to a natural history text. Supplemental paintings now show the alcids as we most often see them, skittering directly away from the boat. To meet his stated goal of including every species likely to be seen free-flying in the coverage area, Sibley has carefully depicted dozens of exotic species that confuse so many birders. And, of course, this edition follows the latest taxonomic order (I am hoping that time spent with this book will help me resolve the disorienting effects of recent decisions made by our ornithological overlords). The closer you look, the more new and helpful details you will find. If you don't learn something new perusing this book for even just a few minutes you're probably not paying close enough attention.

As touched upon previously, Sibley's first edition diverged from orthodoxy in excluding dozens of species encountered rarely in its coverage area. Reasonable as this was, it made National Geographic the default guide of choice for boundary-pushers and day-dreamers. The second edition brings Sibley's bird-universe much closer to that of its main rival. Another 80 pages do add a bit of bulk to the new book, but the difference is incremental and will not be problematic for anyone already comfortable enough with the large format of the first edition. And, honestly, I can't remember the last time I saw a birder leafing through a field guide every time he or she encountered an unfamiliar bird. These books tend to stay in the car or at home, where size and weight are much less important than depth of treatment. From the Great-winged Petrel to Eurasian Kestrel to Piratic Flycatcher to Stonechat to Black-vented Oriole, the new Sibley gives western birders a treasure-trove of far-fetched potentialities to mull over and set our hearts upon during those long car trips and boat rides, and a solid place to start the identification process when lightning eventually strikes. The decisions about which vagrants to add were made by Sibley, who favored taxa found widely across North America over those with records limited to, say, the Aleutian Islands (sorry, Steller's Sea-Eagle!). He also leaned toward adding species that might easily be mistaken for something common, as with the Gray Heron and Mangrove Swallow. I would have liked to have seen the Nazca Booby at least mentioned in the Masked Booby account, although with zero accepted records it's not exactly an oversight. In some borderline cases, the choices reflect Sibley's intuition about the species likely to be encountered in the future as they do the number of records in the past. For example, the European Turtle-Dove, with two accepted records, made the cut, whereas the Ruddy Quail-Dove, which has been recorded about six times, did not.

A complaint frequently expressed in users' reviews at amazon.com, and elsewhere online, is that the new fonts are too small and fine to be legible, especially for older readers. My 49-year-old eyes had absolutely no trouble handling the brief snippets of text interspersed throughout the species accounts. To the contrary, I truly appreciate how the unobtrusive, sans-serif font complements the artwork and opens up the layout. Only with regard to the introductory essays do I side with the sniping squinters. I could not get through them in one or even two sittings, not because of poor writing but because the absurdly tiny font caused my eyes to glaze over. Some of the longer sidebars caused minor ocular distress, although not enough to make me put the book down. With font-fixes said to be in the works for future printings, I hope the designers can refrain from throwing out the baby with the bathwater.

The book does contain some typos and other minor errors unrelated to the printing process itself: three misspellings inside the front cover ("gves," "nuber," and "comparatively"); comma used in place of period in the key to the range map for winter; hybrid geese mislabeled at the bottom of page 4; "Tri-colored" on page 113; the Purple Gallinule placed in the wrong genus on page 144; the Black-tailed and Heermann's Gulls mislabeled on page 197; the Calliope Hummingbird retained in the defunct genus *Stellula* (only in the species account); male and female Green-breasted Mangos

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mislabeled; Thick-billed Kingbird measurements incorrect; the Eastern Phoebe listed under a genus “*Phoebe*” instead of *Sayornis* on page 341; breeding female and non-breeding male Magnolia Warblers mislabeled on pages 485, xxiv, and on the inside of the front cover; and the breeding male Scarlet Tanager mislabeled as nonbreeding. In the index, the two *Agelaius* blackbirds should be grouped together under the genus name; an extraneous listing of *Catharus* is inserted into the list of species in that genus; the three *Melozone* towhees are broken into two listings; likewise the three *Molothrus* cowbirds; and the listing of the Orange-billed Nightingale-Thrush violates format. The depiction of the “Coastal California” Cactus Wren also counts as an error. As in the first edition, this wren is shown as lacking a conglomeration of spots on the chest and also lacking buff below. These marks set Cactus Wren populations of the central and southern Baja California Peninsula apart from all others, including the subspecies *sandiegensis*.

Rest assured, the one questionable Cactus Wren rendering is an outlier. To my eye, there is no group of birds that Sibley has not mastered in terms of postures, patterns, and overall gestalt. Nearly all of the artwork has been improved by the opening up of the layout, the substantially increased image sizes, and, yes, the darkening of most of the images. No part of the guide has improved more than the seabird section, which has swelled by more than a dozen species, all expertly rendered. The gulls, terns, and jaegers that seemed puny, pinched, and hemmed in by the original layout now flow harmoniously across the pages. And, of course, Sibley shows the widest range of geographic, seasonal, and age/sex related variation, as well as many hybrids and aberrant plumages. I could go on and on about the new edition’s many strengths, innovations, and major improvements, but this review must address the shaky reproduction of color on some of the plates.

My initial impression, like that of many others, was that large swaths of the book are just too darned dark. Responding on 31 January 2014 to an early review by Brooke MacDonald at [naturetravelnetwork.com](http://naturetravelnetwork.com), Sibley stated, “There is a fairly dramatic contrast between the colors of the first and second editions. I would describe the new printing as rich, deep colors and excellent detail, on bright white paper, and the first edition actually looks washed-out in comparison. It’s possible that some will find the new colors too dark, or it may just take some getting-used-to after using the first edition for years.”

After reading this explanation I resolved to banish prejudice from my mind and to spend more time with the book before forming an opinion. My one critical piece of advice to readers is to study these plates in good light. Not necessarily bright light, but good light. Suddenly, muted colors of the *Empidonax* flycatchers begin to assert themselves. The suggestion of feathering emerges on the upperparts of the waterthrushes. The adult dipper morphs from an inkblot into a charming little dark gray bird with a brown head! In keeping with the Sibley philosophy, the new plates mimic the way we see birds in the field: Great looks in good light yield subtle details, but under less ideal conditions the process of identification requires developing a solid understanding of shapes and patterns, as well as sounds, habitat preferences, and distribution. In all these respects, the new incarnation of the Sibley Guide is without peer.

That said, the initial printing is not without color problems. Here are the plates that bother me enough to mention: Reds/oranges too dark on some images of the Laughing, Heermann’s, and Black-tailed Gulls, Common and Royal Terns, Cliff Swallow, Spotted Towhee, Chipping Sparrow, Scarlet Tanager, Crimson-collared Grosbeak, Rose-breasted Grosbeak, European Goldfinch, and Orange Bishop; images of the Red-tailed Hawk and California Towhee too dark across the board; older Thayer’s Gulls shown as consistently paler than same-aged Iceland Gulls; leg colors washed out on adult Thayer’s, Slaty-backed, and Great Black-backed Gulls; base of mandible too dark on the Dusky Flycatcher; throat and chest too dark and crown not brown enough on the Ash-throated Flycatcher (also on page 341); pink tones lacking on

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the Scissor-tailed Flycatcher; colors too dull on some Arctic, Yellow-browed, Olive, Prothonotary, Blackburnian, and Wilson's Warblers and the Yellow-breasted Chat, too bright on the Pacific subspecies of the Orange-crowned Warbler; and dark streaks missing from the Golden-cheeked Warbler's undertail coverts. I detected these issues not only in my copy but also in four others.

Finally, in two instances the relative scale among species is distorted enough to warrant a second look by the design team. Most critically, the perched Sharp-shinned Hawks are about half the size of the adjacent Cooper's Hawks. Perhaps the layout should be changed to convey an accurate impression of the relative sizes of these oft-confused accipiters. Also, the Java Sparrow appears at a comically small scale, as if disappearing into a white void; measurements suggest it should be the largest of the four exotic species on page 581.

Even with the handful of cosmetic miscues, and even fewer substantive ones, taken into account, this thoughtful and ambitious upgrade elevates *The Sibley Guide* to the unparalleled gold standard, with platinum clearly an achievable goal. Fixable shortfalls identified in this and other reviews should be useful to the author and his design team as they regroup for the next printing. Before purchasing a book from the first printing, I recommend that birders examine a copy and see whether they regard the tiny fonts and funky colors as deal-breakers.

Robert A. Hamilton

**Birds of the Grand Canyon Region: An Annotated Checklist** (3<sup>rd</sup> ed.), by Brian P. Gatlin. 2013. Grand Canyon Association, Grand Canyon, AZ. 104 pages, eight full-page black-and-white photographs. Paperback, \$19.95. ISBN 978-1-934656-40-2.

World-famous for its spectacular scenery and rich geologic history, the Grand Canyon is not generally regarded as a birding destination. Nonetheless, the Grand Canyon region has produced some remarkable bird records, most notably of a White Wagtail, as well as the only Arizona records of the Common Redpoll and White-winged Crossbill. With the reintroduction of the California Condor in 1996 and the more recent advent of sharing sightings through [www.eBird.org](http://www.eBird.org), birding in the Grand Canyon is becoming more popular among birders beyond the few dedicated observers who regularly report from the region. The most dedicated among these is Brian Gatlin, who arrived at the Grand Canyon in 2002 and has studied the status and distribution of birds in the area intensively ever since. Now, Gatlin has produced this update to the second edition of the *Annotated Checklist* (1984), long awaited by birders and ornithologists interested in the Grand Canyon region.

The basic format remains unchanged from the second edition. This book is larger than a field guide but slim, better suited for a backpack, the car, or use as a desk reference. Introductory materials are followed by a brief overview of habitats and, the meat of the book, the species accounts.

The preface provides a detailed and interesting overview of research in the region since 1984. Unfortunately, the rich ornithological history of the region prior to 1984 included in the second edition is not reproduced here. Some major changes in status and distribution, or our understanding thereof, are described, such as the reintroduction of the California Condor and the discovery of the Burrowing Owl in the region. A few species have also been removed from the list for various reasons, including past misidentifications, lack of self-sustaining breeding populations, and lack of adequate documentation for extremely unlikely occurrences.

The introduction provides a very brief overview of the Grand Canyon region itself, including a detailed description of the area covered, a feature lacking in all too many

## BOOK REVIEWS

guides to status and distribution. The wide area of coverage includes the Colorado River between Page and Lake Mead, the Coconino Plateau south of the river to the Valle and Peach Springs areas, the Kaibab Plateau north of the river, and much of the Arizona Strip. Most information, however, centers on the main river corridor and the rims, where most research and birder activity are focused. Briefly described are the possible effects on birds of anthropogenic changes since 1984, including the introduction of the tamarisk leaf beetle and fire management. Also nestled in the introduction is a two-page map of the region, one of the finest features of this edition. This map includes an outline of the checklist region and many geographic features, as well as towns, roads, and boundaries of public lands. Two features not found on this map that would have been useful are the Mohave/Coconino county line and river miles. The latter are used frequently to describe locations and distributional limits on the Colorado River.

Chapter 1 includes two pages of habitat descriptions, background information useful to the species accounts. This chapter is brief but adequate, and also references prior published works with more detailed information about the region's diverse habitats. This is followed by a useful introduction to the species accounts, including details on criteria for inclusion of noteworthy records, definitions of abundance and seasons, and a key to the bar graphs. The species accounts themselves cover 360 species documented in the region, plus two supplemental accounts of birds that are not on the Arizona state list, the Greater Sage-Grouse and Pileated Woodpecker. Each account includes a brief paragraph with pertinent information on status and distribution, habitat, seasonality, and more as appropriate for the species. The corresponding bar graph is located on the same page, saving the user the trouble of flipping to another section of the book to see specific information on seasonality and abundance. The checklist concludes with an excellent bibliography covering more than five pages of references and an unusually arranged index of the birds sorted only by common name.

The brief species accounts are impressively specific as to habitats and seasonality; for example, the American Wigeon is described as being abundant between Glen Canyon Dam and Soap Creek from November through March, and rare elsewhere in March–April and September–October (p. 27). Dates of migration outside of breeding areas are also given for some species. Descriptions of changes in status and distribution since the last checklist are also interesting. In general, subspecies are neglected. For example, the subspecies group of the White Wagtail is not mentioned (p. 72), nor are then-subspecies of the Sage Sparrow (p. 80). There are several exceptions, as subspecies of Northern Flicker, Yellow-rumped Warbler, Fox Sparrow and Dark-eyed Junco are discussed. The coverage of the junco even includes separate accounts and bar charts for subspecies groups (p. 82).

The bar charts contain a wealth of information, available at a glance under the species' description. It is very useful to have specific dates of occurrence and arrival/departure dates listed on the bar charts, although I could find no reference as to whether arrival and departure dates represented typical or record dates. Unfortunately, the bar charts are represented in shades of gray, which I find difficult to distinguish. Bars of varying width would have been preferable.

The inclusion of notable records was clearly considered with caution, and the removal from the main list of two species not on the Arizona state list, the Greater Sage-Grouse and Pileated Woodpecker, was a wise choice. This checklist does not follow the Arizona Bird Committee strictly, however. Many reports of the Black Rosy-Finch are listed, for example, but the Arizona Bird Committee has accepted no records from the region. The first accepted Arizona record of the Bay-breasted Warbler is from 1972, but there is a report here from 1971. Other apparently unsubmitted recent reports of species the committee reviews include the Golden-winged and Magnolia warblers and Baltimore Oriole. Still, the care with which Gatlin compiled bird records is commendable. Some species accounts address gaps in current knowledge, such as

## BOOK REVIEWS

the winter status of the Ferruginous Hawk (p. 39). Of course, status and distribution are continually changing. The Neotropic Cormorant is rapidly becoming more regular in the region, as Gatlin predicts. These changes are acknowledged in the introduction, where the author requests reports to be e-mailed directly to him (although these reports should also be submitted to the Arizona Bird Committee).

Although there are a few small problems such as the difficult grayscale of the bar charts and the simplistic index, most features of this book are very useful and well done. Ideal for everything from short visits to long-term reference, this new edition will be handy for anyone interested in the avifauna of northern Arizona or southern Utah, and indispensable for anyone interested in the Grand Canyon itself.

*Lauren B. Harter*



California Condor

*Sketch by Narca Moore-Craig*

## FEATURED PHOTO

### THE MANGROVE YELLOW WARBLER REACHES CALIFORNIA

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The Yellow Warbler (*Setophaga petechia*) comprises three groups of subspecies distributed across the Americas, from Alaska and northern Canada south through the West Indies and the mainland of Middle America to the northern coast of South America and the Galapagos Islands. The groups differ primarily in the head pattern of adult males (Lowther et al. 1999). The Northern Yellow Warbler (*S. p. aestiva* group) comprises the predominantly migratory subspecies with a green and/or yellow crown that breed across much of the United States, Canada, and northern and central Mexico; the Golden Yellow Warbler (*S. p. petechia* group) comprises the largely resident subspecies, most with a chestnut crown, found in south Florida, the Caribbean, and the coast of northeastern South America; and the Mangrove Yellow Warbler (*S. p. erithachoroides* group) comprises the largely resident subspecies, most with a fully chestnut head, found in coastal mangroves from extreme southern Texas and central Baja California south as far as the coast of northwestern South America, with an isolated population on the Galapagos Islands that resembles the Golden Yellow Warbler in the extent of red on the head (Lowther et al. 1999). Although currently considered one species (AOU 1998), each of the three subspecies groups has been considered a full species by some authors (Hellmayr 1935).

While counting birds on 18 December 2007 for the Salton Sea (South) Christmas Bird Count, Johnson located a formative-plumaged (first year) male Yellow Warbler (*sensu lato*) at the mouth of the Alamo River, Imperial County, California (33.2066° N, 115.6152° W; *N. Am. Birds* 62:304; Figure 1), whose head was more extensively red than expected of a Northern Yellow Warbler, the subspecies group occurring regularly in California. The bird was feeding in a stand of saltcedar (*Tamarix ramosissima*) near the shore of the Salton Sea and was seen only by Johnson and the two other observers present at the time, Daryl Coldren and Ayla Reith. Johnson was able to obtain four photos of the bird through binoculars before it moved away and was not seen again.

Following this record, Billings located a definitive-plumaged (adult) male Mangrove Yellow Warbler in a small stand of *Eucalyptus* sp. and *Myoporum laetum* between a housing complex and a busy freeway near the mouth of the San Diego River, San Diego County, California (32.7574° N, 117.2175° W), 13 January 2009. It remained through 27 March 2009 (*N. Am. Birds* 63:325 and 358; back cover of this issue) and was seen by many observers. These two individuals represent the first records of the Mangrove Yellow Warbler for California and the second and third records for the United States west of Texas, following a record of an adult male at Roosevelt Lake, Gila County, Arizona, 31 July 2004 (Rosenberg et al. 2007, Banfield and Newell 2009).

Although definitive-plumaged male Mangrove Yellow Warblers with an entirely chestnut head are readily identified, other age classes are more challenging to distinguish from the Northern Yellow Warbler. A review of specimens of Yellow Warblers at the Museum of Vertebrate Zoology (P. Pyle in litt.) and the Western Foundation of Vertebrate Zoology (O. Johnson) found that formative-plumaged male Mangrove Yellow Warblers show a mostly green or grayish head and body with a smattering of chestnut feathers on the crown and sides of the head, while first-spring males are

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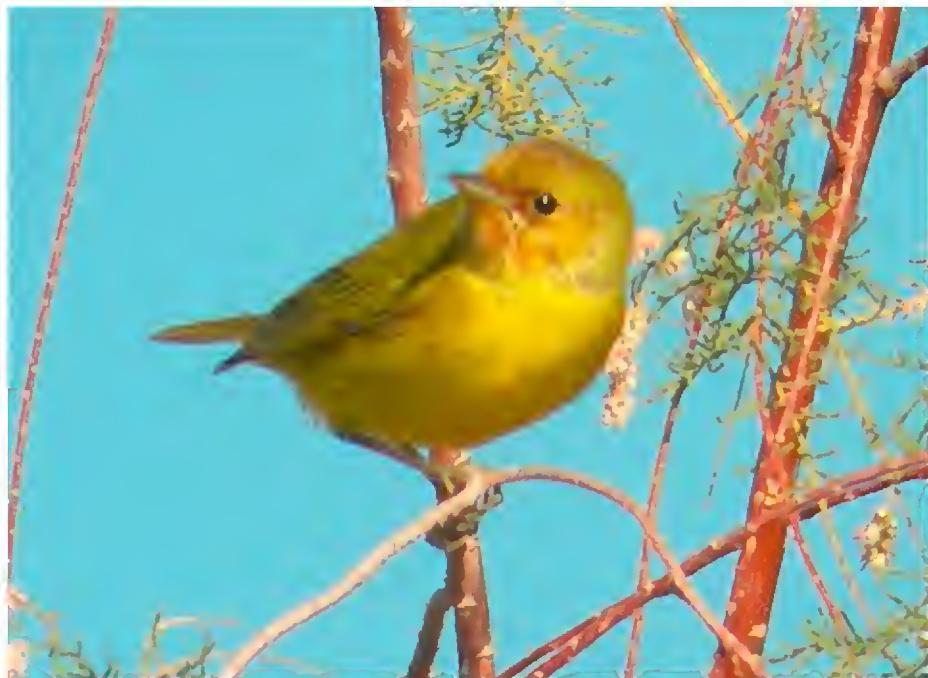


Figure 1. Mangrove Yellow Warbler at the mouth of the Alamo River, Imperial County, California, 18 December 2007. The presence of a molt limit (two generations of feathers, some juvenile feathers retained) in the greater coverts indicates formative plumage, and the smattering of red feathers on the crown, throat, lores, eye ring, and portions of the auriculars indicates a male.

*Photo by Oscar Johnson*

extremely variable in the extent of chestnut on the head. Some first-spring males have only a few chestnut feathers on the head, while others show a largely chestnut head with just a few green feathers interspersed, approaching the full chestnut head of the male's definitive plumage. Thus any male Yellow Warbler (*sensu lato*) with at least a few red feathers on the sides of the head indicates the Mangrove Yellow Warbler, as was the case with the bird at the Salton Sea. Note that a very rare Northern Yellow Warbler can show a red cap approaching that of the Golden Yellow Warbler, but never the extensive red head of the Mangrove Yellow Warbler (J. Dunn pers. comm.). See Curson et al. (1994) and Dunn and Garrett (1997) for a detailed review of the identification of the Mangrove Yellow Warbler, including of female and immature plumages. Additionally, all subspecies of the Mangrove and Golden Yellow Warblers show a primary projection shorter and tarsi thicker than in the subspecies of the Northern Yellow Warbler.

While all subspecies of the Mangrove and Golden Yellow Warblers are considered resident, the northernmost populations of the Mangrove Yellow Warbler make limited movements southward in the winter. The subspecies of the Mangrove Yellow Warbler that occur nearest California are *S. p. castaneiceps* of Baja California Sur from San Ignacio south to the cape district and *S. p. rhizophorae* of mainland Mexico from southern Sonora to Sinaloa (Lowther et al. 1999). Rosenberg et al. (2007) suggested on the basis of geographic proximity that the Arizona record may refer to the mainland Mexican subspecies *S. p. rhizophorae*. Russell and Monson (1998) stated from extensive banding in the mangroves near Punta Chueca, Sonora, that the Mangrove Yellow Warbler is only a summer visitant, arriving in early April and departing in late September. They cited only a handful of winter records from coastal Sonora. Also, the six records of (presumably) *S. p. castaneiceps* well away from mangroves in the northern reaches of Baja California Sur (R. A. Erickson pers. comm.) are evidence for this subspecies straying north of its known breeding range. These six records are

## FEATURED PHOTO

from October to March, as were the two California records outlined here. The only record of the Mangrove Yellow Warbler from the state of Baja California comes from Bahia de Los Ángeles (190 km north of the normal breeding range), where three birds, including two singing males, were found on 1 June 2008 (*N. Am. Birds* 62:622). However, using mark–recapture methods, Schweizer and Whitmore (2013) found no evidence of seasonal movement of adults of *S. p. castaneiceps* in Baja California Sur, perhaps suggesting Sonora as the source for the California records. The definitive-plumaged males of the two subspecies differ only slightly, with *S. p. castaneiceps* having a slightly less extensive chestnut hood, being somewhat more greenish below, and having a paler throat, longer tail, and narrower streaking below than *S. p. rhizophorae* (Browning 1994, Curson 2010). The San Diego individual showed very fine streaking below and a chestnut hood with a slightly paler throat, possibly suggesting *S. p. castaneiceps*, although either subspecies could reach California. Without specimen vouchers, subspecific identification of the birds we have reported may not be possible.

We thank Peter Pyle for his review of specimens and invaluable comments on the manuscript, the Museum of Vertebrate Zoology (Carla Cicero) and the Western Foundation of Vertebrate Zoology (René Corado) for access to their collections, Vic Murayama for use of his photo, and Richard Erickson for extralimital records of the Mangrove Warbler in the Baja California peninsula. Gary Rosenberg and Jon L. Dunn provided helpful reviews of the manuscript.

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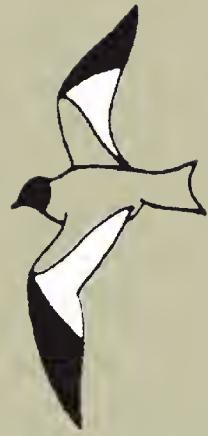
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Photo by © Brenda J. Zaun, U. S. Fish and Wildlife Service, Yuma, Arizona:  
Two fledglings of the Peregrine Falcon (*Falco peregrinus*) on cliff below eyrie, Imperial  
County, California, 16 July 2013. The recovery of the Peregrine Falcon has allowed it  
not only to reoccupy its former range but to extend that range, as attested by two  
successful nests in southeastern California and southwestern Arizona, described in this  
issue by Brenda J. Zaun, Joseph R. Barnett, Christa D. Weise, and Linden A. Piest.



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# *Western Specialty:* Pelagic Cormorant

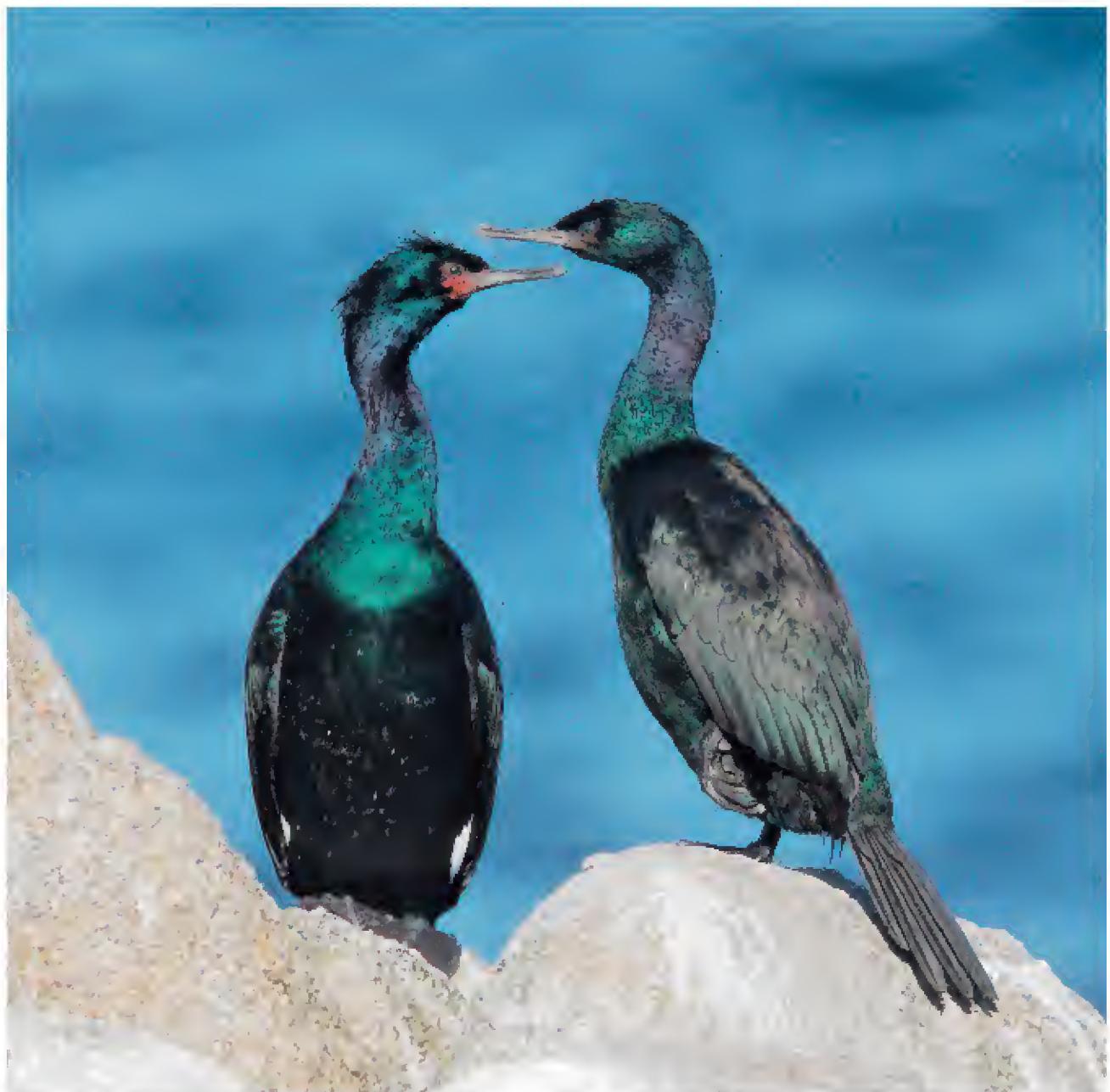


Photo by © Tom Grey of Stanford, California:  
Pelagic Cormorants (*Phalacrocorax pelagicus*)

Pacific Grove, Monterey County, California, 11 January 2009. The Pelagic Cormorant maintains fidelity to a precise nest site year after year, even though the nest itself is washed away in winter storms and even when rock surrounding the site has sloughed off. See in this issue Reuse of Nest Sites by Pelagic Cormorants in North-Central California by Ellen S. Martnsen and Joseph J. Schall.

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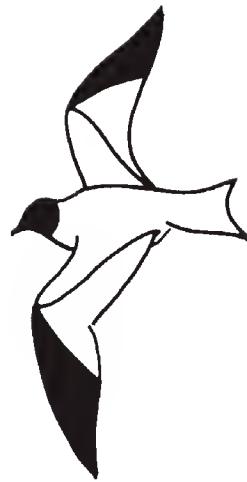
Front cover photo by © Ed MacKerrow, Mountain Horizon Photographs, of Santa Fe, New Mexico: Boreal Owl (*Aegolius funereus*), near Apache Creek, New Mexico, 29 July 2012. The bird retains chocolate-colored juvenal feathers on the throat and upper breast but is undergoing molt and shows basic plumage elsewhere. First photograph of a juvenile Boreal Owl published from New Mexico, where the species persists at the southern tip of its range in subalpine forests of the San Juan, Jemez, and Sangre de Cristo mountains.

Back cover: "Featured Photo" by © S. E. McAllister of Eureka, California: Amelanistic Marbled Murrelet (*Brachyramphus marmoratus*), Glacier Bay, Alaska, 5 July 2009.

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

# WESTERN BIRDS



Volume 45, Number 3, 2014

## PERSISTENCE OF THE BOREAL OWL IN NEW MEXICO: 1987–2012

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**ABSTRACT:** To better understand the status of the Boreal Owl (*Aegolius funereus*) at the southern extremity of its North American range, we conducted audio playback surveys between late July and mid-October 2012 at seven of the nine northern New Mexico locations where the species had been documented between 1987 and 1993, as well as four additional locations 10–15 km from sites of previous detections. All survey locations were in subalpine conifer forest at elevations >3000 m above sea level. In total, we called in at least 12 individuals (6 adults and 6 juveniles) at or near six of the seven historical locations and at least three adults at two new locations. Of the eight locations with confirmed Boreal Owl detections, two were in the San Juan Mountains, two were in the Jemez Mountains, and four were in the Sangre de Cristo Mountains. Recently fledged owls were seen at both San Juan Mountain sites and photo-documented at one site. Adult owls were photo-documented at the other six locations. Detection of Boreal Owls at six of seven historical locations confirmed the species' long-term residency in New Mexico's three northern mountain ranges. While Boreal Owls have likely been present in New Mexico since the Pleistocene, climate change appears likely to threaten their high-elevation habitat, particularly since more frequent and larger fires are predicted in the future as the forest dries.

### INTRODUCTION

Twenty-five years after the Boreal Owl (*Aegolius funereus*) was first photo-documented in New Mexico on 15 April 1987 (Stahlecker and Rawinski 1990), its status in the state remains an enigma. This is not surprising given that there has been no systematic effort to survey the owl's distribution since

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1993 (Stahlecker and Duncan 1996). The species has been reported only occasionally since 1993 (Stahlecker 2010), except in one small area near the Colorado border where birders seek it out by broadcasting recordings. Lack of information on its status over the intervening two decades led the New Mexico Department of Game and Fish (NMDGF) to pursue efforts to remedy this data vacuum and better analyze the species' status in New Mexico. In autumns of 2009 and 2010, NMDGF biologists surveyed for it by playback at four locations (three historical) and heard *Aegolius* calls within two of the historical locations (NMDGF 2012). Since the Northern Saw-whet Owl (*A. acadicus*) is sympatric with the Boreal in northern New Mexico and these observers were inexperienced in distinguishing the vocalizations of the two species, persistence of the Boreal was not confirmed. To augment and expand these survey efforts, in the summer and autumn 2012 we resurveyed seven of the nine historical locations where the Boreal Owl was originally documented between 1987 and 1993 (Stahlecker and Duncan 1996, Stahlecker 2010). This paper summarizes the results of these efforts.

### METHODS

Our primary objective was to revisit and resurvey seven of the nine locations where Boreal Owls were detected by Stahlecker and Duncan (1996). A full description of criteria for location selection, localities, and occupancy by Boreal Owls is provided in Stahlecker and Duncan (1996) and will not be revisited here. Of the nine historical sites, we did not revisit lower-elevation locations D and I (Figure 1) in 2012 as they were not likely to be breeding locales (Stahlecker and Duncan 1996). Neither did we visit locations G (Emslie 1981) and K (Howard 1931), sites of archaeological and paleontological records, respectively. In addition to revisiting historical locations for Boreal Owls, we surveyed four new locations, though only the two where we encountered Boreal Owls are plotted in Figure 1. The presence of subalpine conifer forest (Brown et al. 1979), dominated by Engelmann spruce (*Picea engelmanni*) and subalpine fir (*Abies lasiocarpa*), was the most important factor in choosing these new survey locations, as the species shows a strong link to spruce and fir throughout its range (Hayward and Hayward 1993). We also purposely chose new survey locations that were at least 5 km distant from historical locations, to provide reasonable certainty that we were outside the home range of owls occupying historical locations.

During late summer/autumn of 2012, we surveyed for Boreal Owls by using the technique described by Palmer and Rawinski (1986), which involves playback of the species' primary "staccato" song (Bondrup-Nielson 1984) for ~5-min intervals from stations spaced 200–800 m apart. To confirm locations of breeding in New Mexico, we chose to survey during the post-fledging period (July–September) with the intent of encountering identifiable juveniles (Stahlecker 1997). Equally important, the timing of the surveys allowed vehicular access to locations that are covered in snow and impassible in late winter/spring. In the nonbreeding season (July to December), Boreal Owls do not respond to playback with their primary "staccato" song given in the breeding season (Palmer and Rawinski 1987, Macaulay Library 2006), nor did they in New Mexico in 2012. Instead, adult Boreal Owls sometimes

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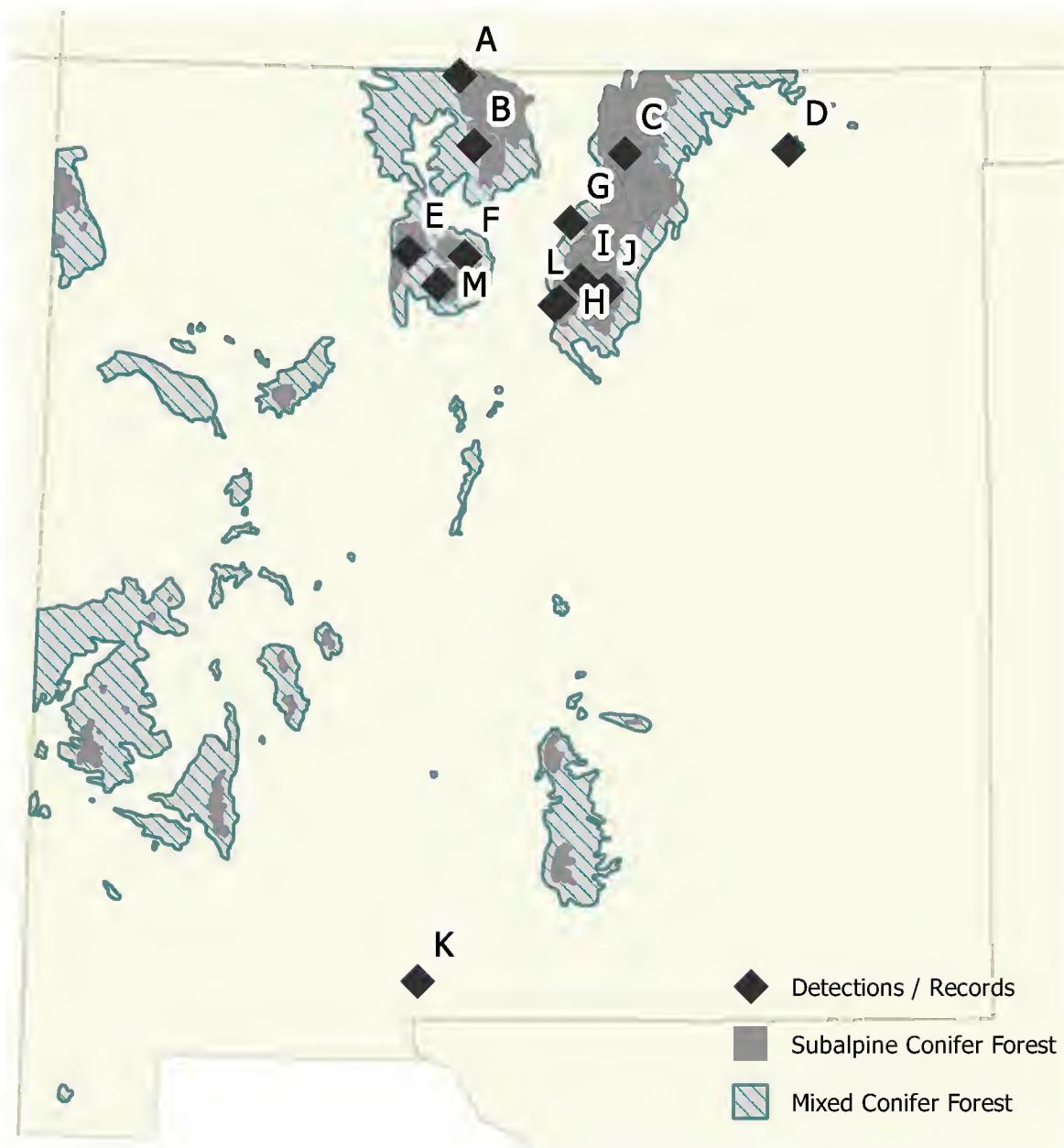


Figure 1. Locations of 2012 detections (see Table 1 for codes) and historical records (Stahlecker and Duncan 1996) of the Boreal Owl in New Mexico. Stahlecker and Duncan (1996) had found the species at nine locations. In 2012, Boreal Owls were relocated at six of these and at two additional locations.

flew in silently (Stahlecker 1997) or responded with “skiew” or “moo-a” calls (Bondrup-Nielson 1984, Hayward and Hayward 1993, Macaulay Library 2006). When Boreal Owls were heard but not seen, we tried playback of both song and calls to entice the owls to remain in close proximity and come into view to facilitate photo-documentation. We conducted a single survey in each area except locations C and H. We completed most surveys during the five nights preceding and including the full moon because moonlight allowed observers to better see silent owls in flight (Palmer and Rawinski 1986). However, we found that surveys at several historical locations were equally successful during nights with little or no moonlight.

## RESULTS

We conducted surveys on 18 nights between 28 July and 20 October 2012. In 26.4 hours on 11 nights, we called in at least 12 Boreal Owls (6 adults and 6 juveniles) at or near six historical locations, for a response rate of 0.45 owl/survey-hour. We also searched an additional 34.6 hours on seven nights at four new locations and encountered at least three adult owls at two locations where the species was previously undocumented, for a response rate of 0.09 owl/survey-hour. The combined response rate for 61 hours of surveys was 0.25 owl/survey-hour. Thus we were five times more likely to detect an owl when surveying historical locations (0.45 owl/survey-hour) than when surveying new locations (0.09 owl/survey-hour). Furthermore, in 2012 the response rate at historical locations was ~2.5 times greater than the response rate (0.17 owl/survey-hour) during the original “discovery” surveys from 1987 to 1993 (Stahlecker and Duncan 1996). We attribute higher encounter rates at historical locations to our ability to go directly to these sites rather than have to search new areas, either 25 years ago or in 2012.

Because this study was primarily a resurvey effort, the locations we found owls in 2012 were generally consistent with those from 1987 to 1993, as reported by Stahlecker and Duncan (1996). In 2012, Boreal Owls were again confirmed in the northern and southern portions of the San Juan Mountains (Figure 1, Table 1: locations A and B), the northern and southern portions of the Sangre de Cristo Mountains (locations C, H, and I), and the northeast Jemez Mountains (location F). A single survey in the northwest Jemez Mountains (location E) was unsuccessful. We obtained photographs at all sites where owls were detected except location B. A second survey was needed to call in and photograph an adult owl at location C, and a third visit was necessary to photo-document an owl near location H, though we considered it highly probable that previous vocal responses were of Boreal Owls.

In addition to reconfirming Boreal Owls at six of the seven historical locations, we documented them at two locations distinct enough to be considered new for the species (Figure 1, Table 1). One new location (L) was 4.5 km from location H in the Sangre de Cristo Mountains but in a different drainage. The second location (M) was the first for Sandoval County and was 21 km southwest of location F, in the largest stand of spruce–fir (770 ha) forest within the Valles Caldera National Preserve (Muldavin et al. 2006), and 12 km south of more extensive spruce–fir habitat in the northern Jemez Mountains. The presence of two adults at location M on 28 September 2012 suggests an occupied territory on this isolated mountain (Figure 2).

We saw three juvenile owls (hatched in 2012) on 28 and 29 July at both San Juan Mountain locations, photo-documenting them at location A. The juveniles approached us while giving the “chirp” call that is a shortened staccato song generally given by nestlings and fledglings in response to the adult male’s “food” call (Bondrup-Nielsen 1984). In addition, we initially heard three juvenile owls at location B “chirping” at a distance of 800 m. These birds did not approach upon playback: they instead stayed high in the trees but offered enough glimpses to be identified as juveniles. All juveniles observed were undergoing prebasic molt but retained the “chocolate” breast characteristic of juvenal plumage. While juvenile owls have been seen

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**Table 1** Results of Surveys for the Boreal Owl (*Aegolius funereus*) in New Mexico, 2012

Location		Coordinates <sup>a</sup>					
Code	Name	Mountain range	Latitude (N)	Longitude (W)	Elevation (m)	Date	No. of owls seen/heard
Historical							
A <sup>b</sup>	Apache Creek	San Juan	36° 58'	106° 26'	3300	29 July 4 Aug	3 juveniles seen/heard 1 adult seen/heard,
B	Canjilon Mountain	San Juan	36° 36'	106° 20'	3100	8 Aug	1 unknown age heard 1 adult seen/heard <sup>c</sup>
C <sup>b</sup>	Wheeler Peak	Sangre de Cristo	36° 34'	105° 21'	3200	30 Jul	3 juveniles heard (1 seen) <sup>d</sup>
E	San Pedro Parks	Jemez	36° 07'	106° 45'	3300	27 Sep	1 adult seen/heard
F	Chicoma Mountain	Jemez	36° 01'	106° 23'	3000	4 Oct	No owls seen or heard
H	Lake Peak	Sangre de Cristo	35° 47'	105° 46'	3300	30 Jul	2–3 adults seen
I	Jack's Creek		35° 54'	105° 38'	3650	1 Aug	1 unknown age heard
New					3650	26 Sep	1 unknown age heard
L	Tesuque Creek	Sangre de Cristo	35° 46'	105° 48'	3650	9 Oct	1 adult seen
M	Redondo Peak	Jemez	35° 52'	106° 33'	3300	4 Aug	2 adults seen/heard

<sup>a</sup>Rounded to the nearest minute.<sup>b</sup>New Mexico Department of Game and Fish personnel, led by Walker, also recorded *Aegolius* here in 2009 or 2010.<sup>c</sup>Data provided by C. Adams, N. Hetrick, M. O'Donnell on 4 Aug, and J. Kitting, K. McCormick, W. Talbot, and C. Wolf on 8 Aug. Adult photo-documented.<sup>d</sup>Only detection in 2012 that was not photo-documented.

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Figure 2. Adult Boreal Owl, Redondo Peak, Jemez Mountains, New Mexico, 29 September 2012. This photo documents the first record of the species in Sandoval County.

*Photo by Ed MacKerrow, Mountain Horizon Photographs*

previously at locations A and I (Stahlecker and Duncan 1996, Stahlecker 1997), the photo on this issue's front cover is the first published of a juvenile Boreal Owl in New Mexico.

### DISCUSSION

The Boreal Owl was added as “threatened” to New Mexico’s list of threatened and endangered species in 1990 because the limited data available at that time suggested a small, sparse, and vulnerable population (NMDGF 2012). However, we believe that the Boreal Owl might not be so much rare in New Mexico as it is difficult to encounter incidentally. In this study, we had little difficulty in refinding this species at historical locations

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by broadcasting its song, even though this was the first systematic survey for the Boreal Owl in New Mexico in two decades. To find Boreal Owls at six of the same locations 20–25 years later suggests that there have been Boreal Owls resident at each site throughout the intervening years. However, such persistence data alone do not clarify the species' population status and distribution in New Mexico. We recommend long-term systematic surveys, as well as reproductive studies, across the species' range in New Mexico. Genetic studies showed little variation within the patchily distributed Rocky Mountain subpopulations of the Boreal Owl or between them and the broadly distributed contiguous subpopulations of the boreal forest of northern North America (Koopman et al. 2007); otherwise, population-level monitoring for North America is limited and unpublished. We publish our results in part to stimulate discussion, review, and study of the status and distribution of the Boreal Owl in North America.

The need for such work is particularly relevant as evidence mounts that climate change, at least in the U.S. Southwest, could erode the ranges of alpine and subalpine species such as the Boreal Owl significantly. Williams et al. (2012) combined data on tree-ring growth, climate records, and computer-model projections of future climate trends and predicted that warmer summer temperatures and lower winter precipitation in the 21st century will result in greater evaporation rates and so drying out of the region's forests. Consequently, these forests will become more susceptible to diseases, infestations such as outbreaks of bark beetles (family Scolytidae), and catastrophic wildfires. Already, we are seeing some evidence of such effects on Boreal Owl habitat in New Mexico. From 2011 to 2013, two wildfires in the Jemez Mountains totaling  $>700 \text{ km}^2$  decreased the extent of spruce–fir forest around the southern and eastern portions of the Valles Caldera National Preserve by 34 km<sup>2</sup>. In the same three years, three fires in the southern Sangre de Cristo Mountains burned through 54 km<sup>2</sup> of spruce–fir habitat. In 2013, one of these fires burned through the Boreal Owl's historical location at Jack's Creek. More large fires could decimate Boreal Owl habitat in the three New Mexico mountain ranges the species is known to inhabit.

There is some evidence that climatic and ecological changes are affecting the Boreal Owl already. The species' use of nest boxes in Scandinavia has been declining in the last few decades, but Hipkiss et al. (2013) found that in Sweden the owls were likely not avoiding old nest boxes. They concluded that the decline in Boreal Owl populations was real and more explainable by concurrent documented declines in prey populations. Field work for Colorado's second breeding bird atlas from 2007 to 2012 recorded slightly fewer priority (23) and non-priority (24) blocks with Boreal Owls (L. Wickershamb in litt.) than did the 1987–95 effort (27 priority and 26 non-priority blocks; Ryder 1998), though this dataset, like ours, is largely distributional rather than numerical.

Meanwhile, a more imminent threat to New Mexico's Boreal Owl habitat is rapidly approaching from the north. Large outbreaks of spruce bark beetles (*Dendroctonus rufipennis*) have been documented in Colorado for over a century (Schmid and Frye 1977), but they have accelerated in

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the dry years of the early part of the 21<sup>st</sup> century. From 2010 to 2014 the Rio Grande National Forest of southern Colorado lost 90% of its mature spruce trees, or approximately 200,000 of 240,000 ha (R. Ghormley in litt; Figure 3a). Three fires ignited by lightning in June 2013 intensified as they burned through dead spruce forests; nearly 45,000 ha burned. In August 2014, 25–50% of the spruce trees in the spruce–fir forest at Cumbres Pass on the Colorado/New Mexico border near Apache Creek were dead or dying (Figure 3b). Thus the historical sites for the Boreal Owl in the Rio Grande National Forest and elsewhere in Colorado should be revisited to determine whether the species is still present, and the same will be true of the New Mexico sites if the devastation of mature spruce forests extends into northern New Mexico.

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Figure 3. (a) Nearly complete mortality of mature Engelmann spruce at Wolf Creek Pass, Colorado, 50 km from New Mexico, June 2014. (b) Approximately 50% mortality in a stand of spruce at Cumbres Pass, Colorado, 5 km from New Mexico, August 2014.

*Photos by Dale Stahlecker (a) and Mark Blakemore (b)*

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# **FIRST SUCCESSFUL NESTING OF SWAINSON'S HAWK IN SANTA CLARA COUNTY, CALIFORNIA, SINCE THE 1800s**

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**ABSTRACT:** We documented successful nesting of a pair of Swainson's Hawks (*Buteo swainsoni*) over two consecutive years (2013 and 2014) in Coyote Valley, California, which represents the species' first nesting in Santa Clara County since 1894 and a range expansion of approximately 60 km from the Central Valley into the species' historic range. It confirms that there is habitat in Santa Clara County for breeding Swainson's Hawks, which has implications for conservation. Expansion of this species' breeding, in recent years, has been documented in other counties within the central and northern Coast Ranges of California, including San Benito, Napa, and Sonoma, suggesting that efforts toward Swainson's Hawk conservation in California have allowed this species to recolonize some of its historical breeding range, or that Swainson's Hawk may be adapting to new areas of natural or human-modified habitats.

The historic range of Swainson's Hawk (*Buteo swainsoni*) in California spanned the Coast Ranges north to Sonoma County, most of southern California, and much of the eastern side of the Sierra Nevada (Anderson et al. 2007). In 1983, Swainson's Hawk was listed as a threatened species under the California Endangered Species Act, following a 1979 statewide assessment by Bloom (1980), who estimated 350 breeding pairs throughout the state, a 90% reduction from historic densities, and confirmed extirpation from most of the former range. The listing was justified by the dramatic decline in the population and the loss of breeding habitat. In California currently, Swainson's Hawk has a restricted breeding range, fragmented into three genetically distinct populations: Central Valley, Modoc Plateau, and Inyo (Hull et al. 2008). An inventory of California Swainson's Hawks conducted by the California Department of Fish and Game (now Fish and Wildlife) and the University of California, Davis, in 2005 and 2006 yielded an estimated 2081 breeding pairs (averaged over the two years; 94% in the Central Valley, Anderson et al. 2007), corresponding to a 600% increase in 27 years.

Oological collections confirm that the Swainson's Hawk bred sporadically in Santa Clara County in the late nineteenth century (Bousman 2007a). On 30 April 1889, Henry R. Taylor, an egg collector, collected two eggs (Western Foundation of Vertebrate Zoology 98178) from a nest in "Ferguson's Swamp," which Bousman (2007a) presumed to be a swampy area located along Llagas Creek and adjacent to ranch land south of Gilroy in southern

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Santa Clara County. The other collected egg set (Museum of Vertebrate Zoology 5227), dated 21 April 1894, was from a nest located near the Berryessa district or North Valley in San Jose, which is between Coyote Creek and the foothills of the Diablo Range.

More recently, however, Swainson's Hawk has occurred in Santa Clara County only as a rare transient, with no nesting records since 1894 (Bousman 2007a). There have been two summer records, of an immature on 27 July 2002 and an adult on 9 June 1994 (Bousman 2007a), with the exception of three enigmatic records of nestlings. A nestling with full natal down was found at the Summitpointe Golf Course in the hills of eastern Milpitas on 11 June 1999 and was taken to a rehabilitator. A second nestling, of near fledging age, was found in a pool house in Saratoga on 1 July 2005, and a third nestling was discovered north of Tully Road in San Jose on 17 July 2005 (Rogers et al. 2005, Bousman 2007a). As a result of the unusual and unaccountable circumstances of the recovery of these three nestlings in unsuitable breeding habitat, Bousman (2007a) did not consider them conclusive evidence of Swainson's Hawks nesting in Santa Clara County.

### STUDY AREA AND METHODS

Coyote Valley, in the greater Santa Clara Valley, is located within the central Coast Range in California between south San Jose and Morgan Hill and covers an area of ~33 km<sup>2</sup> (Phillips et al. 2012). Coyote Valley is the largest contiguous and primarily undeveloped tract of the valley floor remaining in Santa Clara County. It comprises a mosaic of habitat types, including agricultural fields (mostly alfalfa fields), oak savanna, riparian, urban, and the largest freshwater wetland (Laguna Seca) and watershed (Coyote Creek) in the county.

Aided with 8–10 × 40–50 binoculars and spotting scopes with varying magnifications, in 2013 we observed the nest from a distance of 70 m over 14 days from 14 May to 8 August 2013 for a total of 80 hours, all observers pooled. To minimize disturbance we used a thick low coast live oak (*Quercus agrifolia*) as a blind; it concealed the observers when the birds flew overhead. In 2014, the nest was first checked on 9 April and was observed on 7 days through June.

### RESULTS

During April and May 2013, unprecedented numbers of migrant Swainson's Hawks were recorded in Santa Clara County, in the agricultural fields north of Richmond Avenue in mid-Coyote Valley, with up to 14 individuals observed on 20 May. Of the 14, three were adults, of which two were of the light and one of the dark morph, three were juveniles, of which two were of the light and one was of an intermediate morph, and the others could not be identified to age.

On 13 April 2013, Rogers found an intermediate-morph Swainson's Hawk, confirmed later to be the male of this pair, soaring low over the nest location, displaying with rodent prey over the Coyote Creek riparian corridor in the Coyote Creek County Park. On 14 May, Bousman located an

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intermediate-morph Swainson's Hawk (later confirmed as the female by her unique plumage) building a nest in the same area where Rogers observed the male display. The nest was built in a western sycamore (*Platanus racemosa*) tree ~22 m high directly above the creek and adjacent to an agricultural field in the mid-Coyote Valley (Figure 1).

On 15 May, we observed the male soaring over the nest site (Figure 2), as well as landing on the nest, where the female was sitting on the nest in an incubation posture. From her apparent incubation for over an hour, we believe the female had either already laid at least one egg or was preparing to lay an egg. From the female's behavior, we estimate she laid from 15 to 19 May. On the basis of an incubation period of 34–35 days (Woodbridge 1998), we estimate hatching between 18 and 23 June. A single nestling with some down was first observed on 27 June. It evidently fledged (branched) on 7 August, as it was observed in the nest on 6 August and in an adjacent tree ~7 m from the nest on 8 August. This was the last day the juvenile was observed. Thus the nestling period was 45–50 days, which is on the long end of the spectrum reported from other studies, 27–46 days (Woodbridge 1998).

In 2014, we first observed a Swainson's Hawk in Coyote Valley on 5 April. On 9 April, we checked the nest that was used in 2013 and observed an adult Swainson's Hawk of the intermediate morph perched ~40 m from the nest,



Figure 1. Swainson's Hawk nest, single nestling, and female in a western sycamore, Coyote Valley, Santa Clara County, California, 12 July 2013.

*Photo by Ryan A. Phillips*

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Figure 2. Intermediate-morph male Swainson's Hawk of the pair nesting in Coyote Valley, Santa Clara County, California.

*Photo by Michael Mammoser*

in which there were fresh cottonwood sprigs. On 22 April, an adult of the intermediate morph, presumably the female, was in an incubation posture on the nest (Figure 3), and the presumed male, an intermediate-morph adult patterned like last year's male, delivered an unidentified prey item to the female. On 6 June, the nest contained at least one nestling, ~1.5 weeks old. It fledged between 5 and 8 July, during which time the nest fell as a result of high winds. The farthest from the nest we observed this presumed same pair in both 2013 and 2014 was 2.6 km. All observations of their foraging were over agricultural fields, primarily alfalfa, but this was the primary crop in Coyote Valley in 2013 and 2014.

On 30 April 2014, we observed six Swainson's Hawks over and in the same alfalfa fields adjacent to Richmond Avenue where the 14 individuals had been on 20 May 2013. These six individuals included one adult of the dark morph, one adult of the light morph, one immature of the dark morph, two immatures of the light morph, and one of unknown age and morph. Four of these birds were soaring together in pairs and were displaying (legs extended and soaring wing tip to wing tip) and courting (undulating flights and vocalizations). The same dark-morph pair was observed in the same area on 31 May defending a territory against Red-tailed Hawks (*Buteo jamaicensis*), but we could not locate a nest.

## DISCUSSION

These records and others suggest that efforts toward Swainson's Hawk conservation in California have allowed this species to recolonize some of

## SWAINSON'S HAWK RECOLONIZING COASTAL CENTRAL CALIFORNIA



Figure 3. Adult Swainson's Hawk in same nest as 2013 on 30 April 2014.

*Photo by Ryan A. Phillips*

its historical breeding range, or that it may be adapting to human-modified habitats. Not only did Swainson's Hawk nest in Santa Clara County in 2013 and 2014, but a pair nested in San Benito County for the first time in 2013 (S. Johnston and D. Shearwater pers. comm.), and a team with the Golden Gate Raptor Observatory monitored eight nesting territories in Napa and Sonoma counties in 2013 (M. Berner and A. Fish pers. comm.). There is a single historical record of Swainson's Hawk nesting in Sonoma County, at Petaluma, where an egg was collected prior to 1859 (U.S. National Museum of Natural History B01679; Bousman 2007b). In Napa County, where to our knowledge there are no historical records of nesting, nesting Swainson's Hawks were first noted in 2005, and seven nesting attempts or fledged young have been observed since (M. Berner pers. comm.). The 19<sup>th</sup> century records from Santa Clara and Napa counties attest to the historic range encompassing the Coast Ranges, but there is no information on the size of the population.

The Swainson's Hawk is a complete migrant, with the exception of a small population (29 individuals in 1994) in the Sacramento–San Joaquin delta that has wintered since at least 1991 (Herzog 1996), as well as the occasional juvenile that does not migrate farther south. At least 30 wintering individuals were observed in 2014 (C. Briggs pers. comm.). In recent years, wintering Swainson's Hawks have been observed more frequently, including 27 individuals near Dos Palos in the San Joaquin Valley (unpublished notebooks, *North American Birds*). The only winter record for Santa Clara County is

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of a light-morph juvenile in Coyote Valley, 13 January 2010 (Phillips pers. obs.). Marking or telemetry (e.g., Kochert et al. 2011) might reveal the origins of the recent pioneers in the Coast Ranges and possible connections among them, the birds wintering in the delta, and the main breeding range.

In the Swainson's Hawk's primary breeding range in California, 85% of nests are located within riparian forest or remnant riparian forest surrounded by ample and productive foraging habitat, which consists mostly of alfalfa and fallowed agricultural fields (Woodbridge 1998). Coyote Valley could be an ideal location for Swainson's Hawk to establish a population because of its alfalfa and fallowed agricultural fields, abundant prey (Phillips pers. obs.), and riparian forests along Coyote and Fisher creeks.

Our observations imply establishment of Swainson's Hawks in Coyote Valley, but further monitoring is warranted. The threat of urban sprawl and land-use changes reducing the riparian forests and agricultural fields in Coyote Valley and other areas in the Coast Ranges may curtail the incipient recolonization, as well as use by the many other species of raptors that breed and winter in Coyote Valley. Effects on this species recognized as threatened should be considered prior to development.

### ACKNOWLEDGMENTS

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# REUSE OF NEST SITES BY PELAGIC CORMORANTS IN NORTHERN CALIFORNIA

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**ABSTRACT:** We photographed nests of Pelagic Cormorants (*Phalacrocorax pelagicus*) on cliff ledges at two colonies in Mendocino and Sonoma counties, California, from 1986 to 1996. In 135 comparisons of the positions of nests in different years, we found that 92% of the nests shifted by <25 cm (approximate diameter of a Pelagic Cormorant nest), and in 24% of comparisons the shift was <5 cm. Some nests were placed within a few centimeters of previous sites for as long as nine years. The rate of reuse of nest sites was high on both small ledges and on large shelves where the nest could have readily been shifted. At sites where substantial rock substrate sloughed off the cliff face in the previous year, nests were placed precisely at former sites. This high rate of nest reuse is striking because many apparently suitable sites on these cliffs remain unused.

Nest-site fidelity, the tendency for birds to return to and reuse a previous nest site, has been noted in many species, both migrants and residents, and among songbirds, waterfowl, seabirds, and birds of prey (Badyaev and Faust 1996). The pervasiveness of nest-site fidelity suggests the behavior has an adaptive significance and increases reproductive success (Greenwood and Harvey 1982). Within a colony, the site fidelity of seabirds nesting on cliffs and slopes is often strong (Aebischer et al. 1995, Fairweather and Coulson 1995). For example, Ollason and Dunnett (1978) found 91% of breeding pairs of the Northern Fulmar (*Fulmarus glacialis*) to reunite at approximately the same nest site, and Huyvaert and Anderson (2004) detected no measurable shift in placement of Nazca Booby (*Sula granti*) nests in successive years.

The Pelagic Cormorant (*Phalacrocorax pelagicus*) is a long-lived seabird that usually nests on ledges on high, steep, inaccessible rocky cliffs facing the sea (Hobson 1997). These nest sites provide protection from predators (Aebischer et al. 1995), although they expose the nest to cold winds, sea mist, and ocean waves, which occasionally destroy active nests (Schall pers. obs.). Siegel-Causey and Hunt (1986) reported that nest sites used persistently over several years are those that are most strongly defended. Here we document reuse of nest sites by Pelagic Cormorants at two breeding colonies in northern California over 10 years. Our goals were to measure differences in nest placement on ledges by year and between the two colonies. We observed that all nests were washed off the cliff ledges during winter storms, so we used photographs to locate the precise previous sites of nests on the basis of the cliffs' landmarks.

## METHODS

In 1986 we selected two colonies for study. The Point Arena colony is located 2 km north of the town of Point Arena, Mendocino County (obser-

## REUSE OF NEST SITES BY THE PELAGIC CORMORANT

vation locations were within 0.32 km north and south along the cliffs from 38.9289° N, 123.7293° W). Since 2004, this section of coast has been included within the Stornetta Public Lands managed by the U.S. Bureau of Land Management. The Sea Ranch colony is 24 km south of the Point Arena study site and 10 km south of the town of Gualala, Sonoma County (observation locations within 0.70 km north and south along the cliffs from 38.7190° N, 123.4646° W). This area has been privately owned as a planned unincorporated community since 1963. At each location, the coast is thrown into a series of convolutions with many narrow inlets that allow an observer to sit on the cliff edge above one cliff face and look into the nests on the opposite face (see satellite photographs of the two locations, Figure 1).

We took color photographs (35-mm slides) of cormorant nests during the early to mid breeding season (May to July) in 1986, 1987, 1988, 1989, 1994, 1995, and 1996. Only active nests (with adult birds attending eggs or hatchlings) are included in the analysis. That is, we excluded nests that had been constructed in April and early May, then abandoned with no eggs laid. We examined the slides by scanning them into digital format for viewing on a flat computer monitor. We compared the nests' locations by year by the use of landmarks on the cliff face such as overhangs, ledges, distinctively shaped rocks, or clumps of vegetation. We drew lines between the nest and appropriate landmarks and estimated the vertical and horizontal difference in nest placement at each location over different years (see Figure 2). Nests varied in size and shape, so we scored their location from the center top of the forward rim; this point is visible even when the nest contained incubating adults or nestlings. The distance from camera to nest and the camera lens used differed from year to year, so we needed a benchmark in each photograph to determine distance. This we achieved by measuring the wing length of an attending adult in every photograph, using the average chord for the Pelagic Cormorant of 25 cm as the reference scale (Hobson 1997).

We analyzed the data by nonparametric methods in JMP 3.0.2 and Stat-view 5.0.1, setting the significance level at  $P = 0.05$ .



Figure 1. Aerial photographs (from Google Earth, 7 January 2014) of the two study sites, Point Arena (A, centered at 38.9289° N, 123.7293° W) and Sea Ranch (B, centered at 38.7190° N, 123.4646° W).

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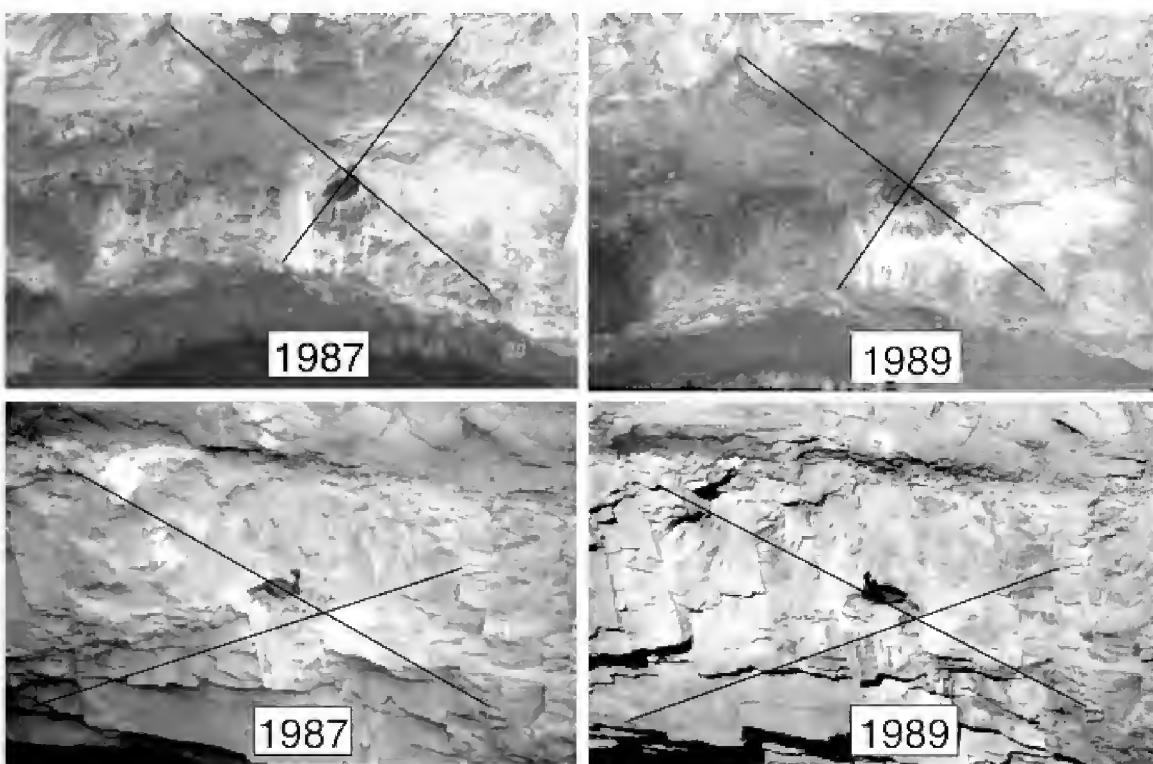


Figure 2. Reuse of nest sites by Pelagic Cormorants after loss of rock substrate at Point Arena. The two pairs of figures show use of the same two nest sites before (1987) and after (1989) loss of surrounding rock substrate.

## RESULTS

Over the 10-year period, we made 135 comparisons at 44 nest sites. A nest was not active (egg laid) at each site each year; 57 one-year comparisons were possible. The longest periods observed between placement of nests at a specific site on the cliff ledge were 9 ( $n = 60$ ) and 10 ( $n = 1$ ) years. The distribution of distances between nests at individual sites is shown in Figure 3. We found no significant difference in nest-site reuse over multiple years at the two colonies (an unequal number of observations allowed comparison for an interval of one year only; Point Arena  $n = 22$ , Sea Ranch  $n = 35$ ,  $U$  test,  $P = 0.362$ ). Therefore, we pooled the data for the two colonies for subsequent analysis.

Estimated differences in placement of nests at individual sites ranged from 1 cm (essentially no difference between location of the nest from year to year; a few centimeters of vertical difference could be accounted for by variation in the height of the nest rim) to 43 cm. Vertical shifts in nest placement did not differ from horizontal shifts (Wilcoxon signed-rank test,  $P = 0.873$ ). Only 8% of the measured differences were greater than 25 cm, the length of the Pelagic Cormorant's wing chord and the approximate diameter of the nest, and 24% were less than 5 cm (Figure 3). In comparisons for one-year intervals only, there was no effect of year on the distance between nest sites (Kruskal-Wallace test,  $P = 0.073$ ); that is, the distance nest sites shifted did not change over the observation period. The number of years between measures over the 10-year period was weakly positively related to distance between placement of the nests (Spearman rank correlation,  $r_s = 0.194$ ;  $P = 0.027$ ,  $n = 133$ ) (Figure 4), but this correlation vanished if the four greatest shifts were removed from the analysis.

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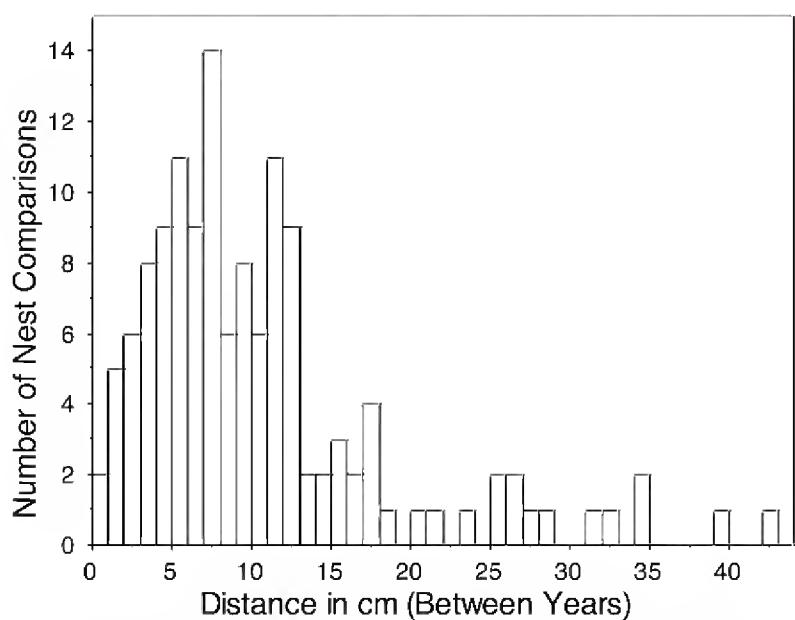


Figure 3. Shifts in nest sites of Pelagic Cormorants in successive years at two breeding colonies in northern California.

The cliff ledges were durable through our study, so we could readily find large and small landmarks for locating nest sites with precision. However, at two Point Arena nest sites, a large amount of ledge material (rock and minimal vegetation) fell off during the stormy winter of 1987–1988. We were able to ascertain the location of the original nest sites by using landmarks far from the site and lines drawn between these distant landmarks (Figure 2). Cormorants constructed nests on these two sites, even with very little apparent horizontal area remaining after the loss of cliff material and precisely at the site of the previous nest.

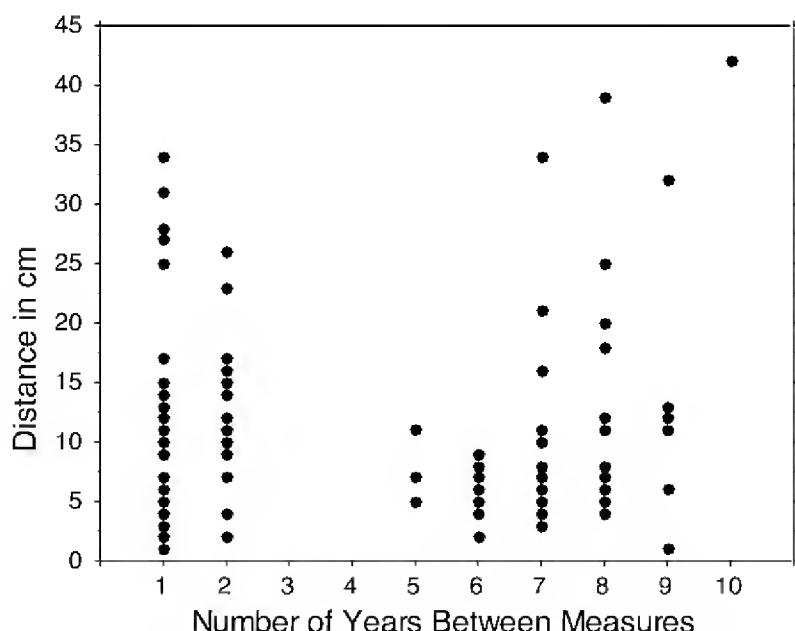


Figure 4. Number of years between recorded shifts in sites of Pelagic Cormorant nests at two breeding colonies in northern California.

## REUSE OF NEST SITES BY THE PELAGIC CORMORANT

### DISCUSSION

At two breeding colonies in northern California, Pelagic Cormorants' rate of reuse of nest sites over a 10-year period was high. Only 8% of comparisons revealed a shift greater than or equal to 25 cm, the approximate diameter of a nest. Therefore, in 92% of comparisons, the nest was placed with at least some overlap with the site occupied in another year. In approximately a quarter of the comparisons, nests shifted 5 cm or less, including some comparisons made eight or nine years apart. This small shift was likely to be within the method's margin of error, so many nests may have been placed precisely at a previous site. Not all sites were used each year, but even comparisons over more than one year showed very little shift. In some cases, the ledge on the cliff face appeared through a telescope to be equal to or even smaller than the size of a Pelagic Cormorant nest, so precise placement of a nest there year after year is not surprising. However, inspection of the cliff faces with the telescope revealed a great many other similarly sized ledges, including many near the observed nests.

Although we could not assess all factors related to nest-site selection, choice of specific small ledges does not seem to be a result of scarcity of suitable ledges. In many cases the ledge was more of a shelf, and large enough to allow the birds to build a nest at a variety of sites on it, yet even in such places nests were placed at the same site year after year. And, most striking, at sites of substantial rock slides from the cliff face over the winter, changing the cliff's appearance, birds returned to build nests at precisely the same site seen in previous years. One of these nests was placed at a site that seemed to have little or no horizontal surface but was within a few centimeters of the site used in previous years. It is not known how Pelagic Cormorants find previous nest sites, although memory of landmarks and access as well as position in relation to other nest sites likely are involved. We pinpointed the nest locations by use of sketch maps and photographs, but at places where material had fallen off the cliff ledges during winter storms, extremely detailed study of photographs was required.

Cliff nesting offers the Pelagic Cormorant many advantages including the ability to breed near foraging areas at many points along the mainland coast, as well as on islands (Carter et al. 1984, Siegel-Causey and Hunt 1986). The species' high fidelity to specific cliffs likely increases an individual's efficiency in finding food, as the birds are familiar with the distribution of prey nearby (Siegel-Causey and Hunt 1986). Cliffs are also advantageous because they limit the access of avian and mammalian predators. During our study, Common Ravens (*Corvus corax*) patrolled the two study locations, with 0.3 passes per hour at Point Arena and 0.5 per hour at Sea Ranch, and ravens were observed to take eggs or small nestlings from nests (Cannon 1990).

Although cliff nesting itself has advantages, why are the cormorants so loyal to specific nest sites? A specific site may offer better protection from the elements, including rain from above and sea waves and mist from below, and may be sloped to prevent eggs from rolling into the sea (Lengagne et al. 2004). Small differences, not apparent to the human eye, may also reduce attack by foraging ravens. If specific nest sites are of higher quality, then we may expect the birds to compete for them. Competition among Pelagic

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Cormorants for nest sites appears most intense early in the breeding season, especially for sites used over several previous years (Siegel-Causey and Hunt 1986). At our study locations, Cannon (1990) observed numerous attacks by adult cormorants on the nestlings of other birds throughout the nesting season. Cannon also found that early nesters were more successful and used nest sites away from other cormorants.

Studies of cliff-nesting seabirds that share many of the characteristics of the Pelagic Cormorant, including longevity and coloniality, indicate that reuse of nest sites may promote site defense, ensure distance from conspecific nesting pairs, facilitate mate acquisition or retention, and aid in the rapid replacement of a lost mate (Ollason and Dunnett 1988, Boekelheide and Ainley 1989, Pyle et al. 2001, Huyvaert and Anderson 2004). Nest-site reuse may be especially important in cliff-nesting species, in which mate acquisition does not involve choice among a dense group of the species at the colony early in the reproductive season (Vergara et al. 2006), although Pelagic Cormorants can form dense groups at roosts near colonies. Nest-site reuse has been found an efficient way for individuals or pairs to continue breeding at a successful cliff colony in the Common Murre (*Uria aalge*) and Black-legged Kittiwake (*Rissa tridactyla*) (Kokko et al. 2004, Naves et al. 2006). Pelagic Cormorants may not breed every year, and they breed in colonies relatively small and scattered in comparison to those of many other seabirds, so returning to the same nest site may be an important means of finding a previous mate (Siegel-Causey and Hunt 1986). In the Black-legged Kittiwake, which also nests on steep rocky sea cliffs, mate retention dropped significantly when nests were located more than 0.3 m from previous sites (Fairweather and Coulson 1995). In birds in general, breeding success increases fidelity to mate and nest site, and in socially monogamous seabirds replacement of a mate has been shown to exact a cost in reproductive fitness (Bried et al. 2003, Ismar et al. 2010).

In our long-term study, we demonstrated great precision in the Pelagic Cormorant's reuse of nest sites. Unfortunately, as the birds we studied were not marked, we have no information on the identity of individuals returning to nest sites over the years, so we cannot discern whether this reuse of nest sites was caused by individual birds returning to the same site year after year. However, such precision in nest-site reuse does suggest a high rate of nest-site fidelity, which may imply a stable or increasing population. Further study of these two Pelagic Cormorant colonies including banding of adults and chicks would be needed to clarify individuals' fidelity to nest site and colony as well as the species' population dynamics. Additional study of these colonies also promises to shed light on the environmental variables most important for nest-site selection.

### ACKNOWLEDGMENTS

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Community College permitted us to live near and work at the Point Arena colony. Jim and Linda Riley hosted us at that site and offered substantial logistical assistance.

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## STATUS OF OSPREYS NESTING ON SAN FRANCISCO BAY

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**ABSTRACT:** Historical records from the early 1900s, as well as surveys updated in the late 1980s and more recent information from local breeding bird atlases, indicate that Ospreys rarely nested on San Francisco Bay prior to 2005. In 2013, we surveyed nesting Ospreys baywide and located 26 nesting pairs, 17 of which were successful and fledged 44 young. We also report on findings from previous annual nest surveys of a portion of San Francisco Bay beginning in 1999. These results demonstrate a greater breeding abundance than has previously been recognized. The density of Osprey nests is highest near the north end of San Francisco Bay, but nesting also appears to be expanding southward. Nearly all of the nests observed were built on artificial structures, some of which were inappropriate and required nests to be removed. Over half of unsuccessful pairs experienced significant human disturbance. We recommend that conservation efforts focus on reducing this ratio, and to help do so, we urge erecting nest platforms as part of efforts to deter nesting when it conflicts with human activity.

The Osprey (*Pandion haliaetus*) is a diurnal, piscivorous raptor that breeds or winters in a variety of habitats on all continents except Antarctica. Upon reaching maturity, the birds typically return close to their natal site to breed. Ospreys do not maintain or defend hunting territories but instead reuse the same nest each year and aggressively defend only the local area around the nest site, called the nesting territory. This results in nesting birds ranging from isolated single pairs to semicolonial groups (Poole 1989, Poole et al. 2002). Historically, Ospreys nested in trees, but with increasing human population and development they now readily nest on artificial structures when available. For example, in Chesapeake Bay, in 1973, 32% of the estimated 1450 Osprey pairs nested in trees, while in 1995 and 1996 only 7% of 3473 pairs nested in trees. The rest nested on artificial structures. In the Willamette River valley of Oregon, in 1976 all of the 13 Osprey nests were in trees, but by 2008, 88% (242 of 275) were on artificial sites, such as nesting platforms, power poles and towers, pilings, cell-phone towers, and bridges (Henny et al. 2010).

Early historical documentation of Ospreys nesting around San Francisco Bay is sparse. Grinnell and Wythe (1927) listed the Osprey as a very rare resident in the bay area. In their compilation of the birds of California, Grinnell and Miller (1944) noted that Ospreys were formerly found along the whole length of California, primarily on rivers and lakes, but had become much less common and were reduced to nesting at only a few sites. Both publications excluded San Francisco Bay as a location for Osprey nesting.

Henny and Anthony (1989) described the population breeding in Califor-

## STATUS OF OSPREYS NESTING ON SAN FRANCISCO BAY

nia as located primarily in northern coastal and mountainous areas. Along the coast, they placed the southern boundary of the breeding population at Kent Lake in Marin County, north of San Francisco Bay. They also reported breeding pairs along the Sacramento River and in the central and southern Sierra Nevada. More recently, breeding pairs have also been reported in Orange County (Kerr 2007) and San Diego County, including on San Diego Bay (Unitt 2004).

Since the surveys by Henny and Anthony, breeding bird atlases have been compiled for the nine San Francisco Bay counties with tidelands. Six of these atlases do not list Osprey as breeding around the tidelands, including those for San Francisco (San Francisco Field Ornithologists 2003), Marin (Shuford 1993), Sonoma (Burridge 1995), Napa (Berner et al. 2003), Santa Clara (Bousman 2007), and San Mateo (Sequoia Audubon 2001) counties. For the three other counties, a nest was reported in Contra Costa County (near Point Pinole) in 1998 (Glover 2009), a pair summered in Alameda County at the mouth of San Lorenzo Creek in 1999 (Richmond et al. 2011), and beginning in 2005, Ospreys nested regularly at Mare Island in Solano County (Berner and Rippey in press).

The largest active Osprey colony located near San Francisco Bay is at Kent Lake, north of the Golden Gate in Marin County (Figure 1). Established in the mid-1960s, the colony reached a peak of 52 occupied nests in 1994 and has since maintained itself but at smaller numbers. All the nests at Kent Lake are in trees, dead or living (Jules Evens pers. comm.).

In this paper we update the status of Osprey nesting on San Francisco Bay on the basis of Leong's surveys at Mare Island from 1999 to 2013 and from a baywide survey by Brake, Wilson, and volunteers in 2013.

### METHODS

Each year from 1999 through 2013, Leong surveyed nests of the Osprey and herons at Mare Island and the Vallejo waterfront (Solano County). Mare Island is the site of a naval shipyard that closed in 1996, but the area has not been extensively redeveloped, so numerous cranes and light poles that provide substrate for Osprey nests persist. These surveys took place between March and late July each year and were done either by car or on foot. The location of active nests was recorded and the behavior of adults and chicks was monitored during multiple visits.

Beginning in mid-summer 2012, Brake and Wilson extended Leong's work with an exploratory survey of nesting Ospreys throughout San Francisco and San Pablo bays, during which we found 18 nests and counted 30 young.

In 2013, under the auspices of the Golden Gate Raptor Observatory, we initiated a more thorough survey of the bays (Figure 1). Suisun Bay (not shown in Figure 1), east of the Carquinez Strait, is generally considered part of the San Francisco Bay complex, and Ospreys are known to nest there, but only on ships of the Maritime Administration Reserve Fleet. Because the administration actively deters Ospreys from nesting on some of the ships, we excluded Suisun Bay from the study area.

We began nest surveys early in the local breeding season, which is from

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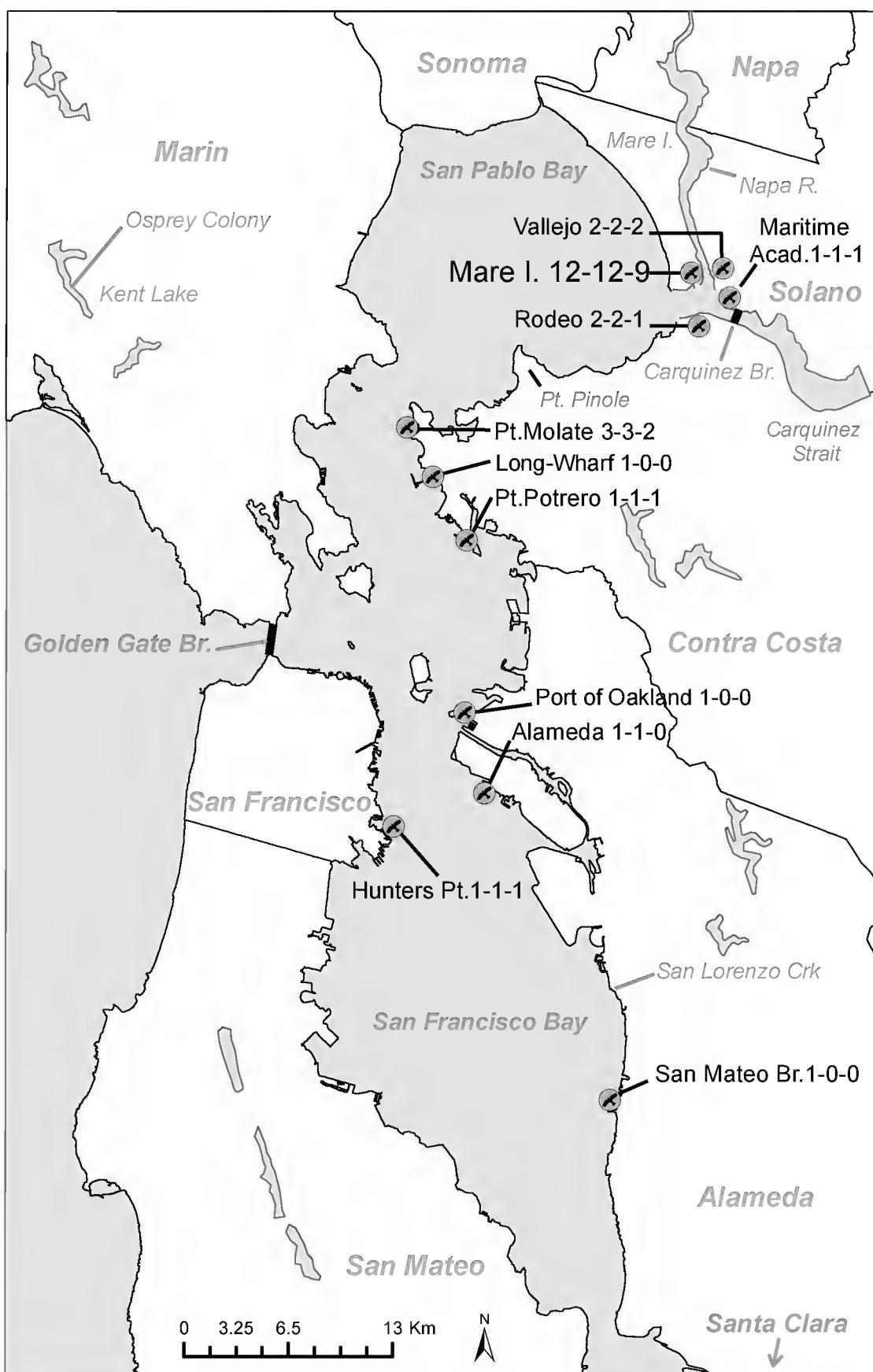


Figure 1. Locations of Osprey nests around the San Francisco Bay area in 2013. The three numerals for each location refer to number of territorial pairs, number of laying pairs, and number of successful pairs, respectively. For example, Mare Island had 12 territorial pairs, 12 laying pairs, and 9 successful pairs.

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late February to late July. We visited nests found in 2012 as well as searching for new nests. Surveys were limited to within 300 meters of the bay's shoreline and were conducted on foot or from a car, ferry, or small boat. We solicited additional information on Osprey nesting by posting requests on local Internet birding forums. Each nest was photographed, and its location, substrate, status, number of chicks, and number of young fledged were recorded. We also recorded the behavior of adults and information regarding human disturbance of the nest. All nests were visited numerous times through the season.

We report nesting status and productivity in the terminology of Steenhof and Newton (2007). Two Ospreys occupying a nesting territory were a *territorial pair*. Territorial pairs that laid eggs were *laying pairs*. Territorial pairs that fledged at least one young were *successful pairs*. A nesting territory was *occupied* if it contained a pair that engaged in courtship or mating behavior, territory-defense behavior, nest building or refurbishing, incubation for long periods, or if eggs or chicks were present. We defined a pair as laying if we observed incubation for long periods or if eggs or chicks were present. We considered chicks *fledged* when they were 45 days old, which is about 80% of their average age at fledging of 55 days (Poole 1989). We estimated age by visiting nests frequently, usually at least once per week, during the latter part of the incubation and nestling period and noting the date when chick-feeding behavior was first observed and by aging the chicks when they were first visible. We continued regular visits until all of the nestlings had fledged. We report *nesting success* as both the ratio of successful pairs to territorial pairs and the ratio of successful pairs to laying pairs. We report *productivity* as the number of chicks fledged both per territorial pair and per laying pair.

## RESULTS

### Surveys 1999–2013, Mare Island, Vallejo

From 1999 through 2002, one pair of Ospreys nested annually on Mare Island and none nested on the Vallejo waterfront. In 2003, this increased to two pairs on Mare Island, four in 2004, and five in both 2005 and 2006 before dipping to four in 2007. Since then the number of nesting pairs found at Mare Island/Vallejo has increased steadily, rising to 14 in 2013.

### Surveys 2013, Baywide

During the 2013 baywide survey, we found 26 territorial pairs (Table 1; Figure 1), which included all 16 pairs found during the exploratory survey in 2012. Of the additional 8 pairs found in 2013, five were in areas thoroughly surveyed in 2012, so we believe they were newly established in 2013 (two pairs at Mare Island and one each at Point Molate, port of Oakland, and San Mateo Bridge). The remaining three pairs were in areas not thoroughly surveyed in 2012, and the structure and appearance of nests suggest these pairs may have been overlooked (Rodeo 1 and 2, Long Wharf).

Of the 26 pairs found, 23 were laying pairs, of which 17 were successful. Of the nine pairs that were not successful, six laying pairs failed and

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**Table 1** Pairs of Nesting Ospreys Found During the 2013 Survey of San Francisco Bay

Location	Nearest city	Nest substrate <sup>a</sup>	Territorial pairs	Laying pairs	Successful pairs	Young fledged
Hunters Point	San Francisco	A	1	1	1	2
San Mateo Bridge	San Mateo	E	1	0	0	0
Alameda Point	Alameda	E	1	1	0	0
Port of Oakland	Oakland	A	1	0	0	0
Point Potrero	Richmond	C	1	1	1	3
Point Molate	Richmond	A, B, D	3	3	2	6
Long Wharf	Richmond	B	1	0	0	0
Maritime Academy	Vallejo	A	1	1	1	3
Mare Island	Vallejo	A, C, E	12	12	9	22
Vallejo	Vallejo	D, E	2	2	2	6
Rodeo	Rodeo	B	2	2	1	2
Total			26	23	17	44

<sup>a</sup>A, light pole; B, utility pole; C, crane; D, piling; E, other.

three pairs did not lay eggs. Nesting success was 17/26 (0.65) for territorial pairs and 17/23 (0.74) for laying pairs. Laying pairs fledged 44 young for a productivity of 1.7 young per territorial pair and 1.9 young per laying pair.

In our study area, we first observed building or maintenance of nests on 22 February, and the first sign of a pair at a nest on 27 February. Behavior indicating incubation was first observed on March 28. Dates of hatching ranged from 24 April to 21 May. Fledging was first observed on 22 June, and all young had fledged by 30 July.

### Nest Locations and Substrates

All but one of the pairs nested on the east side of the bay (Figure 1). The highest concentration of pairs was at Mare Island/Vallejo, which represented 54% (14/26) of all pairs, 65% (11/17) of all successful pairs, and 33% (3/9) of all unsuccessful pairs. The bay south of Mare Island/Vallejo had 46% (12/26) of all pairs, 35% (6/17) of all successful pairs, and 67% (6/9) of all unsuccessful pairs.

Twenty-five nests (96%) were on artificial structures. Of these, 13 (52%) were on either utility poles or light poles (e.g., Figure 2A) and 6 (24%) were on either active commercial cranes or infrequently moved cranes at a former shipyard (Figure 2B). The remaining six nests (24%) were located on a variety of structures, including a building roof, a ship, and near-shore pilings. One nest at Mare Island was located on a palm tree that had a flattened top.

### DISCUSSION

Available literature indicates that since the early 1900s Ospreys have nested on San Francisco Bay only rarely. Our studies documented a steady increase in nesting pairs, especially at Mare Island/Vallejo since 1999. Our 2013 baywide survey produced 26 nesting pairs, about half of which nested

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Figure 2. Osprey nests on artificial structures around San Francisco Bay. (A) Light structure on pier, Mare Island, from which three young fledged. (B) Operating crane on Mare Island where, not surprisingly, the pair failed. (C) Enshrouded nest and PVC deterrence devices installed to prevent use by Ospreys of an existing nest at Point Molate. Note the adult Osprey perched on a deterrence device. (D) Successfully used alternative nest structure installed near the nest shown in (C) with three nearly fledged nestlings.

*Photos by Anthony J. Brake*

at Mare Island/Vallejo and the remainder south of there, predominately along the eastern shore of the bay.

We believe that the concentration of nests at Mare Island/Vallejo and the timing of population growth may be traceable to several factors. Mare Island/Vallejo is at the confluence of the Napa River and Carquinez Strait, both of which add large amounts of fresh water to the bay at various times through the year, resulting in a zone of relatively low salinity (Jassby et al. 1995), which may influence the availability of fish the Osprey prefers (Dege and Brown 2004). In addition, over the last 10 years the turbidity of the water in the bay has diminished (Schoellhamer 2011), and this turbidity is an important determinant of the Osprey's hunting success (Vana-Miller 1987). Finally, when the Mare Island Naval Shipyard closed in 1996, light poles, cranes, and other structures became available as potential nesting sites, and they host 11 of the 12 nests found there in 2013.

### Population Growth

Additional study is needed to quantify the status of the bay's Osprey population, but several findings suggest the population is growing and expanding geographically. Between 2007 and 2013, the number of nesting pairs at

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Mare Island/Vallejo grew steadily from four to 14 nests, implying that food supply, availability of nest sites, or other variables have not yet begun to limit population growth at Mare Island/Vallejo. In addition, in 2013, Brake and Wilson found Osprey nests at Point Molate, the port of Oakland, and the San Mateo Bridge that were not present during our exploratory survey in 2012, indicating that the number of nesting pairs south of Mare Island/Vallejo is increasing as well. Finally, in 2013 the number of fledged young per laying pair was 1.9. This compares favorably to the annual productivity range of 1.11 to 2.09 per laying pair at the Kent Lake Osprey colony in Marin County (Figure 1) between 1981 and its peak year of growth in 1994 (J. Evens pers. comm.).

### Conservation Issues

Ospreys nesting on the bay strongly preferred artificial structures, entailing the need for nesting on inappropriate structures to be deterred and for shielding of nests from human disturbance. In 2013, these issues affected five of nine unsuccessful pairs (56%). An incubated nest on a working barge-crane at Mare Island, an occupied nest on a power pole at Long Wharf, and an occupied nest on a light pole at the port of Oakland were removed to deter nesting. Significant human disturbance contributed to two additional pairs abandoning their nests: one pair incubating at Mare Island abandoned its nest when the former shipyard crane supporting it was moved, and another nest at Point Molate was abandoned after people began fishing within a few meters of the nest, which was located near eye level. While Ospreys are somewhat tolerant of human disturbance, they are particularly sensitive to abrupt or sporadic disturbance after nesting has begun (Levenson and Koplin 1984, Vana-Miller 1987).

To address these adverse effects on nesting success, we recommend tracking the ratio of nest failures related to disturbance. In 2013, this ratio was needlessly high (56%), and we urge that conservation efforts focus on reducing it to at least 25%, preferably lower. To help accomplish this, we recommend integrating the providing of nest platforms into efforts at deterrence, which typically include only removing nests and installing deterrence devices such as flagging, domed or peaked objects, or flexible plastic pipe structures. Ospreys are unusually persistent, and when their nests are removed birds will frequently try to build one or more new nests at the same or nearby locations, thus prolonging attempts at deterrence. If a platform is erected, however, Ospreys will usually nest on the platform in either the same or the following nesting season (Poole 1989, APLIC 2006). This approach promotes the success of deterrence and enhances the success of the affected pairs. For example, in 2013 at Rodeo, an incubated nest on live electrical wires collapsed. Subsequently, a nest platform was installed on the pole, and the pair used the platform in 2014, rather than attempting to nest on the wires again. In another case, after an attempt at deterring the nest at Point Molate in early 2014 (by covering the previously used nest with black fabric and adding flexible T-shaped devices constructed from PVC pipe; Figure 2C), the pair began building new nests on nearby utility poles, including a pole with live electrical wires. The pair continued building in spite

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of continued efforts at deterrence until a platform was installed approximately 400 meters from the existing nest. The pair then quickly occupied the nest platform, adding nest material and commencing incubation (Figure 2D). We hope these results will serve as a model for conservation measures to be used routinely where Osprey nesting may conflict with human activities.

### ACKNOWLEDGMENTS

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# FIRST NESTING OF THE CALIFORNIA GULL IN NEW MEXICO

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**ABSTRACT:** The California Gull (*Larus californicus*) has been expanding its breeding range southward in the western United States, including in the Rocky Mountains, for several decades. In New Mexico, the species was accidental in occurrence until numbers appeared in summer in the mid-1970s. Here we document the first breeding of the California Gull in New Mexico, where a small colony containing four broods was discovered in 2013; this event extends the known breeding range southward in the Rocky Mountains by about 150 km. Nesting will likely continue at least intermittently in New Mexico as water levels in the state's reservoirs, and the presence of islands suitable for nesting, fluctuate over time.

The California Gull (*Larus californicus*) breeds largely in the interior of North America from the Northwest Territories and prairie provinces of Canada south into the U.S. locally to California, Nevada, Utah, and along the Rocky Mountain front from Wyoming into Colorado. Until recently, the southern limits of the breeding range included Mono Lake in California, the Great Salt Lake and Utah Lake regions of Utah, and southern Colorado (Winkler 1996). Exceptionally far south, a small colony was discovered at the Salton Sea in southern California in 1997 (Molina 2000). Here we provide documentation for California Gulls successfully nesting in northern New Mexico at Heron Lake in 2013.

## HISTORY OF THE CALIFORNIA GULL IN NEW MEXICO

The California Gull is a relative newcomer to New Mexico, with only two records for the state prior to the mid-1970s: fall 1942 (band recovery near Carlsbad, Eddy County; Woodbury and Knight 1951, Hubbard 1978) and spring 1960 (observation near Española, Rio Arriba County; Audubon Field Notes 14:330, 1960). Its known status radically changed in the mid-1970s, when J. P. Hubbard discovered 31 in July 1975 at Heron Lake (elevation 2188 m), a newly created reservoir adjacent to the San Juan Mountains, Rio Arriba County (American Birds [AB] 29:1016, 1975), followed by 37 seen at Eagle Nest Lake (elevation 2493 m) in the Sangre de Cristo Mountains, Colfax County, in June 1976 (AB 30:987, 1976). The species has since appeared annually at those sites in summer, occasionally in substantial numbers, as well as increasingly at other northern New Mexico locales, including on the Colorado Plateau at Morgan Lake, San Juan County.

By the late 1970s, migrating California Gulls began to occur at large lakes in the lower Rio Grande Valley of New Mexico: in Sierra County at Caballo Lake by November 1978 (AB 33:203, 1979) and Elephant Butte Lake by November 1979 (AB 34:188, 1980). Since then the species has increased in numbers and regularity there as well as to the south in Doña Ana County

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and also in several northwestern counties. It is now regular in small numbers in winter in Sierra and Doña Ana counties and is increasingly regular in the northwest in San Juan County.

In addition, summering birds now regularly linger at the Sierra County reservoirs. Elsewhere in New Mexico, the California Gull is rare and irregular in the middle Rio Grande Valley (where migrants are likely overlooked) and the watersheds of the Canadian and Pecos rivers and is casual elsewhere (e.g., eastern plains, southwestern counties). There are now reports from 27 of New Mexico's 33 counties (Williams, unpubl. data).

## DISCOVERY OF THE HERON LAKE COLONY

On 28 June 2013, Howe and Marilyn D. Howe were canoeing Heron Lake, with the intent of circling the largest island in the lake ( $36.6827^{\circ}$  N,  $106.7012^{\circ}$  W) to investigate the activity of the gulls that were visible from shore over a kilometer away. Ring-billed (*L. delawarensis*) and California gulls had been frequently seen using this island, which is usually small and steep-sided at the water levels normally maintained at the lake. In 2013, following three years of drought, this island was much larger than usual, with long, relatively flat shelves radiating out from the steep center, particularly on the northwest side. It was on this northwestern shelf that the gull activity seemed to be concentrated, and thus a target of the canoe trip.

During our approach to the island from the southwest, 20 or more of what appeared to be California Gulls were visible from a distance. As the northwestern shelf came into view, two large but flightless gull chicks were seen running into the water in response to the approach of the canoe. As we maintained a distance of about 75 m from shore (the distance beyond which the gulls ceased to mob us), a scan from the canoe revealed 26 adult California Gulls plus four different broods of chicks—the two large chicks in the water, another brood of two large chicks with an attendant pair of adults, a younger chick with a single adult in attendance, and a pair of adults with two small chicks. There were also up to five solitary adults on the island in positions suggesting incubation, but we could not accurately count how many might have been incubating. Other adults loitering in this area may or may not have been associated with active nests.

## AGE OF CHICKS AND NESTING CHRONOLOGY

We estimated the ages of chicks, all of which were photographed, on the basis of visible characteristics as presented by Smith and Diem (1972). We estimate the young California Gulls observed on 28 June 2013 ranged from about 9 to 27 days in age. The youngest chicks (Figure 1), about 9 days of age, appeared as balls of fluff with legs and necks more prominent than in chicks less than a week old but lacked apparent development of pin feathers in the wing or humeral tract, which typically begins around day 11. The next oldest was a single fluffy bird with a single adult; from the fuzzy appearance of its entire front due to down feathers clinging to the tips of the juvenal feathers, plus the lack of juvenal feathers on the crown or front of the head and only a hint of dark gray tuft in the auricular area, that chick

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Figure 1. California Gull chicks estimated to be about 9 days old at Heron Lake, Rio Arriba County, New Mexico, 28 June 2013, representing the youngest of four broods documented there that day.

*Photo by William H. Howe*

appeared to be in the middle of its third week, or about 17 days old. The oldest chicks were the two on shore with two adults (Figure 2) and the two on the water; these appeared to be roughly the same age of about 27 days, by their feathered heads, traces of down around the neck, and the backs appearing fully feathered or nearly so.

California Gulls typically lay two to three eggs per clutch, at two-day intervals, and full incubation does not begin until completion of the clutch (Winkler 1996). Five studies cited by Winkler (1996) indicated average incubation periods ranging from 23.6 to 26.6 days, with an overall average among those studies of 25.2 days. Presuming an incubation period of about 25 days suggests that the eggs producing the oldest chicks were laid on or about 7 May, and those of the youngest chicks on or about 26 May, with the egg of the intermediate-aged chick laid about 17 May.

## DISCUSSION

Conover (1983), analyzing available data from the early 20<sup>th</sup> century forward, concluded that the California Gull had increased substantially in both range and abundance in western North America. To the north of New Mexico in Colorado, Andrews and Righter (1992) observed that the species had “increased dramatically” since the 1950s, with the first breeding

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Figure 2. Adult California Gulls with two chicks estimated to be about 27 days old at Heron Lake, Rio Arriba County, New Mexico, 28 June 2013, representing the oldest of four broods documented there that day.

*Photo by William H. Howe*

documented in 1963, regular wintering established by the mid-1970s, and breeding established as far south as southeastern Colorado by 1988. The increases observed in New Mexico since the mid-1970s, including in migrating, wintering, and summering birds, which led to the discovery of nesting reported here, appear to have been a predictable part of this overall increase in range and numbers during the latter half of the 20<sup>th</sup> century.

Heron Lake began filling in 1971 and was populated by summering California Gulls by 1975. There was no known breeding until 2013, likely because of the absence of a substrate suitable for nests. Under normal operating conditions, the water level of the lake is maintained at about 2188 m. At that level the small, steep-sided island is presumably unsuitable for nesting California Gulls. The lake's surface elevation on the day of discovery of the colony was 2171 m. Visual estimates from the canoe suggested the elevation of the shelf upon which the gulls were nesting was about 2174 m, increasing gradually toward the interior of the island. Given this, we estimate that this island in Heron Lake would likely be suitable for nesting by California Gulls when the water's surface elevation ranges between about 2160 m and 2175 m.

Water levels at Heron Lake are likely to continue fluctuating with the climate, and this site's suitability for breeding gulls should vary over time. Since the dam was constructed in 1971, water levels may have been suitable for nesting in other years, such as in 2004, when the May surface elevation

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was 2169 m, and possibly in 2003 and 2005, when May surface elevations were 2176 m. In 2003, the water level changed little during the ensuing summer; in 2005, however, the level increased to 2182 m by mid-June, which would likely have flooded any nests. Regardless of year-to-year variability, there now appears to be a population of adult California Gulls in northern New Mexico during late spring and early summer, poised to exploit suitable conditions wherever they may become available.

Breeding at Heron Lake not only marks the first documented nesting by the California Gull in New Mexico, it also extends its known breeding range in the Rocky Mountain region some 150 km to the south, making it second only to the Salton Sea as the southernmost colony known for the species. In addition, this is the only known nesting of any species of gull in New Mexico.

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# CONSERVATION CONCERNS FOR SIERRA NEVADA BIRDS ASSOCIATED WITH HIGH-SEVERITY FIRE

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**ABSTRACT:** Numerous avian species are positively associated with “snag forest” habitat created by patches of high-severity fire, mainly because of the abundance of standing fire-killed trees (snags) and fire-following shrubs. There is now considerably less severe fire than there was historically in the forests of California’s Sierra Nevada, owing to fire suppression. Moreover, under current policies for management of public and private forest, much of the snag forest created by fire is subjected to post-fire logging of snags. Mechanical mastication and herbicide spraying of shrubs, followed by planting of conifers, are also common, and large-scale programs of mechanical thinning seek to prevent creation of this habitat. Thus there is reason for concern for birds associated with snag forest. I synthesized existing research to identify the species positively associated with this habitat and assessed their population trends according to the Breeding Bird Survey. In the Sierra Nevada 24 species are associated with snag forest, and half of these are declining or are too rare for the Breeding Bird Survey to detect any trend. For snag-forest species, there are significantly more declines than increases (all snag-forest species with statistically significant population trends are declining), whereas species of unburned forest manifest no such pattern. These results indicate a need for more managed wildland fire, and for current management policies, both pre- and post-fire, to be revisited, particularly in national forests where most of the post-fire habitat exists.

Recently there has been increased research interest in birds and post-fire environments of conifer forests of the western U.S., including in the Sierra Nevada of California. Numerous bird species have been found to select post-fire habitat created by severe fires (i.e., patches in which most or all trees are killed) (e.g., Hanson and North 2008, Fontaine et al. 2009, Bond et al. 2012, Odion and Hanson 2013, DellaSala et al. 2014). This “snag forest” habitat, also known as “complex early seral forest” (DellaSala et al. 2014), is rich in standing fire-killed trees, or “snags,” used by woodpeckers and secondary cavity-nesters, and has an abundance of fire-following flowering shrubs, which attract flying insects and, in turn, aerial insectivores (Hanson 2007, Fontaine et al. 2009, DellaSala et al. 2014). Biodiversity and wildlife abundance in snag forest is high, particularly among birds, and is comparable to, and often higher than, that found in unburned old forest (Fontaine et al. 2009, Burnett et al. 2012, Swanson et al. 2011, DellaSala et al. 2014).

Since the early 20<sup>th</sup> century, however, snag forest has become rare in the Sierra Nevada because of fire-suppression policies, resulting in a twofold (Mallek et al. 2013) to fourfold (Odion and Hanson 2013, Hanson and Odion 2014, Odion et al. 2014) decline in severe fire. Moreover, on both public and private lands, when fires do occur, much of the post-fire habitat—especially in severely burned areas—is subjected to intensive post-fire logging, with no restrictions on logging around nest sites for most species, as well as mechanical mastication and herbicide-spraying of shrubs, followed by planting of conifers (USFS 2004). These practices exacerbate the deficit in snag forest caused by fire suppression (Swanson et al. 2011, DellaSala et al. 2014). Furthermore, the U.S. Forest Service is currently proposing

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as much as a tenfold increase in large-scale projects of mechanical thinning designed to prevent severe fires in the first place (North 2012). After a fire, logging, reduction/removal of native shrubs, and planting of conifers are the common current practice on private lands and much of national forest lands (USFS 2014a–c). For these reasons, researchers' concern about conservation of species associated with snag forest is justified.

My objectives in this study were three. First, to synthesize existing data to determine which forest birds native to the Sierra Nevada are positively associated with the habitat conditions created by severe fire and which are associated with unburned forests. Second, to determine the extent to which species in these two habitats are at risk because of either declining populations or rarity. Third, to determine whether declining species are disproportionately represented in one habitat or the other (snag forest or unburned).

## METHODS

This paper contains both a synthesis of existing literature on habitat associations of Sierra Nevada bird species with regard to wildland fire and an analysis of population trends in two sets of species: those associated with severe fire and those associated with unburned forest.

First, I synthesized existing studies that have investigated the relationships between severe fire and birds native to the Sierra Nevada to identify those species that tend to select snag forest during the breeding season. Four published, peer-reviewed studies addressing this question, Raphael and White (1984), Raphael et al. (1987), Hanson and North (2008), and Fontaine et al. (2009), are the basis for my categorization.

Raphael and White (1984) and Raphael et al. (1987) compared use of unburned forest and severely burned forest by various species in the northern Sierra Nevada. The former used a cluster analysis with a threshold of 0.75 for overlap in selection of nesting habitat. The latter evaluated species' habitat associations in a severely burned area versus an adjacent unburned forest by using frequencies of detection in surveys during three intervals, 6–8, 15–19, and 21–25 years after the fire. Raphael et al. (1987) did not include a statistical analysis, so I characterized species as being associated with severe fire or unburned forest if, during the breeding season, they were at least twice as abundant in one forest type than in the other. Hanson and North (2008), using point counts, investigated the relationship between three woodpecker species and fire severity in the Sierra Nevada in terms of foraging-habitat selection in three burned areas at 2 to 4 years after the fire. Fontaine et al. (2009) used point counts to evaluate differences in birds' use of unburned versus severely burned forest of two ages in southwestern Oregon. Though their study was not in the Sierra Nevada, it was useful in identifying the habitat association of a few of the rarer Sierra Nevada species for which the Sierra Nevada studies had too few (or no) detections for habitat selection to be assessed effectively. From Hanson and North (2008) and Fontaine et al. (2009) I categorized a species as associated with severe fire or unburned forest if the studies reported a statistically significant association with such habitat (at  $\alpha = 0.05$ ).

In some cases the literature identifies a species as being associated

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with severe fire only in the early years after the fire (e.g., Black-backed Woodpecker, Hairy Woodpecker, and Dark-eyed Junco [scientific names in Table 1]) but not in older burns, or vice versa (e.g., Orange-crowned Warbler, MacGillivray's Warbler). I have included both categories in the list of species associated with severe fire.

I restricted the list to species whose California breeding ranges lie primarily or exclusively in the montane and foothill forests of the Sierra Nevada, not extending to other nearby ecosystems such as the Central Valley to the west or the desert to the east. For this selection I used range maps from field guides to birds of western North America in general and northern California in particular (Fix and Bezener 2000, Peterson 2010).

Once the list of bird species associated with severely burned areas was determined, I used population-trend data (1966–2012) for the Sierra Nevada region from the Breeding Bird Survey (BBS) (<http://www.mbr-pwrc.usgs.gov/cgi-bin/atlasa12.pl?S15&2&12>) as the basis for which species are declining or increasing or are too rare for BBS data to reveal trends with confidence. I categorized a declining species as being at risk only if the long-term trend (1966–2012) was statistically significant, as coded by red at the BBS website ([http://www.mbr-pwrc.usgs.gov/bbs/trend\\_info10.html](http://www.mbr-pwrc.usgs.gov/bbs/trend_info10.html)).

I characterized species with serious data deficiencies due to rarity (coded by a red dot in BBS data: <http://www.mbr-pwrc.usgs.gov/bbs/credhm09.html>)—those with so little data that no trend could be estimated—as being at risk because of the inherent vulnerability of small populations (Traill et al. 2007).

Second, I used these sources to also identify the Sierra Nevada birds most strongly associated with the opposite end of the spectrum: unburned forest. To identify species at risk within this group, I used the BBS data as described above for snag-forest species.

To base the assessment on sets of species with a clear contrast, I excluded from the analysis species that were significantly associated neither with snag forest nor with unburned forest, for example, those species for which habitat associations are not yet well understood or which are more associated with intermediate levels of fire severity.

I used a chi-squared test for goodness of fit (Rosner 2000) to determine whether the proportions of increasing and declining species—those with statistically significant BBS trends—differed from the expectation under the null hypothesis of an equal proportion of increasing and decreasing species.

## RESULTS

I identified 24 forest birds native to Sierra Nevada that are associated with severely burned areas (Table 1). Of these 24 species, 10 have a population trend in the Sierra Nevada with a statistically significant decline, and six of these are also experiencing significant population declines across the United States as a whole (Table 1). Data for an additional two species are insufficient for a trend to be estimated (Table 1). Of the remaining species, most have downward trends, but these are not statistically significant. All of the snag-forest species with statistically significant population trends are in decline.

I identified 17 forest birds associated with unburned forests (Table 2). Of

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**Table 1** Birds Associated with Severely Burned Areas in the Sierra Nevada and Their Population Trends

Nesting guild and species	Studies indicating habitat association	BBS trend, 1966–2012 <sup>a</sup>
<b>Canopy</b>		
Calliope Hummingbird <i>Selasphorus calliope</i>	Raphael et al. 1987	
Olive-sided Flycatcher <i>Contopus cooperi</i>	Raphael et al. 1987 Fontaine et al. 2009	-3.71 <sup>b</sup>
Western Wood-Pewee <i>Contopus sordidulus</i>	Raphael et al. 1987	-1.68
Warbling Vireo <i>Vireo gilvus</i>	Fontaine et al. 2009	
Purple Finch <i>Haemorhous purpureus</i>	Fontaine et al. 2009	-2.14 <sup>b</sup>
<b>Shrub and ground</b>		
Mountain Quail <i>Oreortyx pictus</i>	Fontaine et al. 2009	
Common Nighthawk <i>Chordeiles minor</i>	Raphael et al. 1987	
Dusky Flycatcher <i>Empidonax oberholseri</i>	Fontaine et al. 2009	
Wrentit <i>Chamaea fasciata</i>	Fontaine et al. 2009	-1.98
Orange-crowned Warbler <i>Oreothlypis celata</i>	Fontaine et al. 2009	-2.32 <sup>b</sup>
Nashville Warbler <i>Oreothlypis ruficapilla</i>	Fontaine et al. 2009	-1.54 <sup>b</sup>
MacGillivray's Warbler <i>Geothlypis tolmiei</i>	Fontaine et al. 2009	
Yellow Warbler <i>Setophaga petechia</i>	Raphael et al. 1987	-1.26 <sup>b</sup>
Green-tailed Towhee <i>Pipilo chlorurus</i>	Raphael et al. 1987 Fontaine et al. 2009	
Chipping Sparrow <i>Spizella passerina</i>	Raphael et al. 1987	-2.85
Brewer's Sparrow <i>Spizella breweri</i>	Raphael et al. 1987	
Fox Sparrow <i>Passerella iliaca</i>	Raphael et al. 1987 Fontaine et al. 2009	
White-crowned Sparrow <i>Zonotrichia leucophrys</i>	Fontaine et al. 2009	
Dark-eyed Junco <i>Junco hyemalis</i>	Fontaine et al. 2009	-1.12 <sup>b</sup>
<b>Cavity</b>		
Lewis's Woodpecker <i>Melanerpes lewis</i>	Raphael and White 1984	NA <sup>c</sup>
Hairy Woodpecker <i>Picoides villosus</i>	Raphael et al. 1987 Fontaine et al. 2009	
Black-backed Woodpecker <i>Picoides arcticus</i>	Raphael et al. 1987 Hanson and North 2008	NA <sup>c</sup>
Pygmy Nuthatch <i>Sitta pygmaea</i>	Raphael and White 1984 Raphael et al. 1987	-2.93
Mountain Bluebird <i>Sialia currucoides</i>	Raphael and White 1984 Raphael et al. 1987	

<sup>a</sup>Percent change per year in Sierra Nevada. Only statistically significant trends are shown.

<sup>b</sup>Species also experiencing significant long-term (1966–2012) and short-term (2002–2012) population declines nationally, according to the BBS (<http://www.mbr-pwrc.usgs.gov/cgi-bin/atlas12.pl?US&2&12>).

<sup>c</sup>Detections during the BBS, at both the regional and national scales, too few for any trend to be estimated, and there are major deficiencies in the data (BBS red dot category).

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**Table 2** Birds Associated with Unburned Forest in the Sierra Nevada and Their Population Trends

Nesting guild and species	Studies indicating habitat association	BBS trend, 1966–2012 <sup>a</sup>
<b>Canopy</b>		
Pacific-slope Flycatcher <i>Empidonax difficilis</i>	Fontaine et al. 2009	
Hutton's Vireo <i>Vireo huttoni</i>	Fontaine et al. 2009	+5.33
Steller's Jay <i>Cyanocitta stelleri</i>	Raphael et al. 1987	
Brown Creeper <i>Certhia americana</i>	Raphael and White 1984	
Golden-crowned Kinglet <i>Regulus satrapa</i>	Raphael et al. 1987	
Black-throated Gray Warbler <i>Setophaga nigrescens</i>	Fontaine et al. 2009	-1.61 <sup>b</sup>
Hermit Warbler <i>Setophaga occidentalis</i>	Fontaine et al. 2009	
Western Tanager <i>Piranga ludoviciana</i>	Raphael et al. 1987	+1.21
Red Crossbill <i>Loxia curvirostra</i>	Raphael et al. 1987	NA <sup>c</sup>
Evening Grosbeak <i>Coccothraustes vespertinus</i>	Raphael et al. 1987	NA <sup>c</sup>
<b>Shrub and ground</b>		
Hermit Thrush <i>Catharus guttatus</i>	Raphael et al. 1987	
Wilson's Warbler <i>Cardellina pusilla</i>	Fontaine et al. 2009	-4.71 <sup>b</sup>
<b>Cavity</b>		
Williamson's Sapsucker <i>Sphyrapicus thyroideus</i>	Raphael and White 1984	+3.14
Red-breasted Sapsucker <i>Sphyrapicus ruber</i>	Raphael and White 1984	
Chestnut-backed Chickadee <i>Poecile rufescens</i>	Fontaine et al. 2009	NA <sup>c</sup>
Red-breasted Nuthatch <i>Sitta canadensis</i>	Raphael and White 1984	
Pacific Wren <i>Troglodytes pacificus</i>	Raphael et al. 1987	
	Fontaine et al. 2009	
	Fontaine et al. 2009	

<sup>a</sup>Percent change per year in Sierra Nevada. Only statistically significant trends are shown.

<sup>b</sup>Species also experiencing significant long-term (1966–2012) and short-term (2002–2012) population declines nationally, according to the BBS (<http://www.mbr-pwrc.usgs.gov/cgi-bin/atlas12.pl?US&2&12>).

<sup>c</sup>Detections during the BBS, at both the regional and national scales, too few for any trend to be estimated, and there are major deficiencies in the data (BBS red dot category).

these 17, two have experienced a statistically significant decline in the Sierra Nevada, three have experienced an increase, and three are too rare for their trend to be determined (Table 2).

Among snag-forest species associated with severely burned areas, the ratio of declining species to increasing species was significantly greater

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than expected, contradicting the null hypothesis ( $\chi^2 = 10.0$ ,  $P = 0.002$ ). The observed numbers of increasing and decreasing snag-forest species were zero and ten, respectively, whereas the expected values for both were five. The number of species of unburned forest with statistically significant population trends was insufficient for this analysis, but there were more increasing species than decreasing species. Thus, while it cannot be said that significantly more species of unburned forest are increasing rather than decreasing, the possibility that more of these species are decreasing than increasing can be ruled out.

## DISCUSSION

These results imply that about half of the Sierra Nevada bird species associated with severe fire are at risk, including some nesting in the canopy, in shrubs, and in cavities. BBS data also suggest that most of these are experiencing population decline nationally as well (Table 1). Moreover, all of the Sierra Nevada snag-forest species with statistically significant population trends are declining, a pattern not evident for the species of unburned forest.

Stephens et al. (2012) analyzed the effects of mechanical forest thinning intended to inhibit fires, but they did not include the effects of such fire reduction on species associated with habitat created by severe fire. They suggested that such projects have “few unintended consequences” (p. 558). However, the substantial number of bird species that select severely burned areas, and the pattern of declines among these species, indicate that the effects on snag-forest associates from management designed to reduce fire cannot be so easily dismissed.

White et al. (2013) suggested that mechanical thinning could be used to create “open” forests, with which many species are aligned. However, White et al. did not distinguish between open conditions created by intensive mechanical thinning, which is designed to minimize snags and reduce shrubs, versus open conditions created by natural disturbance, which contain an abundance of snags and patches of chaparral. For this reason, White et al. (2013) categorized species such as the Olive-sided Flycatcher and Black-backed Woodpecker, which are associated with severe fire, as associated with “open” forest rather than burned habitat. However, logging creates an ecological trap for the former (Robertson and Hutto 2007), and, once the forest is burned, severely degrades it for the latter by reducing the density of snags (Hutto 2008). This underscores the need for the rather specific nature of burned habitat, and the species associated with it, to be recognized (DellaSala et al. 2014).

The species associated with fire-following shrubs may be particularly vulnerable, as this group contains the largest number of species at risk. The threats to these species—as well as to other species associated with snag forest—from current policies for forest/fire management are compounded by a lack of protection during nesting season. Much of the post-fire logging and pre-fire mechanical thinning is ground-based, and heavy machinery crushes shrub patches, potentially affecting nesting birds, since there are currently no restrictions to prevent this (USFS 2004). The U.S. Forest Service’s conservation strategy for the Black-backed Woodpecker, which is the agency’s chosen “management indicator species” for snag forest, strongly

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recommends no logging in the nesting season, to protect not only Black-backed Woodpecker chicks as snags are felled, but also the many other birds of Black-backed Woodpecker habitat (Bond et al. 2012). However, although many studies of birds and burned habitat have been published over the last decade, the Forest Service has not incorporated this recommendation into its plan governing Sierra Nevada national forests (USFS 2004, USFS 2014a-c).

Additional harm to species associated with post-fire shrub habitat is caused by planting of conifers, intended to short-circuit the chaparral stage of natural post-fire succession and substantially reduce the extent and duration of shrub cover. This suppression of shrubs is exacerbated by post-fire logging often being promoted as a means of generating revenue to fund artificial planting of conifers (USFS 2004). Thus current post-fire management practices represent a threat to species that nest in or under shrubs, like the Orange-crowned Warbler, which is associated with intermediate stages of succession of severely burned forest in the Pacific states and the northern Rockies (Hutto 1995, Fontaine et al. 2009) and which is declining in the Sierra Nevada.

While my results highlight conservation concern for snag-forest species, they do not suggest that there are no threats to any species in unburned forest in the Sierra Nevada, particularly those of specialized habitat within unburned forest. For example, one of the declining species of unburned forest, Wilson's Warbler, is associated with dense thickets of riparian shrubs and small trees, and livestock grazing has been identified as a substantial threat in this regard (Beedy and Pandolfino 2013). Also, dense, old conifer forest is disproportionately affected by intensive mechanical thinning, which under current management tends to remove most of the trees, many of which are mature and old (USFS 2004). The California Spotted Owl (*Strix occidentalis occidentalis*), which the Forest Service considers sensitive, tends to avoid such thinned areas (Gallagher 2010). Dense, old forest adjacent to unmanaged burned patches offers conditions optimal for this species, since the owls prefer the former for nesting and roosting, the latter for foraging (Bond et al. 2009). Under current management (USFS 2004), these conditions are being targeted by mechanical thinning of dense old forest and by post-fire logging (DellaSala et al. 2014), which tends to reduce occupancy (Lee et al. 2012). The California Spotted Owl is now experiencing a population decline, except in unmanaged forests protected on national park lands (Conner et al. 2013, Tempel and Gutiérrez 2013, Tempel 2014).

Thus a reevaluation of current policies for forest and fire management (i.e., fire suppression, forest thinning for fuel reduction, post-fire logging, shrub eradication, and conifer planting) is warranted, especially on federal public lands where most of the current and potential habitat for these species occurs. Furthermore, increased use of managed wildland fire, particularly in remote areas, to restore fire of mixed severity to these forests, would benefit many species.

## ACKNOWLEDGMENTS

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# **CALL TYPES OF THE RED CROSSBILL IN THE SAN GABRIEL, SAN BERNARDINO, AND SAN JACINTO MOUNTAINS, SOUTHERN CALIFORNIA**

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**ABSTRACT:** The Red Crossbill (*Loxia curvirostra*) is notable for its extensive morphological and vocal variation, which may represent a complex of incipient and cryptic species differing by flight call. To date, at least 10 distinct flight-call groups have been identified in North America. To our knowledge, however, the flight calls of the Red Crossbills of southern California have not been studied. To begin to address this deficit, we recorded Red Crossbill flight calls at 17 locations in and near the Transverse and northern Peninsular ranges from January 2011 through April 2014. These crossbills were associated with multiple species of conifers, including Jeffrey Pine, Sugar Pine, White Fir, and ornamental plantings of non-native Aleppo Pine, at elevations from 380 to 2700 m. Analysis of sonograms of these flight calls reveals primarily type 2 of Groth's (1993) classification system but also migrants of type 3 in the Mojave Desert.

The nomadic Red Crossbill (*Loxia curvirostra*) is found throughout the coniferous forests of North America and is notable for its large irruptions, which are modulated primarily by the waxing and waning of cone crops (Dickerman 1987, Knox, 1992, Benkman, 1993). The Red Crossbill is further distinguished by its complex morphological and vocal variation (Groth 1993, Smith and Benkman 2007), characteristics that may help create or reinforce reproductively isolated populations. Although often difficult to discern under field conditions, these vocal variations, particularly in flight calls, may be used to assign individual crossbills to groups that may represent incipient or cryptic species. The physical differences, primarily in body and bill size, by which the various subspecies have been defined are not obvious under field conditions (Groth 1993).

In southern California, the occurrence of the Red Crossbill has been documented in the literature since the end of the 19th century (Daggett 1899, Grinnell and Miller 1944). Much work on the variation of the Red Crossbill has been done since the publication of the most recent regional survey (Garrett and Dunn 1981), yet no study, to our knowledge, has categorized the Red Crossbills of southern California by flight calls. To address this deficit, we audio-recorded the species in the San Gabriel (Kern and Los Angeles counties), San Bernardino (San Bernardino County), and San Jacinto mountains (Riverside County) from January 2011 to April 2014. Here, we describe the results of the analysis of these audio recordings.

## **Distributional Summary**

Red Crossbills inhabit coniferous forest throughout North America. In California, they are widespread in the northern half of the state, with breed-

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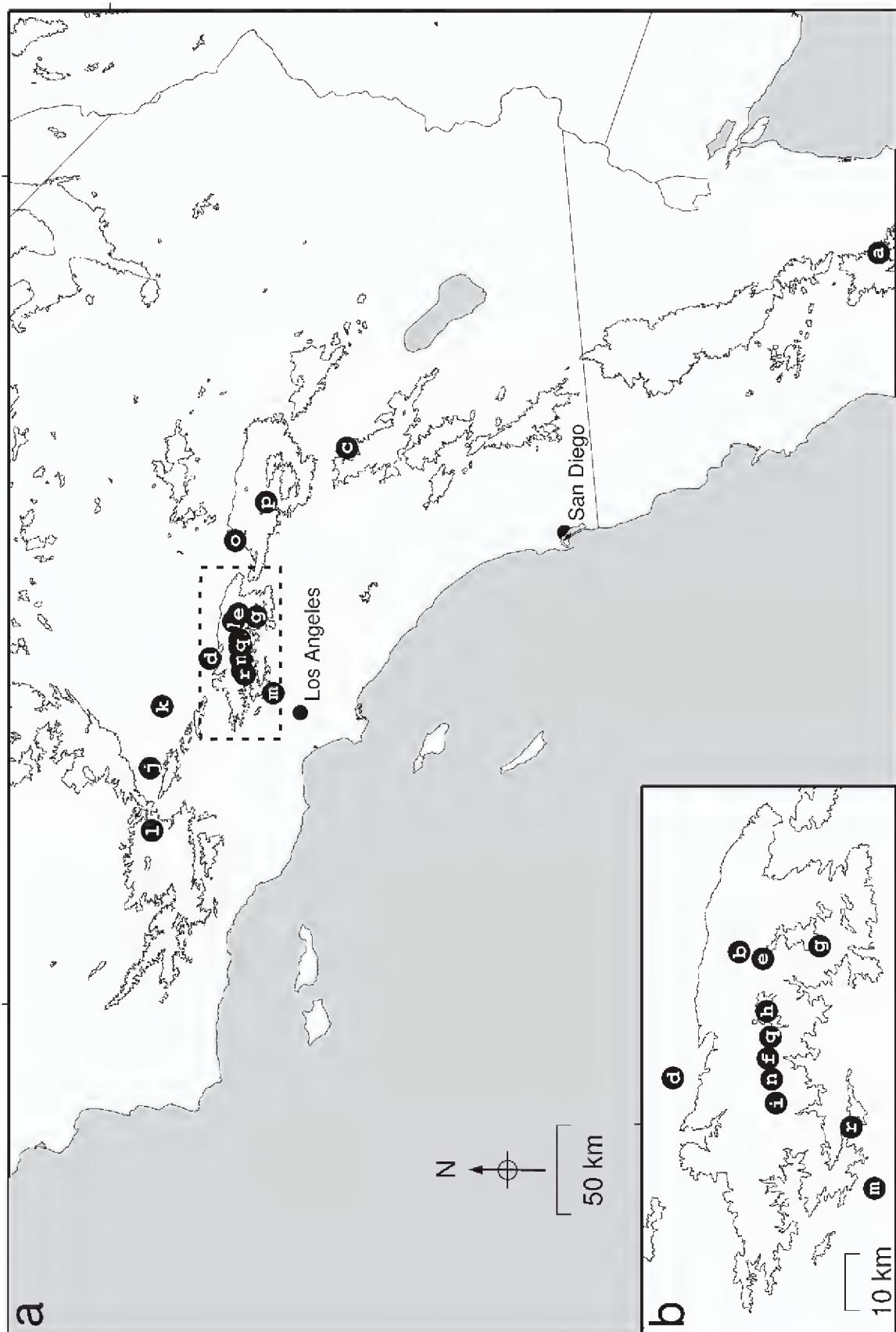


Figure 1. Locations of Red Crossbill recordings discussed in this paper. Letters refer to locations keyed in Table 1. Contour interval 1200 m. (a) Southern and Baja California. Dashed box shows region of detail. (b) Detail of sites of Red Crossbill recordings in the San Gabriel Mountains.

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ing populations in the southern Cascade Range, northern Coast Ranges, Klamath Mountains, Modoc Plateau, and the Sierra Nevada (Adkisson 1996). In southern California, the occurrence of Red Crossbill is erratic, with most records from the mountains of the Transverse and Peninsular ranges, supplemented with exceptional records, both toward the coast and in the desert, primarily in ornamental plantings, during irruption years (Garrett and Dunn 1981, Unitt 2004).

In the Transverse Ranges, nesting has been recorded on Mt. Pinos (elevation ~2600 m), Ventura County, but is still only suspected elsewhere despite an abundance of apparently suitable habitat (K. L. Garrett pers. comm. 2011). Farther south, potential breeding has been observed on only one occasion, in coastal ornamental plantings in San Diego County (Unitt 2004).

The morphological variation in the Red Crossbill has led to various classification schemes over the past century (Griscom 1937, Monson and Phillips 1981, Payne 1987, Groth 1993). However, most of the recent work has focused on variations in flight calls, which in North America have been grouped into 10 types (Groth 1993, Benkman et al. 2009, Irwin 2010).

Birds of each call-type differ in bill structure, and these differences influence their ability to feed on cones of various sizes (Benkman 1993, Benkman et al. 2010). These differences in bill structure are thought to cause each call-type to preferentially forage on and associate with specific conifers. This preferential foraging may be especially apparent during periods of food scarcity (Benkman 1993). During failures of cone crops of a call-type's key conifer, crossbills may irrupt in search of other seed sources.

### Observations

In southern California Red Crossbills are sporadically reported to ornithological mailing lists and to the online database at <http://www.ebird.org>. We drew upon both of these sources in choosing locations to search for Red Crossbills. Garrett's observations near Big Pines, San Gabriel Mountains, provided the impetus for beginning our search on nearby Table Mountain.

We recorded the birds with a Sennheiser ME66 shotgun microphone connected to a Marantz PMD 670 digital recorder sampling at 44 kHz and a Sennheiser MKE-400 short shotgun microphone connected to an Olympus LS-10. One exception is the recording made on 25 June, which was extracted from a video taken with a Canon A720 IS digital camera. Table 1 lists our observations and recordings. We are aware of one additional recording from the Peninsular ranges, made by Richard Webster on 24 September 2010, in the Sierra San Pedro Mártir of Baja California, Mexico (XC71803, accessible at <http://www.xeno-canto.org/71803>).

Our observations in the mountains were made mostly above 2000 m elevation in mixed-conifer forests (Minnich 2007). In addition, we observed crossbills in subalpine forests on Throop Peak and at Bluff Lake as well as in ornamental plantings of Aleppo Pine (*Pinus halepensis*) in the Mojave Desert. Mixed-conifer forests in the Transverse and Peninsular ranges consist primarily of Jeffrey Pine (*P. jeffreyi*), Sugar Pine (*P. lambertiana*), and White Fir (*Abies concolor*), infrequently of Ponderosa Pine (*P. ponderosa*), while subalpine forests at high elevations consist of Lodgepole Pine (*P. contorta* subsp. *murrayana*) and Limber Pine (*P. flexilis*).

**Table 1** Recordings of Flight Calls of the Red Crossbill from Southern California and Northern Baja California

Location	Map key <sup>a</sup>	Elevation (m)	Coordinates	Forest type	Date	Call type(s)	Notes <sup>b</sup>
Kern County							
Frazier Mountain	1	2322	34.792° N, 118.954° W	Jeffrey Pine	12 May 2013	2	XC133514
Los Angeles County: Mojave Desert	d	950	34.502° N, 117.911° W	Aleppo Pine (ornamental)	5 Mar 2011 4 Nov 2012	2 3	XC112383, XC112571
Pearblossom Park, Pearblossom					10 Nov 2012 12 Nov 2012 26 Jan 2013	3 2 and 3 2 and 3	XC112570 XC120276, XC120295, XC120319
Holiday Lake, Neenach	j	879	34.800° N, 118.576° W	Aleppo Pine (ornamental)	23 Feb 2013 2 Mar 2013	2 2	XC123662
Apollo Park	k	710	34.742° N, 118.200° W	Aleppo Pine (ornamental)	2 Mar 2013	3	XC123661
Los Angeles County: San Gabriel Mountains							
Table Mountain, Big Pines	b	2200	34.386° N, 117.687° W	Ponderosa/Jeffery Pine	8 Jan 2011 15 Jan 2011 13 Apr 2014 25 Apr 2014	2 2 2 2	XC175904 XC176661
Blue Ridge Campground	e	2400	34.359° N, 117.686° W	Jeffrey Pine/White Fir	24 Apr 2011	2	
Angeles Crest Hwy., Mile 60.7	f	2100	34.352° N, 117.890° W	Jeffrey Pine/White Fir	3 Jun 2011	2	
Throop Peak	h	2700	34.353° N, 117.800° W	Lodgepole Pine	15 Jun 2011 19 Jun 2011 17 Aug 2013 14 Sep 2013	2 2 2 2	XC145609 XC147715

(continued)

**Table 1** (continued)

Location	Map key <sup>a</sup>	Elevation (m)	Coordinates	Forest type	Date	Call type(s)	Notes <sup>b</sup>
Mt. Waterman	i	2117	34.350° N, 117.929° W	Jeffrey Pine	25 Jun 2011	2	Specimen LACM 115904
Altadena	m	380	34.184° N, 118.122° W	Suburban Jeffrey Pine	3 Jun 2013	2	XC136217
Buckhorn Campground	n	1980	34.346° N, 117.915° W		8 Jun 2013	2	XC139367, XC139365
Grassy Hollow	o	2230	34.375° N, 117.20° W	Jeffrey Pine	16 Jun 2013	2	XC139364
Little Jimmy Spring	q	2290	34.348° N, 117.834° W	Jeffrey Pine	14 Sep 2013	2	XC147717
Chilao Visitors Center	r	1610	34.327° N, 118.006° W	Jeffrey Pine	19 Jan 2014	2	XC165047
San Bernardino County: San Bernardino Mountains	g	1974	34.270° N, 117.622° W	Jeffery Pine, Sugar Pine, White Fir	18 Jun 2011	—	
Mt. Baldy Ski Lodge	p	2315	34.221° N, 116.969° W	Lodgepole Pine	20 Jul 2013	2	XC143040, XC143041, XC143042, XC143043
Bluff Lake, Big Bear Lake							
Riverside County: San Jacinto Mountains							
Mountain Station, Palm Springs	c	2600	33.813° N, 116.639° W	Sugar Pine	23-24 Jan 2011	2	XC124421
Aerial Tramway							
Baja California: Sierra San Pedro Martir							
National Observatory	a	2400	31.014° N, 115.463° W	Jeffrey Pine, Sugar Pine, White Fir	24 Sep 2010	2	XC71803 <sup>c</sup>

<sup>a</sup>See Figure 1.<sup>b</sup>Recording available at [www.xeno-canto.org](http://www.xeno-canto.org) or specimen.<sup>c</sup>Recording by Richard E. Webster. All others by Benner.

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Flocks of Red Crossbills ranged in size from as few as two adults to in excess of 30 individuals, including adults and juveniles. One juvenile, from a flock of call-type 2, was killed by striking a window at the Mt. Waterman ski area on 25 June 2011 and is deposited as a specimen in the Natural History Museum of Los Angeles County (LACM 115904).

We observed crossbills feeding on seeds of Sugar Pine (once, Mt. San Jacinto), Jeffrey Pine (Angeles Crest Highway, Mt. Waterman Ski Area, Table Mountain), Lodgepole Pine (Throop Peak, Bluff Lake), and Aleppo Pine (Holiday Lake, Apollo Park, Pearblossom Park), as well as visiting a feeder (Grassy Hollow). On many occasions, we saw individuals perching, but not feeding, in White Fir. We also noted birds taking grit at Mt. Waterman and gleaning insects from branch tips on Mt. San Jacinto. In addition, we observed adults feeding juveniles on at least two occasions (25 June 2011 and 14 September 2013). Because of the species' nomadism, however, this behavior does not necessarily indicate breeding in the immediate area.

### Analysis and Discussion

Identification of crossbill calls from audio recordings requires analysis of the calls' time-frequency content. Figures 2 and 3 show spectrograms of representative flight calls. Groth (1993) provided sample spectrograms and written descriptions of the eight flight-call categories he defined.

Of these eight, four (types 1, 2, 3, and 5) are dominated by a downward modulation in frequency over time, similar to the recordings shown in Figures 2 and 3. The frequency modulation of flight calls of type 1 is rapidly upward followed by rapidly downward. Flight calls of type 2 have a downward frequency modulation interrupted by a hesitation (Figure 2). Flight calls of call-type 3 feature a zigzag modulation in frequency, so that the trace resembles a lower case "n" stretched horizontally (Figure 3). Flight calls of type 5 have two parallel frequency components, both with an overall downward frequency modulation.

In comparison with those presented by Groth (1993) and one of type 2 from New York (Figure 2D), spectrograms of most of our recordings resemble call-type 2. In addition, Webster's recording from the Sierra San Pedro Martir, 24 September 2010, is most similar to call type 2. However, comparison with Groth (1993) and examples of type 3 from Washington and New York (Figures 3B and C) shows that some flight calls recorded at Pearblossom Park during November 2012 (Figure 3A) are most similar to that type.

Our record of call-type 3 is notable. Crossbills of call-type 3 are considered specialists on Western Hemlock (*Tsuga heterophylla*) and occur primarily in the Pacific Northwest and, during irruptions, locally in the Eastern Hemlock (*T. canadensis*) forests of the north-central U.S. and Canada (Benkman 1993, Groth, 1993). Although call-type 3 is plentiful in the Coast Ranges of northern California, there appear to be few records south of the San Francisco Bay area or elsewhere in the southwestern U.S. The occurrence of call-type 3 in the Mojave Desert during the winter of 2012–2013 coincided with a broad irruption of that call-type throughout the western U.S. (M. Young pers. comm.). One record of call-type 3 from the Pinaleno Mountains of southern Arizona during an irruption in the

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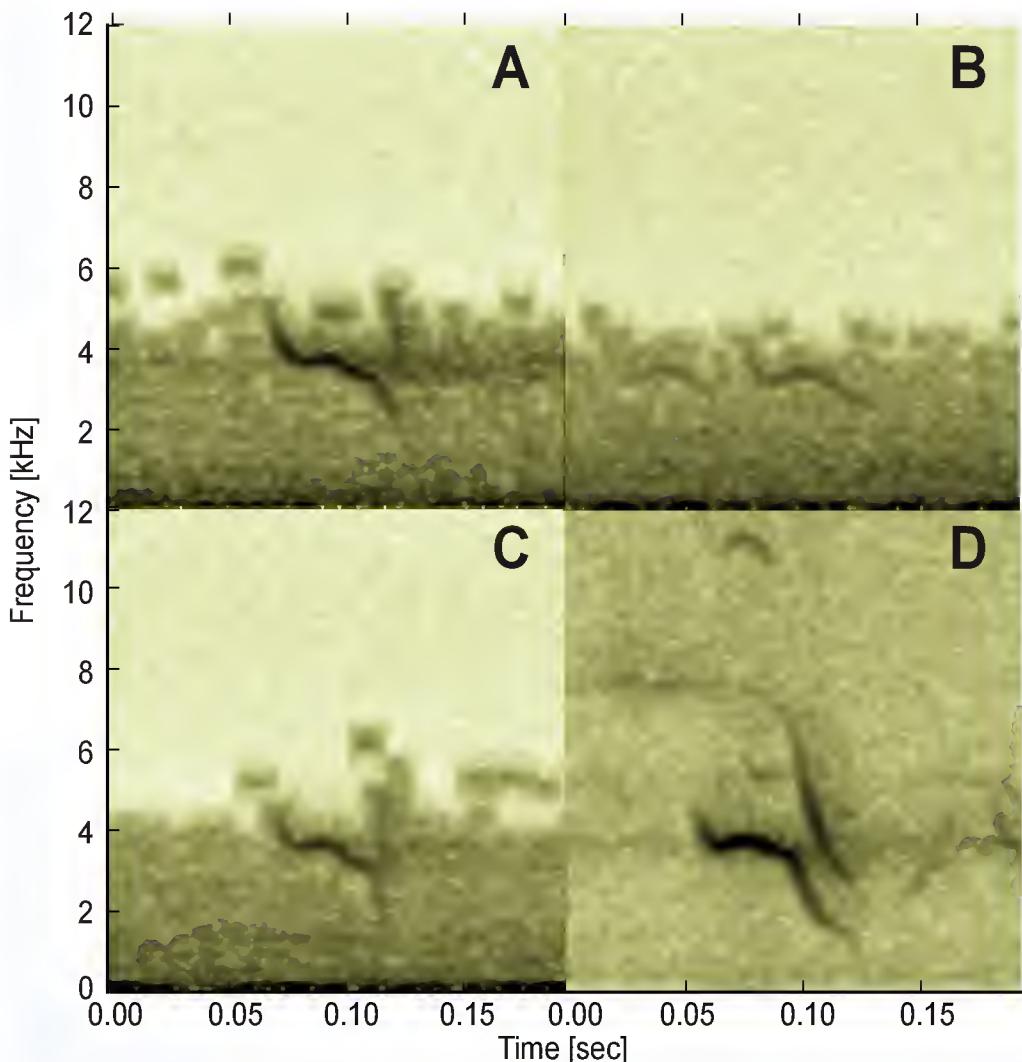


Figure 2. Comparison of type 2 flight calls. (A) Recorded on 23 January 2011 at Mt. San Jacinto, San Jacinto Mountains, (B) recorded on 8 January 2011 at Table Mountain, San Gabriel Mountains, (C) recorded on 5 March 2011 at Pearblossom Park, Los Angeles Co., (D) recorded in Cayuga County, New York (M. Young; Macaulay Library of Natural Sounds [LNS] 161296). Digitization artifacts from file compression are apparent in A, B, and C.

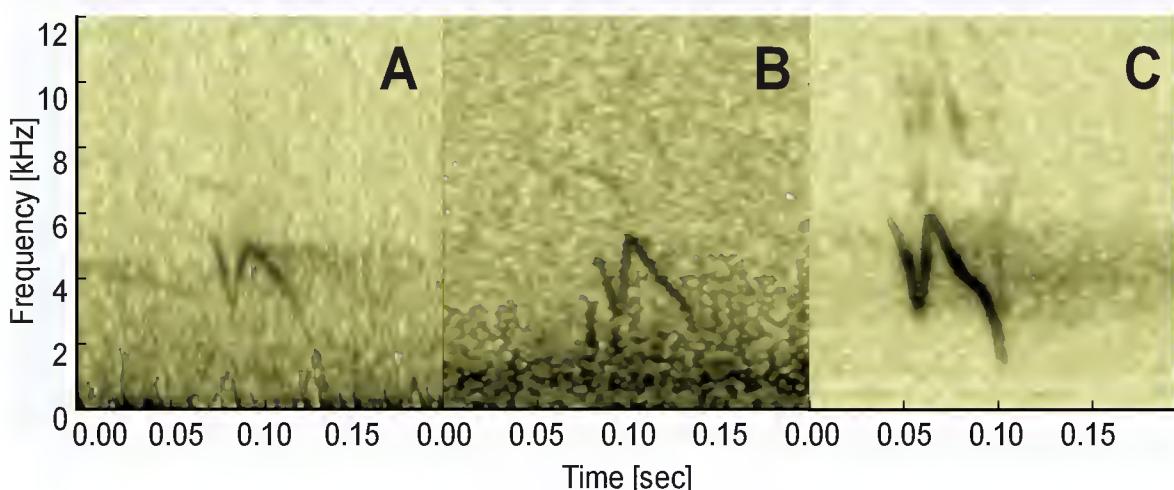


Figure 3. Comparison of call type 3 flight calls. (A) Recorded on 4 November 2012 at Pearblossom, Los Angeles Co., (B) recorded on 3 September 2011 at Tucquala Meadows, Kittitas Co., Washington, (C) recorded in Pharsalia, Chenango Co., New York (M. Young; LNS 136592).

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summer of 1986 (Groth 1993), however, hints at prior far-ranging irruptions. Crossbills making call-type 3 correspond with the smallest North American subspecies, *minor*, of which *sitkensis* is a synonym (Monson and Phillips 1981, Groth 1993). This subspecies has been reported from southern California previously on the basis of measurements of two small specimens from Pasadena collected on 26 December 1898 and of one small specimen from Riverside collected 17 January 1909 (Daggett 1899, Willett 1933, Grinnell and Miller 1944). So long ago, of course, these specimens' vocalizations were not reported.

The habitat requirements inferred from Benkman (1993) suggest that the mountains of southern California could support resident populations of crossbills of up to four call-types (Figure 4). The preponderance of mixed-conifer forest throughout the Transverse and Peninsular ranges (Figure 4a and Minnich 2007) suggests that birds of call-type 2, a Ponderosa Pine specialist, should be the most abundant, as we confirmed.

Crossbills of call-type 4, specializing on Douglas-fir (*Pseudotsuga menziesii*), occur throughout the Pacific Northwest. In southern California, Douglas-fir is replaced by the endemic Bigcone Douglas-fir (*P. macrocarpa*) (Burns and Honkala 1990). Although the massive cones of Bigcone Douglas-fir appear to provide ideal forage for Red Crossbills, the late age at which the trees bear cones and smaller size of their cone-crop size in comparison with *P. menziesii* (Burns and Honkala 1990), combined with the absence of large, continuous stands (Minnich 2007), suggest that Bigcone Douglas-fir may not provide enough nourishment to support a resident population of the Red Crossbill. However, crossbills of call-type 4 could occur in Bigcone Douglas-fir during irruption years (Figure 4b).

The presence of small yet continuous stands of subalpine forest, containing primarily Sierra Lodgepole Pine (*P. contorta* subsp. *murrayana*), scattered about the Transverse and Peninsular ranges (Minnich 2007), suggests that small populations of call-type 5, a specialist on the Rocky Mountain subspecies of the Lodgepole Pine (*P. contorta* subsp. *latifolia*), are possible (Figure 4c). However, differences in serotiny between *latifolia* and *murrayana* should lead to an increase in competition for seed from other, nonspecialized consumers, reducing the likelihood of a resident type-5 population in southern California (Critchfield 1980, Benkman, 1999).

Finally, call-type 6, equivalent to the Mexican Crossbill (*L. c. stricklandi*), is presumed to occur in the southern Peninsular Ranges of the Mexican state of Baja California and may disperse northward toward the international border, just as it does in Arizona (Monson and Phillips 1981). Although we are not aware of any audio recordings of call-type 6 from the Sierra Juárez and Sierra San Pedro Mártir of Baja California, the presence of a single specimen of *L. c. stricklandi* collected at Campo, San Diego County (Unitt 2004, San Diego Natural History Museum 873), coupled with reports of *L. c. stricklandi* from Santa Cruz Island (Howell 1917, Dickey and van Rossem 1923) suggests that call-type 6 may, at least, be considered accidental. Additional recordings and new specimens from Baja California are needed to assess the status of call-types 2 and 6 there.

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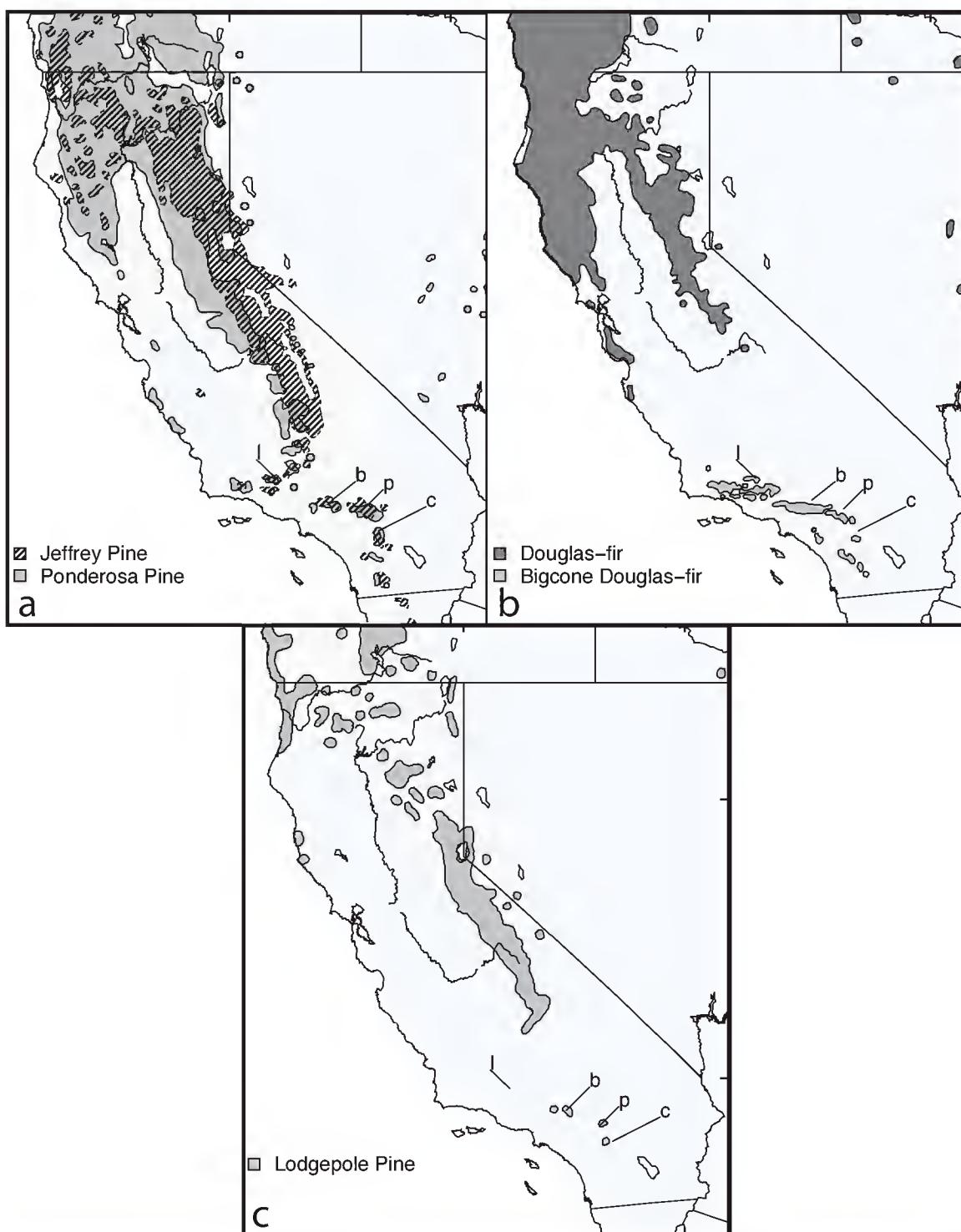


Figure 4. Ranges of conifer species key for Red Crossbills of various call-types, from Little (1971). (a) Sister species Jeffrey (diagonal hatching) and Ponderosa Pine (solid gray), on which call-type 2 is a specialist; (b) Bigcone Douglas-fir (light gray) and Douglas-fir (dark gray), on which call-type 4 is a specialist; (c) Sierra Lodgepole Pine; call-type 5 is considered a specialist on Rocky Mountain Lodgepole Pine. Letters correspond to the locations of recordings in listed Table 1.

## CONCLUSIONS

We have obtained recordings of the Red Crossbill from the San Gabriel, San Bernardino, and San Jacinto Mountains and surrounding desert valleys demonstrating the occurrence of individuals of call-types 2 and 3. While

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call-type 2 is expected on the basis of habitat and wide range elsewhere in western North America, call-type 3 is notable, possibly representing vagrancy from the Pacific Northwest. Furthermore, the presence of Red Crossbills of call-type 2 in the mountains of southern California continuously from 2011 to 2014 suggests they are resident. The recordings we obtained in southern California cover a little over three years, and continued observation may demonstrate the occurrence of other call-types, especially during irruption years. Diagnostic recordings are often obtainable with readily available technology, such as cell phones, and we encourage bird watchers to continue collecting data.

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Red Crossbill

*Photo by Lance Benner*

## NOTES

### INTERSPECIFIC NEST PARASITISM BY CHUKAR ON GREATER SAGE-GROUSE

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Nest parasitism occurs when a female bird lays eggs in the nest of another and the host incubates the eggs and may provide some form of parental care for the offspring (Lyon and Eadie 1991). Precocial birds (e.g., Galliformes and Anseriformes) are typically facultative nest parasites of both their own and other species (Lyon and Eadie 1991). This behavior increases a female's reproductive success when she parasitizes other nests while simultaneously raising her own offspring. Both interspecific and conspecific nest parasitism have been well documented in several families of the order Galliformes, particularly the Phasianidae (Lyon and Eadie 1991, Geffen and Yom-Tov 2001, Krakauer and Kimball 2009). The Chukar (*Alectoris chukar*) has been widely introduced as a game bird to western North America from Eurasia and is now well established within the Great Basin from northeastern California east to Utah and north to Idaho and Oregon (Christensen 1996). Over much of this range the Chukar occurs with other phasianids, including the native Greater Sage-Grouse (*Centrocercus urophasianus*), within sagebrush (*Artemisia* spp.) steppe (Christensen 1996, Schroeder et al. 1999, Connelly et al. 2000). Chukar typically exploit a broader range of habitats than do sage-grouse, but both species use the same species of sagebrush and other shrubs for nesting cover (Christensen 1996, Schroeder et al. 1999). Chukar are known to parasitize nests of other individuals of their own species (Geffen and Yom-Tov 2001), but we are unaware of reported evidence that Chukar may parasitize nests of sage-grouse. Here we describe a case of a Chukar parasitizing a sage-grouse nest in the sagebrush steppe of western Nevada.

We observed this parasitism during a large-scale study aimed at evaluating spatio-temporal variation in the sage-grouse's demographics. The study area is in the Virginia Mountains ( $40^{\circ} 3' N$ ,  $119^{\circ} 50' W$ ) approximately 65 km north of Reno, where the sage-grouse population is small and isolated (Coates et al. 2011). Although Chukar occupy the site, their population is scattered and their numbers are relatively small (Coates pers. obs.). The habitat is high-desert sagebrush steppe altered by exurban development, encroachment of conifers and invasive annual grasses, and multiple human land uses, including livestock grazing and recreation. Land ownership is a mix of private and public, the latter administered by the U.S. Bureau of Land Management.

On 5 May 2011, while we were using radio-telemetry (Millspaugh and Marzluff 2001) to monitor nesting sage-grouse equipped with necklace-style VHF transmitters (Advanced Telemetry Systems, Isanti, MN), we incidentally flushed an incubating sage-grouse and observed two Chukar eggs and eight sage-grouse eggs. We distinguished the remains of the Chukar eggs by their morphology, and David J. Delehanty (Idaho State University) later confirmed our identification. After discovering the parasitized nest, to evaluate the effect of the parasitism we deployed a camouflaged miniature video camera at the nest site (Figure 1a). The device recorded continuously. On 3 June, this nest contained two Chukar eggs and the eggshells of eight hatched sage-grouse eggs (Figure 1b). One of the Chukar eggs was partially hatched, but the chick did not survive; the other egg was fertile and appeared to be in the later stages of incubation, but failed to begin hatching (Figure 1c). We collected the eggs for confirmation of the species.

Although species of the family Phasianidae have been reported to parasitize

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Figure 1. Images recorded by the miniature camera at the Greater Sage-Grouse nest parasitized by the Chukar in the Virginia Mountains, northwestern Nevada. Arrows identify the Chukar eggs: (A) Hen leaving for an incubation recess on 30 May 2011; (B) partially hatched sage-grouse clutch with two Chukar eggs remaining (one is hidden from view under a sage-grouse eggshell); (C) a partially hatched Chukar egg. Images B and C were recorded on 3 June 2011.

nests of others (Lyon and Eadie 1991, Krakauer and Kimball 2009), and the sage-grouse has been documented as a conspecific nest parasite (Bird et al. 2012), our observations represent the first evidence of the Chukar parasitizing sage-grouse nests. Both species construct similar nests by scraping a shallow depression in the ground under vegetation that provides cover (Mackie and Buechner 1963, Connelly et al. 2000). These shared characteristics present opportunities for parasitism by other Galliformes or other ground-nesting precocial birds (Krakauer and Kimball 2009). Furthermore, the Chukar and sage-grouse nest concurrently, usually from early April to early July (Mackie and Buechner 1963, Schroeder et al. 1999), which enhances the opportunity for parasitism.

Parasitic chicks of species with incubation periods shorter than those of the host species are often more successful (Slagsvold 1998), largely because the difference in timing allows parasitic chicks to hatch first and subsequently outcompete the host's chicks. Ground-nesting species may depart from their nests soon after hatching of the first few eggs, and unhatched eggs are often left behind (Westemeier et al. 1998). Among other Galliformes, for example, Greater Prairie-Chicken (*Tympanuchus cupido*) nests parasitized by the non-native Ring-necked Pheasant (*Phasianus colchicus*) are more likely to be abandoned than unparasitized nests because pheasant eggs hatch earlier (Westemeier et al. 1998). Although the incubation period of the Chukar (24 days; Mackie and Buechner 1963, Christensen 1996) is shorter than that of the sage-grouse (28 days; Schroeder et al. 1999, Taylor et al. 2012), at the nest we observed the parasite did not gain this advantage. The Chukar appeared to lay its eggs up to 5 days after the sage-grouse's clutch was complete, as indicated

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by the partially hatched Chukar chick. Therefore, the Chukar eggs may have been incubated insufficiently. Alternatively, the Chukar eggs could have been laid while the sage-grouse was laying but the development of the smaller Chukar eggs was slower than that of the sage-grouse eggs because transfer of heat from hen to egg was reduced. Although this instance of nest parasitism by the Chukar failed to produce viable offspring, if Chukar are able to parasitize sage-grouse nests during laying and hatch before the sage-grouse eggs, the female sage-grouse may abandon her clutch. Bird et al. (2012) reported that in Alberta sage-grouse successfully hatched 42.3% of parasitic eggs deposited by conspecifics.

Our observation should be of interest to wildlife conservationists and managers, as the Chukar is a non-native species whose range overlaps that of the sage-grouse in the Great Basin. Although this observation represents the single clear occurrence of parasitism by the Chukar among 91 sage-grouse nests monitored over 4 years, other occurrences were possible. Furthermore, the parasitism was observed in an area in which Chukar were relatively few. Research into the prevalence of parasitism by the Chukar and its effects on the sage-grouse's nest survival and recruitment rates, particularly in areas where sage-grouse populations overlap areas where the Chukar's population density is moderate to high, might prove beneficial.

We thank Zachary B. Lockyer and Jonathan Dudko for their help in the field, as well as Mike L. Casazza and David J. Delehanty for collaboration on the project from which this observation arose. Financial support was provided by the Nevada Department of Wildlife, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service. Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. government.

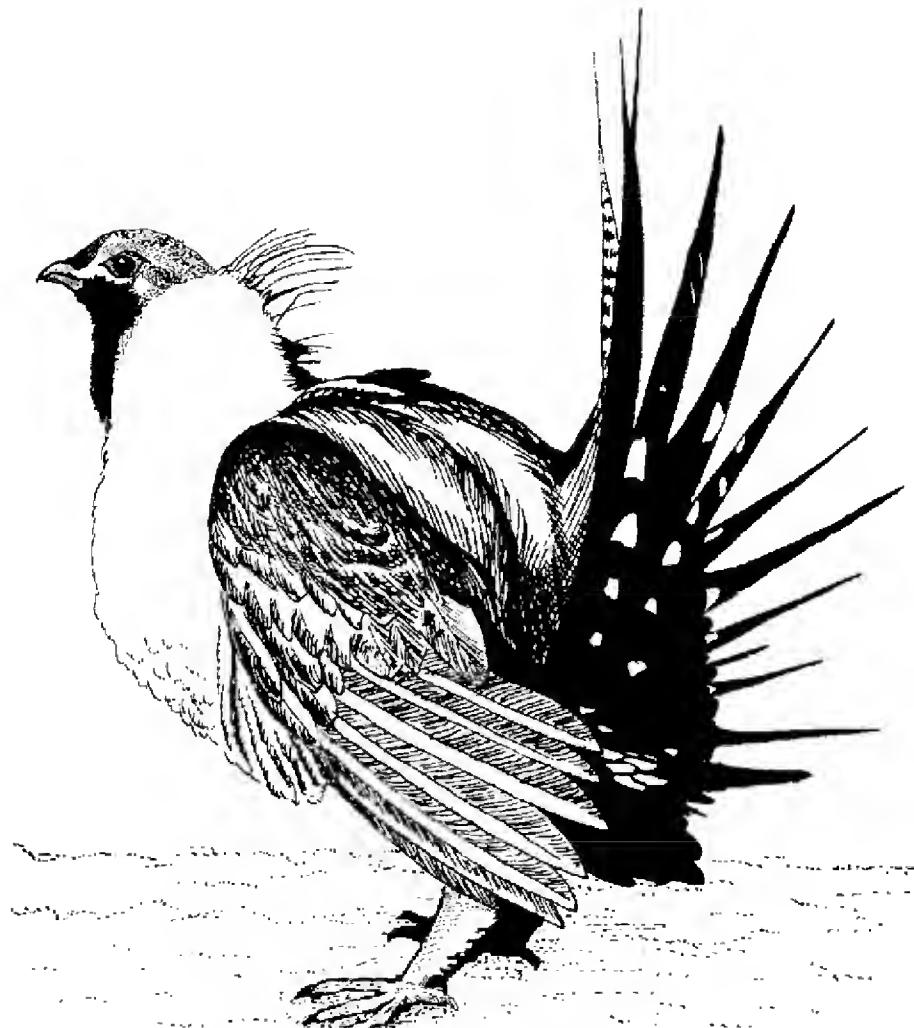
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Greater Sage-Grouse

Sketch by George C. West

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# CALIFORNIA BREEDING OF THE BLACK-THROATED MAGPIE-JAY, INCLUDING EVIDENCE OF HELPING

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In San Diego County, California, anecdotal records of free-ranging Black-throated Magpie-Jays (*Calocitta colliei*) date back to the 1970s in the vicinity of the Solana Beach neighborhood of Eden Gardens (M. U. Evans pers. comm.). Of several locales within the county where the species has persisted, the oldest is the Tijuana River valley, where it has been documented continuously since ~1992 (G. McCaskie pers. comm.). These long-tailed corvids are endemic to the Pacific slope of mainland Mexico and reside in deciduous open woodlands and arid scrub forests between sea level and 1200 meters elevation. Their occurrence in San Diego County can almost certainly be attributed to the pet trade in adjacent northwestern Baja California (see Hamilton 2001) and escapees from aviaries north of the U.S.–Mexico border. Primary areas of their local occurrence and where I documented breeding include the Tijuana River valley as well as the Sweetwater River in the vicinity of the Plaza Bonita mall in the community of Bonita (Haas 2004). Magpie-jays seen in Jamul (e.g., 15 June 2000, M. U. Evans) were probably escapees from a local aviary. The origin of their occurrence on Point Loma (e.g., 17 May 1999, P. A. Ginsburg; 1 May 2000, S. E. Smith; 12 September 2004, K. Goldman) and within Mission Trails Regional Park and nearby residential communities (e.g., 20 April 2013, M. Beeve; 21 April 2013, B. Mulrooney) is less clear. They may have been escapees from local aviaries or individuals dispersing from Bonita or the Tijuana River valley.

Between April and July of 2000, during unrelated field studies in Goat Canyon just north of the international border at the eastern edge of Border Field State Park, I regularly observed two to three adult magpie-jays. These garrulous birds were easily found during virtually every visit to my study site of >12 hectares. On 20 April, when I was in a stand of tall, sparsely leaved arroyo willows (*Salix lasiolepis*), a pair of adult magpie-jays scolded me. Their close approach and persistent scolding suggested the presence of a nearby nest or young. As I worked my way through the willow thicket, the two jays followed me and continued to scold. I subsequently entered an area with a partially open canopy and found a third adult sitting atop a bulky nest of loosely assembled sticks (Figure 1). The nest had been built in the upper crotch of one of the taller willows approximately 5 meters above the ground. As I neared the nest tree, the sitting adult departed. Hoping to determine the status of the nest (presence of eggs, nestlings, etc.), I found a nearby area from which to observe. Within 15 minutes two adults returned to the vicinity of the nest. Although my position was fairly well concealed, both magpie-jays approached me, did not visit the nest, but instead re-initiated scolding, at which time I departed.

I returned to my study site eight days later (28 April) to once again find an adult atop the nest. I did not approach the nest closely, but once again took refuge, this time under a dense arch of giant reed (*Arundo donax*). A second adult approached the nest, fed the sitting adult, and was quickly forced aside by a third adult that likewise fed the sitting bird. I saw no other feeding behaviors during one hour of observation, the sitting bird did not depart the nest, and I consequently assumed that the sitting bird was brooding.

I continued to monitor the nest through May, returning on 22 May to find the nest occupied by two nestlings. One nestling was considerably larger than the other. I estimated that it must have hatched two or more days prior to its sibling. The larger bird's tail was already becoming elongate, and its posture and plumage (e.g., pin

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feathers not obvious, crown fully feathered with few down feathers) suggested to me that fledging was imminent. I observed no feeding behaviors at this time. Because the adults remained away from the nest for more than 30 minutes, I departed.

On 2 June I returned to my study site but first checked the magpie-jay nest and found no evidence of occupancy. After resuming my field work I spotted two juvenile magpie-jays at the top of a large gum tree (*Eucalyptus* sp.); they were easily distinguished from three nearby adults by their extensively white underparts. I subsequently observed each of the three adults feeding the fledglings. These events represent the first documentation of not only successful breeding of the Black-throated Magpie-Jay in San Diego County but also of cooperative breeding.

In an intensive study of four breeding groups of Black-throated Magpie-Jays in Sonora, Mexico, from 1980 to 1982, Winterstein (1985) reported numerous examples of helping including courtship feeding as well as helping behavior at the nest. Helpers, ranging from one to seven per group, "participated in all aspects of the reproductive effort except copulation and incubation" (p. ix). Although the breeding females were responsible for the majority of nest construction, helpers were also involved. Helpers also were the primary feeders of females on nests. Helping behavior has also been documented in the closely related White-throated Magpie-Jay (*C. formosa*; e.g., Langen and Vehrencamp 1999), with helpers similarly providing disproportional feedings to female breeders and occasionally acting as the primary care-providers of fledglings.

My San Diego County observations document courtship feeding, helping at the nest, and fledgling support within the species' introduced range. These behaviors are not unexpected in view of the pervasive level of helping reported by Winterstein as well as the species' close relationship with the cooperatively breeding White-throated Magpie-Jay. The benefits of cooperative breeding in corvids as well as theories on its evolution are widely addressed in the ornithological literature (e.g., Brown 1974, Emlen 1978, Ekman and Ericson 2006).

I initially documented the Black-throated Magpie-Jay's nesting season in San Diego County as extending from March to July (Haas 2004). Within its natural range the species may breed from as early as November to July of the following year (Howell and Webb 1995), this extended period incorporating two periods of seasonal rains. My San Diego County records corresponded with the region's single, often limited, rainy season. However, while continuing to study the small population in the Tijuana River valley over several succeeding years, I discovered on 12 November 2005 a trio of magpie-jays building a nest. This event, which followed a season of above-average rainfall in 2004–2005, marked the return of a family group to Goat Canyon in the vicinity of previously documented late winter–early spring nests that were constructed in 2000, 2001, and 2002. The November nest, however, was abandoned prior to egg deposition.

Since 2005, I have found successful nesting of the Black-throated Magpie-Jay only in 2009 (both of two nests found in the Tijuana River valley were successful), 2011 (two of three nests found in the Tijuana River valley were successful, as was one nest along the Sweetwater River in Bonita), and 2012, which was the year of the magpie-jay's most successful breeding since I began monitoring the species in 2000 (three of three nests found in the Tijuana River valley and one of two nests found in Bonita were successful). All of these nestings took place during the locally more traditional late winter–early spring avian breeding season. Given that "family group" is the appropriate descriptor of the magpie-jay's breeding system, and despite reports of their occurrence at an increasing number of localities within San Diego County, the number of family groups (of annually variable size) has remained fairly constant over the past 15 years. Typically two but as many as three family groups have occupied the Tijuana River valley during this period, and one family group (although I found two family groups in 2012) has occupied the Sweetwater River–Bonita area. Recent observations along the San Diego River in Mission Trails Regional Park may portend

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Figure 1. Black-throated Magpie-Jay on nest, Tijuana River Valley, San Diego County, California, 28 April 2000.

*Photo by William E. Haas*

the species' colonization of a new locale. Although the habitat there is ideal for breeding, the species' persistence will be dictated more likely by the availability of forage (especially fruits, nuts, and large invertebrates) in adjacent residential neighborhoods.

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# A RAPID FIELD ASSESSMENT OF THE RUFOUS NIGHT-HERON POPULATION OF PALAU, MICRONESIA

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A medium-sized (58 cm) cinnamon-brown heron with a black crown and nape, *Nycticorax caledonicus pelewensis* is a nonmigratory subspecies of the Rufous Night-Heron that occurs only in the Palau and Chuuk islands of Micronesia (Pratt et al. 1987, Wiles 2005, Pratt and Etpison 2008). Its natural habitat is coastal wetland with mangroves for roosting and tidal flats for feeding grounds (Engbring 1988). The Rufous Night-Heron was selected as the flagship coastal species for Palau's National Program for Monitoring Forest and Coastal Birds because it is a prominent feature of Palau's coastal avifauna and, as a conspicuous territorial predator with a varied diet, it has practical value as an indicator of the biological richness of Palau's coastal wetlands (Olsen and Eberdong 2012). In order to fully incorporate the Rufous Night-Heron into the national monitoring program, we needed a baseline population estimate for the Palau subpopulation. When we reviewed the reports of previous surveys of Micronesia's birds (Engbring et al. 1990, Engbring 1992, VanderWerf 2007) we found that the reports mentioned sightings of Rufous Night-Herons but did not provide a population estimate. *Waterbird Population Estimates* (Wetlands International 2014) hazarded a "best guess" population estimate of "1–10,000" for the subspecies. The chief obstacles to establishing a more precise population estimate for the subspecies are the lack of a well-defined breeding season and the lack of centralized roosting or nesting colonies where the birds can be conveniently counted. Although Rufous Night-Herons are generally considered to be crepuscular or nocturnal creatures (Hancock 1999, Brazil 2009), we observed that, in Palau, they are routinely attracted to their coastal feeding grounds during daytime low tides. So we took the approach of a rapid field assessment of Palau's Rufous Night-Heron population by counting the birds at low tide on their daytime feeding grounds as they stand on the tidal flats waiting for prey.

Taking advantage of a four-day sequence of exceptionally low (−6 cm to −21 cm) afternoon tides from 4 through 7 June 2012, we counted Rufous Night-Herons on their feeding grounds in a study area that encompasses the coastal wetlands of Babeldaob Island and of the smaller islands of Koror, Ngerkebesang, and Malakal (known collectively as the Koror Complex) immediately south of Babeldaob. Together, the four islands account for 80% (376 km<sup>2</sup>) of Palau's land mass and 92% (4200 ha) of Palau's mangroves (Colin 2009). The remaining 8% of Palau's mangroves is scattered among small, remote islands in the lagoon south of the study area. In order to complete the assessment during the four-day tide sequence, we selected four representative assessment localities within the study area, using the extent of mangroves to express our coverage of Rufous Night-Heron habitat in the study area. The four assessment localities and their estimated coverage by mangrove in hectares are in eastern Babeldaob (500 ha), western Babeldaob (600 ha), northern Babeldaob (500 ha), and southern Babeldaob/Koror Island Complex (500 ha). The greater extent of mangrove represented at western Babeldaob resulted from the inclusion of Ngermeduu Bay, an estuary that is lined with mangrove forest. In combination, the four localities encompass 2100 ha of mangroves, representing half of the Rufous Night-Heron habitat in the study area. En route to or from each assessment locality, we visited inland sites where Rufous Night-Herons are known to congregate to see how many remained at these sites at low tide.

Over the four-day period, we completed 46 counts of Rufous Night-Herons from

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separate vantage points at the coastal assessment localities and at inland sites where Rufous Night-Herons reportedly congregate. For each count, we recorded the number of Rufous Night-Herons, time of day, geographic coordinates, temperature, cloud cover, and wind condition. We conducted our coastal counts from vantage points that offered neighboring panoramic views of the tidal flats and mangroves, using landmarks to avoid overlapping counts and following the daily progressions of low tide from north to south. We conducted 22 coastal counts from separate shoreline vantage points (beach, bluff, bridge, causeway, or pier) as follows: eastern Babelaob (4 June 2012, 8 counts), northern Babelaob (6 June 2012, 6 counts), southern Babelaob/Koror Island Complex (7 June 2012, 8 counts). The number of shoreline counts per assessment locality depended on the distribution of suitable vantage points and landmarks. We made 18 coastal counts from a boat traveling along the remote coast of the western Babelaob assessment locality (5 June 2012), which is not accessible by a land route. These offshore counts required many tightly spaced offshore vantage points to avoid overlap from drift each time we stopped the boat to count birds. The six inland sites that we assessed en route to or from the coastal counts included a fish farm in western Babelaob, a landfill in eastern Babelaob, and two landfills, a fish farm and a sewage-treatment plant in the southern Babelaob/Koror Complex. Figure 1 maps the approximate locations of the vantage points in each assessment locality. In three instances, pairs of vantage points for adjacent sites (e.g., a pier and a landfill) were too close together to register as separate points on the scale of the map.

We tallied a four-day cumulative total of 552 Rufous Night-Herons: 514 (93.1%) adult birds and 38 (6.9%) immature birds, with an average of 12 birds per count (range 0–50 birds per count). The time of day ranged from 12:45 to 16:00; temperature from 26.2°C to 35.5°C; cloud cover from 5% to 100%; wind calm to gentle breeze (Beaufort Scale 0 to 3); visibility unlimited. Table 1 summarizes our cumulative counts for each coastal assessment locality and for the inland sites. All of the Rufous Night-Herons that we encountered during the assessment were on exposed meadows of sea grass except for three adults at the Koror municipal landfill, an inland site that reportedly attracts up to 50 Rufous Night-Herons at high tide (Pratt et al. 1980). Rufous Night-Herons were absent from the other five inland sites. No Rufous Night-Herons were seen in the mangrove areas of the assessment localities, and none were seen on the tidal flats of Ngermeduu Bay, which is rich in mangroves but devoid of sea-grass meadows because of sedimentation from the three rivers that empty into the bay. Our results are consistent with previous anecdotal reports that Palau's Rufous Night-Herons normally roost in coastal mangroves until low tide, when they fly to their feeding grounds on nearby tidal flats (Marshall 1949, Baker 1951, Pratt et al. 1980, Pratt and Etpison 2008, Olsen and Eberdong 2009).

On the basis of the results of our rapid field assessment of half of the study area and several inland sites, we conclude that the Rufous Night-Herons that we encountered during the low-tide sequence of the four-day assessment period represent half of the

**Table 1** Cumulative Counts of the Rufous Night-Heron in Palau, 4–7 June 2012

Assessment Locality	No. Adults	No. Immature	Total
Eastern Babelaob	109	6	115
Western Babelaob	174	0	174
Northern Babelaob	162	13	175
Southern Babelaob/Koror Complex	66	19	85
Inland sites	3	0	3

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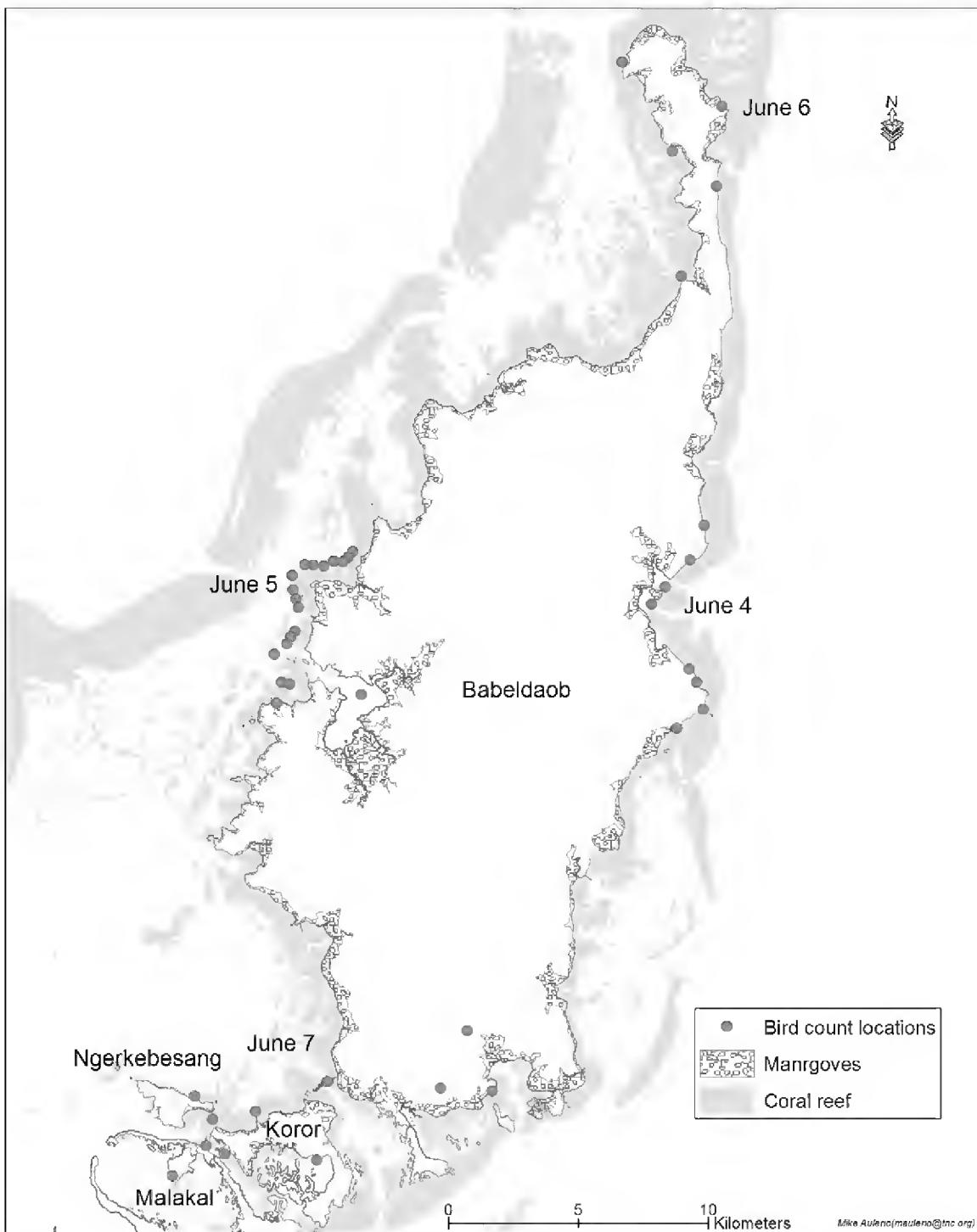


Figure 1. Locations of vantage points for counts of the Rufous Night-Heron in Palau, 4–7 June 2012.

Rufous Night-Herons in the study area. We estimate that Palau harbors a population of no more than 1200 Rufous Night-Herons—roughly twice the four-day cumulative total from our field assessment plus an 8% adjustment to account for the birds in the southern lagoon, which was not included in the study area. It is noteworthy that the Rufous Night-Herons on the exposed tidal flats were attracted to sea-grass meadows exclusively (Figure 2). Palau's sea-grass meadows face continuing threats from sedimentation due to economic development and from rising sea level and other effects of climate change (Colin 2009). The Rufous Night-Heron should prove useful as an indicator species for managers of coastal ecosystems where sea-grass meadows occur. We recommend a companion assessment of the Rufous Night-Heron subpopulation

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Figure 2. Adult Rufous Night-Heron, *Nycticorax caledonicus pelewensis*, capturing prey on an exposed meadow of sea grass during an afternoon low tide, eastern coast of Babeldaob Island, Palau, 19 May 2010.

*Photo by Alan R. Olsen*

in the Chuuk islands to combine with our results as a starting point for future population studies of the subspecies.

We gratefully acknowledge the support we received from the Belau National Museum and the National Program for Monitoring Forest and Coastal Birds, as well as the Palau Conservation Society and the Marisla Foundation through the Global Greengrants Fund. Hon. Wilson Ongos, governor of the state of Ngaremlengui, arranged boat transportation for the offshore counts. We thank Mark O'Brien of BirdLife International for guidance, reviewers Kimball L. Garrett and Daniel D. Gibson for their valuable comments, Mike Aulerio of The Nature Conservancy for the map of the study area, and our student birdwatchers: Angelica Olsen, Aurora Olsen, and Murako Belibei.

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## BOOK REVIEWS

**The Cornell Guide to Bird Sounds: Master Set for North America**, by Cornell Lab of Ornithology. 2013. [www.macaulaylibrary.org](http://www.macaulaylibrary.org). \$49.99.

Familiarity with bird vocalizations is an integral part of birding, identification, and understanding behavior. Thus a good sound library is critical for anyone with a strong interest in birds. A suite of CDs, websites, and apps is available to satisfy this need, each with varying geographic coverage, number of vocalizations per species, quality, and overlap in sound libraries. The *Cornell Guide to Bird Sounds: Master Set for North America* (Master Set) stands apart from other sound libraries in its massive scope, with 4938 recordings of 735 species. Recordings are meant to represent the vocal and nonvocal repertoire of each species, as well as geographic variation and dialects.

This set is essentially a compilation of the most representative recordings available in the Macaulay Library of Natural Sound, an enormous archive of recordings accumulated since 1929. The library was recently digitized and is available online in a searchable format (<http://macaulaylibrary.org>), but wading through all the available recordings can be cumbersome. Many are not labeled with vocalization type, or are not labeled correctly (especially song vs. call), some are very long clips with a variety of sounds, and quality varies. The Master Set excels at making this enormous resource more user-friendly for someone wishing to learn a bird's vocalizations, look up a mystery sound, or even learn a little about the function of a certain call. Another benefit of the Master Set is its portability. Once the set has been downloaded to a computer, the files can be organized to suit the user's needs, displayed in a computer media player such as iTunes or Windows Media Player, or downloaded onto a mobile device. For birders who want a smaller but still robust sound library with fewer examples of uncommon vocalizations and regional dialects, the Cornell Guide to Bird Sounds is also available in an Essential Set for North America, with nearly as many species as the Master Set but about a third of the recordings and a much smaller size at 812 MB.

The Master Set comes as a downloadable 4.71-GB .zip file, organized into three folders arranged in alphabetical order by species. Each file name includes the species, location (two-letter state or province code or three-letter country code), and a description of the song or call type. A "track number" orders the set taxonomically, so it is easy to sort the entire set into taxonomic order (following Clements version 6.7; <http://www.birds.cornell.edu/clementschecklist/download/>). A "Comments" field includes a suite of additional information, including scientific name, location, date, recordist, and the Macaulay Library catalog number. Also included is a photo of each species, which pops up when the track is played, a nice touch. A booklet included with the download has a good deal of background information, including resources, credits, and a handy "How to Use" section. It also includes contact information for users to send in feedback (see below).

One aspect of the Master Set that sets it apart from other audio guides is its focus on highlighting geographic variation. Not only is every recording labeled with location, but many species are split into field-identifiable "groups" with representative recordings of each. Clearly a great deal of effort went into selecting not only the most distinctive variations but many more subtle differences as well. Each "call type" of the Red Crossbill and the Evening Grosbeak is included, as well as each "group" of the White-crowned Sparrow, and I was delighted to hear the distinctive Martha's Vineyard song type of the Black-capped Chickadee. There are a variety of clips for widespread and variable species such as the White-breasted Nuthatch, Bewick's Wren, and Dark-eyed Junco, although the Red-backed Junco (*Junco hyemalis dorsalis*) is not represented. Many vagrants to North America are also included. Most of these are represented by only one or two recordings, although a few have a variety of sounds given. For example, there are four clips of song and one of call of the Golden-crowned

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Warbler, and several of the Fork-tailed Flycatcher, including the dawn song.

For such an enormous undertaking, it is perhaps to be expected that the Master Set suffers from a lack of consistency, many missing vocalization types, and containing a few errors. In general, species that are widespread, well studied, or highly variable are well represented in this set. For example, there are 20 clips each of the Common Raven and of the Great Gray Owl, and 23 of the Ruby-crowned Kinglet. On the other hand, there are only three tracks of the Pinyon Jay, which has a large and varied repertoire. The Song Sparrow is well represented in song, with an array of examples from different populations, but only two call types are given. The Master Set booklet claims that it represents “the full vocal repertoire” of many regular North American breeding species, but this claim is not met for many others. One of the most glaring examples for me is in the towhees, for which each species has several examples of songs but only one clip of the typical contact call. For the three “brown” towhees with which I am most familiar (Abert’s, California, and Canyon), this set should include high-pitched “seet” calls, aggression, alarm, and begging calls, and especially the distinctive “squeal duet.” Clips of the Anna’s and Black-chinned hummingbirds do not include the dive displays. Although the Master Set does include most species likely to be encountered in North America, a few regular North American species are not represented. The Pink-footed Shearwater, one of the most vocal North American seabirds away from its breeding islands, is one example. A few species with limited ranges, such as the Red-faced Cormorant, are also absent from this set. Given the size and scope of this work, I found relatively very few errors. These included a prominent song of a Rufous-winged Sparrow included in a recording of a family of Verdins, and the typical daytime song of the Ash-throated Flycatcher is labeled as a “possible dawn song.” The assembly call of the Gambel’s Quail is labeled “song,” and the male’s advertisement calls are simply labeled “call.” whereas equivalent vocalizations of the California Quail are labeled and ordered correctly.

To the developers’ credit, the booklet notes that this is a work in progress, and contact information is given for those who wish to send in additional recordings, comments, suggestions, or corrections. It is also noted that those who purchase the Master Set will be notified when additions or corrections are available.

The strength of the Master Set is not as a compendium of the entire vocal repertoire of North American birds but as a thorough, well-organized collection of the most representative recordings available in the Macaulay Library of Natural Sounds. This is by far the most extensive portable sound library available today. It will be useful to advanced birders as well as to researchers for a wide array of purposes, and is extremely interesting and informative to simply browse. I enjoyed stumbling upon recordings of human mimicry by the European Starling and the American Crow, the advertising hoot of a Barred × Spotted Owl hybrid, and even recordings of the Bachman’s Warbler, Ivory-billed Woodpecker and Dusky Seaside Sparrow. The Master Set is a treasure trove of sounds that can only improve with further additions and input from the ornithological community, making available the sounds of the bird world that can improve our understanding of the birds around us.

*Lauren B. Harter*

**California Condors in the Pacific Northwest**, by Jesse D’Elia and Susan M. Haig, illustrations by Ram Papish, foreword by Noel Snyder. 2013. Oregon State University Press. 208 + xvi pp., 29 black-and-white figures including five maps, and five tables. Paperback, \$19.95. ISBN 978-0-87071-700-0; e-book, ISBN 978-0-87071-701-7.

This slim volume is a valuable contribution to our understanding of the historic occurrence of the California Condor from California north of San Francisco Bay to southern Canada. It is perhaps not widely recognized that the condor was at one

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time a conspicuous element of the Pacific Northwest's avifauna. We may associate condors with the open, semi-arid mountain ranges of southern California, their last redoubt, rather than with the dense coastal forest habitats to the north. However, the authors compile a carefully scrutinized and apparently exhaustive list of 81 reports from the Pacific Northwest dating from Lewis and Clark's first observation while they descended the Columbia River gorge on 28 October 1805 to a 1925 report from Siskiyou County, California. Dave DeSante's sighting of a single condor soaring over the Stanford University campus in March of 1971 falls a bit south of the region covered by this study (J. Nisbet, *Visible Bones*, Sasquatch Books, Seattle, 2003, pp. 55–58).

The established facts with regard to the condor's occurrence in this northern portion of its historic range are of more than academic interest. From a low point of just 22 in the early 1980s, through prodigious efforts by recovery teams, there are today over 400 living condors, including over 200 that have been reintroduced into the wild from several captive-breeding programs. These free-flying condors have been released in southern and central California, northeastern Arizona, and northern Baja California. Several pairs have successfully fledged young in the wild. However, these populations are carefully monitored and managed, provisioned, and periodically captured for lead detoxification, which is a serious continuing threat to the success of these reintroductions. The aggressive management required offends the sensibility of some passionate observers. If ultimately successful, however, these efforts may be appreciated as atonement for our prior sins.

If the condor was once a well-established permanent resident of the Pacific Northwest, future reintroductions along our rugged and sparsely populated coast might well be successful. The historical evidence the authors compile here supports that supposition. Though they found no firm proof of nesting within the Pacific Northwest, they address the controversy with respect to whether condors were permanent residents or just seasonal visitors to the region, a key consideration for any attempt at reintroductions here.

The first Euroamerican explorers and naturalists to visit these regions, notably, Meriwether Lewis and William Clark, Alexander Henry, David Thompson, David Douglas, William Fraser Tolmie, John Kirk Townsend, and Titian Ramsey Peale, reported observing condors frequently at various seasons and in substantial numbers along the lower Columbia, the Willamette, Umpqua, Rogue, Klamath, and Sacramento rivers, even north to the lower Fraser and east of the Cascades on the Columbia. By the 1850s, however, the condor was judged rare and declining in these northern regions.

The authors evaluate several competing explanations for this early and precipitous decline. They make a compelling case that the primary threat to the condor at this time was the widespread use of poisoned bait to protect livestock raised at the early fur-trading posts and missions. For example, John McLoughlin, chief factor for the Hudson's Bay Company outpost at Fort Vancouver on the lower Columbia, ordered strychnine for that purpose as early as 1839 (pp. 79–80). Ironically, lead poisoning from lead shot remains a potent threat to the survival of condors reintroduced in recent years.

The Oregon Zoo initiated breeding condors in 2003. In 2007 the Yurok Tribe on the Smith River in northwesternmost California voted to support a study of the feasibility of reintroducing condors within their traditional territory. Perhaps condor recovery will be more effective in the Pacific Northwest than elsewhere given that the threat of poisoning could be much reduced here.

The authors take note of the ethnographic and linguistic evidence of Native American observers. Though they left no written accounts that meet contemporary scholarly standards of evidence, it is clear that Native peoples throughout the Pacific Northwest (and beyond, to the high Plains east of the northern Rockies) were well acquainted with the California Condor, as Brian Sharp has meticulously documented ("The California Condor in Northwestern North America," *Western Birds* 43:54–89,

## BOOK REVIEWS

2012). The authors are critical of some of Sharp's claims, but are in agreement on the fundamentals. They effectively dismiss the facile equation of the condor with the mythical thunderbird, noting that thunderbird legends have a much wider distribution that scarcely overlaps that of the known Anthropocene range of the California Condor. They also dismiss as most unlikely that Native communities might have contributed significantly to the rapid decline of the condor in the mid-1800s (pp. 98–99). They note that Native people coexisted with the condor throughout the West for millennia and that they suffered massive population declines as a result of introduced diseases and hostility from settlers at the very time the condor population was plummeting.

If one day soon we may marvel at the sight of this “beatifull Buzzard of the columbia” (Meriwether Lewis, 3 January 1806, in Gary E. Moulton, ed., *The Journals of the Lewis & Clark Expedition*, vol. 6, p. 162) at home along the rugged Northwest coast, the authors’ meticulous research will be amply rewarded.

*Eugene S. Hunn*

## FEATURED PHOTO

### OCCURRENCE OF AMELANISTIC MARBLED MURRELETS IN SOUTHEAST ALASKA AND NORTHERN BRITISH COLUMBIA

SEAN E. McALLISTER, 417 Second Street, Suite 201, Eureka, California 95501  
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*Authors' note: Although the terminology commonly used to describe abnormal pigmentation in birds (e.g., albinism, leucism) is generally understood, confusion and disagreements over the exact definitions of such terms can be problematic, and may result in misrepresentations of the actual source of associated abnormalities (van Grouw 2006, Davis 2007). Therefore, in this paper we use the more general term "amelanistic" to refer to birds that lack melanin, either partially or completely, when the cause is not known.*

On 5 July 2009, McAllister was part of a team surveying by boat for Marbled (*Brachyramphus marmoratus*) and Kittlitz's (*B. brevirostris*) Murrelets in Glacier Bay, southeast Alaska. In calm and clear conditions, toward the end of a survey transect at North Sandy Cove (58.7° N, 135.9 °W), he saw in the distance a small, bright white object on the water. His initial impression was that it was Styrofoam or other debris, but closer inspection revealed it to be a lone live bird the size and shape of a Marbled Murrelet (see this issue's back cover). Although largely white, the bird had a dark eye, ruddy brown bill, and pale brown pigmentation in some feathers of the back and wings, indicating the bird was partially amelanistic. In addition, the bird also appeared to have a slightly malformed bill, with the tip of the maxilla curving beyond and below the tip of the mandible. The possibility of a stray Long-billed Murrelet (*B. perdix*) could not be fully dismissed, but McAllister's impression of the overall size of the bird and the relative length and depth of the bill was more consistent with a Marbled Murrelet.

After sharing photos of this striking bird and discussing it with several murrelet experts, it became apparent that amelanism in murrelets was largely unrecorded. However, seven years earlier, in August 2002, Neilson photographed a small all-white alcid (Figure 1) near Leland Island in Glacier Bay (58.6° N, 135.9° W), within 10 km of the bird seen in 2009. Observed with two Marbled Murrelets also in view, the bird resembled a murrelet in appearance and behavior. However, the low quality of the image, scanned from a black and white negative, precludes positive identification. In particular, the bill of the bird appears too large and conical for a Marbled Murrelet, being more typical perhaps of a juvenile Rhinoceros Auklet (*Cerorhinca monocerata*), but a Rhinoceros Auklet should have appeared larger in comparison to the nearby Marbled Murrelets, and the eye appears disproportionately large for that species.

Notwithstanding, Neilson photographed another white alcid (Figure 2), which we consider is definitely a Marbled Murrelet from its overall shape and proportions of the eye and bill, at the mouth of Idaho Inlet (58.2° N, 136.3° W), approximately 25 km southwest of the mouth of Glacier Bay, in June 2012. The photo shows a dark eye, dark bill, and all white plumage except for a blackish lining on the tip of the outer primary and at least one of the tertials.

S. G. Sealy and H. R. Carter also informed us of a specimen of an apparently totally amelanistic Marbled Murrelet that they had examined at the Royal British Columbia Museum (RBCM 6023) in Victoria (Figure 3). The bird was collected by M. Lohbrunner in August 1936 near Price Island on the northern mainland coast of British Columbia

FEATURED PHOTO



Figure 1. Unidentified amelanistic alcid (possibly a Marbled Murrelet) in Glacier Bay, Alaska, 19 August 2002.

*Photo by Janet Neilson*



Figure 2. Partially amelanistic Marbled Murrelet at the mouth of Idaho Inlet, southeast Alaska, 19 June 2012.

*Photo by Janet Neilson*

## FEATURED PHOTO



Figure 3. Amelanistic Marbled Murrelet (Royal British Columbia Museum 6023) collected on 17 August 1936 by M. Lohbrunner at Price Island, British Columbia.

*Photo courtesy of Lesley Kennes, Royal British Columbia Museum*

(52.4° N, 128.7° W), and its identity was confirmed by measurements. No obvious pigment was evident in any of the feathers, and the bare parts (bill and feet) appeared yellow to flesh colored (not dark). It is possible, however, that the pale appearance of the bare parts resulted from age-related foxing of the specimen rather than a lack of melanin in the bare parts of the living bird.

Gross's (1965) compilation of 54 bird families for which albinism had been reported, included 7 species of the family Alcidae: the Razorbill (*Alca torda*), Common Murre (*Uria aalge*), Thick-billed Murre (*U. lomvia*), Dovekie (*Alle alle*), Black Guillemot (*Cephus grylle*), Pigeon Guillemot (*C. columba*), and Atlantic Puffin (*Fratercula arctica*). Sealy (1969) reported an additional three species, the Parakeet Auklet (*Aethia psittacula*), Least Auklet (*A. pusilla*), and Crested Auklet (*A. cristatella*). An Internet search for unpublished alcid observations produced a recent (January 2009) photo from an undisclosed location of an amelanistic Rhinoceros Auklet and a brief account of a reportedly well-seen, but unphotographed, all-white Kittlitz's Murrelet off the east side of Kodiak Island in September 2002 (J. Allen, fide G. van Vliet). Those, along with our examples of the Marbled Murrelet, bring the total number of alcid species in which amelanism is known to 13 of the total 25, including the extinct Great Auk (*Pinguinus impennis*).

In the Marbled Murrelet, the body plumage is molted twice per year, during pre-alternate molt in late winter to spring and prebasic molt in late summer to early fall, while the remiges are molted once per year during the complete prebasic molt (Carter and Stein 1995). Prior to the prebasic molt in mid to late summer, some individuals' body plumage and primaries are heavily worn and faded (at times, only the rachis remains on the distal part of the outer primaries), but they still appear light brown when viewed from a relatively close distance (H. R. Carter pers. comm.). Whitish, lighter colored, or basic plumaged murrelets during the breeding season have been reported throughout the breeding range, without photographs or careful descriptions and often from a distance (Carter and Stein 1995; H.R. Carter pers. comm.). Such observations may include second-year birds in incomplete or delayed alternate plumage (Pyle 2008), birds in faded alternate plumage, juveniles with lighter brown coloration, or amelanistic adults with less white than those depicted in this paper. Strikingly white individuals like these have never been recorded south of northern British Columbia or north of southeast Alaska.

The pattern of dark markings on the left wing (in both the primaries and tertials) appears similar in the 2002 and the 2012 photos, although the poor quality of the 2002 photo makes it difficult to discern pigmentation from shadow or artifact. Slight differences in the appearance of the dark markings in all of the photos could be affected somewhat by molt, feather wear, and/or artifact. Photographic artifact may have also contributed to the appearance of a massive bill in the 2002 photo of the 2002 bird. But any two of these three photos of live birds may be of the same individual, suggesting that amelanistic murrelets may survive for many years with-

## FEATURED PHOTO

out the cryptic alternate plumage that Carter and Stein (1995) and Nelson (1997) thought to be vital for successful breeding. But although the Marbled Murrelet nests in trees in the southern part of its range from British Columbia to California, it nests on the ground in the treeless northwestern part of its range at Kodiak Island, on the Alaska Peninsula, and in the Aleutian Islands. In northern southeast Alaska, where these amelanistic birds were observed, Marbled Murrelets nest both in trees and on the ground (DeGange 1996). As much as 50% of one population studied near Port Snettisham, in southeast Alaska, was found to nest on the ground at higher elevations above the tree line (Nelson et al. 2009, Barbaree 2011). Of all of Marbled Murrelet nests known in Alaska, 45–50% have been found on the ground (Nelson et al. unpubl. data), or in a few cases in rock cavities (e.g., Johnson and Carter 1985). These habitats can retain significant amounts of snow/ice through the nesting season. Largely white amelanistic individuals without the typical cryptic plumage may be able to breed successfully in these habitats. However, any adaptive value of amelanism for the Marbled Murrelet and other alcids is unlikely.

We thank Harry Carter, Matt Kirchoff, Kathy Kuletz, Kim Nelson, John Piatt, Spencer Sealy and Gus van Vliet for reviewing photos and providing comments. Lesley Kennes of the Royal British Columbia Museum provided specimen photos and details. The manuscript was improved thanks to reviews and contributions from Harry Carter, Jeff Davis, and Kim Nelson.

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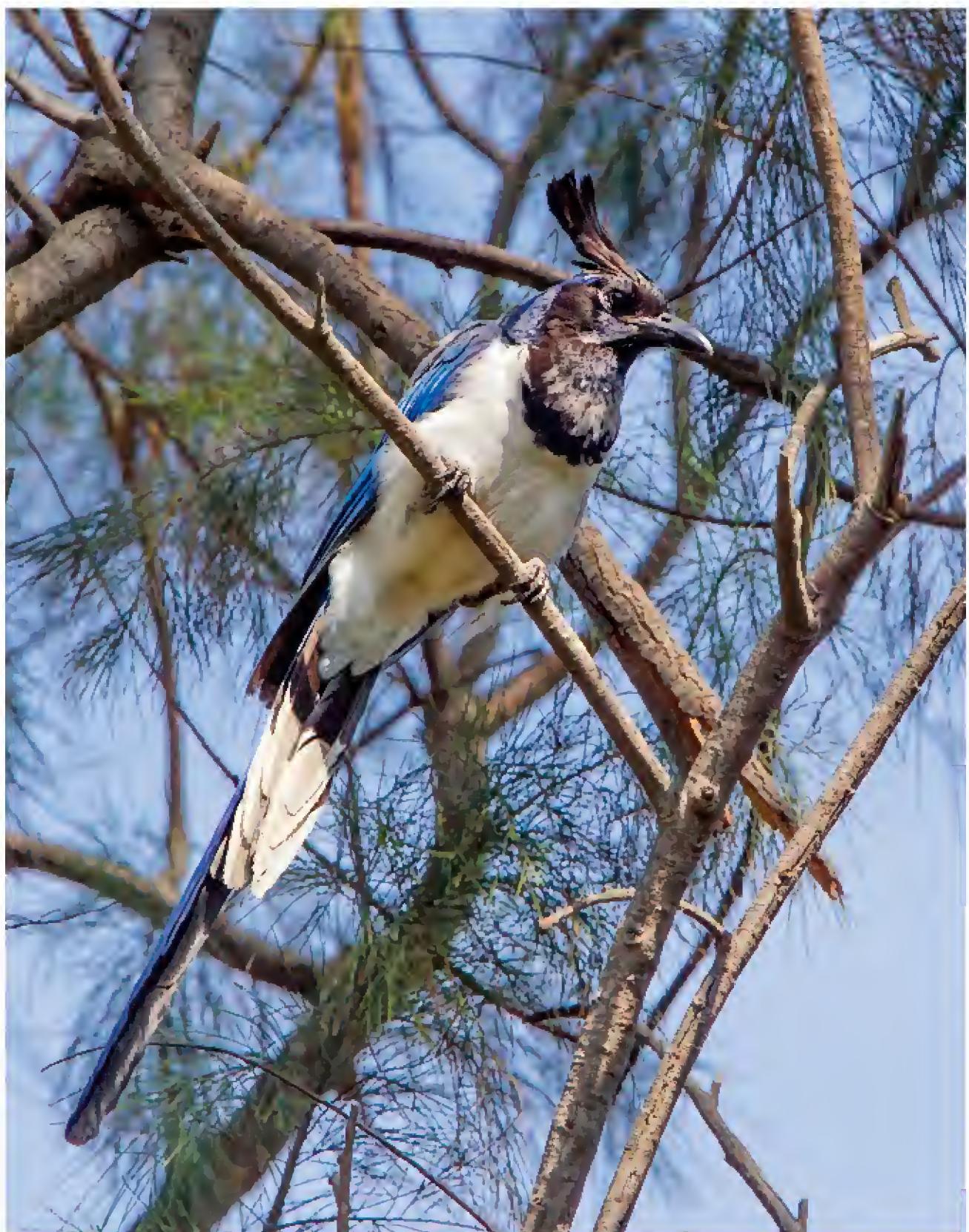
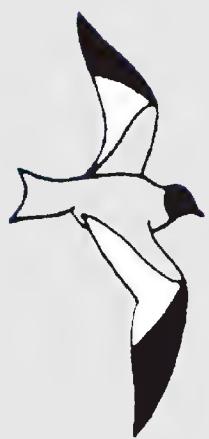
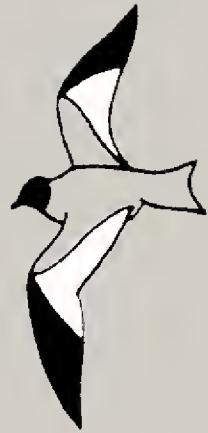


Photo by © Thomas A. Blackman of San Diego, California:  
Black-throated Magpie-Jay (*Calocitta colliei*) Tijuana River valley, San Diego County, California, 4 September 2012. A small population of the Black-throated Magpie-Jay, native to northwestern mainland Mexico, has been nesting in southwestern San Diego County, California, since the 1990s. Even where the population consists of only two or three families and so is unrestrained by competition, the birds nest cooperatively. See in this issue California Breeding of the Black-throated Magpie-Jay, Including Evidence of Helping, by William E. Haas.



# WESTERN BIRDS



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# *Western Specialty:* California Purple Finch



Photo by © Peter LaTourrette of Los Altos, California:  
California Purple Finch (*Haemorhous purpureus californicus*)  
Cascade Ranch, San Mateo County, California, 3 February 2012.

The two subspecies of the Purple Finch are best differentiated in the female plumage, shared by yearling males. As seen in this photo, the western *H. p. californicus* has blurrier brown streaking on the underparts and more brown mottling of the pale supercilium than does the eastern and boreal *H. p. purpureus*; on the upperparts *californicus* has an olive tinge and the streaking muted. In this issue of *Western Birds* (pp. 284–295), Cameron Rutt, Peter Pyle, Paul W. Collins, Matthew L. Brady, James R. Tietz, and Jon L. Dunn clarify the distributions of the two subspecies in western North America, reporting the first records of *californicus* for Alaska, Colorado, and New Mexico and the first record of nominate *purpureus* for California.

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**Front cover photo by © Larry Sansone of Los Angeles, California: White Wagtail (*Motacilla alba*), Cabrillo Beach, Los Angeles Co., California, 8 December 2012.** The clean gray rump, dark base to the secondaries, and extensively dark centers to the median and greater secondary coverts specify the subspecies *ocularis*.

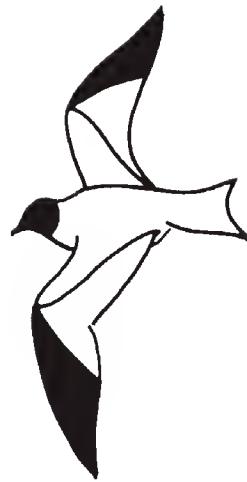
**Back cover “Featured Photo” by © Floyd Hayes of Angwin, California: Black Skimmer (*Rynchops niger*) over Clear Lake near Lakeport, Lake County, California, 3 July 2013, representing the northernmost inland record in western North America.**

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*Western Birds* solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. The journal welcomes contributions from both professionals and amateurs. Appropriate topics include distribution, migration, status, identification, geographic variation, conservation, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for censusing, sound recording, and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but 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](mailto:avesalaska@gmail.com). For matters of style consult the Suggestions to Contributors to *Western Birds* (at [www.westernfieldornithologists.org/docs/journal\\_guidelines.doc](http://www.westernfieldornithologists.org/docs/journal_guidelines.doc)).

# WESTERN BIRDS



Volume 45, Number 4, 2014

## THE 38<sup>TH</sup> ANNUAL REPORT OF THE CALIFORNIA BIRD RECORDS COMMITTEE: 2012 RECORDS

*This report is dedicated to the memory of former committee member Jon Winter (member 1970–1976).*

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**ABSTRACT:** The California Bird Records Committee reached decisions on 280 records involving 525 individuals of 88 species and two species pairs documented since the 37<sup>th</sup> report (Nelson et al. 2013), endorsing 226 records of 471 individuals. The recent addition of the Scaly-breasted Munia (formerly Nutmeg Mannikin, *Lonchura punctulata*) to the state list, and the split of the Sage Sparrow into the Sagebrush Sparrow (*Artemisiospiza nevadensis*) and Bell's Sparrow (*A. belli*), combined with first accepted state records of the Northern Gannet (*Morus bassanus*), Gray Hawk (*Buteo plagiatus*), and Common Cuckoo (*Cuculus canorus*) outlined in this report, brings California's total list of accepted species to 654, 11 of which, including the munia, are established introductions. Other notable records detailed in this report are of the Common Crane (*Grus grus*), Wood Sandpiper (*Tringa glareola*), and Varied Bunting (*Passerina versicolor*).

This 38<sup>th</sup> report of the California Bird Records Committee (hereafter CBRC or the committee), a formal standing committee of Western Field Ornithologists, summarizes determinations on 280 records of 88 species and two species pairs involving 525 individuals. The committee accepted 226 of the 280 records, involving 471 individuals of 78 species and two species pairs, for an acceptance rate of 81%. We consider 24 of these records, involving 26 individuals, to represent returning or continuing birds that were accepted previously. Fifty-two reports of 34 species were not accepted because the identification was not considered to be substantiated, and two reports of two species were not accepted because natural occurrence was questionable. Reports of multiple individuals together are given the same record number

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for purposes of review; we report the total number of accepted individuals, which may be greater than the number of accepted records. Although the majority of the records in this report pertain to birds documented in 2012, the period covered spans the years 1960 through 2013.

Highlights of this report include the first acceptance to the California state list of three species: the Northern Gannet (*Morus bassanus*), Gray Hawk (*Buteo plagiatus*), and Common Cuckoo (*Cuculus canorus*). Also included are the second state records of the Common Crane (*Grus grus*) and Wood Sandpiper (*Tringa glareola*), the third Little Bunting (*Emberiza pusilla*), and the first spring records of the Long-billed Murrelet (*Brachyramphus perdix*) and Smith's Longspur (*Calcarius pictus*). In addition, the state received the southernmost Gyrfalcon (*Falco rusticolus*) recorded in North America, the second Varied Bunting (*Passerina versicolor*) in nearly a century (fourth, overall), and a doubling of records of the White Ibis (*Eudocimus albus*). Furthermore, the committee added the Scaly-breasted Munia (*Lonchura punctulata*) to the state list on the basis of a naturalized population. In 2013, the committee accepted first California records of the Marsh Sandpiper (*Tringa stagnatilis*), Great Black-backed Gull (*Larus marinus*), and Common Swift (*Apus apus*), the details of which will be published in the next report. These records, combined with the split of the Sage Sparrow into the Sagebrush Sparrow (*Artemisiospiza nevadensis*) and Bell's Sparrow (*A. belli*) (AOU 2013a), bring the total number of accepted species on California's state list as of press time to 657. At its 2014 annual meeting, the committee removed from the review list the Neotropic Cormorant (*Phalacrocorax brasiliianus*), Galapagos/Hawaiian Petrel (*Pterodroma phaeopygia/sandwichensis*), and Pine Warbler (*Setophaga pinus*). Counties hosting the most accepted records (numbers refer to the number of records, not individual birds) were San Diego (35), Los Angeles (19), Imperial (17), Marin (15), Riverside (14), San Francisco (14), Humboldt (12), Santa Barbara (12), and San Mateo (10). In all, records were accepted from 36 of California's 58 counties (62%), including all 15 coastal counties.

Species-account headings are organized with English and scientific names first, followed in parentheses by the total number of accepted individuals in the state and the number of new individuals accepted in this report. Following the heading are accounts for records accepted (as applicable), followed by records not accepted because identification was not established or because natural occurrence was questionable (as applicable). An asterisk (\*) preceding the species name indicates that the CBRC has discontinued reviewing records of the species after 2012. A double asterisk (\*\*) following the number of accepted state records indicates that the species has been reviewed for a restricted time span so the number of accepted records does not represent the total number of records for the state. Date ranges for each record are those accepted by the CBRC, and instances where these differ from those published in *North American Birds* are indicated with italics. A dagger (†) following an observer's initials indicates submission of a photograph, (S) indicates submission of a sketch, (§) indicates submission of audio recordings, (#) indicates submission of a video, and (#) precedes a specimen number. Museum collections mentioned in the text are LACM (Natural History Museum of Los Angeles County), SDNHM (San Diego Natural History Museum), and

## THE 38<sup>TH</sup> ANNUAL REPORT OF THE CBRC: 2012 RECORDS

WFVZ (Western Foundation of Vertebrate Zoology). The absence of a symbol following the observer's initials indicates the submission of a sight report alone. Additional details regarding minutiae of formatting, abbreviations, and our treatment of age, sex, and subspecies in records may be found in previous CBRC reports, at <http://www.californiabirds.org/>, and in CBRC (2007). Also available at the website is the California bird list, the review list, committee news, recent photos of rare birds in California, the CBRC's bylaws, a form for querying the CBRC database, and all annual reports from 1996 through 2011. Age terminology follows that used by CBRC (2007).

Observers are encouraged to submit documentation for all species on the CBRC's review list, sending it to Guy McCaskie, CBRC secretary, P. O. Box 275, Imperial Beach, CA 91933-0275 (e-mail: [secretary@californiabirds.org](mailto:secretary@californiabirds.org)). In recent years, the proportion of records supported only by photographs, without any written documentation, has increased considerably. Even minimal written details on a bird's appearance, accompanying photographs, can assist significantly in documenting records of rare birds. Documentation of all CBRC records is archived at the Western Foundation of Vertebrate Zoology, 439 Calle San Pablo, Camarillo, CA 93012, and is available for public review.

**BLACK-BELLIED WHISTLING-DUCK** *Dendrocygna autumnalis* (32, 1). One was at the Toledo Pits 8 km west of Tipton, TUL, 15–27 May 2012 (RHD†; DFat†, JFL, MMat†, BKSt†, SS†; 2012-074). The lone committee member voting against acceptance expressed concerns that the bird might be an escapee, though it was unbanded and considered wary. The date span lies at the early end of the pattern of previous California records, which are mainly from June through August. Nearly all previous California records have been from the Salton Sink, though the first, at Buena Vista L., KER, 19 Jun 1938, was at a site (now largely destroyed) also in the San Joaquin Valley, about 85 km south of Tipton. The species' northward vagrancy and expansion of its breeding range are well documented (James and Thompson 2001, Corman and Wise-Gervais 2005). This is the first record accepted since 2000.

**EMPEROR GOOSE** *Chen canagica* (91, 1). The written description of one seen off Rodeo Beach/Lagoon, MRN, 27 Nov 2011 (WL; 2011-270), lacked details of the head pattern, leading to one vote against acceptance. However, other members troubled by the incomplete description acknowledged that the very rare but superficially similar dark-morph Ross's Goose (*C. rossii*) is highly unlikely on the ocean.

**WHOOPER SWAN** *Cygnus cygnus* (11, 1). An adult observed at King I., SJ, 9 Jan 2011 (DGY; 2011-179), along with a previous record near Stockton, SJ, 16 Dec 1988 (McCaskie and San Miguel 1999), establishes the southernmost record for California.

**FALCATED DUCK** *Anas falcata* (3, 1). The committee unanimously considered an adult male at Colusa N. W. R., COL, 2–22 Dec 2012 (CG†; CT†; 2012-196), the same as the one here 8 Dec 2011–10 Feb 2012 (2011-205), and this return was noted by Nelson et al. (2013). A similar male seen shortly thereafter at Sacramento N.W.R., GLE, 30 Dec 2012 (TSt; 2012-238), was agreed to be the same individual, as the sites are about 30 km apart.

**KING EIDER** *Somateria spectabilis* (41, 1). A first-winter male at Elkhorn Slough, MTY, 27–28 Dec 2012 (LMat†; 2012-249), was photographed alive from a tour boat on 27 Dec by an unknown person, then shot by a hunter the next day. The specimen, if preserved, remains in private hands.

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ARCTIC LOON *Gavia arctica* (9, 2). An apparently ill adult at the Palo Alto Baylands, SCL, 12 Nov 2010 (STiT; 2010-192), was accepted on a vote of 8–1. An adult (fide P. Pyle) at the mouth of San Simeon Cr., SLO, 13–15 Jan 2012 (CAM†; DWAT, BB†, TME†, GMcC, BLSt, CT†; 2012-006), was extensively photographed; a photo was published in *N. Am. Birds* 66:344. IDENTIFICATION NOT ESTABLISHED: The report of one on Camanche Reservoir, SJ, 2–22 Jan 2011 (2011-274), would have been California’s first inland; good details were provided, but three members felt they were not conclusive. The bird was described as having a “smudgy” and barely complete chin strap; it is not clear whether Arctic Loons ever show such a mark (a chin strap is shown by most Pacific Loons, *G. pacifica*).

YELLOW-BILLED LOON *Gavia adamsii* (94, 3). This species continues to appear annually, most frequently along the central coast. First-winter birds were at Del Monte Beach in Monterey and Seaside, MTY, 31 Jan–8 Feb 2012 (BJW; RBet, DR†, BLS; 2012-013), and at Monterey harbor, MTY, 30 Dec 2012–3 Jan 2013 (BTM; DR; 2012-250). One was at Half Moon Bay, SM, 11 Aug 2012 (LK; AJ, JMu†, DSSt, SBT, MV†; 2012-113); a handful of these loons have remained into the summer, but this is only the fourth to be discovered in mid-summer. IDENTIFICATION NOT ESTABLISHED: One at Monterey harbor, MTY, 10 May 2012 (2012-098), was nearly accepted on the first round under the presumption it was the same bird as 2012-013, seen three months earlier. However, the relatively brief description (the bird was seen without optics from a paddleboard) and the long gap after the last documentation of the earlier bird eventually whittled the “accept” votes down to three. A loon photographed at the municipal wharf, Santa Cruz, SCZ, 10 Nov 2011 (2011-229) was more likely a Common Loon (*G. immer*).

SHORT-TAILED ALBATROSS *Phoebastria albatrus* (38\*\*, 1). One in its first spring 9.7 km southwest of Noyo Harbor, Ft. Bragg, MEN, 20 May 2012 (RHDT, KAH, RJK†, MMa†, DWNT, DTo; 2012-082), had been banded before fledging, 21 Apr 2011, on Torishima I., Japan.

GREAT-WINGED PETREL *Pterodroma macroptera* (5, 1). One photographed, remarkably, from shore at Pt. La Jolla, La Jolla, SD, 18 Dec 2012 (GN†; 2012-209), was two months later than the previous late summer and fall records; even more astounding was the quality of the photographs (one published in *N. Am. Birds* 67:368). Plumage characters confirm that the bird was of the subspecies *gouldi* (the Gray-faced Petrel, considered by Onley and Scofield (2007) and Howell (2012) to be specifically distinct from the Great-winged); all California records appear to pertain to this taxon. IDENTIFICATION NOT ESTABLISHED: The report of one 11.2 km off Half Moon Bay, SM, 17 Sep 2011 (2011-269), received no support; two observers who saw the bird briefly submitted documentation, but the primary observer (who had considerable previous experience with the species) did not, so the record was inadequately documented.

HAWAIIAN PETREL *Pterodroma sandwichensis* (19, 5). A pattern of regular use of the far offshore waters by this species, as distinguished from the Galapagos Petrel (*P. phaeopygia*), from April to September continues to crystallize as records accumulate. Here we add birds 232 km southwest of Pt. Arguello, SBA, 23 Apr 2012 (GSMT; 2012-076); 62 km southwest of Año Nuevo, SM, 9 May 2012 (PEL; 2012-078); 43 km west-southwest of Pigeon Pt., SM, 25 Aug 2012 (MDoS; CDu†, MR†, DSS; 2012-115); 48 km west-southwest of Pillar Pt. Harbor, SM, 8 Sep 2012 (MDot; TG†, AJ, DSS; 2012-122); and over Bodega Canyon, off Bodega Bay, SON, 21 Sep 2012 (TC†; 2012-138). All these records except that for 9 May included photos that eliminated the Galapagos Petrel; the sight record involved a bird close to a large cruise ship, with the head pattern seen well. Increasing coverage well offshore from the stable decks of cruise ships is showing the Hawaiian Petrel to be a regular part of

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our pelagic avifauna. It and the “Galapagos/Hawaiian Petrel” category were removed from the review list at the committee’s 2013 meeting.

\*GALAPAGOS/HAWAIIAN PETREL *Pterodroma phaeopygia/sandwichensis* (29, 3). Sight records in which the Galapagos Petrel could not be eliminated were made 141 km west-southwest of Point Sur, MTY, 28 Apr 2012 (GSM S; 2012-077); 48 km west of Southeast Farallon I., SF, 9 May 2012 (PEL; 2012-079); and 199 km west of the Farallon Is., SF, 24 Aug 2012 (GSM S; 2012-145). As noted above, there is a clear pattern of dispersal of the Hawaiian Petrel to waters off California, whereas the Galapagos Petrel is so far not known to range north of 20° N off Middle America (Howell 2012).

STREAKED SHEARWATER *Calonectris leucomelas* (18, 0). IDENTIFICATION NOT ESTABLISHED: One seen on the water and briefly in flight in fog 72 km off Pt. Reyes, MRN, 27 Sep 2011 (2011-255), was documented by a single observer. While a majority of committee members supported the identification in the first round, concerns about the brevity of observation and some aspects of the description led to non-acceptance.

CORY’S SHEARWATER *Calonectris diomedea* (2, 0). IDENTIFICATION NOT ESTABLISHED: If accepted, the report of one from the Newport Beach pier, ORA, 27 May 2012 (2012-089) would have been only the third for the eastern Pacific Ocean. However, the distance of observation (1.5 km) precluded photo-documentation and analysis of some key characters.

RED-TAILED TROPICBIRD *Phaethon rubricauda* (34, 1). One was over Año Nuevo I., 30 Apr 2012 (JFF†; 2012-063), less than 0.5 km off the mainland of San Mateo Co. Although a seabird of relatively warm tropical waters, the Red-tailed Tropicbird is now known from northern California (Monterey Co. north to Humboldt Co.) by 13 records. Most occurrences from California are from far offshore, but there are three previous records at Southeast Farallon I., as well as from shore at Bolsa Chica Ecological Reserve, ORA, and at Cabrillo Beach, LA (LACM #114039, Iliff et al. 2007).

MAGNIFICENT FRIGATEBIRD *Fregata magnificens* (37\*\*, 25). Although no strong winds were associated with the northward passage of the remnants of Tropical Storm Paul into southern California, Magnificent Frigatebirds nonetheless appeared in the storm’s wake. Twenty-four, including an adult male, an adult female, and 22 first-year or second-year birds, were at La Jolla and Coronado, SD, 18 Oct 2012 (JK†; DWA†, AAr†, EGK†, GMCC, JMMc†; 2012-160); the same movement brought a single individual in its first fall to Pt. Dume, Malibu, LA, 18 Oct 2012 (KR†; 2012-161). The La Jolla/Coronado group was the largest ever noted in California, eclipsing a flock of 22 at the north end of the Salton Sea 29 Jul 1979 (Patten et al. 2003).

MASKED BOOBY *Sula dactylatra* (17, 1). One in its second fall was seen and photographed in flight at the San Lorenzo R. mouth, SCZ, 17 Nov 2012 (JFG†; 2012-187); the “dusky-greenish yellow bill, with no pink or orange hues,” though difficult to discern in the photos, was sufficient to eliminate the Nazca Booby.

MASKED/NAZCA BOOBY *Sula dactylatra/granti* (12, 1). A subadult seen from Pt. La Jolla, La Jolla, SD, 23 Dec 2012 (BR; PTT, SWa; 2012-221), was clearly of this species pair. Although the bill was described as “pale tangerine” by one observer (implying the Nazca), the bill color was noted by the other observers simply as “pale” and is not apparent in the rather poor photographs. IDENTIFICATION NOT ESTABLISHED: A distant bird scoped from Pt. La Jolla, La Jolla, SD, 9 Nov 2012 (2012-204), was not seen well enough for other black-and-white sulids to be eliminated.

BLUE-FOOTED BOOBY *Sula nebouxii* (114\*\*, 2). An unseasonal bird was at Carlsbad, SD, 30 Apr 2012 (JMMc†, BMu; 2012-062). One at Obsidian Butte, south

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end of the Salton Sea, IMP, 7 Oct 2012 (BJSt; 2012-154), was within the more typical late summer and early fall window of occurrence.

**RED-FOOTED BOOBY** *Sula sula* (19, 1). A first-year or second-year bird was photographed from a whale-watching boat 5 km west of Mission Bay, SD, 23 Sep 2012 (MGa†; 2012-140).

**NORTHERN GANNET** *Morus bassanus* (1, 1). Completely unexpected was an adult found among the massive seabird colonies (primarily of the Common Murre, *Uria aalge*) on Southeast Farallon I., SF, 25 Apr 2012 and seen intermittently to at least October 2014 (PW; BED†, GMcC, TMcG†, LSt, BJSt, SWet; 2012-058; Figure 1; photo also published in *N. Am. Birds* 66:574 and on the cover of *W. Birds* 44[1]). This individual, the first for the entire Pacific Ocean, was subsequently seen on a rock along the shore of southern Marin Co. in late October 2013, and in the spring of 2014 it took up part-time residence in a cormorant colony at Alcatraz I. within San Francisco Bay. Gibson et al. (2013) discussed sight records northwest of Barrow, Alaska, 16–17 August 2010, and Day et al. (2013) discussed these sightings in the context of changing seabird distributions in that region. Large-scale reductions in arctic pack ice have conceivably introduced a dispersal route for the gannet [and other seabirds? See Able et al. (2014)] from the North Atlantic to the Pacific. Cross-continental vagrancy seems far less likely, with interior records no closer than northern Arkansas (*N. Am. Birds* 59:608).

\***NEOTROPIC CORMORANT** *Phalacrocorax brasiliensis* (44, 10). Records of this increasing species continue to accumulate in southeastern California, and with a considerable sigh of relief (due to the difficulty of resolving “same bird” issues) the committee removed it from the review list at its 2014 meeting; since the species’ removal, single-day counts at the south end of the Salton Sea in spring 2014 have ranged up to 31 birds! The committee considered one at Ramer L., IMP, 3 Feb–17 Mar 2012 (GMcC; TJ†; 2012-016) to be the same as one of the birds previously accepted under record 2011-048 (Nelson et al. 2013). An adult and a one-year-old bird were at the west end of Young Road on the south shore of the Salton Sea, IMP, 27 Jun–8 Jul 2012 (GMcC; ARAT†, SBT†, STut†; 2012-099). Two adults and a one-year-old bird were at the north end of Lack Road on the south shore Salton Sea, IMP, 21 Jul–9 Oct 2012 (HK†; KLG†, GMcC, CMcF†, BJSt, ET†, STut†; 2012-110), the latter considered to be the same bird as in record 2012-099. A two-year-old bird was at Fig Lagoon, IMP, 30 Jun–5 Aug 2012 (GMcC; 2012-100). Another two-year-old bird was at the Alamo R. mouth at the south end of the Salton Sea, IMP, 26 Jul–26 Aug 2012 (GMcC; 2012-107). An adult was along Schrimpf Road at the south end of the Salton Sea, IMP, 9 Oct 2012 (GMcC; 2012-157). One at Fig Lagoon, IMP, 13 Sep 2012 (JMMc†; 2012-133), was accepted in its third round despite a single poor photo and brief description. Along the lower Colorado R., single first-spring birds were at Imperial Dam, IMP, 18 Apr 2012 (DVP; 2012-055) and L. Havasu, SBE, 5 Apr 2012 (LH; 2012-097). An adult at Parker Dam, SBE, 12 Dec 2012 (DVPT†; 2012-203) was considered to be the same as the one there 3 Dec 2011–21 Jan 2012 (2011-201; Nelson et al. 2013). IDENTIFICATION NOT ESTABLISHED: One at Fig Lagoon, IMP, 28 Oct 2012 (2012-169) was described only briefly.

**TRICOLORED HERON** *Egretta tricolor* (62\*\*, 1). A juvenile at the mouth of Salt Cr., RIV, 5–18 Aug 2012 (CMcG†; TABe; 2012-111), is the 22nd recorded at the Salton Sea since 1990; six of these are from the Riverside Co. portion.

\***YELLOW-CROWNED NIGHT-HERON** *Nyctanassa violacea* (66, 11). The committee struggled with a series of records from the San Diego area; because there is now a breeding population here, individuals and record numbers are difficult to track, and records after 2012 are no longer reviewed. Two adults at the Imperial Beach Sports Park, Imperial Beach, SD, 17 Dec 2011–29 Jul 2012 (PEL; GMcC, JP†; 2011-254),

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were noted by Nelson et al. (2013) as being considered individuals accepted as juveniles in previous years from this site (where the species has nested since 2006). At its January 2013 meeting, however, the committee agreed that juveniles are normally chased away from the nest site after fledging and do not return. Reconsidering the record, the CBRC concluded these most likely constituted two new, previously unreviewed individuals. Two nests at this park, one in an ash tree (*Fraxinus* sp.) and one in a pine (*Pinus* sp.), contained three young each in 2012: 6 Jun–15 Jul 2012 (JPet; GMcC; 2012-086) and 17 Jun–24 Jul 2012 (GMcC; CAM†, JPet; 2012-095). Two adults, differing slightly in leg color, around the San Diego R. mouth, SD, 29 May–10 Sep 2012 (JPet; TAB†, ART; 2012-083), were considered to be the same two as were there 28 Apr–7 Sep 2011 (2011-062) and in prior years (Nelson et al. 2013; photo in *N. Am. Birds* 66:733). An adult at Sea World, San Diego, SD, 9 Jul–5 Sep 2012 (JPet; 2012-105) was considered the same bird as that seen there in 2009, 2010, and 2011 (2011-100; Nelson et al. 2013). Another at Sea World 2 Dec 2007 (TO; 2007-309), was considered to be the same bird as at nearby Famosa Slough, 7 Aug 2007 (2007-166). Away from the San Diego area population, one in its first fall was at the Bolsa Chica Ecological Reserve, ORA, 11 Nov 2012–20 Jan 2013 (TAB†, RCat†, JLD, ABL†, SMo; 2012-183).

**WHITE IBIS** *Eudocimus albus* (6, 3). An adult at the Baker sewage ponds, SBE, 31 Aug–6 Sep 2012 (JBo†; TAB†, JLD, RHo†, GMcC, SJM†, MSr†; 2012-117; photo in *N. Am. Birds* 67:159) was the first for the Mojave Desert. A similar adult appeared at L. Jocelyn, Carpinteria, SBA, 23 Sep–5 Oct 2012 (EBC S; JLD, GMcC, JM†, HPR†, DR†, BKSt; 2012-141). Because both birds were in worn plumage with brown-stained wing coverts and not molting, unusual for adult White Ibises at this time of year, there was considerable discussion as to whether the Baker and Carpinteria records involved the same individual, possibly an escaped captive, but ultimately the majority of the committee rejected these hypotheses. In part on the basis of these new records, the committee reconsidered the record of an adult at Bolinas and San Rafael, MRN, 14 May–9 Sep 1971 (JWn; LCB, EO†; 1981-014), previously not accepted on the grounds of questionable natural occurrence (Morlan 1985); the recent review resulted in a unanimous acceptance. **NATURAL OCCURRENCE QUESTIONABLE:** Also re-reviewed was a record previously not accepted (105-1978; Binford 1983) of a White Ibis in Malibu Canyon, LA, from about one month before 22 Apr 1978 until sometime in May 1978, then at Pt. Mugu/Santa Clara R., VEN, from 6 Jun 1978 until 22 Dec 1979, when collected (LACM #90516). Because the species was known to have been kept in captivity at nearby Busch Gardens in the San Fernando Valley, LA, with some accounts of free-flying individuals, the record did not gain acceptance on re-review even in light of the other accepted coastal records.

**BLACK VULTURE** *Coragyps atratus* (7, 0). One adult near Goleta, SBA, 23 Jul–29 Nov 2012 (WTF†; DMC†, MSM; 2012-106) was judged to be the same as the one in Santa Barbara and Ventura counties since Sep 2009 (2009-156). Similarly, an adult at Lompoc, SBA, 22 Feb 2011 (KHo; 2011-033), was considered the same as 2011-004 at Buellton, 14 Jan 2011, as was one in Vandenberg Village and Lompoc, SBA, 21 Sep–18 Dec 2012 (BKSt; KHo, PK, PSct; 2012-137). **IDENTIFICATION NOT ESTABLISHED:** One reported at Mission Canyon in Santa Barbara, 16 Feb 2012, and later at Goleta, SBA, 17 Mar 2012 (2012-024), was considered inadequately documented, as was one over the Verdugo Hills, LA, 7 Nov 2012 (2012-179).

**MISSISSIPPI KITE** *Ictinia mississippiensis* (46, 1). A one-year-old bird was in the Tijuana R. Valley, SD, 1–2 Aug 2012 (PM†; JMMc†, GMcC, VM†, STu†; 2012-109; photo in *N. Am. Birds* 66:752). Another one-year-old bird at Mast Park in Santee, SD, 9 Jul 2011 (BJSt; 2011-275), was initially submitted to [www.iNaturalist.org](http://www.iNaturalist.org)

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(which the CBRC does not monitor for entries of reviewed species) as a White-tailed Kite (*Elanus leucurus*) but later reidentified.

COMMON BLACK HAWK *Buteogallus anthracinus* (7, 1). An adult at Parker Dam, SBE, 6 Apr 2012 (TJ†; 2012-047), joins three previously accepted spring records for the deserts of southern California.

\*HARRIS'S HAWK *Parabuteo unicinctus* (67\*\*, 3). Three chicks were produced by the long-staying adults at Jacumba, SD, with the first chick noted on 9 May, all three chicks visible in the nest by 22 May, and all three found newly fledged on 27 Jun 2012 (EGK†; GMcC; 2012-070). IDENTIFICATION NOT ESTABLISHED: One at Indian Wells, RIV, 10 Mar 2012 (2012-035), was described only briefly. NATURAL OCCURRENCE QUESTIONABLE: One at Ft. Rosecrans National Cemetery, Pt. Loma, SD, 29 Oct 2011 (TRSt; 2011-160), was met with divided opinion, as the coastal locality raised the specter of escape from captivity, and at least two committee members believed that a band was visible on one leg in the photo.

GRAY HAWK *Buteo plagiatus* (1, 1). A juvenile remained in the vicinity of Santa Claus Lane on the west side of Carpinteria, SBA, 25 Nov 2012–15 Mar 2013 (EBC†; DAB†, JC†, JLD, JSF†, WTF†, NG†, RHo†, OJ†, GMcC, JMo†, LS†, BKSt†, CT†, SBT†, MT&DT†; 2012-193; Figure 2), establishing the first accepted record for California. A flight photo was published in *N. Am. Birds* 67:183. Characters distinguishing this species from its sibling species *B. nitidus*, the Gray-lined Hawk, found from Costa Rica through much of South America, were discussed by Millsap et al. (2011). This individual returned in adult plumage for the winter 2013–14, using many of the same hunting and resting perches. The Gray Hawk breeds in Arizona as far west as Gila Co. (Corman and Wise-Gervais 2005) and Maricopa Co. ([http://www.azfo.org/seasonalReports%5C2009\\_spring.html#SouthCentralSpring2009](http://www.azfo.org/seasonalReports%5C2009_spring.html#SouthCentralSpring2009)): recent spring and summer sightings reported to [www.eBird.org](http://www.eBird.org) extend north to Yavapai Co. Populations have increased during the current century with protection and management of riparian habitats (Corman and Wise-Gervais 2005). The species withdraws almost completely from Arizona and Sonora in winter, being present mainly from mid-March to September (Phillips et al. 1964, Russell and Monson 1998). Vagrancy within the U.S. has been limited, but two records for Kansas (a sight record in Geary Co. 15–16 Apr 1990 [*N. Am. Birds* 44:455] and of one photographed in Sedgwick Co. 20–30 Oct 2005 [*N. Am. Birds* 60:95]) were accepted by the Kansas Bird Records Committee ([http://www.ksbirds.org/kos/kos\\_kbrc.htm](http://www.ksbirds.org/kos/kos_kbrc.htm)). IDENTIFICATION NOT ESTABLISHED: The report of an immature flying over the Marin Headlands, MRN, 10 May 2012 (2012-072) was inadequately documented.

\*YELLOW RAIL *Coturnicops noveboracensis* (85\*\*, 1). One was at Tomales Bay near Inverness, MRN, 23 Dec 2003 (BSh; 2003-206). The CBRC ceased review of records of this species after 2003.

COMMON CRANE *Grus grus* (2, 1). An adult at Modoc N.W.R., MOD, 27 Dec 2012 (JHK†; 2012-231) was with an adult Sandhill Crane (*G. canadensis*) and two immature cranes, which some CBRC members thought might represent hybrid offspring. The photos (see *N. Am. Birds* 67:334) do not appear to show any bands. What was likely the same adult Common Crane and family group was seen at Overton, Nevada, 15 Jan–5 Feb 2013 (*N. Am. Birds* 67:321). The Modoc record comes closely on the heels of California's first accepted record (2011-065), of one at L. Earl, DN, 5–8 May 2011 (Nelson et al. 2013).

WILSON'S PLOVER *Charadrius wilsonia* (21, 1). A one-year-old bird was at Border Field State Park, Imperial Beach, SD, 14 Jun–1 Jul 2012 (MSa†; CAM†, GMcC, JP†, BJS†; 2012-093). Thirteen of California's 21 records are for San Diego Co., and all but one of those are between 24 March and 1 July.

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WOOD SANDPIPER *Tringa glareola* (2, 1). A juvenile was near the Santa Margarita R. 2.4 km east of the river's mouth, Camp Pendleton, SD, 24–29 Sep 2012 (BMu; AF†, GMcC, JMMc†; 2012-142; Figure 3; photo also published in *N. Am. Birds* 67:160), establishing California's second accepted record. The first, of an adult, also on a military base, at China L., KER, 22–23 May 2007 (2007-119; Singer and Terrill 2009), still represents the only spring record for the Pacific states and provinces south of Alaska. Most of the four other records are of juveniles in fall (Howell et al. 2014), like that for Camp Pendleton in 2012.

BAR-TAILED GODWIT *Limosa lapponica* (41, 2). Single juveniles were at Montaña de Oro State Park, SLO, 7 Sep 2012 (KJZ†; 2012-123) and the Santa Clara R. Estuary, VEN, 18 Sep 2012 (DPe†; 2012-216). One member raised the possibility that these two records represented the same individual (the localities are about 200 km apart), but the committee elected to consider them different.

CURLEW SANDPIPER *Calidris ferruginea* (43, 2). A one-year-old bird, lacking any chestnut alternate plumage and molting the secondaries, was at the south end of San Diego Bay, SD, 16 Jun–17 Jul 2012 (PEL; ARA†, CAM†, GMcC, SES, MSr†; 2012-094). An alternate-plumaged adult was at Westside Park, Bodega Bay, SON, 20 Sep 2012 (GBe†; 2012-135). The bird at Bodega Bay occurred at the peak time of fall records of this species, but the one at San Diego Bay was the first recorded in California in June. IDENTIFICATION NOT ESTABLISHED: The report of one on the south shore of the Salton Sea, IMP, 29 Jun 2012 (2012-112) was documented inadequately. Another from the Ventura County Game Preserve, VEN, 6 Apr 2012 (2012-048) ultimately failed 7–2 on the fourth round.

RED-NECKED STINT *Calidris ruficollis* (14, 0). IDENTIFICATION NOT ESTABLISHED: The documentation of a bird on the south jetty of Humboldt Bay, HUM, 1 Sep 2012 (2012-144), was inadequate, though it was described as retaining much alternate plumage. A supposed juvenile Red-necked Stint photographed at the Ventura County Game Preserve, VEN, 29 Aug 2010 (2010-191) was agreed by all to be a relatively bright Semipalmated Sandpiper (*C. pusilla*).

LITTLE STINT *Calidris minuta* (21, 2). Adults retaining alternate plumage were at the Alexandre Dairy near Ft. Dick, DN, 10 Jul 2012 (KMB†; JCS†; 2012-101) and Arcata Marsh, Arcata, HUM, 29–30 Jul 2012 (TK†; CSB, RF; 2012-108). Two-thirds of California's Little Stints have been recorded since 2006, likely reflecting greater awareness of the species' status and characters rather than a change in its abundance or distribution.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis* (26, 1). One was at the Bolinas sewage ponds, MRN, 11 Nov 2012 (MDe, RD†, JMi, SBT†; 2012-207). Even at this late date, which exceeds California's latest by nearly a month, the bird was an adult. Although the juvenile plumage remains unrecorded in the state, two juveniles were photographed at Shafter Lake, northwestern Texas, 16 Oct 2008 (*N. Am. Birds* 63:118), raising the possibility of California records in the future.

COMMON SNIPE *Gallinago gallinago* (1, 0). IDENTIFICATION NOT ESTABLISHED: Snipes at Inverness, MRN, 3 Nov–17 Dec 2011 (2011-207) and Centerville Beach, west of Ferndale, HUM, 16 Jan 2012 (2012-008) were reported as the Common by observers specifically checking concentrations of Wilson's Snipes (*G. delicata*) for apparent Common Snipes. These reports are from the same winter as the one accepted California record (2011-215, 11 Dec 2011; Nelson et al. 2013). However, the inadequacy of the photos (understandable given the difficulty of photographing a snipe in flight) and reliance on fewer diagnostic characters than available on a bird in the hand (as in the accepted record) led to lack of acceptance. One key character, the relative amount of white and black on the underwings, varies considerably in the

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Common Snipe (Minias et al. 2014), though there is no indication that Wilson's shows the extensively white underwings typical of most Common Snipes. The extent and pattern of white on the trailing edge of the secondaries, broader and more "scalloped" on the Common than on Wilson's, is perhaps the most diagnostic feature. Photos of the birds at Inverness Park appear to show both whitish underwings and a pattern of the secondaries resembling the Common Snipe's, but the committee believes variation in these features is insufficiently understood for this record to be accepted at this time.

**LONG-BILLED MURRELET** *Brachyramphus perdix* (30, 1). An adult seen and photographed on Humboldt Bay, HUM, 22 Apr 2012 (JKJ†; 2012-060) represents California's only accepted spring record. Several members commented on the relatively poor quality of the photograph and lack of any accompanying description, while one member did not endorse the record because of possible overlap in appearance with transitional plumages of the Marbled Murrelet (*B. marmoratus*).

\***PARAKEET AUKLET** *Aethia psittacula* (293, 207). The CBRC discontinued reviewing records of the Parakeet Auklet after 2012 because of an increase in reports far offshore of this irruptive species. This increase is likely due to more frequent trips to deep waters off northern California rather than to an actual range expansion. A group of four were seen off San Mateo, SM, 10 May 2011 (MH S; 2011-272); up to 200 were seen in deep water off Humboldt and Del Norte counties, 17 Apr 2012 (PEL; GMcC, RM†, BJSt; 2012-054); two were seen 74 km west of Big Lagoon, HUM, 10 May 2012 (PEL; 2012-080); one was seen 43 km west of Cape Mendocino, HUM, 25 Oct 2012 (PEL; 2012-176). One member voted against acceptance because of the brevity of the observation and lack of bill detail seen and described; multiple members also noted the unusual date. **IDENTIFICATION NOT ESTABLISHED:** One 8 km west of Bodega Bay, SON, 28 Jan 2012 (2012-178) was seen poorly and no details of the head or bill were noted; most members found the description inadequate.

**LITTLE GULL** *Hydrocoloeus minutus* (108, 1). One in its first fall 15 km northwest of Pt. Pinos, MTY, 9 Sep 2012 (MDo†; JH†, DR†, DSS, MV†; 2012-128), provided Monterey Co. with its first fall record and fifth overall.

**ICELAND GULL** *Larus glaucopterus* (15, 4). The Iceland Gull complex continues to plague the committee with difficult records; uncertainties regarding identification criteria and taxonomic status render consistent treatment of Iceland-type gulls difficult at best (CBRC 2007; Pyle et al. 2011a). Nevertheless, the committee endorsed four records in 2012. One in its first winter was at Ft. Baker, Sausalito, MRN/SF, 2–9 Feb 2012 (SCH†; DSS†, LB†, MBr†, JM†; 2012-015). An adult was at the Davis wastewater-treatment plant, YOL, 9–19 Mar 2012 (SCH†; ToE†; 2012-036)—members' opinions leaned toward the far less expected nominate *glaucopterus*, but the committee does not make formal decisions on subspecific taxa. A second-winter individual at Vernalis, SJ, 24 Mar 2012 (DGY†; 2012-096), was accepted after three rounds; members were concerned with the bird's large size and the possibility it may have been a Glaucous Gull (*L. hyperboreus*). Obviously small Iceland Gulls, likely females, have been more readily endorsed in the past (Nelson et al. 2013); acceptance of larger individuals such as that at Davis, likely males, may increase in the future as the status of the Iceland Gull in California is clarified. A fresh-plumaged first-winter bird was at the mouth of Baldwin Cr., SCZ, 15–16 Nov 2012 (JPot; JFG†; 2012-185; photo published in *N. Am. Birds* 67:155). Previously accepted records extend from 4 December to 14 March (Nelson et al. 2013); these new records expand this interval from 15 November through 19 March. **IDENTIFICATION NOT ESTABLISHED:** A single-observer sight record of a third-winter bird at Jenner, SON, 8 Jan 2012 (2012-011), received limited support. A first-winter bird at Napa Valley College, NAP, 5–6 Feb 2012 (2012-037) may have been a hybrid Glaucous-winged (*L. glaucescens*) × Glaucous Gull or another combination. A second-winter bird photographed at the Yolo

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Co. landfill near Davis, YOL, 1 Mar 2012 (2012-034), was not accepted because of some members' concerns that wear late in the winter could account for a Thayer's Gull (*L. thayeri*) appearing so pale and the bird's large size, especially its bill. A report of a bird of unknown age from Oceano, SLO, 16 Mar 2012 (2012-038), received no support, as it lacked sufficient detail and any photos.

\*LESSER BLACK-BACKED GULL *Larus fuscus* (113, 18). The number of records of the Lesser Black-backed Gull has met the committee's criterion for a species' removal from the review list—the species has been steadily increasing since California's first documented record in 1978 (CBRC 2007). The CBRC has discontinued reviewing records after 2012. Listed here are 18 new records and two records of previously accepted individuals continuing. One adult at Salton Sea State Recreation Area, RIV, 8 Dec 2011 (CMcG†; 2011-248) was examined in detail with respect to whether it represented another individual long present at this location; differences in bill coloration showed it to be a new bird. Birds in their third winter or older were at Rock Hill, Salton Sea, IMP, 7 Jan 2012 (CMcG; 2012-003), at the northwest corner of the Salton Sea, RIV, 15 Jan 2012 (RMcK S; 2012-041), and at the San Leandro marina, ALA, 22 Jan 2012 (NA†; 2012-066). A first-winter bird was at Malibu Lagoon, LA, 19 Feb 2012 (TMcG†; 2012-044). The leg color of a third- or fourth-winter bird photographed at Oceano County Park, Oceano, SLO, 16 Mar 2012 (TMET; 2012-039), was muted, eliciting inconclusive speculation about a possible origin in Asia or hybridization with one of the large pink-legged gulls. A second-winter individual and an adult were in south San Diego Bay, SD, 21–23 Mar 2012 (MSat; 2012-042), and 21–24 Mar 2012 (MSat; GMcC; 2012-043), respectively. A relatively large-billed adult was well photographed at Folsom L., PLA, 28 Mar–3 Apr 2012 (GE†; 2012-046). One in its second winter at the Davis water-treatment plant, YOL, 30 Mar 2012 (JCSt; 2012-245), was accepted on the basis of one poor photograph and no written details; unfortunately, the lack of written details accompanying photographic submissions is a continuing trend in the documentation of rarities; the committee urges observers to include written descriptions in addition to photographs, as such details may be of great use in judging a record's validity. Individuals in their first spring were at the north end of Poe Road, Salton Sea, IMP, 10–19 Apr 2012 (GMcC; 2012-025), and at Corvina Beach, Salton Sea, RIV, 12 May 2012 (CMcG†; 2012-073); a one-year old bird was at the south end of the Salton Sea, IMP, 13 Jul–21 Sep 2012 (GMcC; HK†; 2012-102). An adult at Obsidian Butte, IMP, 15 Sep–10 Dec 2012 (GMcC; 2012-134), was considered the same as the one there 18 Sep–9 Nov 2011 (2011-133; Nelson et al. 2013). An adult was at Oyster Bay, San Leandro, ALA, 14 Nov 2012 (NA†; 2012-186); another was at the Yolo Co. landfill, YOL, 8 Dec 2012–9 Jan 2013 (SCH†; 2012-199). A third-winter individual was at Morgan Hill, SCL, 22–23 Dec 2012 (SCR†; 2012-222). An adult at the Norco Egg Ranch, Norco, RIV, 26 Dec 2012–9 Mar 2013 (CMcG†; MG†, SRet; 2012-232), was considered a returning bird, previously recorded 28 Dec 2010–26 Mar 2011 and 19 Nov 2011–13 Jan 2012 (2011-193; Johnson et al. 2010, Nelson et al. 2013); a first-winter bird, also at the Norco Egg Ranch, was present from 27 Dec 2012 through 26 Feb 2013 (DWl†, HK; 2012-233). Finally, an adult was at Folsom L., PLA, 28 Dec 2012 (JLD; BW; 2012-239).

SLATY-BACKED GULL *Larus schistisagus* (49, 6). Submitted photographs of an adult at Ferry Pt., CC, 11 Feb 2011 (ToE†; 2011-244), lacked an accompanying description and did not show the wings spread, but what could be ascertained in the photographs was ultimately judged sufficient. A total of seven individuals were recorded in 2012, one of which is considered a bird from 2011 returning. An adult at Pacific Commons in Fremont, ALA, 31 Jan 2012 (JT†; 2012-065), was considered the same as the one present 17–29 Nov 2011 (2011-180; Nelson et al. 2013). A dark-eyed second-winter bird was at the mouth of Pilarcitos Cr., Half Moon Bay, SM, 30

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Jan 2012 (AJ†; 2012-012), and what was considered the same individual was later at Don Edwards San Francisco Bay N.W.R., Alviso, SCL, 11–18 Feb 2012 (SCR†; 2012-064); some members were concerned about the darkness of the eyes, but their color appears to fall within the normal range of the species' age-related change in eye color (A. Jaramillo pers. comm.). Adults were at Ft. Baker, MRN/SF, 7–9 Feb 2012 (ToEt†; JM†, DSS†; 2012-017), at San Gregorio State Beach, SM, 11 Feb 2012 (RTh†; 2012-059), and at Half Moon Bay, SM, 20 Feb 2012 (AJ†; 2012-027). An additional adult was at the mouth of the Russian R., SON, 20–21 Feb 2012 (ToEt†; 2012-028), and a second bird at the same location 4 Mar 2012 (ToEt†; 2012-033); these represented the first and second records, respectively, for Sonoma Co. IDENTIFICATION NOT ESTABLISHED: The report of one at the Davis wastewater-treatment plant, YOL (2011-247), 5–21 Feb 2011 was not accepted because of the lack of a pale (or paling) eye on a second-winter individual (but see records 2012-012 and 2012-064), difficulty in assessing the darkness of incoming mantle feathers, and lack of the expected broad white tertial tips. The divergent opinions represented in two rounds of split votes (5–4, 4–5, respectively) illustrate the continuing difficulty in identifying four-year gulls in their first two years of life (Pyle et al. 2011a). The report of a second-winter individual at Half Moon Bay, SM, 23 Feb 2011 (2011-258), was ultimately not accepted because the photographs provided were inadequate to rule out possible hybrids involving the American Herring (*L. argentatus smithsonianus*) or Vega (*L. a. vegae*) Gulls. The report of a second-winter bird at Ft. Baker, MRN/SF, 7–9 Feb 2012 (2012-018) was ultimately not accepted because of its retarded plumage, apparently pale mantle feathering, and the possibility of hybridization, though its structure and wing pattern were consistent with the Slaty-backed Gull. The report of a third-winter bird at Drake's Beach, MRN, 10–11 Feb 2012 (2012-023), was poorly documented. The report of an adult from the Davis wastewater-treatment plant, YOL, 9 Mar 2012 (2012-067), lacked photographs or written details regarding the wing pattern.

SANDWICH TERN *Thalasseus sandvicensis* (7, 0). IDENTIFICATION NOT ESTABLISHED. An adult *Thalasseus* in Chula Vista, SD, 12–15 Apr 2012 (2012-050), allowed for careful study and submission of excellent photographs. It had more yellow on the bill than expected of a Sandwich Tern of the expected subspecies *T. s. acuflavidus*, suggesting mixed parentage, so most members did not accept the record (see Pyle et al. 2011a). Hybridization between *acuflavidus* and the Elegant Tern (*T. elegans*) appears to be rare: these species have hybridized in California (Collins 1997), and birds presumed to be hybrids have been reported from the Elegant Tern's main breeding colony on Isla Rasa in the northern Gulf of California (Velarde and Rojo 2012), two adult Sandwich Terns having been observed in this colony in 1986 and 2008 (Velarde and Tordesillas 2009). The possibility of a Cayenne Tern (*T. s. eurygnatha*) or a hybrid between the Sandwich and Cayenne terns was also raised; these two populations hybridize in the Caribbean where their breeding ranges overlap (Hayes 2004). If these subspecies of the Sandwich Tern are recognized at the species level, as proposed by Efe et al. (2009), the committee will have to revisit questions regarding hybridization and variation of the Elegant Tern and its close relatives.

COMMON CUCKOO *Cuculus canorus* (1, 1). A first-fall female Common Cuckoo in Watsonville, SCZ, 28 Sep–2 Oct 2012 (SGe; TABet†, BB†, JLD, TG†, KH†, MJM†, GMcC, MM†, DRM†, JM†, WNT, MRT, DR†, BKSt, PSot, BJSt, JCSt, BLSt, STu†, JW†, CW†; 2012-147; Figure 4; photos published *N. Am. Birds* 67:184, and cover of *W. Birds* 44[2]), not only represented a first state record, it was just the second to be found in the contiguous United States. The Common Cuckoo is remarkably difficult to distinguish from the Oriental Cuckoo (*C. optatus*); where the two co-occur, many cuckoos are left unidentified to the level of species. Adults of both the Common and Oriental are of either a gray or a rufous morph, with the latter

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restricted to females (Beaman and Madge 1998). One key distinction is that “hepatic” (rufous-morph) females and juveniles of the Common Cuckoo typically lack barring on the rump, while that barring is always present in corresponding plumages of the Oriental Cuckoo (Mullarney et al. 1999). The Santa Cruz bird had the white patch on the nape and narrow white dorsal fringes indicating juvenile plumage (Mullarney et al. 1999), and the rufous of newly molted formative scapular feathers identified it as a hepatic female. Thus the Oriental Cuckoo was excluded primarily on the basis of the unbarred rump, in conjunction with barred alula coverts, thin ventral barring, and lack of contrast on the pale, faintly barred underwing (Howell et al. 2014). The Common Cuckoo is a very rare to casual vagrant to islands in the Bering Sea, primarily in spring and early summer; the only fall record is of a juvenile on the Alaska mainland, 9–11 Sep 2008 (Tobish 2009). Farther afield, additional records have come from Martha’s Vineyard, Massachusetts, 3–4 May 1981 (Baicich 2010), Barbados, 5 Nov 1958 (Bond 1993), and Midway Atoll, northwestern Hawaiian Islands, 23 May 1997 (Pyle and Pyle 2009). The much scarcer Oriental Cuckoo has been recorded 14 times on islands off western Alaska and only once on the mainland (Howell et al. 2014). Curiously, in contrast to the clustering of Common Cuckoo sightings in spring, the large majority of Oriental Cuckoo records extend from late June through early October (Howell et al. 2014). The Oriental Cuckoo could occur in California, but occurrences of both species in Alaska have declined since 2000, perhaps implying a decline in the source population in northeastern Asia (P. E. Lehman in litt.).

ELF OWL *Micrathene whitneyi* (5\*\*, 2). A nesting pair was at Corn Spring in eastern Riverside Co., 31 Mar–27 May 2012, a site that had been occupied by one or two birds during the breeding seasons of the preceding three years (DWN†; MMa†, CMcC††; 2012-045; also 2010-050 and 2011-056; Nelson et al. 2013). Along the Colorado River in extreme southeastern Riverside Co., two additional owls were detected 400–500 m apart on 15 Apr 2012 but not on successive surveys of the area (RRa; 2012-252). See Johnson et al. (2012) for more information on the Elf Owl’s recent status in California.

\*BARRED OWL *Strix varia* (8, 0). IDENTIFICATION NOT ESTABLISHED: A bird heard in the Six Rivers N. F., HUM, 14–15 Jul 1976 (1976-502), was likely correctly identified, advancing this species’ appearance in California by five years (CBRC 2007). However, the calls weren’t the classic “who cooks for you?” advertising call and weren’t ascribed to this species until well after the fact, and the possibility of a hybrid with Spotted Owl (*S. occidentalis*) was not excluded. Furthermore, the committee is reluctant to accept a first state record based only on sounds heard by a single observer. The committee reviews records of the Barred Owl, still spreading as a resident in California, through 1989 only.

BROAD-BILLED HUMMINGBIRD *Cynanthus latirostris* (82, 1). A first-fall female was at Chiriaco Summit, RIV, 28–30 Oct 2012 (OJ†, AJSt†; TABet†; 2012-171), while an adult male returned to winter in San Diego, SD, 24 Nov 2012–29 Jan 2013 (2011-170) (JK†, GN†; 2012-194).

CRESTED CARACARA *Caracara cheriway* (11, 1). The six following records from 2012 all pertain to the same wandering adult as determined by detailed analyses of feather wear and molt timing (Nelson and Pyle 2013): Ballona Wetlands, LA, 13 Jan 2012 (RPi†; 2012-005); Pt. Piedras Blancas, SLO, 10–25 Feb 2012 (BB†; JD†, CAM; 2012-019); Pt. Sur, MTY, 30 Mar 2012 (SJ†; 2012-069); Mace Blvd., south of Putah Cr., YOL/SOL, 16–17 Apr 2012 (MSc; SCH†, SMa†; 2012-052); Pt. Mugu, VEN, 19 Dec 2011–6 Jan 2012 (FF†; AJS S; 2011-239). The committee considered a different adult, first observed chasing Western Gulls (*L. occidentalis*) in the Tijuana R. valley, SD, 2–9 Sep 2012 (TF; EGK†, GMcC, GN†, MSr & CSr†; 2012-118), the same as the one present sporadically from 9 Sep 2006 through 1

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Oct 2011 (2006-127, 2007-144, 2008-093, 2009-076, and 2011-139; Singer and Terrill 2009, Pike and Compton 2010, Nelson and Pyle 2013, Nelson et al. 2013). IDENTIFICATION NOT ESTABLISHED: An adult Crested Caracara was photographed at Sonoma State University, SON, on an uncertain date, possibly 2 Mar 2012 (2012-032). The absence of characters matching any caracara known to be in California, in conjunction with the lack of a firm date, led a majority of members to question the authenticity of this report.

GYRFALCON *Falco rusticolus* (12, 1). A first-winter Gyrfalcon was at the San Jacinto W. A., RIV, 15 Jan–9 Mar 2012 (MAC†; DWA†, TAB†, DFu†, BH†, CAM†, GMcC, CMcG†, LMo†, SJM†, DWN†, CT†; 2012-007; Figure 5; photo also published in *N. Am. Birds* 66:344). Amazingly, the same Gyrfalcon intercepted birdwatchers ~300 km to the north at Owens L., INY, 21 Mar 2012 (DH†; JLD†; 2012-056). Analysis of feather wear and plumage details confirmed that these two records involved the same individual. The record for Riverside Co. is the southernmost of this species for California and North America. Captive origin is always a concern with wayward raptors, as discussed in CBRC (2007). IDENTIFICATION NOT ESTABLISHED: The committee judged three sight records from Humboldt Co. inadequate: one from the Arcata Bottoms, HUM, 26 Sep 2011 (2011-268), one from Fay Slough W. A., 19 Mar 2012 (2012-090), and one from the mouth of Redwood Cr. 29 Sep–2 Oct 2011. A September date for the Gyrfalcon is unprecedented in California, and unexpected for a bird in its first fall, as the descriptions suggested. Note, however, that Gyrfalcon records from nearby Oregon begin from late September (Marshall et al. 2003).

YELLOW-BELLIED FLYCATCHER *Empidonax flaviventris* (27, 4). A first-fall immature at Southeast Farallon I., SF, 1 Sep 2012 (DMx†; JRT, JWrt†; 2012-127) established the second-earliest fall date for the species in California. Fully a third of the state's records have come from this rocky, barren island. Additional first-fall birds at Grasslands Regional Park, YOL, 2–3 Sep 2012 (ToEt†; SCH; 2012-129); Nunes Ranch at Pt. Reyes National Seashore, MRN, 6–7 Sep 2012 (RSt; DFr, GH, DWN†, DWmt†; both 2012-121 and 2012-205); and Huntington Beach Central Park, ORA, 15–16 Oct 2012 (ToEt†; DAB†, TABet†, BED†, JLD†, BS†; 2012-158), constituted first records for the respective counties. The latter date matches the latest for this species in California. IDENTIFICATION NOT ESTABLISHED: Documentation submitted for *Empidonax* flycatchers seen at Pt. Reyes National Seashore, MRN, 30 Sep 2006 (2006-226) and 4 Oct 2012 (2012-188) and at Desert Center, RIV, 10 Sep 2011 (2011-267) proved inconclusive. See Heindel and Pyle (1999) for useful identification criteria.

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer* (94, 6). An especially early first-fall migrant at Malibu Lagoon, LA, 9 Nov (ABr†; 2012-242), was in the midst of its preformative molt. Additional apparent migrants were at Pt. Reyes National Seashore, MRN, 19 Nov 2012 (DSS†‡; 2012-198) and 6–8 Dec 2012 (AM†, DMo†; 2012-237); in Arcata, HUM, 20–24 Nov 2012 (GBl†S; RF†; 2012-190); and near Hinds Pumping Station, RIV, 17–18 Dec 2012 (JY†; 2012-208). One in Niland, IMP, 6 Jan 2012 (GMcC; 2012-002), was likely wintering. The first Dusky-capped Flycatcher known to return to California in successive winters (see Figure 8, Pike and Compton 2010), was back to La Mirada Cr. Park, LA, for the sixth consecutive year, 13 Dec 2012–20 Mar 2013, (SRe†; 2012-227; 2008-040, 2008-187, 2009-222, 2011-037, and 2011-233; Nelson et al. 2013). Another returned for its second winter, 18 Nov 2012–27 Mar 2013, to Veterans' Memorial Park in Bell Gardens, LA (RBa†; KR†, AW†; 2012-213; 2011-010; Nelson et al. 2013).

GREAT CRESTED FLYCATCHER *Myiarchus crinitus* (57, 2). A first-fall immature in Birchim Canyon, 16 km north of Bishop, INY, 6 Sep 2012 (DPr, JPr†; 2012-201), was exceptionally early; another was at Natural Bridges State Beach, SCZ, 16–21

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Sep 2012 (STu†; CST, JBl†‡, MBl†, SGet, JLRT, JCSt, SBT†; 2012-132). The latter had almost completed replacing its primaries during its preformative molt, which typically takes place in the winter range (P. Pyle pers. comm.). IDENTIFICATION NOT ESTABLISHED: The report of one along the Pajaro R. in Watsonville, SCZ/MTY, 20 Sep 2012 (2012-139), garnered no support on the second round, as no calls were heard to help bolster the distant, equivocal photographs.

THICK-BILLED KINGBIRD *Tyrannus crassirostris* (22, 2). One in Otay Valley at the mouth of Poggi Canyon, Chula Vista, SD, 14 Oct 2012–14 Apr 2013 (GMcC, MSr†; 2012-163), was back for at least its third winter (2010-176 and 2011-184; Nelson et al. 2013). A first-year bird wintered in San Dieguito Valley 4 km east of Del Mar, SD 22 Dec 2012–26 Mar 2013 (PU; DB†, SBr†, GMcC, CSmt; 2012-220), while another first-year individual at El Dorado Park in Long Beach, LA, 19–25 Oct 2012, was evidently a migrant (DAB†, MMet, KR†; 2012-164).

WHITE-EYED VIREO *Vireo griseus* (74, 5). A spring vagrant was banded at Audubon Starr Ranch, ORA, 29 May 2012 (CM, TSht; 2012-087). Additional birds were in El Segundo, LA, 10–12 May 2012 (RB†; FG†, ABL†, JR†, DS†; 2012-071; photo published *N. Am. Birds* 66:557); Harbor Regional Park, LA, 12–15 May 2012 (JLS†; AB†; 2012-087); and Galileo Hill Park, KER, 31 May–1 Jun 2012 (SLS; BK, KK†; 2012-085). One at Ft. Rosecrans National Cemetery on Pt. Loma, SD, 19 July–6 Oct 2012 (GN†; JLD, EGK†, GMcC, KR†, STu†; 2012-104), was one of very few White-eyed Vireos recorded summering in California. Since 2008, however, it is noteworthy that there have been more records of summering individuals (3) than of fall vagrants (2).

\*YELLOW-THROATED VIREO *Vireo flavifrons* (119, 1). The record of one at Inverness, MRN, 30 May 1987 (JA; 1987-501), had initially been assigned the number 1988-114, but the physical record had been lost. The committee reviews records of this species through 2007 only.

BLUE-HEADED VIREO *Vireo solitarius* (73, 4). San Diego Co. hosted fall migrants near Famosa Slough in San Diego, 24 Oct 2011 (PEL; 2011-153) and Lake O’Neill, Camp Pendleton, 11 Sep 2012 (JMMc†; 2012-131). Another was in willows along Pecho Road near Los Osos, SLO, 20–21 Oct 2012 (JSR; ARA†, BB†, TME; 2012-166). A record of what was originally thought to be a bright Cassin’s Vireo (*V. cassinii*) wintering along the Wilmington Drain, Wilmington, LA, 26 Dec 2011 (DS†; 2011-273), was submitted following the acceptance of a Blue-headed Vireo at that location the following winter, 13 Jan–4 Mar 2013 (2013-006); it was a first-year bird in 2011 and an adult in 2013, and the committee considered it the same individual. IDENTIFICATION NOT ESTABLISHED: The committee’s decisions not to accept records from Eureka, HUM, 23 Sep 2012 (2012-251), Harkins Slough, Watsonville, SCZ, 12 Oct 2012 (2012-167), and Bishop, INY, 15 Dec 2012 (2012-244), reflect its cautious approach with this difficult taxon. See Nelson et al. (2013) for additional information on the evolving criteria for identifying the Blue-headed Vireo.

YELLOW-GREEN VIREO *Vireo flavoviridis* (108, 5). Specimens preserved from San Diego, SD, received from wildlife rehabilitators, were one in North Park, 16 Sep 1996 (SDNHM #50241; 1996-179), and one near Tecolote Canyon in Clairemont, 3 Oct 2012 (SDNHM #53708; 2012-215). Also in fall 2012 were one on Pt. Loma, SD, 26–27 Sep 2012 (SESS; EGK†, GN†; 2012-146), and, in Ventura Co., one at Camarillo, 13 Oct 2012 (SBT†; 2012-165), and one near Oxnard, 24–28 Oct 2012 (TAB†, JC†, OJ, MMet; 2012-168).

BLUE JAY *Cyanocitta cristata* (16, 1). One along Redwood Cr. near Arcata, 11 Jul 2012, was the sixth recorded in Humboldt Co., on a mid-summer date unprecedented for California (KL†; 2012-103). Previous records had extended from 7 Oct to 25

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Figure 1. A first for California and the entire Pacific Ocean, this Northern Gannet (*Morus bassanus*) spent much of its time within a large colony of Common Murres (*Uria aalge*) on Southeast Farallon Island after its discovery on 25 April 2012. This photo was taken 24 June 2012 (2012-058).

*Photo by Todd McGrath*



Figure 2. California's first accepted Gray Hawk (*Buteo plagiatus*) wintered near Carpinteria, Santa Barbara Co., 25 November 2012–15 March 2013 (2012-193). This photo, taken 25 December 2012, shows the considerable extension of the tail beyond the primary tips and extensively white cheeks, distinguishing it from the superficially similar juvenile Broad-winged Hawk (*B. platypterus*).

*Photo by Ronald Holland*

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May. Washington has a mid-August record (Wahl et al. 2005), and the species has nested as close as northeastern Oregon (Marshall et al. 2003).

CAVE SWALLOW *Petrochelidon fulva* (9, 4). Two photographed at the southeast end of the Salton Sea, IMP, 18 Dec 2012 (AJS†; 2012-210), were later joined by two others, 12 Mar–6 Apr 2013 (GMCC; TABE†, EC†, KLG, MGr†, RBMc†, JMOT†; 2013-040). One found 5 km away on 30 Mar 2012 was considered part of this same wintering group (KLG†; 2013-061). IDENTIFICATION NOT ESTABLISHED: A worn one-year-old bird photographed in Mountain View, SCL, 4 Aug 2011 (2011-113), prompted much debate before ultimately failing to gain acceptance on its fourth round. The described “pumpkin” coloration of the forehead and rump was more appropriate for the Cave Swallow than for the similar Cliff Swallow (*P. pyrrhonota*), but this was not evident in the lone photograph provided to the committee. Most intriguing was the presence of newly molted inner primaries, as juveniles of neither species should be molting flight feathers in early August (Pyle 1997). By contrast, one-year-old Cave Swallows could be molting those feathers in late summer, whereas one-year old Cliff Swallows are not currently known to do so (Pyle 1997). Committee members Johnson and Pyle argued persuasively, however, that the outermost visible primary was likely a retained juvenal feather, a remnant of a previous incomplete preformative molt. Thus the worn condition of this one-year-old bird could be explained by its being a Cliff Swallow showing delayed plumage maturation and undergoing an early second prebasic molt. The Cave Swallow remains unrecorded in northern California.

WINTER WREN *Troglodytes hiemalis* (12, 4). One with grayish coloration from chin to breast wintering at Huntington Beach Central Park, 30 Oct–30 Dec 2007 (JEP†; CAM; 2007-310), was the first recorded in Orange Co.; its calls were variously compared to those of the Red Crossbill (*Loxia curvirostra*) and Song Sparrow (*Melospiza melodia*). Additional pale-throated birds at Putah Cr., YOL, 20 Nov 2012–20 Jan 2013 (JLD; RF†, SCH‡, EP‡; 2012-192), and Pine Gulch Cr., MRN, 12 Nov 2012 (EEn‡; 2012-189), similarly gave the Song Sparrow-like calls distinguishing the Winter Wren from its sister species, the Pacific Wren (*T. pacificus*), and also provided first records for the respective counties. A more controversial bird along Kinevan Rd. at San Jose Creek, near San Marcos Pass, SBA, 14–29 Nov 2011 (ARA†; DMC, TME; 2011-188), went four rounds before acceptance. The photos supported the identification as a Winter Wren, but the vocalizations were simply stated to be dissimilar to those of Wilson’s Warbler (*Cardellina pusilla*) and, thus, those of the Pacific Wren. The committee encourages the audio recording of all potential Winter Wrens, particularly as our understanding of the relative importance of various phenotypic traits distinguishing these two species continues to evolve. IDENTIFICATION NOT ESTABLISHED: The report of one in San Francisco, SF, 1 Jan 2012 (2011-235), went four rounds without gaining the necessary majority for acceptance. While the described calls sounded appropriate for the species, no recordings were obtained. Furthermore, the report contained no description of the bird itself, which could be seen only partially in the lone photo that was procured.

ARCTIC WARBLER *Phylloscopus borealis* (8, 1). One captured and banded on Southeast Farallon I., SF, 28 Sep 2012 (DMx†; KNN†, EMA†, JRT; 2012-149), was the first to be recorded in California since 2007. To date, all records are for the month of September. The three-way split of this species (Chesser et al. 2014), with *P. borealis* breeding in Alaska but the Kamchatka Leaf Warbler (*P. eximianus*) having occurred on the Aleutian Is., may lead the CBRC to reexamine the accepted records. The small size of the Southeast Farallon bird suggested to the banders that it represented the subspecies breeding in Alaska, *P. b. kennicottii*, but the committee made no formal decision beyond the Arctic Warbler, *sensu lato*.

NORTHERN WHEATEAR *Oenanthe oenanthe* (13, 0). IDENTIFICATION NOT

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**ESTABLISHED:** One reported from India Basin Park in San Francisco, SF, 28 Oct 2011 (2011-163), was incompletely and briefly seen at a distance of 200–300 m. While most committee members believed that a Northern Wheatear was seen, some key details, such as tail-pumping, were not noted by the observer, who had no prior experience with the species.

**VEERY** *Catharus fuscescens* (14, 0). **IDENTIFICATION NOT ESTABLISHED:** The report of one near Davis, YOL, 4 Jun 2012 (2012-088), went three rounds before failing to gain acceptance. While the observer was experienced and much of the description sounded good for the Veery, the bird was observed for less than 30 seconds, no diagnostic vocalization was heard, pale gray on the flanks was not noted, and no photo was obtained. *Catharus* thrushes are notoriously difficult to identify, and the committee maintains a high standard for records within this genus. Only 42% (14 of 33) of submitted reports of the Veery have been accepted, among the lowest of species on the review list. Furthermore, of the four records that have been accepted over the past decade, three were of birds either captured or preserved as a specimen, and the last was heard singing in the Sierra Nevada.

**GRAY-CHEEKED THRUSH** *Catharus minimus* (23, 1). One in its first fall was netted and measured on Southeast Farallon I., SF, 4 Oct 2012 (DMx†; KNN†, JRT; 2012-153). All three Gray-cheeked Thrushes recorded in California in the past 15 years have been on this island, which accounts for fully 65% (15 of 23) of all California records of this species.

**RUFous-BACKED ROBIN** *Turdus rufopalliatus* (18, 1). Like nearly all of California's other Rufous-backed Robins, this first-fall male was found at a desert oasis, in this case Chiriaco Summit, RIV, 29 Oct–9 Dec 2012 (AAnt, TABet†, JLD, LSt, DVPT; 2012-172).

**CURVE-BILLED THRASHER** *Toxostoma curvirostre* (30, 2). A first-spring male of the western subspecies *palmeri* near Bishop, 11 Jun–27 Sep 2012, was a first for Inyo Co. and established only the second record of a Curve-billed Thrasher summing in the state (RS; SC†, JLD†, JH†, TH, KNN†, DPr†, JPr†, KSt†, SLS†, JCSt†; 2012-091). Especially intriguing was an apparently paired bird west of the McCoy Mts. ~40 km west-northwest of Blythe, RIV, 19–27 Apr 2012 (CMcC†; 2012-051), but unfortunately the second bird was not seen well enough for the species to be confirmed.

**WHITE WAGTAIL** *Motacilla alba* (28, 1). One in its first fall was at Cabrillo Beach in San Pedro, LA, 8–18 Dec 2012 (BA; JLD, JSF†, KLG†, MGr†, RHo†, DMgt, JRat†, KR†, LS†, CT†; 2012-197; this issue's front cover). While the subspecific identification of first-fall White Wagtails is notoriously difficult, and complicated by interbreeding (Pyle 1997, Alström and Mild 2003), the clean gray rump, extensive dark centers to the median and greater secondary coverts, and distinct dark bar at the base of the secondaries indicated it to be *M. a. ocularis* (Alström and Mild 2003). Surprisingly, this is the first definitive record of this Alaska-breeding subspecies for California since 1996, and only the second since 1989 (CBRC 2007). The late fall date is typical of the race, as all fall birds identified as *ocularis* in the state have been found after 4 Oct. The converse is true of *M. a. lugens*, the Black-backed Wagtail, as nearly all fall migrants of it have been detected before 8 Oct (CBRC 2007). **IDENTIFICATION NOT ESTABLISHED:** A short report of one near Mendocino, MEN, 6 Oct 1995 (1995-145), contained details that were consistent with the claimed species but was written from memory 17 years after the observation.

**SMITH'S LONGSPUR** *Calcarius pictus* (10, 2). A male at Bear R. Ridge near Ferndale, 19–20 Apr 2012 (SEM†, KR†, AS†; 2012-053; Figure 6), and an adult male at Fay Slough near Eureka, 9 Sep 2012 (PR; MSft†; 2012-124), were the first of this species to be seen in Humboldt Co. More importantly, the former was the first ever

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Figure 3. This Wood Sandpiper (*Tringa glareola*), California's second, spent 24–29 September 2012 at a sewage pond near the mouth of the Santa Margarita R., Camp Pendleton, San Diego Co. (2012-142). In this photo, taken 26 September, the completely white rump and coarse whitish and rufous upperpart spotting distinguish it from the Solitary Sandpiper (*T. solitaria*) just below it.

Photo by Andrew Fisher



Figure 4. Albeit not a candidate for framing, this photo taken 29 September 2012 of a Common Cuckoo (*Cuculus canorus*) in Watsonville, Santa Cruz Co. (2012-147), shows thin, evenly spaced barring throughout the underparts, including across a uniformly pale underwing. The remarkably similar Oriental Cuckoo (*C. optatus*) has broad and dark ventral barring and a white stripe contrastingly bordered by dark across the median underwing, a feature completely lacking in this bird.

Photo by B. J. Stacey

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Figure 5. This second-year Gyrfalcon (*Falco rusticolus*), seen here finishing off an American Coot (*Fulica americana*) at the San Jacinto Wildlife Area, Riverside Co., 15 January–9 March 2012 (2012-007), was also recorded ~300 km away at Owens L., Inyo Co., 21 March 2012 (2012-056), and represents the southernmost record in North America.

*Photo by Mark A. Chappell*



Figure 6. This striking male Smith's Longspur (*Calcarius pictus*) photographed on the first day of its 19–20 April 2012 layover at Bear River Ridge represents the first record of that species for Humboldt County (2012-053) and the first for California in spring.

*Photo by Alex Simon*

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to be found in California in spring and in such striking breeding plumage. Arizona's only record of Smith's Longspur was on a similar date, but that bird, collected in the White Mts. 24 Apr 1953, was in worn basic plumage (Phillips et al. 1964).

**SNOW BUNTING** *Plectrophenax nivalis* (126, 2). First-winter females were at the Eel R. W. A., HUM, 1 Jan 2012 (KMB†; 2012-004), and at Tolowa Dunes State Park, DN, 16 Jan 2012 (TK†; 2012-010). IDENTIFICATION NOT ESTABLISHED: All committee members believed that a bird observed at Abbott's Lagoon on Pt. Reyes National Seashore, MRN, 6 Nov 2011 (2011-222) was very likely a Snow Bunting but agreed that the sparse details fell short of meritng acceptance.

**WORM-EATING WARBLER** *Helmitheros vermivorum* (124, 4). A first-spring vagrant was in Bolinas, MRN, 10 Jun 2012 (KF†; 2012-092), a fall vagrant was in Pescadero, SM, 18–26 Oct 2012 (MK; JRy†; 2012-181), and a wintering bird was at Shay Park in Arcata, HUM, 26 Oct 2012–11 Jan 2013 (RF; TK†; 2012-226). Also accepted was an older record of one at Rodeo Lagoon, MRN, 12 Sep 1979 (BSh; 1979-501), submitted to www.eBird.org but never previously reviewed by the committee.

**LOUISIANA WATERTHRUSH** *Parkesia motacilla* (18, 2). One at California City, KER, 3–8 Sep 2012 (TEW; TAB†, KHL, BSt†, STS‡; 2012-120), was the first to be recorded in California since 2004. An older record of one “found dead” at Cottonwood Springs in Joshua Tree N. P., RIV, 8 May 1960 (WFVZ #43171; 2011-116), went three rounds before acceptance. The specimen, in the Donald Bleitz collection housed at the Western Foundation of Vertebrate Zoology, is clearly a Louisiana Waterthrush. However, Bleitz was known to band and “experimentally” release birds that had been transported to him from around the world, complicating the issue of the specimen’s provenance. Following a tortuous investigation, the CBRC ascertained that an associate of Bleitz had banded multiple site-appropriate birds at Cottonwood Springs around that time and that the specimen had been obtained on site. This record now shortens the interval between the first state record (in 1908) and the second to 52 years, from the previous 77.

**GOLDEN-WINGED WARBLER** *Vermivora chrysoptera* (75, 0). IDENTIFICATION NOT ESTABLISHED: A report of one at Oceano Lagoon, Pismo State Beach, SLO, 17 Sep 2012 (2012-143), contained details such as “broad yellow wing patches” that strongly suggested the claimed species. The bird was seen incompletely, however, and the record ultimately failed to gain acceptance after four rounds.

**BLUE-WINGED WARBLER** *Vermivora cyanoptera* (47, 2). A singing male was at Cottonwood Cr. near Oasis, MNO, 27 May 2012 (PJM†; AD; 2012-246), and another male was near Covington Park, Morongo Valley, SBE, 4 Jun 2012 (RCr†; 2012-116).

**CONNECTICUT WARBLER** *Oporornis agilis* (119, 4). First-fall immatures were at Prisoner’s Harbor on Santa Cruz I., SBA, 14 Sep 2012 (NL; 2012-223), the north spit of Humboldt Bay near Fairhaven, HUM, 25 Sep 2012 (TLS; AD; 2012-228), and at Pt. Reyes National Seashore, MRN, 28 Sep–1 Oct 2012 (MBat†; CW†, RLB†, KSc, JCS†, JW†; 2012-148). A record of one seen briefly at dusk on Southeast Farallon I., SF, 1 Oct 2006 (RF; 2007-040; 2007-308), went four rounds before acceptance, largely because of ambiguities in the report regarding the bird’s described “walking” versus “hopping,” a key point of distinction from the similar Mourning Warbler (*Geothlypis philadelphia*).

**MOURNING WARBLER** *Geothlypis philadelphia* (143, 2). A vocalizing female was at California City, KER, 30 May 2012 (SBT†; 2012-241), while one in its first fall was at Mad R. Beach Co. Park, HUM, 3 Sep 2012 (GBI S; TK†, KR†; 2012-119). IDENTIFICATION NOT ESTABLISHED: A report from Arcata Marsh, HUM, 9 Sep 2012 (2012-130), suggested the Mourning Warbler, but the observer was not

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experienced with this difficult-to-identify species and was not completely certain of the identification; it failed to pass after three rounds.

CAPE MAY WARBLER *Setophaga tigrina* (27\*\*, 7). A first-spring male was in Santa Cruz, SCZ, 12–15 Apr 2012 (SGet†; 2012-081). An adult male was at Southeast Farallon I., SF, 7–8 Sep 2012 (DMxt†; JRT; 2012-126), the 72<sup>nd</sup> of this species to appear on the island (J. Tietz in litt.). Additional records of first-fall birds were of single individuals near the Golden Gate bridge, SF, 18 Sep 2012 (ME; 2012-136); Goleta, SBA, 3 Oct 2012 (KA†; 2012-223); and the Carrizo Plain, SLO, 4 Nov 2012 (DT†, MT†; 2012-177), and of two different individuals in Bodega Bay, SON, 26 Sep 2012 (STr†; 2012-151), and 30 Sep 2012 (SCat†; 2012-150). IDENTIFICATION NOT ESTABLISHED: One at O’Neill Forebay, MER, 27 Sep 2012 (2012-152), was only sparingly described and received no support. The brief description of another bird in Goleta, SBA, 15 Sep 2012 (2012-219), suggested a male Cape May Warbler, but members were concerned by the presence of white “wing bars” rather than the more expected white patches on the median coverts.

\*PINE WARBLER *Setophaga pinus* (114, 11). All 21 California records of this species from 2010 to 2012 were from the southern half of the state, including one of two first-fall birds discovered in the same tree in Fountain Valley, ORA, 27 Nov 2012–6 Jan 2013 (JEP; 2012-224) and 27 Nov 2012–21 Jan 2013 (JEP; KSp, TABe, TFH†; 2012-240). New birds for the winter period were in Montecito, SBA, 10 Jan 2012 (OJ; 2012-009); Coronado, SD, 25 Nov 2012–10 Apr 2013 (EC; JK†, PEL, GMcC, JMMc†, MSr†, SBT†; 2012-195); Yorba Linda, ORA, 1 Nov 2012–27 Feb 2013 (TFH†; 2012-248); Del Mar, SD, 10 Dec 2012 (PEL; 2012-202); and Earvin Magic Johnson Recreation Area, Los Angeles, LA, 9 Dec 2012–31 March 2013 (TABet†; RBat†; both 2012-214 and 2013-046). Adult males returning for their third winters were at Hansen Dam Park in Lake View Terrace, LA, 28 Oct 2012–31 Mar 2013 (KLG†; KR†; 2012-191; also 2010-159 and 2011-237; Nelson et al. 2013) and Palos Verdes Estates, LA, 23 Dec 2012 (JEP†; 2012-225; also 2011-025 and 2011-236; Nelson et al. 2013). First-fall females at La Mirada Park, La Mirada, LA, 24–25 Oct 2012 (JR; 2012-170); Pt. Loma, SD, 30 Oct–4 Nov 2012 (ARAt†; 2012-173); and Goleta, SBA, 4 Nov 2012 (NL; 2012-180), were evidently migrants. Another migrating first-fall female near Oxnard, 11 Oct 2012 (DAB†; 2012-156), was a long-awaited first record for Ventura Co. The committee removed the Pine Warbler from the review list at the 2014 meeting and now reviews only records through 2013.

GRACE’S WARBLER *Setophaga graciae* (65, 4). Individuals at Ft. Rosecrans National Cemetery on Pt. Loma, SD, 3 Sep 2012 (AJS; 2012-243) and Montaña de Oro State Park, SLO, 29–30 Sep 2012 (JSR; 2012-230) were evidently migrants. Newly discovered wintering birds were at Camino Real Park in Ventura, VEN, 10 Dec 2012–20 Jan 2013 (IT; JC†, JSF†, PEL, GMcC, SBT, DVPT†; 2012-212) and Spring Valley, SD, 24 Dec 2012–17 Mar 2013 (DWAt†; PEL; 2012-229), while returning birds included one back for its fifth winter in Goleta, SBA, 28 Oct 2012–21 Feb 2013 (DMC†, DMxt†, HPR†, MSm; 2012-218), and another returning to Greenwood Cemetery in San Diego, SD, 31 Oct 2012–10 Apr 2013 (CA†, GMcC, MSa†, SBT†; 2012-174).

RED-FACED WARBLER *Cardellina rubrifrons* (23, 1). A well-described bird was at Horse Heaven Campground in the Laguna Mts., SD, 9 Aug 2012 (SRo; 2012-114), also the area of California’s last Red-faced Warbler, 16 Sep 2007 (Singer and Terrill 2009).

EASTERN TOWHEE (*Pipilo erythrrophthalmus*) (0, 0). IDENTIFICATION NOT ESTABLISHED: An intriguing report of one at Venice I., west of Stockton, SJ, 18 Dec 2011 (2011-266), received no support, despite many members believing that the claimed species could have been involved. While much of the description matched

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Figure 7. This first-fall Varied Bunting (*Passerina versicolor*) at Horsethief Springs in the Kingston Mts., 10–12 Oct 2012 (2012-155), is the first recorded in San Bernardino Co. and only the second in California in nearly a century. Although the presence of obscure wingbars is often cited as a trait of the Varied Bunting (e.g., Beadle and Rising 2000), it is in fact typical for this species to exhibit pale wingbars at least in fresh plumage (S.N.G. Howell pers.comm.). In this photo, taken 11 October 2012, note the pale contrasting tips of the median secondary coverts, most of which are hidden by the scapular feathers.

Photo by Thomas A. Benson



Figure 8. The Scaly-breasted Munia (*Lonchura punctulata*, also known as the Nutmeg Mannikin) is now well established over much of the coastal slope of southern California, and the committee determined that the species met all criteria for addition to the California list as an introduced species. Shown here are 28 specimens from a series of 42 at the Natural History Museum of Los Angeles County and collected in Los Angeles and Orange counties between 1995 and 2014.

Photo by Kimball L. Garrett

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a female Eastern Towhee and not any race of the Spotted Towhee (*P. maculatus*), the committee was most concerned that the distinctive white patch at the base of the outer primaries was not observed. In addition, several members cited the possibility of hybridization with another species of towhee. New Mexico has accumulated 16 records of the Eastern Towhee but also has three well-documented records of hybrid Eastern × Spotted Towhees (S. O. Williams). Furthermore, the committee is reluctant to accept a first state record by a single observer in the absence of a photograph. We expect that the Eastern Towhee will eventually be documented adequately in California, but it has been over a decade since the last of Arizona's two winter records of this species (Rosenberg et al. 2007).

**FIELD SPARROW** *Spizella pusilla* (12, 4). One visiting a feeder in San Francisco, SF, 28 Dec 2012–10 Feb 2013 (KMcK†; ME†, JM†; 2012-234), exhibited the pale gray underparts consistent with the Great Plains race *S. p. arenacea*, as have all other Field Sparrows recorded in California. Another relatively drab representative of this race was at the Kenneth Hahn State Recreation Area, Baldwin Hills, 19 Apr–9 May 2012 (AB†, EB†; KLG, ABL, JCS†; 2012-057; photo published *N. Am. Birds* 66:574), providing Los Angeles Co. with its first record. The absence of prior spring records for California, as well as the length of the stay, suggested that the bird might have been wintering in a less-visited portion of this well-birded park. A migrant at Nunes Ranch on Pt. Reyes National Seashore, 3–5 Nov 2012 (LB†, DRM†, JM†, SWo†; 2012-175), provided a first record for Marin Co. Another at China L., KER, 14–15 Oct 2012 (DVB†; SGr; 2012-159), was likely as early as one could expect a fall migrant in the state, given that the species' peak migration does not begin until mid-October (Pyle et al. 2011a).

**LITTLE BUNTING** *Emberiza pusilla* (3, 1). One was on Southeast Farallon I., SF, 14 Nov 2012 (JRT; LMu; 2012-184). Although the bird was seen rather briefly and not photographed, the white eye ring, chestnut face with a dark frame that fell short of reaching the small, conical bill, and white outer rectrices, along with the sharp “tsip” vocalizations, convinced the committee that the Little Bunting and not the Reed Bunting (*E. schoeniclus*), Chestnut-eared Bunting (*E. fucata*), Rustic Bunting (*E. rustica*), or Lapland Longspur (*Calcarius lapponicus*) had been observed. The now three records of the Little Bunting in California span the period 27 Sep–14 Nov. An additional fall record along the Pacific coast comes from the Vizcaino Peninsula in Baja California Sur, 8 Oct 2008 (Radamaker and Powell 2010), while the first winter record for North America was recently established in northeastern Oregon, 28 Jan–25 Mar 2013 (Contreras and Turner 2013).

**PYRRHULOXIA** *Cardinalis sinuatus* (28, 1). A male was in a wash vegetated with ironwood (*Olneya tesota*) and blue palo verde (*Parkinsonia florida*) at the north end of the McCoy Mts., RIV, 28 Apr 2012 (CMCC; 2012-061).

**VARIED BUNTING** *Passerina versicolor* (4, 1). A first-fall immature at Horsethief Springs in the Kingston Mts., 10–12 Oct 2012 (DAG†; TAB†, JLD, SJM†, BS†, JCS†; 2012-155; Figure 7; photo published *N. Am. Birds* 67:185), represents the first record of this species in San Bernardino Co. and only the fourth for California. Separation from the very similar Indigo Bunting (*P. cyanea*) was centered on the clearly decurved culmen, the absence of streaking across the breast, the uniform buff coloration over the entire underparts, and the indistinct edgings to the tertials and greater secondary coverts. In addition, it was evident in photographs that the (outermost) ninth primary was shorter than the fifth primary, as is characteristic of the Varied, while the opposite is true for the Indigo (Pyle 1997). California's first two records of the Varied were of adults collected 8 and 9 Feb 1914 near Blythe, RIV, from a remarkable flock of 15–20 birds. The only other record is of an adult male at Mesquite Spring, Death Valley N. P., INY, 18–21 Nov 1977 (Luther et al. 1979).

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Thus the bird in the Kingston Mts. was only the second Varied Bunting to appear in the state in nearly a century, and the first that was not an adult.

RUSTY BLACKBIRD *Euphagus carolinus* (29\*\*, 5). A first-winter female was at Legg L. in El Monte, LA, 3 Jan 2012 (ML†; ABL†; 2012-001). Others were discovered at famed, offshore migrant traps, with two birds at Lemon Tank on San Clemente I., LA, 13–15 Nov 2012 (JTS†; 2012-182), and a first-fall female at Southeast Farallon I., SF, 14–18 Nov 2012 (LMu†; JRT†; 2012-206). Another first-fall immature was far inland at China L., KER, 20–22 Nov 2012 (SLS†; 2012-211).

COMMON GRACKLE *Quiscalus quiscula* (90, 3). A male at Bob's Cr. Ranch, 19 km southeast of Pittsville, 4–14 May 2012 (KPA†; 2012-075), was the first to be recorded in Lassen Co. A record of a spring vagrant male along Soquel Cr. in Capitola, SCZ, 2 May 2011 (DLS; 2011-099) went three rounds before acceptance, as the bird was observed mainly in flight and only briefly perched atop a redwood tree. A first-winter male was in Bishop, INY, 19 Feb–3 Apr 2012 (CY†; JLD†, KNN, NJO, DPr†, JPr†, BSt†, SLS; 2012-026).

COMMON REDPOLL *Acanthis flammea* (91, 10). A first-winter female was in McArthur, SHA, 17 Dec 2011–14 Jan 2012 (OJ†; JRT†; 2011-218), while a first-winter male in Julian, SD, 4–19 Feb 2012, was one of the most southerly of this species yet recorded (MGot†; PEL, CAM†, GMcC, CMcG†, VM†, SJM†, MST†; 2012-014; photo published *N. Am. Birds* 66:376). However, a first-spring female on San Clemente I., LA, 3–4 May 2012 (MSIS; JST†; 2012-068), was perhaps arriving from points even farther to the south. Two more first-winter females were at Winema Lodge near Tulelake, SIS, 10 Feb–5 Mar 2012 (BP†; DN, FO, LP†, JRu, BLSt†; 2012-022), while an adult male was in Paradise Estates, MNO, 21–22 Jan 2012 (DHT†; 2012-031). Additional first-winter birds were in Taylorsville, PLU, 6–25 Feb 2012 (SE; CDi†; 2012-020); Woodland, YOL, 22–25 Feb 2012 (JS†; JCSt†; 2012-029); Santa Cruz, SCZ, 24–26 Feb 2012 (SMd†; DLS; 2012-030); and Westwood, LAS, 9 Apr 2012 (SMcD†; 2012-200). IDENTIFICATION NOT ESTABLISHED: The report of one at Mammoth L., MNO, 7 Feb 2012 (2012-040), was likely correct but too light on details, even for a year of irruption.

### POPULATIONS ACCEPTED

In addition to evaluating and archiving records of birds that rarely occur in California, the committee also maintains a California bird list, which includes introduced species considered to be established in the state. For a species to be added to the list, the identification must be established and the population in the state must be considered “viable.” The committee’s criteria for viability are (1) that the species has bred in the state for 15 consecutive years, (2) that the population is increasing or stabilized after an initial period of increase, (3) that the species occupies enough geographically contiguous suitable habitat that the population is unlikely to diminish significantly, and (4) that the occupied environment is ecologically similar enough to the species’ native habitat, or to that of other successful introductions, that permanent establishment seems likely. Populations maintained primarily by continued releases or requiring intensive management are not considered viable.

\*SCALY-BREASTED MUNIA *Lonchura punctulata*. The CBRC’s Introduced Birds Subcommittee (K.L. Garrett, J. Morlan, J. E. Pike) gathered evidence that naturalized populations of this species had met the criteria for addition to the California list; the full committee accepted their proposal (2013-085), and the species has since been added to the American Birding Association’s checklist as well (Pranty and Floyd 2013).

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Scaly-breasted Munias have been reported in the wild in California since at least the mid- to late 1980s; breeding was not documented until 1997, although the species was clearly naturalized here before that. It ranges from southwestern San Diego County to coastal San Luis Obispo County, with the largest numbers in the coastal lowlands of Orange and Los Angeles counties, especially along rivers. Small populations have also been noted in the south San Francisco Bay area. A series of specimens (42 from southern California populations at LACM alone; Figure 8) document that the established subspecies is the nominate subspecies of much of the Indian subcontinent and Sri Lanka; it is characterized by clean black-on-white scaling on the underparts, a black bill, and yellow-tinged uppertail coverts (Restall 1997). A distinctly different subspecies from southeast Asia, *L. p. topela*, has long been established on the Hawaiian Islands (Pyle and Pyle 2009). This species has generally been called the Nutmeg Mannikin in the North American literature, but the A.O.U. adopted the more widely used English name in its 55<sup>th</sup> supplement (Chesser et al. 2014).

### CORRIGENDA

The following corrections should be made to the CBRC's previous report (Nelson et al. 2013): California's latest record of the Blue Jay should be changed from 8 May 2012 to 25 May 2005 (Iliff et al. 2007); the record number (2010-046) was omitted from the 26–27 May 2010 report of a Great Crested Flycatcher in Olivenhain, SD; the county of the Short-tailed Albatross (2011-265) 65 km off Pigeon Pt. should be changed from SCZ to SM; the total number of records of the Neotropic Cormorant should be 34, not 33; the two adult Yellow-crowned Night-Herons at Imperial Beach, SD, 7 Dec 2011–29 Jul 2012 (2011-254) were presumed to be birds returning to a frequently used nest site but were inadvertently counted in the final tally, which should be changed from 7 to 5.

The following correction is noted for the 36<sup>th</sup> report (Johnson et al. 2012): the total number of records for Neotropic Cormorant should be 26, not 25.

### DATA SOLICITATION

Sightings for 2012 for which the CBRC has received no documentation: a Little Stint at the Elk R. mouth, HUM, 24 Jul (*N. Am. Birds* 66:730); a White-eyed Vireo at Galileo Hill Park, KRN, 15 Jul (*N. Am. Birds* 66:734).

### ACKNOWLEDGMENTS

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# EFFECTS OF NATURAL HABITAT ON PEST CONTROL IN CALIFORNIA VINEYARDS

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**ABSTRACT:** Ecosystem services provided by wildlife can offer powerful incentives for conservation, particularly if species can be linked to natural habitat. We examined the hypothesis that natural habitats adjacent to vineyards provide a source of insectivorous birds by testing the prediction that predation rates should be higher close to oak woodland than in the interior of a vineyard. We simulated an insect outbreak in four small vineyards all adjacent to oak woodland. There was no evidence that predation was higher along edges of vineyards than in the interior. We did find that birds responded quickly to a simulated outbreak of insect larvae, with predation rates during the late summer reaching 90%. Motion-sensing cameras revealed that the most common predator of the larvae was the Western Bluebird (*Sialia mexicana*). These results suggest that vineyard managers may take advantage of biological pest control offered by songbirds and perhaps increase control by actively managing for the birds, a potentially beneficial scenario for both vineyard managers and bird conservation.

One of the major factors contributing to habitat loss is the expansion of agriculture (Tilman et al. 2001), and such habitat loss is currently one of the most pressing issues for wildlife (Johnson 2005). If wildlife can be shown to provide ecosystem services and those species can be linked to natural habitats, that connection may increase the incentive to conserve habitat. In California, songbirds can offer wine-grape growers pest-control services (Jedlicka et al. 2011), providing an economic incentive to preserve and expand the oak woodlands surrounding vineyards. Numerous studies have shown that birds can provide various levels of pest control in various agricultural settings (e.g., Mols and Visser 2002, Kellermann et al. 2008, Van Bael et al. 2008), but rapeseed and coffee are the only crops for which a decrease in pest damage has been quantified in relation to natural habitat (Thies and Tscharntke 1999, Chaplin-Kramer et al. 2011, Karp et al. 2013). More research is needed to clarify how avian predation of agricultural pests may be linked to habitats surrounding farms. Previous studies have shown that installation of nest boxes in vineyards can attract Western Bluebirds (*Sialia mexicana*; Fiehler et al. 2006) and enhance their control of pests (Jedlicka et al. 2011). Artificial provision of nesting sites, however, does not provide incentive for habitat conservation that may benefit other species as well.

In 2010, Sonoma County had 23,090 ha devoted to wine grapes, second only in area within California to San Joaquin County; Mendocino County supported 6977 ha, ranking ninth in the state ([http://www.nass.usda.gov/Statistics\\_by\\_State/California/Publications/Grape\\_Acreage/index.asp](http://www.nass.usda.gov/Statistics_by_State/California/Publications/Grape_Acreage/index.asp)). The continued conversion of oak woodland to vineyards contributes to habitat loss and displacement of wildlife in this region (Merenlander 2000). At least one study, however, has shown that the nest success of many native birds is higher in oak woodlands directly adjacent to vineyards, possibly because of a reduced diversity of nest predators exerting less predation pressure, suggesting that the oak woodland remaining within a matrix of vineyards may be of high

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value to breeding birds (Reynolds et al. 2006) and serve as sources of birds in a landscape dominated by agriculture. We examined the hypothesis that natural habitats adjacent to vineyards provide a source of insectivorous birds by testing the prediction that rates of predation on insects should be higher close to oak habitat than in the interior of a vineyard.

### METHODS

Our study took place from 29 May to 15 July 2011 in four vineyards in northern California: Haywood Vineyards, Sonoma ( $38^{\circ} 21' N$ ,  $122^{\circ} 26' W$ , 36 ha), Bedrock Vineyard, Sonoma ( $38^{\circ} 20' N$ ,  $122^{\circ} 30' W$ , 49 ha; Figure 1), Old Hill Vineyard, Glen Ellen ( $38^{\circ} 21' N$ ,  $122^{\circ} 30' W$ , 12 ha), and Fetzer's Sundial Vineyard, Hopland ( $38^{\circ} 59' N$ ,  $123^{\circ} 6' W$ , 30 ha). Each vineyard was part of a matrix of natural habitat and land developed with homes, roads, and other man-made features, but adjacent to all was natural oak woodland dominated by Coast Live Oak (*Quercus agrifolia*), Bay Laurel (*Umbellularia californica*), Western Poison Oak (*Toxicodendron diversilobum*), and non-native annual grasses (Mayer and Laudenslayer 1988). Using aerial imagery in ArcMap (version 10.0, Environmental Systems Research Institute, Inc., Redlands, CA), we estimated the extent of natural habitat and vineyard or otherwise developed land in an area of  $1 \text{ km}^2$  surrounding the center of each of our study sites. The extent of developed and natural habitat was, respectively, 24 and 43 ha at Haywood, 46 and 17 ha at Bedrock, 42 and 20 ha at Old Hill, and 34 and 25 ha at Sundial. The grape vines were all grown on trellises



Figure 1. Aerial image of the Bedrock Vineyard with study design illustrated, Sonoma County, California, 2011. White bars represent transects of 100 m.

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and were between 1.3 and 3 m tall, in rows spaced 1 m apart. Grape varieties grown included red varietals, chardonnays, field blends, barbera, petite sirah, merlot, and cabernet franc; during the study all grapes were in the stages of flowering or green-bud growth.

We assessed predation of arthropods by birds in vineyards by using Mealworm Beetle (*Tenebrio molitor*) larvae to simulate an outbreak. We pinned the larvae to cardboard squares staked to the ground along transects (*sensu* Jedlicka et al. 2011). The mealworms represented caterpillars, as at least five species of Lepidoptera are major grapevine pests and four are minor pests (Flaherty et al. 1992). Recently the European Grapevine Moth (*Lobesia botrana*), a potentially devastating pest of grapevines, has been detected in parts of California ([http://www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/eg\\_moth/index.shtml](http://www.aphis.usda.gov/plant_health/plant_pest_info/eg_moth/index.shtml)). These larvae hatch from eggs laid on the leaves and do damage to the plant from May through August (<http://www.ipm.ucdavis.edu/EXOTIC/eurograpevinemoth.html#LIFE>). Although mealworms are coleopteran larvae, they are similar in size and shape to lepidopteran larvae. They are also easily obtained, agriculturally benign, and hardy, making them ideal candidates for experiments with sentinel pests.

Our experiments and surveys at each vineyard took place on two consecutive days from May through July to correspond with birds' breeding season, the grape-growing season, and the larval stage of lepidopteran pests. We sampled all four farms between 29 May and 20 June, then again in July at two of the vineyards, Bedrock and Old Hill, 40 and 25 days after the first sample, respectively; time constraints prevented additional sampling at all four vineyards. At each farm we established four to six 100-m transects, depending on vineyard size ( $\bar{x} = 15.3$  ha), that were at least 30 m apart along vine rows perpendicular to oak habitat (see Figure 1). No transect was more than one half the total length of the vineyard, so at least 100 m of vineyard extended beyond the end of each transect. Oak patches were on average 60 m wide perpendicular to the edge of vineyard (range 29–119 m). From 07:00 to 07:30 on experiment days, we placed brown cardboard squares with five larvae each at 10-m intervals along each transect from 0 to 100 m. After 6 hours (13:00–13:30), we rechecked the squares and categorized each as depredated, if one or more larvae were missing, as not depredated if not. During the second sampling period we placed five motion-sensing cameras (Primos TruthCam 35) on random transects to document which species were consuming the larvae.

Prior to each experiment, we did an area survey (Ralph et al. 1993) to generate a rough index of relative abundance and composition of the bird population. These surveys began at 07:00 the day before an experiment, lasted 30 min, and covered the border between the oak habitat and the vineyard where the experiment was set up the following day. To prevent any confounding effects of the surveys on the experiment and vice versa, we recorded numbers of all species heard and seen each day preceding an experiment. On the basis of general diet and foraging behavior (Ehrlich et al. 1988), we identified which of the species observed is a potential predator of insect pests in vineyards, and we tallied the number of individuals of those species.

To avoid the possible confounding effects of pesticides, we restricted our experiment to vineyards where insecticides were not sprayed and no fungicides

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or herbicides had been sprayed in the 24 hours preceding the experiment. We avoided rainy days, and days when farm equipment or other people were working in the vineyards. All research was done with approval of Humboldt State University's Institutional Animal Care and Use Committee (HSU 10/11.W.69-A).

### Statistical Analysis

In most cases (86% of 232) either all five or no mealworms were removed from a station, so we analyzed predation as a binary variable where 1 = predation and 0 = no predation. To examine the effect of distance to natural habitat on predation rate, we ran mixed-effects linear models with a binary response distribution (routine lme4 in program R 3.0.1) with transect number nested within vineyard (site) as a random effect and distance to oak-patch edge as the fixed effect. We used a chi-squared test to determine whether, at the vineyards sampled twice, predation rates in the two samples differed significantly, and ran the mixed-effects models separately for the first and second samples. We assessed significance by comparing the AIC<sub>c</sub> scores of models with (hypothesized model) and without (null model) distance as a fixed effect.

## RESULTS

The predation rates during the two periods of sampling differed ( $\chi^2 = 17.0_1$ ,  $P = 0.00004$ ), being 21% higher in the second period than in the first, reaching a maximum of 90% (Table 1), although species composition and abundance changed little. There was no evidence that distance to oak-patch edge contributed to the fit of the model predicting removal of larvae. In the first sampling period the null model (without distance) had an AIC<sub>c</sub> score insignificantly lower (364.43) and model weight higher (0.65) than the model with distance (AIC<sub>c</sub> = 365.67, weight = 0.35). Likewise, in the second period the null model had an AIC<sub>c</sub> score insignificantly lower (206.13) and model weight higher (0.72) than the model with distance (AIC<sub>c</sub> = 208.05; weight = 0.28). Coefficients for the Bedrock Vineyard were higher by 3.005 to 3.646 (standard error 0.644–0.670) than those for the other three sites, which were all nearly identical to each other, indicating that the probability of predation was higher at Bedrock than at the other three vineyards. The number of birds counted

**Table 1** Prevalence of Predation of Mealworms Supplied in Four Vineyards in Sonoma and Mendocino Counties, California, 2011

Site	Date	Depredated	Not depredated	% Depredated
Haywood	29 May	17	27	39
Bedrock	2 June	53	3	95
Sundial	18 June	21	45	32
Old Hill	20 June	31	35	47
Bedrock	13 July	55	1	98
Old Hill	15 July	55	11	83
Total		232	122	66

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during the area surveys and potential predators of the larvae varied from 14 to 46 per vineyard (Table 2). The cameras installed at Bedrock and Old Hill revealed the Western Bluebird (both sexes, adults and juveniles) to be the most frequent predator eating the larvae (Table 2), as well as one Dark-eyed Junco (*Junco hyemalis*) and two Western Scrub-Jays (*Aphelocoma californica*). In many cases the camera was too slow to reveal the animal responsible for predation (predator left the field of view before video recorded), but the speed at which the sensors worked (~2 sec) suggests that birds are the most likely candidate, though we cannot rule out the Western Fence Lizard (*Sceloporus occidentalis*), present in all of the vineyards, as were ants, wasps, and a variety of other predatory insects.

**Table 2** Numbers of Potential Predators of Caterpillars Detected during Area Surveys along the Edges of Four Vineyards in Sonoma and Mendocino Counties, California, 2011

Species	Haywood (29 May)	Bedrock (2 June)	Sundial (18 June)	Old Hill (20 June)	Bedrock (13 July)	Old Hill (15 July)
California Quail <i>Callipepla californica</i>	1	1	7	12	0	0
Northern Flicker <i>Colaptes auratus</i>	0	0	3	0	0	0
Steller's Jay <i>Cyanocitta stelleri</i>	0	0	1	0	0	0
Western Scrub-Jay <i>Aphelocoma californica</i>	1	0	3	2	0	3
American Crow <i>Corvus brachyrhynchos</i>	0	3	0	0	1	1
Western Bluebird <i>Sialia mexicana</i>	1	0	5	3	0	3
American Robin <i>Turdus migratorius</i>	1	0	6	0	0	0
European Starling <i>Sturnus vulgaris</i>	0	0	5	0	1	0
Spotted Towhee <i>Pipilo maculatus</i>	0	2	0	2	1	4
California Towhee <i>Melozone crissalis</i>	10	4	3	0	1	0
Chipping Sparrow <i>Spizella passerina</i>	0	2	2	0	0	0
Song Sparrow <i>Melospiza melodia</i>	0	6	3	0	5	0
Dark-eyed Junco <i>Junco hyemalis</i>	15	1	0	2	3	2
Brown-headed Cowbird <i>Molothrus ater</i>	0	0	7	0	0	0
House Finch <i>Haemorhous mexicanus</i>	17	3	0	2	2	7
Total	46	22	45	23	14	20
Mean	3.1	1.5	3.0	1.5	0.9	1.3

## EFFECTS OF HABITAT ON PEST CONTROL IN CALIFORNIA VINEYARDS

### DISCUSSION

We found no evidence that rates of predation were higher along edges of vineyards adjacent to natural habitat than farther from those edges. The vineyards we studied were small (mean 31.75 ha, range 12–49 ha), irregularly shaped, and embedded in heterogeneous landscapes, with maximum distances to adjacent habitat 30 to 300 m. It is possible that the effects of distance on predation would be evident at significantly larger distances in larger, more homogeneous, vineyards. It is possible that birds on the edges developed a search image for the mealworms or cardboard squares and followed the transects to the interior. Kellermann et al. (2008) demonstrated that birds reduce pest damage to coffee plants but were unable to confirm that natural habitat was correlated with the pest reduction, most likely because of birds' mobility and the patchiness of the plantations studied, a situation similar to the vineyards we studied. Baumgartner (1999) investigated birds' predation of codling moths (*Cydia pomonella*) in apple orchards and found it to be significant. They also found a higher diversity of birds in orchards near native habitat. Vineyards are essentially a shrub layer, and in our study area the natural surrounding habitats, being oak woodlands, are dominated by trees (Mayer and Laudenslayer 1988). Therefore, unlike orchards or shaded coffee plantations surrounded by forests, the use of vineyards by native birds may be limited by the local species' preferences for foraging in or under a canopy. Thus maintaining a heterogeneous landscape may promote a more diverse suite of species, which can provide agroecosystems with the resilience (Tscharntke et al. 2005) to recover from a pest outbreak.

We found that predation rates were significantly higher in mid-July than in May and June. In other California vineyards, Jedlicka et al. (2011) found that the abundance of birds more than doubled late in the breeding season, when fledglings are foraging alongside their parents. In our study the fledging of juveniles, which we video-documented foraging on larvae, may also explain the increased predation rates.

We found that the probability a mealworm would be taken was higher at Bedrock Vineyard than at the other three sites. The area surveys did not suggest a greater abundance of birds at Bedrock, suggesting bird density was not responsible for its high predation rate. Although the area surveys may not have reflected variation in abundance accurately, this vineyard maintained its vines at a height of 3 m rather than the standard 1.3 m, so it is possible that the different structure of the vines contributed to the difference in predation rate. Further investigation to identify specific characteristics of a vineyard and its surrounding habitat that enhance predation of pests would be valuable to vineyard managers. Reynolds et al. (2009) suggested that the natural heterogeneity of oak woodland may preadapt its native birds to certain levels of fragmentation. Quantifying threshold sizes of fragments within a matrix of vineyards may support a basis for preventing loss of important habitat patches that can support native bird communities, as well as for guidelines for restoring habitat useful to both birds and agriculture.

To make the service provided by wildlife into an incentive for conservation, one must be able to link those services to a direct human benefit. Further study could quantify the dollar value of pest removal to clarify for vineyard managers the financial benefit they would gain in crop yield saved from insect

## EFFECTS OF HABITAT ON PEST CONTROL IN CALIFORNIA VINEYARDS

damage. Johnson et al. (2010) and Kellerman et al. (2008) estimated these savings to coffee growers, which in combination with outreach has resulted in farm-management recommendations that increase the quality of coffee farms for wildlife (Johnson pers. obs.).

Although we were not able to show that natural oak habitat provides a diversity of avian predators, we did corroborate that the Western Bluebird is an effective predator of arthropod larvae in vineyards. Jedlicka et al. (2011) found that providing nest boxes in vineyards increases the bluebird's numbers and that predation rates in vineyards with nest boxes are higher than in those without. The video cameras we deployed showed that the bluebird was the main predator of the larvae. The provision of nest boxes in vineyards increases the sizes of bluebirds' clutches, though it is unclear if there is a corresponding increase in fledgling success or survival (Fiehler et al. 2006). Jedlicka et al. (2014) showed that the species composition of birds using nearby natural habitats was greater and significantly different from that found in vineyards, and the establishment of nest boxes within vineyards did not alter species composition.

Although our study examined the benefits of insect-eating songbirds, frugivorous songbirds can be pests in vineyards (Tracey and Saunders 2010). According to Taber and Martin (1998), the main bird species that do economic damage to grapes are the European Starling (*Sturnus vulgaris*) and House Finch (*Haemorhous mexicanus*), commonly excluded with netting during véraison. Thus, although the Western Bluebird may do some minor damage, it is not the species that concerns growers most. Kross et al. (2012) showed that in New Zealand the introduction of the New Zealand Falcon (*Falco novaeseelandiae*) can help reduce pest birds and limit crop damage. Future work should investigate the trade-off of raptors reducing frugivorous and insectivorous songbirds in vineyards. Although our study was short and its sample was relatively small, it suggests birds provide significant pest-control services that merit further investigation.

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# THE NOMINATE SUBSPECIES OF THE PURPLE FINCH IN CALIFORNIA AND WESTERN NORTH AMERICA

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**ABSTRACT:** The Purple Finch (*Haemorhous purpureus*) is most often recognized as comprising two distinct subspecies: *purpureus*, breeding and wintering through most of Canada and the eastern United States, and *californicus*, reported to be largely resident along the Pacific coast, from British Columbia to southern California. Although the migratory *purpureus* is the subspecies expected as a vagrant in Alaska and the interior West, the identity of the subspecies occurring in these regions has been poorly documented. Here we document the first records of *purpureus* for California and assess the subspecies of the Purple Finch from photographs and specimens throughout western North America. Nominate *purpureus* occurs regularly in the western Great Plains states and very sparsely farther west. *H. p. californicus* may be more prone to vagrancy than previously suspected, as we document the first records for Alaska, Colorado, and New Mexico.

The Purple Finch (*Haemorhous purpureus*) is most often recognized as comprising two subspecies (Wootton 1996, Pyle 1997). Nominate *H. p. purpureus* breeds across the boreal forest from southeastern Yukon Territory and northern British Columbia to Newfoundland and south through the northeastern United States and along the Appalachian Mountains to West Virginia (AOU 1957, 1998, Wootton 1996). In winter, *purpureus* is regularly found east of the Great Plains (approximately east of the 100<sup>th</sup> meridian), from southern Manitoba and Newfoundland south to central Texas, the coast of the Gulf of Mexico, and northern Florida (AOU 1957, Wootton 1996, AOU 1998, [www.eBird.org](http://www.eBird.org)). Along the Pacific coast, *H. p. californicus* is reported to be less migratory, although recovered banded birds have moved up to nearly 1500 km (Duvall 1945). It breeds primarily along the coast and in montane regions on the western slopes of the Cascades and the Sierra Nevada from west-central British Columbia to southern California, possibly northwestern Baja California, and migrates to lower elevations from much of this range, at times wintering to southeastern California and Arizona (Duvall 1945, AOU 1957, Wootton 1996, Patten et al. 2003, Sibley 2011). Although the breeding ranges of *californicus* and *purpureus* meet in an area bounded by the Coast and Rocky mountains in British Columbia, the frequency of contact and the extent of intergradation between these two subspecies is unknown (Sibley 2011). Three other described subspecies ap-

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pear to be based on clinal variation and are not generally accepted, including two named from the West: *H. p. rubidus* (treated here as a synonym of *californicus*) and *H. p. taverneri* (treated here as a synonym of nominate *purpureus*) (Duvall 1945, Howell et al. 1968, Wootton 1996, Pyle 1997). Here we document the first records of the nominate subspecies of the Purple Finch in California and discuss its occurrence in western North America.

### SUBSPECIFIC IDENTIFICATION

Criteria distinguishing the two subspecies in the field are covered in detail by Ridgway (1901), Duvall (1945), Phillips et al. (1964), Kaufman (1990) Pyle (1997), and Sibley (2011, 2014), but a number of the most important characters are worth reiterating. Females and first-cycle males, which are similar in plumage, are the most straightforward, with distinguishing features visible from all angles, whereas adult males require dorsal views. Overall, the female-like plumage of *purpureus* is more boldly patterned than that of *californicus*, with more contrasting and sharply defined dark streaking and paler or whiter background coloration. This includes a bolder and cleaner white face; white underparts with shorter, sparser, crisper dark streaking; browner (less olive) upperparts and secondaries; more distinct dark and light back streaking; white-tipped greater coverts; a paler rump; and usually unmarked undertail coverts (Pyle 1997, Sibley 2011, 2014). Adult males of *purpureus* differ from those of *californicus* more subtly, although many of the same upperpart features apply, most notably the more distinct dark and light back streaking; a paler, more contrasting rump; and pale-tipped greater coverts (Sibley 2011). Underpart and head-on differences are rather limited for adult males, but smudgy brown flank streaking is characteristic of *californicus* (Sibley 2011).

### OCCURRENCE OF *H. P. PURPUREUS* IN CALIFORNIA

The first documented record for nominate *purpureus* in California is of an adult female collected on San Miguel Island, Santa Barbara Co., 11 May 1976 (Santa Barbara Museum of Natural History [SBMNH] 3506)—the only record of the Purple Finch for that island. In February 2009, Pyle confirmed the subspecific identification of SBNMH 3506 and compared it with 10 specimens each of adult female *purpureus* and of *californicus* at the U.S. National Museum of Natural History (USNM), Washington, D.C. (Table 1). Although all measurements of these subspecies overlap, relative tail length (wing minus tail) and wing formula (p9 – p6) are most useful for distinguishing them (Pyle 1997); SBNMH 3506 has a wing minus tail length that indicates *purpureus*, but it is intermediate in wing formula and shows a longer bill than most *purpureus*. Photographs of the specimen alongside both *purpureus* and *californicus*, however, clearly show it to match *purpureus* in plumage (Figure 1).

Since that specimen was collected, three other Purple Finches of the nominate subspecies have been recorded in California, two sight records and one documented with photographs. Dunn found the second *purpureus* for California, another in female plumage, which lingered 18–21 November 1987 at Furnace Creek Ranch, Inyo Co. (McCaskie 1988). Brady discovered

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**Table 1** Measurements (mm) by Subspecies of Females of the Purple Finch<sup>a</sup>

	n	Wing chord	Tail	Wing – tail	Exposed culmen	Tarsus	p9 – p6
California specimen		81.5	55	26.5	11.5	17.7	1
<i>H.p. purpureus</i>	10	78.4–83.1	52.3–57.3	23.0–28.9	10.4–11.4	17.6–18.9	0.7–3.3
<i>H.p. californicus</i>	10	73.0–80.8	51.3–59.3	18.7–24.5	11.0–13.4	17.8–19.5	–5.6–2.4

<sup>a</sup>Ranges are based on 95% confidence intervals as estimated by means plus or minus two standard deviations from 20 specimens of females measured by Pyle and Collins at the Santa Barbara Museum of Natural History, Santa Barbara, California, and National Museum of Natural History, Washington D.C.

a female-type *purpureus* on Southeast Farallon Island, San Francisco Co., on 22 October 2007, in a season in which a remarkable five taxa of *Carduelis/Haemorhous* (including the Common Rosefinch, *C. erythrinus*) reached the island (Singer and Terrill 2009). In both cases, these birds were identified to subspecies by the bold white supercilium, distinctly streaked underparts, and some fine white streaking to the upperparts; they were distinguished from Cassin's Finch (*H. cassini*) by bill shape.

On 23 October 2013, Rutt and Luke Musher identified, photographed, and recorded a calling first-cycle *purpureus* on Southeast Farallon Island. The bird was found on a day on which very few other landbirds, and no other eastern vagrants, arrived. An incessant flight call first alerted us that the bird was not *californicus*: hard, hollow, mechanical, wooden "pik" calls instead of the lower, liquid, less sharp, and more blackbird-like "pit" call notes



Figure 1. Female Purple Finch specimens USNM 572739 (left; *purpureus*, Etna, New York, 29 April 1964), SBMNH 3506 (center; *purpureus*, San Miguel Island, California, 11 May 1976), and USNM 257248 (right; *californicus* Placerita Canyon, California, 23 April 1991), showing dorsal (A) and ventral (B) aspects.

Photos by Peter Pyle

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Figure 2. First-cycle *purpureus* Purple Finch on Southeast Farallon Island, California, 23 October 2013. The bold and cleanly white face pattern; white underparts with short, sparse, and crisp streaking; white wingbars; and unstreaked white undertail coverts all help to distinguish this bird from *californicus*.

Photo by Cameron Rutt



Figure 3. First-cycle *californicus* Purple Finch in Ketchikan, Alaska, 30 December 2012. The bird's streaked white facial stripes, heavy streaking below that becomes long continuous flank streaking, streaked undertail coverts, olive-edged primaries, and a lack of white wingbars all help to distinguish it from *purpureus*.

Photo by Steve Heinl

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of *californicus*. Additionally, it was verified visually by the aforementioned plumage criteria (Figure 2).

### OCCURRENCE OF VAGRANT PURPLE FINCHES IN THE WEST

Outside of breeding ranges, Purple Finches are casual in interior western North America (AOU 1998), although the species' status varies on a state-by-state basis (Table 2). Although almost all individuals can, with good views, be identified to subspecies in the field (Sibley 2011), relatively few extralimital records have been reported to subspecies. The majority of vagrant Purple Finches are female-type birds, with most records in the fall, although sightings from the West also take place in winter and spring. We aged or attempted to age birds in photographs as first cycle or adult by using molt patterns and the condition of the wing coverts, outer primaries, and rectrices, following Pyle (1997).

It was difficult to pinpoint records of nominate *purpureus* in Oregon and Washington, where *californicus* is a common resident. Marshall et al. (2003) made no mention of *purpureus* for Oregon. In southeastern Oregon, outside of the normal distribution of *californicus*, Purple Finches have been recorded on at least six occasions (Littlefield 1991), with at least one record, a specimen of an adult male, representing *californicus* (USNM 478849), according to the specimen label and photographs of the specimen. At least three unconfirmed reports of *purpureus* exist for Oregon (D. Robinson, J. Gilligan pers. comm.), but we have not examined any documented records for the state. In Washington, one record of *purpureus*, from Conconully, Okanogan Co., on 19 February 2009, has been accepted by the Washington

**Table 2** Status of Purple Finch Subspecies by State

State	Dominant subspecies	Status/number of Purple Finch records	Percent presumed or number of records	
			<i>californicus</i>	<i>purpureus</i>
Alaska	<i>purpureus?</i>	Rare <sup>a</sup>	8–9	8
Washington	<i>californicus</i>	Resident	—	2
Oregon	<i>californicus</i>	Resident	—	0
California	<i>californicus</i>	Resident	—	4
Idaho	<i>purpureus</i>	8	0	2
Nevada	<i>californicus</i>	5	4	1
Utah	unknown	1	??	??
Arizona	<i>californicus</i>	Uncommon <sup>a</sup>	>90%	1
Montana	<i>purpureus</i>	>100	0	>99%
Wyoming	<i>purpureus</i>	12	0	>95%
Colorado	<i>purpureus</i>	44	1	>95%
New Mexico	<i>purpureus</i>	34	2	>75%

<sup>a</sup>Unknown number of records for states where Purple Finch is either not on the review list (Alaska) or was only recently reinstated (Arizona).

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Bird Records Committee (M. Bartels pers. comm.), and an additional report by Charlie Wright from Bradley Lake, Pierce Co., on 20 November 2012 (eBird) bears written details sufficient for inclusion in this summary.

In Alaska, outside the breeding season, the species is a rare, irregular visitor in the southeastern portion of the state, (Gibson and Kessel 1992, Heinl and Piston 2009). Farther west, it is exceedingly rare in south-coastal (at least two individuals of *purpureus* photographed; A. Lang pers. comm.), central, western (at least two records), and northern Alaska (one record of *purpureus*) (Brinkley 2009, Figure 5; Gibson and Kessel 1992; Tobish 2009; T. Tobish pers. comm.). There are also four reports from St. Lawrence Island in the Bering Sea (P. E. Lehman pers. comm.). All photographs submitted to eBird ( $n = 5$ ) (Figure 3) were taken in southeastern Alaska and represent *californicus*. In July 2014, Pyle compared the seven Alaska specimens at the University of Alaska Museum (UAM) with series at the Museum of Vertebrate Zoology, Berkeley, California (MVZ). Two adult specimens, a male (UAM 5002) and a female (UAM 5003), are *californicus*, while another adult male (UAM 5004) is possibly an intergrade tending toward *californicus* (Figure 4). All three birds were collected at Ketchikan on 6 March 1984. On this basis, we document *californicus* as a subspecies new to Alaska (Gibson and Kessel 1997; D. D. Gibson pers. comm.). Additionally, a first-cycle Purple Finch photographed on St. Lawrence Island on 7 September 2004 appears to be *californicus* (Figure 5; B. L. Sullivan pers. comm.). The remaining four Alaska specimens are all *purpureus*: three from southeastern Alaska and, notably, an adult male collected 5 June 1984 at Savoonga, St. Lawrence Island (Figure 4; UAM 5559). One of the other sightings there also pertains to *purpureus*, a bird photographed at Gambell on 22 October 2011 (Figure 6; P. E. Lehman pers. comm.).

In Idaho, eight Purple Finch records have been accepted by the Idaho Bird Records Committee ([http://www.idahobirds.net/ibrc/reviewspecies/grosbeak\\_finch.html#pufi](http://www.idahobirds.net/ibrc/reviewspecies/grosbeak_finch.html#pufi)) from fall through spring, with most records from fall. Two of these, with photos linked via eBird, are of *purpureus*; the remaining six are of indeterminate subspecies. Similarly, there are four accepted records of the Purple Finch in Nevada. One from Reno (3 November 2012) represents *purpureus*, whereas the remaining three, all photographed along the western border of the state, represent *californicus* (Nevada Bird Records Committee, <http://gbbo.org/nbrc/FullReportByTaxa.htm>). A female-plumaged Purple Finch photographed by Richard Aracil at Miller's Rest Stop, Esmeralda Co., 18–19 September 2014 (eBird) is also *californicus*. To the east, Utah had no confirmed records (Behle et al. 1985) prior to 7 September 2007, when its lone accepted record from Lytle Ranch, Washington Co., was not confirmed to subspecies (Utah Bird Records Committee, [http://www.utahbirds.org/RecCom/2007/2007\\_38Summary.htm](http://www.utahbirds.org/RecCom/2007/2007_38Summary.htm)).

The Purple Finch is an uncommon migrant and winter resident in Montana with over 100 sightings, primarily east of the continental divide (J. Marks unpubl. data). Two specimens in the University of Montana Zoological Museum and five photographs, from both sides of the continental divide, all suggest that these birds are primarily nominate *purpureus* (Figure 7). In Wyoming, the Purple Finch is considerably scarcer, although probably regular in the

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Figure 4. Alaska Purple Finch specimens, all adult males in typical plumage. From left to right: UAM 5559 (*purpureus*), 5 June 1984, St. Lawrence Island; UAM 5825 (*purpureus*), 28 April 1991, Juneau; UAM 5004 (possibly an intergrade between *purpureus* and *californicus*, tending toward the latter), 6 March 1984, Ketchikan; UAM 5002 (*californicus*), 6 March 1984, Ketchikan. Specimens UAM 5002 and 5003, also collected 6 March 1984, represent the first documented records of *californicus* for Alaska.

Photo by Peter Pyle

northeast, where most of the state's 12 accepted records are located; none has been critically identified to subspecies (Faulkner 2010), but the pattern there and in Montana indicates these birds are very likely *purpureus*. In Colorado, the Purple Finch is occasional from fall through spring, chiefly in the eastern foothills of the Rocky Mountains and on the eastern plains (Andrews and Righter 1992, eBird). Forty-four records comprising 84 individuals have been accepted by the Colorado Bird Records Committee (D. Faulkner pers. comm.). Many of these occurred during a winter invasion in 2007–2008 (D. Faulkner pers. comm.), when as many as 29 birds were reported at once from the eastern plains (eBird). Significantly, among Colorado's many Purple Finch records, there is a single documented sighting of *californicus* from the southeastern corner of the state, the easternmost known record of that subspecies. This adult female was photographed in Lamar, Powers Co., on 7 December 2004 (Figure 8; T. Leukering pers. comm.). West of the Front Range, the species is accidental, with only two accepted records (Andrews

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Figure 5. First-cycle *californicus* at Gambell, St. Lawrence Island, Alaska, 7 September 2004. Although this bird exhibits rather pale back streaking and whitish wingbars, features more commonly associated with *purpureus*, the olive tinge to the secondaries and, especially, the drab, dark face pattern, almost wholly lacking white in the supercilium and malar, indicate *californicus*.

*Photo by Brian Sullivan*



Figure 6. A rather ambiguous first-cycle Purple Finch at Gambell, Alaska, 22 October 2011, one of four Purple Finches recorded from St. Lawrence Island (two *purpureus*, one *californicus*, and one unidentified to subspecies). This one shows the white wingbars, sparse streaking below, and lack of olive tones throughout the upperparts characteristic of *purpureus*.

*Photo by John Vanderpoel*

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and Righter 1992, eBird); photographs show both to be of *purpureus* (R. Hopper pers. comm.).

Conversely, in Arizona, records and specimens indicate that *californicus* predominates (Phillips et al. 1964, Monson and Phillips 1981); excepting one specimen, all Arizona Purple Finches are presumed to be this subspecies (Rosenberg et al. 1991). The single exception is a first-cycle female *purpureus* collected 6 January 1956 northeast of Tucson (Delaware Museum of Natural History 27492; Phillips et al. 1964, Monson and Phillips 1981, Rosenberg et al. 1991). Purple Finches are irregular fall and winter visitors primarily to southeastern Arizona (eBird), with most records during invasion years, which also bring unusual numbers of Lawrence's Goldfinches (*Spinus lawrencei*) to the state (Phillips et al. 1964, Rosenberg 1991). In New Mexico, the Purple Finch is rare and irregular from spring through fall, with 34 records, >75% from the Rio Grande valley eastward (S. O. Williams pers. comm.). Of the 11 photos and specimens we examined, at least eight were of *purpureus*; however, one of the photographed birds appears to represent *californicus*: an adult male from Glenwood, Catron Co. (western New Mexico), in March of 1991 (Figure 9). Additionally, one of the three specimens at the Museum of Southwestern Biology (MSB), Albuquerque, is *californicus*: an adult male (MSB 8487) collected 2 January 1958 near Silver City, Grant Co. (southwestern New Mexico).

## CONCLUSION

Most records of vagrant Purple Finches in interior western North America, documented by either photograph or specimen, prove to be of *purpureus*, although *californicus* appears to be regular in neighboring states, just outside of its expected range, including extreme southeastern Alaska, western Nevada, and Arizona. Outside of these regions, we found evidence for four vagrants of *californicus*: at Gambell, St. Lawrence Island, Alaska; Lamar, Colorado; Glenwood, New Mexico; and Silver City, New Mexico. Thus *californicus* may be more prone to vagrancy than previously thought, and observers in interior western states should be aware of the possibility of additional records.

Elsewhere in the interior West and Alaska including, notably, St. Lawrence Island, the majority of available records identified to subspecies represent *purpureus*. Outside of the breeding range in western North America, *purpureus* is recorded most frequently in the western Great Plains states (Montana and Colorado), but it becomes sparser farther west, with 14 records from Idaho, Nevada, and Utah, and only seven among Arizona, Washington, Oregon, and California. Birders throughout the West should attempt subspecific identification when possible, including critical assessments of birds showing characters of *purpureus* within the range of *californicus*.

## ACKNOWLEDGMENTS

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Figure 7. First-cycle *purpureus* Purple Finch at Fort Peck, Valley Co., Montana, 2 February 2008. In most of the interior West and on the western Great Plains, *purpureus* is the more likely subspecies.

*Photo by John Carlson*



Figure 8. Adult female *californicus* (right) in Lamar, Colorado, 7 December 2004, photographed alongside a Chipping Sparrow (*Spizella passerina*; left). The bird's overall gray-brown coloration, entirely lacking white, suggests *californicus*. This identification is confirmed by the heavily streaked drab face, thick, blurry flank streaking, dull wingbars, and a lack of white back streaking.

*Photo by Tony Leukering*

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Figure 9. Outside of Arizona and southeast Alaska, vagrants of *californicus* are very rare. Adult male *californicus*, Glenwood, New Mexico, March 1991, representing, along with a specimen collected in Silver City, two of only three documented *californicus* east of Arizona. Distinguished from *purpureus* primarily by the lack of pale tipping to the greater coverts and perhaps by the suggestion of smudgy dark streaking on the lower flanks.

*Photo by Sharon Nelson*

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# ROOST SITES OF THE BLACK-BACKED WOODPECKER IN BURNED FOREST

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**ABSTRACT:** The Black-backed Woodpecker (*Picoides arcticus*) is strongly associated with recently burned forest, which makes it vulnerable to salvage logging or other post-fire forest management that removes snags. As part of a larger radio-telemetry study of the species' resource use and habitat selection in a burned forest in California, we located radio-tagged Black-backed Woodpeckers at night to find and describe their roost sites. We found 14 unique roost locations during night-time searches for five individual birds. Description of the micro-site on the tree that the bird used was impossible at five roosts where we could not visually locate the bird in the dark. At the nine roosts confirmed visually, none of the birds roosted in excavated cavities. Rather, they roosted in sheltered spaces within burned-out hollows of trunks (5 instances), in the crook of a forked trunk (1 instance), wedged between adjacent trunks of two closely spaced trees (1 instance), in a deep, natural bark furrow (1 instance), and clinging to a trunk directly above a horizontal branch (1 instance). Eleven of the 14 roosts (79%) were in dead trees. Our results suggest that in burned forests the Black-backed Woodpecker may benefit if, during salvage logging, emphasis is placed on retaining snags with burned-out hollows, forked trunks, or other relatively unusual structures that may create crevices or other opportunities for shelter.

The Black-backed Woodpecker (*Picoides arcticus*) is strongly associated with recently burned forest, which makes it vulnerable to salvage logging or other post-fire forest management that removes snags (Bond et al. 2012). In California, the U.S. Forest Service has designated the Black-backed Woodpecker a "management indicator species" for burned forest across ten national forests (U.S. Forest Service 2007). At this writing, the U.S. Fish and Wildlife Service is also evaluating the California segment of the species for candidacy as threatened or endangered under the federal Endangered Species Act. Recent research into the Black-backed Woodpecker's occupancy patterns (Saracco et al. 2011), habitat selection for nesting (Seavy et al. 2012) and foraging (Hanson and North 2008), and home-range size and characteristics (Tingley et al. 2014) in burned forests of California have provided a wealth of information that land managers can use to consider habitat needs of the species when managing burned forests.

Night-time roost sites could be a habitat element limiting the suitability of otherwise appropriate burned forest as habitat for Black-backed Woodpeckers. Understanding the specific characteristics of sites the species selects for roosting could lead to more informed snag-retention guidelines to help ensure that retained habitat is as suitable for Black-backed Woodpeckers as possible.

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Although many woodpeckers create their own roost sites by excavating cavities in live or dead trees (Winkler et al. 1995), the limited evidence available indicates this is not the case for the Black-backed Woodpecker, at least during the nesting season. Goggans et al. (1988) reported characteristics of roosts used by four radio-tagged Black-backed Woodpeckers breeding in unburned Oregon forests with a high rate of tree mortality induced by bark beetles. Of 20 roost sites found, none were in excavated cavities. Rather, the birds roosted in a variety of micro-sites, including trunk scars and concave western gall rust (*Endocronartium harknessii*) cankers, primarily on live trees. However, no information is available about the Black-backed Woodpecker's roost-site selection in burned forests. As part of a larger radio-telemetry study of the species' resource use and habitat selection in a burned forest in California (Tingley et al. 2014), we located radio-tagged Black-backed Woodpeckers at night to find and describe their roost sites.

## METHODS

During the breeding season of 2013, we studied Black-backed Woodpeckers occupying the area burned by the Wheeler fire (alternatively referred to as the Antelope Complex fire) in the Plumas National Forest (Figure 1) in the northern Sierra Nevada, California. The Wheeler fire burned in 2007, affecting 9265 ha of mostly Sierran mixed conifer forest (California Department of Fish and Game 2005) on Forest Service land. Forest Service mapping based on Landsat Thematic Mapper data before and after the fire classified the burning of 52.6% of the area inside the fire perimeter as high severity, 28.3% as moderate severity, 13.4% as low severity, and 5.7% as unchanged. There was little post-fire logging on Forest Service land within our study area, but a few private inholdings within and adjacent to the study area were clear-cut after the fire, and post-fire wood-cutting for firewood by the public was pervasive along roads through much of the study area on Forest Service land. Much of the study area encompassed large, continuous stands of moderately or severely burned forest. The burned area extends from 1417 to 2138 m above sea level.

In late April of 2013, we began searching for Black-backed Woodpeckers at the study site, using a combination of broadcast surveys (loosely following the survey methods described in Saracco et al. 2011) and passive observation. Once we located birds, we caught them in mist nets and attached model BD-2 radio transmitters supplied by Holohil Systems, Ltd., to the dorsal surface of one of the inner rectrices. Transmitters were custom-modified by the manufacturer with a hole drilled into the large end, through which we could feed monofilament. Transmitters, including batteries, weighed approximately 2.0 g. We used ethyl cyanoacrylate (available commercially as Superglue) to glue transmitters to a feather shaft and then further attached them with two loops of monofilament tied around the feather shaft.

Some of the woodpeckers we radio-tagged occupied home ranges in very steep terrain or in areas otherwise difficult or unsafe to traverse at night. To identify roost sites, we therefore selected five focal individuals from a subset of the larger group of woodpeckers we radio-tagged, on the basis of their feasibility of being radio-tracked at night, given the accessibility and terrain of their home ranges.

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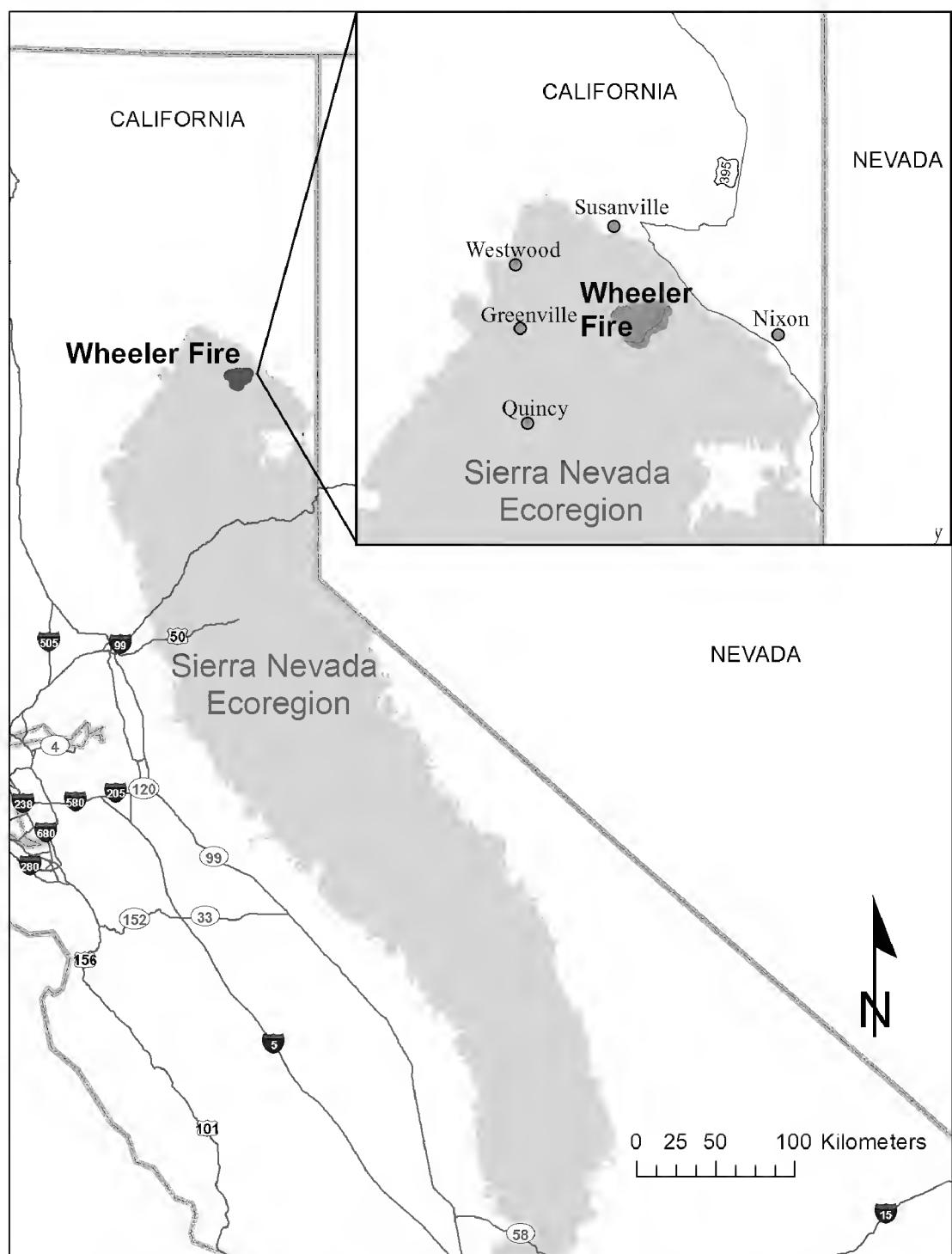


Figure 1. Location of the Wheeler fire, where we located roosts of radio-tagged Black-backed Woodpeckers during the breeding season of 2013.

We attempted to locate the focal birds about every ten days, or opportunistically when our crew was able to visit the study site at night. In the Black-backed Woodpecker, males roost primarily in the nest cavity until late in the nestling period (Short 1974). After confirming this by finding one of our radio-tagged males roosting in the nest with nestlings, we searched for roosts of males only after their nestlings had fledged. We looked for roosts of radio-tagged females both before and after nestlings fledged.

Working in pairs or small groups, our crew used the homing method (Mech 1983, White and Garrott 1990) to find roosting birds at night. Searching

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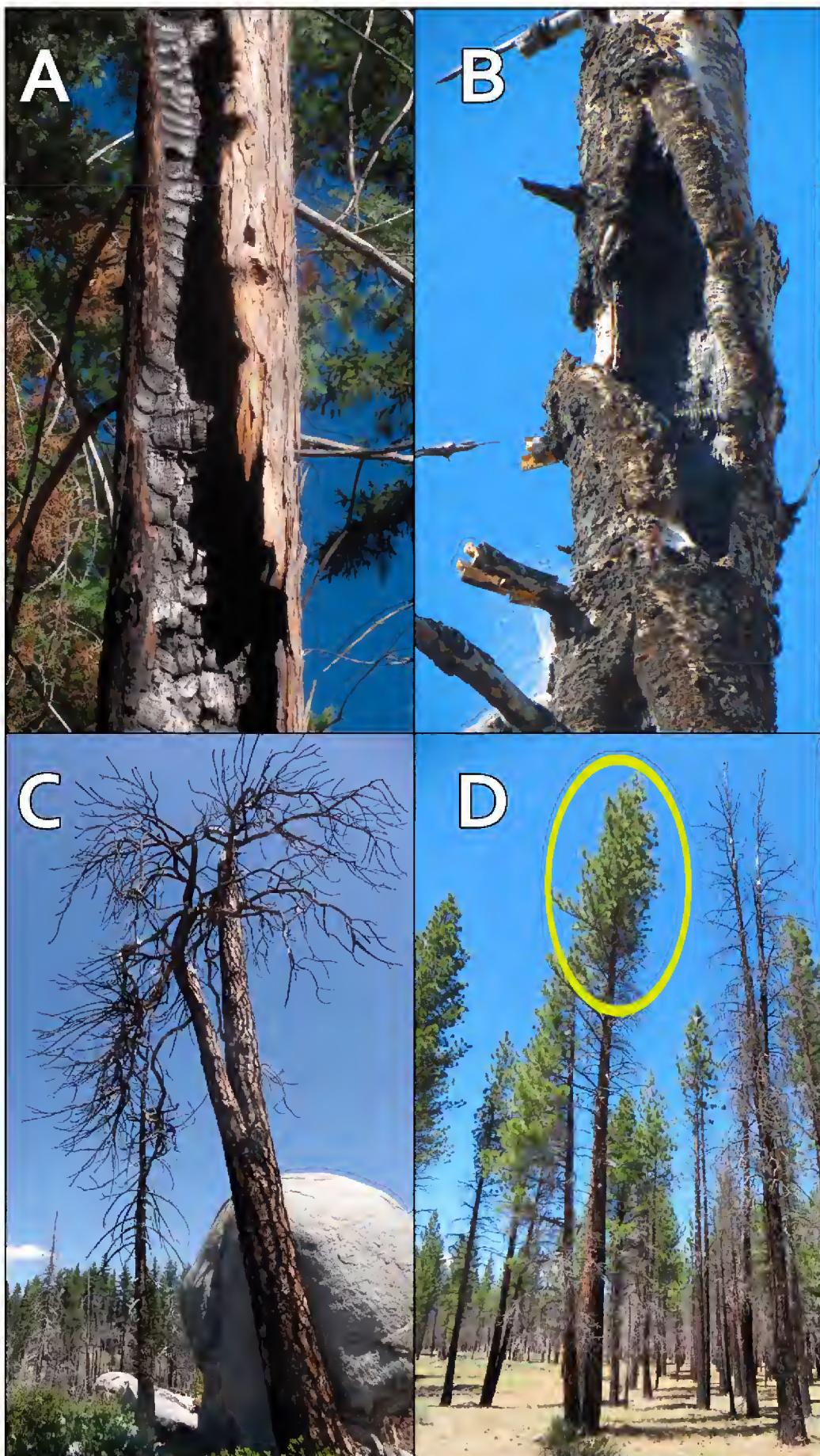


Figure 2. Examples of locations of night-time roosts in burned-out hollows of trunks (A and B), in the crook of a forked trunk (C), and obscured within thick live foliage indicated by the oval (D).

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began only after at least three stars were visible in the night sky, usually near the tagged bird's nest. Locating roosts generally required between 15 and 90 minutes of homing. In many cases we were able to visually confirm the roosting bird's location with a flashlight, but sometimes the birds were obscured by vegetation or were otherwise impossible to see. We recorded the roost's coordinates and marked the site with flagging, then returned during daylight to record the roost's substrate and details of the surrounding habitat.

## RESULTS

We found 14 unique roost locations (other than nests) during 20 night-time searches for the five birds (Table 1). In six cases (30%), we found birds roosting at sites where we had found them roosting on previous nights. In all cases, we ascertained the tree in which the bird was roosting by radio-tracking, but description of the micro-site on the tree that the bird used was impossible at five roosts (36%) where observers could not visually locate the bird in the dark. At the nine roosts (64%) that were confirmed visually, none of the birds roosted in excavated cavities. Rather, we found them roosting in sheltered spaces within burned-out hollows of trunks (5 instances; Figure 2), in the crook of a forked trunk (1 instance; Figure 2), wedged between

**Table 1** Characteristics of Black-backed Woodpecker Roost Sites Found in the Area Burned in the Wheeler Fire

Bird	Roost micro-site	Tree species	Live or Dead	Fire severity <sup>a</sup>	Dates used <sup>b</sup>
BX-13	Forked trunk	Yellow Pine	Dead	H	10 Jun
BX-13	Burned-out hollow in trunk	Fir	Dead	M	18 Jun
BX-13	Unseen	White Fir	Dead	H	26 Jun
BX-13	Deep bark furrow	Incense Cedar	Dead	M	3, 10, 18 Jul
CR-13	On trunk above a branch	White Fir	Dead	H	11 Jun
CR-13	Burned-out hollow in trunk	Fir	Dead	H	21, 26 Jun, 3, 10, 18 Jul
EM-13	Wedged between two trunks	Oak	Dead	M	<b>30 Apr</b>
RR-13	Burned-out hollow in trunk	Yellow Pine	Dead	H	<b>8, 26 Jun</b>
RR-13	Unseen	Jeffrey Pine	Live	M	19 Jun
RR-13	Burned out hollow in trunk	Fir	Dead	H	10 Jul
RR-13	Burned out hollow in trunk	Fir	Dead	H	18 Jul
SD-13	Unseen	Ponderosa Pine	Live	M	<b>14 May</b>
SD-13	Unseen	Yellow Pine	Dead	M	<b>21 Jun</b>
SD-13	Unseen	Yellow Pine	Live	M	26 Jun

<sup>a</sup>Severity of the fire as unburned, low, moderate (M), or high (H) within 50 m of the roost, as assessed in the field.

<sup>b</sup>All dates were during 2013. **Bold** type, the bird's young had not yet fledged from the nest; regular type, the bird's young had already fledged.

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adjacent trunks of two closely spaced trees (1 instance), in a deep, natural bark furrow (1 instance), and clinging to a trunk directly above a horizontal branch (1 instance). At the five locations where the roosting bird was not located visually, inspection of the roost tree during the day did not reveal any excavated cavities that could have been used for roosting.

The 14 roosts varied greatly (Figure 3) in distance from the roosting bird's nest, with an average distance of 428 m ( $SD = 241$  m). We recorded both the minimum (110 m) and maximum (874 m) distance from the nest tree when the roosting bird still had nestlings in its nest. All 14 of the roost sites were within stands that had burned at moderate or high severity (Table 1). Three of the 14 roost sites were in live trees, whereas the remaining 11 (79%) were in fire-killed snags (Table 1). Tree species used for roosting included Ponderosa (*Pinus ponderosa*) and Jeffrey Pine (*P. jeffreyi*), White Fir (*Abies concolor*), unidentified fir (which could be White Fir or Red Fir [*A. magnifica*]), and unidentified oak (Table 1). The trees averaged 37.0 ( $SD = 16.1$ ) cm in diameter at breast height (dbh) and 12.3 ( $SD = 5.5$ ) m tall (Figure 3). Most of the roost sites had few or no live trees within 10 m of the roost tree (range 0–17 live trees with dbh >10 cm), whereas the abundance of dead trees within the 10-m radius varied greatly (Figure 3; range 1–89 dead trees with dbh >10 cm).

## DISCUSSION

Our study provides the first information on the Black-backed Woodpecker's roost sites in burned forest. In unburned forest with a high proportion

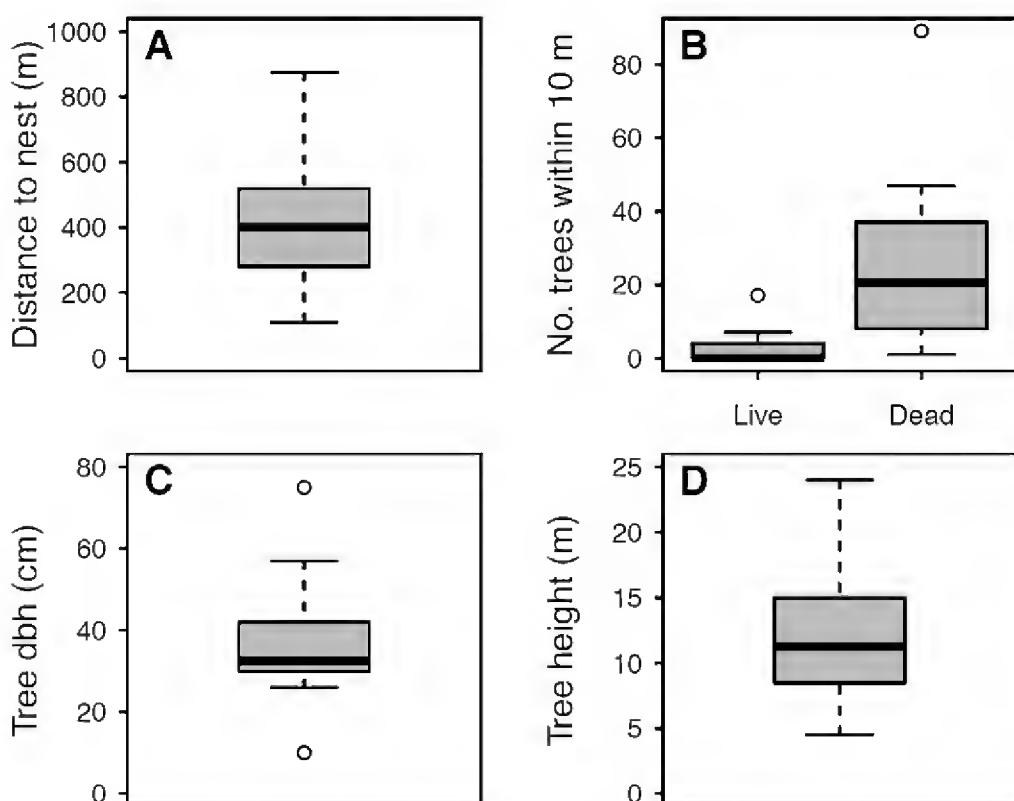


Figure 3. Box plots of distance to nest (A), number of live and dead trees within 10 m (B), tree diameter at breast height (C), and tree height (D) for 14 roost sites. Heavy bar, mean; shading, one standard deviation; whiskers, range excluding outliers; circles, outliers.

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of trees killed by bark beetles, Goggans et al. (1989) reported Black-backed Woodpeckers roosting primarily in live trees (87% of sites), whereas 79% of our observations (11 of 14) were of birds roosting in dead trees. Neither study, however, found woodpeckers roosting in excavated cavities (except within the nest during incubation and brooding). Rather, at least during the nesting season, Black-backed Woodpeckers roost in semi-sheltered, unexcavated micro-sites, such as burned-out hollows in fire-killed trees, tight spaces between forked trunks, and, in at least one instance in our study, a portion of a trunk covered with dense, live foliage. In several cases, the creation of burned-out hollows in fir trunks used for roosting appeared to have been facilitated by previous nonlethal attacks by the Fir Engraver Beetle (*Scolytus ventralis*), a bark beetle that attacks stressed fir trees (D. Cluck, U.S. Forest Service Forest Health Protection program, pers. comm.). Unlike those of many other bark beetles, attacks of the Fir Engraver Beetle may kill only a patch of tissue on the bole (Berryman and Ferrell 1988). Particularly at drier sites, trees may be slow to compartmentalize wounds, leaving dry sapwood exposed and allowing decay-promoting fungi to enter. Several of the hollows we observed appeared to have been created where old partially exposed wounds from beetle attack allowed fire to burn into the bole.

Several of our findings pertaining to roost sites may have implications for retention of burned forest intended to benefit Black-backed Woodpeckers. After the Wheeler fire, Black-backed Woodpeckers roosted in relatively large trees (mean dbh = 37 cm), implying that retained forest stands with larger trees are more likely to provide adequate opportunities for roosting. All 14 of the roost sites we found were in stands that had burned at moderate or high severity, even though some of the birds had extensive lightly burned areas (and in the case of one individual, unburned areas) available within their home ranges.

In California, Black-backed Woodpeckers' home ranges can be quite large, encompassing hundreds of hectares (Tingley et al. 2014). We found Black-backed Woodpeckers—including individuals still tending nests from which the young had not yet fledged—roosting between 110 and 874 m (mean = 428 m) from their nest. The relatively long distances we found between nests and roost sites underscore the need for land managers to adopt a landscape perspective with respect to the Black-backed Woodpecker and retain large blocks of burned forest (Bond et al. 2012).

Perhaps most importantly, fire-killed trees with burned-out hollows, forked trunks, or other relatively unusual structures were most consistently selected for roosting. Forest-management guidelines often emphasize the importance of retaining “defect” trees during selective logging of unburned forest (Mazurek and Zielinski 2004, North et al. 2009) because such trees may be especially valuable to wildlife and are currently scarce in Sierra Nevada forests (McKelvey and Johnson 1992). Our results suggest that in burned forests Black-backed Woodpeckers may likewise benefit from retention of “defect” snags—snags with burned-out hollows, forked trunks, or other unusual structures that may create crevices or other opportunities for shelter—during salvage logging. Additional research is needed to determine which other species of wildlife might also benefit from such efforts.

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# CHARACTERISTICS OF SITES OF WESTERN BLUEBIRD NESTS IN MANAGED PONDEROSA PINE FORESTS OF WASHINGTON

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**ABSTRACT:** I compared characteristics of sites of Western Bluebird (*Sialia mexicana*) nests in natural tree cavities in burned and unburned logged ponderosa pine (*Pinus ponderosa*) forests along the east slope of the Cascade Range of Washington, 2003–2008 and 2010. Tree density and percent debris cover (litter and large woody debris) were greater at nest sites in unburned stands because fire kills live trees and consumes woody debris, and they were the only characteristics in which nest sites in burned and unburned forests differed. In burned stands cavities were oriented primarily east, whereas in unburned stands they were oriented randomly. East-facing cavities may be thermally advantageous early in the day, keeping eggs warmer when the incubating female is away foraging. Most snags containing bluebird nest cavities (73%) were advanced in decay and had broken tops. Of the cavities whose original excavator was known, 27% were excavated by the Hairy Woodpecker (*Picoides villosus*), 12% by the White-headed Woodpecker (*P. albolarvatus*), and 5% by the Northern Flicker (*Colaptes auratus*). Only one nest was located in a non-excavated cavity. Of the 38 second nests, 76% were in the same cavity as the first, even though 38% of these first attempts were unsuccessful, suggesting that suitable cavities are limiting. My results suggest that bluebirds use similar nest sites in burned and unburned ponderosa pine stands and that abandoned woodpecker cavities are critical to the Western Bluebird in these managed forests.

Birds that nest in cavities they do not excavate face unique challenges during the nesting season because they rely on cavities excavated by primary excavators such as woodpeckers or on natural cavities (e.g., hollows from broken branches, rocky cliffs, and holes in exposed banks along streams) (Aitken and Martin 2007). Because of this, the abundance of such secondary cavity-nesters may be constrained by the often limited availability of adequate cavities (Zarnowitz and Manuwal 1985, Holt and Martin 1997). Conservation of secondary cavity-nesters requires an understanding of the characteristics of their nest sites because forest managers can create these habitat features.

The Western Bluebird (*Sialia mexicana*), a secondary cavity-nester, breeds in semi-open forests, forest edges, and burned forests (Guinan et al. 2008). Over much of its range, the Western Bluebird is associated during the breeding season with forests dominated by ponderosa pine (*Pinus ponderosa*) (Germaine and Germaine 2002, Arsenault 2004, Kozma and Kroll 2010). Since European settlement, ponderosa pine forests have changed considerably through decades of fire suppression and logging focused on the selective removal of large-diameter trees (Arno 1996, Hessburg et al. 2005). As a result, today's forests have high densities of small-diameter trees and low densities of large-diameter trees and snags (Keeling et al. 2006, Kozma 2011). To reduce the potential of forest-consuming fires and outbreaks of insect pests, land-management agencies and commercial foresters may thin the trees and burn the understory (Wightman and Germaine 2006) to restore ponderosa pine forests to a condition that is park-like and

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dominated by large-diameter trees (Converse et al. 2006). It will take many years for these forests to reach this condition, however, and it is unclear the effect these interim forests will have on cavity-nesting birds (Germaine and Germaine 2002). To address this concern, in 2003 I began studying the reproductive ecology of Western Bluebirds using tree cavities in managed ponderosa pine forests of the eastern Cascade Range in Washington (Kozma and Kroll 2010). My objectives were to (1) describe and compare the characteristics of nest trees or snags and other fine-scale habitat features associated with Western Bluebird nest sites in burned and unburned forests and (2) to determine the proportion of excavated and non-excavated cavities in which bluebirds nest.

### STUDY AREA AND METHODS

My study took place along the eastern slope of the Cascade Range in southern Kittitas, Yakima, and Klickitat counties, Washington, from 2003 to 2008 and in 2010 (for a map of the study area, see Figure 1 in Kozma and Kroll 2010). The eastern Cascades have a complex topography (Everett et al. 2000) and hot, dry summers; >80% of the annual precipitation falls during winter (Wright and Agee 2004). The study area ranges in elevation from 560 to 1180 m, encompassing parts of the Okanogan-Wenatchee National Forest and lands owned by the Washington Department of Natural Resources, Western Pacific Timber Company, and one private landowner. This study was part of a larger one investigating the reproductive ecology of primary cavity-nesters (Kozma and Kroll 2012), in which each forest stand contained a breeding pair of White-headed Woodpeckers (*Picoides albolarvatus*). I selected these stands opportunistically on the basis of reviews of areas proposed for logging where I encountered White-headed Woodpeckers and by reviewing a database of historical sightings maintained by the Washington Department of Fish and Wildlife (Buchanan et al. 2003). Stands comprised ~660 ha of ponderosa pine or mixed-conifer forests, and no part of the study area was harvested, burned or salvage-logged during the study.

The overstory of the study area contained a mix of tree species dominated by ponderosa pine (percentage of ponderosa pine ranged from 33 to 100% and was >75% in most stands; Kozma 2011). Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), and grand fir (*Abies grandis*) occurred in smaller numbers, depending upon the site's history, elevation, and aspect. The understory was dominated by antelope bitterbrush (*Purshia tridentata*), wax currant (*Ribes cereum*), snowbrush ceanothus (*Ceanothus velutinus*), snowberry (*Symphoricarpos albus*), and shinyleaf spirea (*Spiraea betulifolia* var. *lucida*). The study area contained 18 forest stands where timber had been harvested within the past 25 years. Nine of these stands burned 1–9 years before my study and had some degree of salvage logging ranging from occasional removal of dead trees for firewood to commercial harvest with mechanized equipment. The remaining nine stands were unburned and were managed for trees of uneven ages by thinning or shelterwood harvest.

I searched for Western Bluebird nests from mid-April to mid-June, 2003 to 2008. In 2010, I recorded Western Bluebird nests found incidentally while

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I was monitoring woodpecker nests. Because of time constraints, I searched a subset of the 18 stands in each year, and stands that I monitored within a given year I searched at least once every 7–10 days. I located nests by checking cavities in which I knew bluebirds to have nested in previous years and by following adults carrying nesting material or food to new or previously unknown cavities. To confirm that a cavity contained an active nest (i.e., at least one egg was laid), I inspected cavities with a Tree Top Peeper IV, a portable telescoping probe and video camera (Kozma and Kroll 2010). If cavities were higher than 11 m, I confirmed nesting by behaviors such as the female entering for an extended period and adults carrying food to the cavity or removing fecal material. If I observed an active bluebird nest in the same cavity after the initial attempt ended, I assumed that cavity was being reused by the same pair of bluebirds (Stanback and Rockwell 2003).

I sampled the vegetation around each nest cavity after the bluebirds were no longer using it. At each nest tree or snag (“nest substrate”), I recorded the following variables: species of the substrate, degree of decay (scale 1–4; Table 1), height (m), diameter at breast height (dbh; cm), cavity height (m), slope (%), canopy cover (%), shrub height (m), and the original excavator of the cavity, if known. I measured shrub, cavity, and nest-substrate height with the telescoping nest-inspection pole (graded in m and cm) or with a clinometer for cavities and nest substrates higher than 11 m (Kozma 2012). I calculated a cavity’s relative height by dividing the cavity’s height by the nest substrate’s height (Siegfried et al. 2010). I used a spherical crown densiometer at the base of the nest substrate to estimate canopy cover in the four cardinal directions, then averaged the four estimates (Farnsworth and Simons 1999). I was able to determine the original excavator of 57 cavities because I also monitored nests of primary excavators in the same study area and I marked all nest substrates with a numbered aluminum tag (Kozma 2012).

I sampled habitat in circles of radii of 2, 5, and 11.3 m centered on each nest substrate (modified from James and Shugart 1970 and Martin et al. 1997). Within the 2-m circle, I estimated the percent cover of herbaceous plants (forbs and grasses) and debris (large woody debris and litter). In the

**Table 1** Stage of Decay of Trees and Snags in Which Western Bluebirds Nested in Managed Ponderosa Pine Forests, Eastern Cascade Range, Washington, 2003–2008 and 2010

	Proportion <sup>a</sup>				
	Type 1	Type 2	Type 3	Type 4	Total
Ponderosa pine	0.04	0.08	0.21	0.49	0.82
Douglas-fir	0.00	0.02	0.03	0.06	0.11
Western larch	0.01	0.00	0.02	0.02	0.04
Grand fir	0.00	0.00	0.00	0.02	0.02
Willow ( <i>Salix</i> sp.)	0.00	0.00	0.00	0.01	0.01
Total	0.05	0.10	0.26	0.59	1.00

<sup>a</sup>Type 1, live tree with a dead top or other defect; type 2, recently dead tree with brown foliage; type 3, snag with moderate decay, foliage and small branches missing, top intact; type 4, snag in advanced decay with broken top and most branches gone (Kozma 2009).

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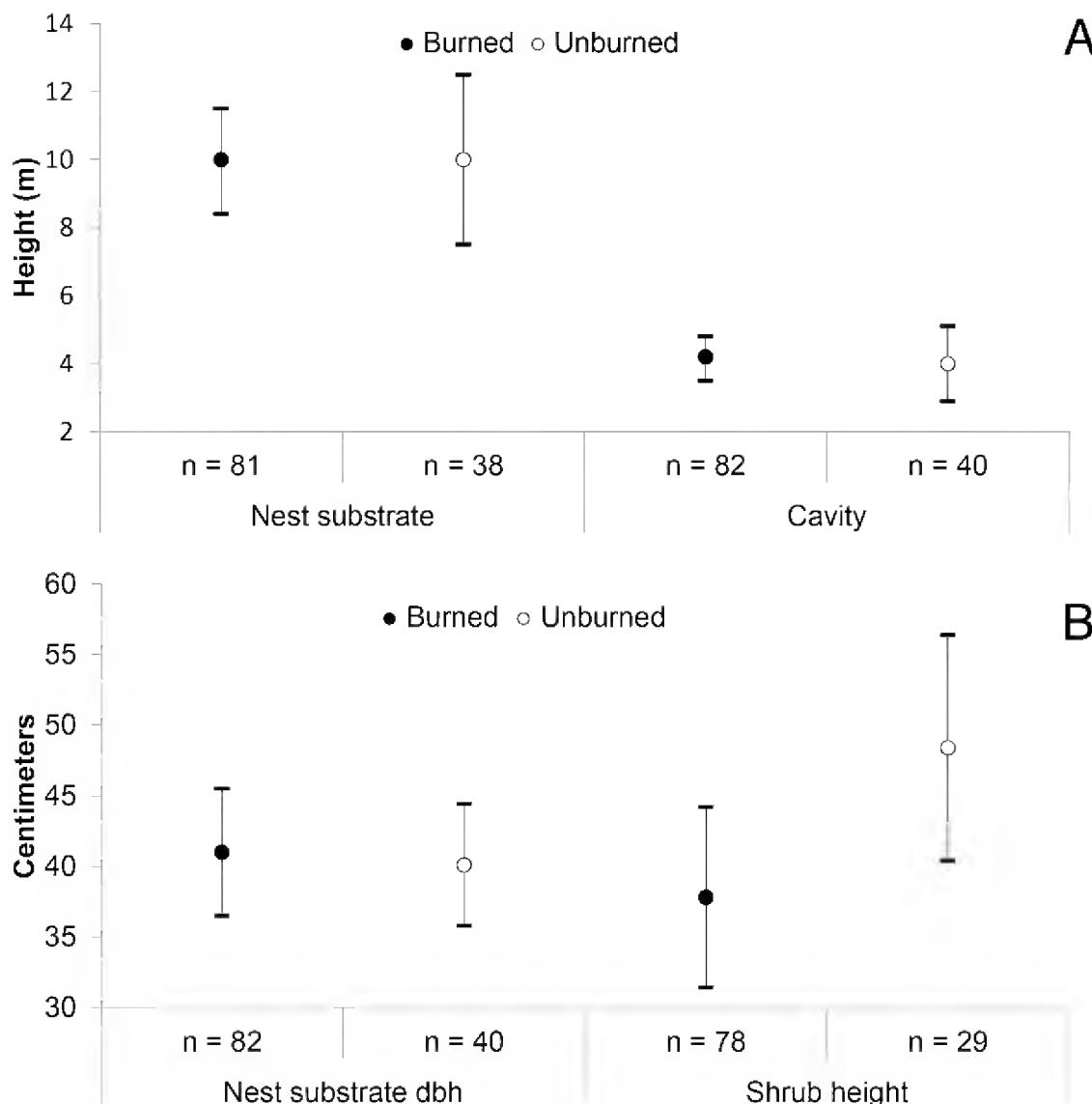
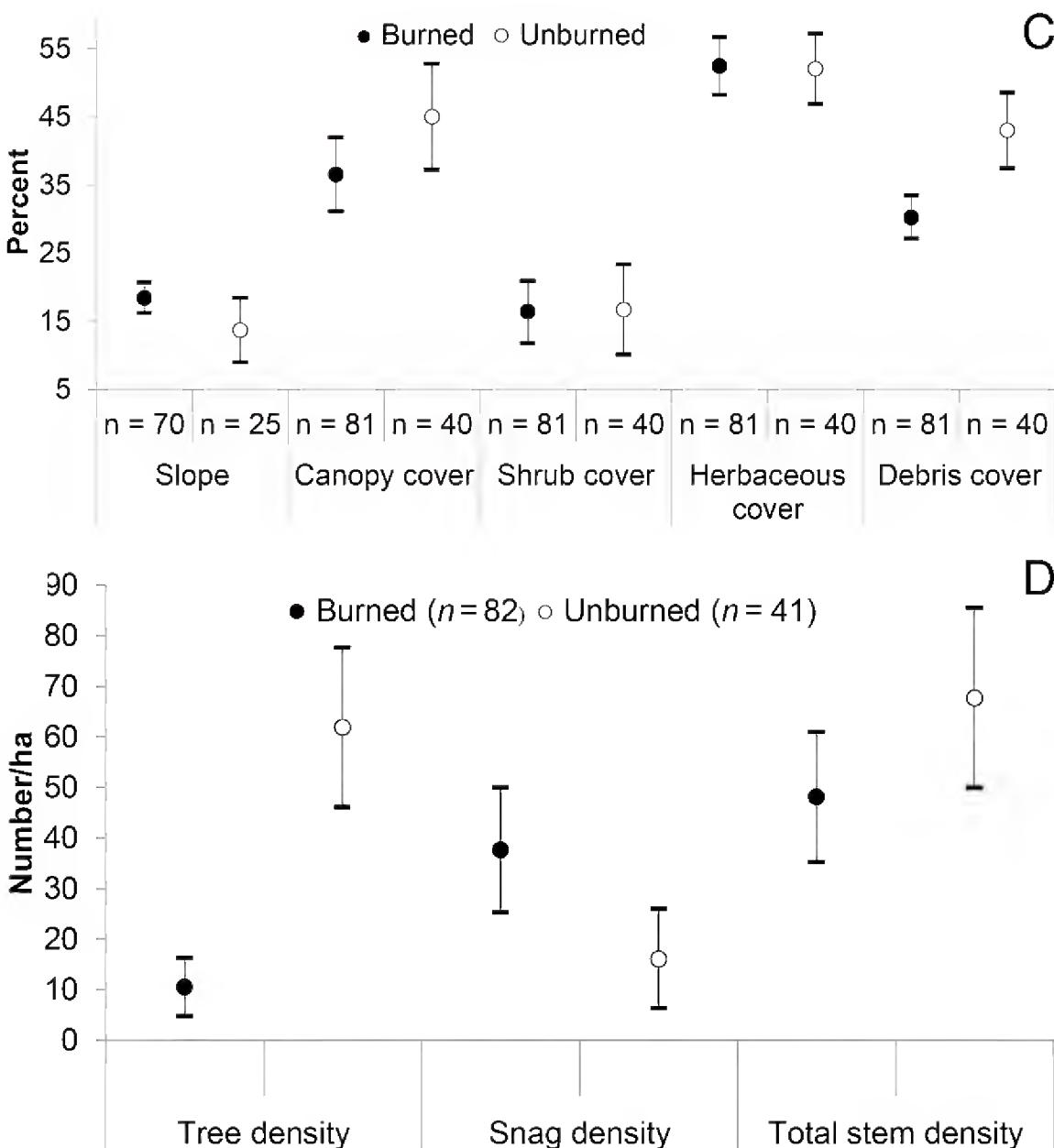


Figure 1. Mean (95% confidence interval with sample sizes) characteristics of sites of Western Bluebirds nests in burned and unburned managed ponderosa pine forests of the eastern Cascade Range, Washington, 2003–2008, and 2010. (A) nest-substrate height and cavity height; (B) nest-substrate dbh and shrub height; (C) percent slope, canopy cover, shrub cover, herbaceous cover, and debris cover; (D) tree density, snag density, and total stem density.

5-m circle I visually estimated the percent cover of each shrub species. In the 11.3-m circle (0.04 ha) I counted trees and snags in three categories of dbh (25.4–50.8 cm, 50.8–76.2 cm, and  $\geq 76.2$  cm).

Because in some years samples were small, for analyses I pooled all years' nests. If bluebirds reused a cavity in a subsequent year, I randomly chose one attempt and used the sampling of vegetation during that attempt in the analyses. I categorized dbh as all trees  $\geq 25.4$  cm, all snags  $\geq 25.4$  cm, and all trees and snags combined (Kozma and Kroll 2010). I used a chi-squared test for goodness of fit to determine if the category of decay of nest substrate differed from that expected by chance. In my comparisons of vegetation variables in burned and unburned stands, no overlap of 95% confidence intervals suggested a statistically significant difference (Kozma

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2012). I used Rayleigh's test to determine if the orientation of cavities in burned and unburned stands clustered around a mean (Zar 1974). For all statistical tests I set  $\alpha = 0.05$ .

## RESULTS

I monitored 182 nest attempts, of which I am presenting the results of vegetation sampled at 123 nest sites (83 in burned and 40 in unburned stands) because of multiple attempts in the same cavity. Ponderosa pine contained 82% of cavities used by bluebirds, followed by Douglas-fir (11%; Table 1). The degree of decay of nest substrates was distributed nonrandomly ( $\chi^2 = 89.5$ ,  $df = 3$ ,  $P < 0.01$ ), with the greatest proportion of bluebird cavities located in snags in the most advanced stage of decay (Table 1). Of the 57 cavities whose original excavator I knew, 33 were excavated by Hairy Woodpeckers (*Picoides villosus*), 15 by White-headed Woodpeckers, 6 by

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Northern Flickers (*Colaptes auratus*), 2 by Black-backed Woodpeckers (*P. arcticus*), and 1 by a Williamson's Sapsucker (*Sphyrapicus thyroideus*). An additional 53 cavities had entrances of a diameter nearly identical to that of a cavity excavated by *Picoides* and smaller than that of one excavated by a flicker, but I did not identify the species. Only one nest was located in a natural, unexcavated cavity. Of the 38 second nests attempted by the same pair of bluebirds, 29 (76%) were in the same cavity as the first attempt even though 11 (38%) of these first attempts were unsuccessful.

Debris cover and tree density were greater at bluebird nests in unburned than in burned stands (Figure 1), but no other vegetation variables I measured differed (Figure 1). Likewise, the mean relative cavity height in burned stands (0.54; 95% CI: 0.47, 0.60) was similar to that in unburned stands (0.55, 95% CI: 0.45, 0.65). In burned stands the mean orientation of cavities was 121°, and values were significantly clumped around the mean ( $n = 83$ ,  $r = 0.195$ ,  $z = 3.167$ ,  $0.05 > P > 0.02$ ). In unburned stands, the mean orientation was 247°, but the distribution did not differ from random ( $n = 39$ ,  $r = 0.206$ ,  $z = 1.651$ ,  $0.20 > P > 0.10$ ).

## DISCUSSION

The majority of Western Bluebird nests were in ponderosa pine snags, which is not surprising given that ponderosa pine was the dominant tree in the study area (Kozma 2011). Bluebirds nested almost exclusively in cavities excavated by woodpeckers. The availability of non-excavated, natural cavities may be limited in my study area by the lack of old-growth deciduous trees of large diameter (dbh > 50 cm; Kozma 2011), which are more likely to have natural cavities, although I did not sample the availability of excavated to unexcavated cavities. Studies finding a greater proportion of use of non-excavated cavities have generally been done in more mature forests (Bai et al. 2003, Wesolowski 2007); older trees are more likely than younger trees to contain non-excavated cavities in the form of broken or hollow branches and crevices behind loose bark.

Bluebirds most frequently used cavities in snags far along in decay. This likely reflects the selection of such snags by the Hairy and White-headed woodpeckers, whose cavities bluebirds used most often, because these two woodpeckers excavate most of their cavities in snags with advanced decay (Kozma 2012). Even though Northern Flicker cavities are abundant in my study area (114 flicker nests monitored from 2003 to 2010; Kozma 2012), bluebirds rarely nested in them. This was unexpected because other species nest in flicker cavities extensively (Martin and Eadie 1999, Gentry and Vierling 2008). Cavities with smaller entrances (e.g., those excavated by *Picoides* woodpeckers) may be more attractive to bluebirds because they are more easily defended, may reduce the number of potential predators able to enter the cavity, and are better at maintaining the cavity's internal temperature (Rhodes et al. 2009). Indeed, Arsenault (2004) and Saab et al. (2009) found that Western Bluebirds nest most frequently in cavities smaller than those excavated by flickers. Furthermore, Arsenault (2004) concluded that cavity size was the most important characteristic distinguishing nest sites of four different cavity-nesters.

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For second nests, Western Bluebirds frequently reused cavities, even if the first nest was unsuccessful. This was also unexpected because the Eastern Bluebird (*Sialia sialis*) is more likely to change sites if the previous attempt failed (Gowaty and Plissner 1997). Bluebirds that reuse a cavity within the same season risk exposing their second brood to an increase in ectoparasites (Stanback and Rockwell 2003). In addition, an increase of predation on these second nests can be expected, especially if the first nest was preyed upon (Sonerud 1985). Although I did not measure the availability of cavities, in my study area, which is composed primarily of managed forests, bluebirds may be faced with a scarcity of suitable cavities (Aitken et al. 2002). As a result, alternate cavities may be occupied, suboptimal, outside of the territory, or of unknown quality (Harvey et al. 1979, Stanback and Rockwell 2003). If bluebirds are unable to find suitable alternate cavities, they may be forced to reuse cavities (Stanback and Dervan 2001).

In only two vegetation variables, debris cover and tree density, did bluebird nest sites in burned and unburned forest differ. Both of these variables were lower in burned areas because fire kills live trees and removes downed logs and other debris from the ground and because during salvage logging some live trees whose crown is scorched and so not expected to live are removed. In burned forest, bluebirds preferred cavities facing east. In burned stands, which are more open than unburned stands, east-facing cavities may have a thermal advantage because they can be warmer than cavities oriented in other directions (Hooge et al. 1999). East-facing cavities may warm up faster in the morning, allowing the eggs to stay warmer when the incubating female leaves the nest to forage (males do not incubate). Arsenault (2004) also found that Western Bluebirds used east-facing cavities more and north-facing cavities less than expected from the orientation of unused cavities. Other secondary cavity-users such as the American Kestrel (*Falco sparverius*) and Tree Swallow (*Tachycineta bicolor*) also prefer natural cavities or nest boxes oriented east (Raphael 1985, Ardia et al. 2006). Primary excavators often selectively excavate cavities facing east as well, although it is unclear if they are selecting this orientation because of its thermal advantages or are taking advantage of the occurrence of heartrot (Saab et al. 2004). In my study area, Hairy and White-headed woodpecker cavities in burned areas had a mean orientation of  $154^\circ$  and were not randomly distributed ( $n = 79$ ,  $r = 0.253$ ,  $Z = 5.06$ ,  $0.01 > P > 0.005$ ), while the orientation of cavities excavated by these two woodpeckers in unburned areas was randomly distributed ( $n = 87$ ,  $r = 0.126$ ,  $Z = 1.38$ ,  $0.50 > P > 0.20$ ). Therefore, bluebirds nesting in burned areas may also be selecting cavities with an east aspect because they are the most readily available.

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# **DOCUMENTING WESTERN BURROWING OWL REPRODUCTION AND ACTIVITY PATTERNS WITH MOTION-ACTIVATED CAMERAS**

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**ABSTRACT:** We used motion-activated cameras to monitor the reproduction and patterns of activity of the Burrowing Owl (*Athene cunicularia*) above ground at 45 burrows in south-central Nevada during the breeding seasons of 1999, 2000, 2001, and 2005. The 37 broods, encompassing 180 young, raised over the four years represented an average of 4.9 young per successful breeding pair. Young and adult owls were detected at the burrow entrance at all times of the day and night, but adults were detected more frequently during afternoon/early evening than were young. Motion-activated cameras require less effort to implement than other techniques. Limitations include photographing only a small percentage of owl activity at the burrow; not detecting the actual number of eggs, young, or number fledged; and not being able to track individual owls over time. Further work is also necessary to compare the accuracy of productivity estimates generated from motion-activated cameras with other techniques.

The Western Burrowing Owl (*Athene cunicularia hypugaea*) is considered a national Bird of conservation concern by the U.S. Fish and Wildlife Service (<http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf>) because of declining populations in many parts of its range. Quantifying aspects of reproduction such as number of successful breeding pairs and number of young per successful pair is important to assessing the population's status and trend. Knowledge of the species' activity patterns should be a basis for a sampling protocol and a better understanding of its ecology. Techniques for documenting Burrowing Owl reproduction include counting the number of young outside burrows (Thomsen 1971, Martin 1973, Conway and Simon 2003, Gorman et al. 2003), direct capture (Plumpton and Lutz 1994), video surveillance (Gorman et al. 2003), or observing the birds inside artificial nest burrows (Henny and Blus 1981, Botelho and Arrowood 1998, Belthoff and Smith 2000, Gorman et al. 2003, Todd et al. 2003). Determining activity patterns is usually done by direct observation (Grant 1965, Coulombe 1971, Thomsen 1971), but other techniques such as event recorders (Marti 1974) and radiotelemetry (Haug and Oliphant 1990) have also been used.

These techniques have multiple limitations. Counts at burrows require several visits to ensure detection of all young at a burrow (Henny and Blus 1981, Gleason and Johnson 1985, Gorman et al. 2003). Capturing owls is invasive and capturing all the young may require multiple visits. Video surveillance requires specialized equipment and is time-consuming. Observation inside artificial nest burrows is labor-intensive, and in areas where burrows are not limiting the owls may not occupy them. Documenting activity patterns entails numerous hours of observation by both day and night.

Motion-activated cameras can be set up to take pictures and monitor animal activity for relatively long periods (not continuously) with minimal effort. They have been used to inventory a wide variety of animals in multiple

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habitats in California (Kucera and Barrett 1993), to identify ground-nest predators (Hernandez et al. 1997), and to monitor burrow use by the Gopher Tortoise (*Gopherus polyphemus*) (Alexy et al. 2003), but they have not been used to study the Burrowing Owl. Because Burrowing Owls live in burrows, frequently enter and exit their burrows, and spend much time around their burrow entrance, the use of motion-activated cameras may be a cost-effective technique to document the species' reproduction and activity patterns. The objectives of our study were to (1) evaluate the use of motion-activated cameras to document Burrowing Owl reproduction and activity patterns, (2) quantify the number of successful pairs and number of young per pair, and (3) describe the owls' activity patterns.

## METHODS

### Study Area

The Nevada National Security Site (NNSS), formerly known as the Nevada Test Site (e.g., Hayward et al. 1963, Castetter and Hill 1979, Boone et al. 1999) is administered by the U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office (NNSA/NFO). The N NSS encompasses approximately 3561 km<sup>2</sup> in south-central Nevada (Nye County), approximately 105 km northwest of Las Vegas. Despite drastic changes (i.e., craters, denuding of vegetation) to localized areas of the N NSS from testing of nuclear weapons for more than 40 years, biological resources over much of the N NSS remain relatively pristine because only an estimated 7% of the site has been disturbed (U.S. Department of Energy, Nevada Operations Office [USDOE] 1996).

The southern two-thirds of the N NSS is dominated by three large valleys or basins: Yucca, Frenchman, and Jackass flats. Mountain ridges and hills rise above sloping alluvial fans to enclose these basins. Pahute and Rainier mesas and Timber and Shoshone mountains occupy the northern, northwestern, and west-central sections of the N NSS. The site ranges in elevation from <1000 m above sea level on Frenchman and Jackass flats to about 2340 m on Rainier Mesa.

The N NSS has a climate characteristic of high deserts with little precipitation, hot summers, mild winters, and wide diurnal ranges in temperature. Monthly average temperatures range from 7 °C in January to 32 °C in July. The average annual precipitation ranges from 15 cm at the lower elevations to 23 cm at the higher elevations (USDOE 1996). Most of the precipitation falls from December to March in the form of rain or snow; lesser amounts of rain usually fall during July and August. From 1960 to 2005, October to March precipitation as measured on Yucca Flat averaged 10.2 cm, but during our study it varied widely (1998–99, 2.3 cm; 1999–2000, 12.9 cm; 2000–01, 10.1 cm; 2004–05, 22.9 cm).

The N NSS straddles the transition between the Great Basin Desert and the Mojave Desert as defined by Jaeger (1957). Within the site, the vegetation of the Great Basin Desert region is dominated by sagebrush (*Artemisia* spp.), Singleleaf Pinyon (*Pinus monophylla*), and Utah Juniper (*Juniperus osteosperma*), the Mojave Desert region by Creosotebush

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(*Larrea tridentata*) and White Bursage (*Ambrosia dumosa*), the Transition region by Blackbrush (*Coleogyne ramosissima*), Nevada Jointfir (*Ephedra nevadensis*), and Burrobrush (*Hymenoclea salsola*).

### Camera Setup and Reproduction

We monitored known owl burrows monthly from February to August 1999–2001 and in April, May, and July 2005 to determine if they were active. We considered a burrow active if we found pellets or scat fresh since our previous visit or if we saw an owl at it. We removed pellets or scat during each visit to facilitate identification of fresh sign on the subsequent visit. We included 2005 in the study primarily to compare reproductive success during a very wet year (twice the average) to reproductive success during years with average or below average precipitation and excluded 2005 data from the activity-pattern analysis. At each active burrow we set up a Trail-Master camera system (TM1500 active infrared trail monitor, Goodson & Associates, Inc., Lenexa, KS). The cameras were deployed from 3 June to 9 September 1999, 22 February to 10 August 2000, 25 April to 20 August 2001, and 31 May to 10 August 2005.

Each system (Figure 1) consisted of an infrared transmitter (A), a receiver (B), a weather-resistant 35-mm camera with a protective shelter and mounted to a fence post (C), and a cable connecting the camera to the receiver (D). The beam of infrared light emitted by the transmitter was aimed at a window on the side of the receiver. The transmitter and receiver were set up within 15 cm of the burrow entrance so that the beam projected across the entrance. Each time an owl or other animal interrupted the beam, the receiver recorded the date and time. Depending upon how the camera system was programmed, each interruption could also trigger the camera to take a picture. We set 0.5 sec as the shortest interruption of the beam the receiver would register and 30 min as the minimum interval between photographs. Thus only events at least 30 min apart were photographed. The camera was mounted on a fence post 4 to 6 m from the burrow entrance and aimed at the burrow entrance. Photographs were recorded on 200-speed, 36-exposure Kodak Royal Gold color film. Cameras were equipped with an automatic flash for night pictures.

Once the camera system was in place, we tested the system by manually interrupting the beam of light with a hand or other object and confirming that the camera took a picture. During initial setup at each burrow we recorded the location, date, time, starting picture number, and starting event number. If, when we retrieved the system, the number of pictures taken was  $\leq 10$  we left the film in the camera for use at the next site. Thus the maximum number of pictures taken at any one burrow ranged from 25 to 35. The length of time the camera could take pictures at each burrow ranged from a minimum of 12.5 hours (25 pictures taken every half hour) to the entire duration of the setup. Thus for photographs the “sampling effort” was not standard across burrows, being affected by the entry/exit behavior and number of owls at each burrow. Because of the memory-storage limitations of the receiver the maximum number of events that could be recorded was about 1100.

Camera systems were moved to new burrows usually every two to three days. We used a portable data recorder to upload data from the receivers in

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the field and later downloaded them to a desktop computer. The cameras were set up to print the date and time on the picture, and the times on both the camera and TM1500 receiver were synchronized. The film was processed commercially, and we hand-labeled each picture with the date, time, location, and which individuals were in the picture. From these pictures we determined the numbers of adults and young, but we did not attempt to age the young. We defined a pair as successful if we detected one or more young at their burrow, as nonproductive if we detected no young. We also recorded species other than the Burrowing Owl.

### Activity Patterns

To investigate daily activity patterns defined as presence of owls on the burrow apron and entry into or exiting from the burrow entrance, we examined the photographs and associated event data for 1999–2001. Our objectives for the analysis of activity patterns were to determine (1) times when owls were present around their burrow entrance, (2) differences in activity patterns between young and adults, and (3) the best times to count the maximum number of young per nest burrow.

To upload all data from the receivers (date, time, event number, photograph number) to a computer, we used StatPack software (Goodson & Associates, Inc., Lenexa, KS). We described the content of each photograph, categorizing the photo by whether it included (1) adult owl(s), (2) young owl(s), and (3) the maximum number of young owls at that burrow. These data were imported into a Microsoft Excel spreadsheet, in which we plotted the number of photographs containing the various contents listed above for each hour of the day. We assigned each photograph a whole-hour value; for example, a photograph taken between 02:00 and 02:59 was assigned the whole-hour value of 02:00. We used a chi-squared analysis of each category to assess whether activity patterns differed from that expected if activity were random. We then modeled the counts as Poisson random variables and used harmonic analysis to identify peaks in activity.

## RESULTS

A total of 2828 photographs were taken from 1999 to 2001. Of these, 2225 (79%) contained pictures of owls, 406 (14%) contained pictures of animals other than owls, and 197 (7%) detected no animals. Over the four breeding seasons, we detected 37 successful breeding pairs and 180 young with an average of 4.9 young per successful pair (Table 1). We also documented ten pairs with no young, one in 1999, two in 2000, three in 2001, and four in 2005. Including these ten lowers the average to 3.8 young per pair. Over all years combined, breeding was successful at 20 of the 45 sites (44%) sampled. We sampled burrows photographically from one to seven times (generally two to four) per year, depending on how long a burrow remained active. Of the 406 photographs of animals other than owls, 22 (5.5%) were of Burrowing Owl predators, including seven photos of the Kit Fox (*Vulpes macrotis*), six of the Badger (*Taxidea taxus*), three of the Coyote (*Canis latrans*), one of a Bobcat (*Lynx rufus*), three of the Common Raven (*Corvus corax*), one of a Greater Roadrunner (*Geococcyx*

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Figure 1. TrailMaster (TM1500) camera system set up at a burrow (A, transmitter; B, receiver; C, camera and protective shelter; D, cable).

*Photo by Derek B. Hall*

*californianus*), and one of an unknown raptor. The remaining photographs were of rabbits, rodents, and passerines. The rate of predator visitation we detected was low, but our technique was not able to detect predators such as snakes. No instances of predation were photographed.

Adult owls were detected on their burrow's apron during all hours of the day and night (Figure 2) and the result of the chi-squared test was significant ( $\chi^2 = 80, P < 0.001$ ). Harmonic analysis revealed two peaks of activity, one in the morning between 07:00 and 08:00 and another in the late afternoon between 16:00 and 17:00 (Figure 2). Young owls were also detected on their burrow's apron during all hours of the day and night (Figure 3), and the result of the chi-squared test for them was also significant ( $\chi^2 = 131$ ,

**Table 1** Productivity of Burrowing Owls as Detected by Motion-Activated Camera at the Nevada National Security Site

Sites sampled	Breeding pairs	Young owls	Young per pair	Range	Standard deviation
1999	18	24	3.4	1–6	1.6
2000	24	43	5.4	3–8	1.6
2001	23	55	5.0	1–8	2.1
2005	18	58	5.3	3–8	1.7
Total	45 <sup>a</sup>	180	4.0	1–8	1.9

<sup>a</sup>Number of unique sites; some sites were sampled in multiple years.

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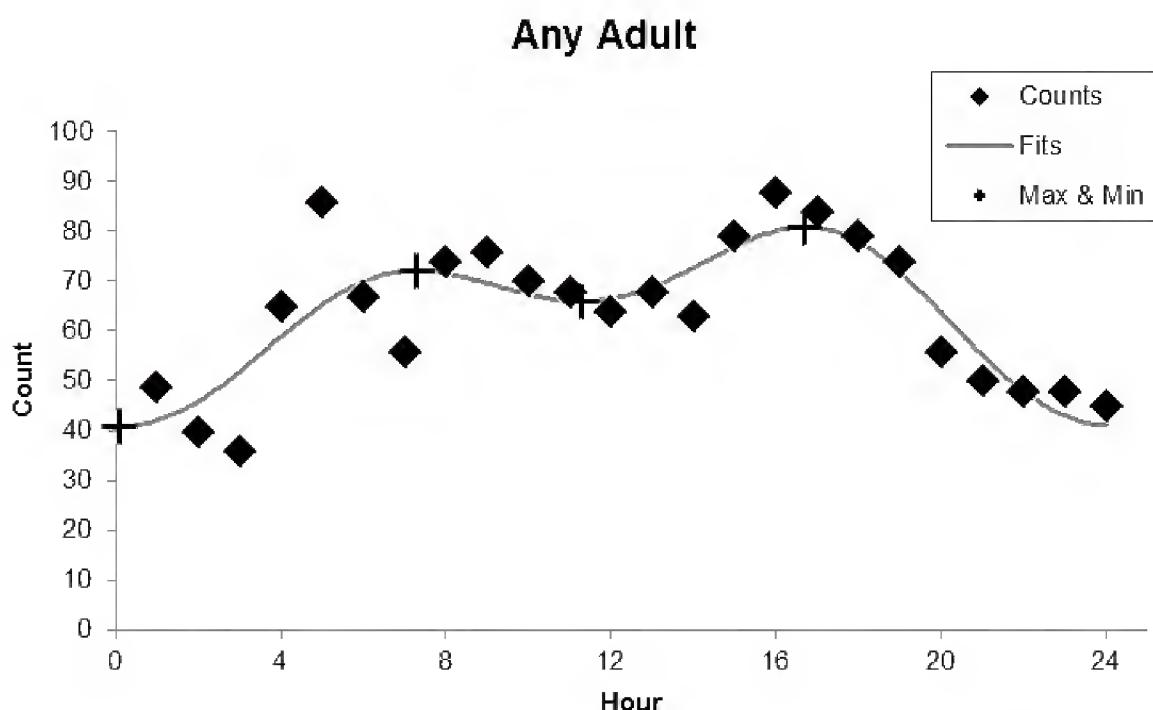


Figure 2. Number of photos with adult owls by time of day at the Nevada National Security Site, 1999–2001 ( $n = 1533$ ). Curve represents results of harmonic analysis.

$P < 0.001$ ). Again, the harmonic analysis showed two peaks of activity, one in the morning between 07:00 and 08:00 and another in the evening between 18:00 and 19:00 (Figure 3). The maximum number of young owls per nest burrow was documented during most but not all hours of the day and night (Figure 4), and the result of the chi-squared test of this variable was again significant ( $\chi^2 = 94$ ,  $P < 0.001$ ). Like that for detection of any young,

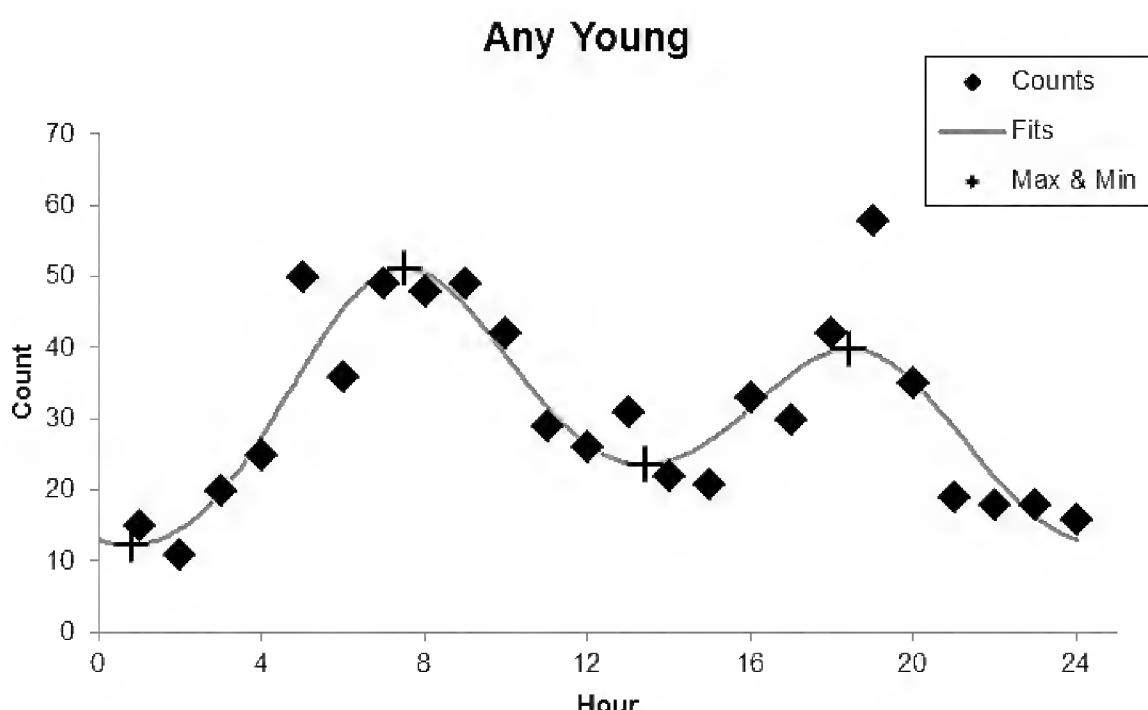


Figure 3. Number of photos with young owls by time of day at the Nevada National Security Site, 1999–2001 ( $n = 743$ ). Curve represents results of harmonic analysis.

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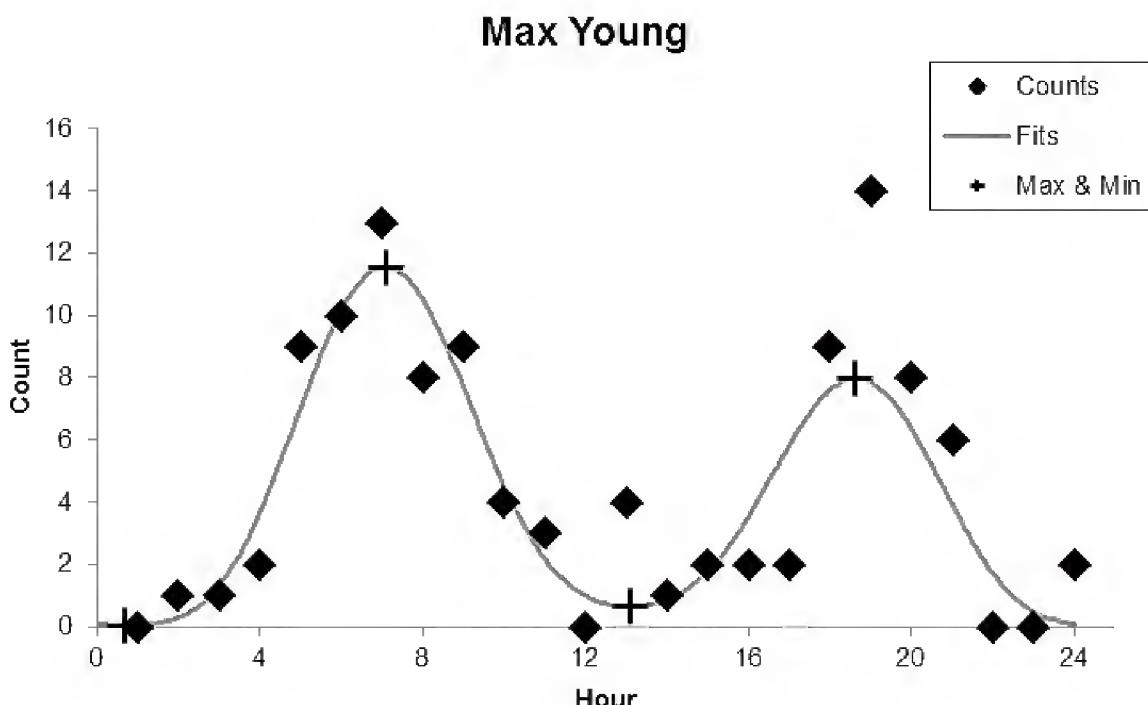


Figure 4. Number of photos when the maximum number of young Burrowing Owls per nest burrow was detected by time of day at the Nevada National Security Site, 1999–2001 ( $n = 110$ ). Curve represents results of harmonic analysis.

harmonic analysis of records of the maximum number of young showed two peaks, between 07:00 and 08:00 and between 18:00 and 19:00 (Figure 4).

## DISCUSSION

Motion-activated cameras set up at burrows documented the Burrowing Owl's reproduction and activity patterns. The actual number of young fledged at each burrow monitored was not known, so it is not possible to determine how accurate this technique was in revealing all young at a burrow. Future study should compare counts of young with motion-activated cameras to the known number of young in artificial nest boxes as exemplified by Gorman et al. (2003). Only two to four visits to a burrow (one to three camera setups plus one visit to determine if the burrow is active) are required to document young at an active burrow, which is one to three fewer visits than recommended by Gorman et al. (2003). With a film camera, up to 35 observations can be recorded over an 18-hour period (photographs taken every half hour,, including at night). Digital cameras can now be used to capture several hundred photographs per setup at an increased frequency (e.g., one every minute) if desired, increasing the number of photographs available for refining activity patterns, including timing of prey delivery and feeding. Infrared light sources could also be used instead of camera flash to minimize disturbance to owls at night. Additionally, cheaper video cameras are now available and could be used to document activity patterns and behavior.

The average numbers of young per successful pair and per pair (including nonproductive pairs), 4.9 and 3.8, respectively, were within the range of values previously reported from the western United States (Thomsen

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1971, Martin 1973, Smith and Murphy 1973, Gleason and Johnson 1985, Belthoff and King 1997, Botelho and Arrowood 1998, Lutz and Plumpton 1999, Belthoff and Smith 2000). Because we sampled throughout the breeding season and didn't track survival of chicks, we do not know how many of the young detected photographically actually fledged. Thus our values are most likely inflated. Timing of camera setups should be standardized at specific times through the breeding season for the number fledged per pair to be determined. The number of young per successful breeding pair varied by year (Table 1), but the differences were not statistically significantly ( $F = 1.86$ ,  $df = 3$ ,  $P = 0.156$ ). Precipitation from October to March prior to the breeding season was well below average during 1998–1999 and average to more than double the average during the remaining years. Precipitation during this period is positively correlated with the abundance of desert vertebrates (Beatley 1969, Munger et al. 1983, Nagy 1988, Saethre 1994, Sowell and Boone 1996) and may partially explain the low number of young per breeding pair during 1999. The correlation between owl productivity and precipitation warrants further study.

The owls we studied were active during all hours of the day and night with peaks of activity in the morning and evening. Although the harmonic analysis showed the morning peak for both adults and young to be between 07:00 and 08:00, another spike of activity occurred between 05:00 and 06:00. In Colorado, Marti (1974) also found the Burrowing Owl to be active in every hour of the day and night with activity distributed trimodally. The peaks of activity he reported differed somewhat from ours and included one of about five hours centered around sunrise, one of two hours just before midday, and another five-hour period centered around sunset. In Minnesota, Grant (1965) concluded that activity was concentrated in early morning and late evening, with little activity during the day. In California, Thomsen (1971) reported that between 12:00 and 16:00 owls were little in evidence but came out to the burrow apron in late afternoon.

Although we detected both young and adult owls at the burrow entrance at all times throughout the day and night, adult owls were detected more frequently than young during the afternoon and early evening. In California, Coulombe (1971) reported that young owls were frequently outside during the morning and afternoon but rarely during midday.

The best times to detect the maximum number of young owls at nest burrows were from 05:00 to 10:00 and from 18:00 to 21:00, so visual surveys at these times should maximize the probability of detecting the greatest number of young at the NNSS.

During our study, the date of the start of camera monitoring varied considerably from year to year: 3 June 1999, 22 February 2000, 25 April, 2001, and 31 May 2005. However, the earliest dates that young were detected were 26 June 1999, 18 May 2000, 31 May 2001, and 2 June 2005, and the vast majority of young were detected during June and July (Hall et al. 2003). Although some nonproductive pairs may have been missed, it is unlikely that any young were missed. Similarly, in southwestern Idaho Belthoff et al. (1995) reported that the first young owls appeared above ground on 20 May 1994, and they concluded that most young were hatched between mid-May and early June. In south-central Idaho, Rich (1986) observed young

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near natal burrows as early as 10 June and as late as 17 September. From the size and plumage of the young in the photographs, we believe that reproduction in 1999 was delayed in comparison to that in 2000, 2001, and 2005. The delay was possibly caused by the late arrival of precipitation (5 cm in late April), which is necessary for stimulating plant growth and rodent reproduction (Beatley 1969). Results from Burrowing Owl trapping at the NNSS in 2007 (a very dry year) also indicated delayed reproduction (National Security Technologies 2008). In Arizona trapping showed late breeding and many failures in 2007 also (Vicki Garcia pers. comm.). In contrast, in Canada Wellicome (2005) found that Burrowing Owls do not adjust their egg laying on the basis of food supply. Perhaps in desert ecosystems Burrowing Owls have adapted a more conservative approach to reproduction in response to a more variable prey base due to limited, sporadic moisture. More study across geographic regions is required to determine if this is true. On the basis of our data, we recommend that researchers using motion-activated cameras in similar habitats set up cameras from mid-May through mid- to late August to document owl reproduction.

We encountered two problems while using the TM1500 system. The most common problem was owls and other birds perching on the camera shelter and tipping the camera so it was no longer focused on the burrow entrance. To fix this problem we taped the camera shelter to the fence post with duct tape. Another problem was rodents or other animals chewing through the cable that connected the camera to the receiver. This was remedied by burying the cable 2.5 to 5 cm under ground and using duct tape to cover the first 30–60 cm of the cable next to the fence post. It is advisable to have two or three extra cables on hand.

Only about half of the active burrows surveyed were productive. At some sites, photographs documented a pair of adults but no young. We considered these pairs nonproductive. Reasons for pairs being nonproductive could have been failure to breed or failure of the nest from factors such as nonviable eggs or predation. Also, sometimes photographs disclosed older juveniles later in the season at sites where photographs from previous months' sampling had not revealed any young. We did not consider these sites nest burrows, inferring that the owls had relocated to these burrows later in the season. At some sites, one adult owl and no young were detected in the photographs. At many active burrows, no owls were photographed, suggesting only short-term occupancy of these burrows (e.g., owls migrating through the area or searching for a suitable burrow). The use of motion-activated cameras did not appear to cause Burrowing Owls to abandon their burrows.

Using motion-activated cameras to document successful owl reproduction and activity patterns requires fewer visits to burrows than do direct observations, is less invasive than capturing the birds, is less time-consuming and less expensive than video surveillance, and requires much less time and effort than direct observations. This technique requires less labor than installation of artificial burrows, and natural burrows may have a higher chance of being occupied than artificial burrows, especially in areas where burrows are not limiting. Limitations of motion-activated cameras with film include photographing only a small percentage of owl activity at the burrow; not detecting the actual number of eggs, young, or number fledged; and not being able to track

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individual owls over time. Using digital cameras to take photographs more frequently would help overcome the first limitation but would also increase the processing time. Future studies should examine how accurate motion-activated cameras are in quantifying the number of young in comparison to the known number of young in artificial nest boxes or observed directly in natural burrows. Studies investigating factors that influence reproduction, including precipitation, predation, and disease, are also needed.

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## NOTES

### PRESENCE OF THE NEOTROPIC CORMORANT IN CHIHUAHUA, MEXICO

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The Neotropic Cormorant (*Phalacrocorax brasiliensis*) is widely distributed from Tierra de Fuego to the southern United States (Coldren et al. 1998). Recently, its breeding range in the United States has expanded (Pranty et al. 2010). In mainland Mexico, this species has been recorded as a regular breeding resident in several states (Friedmann et al. 1950, Howell and Webb 1995, Gómez de Silva 1998, Erickson et al. 2013). In this note, we report what is apparently the first record of Neotropic Cormorant for Chihuahua.

As part of a bird-monitoring project at El Vado de Meoqui in east-central Chihuahua, a migratory bird corridor decreed as a Ramsar site in 2012, Mondaca observed and photographed an adult Neotropic Cormorant on the banks of the San Pedro River on 29 January 2012 ( $28^{\circ} 15' 42.37''$  N,  $105^{\circ} 28' 51.02''$  W) in Meoqui municipality, approximately 70 km south of Chihuahua city. Field identification was based on the tail longer than that of a Double-crested Cormorant (*P. auritus*), whitish border to gular skin, absence of any yellow skin in the supraloral area, facial and gular area brownish yellow, plumage blackish overall (Figure 1). The photo was deposited at the Laboratorio de Ecología y Biodiversidad Animal (LEBA), Instituto de Ciencias Biomédicas, Ciudad Juárez, Chihuahua.



Figure 1. Neotropic Cormorant (*Phalacrocorax brasiliensis*) on banks of San Pedro River, Meoqui municipality, Chihuahua, Mexico, on 29 January 2012.

*Photo by Fernando Mondaca-Fernández*

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From a review of published literature (Howell and Webb 1995, Navarro and Peterson 2007) and online resources for bird distribution (databases of Ornis, www.ornis2.ornisnet.org, and eBird, www.ebird.org), the species has apparently not been recorded previously in Chihuahua. Perhaps this record represents a vagrant, but it also might reflect a recent colonization of areas with environmental conditions similar to those in the species' typical habitat (Ehrlich et al. 1988). We cannot rule out that this species is probably being overlooked in Chihuahua because of a lack of birders and field ornithologists, so it may have been present but gone undetected in the state in previous years.

Possibly, the Neotropic Cormorant also occurs at reservoirs or urban parks in northern Chihuahua (e.g., Juárez or Guadalupe municipalities), given their proximity to recorded localities in the Trans-Pecos region of Texas, where Peterson and Zimmer (1998) considered it an "uncommon permanent resident." Elsewhere in Texas, Lockwood and Freeman (2014) considered it to be an uncommon to common resident throughout the coastal prairies and south to the lower Rio Grande Valley, with previous summer records at inland locations scattered through eastern Texas. In addition, this species has been recorded regularly in southwestern New Mexico (Williams 2013a, b, 2014).

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*Philip Unitt*

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### **Wing your way to....**

### **Billings, Montana 10-14 June 2015**

The 40th annual conference of Western Field Ornithologists will take us to Montana for the first time. Field trips will visit a variety of habitats from the high mountains (Black Rosy-Finch) to the grasslands (Sprague's Pipit). We'll see courting McCown's and Chestnut-collared Longspurs in their finest plumage, Upland Sandpipers, and Lark Buntings. History buffs will delight in viewing the Little Bighorn Battlefield where Custer saw his last Sharp-tailed Grouse.

There will be workshops on the field identification of sparrows (Jon Dunn) and flycatchers (Dan Casey), natural history of owls (Denver Holt), bird-sound identification (Nathan Pieplow), and more. Friday and Saturday afternoon science sessions will update you on the most current avian research from the region, and the Saturday evening banquet will feature a keynote address by Stephen Dinsmore on the Mountain Plover. Ed Harper and Nathan Pieplow will again offer their ever-popular sessions on bird ID by sight and sound.

Registration for the conference will open in February 2015 with the exact date to be announced via a future WFO News e-mail. If you are NOT currently on our electronic mailing list, please send an e-mail to [erpfomca@aol.com](mailto:erpfomca@aol.com), include your full name and city and state of residence, and we'll put you on. WFO members are able to register for our conferences at a reduced rate and have early access to registration. If you are not currently a WFO member, you can join at [westernfieldornithologists.org/join.php](http://westernfieldornithologists.org/join.php).

## FEATURED PHOTO

### INLAND RECORDS OF THE BLACK SKIMMER IN THE WESTERN UNITED STATES

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In the western United States west of the 100th meridian, the Black Skimmer (*Rynchops niger*) was first recorded in coastal southern California on 8 September 1962 (Audubon Field Notes 17:69) and first recorded inland, at the Salton Sea in southeastern California, on 3 July 1968 (McCaskie and Suffel 1971). After breeding began at the Salton Sea in 1972 (McCaskie et al. 1974), the Black Skimmer rapidly expanded its distribution in California, with an estimated breeding population of 1200 pairs in 1995 (Collins and Garrett 1996) and 1400–1500 pairs in 2005 (Molina 2008) in breeding colonies at the Salton Sea and scattered coastal localities as far north as south San Francisco Bay (Collins and Garrett 1996, Molina 1996, 2008). Skimmers occasionally wander along the coast north of San Francisco to Bodega Bay in Sonoma County (Bolander and Parmeter 2000), rarely farther north. In Humboldt County, a pair was seen at Eureka from 17 to 23 August 2004 (N. Am. Birds [NAB] 59:144) and one was at McKinleyville on 19 July 2005 (NAB 59:651). Another turned up at Crescent City, Del Norte County, on 13 July 2007 (NAB 61:638). A skimmer subsequently seen at Pistol River in Curry County, Oregon, on 26 January 2008 (NAB 62:294, Irons 2008), represents the northernmost record in western North America.

Although two subspecies of the Black Skimmer nest primarily near fresh water along rivers in the interior of South America, the nominate race of North America is almost exclusively a coastal breeder, yet individuals often stray inland (Gochfeld and Burger 1994). Following its recent range expansion in California, the skimmer has subsequently wandered with increasing frequency to inland localities scattered across California and four other western states. In this note I report the northernmost inland record of Black Skimmer in the western United States, at Clear Lake in northern California, and review the species' occurrence inland in the western United States, from the published literature and recent reports to [www.eBird.org](http://www.eBird.org) (Figure 1). I obtained approximate elevations for each locality from Google Earth.

#### RECORD FROM CLEAR LAKE, CALIFORNIA

Given the skimmer's extreme rarity north of Bodega Bay, California, with only four coastal records and no inland records, the appearance of one inland, 59 km from the coast, on Clear Lake (elev. 405 m), Lake County, California, was unexpected. At 07:21 on 3 July 2013, Allen Moreno, Bryan McIntosh, and I were searching for grebe nests from a canoe when I spotted an adult Black Skimmer flying toward us, from southeast to southwest, at Rumsey Slough, just south of Lakeport. We watched it for about 1 minute as it flew past us and then vanished when it veered northward over the tules toward Lakeport. It reappeared twice, at 07:37 and again at 07:47, each time flying past us from southeast to northwest as we paddled near Konocti Vista Casino; somehow it circled past us twice without being detected. We heard its nasal grunt several times but never saw it skimming for fish. I managed to obtain several photos (see this issue's back cover). Throughout the day and during the next few days we and other frustrated local birders searched for it in vain from various vantage points around the lake. We also failed to relocate it from a motorboat during a census of waterbirds around the perimeter of the lake on 12 July. At a latitude of  $38^{\circ} 20' 53.15''$  N, this observation represents the northernmost inland record in the western United States.

## FEATURED PHOTO

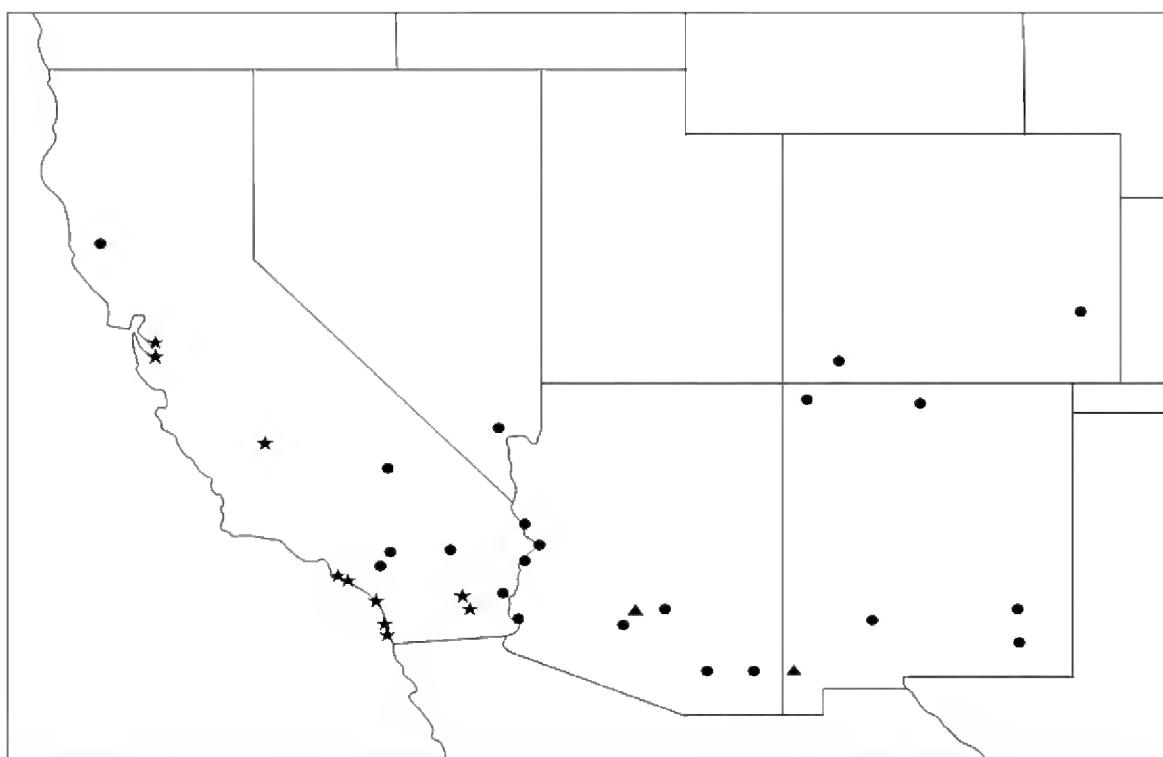


Figure 1. Inland records of the Black Skimmer >50 km from the coast in the western United States. Stars represent breeding localities (Molina 2008), triangles represent band recoveries of skimmers banded at the Salton Sea, California, and circles represent other inland records.

### OTHER INLAND RECORDS IN CALIFORNIA

Because all but a few dozen of California's skimmers nest in colonies at the Salton Sea and in coastal southern California, most of the inland records are from those areas. Skimmers routinely wander short distances inland up coastal floodplains near sea level but rarely stray inland to higher elevations. Some of the more significant inland records from southern California away from the Salton Sea begin with a juvenile at San Jacinto Wildlife Area (elev. 435 m) and Lake Elsinore (elev. 378 m), Riverside County, 28 August–4 September 1978 (Am. Birds [AB] 33:214, Garrett and Dunn 1981). Subsequent records include two at Palo Verde (elev. 71 m), Imperial County, 30 July 1982 (AB 36:1016, K. V. Rosenberg et al. 1991); two at China Lake Naval Weapons Center (elev. 671 m; highest inland record for California), Kern County, 28 July 1990 (AB 44:1187); two at Twentynine Palms, San Bernardino County, 21 August 1994 (Natl. Audubon Soc. Field Notes [NASFN] 49:101); many records at Prado Reservoir and Prado Basin (elev. 142–158 m), between Chino and Corona, San Bernardino and Riverside counties, beginning with one 24–25 July 1997 (NASFN 51:1054), reaching up to eight from 21 May to 18 July 2011 (NAB 65:688), and including a winter record of two, 2–3 January 2012 (Tom Benson and Howard King; eBird); up to four at Mystic Lake (elev. 432 m), Riverside County, 25 October–29 November 1998 (McCaskie 1999) and another there on 4 August 2000 (NAB 55:103); two at Lake Cachuma (elev. 234 m), Santa Barbara County, 13 January 2001, and single individuals there on 6 December 2002, 11 September 2005, and 15 August 2010 (Lehman 2012); one at the San Jacinto Wildlife Area, 21 June–9 July 2011 (NAB 65:688); one at Lake Balboa (elev. 216 m), Los Angeles County, 9–10 August 2011 (Daniel Tinoco; eBird); two at the Santa Maria wastewater-treatment plant (elev. 47 m), Santa Barbara County, 17 August 2012 (Maggie Smith; eBird); one at Lindo Lake (elev. 122 m), San

## FEATURED PHOTO

Diego County, 23 June 2013 (Tom Frankenberger and B. J. Stacey; eBird); and one at Lake Elsinore, 5–11 August 2013 (Charity Hagen and Julie Szabo; eBird).

In the Central Valley, a pair nested successfully, producing a single fledgling, at the Tulare Lake Drainage District's South Evaporation Basin (elev. 61 m), Kings County, and were also seen at nearby Tulare Lake (elev. 56 m), Kern County, from 19 July to 12 October 1986 (AB 40:1251, 1256, 41:139). Subsequent records from the same area in Kings County are of four on 8 July 1993 (AB 47:1147) and one on 22 and 23 July 2013 (Mark Stacy; eBird).

Farther north, a few skimmers have been observed flying over coastal hills in the Monterey Bay area, including one over Capitola (elev. >10 m), Santa Cruz County, on 27 April and two more on 12 May 1998 (NAB 53:326). In the south San Francisco Bay area, where nesting began in 1994 (Layne et al. 1996), skimmers have been observed flying over coastal hills including one over El Granada (elev. >10 m), San Mateo County, on 17 July 1998 (NASFN 52:500), and a flock of eight over the intersection of Page Road and I-280 (elev. 79 m) in Palo Alto, Santa Cruz County, 12 November 2013 (Jennifer Rycenga; eBird). In the north San Francisco Bay area, there have been a few inland records along coastal floodplains within a few m of sea level, including two at Shollenberger Park, Petaluma, Sonoma County, 25 July 2010 (Steve van der Veen; eBird), and one along the Marsh Creek Trail, Oakley, Contra Costa County, 11 August 2011 (Richard Harris; eBird).

## INLAND RECORDS FROM OTHER WESTERN STATES

The Black Skimmer has been recorded twice in Colorado at latitudes slightly lower than the Clear Lake record from California. The first was an adult at Jett Reservoir (elev. 1198 m), Eads, Kiowa County, 19–21 July 2001 (NAB 55:461, Leukering and Semo 2004). Another adult was at Pastorius Reservoir (elev. 2095 m), La Plata County, 29 April 2004 (NAB 58:406, Semo 2006).

In Nevada, two were photographed at the Henderson Bird Viewing Preserve (elev. 488 m), Henderson, Clark County, 18–28 August 1997 (NAB 52:98, Baeppler et al. 1999).

Arizona has ten records accepted and one pending. Accepted records are (1) one at two different localities north of Yuma (including Martinez Lake, elev. 56 m), Yuma County, 12 June 1977 (AB 31:1172, K. V. Rosenberg et al. 1991, G. H. Rosenberg and Witzeman 1998); (2) one at Lake Havasu (elev. 138 m), Mohave County, 1–4 September 1977 (AB 32:241, K. V. Rosenberg et al. 1991, G. H. Rosenberg and Witzeman 1998); (3) two at Willcox (elev. 1271 m), Cochise County, 4 August 1984 (AB 39:87, G. H. Rosenberg and Witzeman 1998); (4) one at Painted Rock Dam (elev. 184 m), Maricopa County, 14 July 1993 (AB 47:1134, G. H. Rosenberg and Witzeman 1998); (5) another at Willcox, 4 August 1994 (G. H. Rosenberg and Witzeman 1998); (6) a juvenile at Chandler (elev. 383 m), Maricopa County, 14–15 October 2000 (NAB 55:84, G. H. Rosenberg et al. 2007); (7) an adult at Lakeside Park (elev. 823 m), Tucson, Pima County, 9 May 2002 (NAB 56:338, G. H. Rosenberg et al. 2007); (8) an immature at Gillespie Dam (elev. 229 m), Maricopa County, 16–19 September 2005 (NAB 60:117, G. H. Rosenberg et al. 2011); (9) three at Bill Williams delta (elev. 138 m), Mohave County, 24–28 Oct 2009 (NAB 64:126, Rosenberg et al. 2011); and (10) one at Lake Havasu (elev. 138 m), Mohave County, 28 May 2010 (NAB 64:475). A record of one at Parker (elev. 104 m), on 4 June 2011 (NAB 65:668), is pending.

New Mexico has six records, summarized by Williams and Howe (2008): (1) an immature at Lake McMillan (elev. 1000 m), Eddy County, 5–7 August 1964; (2) an adult at Elephant Butte Lake (elev. 1355 m), Sierra County, 1 May 1993; (3) an adult at Morgan Lake (elev. 1623 m), San Juan County, 15 May 1996; (4) an adult at Bitter Lake National Wildlife Refuge (elev. 1067 m), Chaves County, 10–11 2001; (5) an immature specimen salvaged at Stein's Pass (elev. 1286 m), Hidalgo County, 18

## FEATURED PHOTO

October 2005 (Museum of Southwestern Biology, University of New Mexico, 25152); and (6) an adult at Heron Lake (elev. 2192 m), Rio Arriba County, 12 May 2007.

## DISCUSSION

The widely scattered records in the interior of the western United States indicate that skimmers occasionally wander far from their breeding colonies along the California coast, Salton Sea, and Gulf of Mexico, crossing deserts and high mountain passes, and may occur nearly anywhere. The record most distant from a known breeding colony is for Jett Reservoir near Eads, Kiowa County, Colorado (Leukering and Semo 2004), approximately 1210 km from Galveston Bay, Texas, along the Gulf of Mexico, and approximately 1290 km from the Salton Sea, California. The highest altitudinal record is from Heron Lake, Rio Arriba County, New Mexico, at an elevation of 2192 m (Williams and Howe 2008). In other regions of the species' range, skimmers also wander far inland and at elevations as high as 2200 m in Mexico (Williams 1982), 2600 m in Colombia (Sergio Chaparro Herrera pers. comm), 2700 m in Chile (Barabara Knapton; eBird), 3710 m in Bolivia (Parker and Rowlett 1984, presumably the source of 3900 m reported in Fjeldså and Krabbe 1990), and 4086 m in Peru (Colin Bushell pers. comm.).

The numerous inland records in southern California indicate that skimmers routinely cross between the coast and the Salton Sea. Most inland skimmers in the western United States probably originate from breeding colonies in California, yet some, especially those in Colorado and New Mexico, may originate from coastal nesting colonies along the Gulf of Mexico, which are nearly equidistant from the Salton Sea. The Gulf of Mexico is presumably the source of Black Skimmers occurring farther east in Kansas (one record; Mengel 1970), Oklahoma (three records; Newell 1968, Ray 1972, Olyphant 1991), and Texas (several inland records in western and northern Texas; Lockwood and Freeman 2004). Remarkably two skimmers banded as chicks by K. C. Molina at the Salton Sea, California, on 19 August 2005, were recovered inland; the band of one was read at Gillespie Dam, Maricopa County, central Arizona, approximately 265 km east of where it hatched, 16–19 September 2005 (NAB 60:117, G. H. Rosenberg et al. 2011), and the other was salvaged as a specimen from Steins Pass, Hidalgo County, southwestern New Mexico, approximately 630 km east-southeast of where it hatched, 18 October 2005 (Williams and Howe 2008). Clearly much remains to be learned about the dispersal of skimmers from their breeding colonies.

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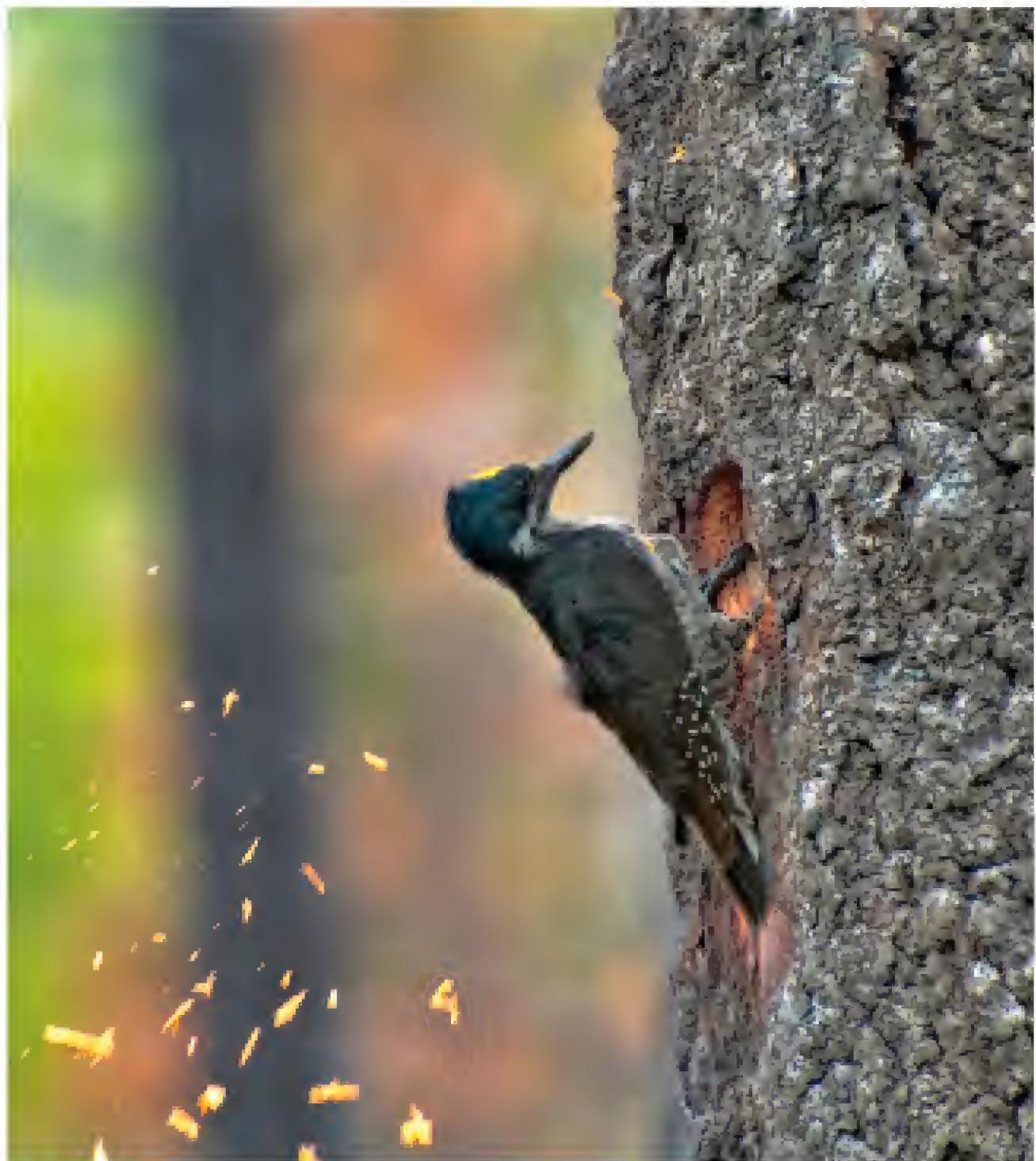


Photo by © Joseph Leibrecht of New Braunfels, Texas:

Black-backed Woodpecker (*Picoides arcticus*)

Lassen National Forest, Shasta County, California, 4 June 2011.

The Black-backed Woodpecker is well known for its use of burned forest, but, like those of many species, its needs for roost sites are poorly known. By means of radio telemetry, Rodney Siegel, Robert L. Wilkerson, Morgan W. Tingley, and Christine A. Howell located 14 roost sites, finding none of them were in cavities the birds excavated themselves (see pp. 296–303). Rather, burned-out hollows or other natural shelters in trees served as roost sites.

