Photo by © Steve N. G. Howell of Stinson Beach, California:
Marsh Sandpiper (*Tringa stagnatilis*)
Estero Punta Banda, near Ensenada, Baja California, Mexico, 12 October 2011. The Marsh Sandpiper breeds in Eurasia but is not known to do so in the Russian Far East north of the Republic of Buryatia or southern Primorsky Krai (Maritime Territory) so is an unlikely vagrant to North America. Six have been recorded so far in the western Aleutians, one in the Pribilof Islands, all in fall. The bird in this photo represents the first record for Mexico and the first for North America away from western Alaska.
Volume 43, Number 1, 2012

One Year of Migration Data for a Western Yellow-billed Cuckoo  Juddson D. Sechrist, Eben H. Paxton, Darrell D. Ahlers, Robert H. Doster, and Vicky M. Ryan .................................................. 1

Irruptive Migration of Chestnut-backed Chickadees to Southwestern Idaho  Jay D. Carlisle ................................................................. 12

Factors Affecting the Behavior of Brown Pelicans at a Post-Breeding Roost  Sadie K. Wright, Daniel D. Roby, and Robert G. Anthony .......................................................... 21

Use of Nest Boxes by Cactus Wrens in Orange County, California  Robert A. Hamilton, Jutta C. Burger, and Susan H. Anon .......... 37

NOTES

Extension of the Breeding Range of Costa’s Hummingbird in Southern Sonora  Adam Hannuksela, Teresa Skiba, Benjamin Zyla, and Amanda Proudman .............................................................. 47

Featured Photo: Extralimital Sage Sparrows on the Central Valley Floor North of the Tulare Basin with Notes on Subspecies Status and Identification  John C. Sterling and Matt Brady ........................................... 50

Front cover photo by © Todd Easterla of Rancho Cordova, California: Common Ringed Plover (Charadrius hiaticula), Davis Wetlands, Yolo County, California, 21 August 2011. Though this species breeds on St. Lawrence and St. Matthew Islands in the Bering Sea, and has been recorded as a migrant elsewhere in western Alaska, the individual depicted on this issue’s cover is the first recorded elsewhere in western North America.

Back cover “Featured Photos” by © John Sterling of Woodland, California: Interior Sage Sparrow (Amphispiza belli nevadensis), Sherman Island, Sacramento County, California, 22 November 2011 (top); Bell’s Sage Sparrow (Amphispiza belli belli), Rayhouse Road, Yolo County, California, 19 May 2007 (bottom).

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 Kathy Molina, Section of Ornithology, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007. For matters of style consult the Suggestions to Contributors to Western Birds (at www.westernfieldornithologists.org/docs/journal_guidelines.doc).
ABSTRACT: In 2009, we studied the migration of the Western Yellow-billed Cuckoo by capturing 13 breeding birds on the middle Rio Grande, New Mexico, and attaching a 1.5-g Mk 14-S British Antarctic Survey geolocator to each bird. In 2010, we recaptured one of the cuckoos, enabling us to download its geolocation data. The cuckoo had flown approximately 9500 km during its southward migration, traveling through Central America to winter in portions of Bolivia, Brazil, Paraguay, and Argentina. The spring migration route differed somewhat from the fall route, with the cuckoo bypassing Central America to migrate through the Caribbean. Additionally, it moved between New Mexico and Mexico at the end of summer in 2009 and again in 2010 before being recaptured at its breeding site. Our results, albeit from one individual, hint at a dynamic migration strategy and have broad implications for the ecology and conservation of the Western Yellow-billed Cuckoo, a species of conservation concern.

Increasingly, researchers are focusing on understanding the ecology and conservation of migratory birds across their entire annual cycle (Webster et al. 2002). Yet documenting the movement patterns of migratory landbirds, and thus where they occur at different times of the year, has proven difficult (Rappole and Ramos 1994, Rappole 1995). Direct methods of tracking have historically relied on techniques such as banding, requiring large numbers of individuals to be marked for a small percentage return (e.g., Norris et al. 2006, Rodriguez et al. 2009); radar, which does not provide information on individuals (Gauthreaux 1971); satellite tracking, which is expensive and
the devices are currently too heavy to be used on most landbirds (Ueta and Higuchi 2002, Hobson 2008); or radio telemetry, which presents logistical difficulty in transmission of data over long distances (Kenward 2001).

Recently, miniaturized light-level geolocators have become an important tool in the study of avian migration, especially with seabirds (Phillips et al. 2004, Mackley et al. 2010), but increasingly with landbirds as the technology becomes further miniaturized (Rodriguez et al. 2009, Stutchbury et al. 2009, Bächler et al. 2010). Light-level geolocation is the calculation of position from readings of ambient light levels (measuring day length and times of sunrise and sunset to estimate longitude and latitude, respectively) with reference to time (Fox 2010). Studies using geolocators are just now beginning to be published (see BAS 2011) and are providing important insights into migratory birds’ entire annual cycle, including a better understanding of winter ranges and migration routes (Stutchbury et al. 2009, Heckscher et al. 2011) and information on connectivity between winter and breeding ranges (Ryder et al. 2011).

The Yellow-billed Cuckoo (Coccyzus americanus) is suffering population declines in both the eastern and western portions of its range (Laymon and Halterman 1987, Sauer and Droge 1992, DeSante and George 1994, Hughes 1999); however, declines in the West have been severe, and listing of the western subspecies (C. a. occidentalis) under the Endangered Species Act is warranted but reportedly “precluded by higher listing priorities” (USFWS 2001). Data on the ecology and conservation needs of breeding Western Yellow-billed Cuckoos are sparse, but studies in California (Laymon et al. 1997), Arizona (Johnson et al. 2008, Halterman 2009, McNeil et al. 2010), New Mexico (Sechrist et al. 2009, Ahlers et al. 2010), and northern Mexico (Rohwer et al. 2009) have recently provided important insights into their ecology, habitat requirements, and potential threats on the breeding grounds. In contrast, virtually nothing is known of the cuckoo’s migration and winter ecology (Hughes 1999). In 2009, we placed geolocators on 13 Yellow-billed Cuckoos in central New Mexico. The following summer (2010) we recaptured and retrieved the geolocator from one of these individuals. Although from a single bird, the data presented here (1) are the first to document the species’ movements over an annual cycle, (2) contradict the suggestion (Laymon 2000) that the western subspecies winters west of the Andes Mountains and does not migrate through the Caribbean (Hughes 1999), and (3) reveal heretofore unknown seasonal movements within the breeding range that may be related, among other things, to molt, dual nesting, or possibly facultative brood parasitism (Nolan and Thompson 1975, Pyle et al. 2009, Rohwer et al. 2009).

METHODS

In 2009, using mist nets and broadcast calls (Halterman 2009), we captured 13 Yellow-billed Cuckoos near Elephant Butte Reservoir on the middle Rio Grande in central New Mexico (33.458° N, 107.176° W). The cuckoos were banded, measured (after Sechrist et al. 2009), and fitted with an archival light-level geolocator (model Mk 14-S at 1.5 g, British Antarctic Survey
[BAS], Cambridge, England; Figure 1). We determined the birds’ breeding status by the presence of a brood patch or palpation of eggs. We attached the geolocators with a Rappole and Tipton (1991) leg-loop harness, scaling the loop’s size to the bird’s mass (Naef-Daenzer 2007); geolocators averaged 2.5% of the bird’s mass at capture. With the instrument attached, the birds were released at their sites of capture, then in 2010 we revisited these sites—and nearby areas where surveys had detected cuckoos—in an effort to recapture them. Yellow-billed Cuckoos have large home ranges, averaging 52–62 ha (Halterman 2009, Sechrist et al. 2009; 95% fixed-kernel home range), and their detectability is low (approximately 32% in tape-playback surveys; Halterman 2009). Despite intensive efforts, we recaptured only 1 of 13 birds (8%). This seemingly low rate is, however, comparable to the 10% (5 of 52 marked birds) rate of site fidelity Halterman (2009) reported from a long-term study in Arizona of cuckoos that were banded but did not carry geolocators. Furthermore, we saw no indication of lower-than-normal return rates due to effects of the geolocators (Bowlin et al. 2010).

We used the BASTrak (BAS) suite of software and a standard method (e.g., Heckscher et al. 2011) of analysis of the geolocator data, a single-threshold technique, which equates a certain sun elevation with a certain light level. We calibrated the retrieved geolocator under an open sky, and the comparison of the open calibration data with the known site of deployment indicated the data points were shifted south by approximately 3° (J. Fox pers. comm.); this shift is likely due to heavy shading consistent with the riparian overstory along the middle Rio Grande and, presumably, the

Figure 1. Yellow-billed Cuckoo with geolocator attached.
bird’s habitats in migration and winter. We corrected for the heavy vegetation shading in BASTrack by selecting a light-level threshold value of 2, corresponding to a solar elevation angle of $-4^\circ$. After this correction, we assigned confidence levels to the data on the basis of an equinox timeline (confidence values decreasing as the date approaches the equinoxes, when
day and night are of equal length at all latitudes) and obviously anomalous
transitions (e.g., a lower confidence value if points were more than 80 km
from land); only data with confidence values of 9 (on a scale of 0 to 9) were
used. The accuracy of geolocators is generally estimated at ±150 km, but it
varies depending on the proximity to solstices and equinoxes, with periods
around the autumnal and vernal equinoxes providing poor resolution (Fu-
dickar et al. 2011). Therefore, we excluded from our analysis latitude data
within 15 days of the equinoxes (Hill 1994).

We then calculated migration routes and wintering areas from the post-
processed BASTrak latitude and longitude data. We applied a conservative
200-km buffer or “area of potential uncertainty” to all calculated positions
in order to accommodate known error associated with calculation of posi-
tions from geolocator data (see Phillips et al. 2004, Bächler et al. 2010,
Fudickar et al. 2011). We smoothed the tracks by means of a polynomial
approximation with an exponential kernel-smoothing algorithm with a 300-
m tolerance in ArcGIS (ESRI, Inc.). Then we used these buffered tracks to
visually assist in the interpretation of movement patterns, migration routes,
and approximate area of error. Range and migration routes were shaded
and delineated on the basis of the date stamp.

RESULTS

We retrieved the lone geolocator from a female cuckoo on 2 July 2010,
approximately 1.4 km from the site of its initial capture on 31 July 2009
south of Socorro, New Mexico. The bird was healthy, vocal (before capture),
and there was no visible injury from the harness or the geolocator unit. Its
mass was barely changed, being 4% less than its 2009 weight of 60 g. We re-
moved the geolocator immediately for downloading and analysis of the data.

The geolocator’s position data may be categorized broadly by the phases
of the annual cycle (breeding, wintering, and migration; Figure 2). The total
distance from the calculated northwesternmost position in New Mexico to
the southeasternmost positions in Argentina was approximately 9500 km.
The distance from the centroid of the summer range to the centroid of the
winter range was approximately 8800 km.

Summer 2009 (31 July 2009–28 August 2009)

After the instrument was attached on 31 July 2009 the bird left the middle
Rio Grande on or about 20 August 2009 and entered Mexico, moving
through the states of Chihuahua and Sonora over a 7-day period. It then
returned to New Mexico, apparently using the Rio Grande prior to beginning
fall migration (Figure 2). During this period the bird moved possibly as much
as 1050 km, as estimated from the greatest straight-line distance between
locations during this period.

Fall 2009 (28 August–12 November 2009)

The cuckoo began fall migration by moving from New Mexico east into
Texas on 28 August 2009 (Figure 2). It may have followed the Canadian
River to the Brazos or portions of the Colorado River while traveling through
Texas to reach the Caribbean slope of Mexico in early September. In Mexico,
before the equinox, it visited the states of Nuevo Leon, San Luis Potosi, Tamaulipas, and possibly Tlaxcala. After the equinox (early October) it moved through the Mexican states of Queretaro, Hidalgo, and Guerrero. It then traveled through Central America and arrived in northern Colombia on or about 18 October 2009. By mid-November, the bird had traveled south along the east side of the Andes through central Colombia, northeastern Peru, western Brazil, and western Bolivia (Figure 2). The overall estimated maximum distance traveled during fall migration was 7250 km. The minimum estimated migration rate (maximum distance traversed divided by estimated numbers of travel days) was 94 km/day.


The cuckoo spent more than 5 months in a winter range that encompassed parts of Bolivia, Brazil, Paraguay, and Argentina (Figure 2). The estimated maximum distance it traveled during this period was 1050 km.

Spring 2010 (27 April–14 June 2010)

The cuckoo’s spring migration apparently began in Bolivia but generally passed to the east of the fall route. The bird moved through western Brazil and eastern Colombia, then reached central Venezuela by mid-May. It apparently island-hopped through the eastern Caribbean, traveling north from Trinidad and just west of the Lesser Antilles, then west through Haiti, Jamaica, and the Cayman Islands (Figure 2). It apparently arrived at the Mexican state of Yucatan on 1 June 2010, then within 5 days began migrating north through Veracruz (Figure 2). It entered southwestern Texas on or about 10 June 2010 and apparently followed the Pecos River to New Mexico. It may have briefly used the Canadian River and its tributaries to reach the upper and middle Rio Grande by mid-June. The estimated overall maximum distance traveled during spring migration was 7750 km during 49 days of migration, for an estimated minimum migration rate of 158 km/day.

Summer 2010 (14 June–2 July 2010)

The cuckoo did not immediately establish a territory upon arriving at the middle Rio Grande; instead, it appears to have traveled through New Mexico into the Mexican state of Chihuahua—possibly along the Conchos River or its tributaries—over 9 days (22 June–30 June, Figure 2). The bird returned to New Mexico on or about 30 June 2010 and was recaptured on the middle Rio Grande 2 July 2010, only 1.4 km from the location of its initial capture in 2010. Overall estimated distance traveled between 14 June and 2 July was 1000 km.

DISCUSSION

Our results, albeit from one individual, hint at a flexible migration strategy and have broad implications for the ecology and conservation of the cuckoo. Western populations of the Yellow-billed Cuckoo are in decline (Laymon and Halterman 1987, Hughes 1999, Laymon 2000). Efforts to monitor breeding populations at several western sites are continuing, but these studies provide data relevant to only the reproductive portion of the species’ life cycle. The use
of geolocators to monitor migration routes, to identify the location of stopover sites and winter ranges, and to measure the length of stopover has obvious and immediate utility for the management and conservation of this species and other migrants (Rodriguez et al. 2009, Stutchbury et al. 2009, Bächler et al. 2010). Although geolocators can provide only a broad picture of location and habitat use because of the error currently associated with this method (Fudiclar et al. 2011), the broad-scale geographic information that our recaptured cuckoo provided raises some interesting questions that we think deserve further study.

Subspecific Differences in Migration Routes and Winter Ranges?

The extent to which the two subspecies of the Yellow-billed Cuckoo use the same migration corridors, or whether their winter ranges overlap, is unclear. Hughes (1999) and Laymon (2000) speculated that the eastern and western subspecies have distinctive, discrete migratory routes and winter ranges with the southward migration of the western subspecies passing along the Pacific slope of western Mexico and Central America to a winter range in northwestern Costa Rica, southern Panama, and along the west slope of the Andes in Columbia, Ecuador, and possibly Peru. In contrast, they suggested the southward migration of the eastern subspecies (C. a. americanus) to pass through the islands of the Caribbean south through northeastern South America to a winter range east of the Andes from Venezuela, Guyana, and Surinam south to southern Brazil, Paraguay, Uruguay, and northern Argentina. Additionally, Hughes (1999) compiled evidence that migrants on Caribbean islands are primarily C. a. americanus, in both spring and fall. Despite our cuckoo breeding on the middle Rio Grande (as attested by a brood patch in both years) within the putative range of C. a. occidentalis, its migration pattern (Figure 2) suggested that of C. a. americanus since it wintered south of the Amazon Basin and used a Caribbean route north in the spring. Clearly more study is needed to reveal whether this one individual’s migratory path reflects that of the western subspecies; nonetheless, its route suggests a migration strategy more complex than previously understood.

Significance of the Breeding-Range Movements into Mexico?

In the summer of both 2009 and 2010 the cuckoo moved from its presumed site of breeding in New Mexico south about 1000 km into Mexico before returning north to New Mexico. This movement appears to be real and directed, as it far exceeds the geolocator’s position error of 150–200 km (Fudiclar et al. 2011). We can think of several possible explanations for such movement. The first, described by Rohwer et al. (2009) as “migratory double breeding,” involves birds that breed in the United States and then, after their first round of breeding, migrate long distances south, where they breed a second time. The Yellow-billed Cuckoo was one of several species Rohwer et al. (2009) suggested to have such a strategy. In 2009 our cuckoo flew south into Mexico near the end of the period in which it is considered resident in central New Mexico (Hunter et al. 1985, Sechrist et al. 2009) and spent 7 days (20–26 August) in Chihuahua and Sonora before returning to New Mexico to begin fall migration. On 14 June 2010, it returned to its site of breeding in 2009 but a week later flew south back into Chihuahua, where it resided for about a week before returning north to New Mexico on or about 30 June.
Although we do not believe this female remained in northern Mexico long enough for double breeding in either year (assuming a 17-day nesting cycle, Hughes 1999), we cannot discount the possibility that directed movement of this type may facilitate a double breeding by some individuals in some years.

Another possible explanation for this unusual movement may be related to molt migration, that is, the movement of birds from more northern parts of North America into northern Mexico to avail themselves of the seasonal flush of vegetation and arthropods associated with the monsoon season (Pyle et al. 2009). Our bird obviously could not have molted in the short periods it was away from its site of breeding area, and the Yellow-billed Cuckoo’s prebasic molt is not reported to begin until September (Hughes 1999). It could, however, have used these flights to prospect for suitable habitat and conditions where it could undergo molt at the appropriate time.

Finally, the Yellow-billed Cuckoo is suspected of engaging in both intra- and interspecific brood parasitism, especially during times of abundant food (Nolan and Thompson 1975, Fleischer et al. 1985, Hughes 1999). Nolan and Thompson (1975) speculated that it may parasitize occasionally as an evolutionary mechanism that permits very quick exploitation of sporadically abundant food. Prospecting for such ephemeral resources, coupled with a flexible reproductive strategy in the form of facultative brood parasitism, could favor movements over large areas to identify areas of seasonally or locally abundant food.

The limited information we have, while not supporting a cause for any one scenario, does indicate a connection between cuckoos occurring on the middle Rio Grande in New Mexico and those in the Mexican states of Chihuahua and Sonora. But clearly more information is needed for an understanding of the significance of this connection and its implications for the conservation of the western population of the species.

ACKNOWLEDGMENTS

We are grateful to James Fox with British Antarctic Survey for his assistance and advice with this study. We thank the Bureau of Reclamation’s Research and Development Program, the Albuquerque Area Office, and U.S. Geological Survey for their funding contributions. We extend a large measure of gratitude to Murrelet Halterman for techniques and advice on netting, which helped make this study possible. Special thanks to Justice Morath and Claire Hansen for their dedication and field expertise. Finally, we thank Seth Kennedy and Durel Carstensen for their assistance. Earlier versions of the manuscript benefited from comments by P. Banko, R. Gill, T. Pratt, and N. Senner. The use of trade names in this paper does not constitute endorsement of the product by the U.S. government.

LITERATURE CITED


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IRRUVPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES TO SOUTHWESTERN IDAHO

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ABSTRACT: I document irruptive movements of the Chestnut-backed Chickadee to Lucky Peak in southwestern Idaho, over 80 km from its regular range. Chestnut-backed Chickadees were captured and/or observed at Lucky Peak in 2000, 2004, and 2008. To evaluate the context for this phenomenon, I also examined data on capture of all chickadees and other irruptive species at Lucky Peak and numbers of irruptive species recorded on Idaho Christmas Bird Counts (CBC) from 1997 to 2011. Though CBCs in the winter of 2004–05 (following the largest movement of Chestnut-backed Chickadees at Lucky Peak in fall 2004) found high numbers of many irruptive species, relatively low numbers of Chestnut-backed Chickadees were detected on Idaho CBCs that winter. Overall, I observed little correspondence between capture totals at Lucky Peak and Idaho CBC data for potentially irruptive species in general, and little correspondence between years with Chestnut-backed Chickadees and patterns of any irruptive species in CBC data for the the subsequent winter. The seasonal movement patterns of this species, their regularity, and their causes warrant greater attention.

Several North American chickadees including the Black-capped (Poecile atricapillus), Boreal (P. hudsonicus), and Mountain (P. gambelli) engage in some level of regular and/or irruptive migration (Ficken et al. 1996, McCallum et al. 1999, Foote et al. 2010), a trait also shared by numerous Old World relatives (van Balen and Hage 1989, Heldbjerg and Karlsson 1997). The Chestnut-backed Chickadee (P. rufescens) is a permanent resident of western North America, primarily in the states/provinces adjacent to the Pacific Ocean (from Alaska to California), but it also occurs in the interior, including southeastern British Columbia, northern Idaho, and western Montana (Dahlsten et al. 2002). It makes short-distance, especially elevational, movements within or close to its regular range in British Columbia, Montana, and Oregon, and irregular post-breeding dispersal has been documented to northern British Columbia, southwestern Alberta, and southern California (Grinnell and Miller 1944, Dahlsten et al. 2002, D. Casey and P. Hendricks, pers. comm.). Longer-distance movements are undocumented. Here I provide evidence for rare but regular movements in Idaho to at least 80 km (mostly well over 150 km) from the nearest point where the species is resident.

METHODS

Since 1997, the Idaho Bird Observatory has operated a banding station in fall migration at Lucky Peak (1845 m; 43.605° N, 116.061° W), along a forested ridgeline near the edge of the Snake River Plain in southwestern Idaho (details in Carlisle et al. 2004, 2005, 2006). Three distinct habitat types occur in a mosaic at Lucky Peak: dry coniferous forest dominated by Douglas-fir (Pseudotsuga menziesii), mountain deciduous shrubland dominated by bitter cherry (Prunus emarginata), and shrubsteppe dominated by sagebrush (Artemisia tridentata). The date on which operation of the station
started advanced during the first few years from mid-August to late July but was standardized at mid-July in 2000; capture and banding have continued through October 15 in all years. Weather allowing, station’s crew captured birds each day from sunrise for 5 hours by using ten 12-m nets placed in the deciduous shrubs adjacent to conifer forest and shrubsteppe. We identified all captured birds to species, age, and sex (Pyle 1997) and fitted each with individually numbered U.S. Geological Survey aluminum leg bands. We also recorded the date, time, and numerous measurements of each bird captured.

Each morning the crew recorded approximate numbers of all bird species observed at the study site. The combination of intensive capture and banding with careful observation on a daily basis has provided a thorough record of bird occurrence at the site.

I examined the patterns of observation and capture of the Chestnut-backed Chickadee at Lucky Peak from 1997 to 2010 in the context of closely related species and other irruptive species. Also, because fall migration of irruptive species might be reflected in Christmas Bird Count (CBC) data and CBC data provide an independent dataset for exploring such questions, I looked at Idaho CBC data for the corresponding winters to determine if similar patterns emerged. Thus datasets used for comparison included (1) patterns of capture of the Black-capped and Mountain chickadees, Red-breasted Nuthatch (Sitta canadensis), Brown Creeper (Certhia americana), and Pine Siskin (Carduelis pinus) at Lucky Peak and (2) CBC data for Idaho covering the winters from 1997–98 to 2010–11 for a suite of species that also show some irruptive tendencies (National Audubon Society 2011).

Figure 1. Chestnut-backed Chickadee captured at Lucky Peak, Ada County, Idaho, 7 October 2004.

Photo by Patrick Kolar
IRRUPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES

Table 1 Specific Dates of Capture and Detection of the Chestnut-backed Chickadee at Lucky Peak, Idaho

<table>
<thead>
<tr>
<th>Year and date</th>
<th>Captured</th>
<th>Observed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 Sep</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Sep</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1 Oct</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3 Oct</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5 Oct</td>
<td>0</td>
<td>3</td>
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<tr>
<td>6 Oct</td>
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<td>8 Oct</td>
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</tr>
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<td>29 Sep</td>
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<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

*This flock of seven individuals was observed by the hawk-migration team but the exact date was not recorded.

RESULTS

We captured and/or detected Chestnut-backed Chickadees only in 2000, 2004, and 2008 (Table 1). The first was captured 25 September 2000, the only Chestnut-backed detected at the site that year. We detected a flock of at least three Chestnut-backed Chickadees on 30 September 2004, beginning a 2-week period during which the species was detected and/or captured on 10 out of 14 days, including three individuals captured and banded (Figure 1) and 19 other observations (Table 1). In addition, the raptor-count team, who did not routinely record passerines, observed a flock of seven individuals calling and taking off from the tree tops and flying south in early October 2004 (G. Papp pers. comm.; Table 1). The next observation was of a bird heard and seen by multiple observers on 29 September 2008. Thus all Chestnut-backed Chickadees were captured or observed at four-year intervals (coincidentally, in leap years): 2000, 2004, and 2008 (Table 1). Three of four captured birds were aged with certainty as hatch-year birds, and the fourth (in 2004) was also suspected to be a hatch-year bird (skull pneumatized but mouth lining suggested an immature) but recorded as of unknown age.

Numbers of both the Black-capped (range 2–66 captured per season) and Mountain Chickadees (range 15–206) have varied substantially over the 14-year study period (Figure 2). Although the highest number of Black-capped Chickadees was recorded in 2000, when one Chestnut-backed was captured, the two other years in which Chestnut-backed Chickadees occurred at the site had among the lowest seasonal totals for both other chickadees.
IRRUPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES

(Figure 2), suggesting that whatever factor was responsible for Chestnut-backed Chickadee movements was not acting simultaneously on the other chickadee species captured at Lucky Peak. On the other hand, the total of Pine Siskins captured was highest in 2004, and we also captured more Red-breasted Nuthatches than normal in 2004 (Figure 2). Thus two other irruptive species dependent on coniferous forests moved to Lucky Peak in higher than normal numbers the same year that we saw the highest numbers of Chestnut-backed Chickadees.

During the 2000–01 CBC, following our first capture of a Chestnut-backed Chickadee in September 2000, several species were recorded in Idaho in above average numbers. These included the Black-capped Chickadee, Mountain Chickadee, Red-breasted Nuthatch, Pine Siskin, Red Crossbill (*Loxia curvirostra*), and Evening Grosbeak (*Coccothraustes vespertinus*), but only for the Evening Grosbeak was this the highest count of the study period (Figures 3 and 4). Interestingly, in the winter of 2004–05 (following the biggest movement of Chestnut-backed Chickadees at Lucky Peak in fall 2004) CBC numbers were high for many irruptive species, including the Black-capped and Mountain chickadees, Red-breasted Nuthatch, Brown Creeper, Bohemian Waxwing (*Bombycilla garrulus*), Pine Siskin, and Red

IRRUPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES

Figure 3. Christmas Bird Counts (birds counted per party-hour of effort) for winters of 1997–98 to 2010–11 for potentially irruptive species that are also captured at Lucky Peak. Species codes: BCCH, Black-capped Chickadee; MOCH, Mountain Chickadee; CBCH, Chestnut-backed Chickadee; RBNU, Red-breasted Nuthatch; BRCR, Brown Creeper; PISI, Pine Siskin.

Crossbill, but relatively low for the Chestnut-backed Chickadee! In the winter of 2008–09 CBC totals were relatively high for the Pine Siskin but relatively low for other irruptive species.

I observed little correspondence between capture totals at Lucky Peak and Idaho CBC data for potentially irruptive species in general, and little correspondence between years with Chestnut-backed Chickadees and patterns of any irruptive species in the subsequent year’s CBC data for Idaho. Indeed, the patterns of Chestnut-backed Chickadee capture at Lucky Peak did not match with CBC data for that species.

DISCUSSION

Though more common in wet forests farther north in Idaho, Chestnut-backed Chickadees are known to be resident as far south as the McCall/Cascade/Smith’s Ferry area of Valley and Adams counties of west-central Idaho (Svingen and Dumroese 1997, Sturts and Sturts 2011, D. Trochlell pers. comm.). Thus Lucky Peak sits approximately 80 km south of the nearest documented range of the species and well over 150 km from higher-density populations farther north. The records at Lucky Peak are the southernmost for the species in the state and in the interior West, as there are no records farther south in Idaho nor from Utah or Nevada (Nevada Bird Records Committee 2011, Utah Bird Records Committee 2011). The
IRRUPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES

Figure 4. Christmas Bird Counts (birds counted per party-hour of effort) for winters of 1997–98 to 2010–11 for potentially irruptive species that are rarely or never captured at Lucky Peak. Species codes: BOWA, Bohemian Waxwing; PIGR, Pine Grosbeak; RECR, Red Crossbill; WWCR, White-winged Crossbill (*Loxia leucoptera*); EVGR, Evening Grosbeak.

only other out-of-range report for Idaho comes from the town of Salmon in December 1984 (also a leap year) (Sturts and Sturts 2011).

The Chestnut-backed Chickadee’s pattern of occurrence at Lucky Peak raises several important questions: (1) Why were these chickadees moving so far from their permanent range? (2) Why have we only documented this every four years? (3) Why were Chestnut-backed Chickadee movements not strongly related to movements of other species? (4) Why was there so little apparent correlation between migration data and CBC data?

The Chestnut-backed Chickadee’s pattern of regular movement every four years was not seen for any irruptive species at Lucky Peak or in Idaho CBC data for corresponding years. There are several plausible reasons why its fall movements detected at Lucky Peak were apparently not correlated with CBC data or movements of other irruptive species; these include diet differences by species, the distance from the study site to the source of dispersing chickadees, and habitat differences between CBC locations and ideal habitat for Chestnut-backed Chickadees.

Patterns of irruption can vary dramatically by species, from irregular and unpredictable to regular with reasonably consistent intervals (e.g., Bock and Leptien 1976, Koenig and Knops 2001). With CBC data, Koenig and Knops (2001) showed that irruptions of many species are correlated with large crops of conifer seeds in the year prior to irruption (likely leading to high winter survivorship and increased population size) followed by a
substantially lower seed crop during the irruption year. They also found that weather variables had no significant relationship with irruptive movements. Among the chickadees and tits, most evidence suggests that a combination of population density and food scarcity drives irruptions (van Balen and Hage 1989, Ficken et al. 1996, Heldbjerg and Karlsson 1997, McCallum et al. 1999, Koenig and Knops 2001, Foote et al. 2010).

Though one might expect migration data and CBC data to match up within a given year and across years, the relationship might not be so straightforward for all species. In the case of conifer-reliant species, it could be that a site like Lucky Peak (with conifer forest dominated by Douglas-fir) provides more habitat for Chestnut-backed Chickadees than do CBCs centered at lower elevations more accessible to surveyors in winter. Also, irruptive migrants occurring during fall migration might not necessarily remain until the CBC season in December and January. In the case of the Chestnut-backed Chickadee, one could imagine a bird undertaking long-range dispersal in September and/or October, only to perish or return to an area closer to the breeding range before mid-December. Another possibility is that survey effort during a CBC, especially in a state with relatively few birders like Idaho, is not of the same intensity as the daily coverage at a site of focused study of migration like Lucky Peak.

It is possible that various species' differences in diet might result in each species responding independently to different environmental cues. Importantly, we have very little information on what tree species' seeds the Chestnut-backed Chickadee relies upon (Dahlsten et al. 2002). Also, the U.S. Forest Service's Northern Region, which includes most of the Chestnut-backed Chickadee's range in Idaho, does not track cone crops on an annual basis; instead, it tracks years with especially good crops and for commercial species only (G. Scott pers. comm.). Thus I was unable to assess whether or not cone crops in the region were correlated with movements of chickadees.

Another important difference between the Chestnut-backed Chickadee and other irruptive species is the extent of its range. Because other irruptive species like the nuthatches, creeper, and other chickadees all have more extensive ranges, irruptions or dispersal could originate from multiple populations across the range at different times (e.g., LeBaron 1999). But, because Chestnut-backed Chickadees observed at Lucky Peak almost certainly originate from northern Idaho or western Montana, a more restricted range with more similarity in environmental variables at any given time, we might expect a lower potential for irruption, and therefore fewer incursions, in this species than in others.

Finally, we cannot be certain that the pattern we observed in our somewhat limited data set accurately reflects a pattern of periodic movement. One possibility is that Lucky Peak is too far from the permanent range for us to detect shorter-distance or more frequent movements. There may be annual or biennial shorter-distance movements to areas within a few kilometers of the permanent range that go unobserved because of a lack of observers and/or long-term research sites. For example, D. Trochell (pers. comm.) has observed the Chestnut-backed Chickadee during fall and winter for three consecutive years at a site near La Grande, Oregon, at least several kilometers from the known breeding range. Also, periodic downslope move-
IRRUPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES

Movements into western valleys of Montana have been observed (D. Casey and P. Hendricks pers. comm.), consistent with evidence in Grinnell and Miller (1944) and Dahlsten et al. (2002) for regular short-distance movements. Such movements might relate to changes within the permanent range, maybe especially breeding areas, but whether fire, mast crops, or other unknown causes are involved is unclear.

While the cause(s) of the longer-distance movements to a site like Lucky Peak remain(s) uncertain, our data provide evidence for a regular, if irruptive, pattern of Chestnut-backed Chickadees moving in Idaho to over 80 km from their permanent range. The species’ seasonal movement patterns, their regularity, and their causes warrant greater attention.

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LITERATURE CITED

IRRUPTIVE MIGRATION OF CHESTNUT-BACKED CHICKADEES


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FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS AT A POST-BREEDING ROOST

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ABSTRACT: We sought to determine how disturbance may influence the behavior of California Brown Pelicans (Pelecanus occidentalis californicus) at a major post-breeding roost. In addition to assessing the effects of natural and anthropogenic disturbance on Brown Pelican behavior, we investigated the effects of other potential explanatory variables, including year, date, time of day, weather, tide stage, and density of pelicans on time-activity budgets of pelicans roosting on East Sand Island in the Columbia River estuary from June to August, 2001 and 2002. We found that during the day, pelicans spent the great majority of time either resting (44%) or preening (41%). Time of day, density of pelicans, wind speed, precipitation, and disturbance accounted for 34% of the variation in resting behavior among pelicans; year, date, time of day, number of pelicans, and disturbance accounted for 27% of the variation in vigilant behavior. All three categories of disturbance (natural, research-related human, other human) were associated with significant increases in the proportion of vigilant behavior and reductions in the proportion of resting behavior. It took longer for pelicans to recover to baseline behavior following a research-related disturbance than after other types of disturbance. This is likely because research-related disturbances involved human activity on the island (i.e., land-based), whereas most other human disturbances were water- or air-based. The potential exists for human disturbance to significantly alter pelican behavior at roost sites. Therefore, restriction of human access to the pelican’s major roost sites and regulation of human activities at roosts should be considered to ensure that available sites support the continued recovery of this subspecies.

Physiological condition has been shown to limit the over-winter survival and subsequent success of breeding by some bird species (Drent and Daan 1980, Krapu 1981). Disturbance can increase energy expenditure, affecting physiological condition and the allocation of resources toward survival and reproduction (Burton and Hudson 1978, Stalmaster 1983, Morton et al. 1989). Time-activity budgets have been used to identify vulnerable stages or limiting factors in the life cycles of birds (Inglis 1977, Hickey and Titman 1983, Maxon and Pace 1992, Adams et al. 2000, Fischer and Griffin 2000). Some studies have used time-activity budgets to assess the behavioral effects of potential disturbances, particularly as they relate to higher energy expenditure for activity (Burger 1981, Bélanger and Bédard 1989, Burger and Gochfeld 1991, Steidl and Anthony 2000). Disturbance is identified as a potential threat to the California Brown Pelican (Pelecanus occidentalis californicus) in the recovery plan (Gress and Anderson 1983) for this subspecies.
In 1970, the U.S. Fish and Wildlife Service (USFWS: 35 Federal Register, 16047, 13 October 1970) listed the California Brown Pelican as endangered under the U.S. Endangered Species Act, following severe reproductive failure due to DDT contamination in the late 1960s (Schreiber and Risebrough 1972, Jehl 1973, Gress and Anderson 1983). One of the three main objectives listed in the recovery plan (Gress and Anderson 1983) is to “assure long-term protection of adequate food supplies and essential nesting, roosting and offshore habitat throughout the range.” Protection of roosting habitat will contribute to the health and conservation of this now delisted subspecies.

Several studies have investigated the effect of disturbance at Brown Pelican roosts in southern California by measuring the number and frequency of instances of flushing, distances at which the birds flush, and the fate of flushed pelicans (Jaques and Anderson 1988, Jaques et al. 1996, Jaques and Strong 2002). A study concurrent with ours examined changes in pelican numbers and distribution on East Sand Island in response to disturbance (Wright et al. 2007), but time-activity budgets for the Brown Pelican are scarce (Croll et al. 1986). No published studies have quantified the effects of various types of potential disturbance on Brown Pelican behavior at major post-breeding roosts.

East Sand Island in the Columbia River estuary (between the states of Oregon and Washington) is now a major post-breeding roost site for the California Brown Pelican, with over 10,000 pelicans counted on the island at one time (Wright et al. 2007). The USFWS expressed concern regarding the potential effects of research-related disturbance on Brown Pelicans roosting on East Sand Island (USFWS 2001). By recording and analyzing their time-activity budgets, we sought to better understand how various types of disturbance affect the behavior of roosting pelicans.

We investigated several sources of potential disturbance of pelicans roosting on East Sand Island, including natural, research-related human, and other human disturbances. Bald Eagles (*Haliaeetus leucocephalus*) and Peregrine Falcons (*Falco peregrinus*) are two large avian predators that nest in the Columbia River estuary and frequent East Sand Island (Isaacs and Anthony 2002). Both species kill and/or scavenge waterbirds nesting on the island. Although we know of no evidence that Peregrine Falcons prey on Brown Pelicans, we observed Bald Eagles killing Double-crested Cormorants (*Phalacrocorax auritus*) on their nests and stooping on Brown Pelicans that were roosting on East Sand Island; there is at least one account of a Bald Eagle killing incubating an adult Brown Pelican in Georgia (Shields 2002). At East Sand Island, pelicans respond to both of these raptors by taking flight, although in the case of the Peregrine Falcon, the pelicans may be reacting to the alarm calls and predator-avoidance behavior of nesting gulls rather than perceiving a threat of predation.

Located just north of the main Columbia River shipping channel and between the harbors of Chinook and Ilwaco, Washington, the waters around the East Sand Island are subject to heavy traffic of recreational and commercial boats. The Columbia River estuary is also used by the U.S. Coast Guard for helicopter and boat-rescue training, and the helicopters occasionally fly low over the island. Although public access to the island is not allowed, we did observe infrequent visits by beachcombers and birdwatchers.
FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS

In addition, East Sand Island has been the site of continuing research on the colonial waterbirds that nest on the island. This research is focused on two large breeding colonies, one of the Caspian Tern (Hydroprogne caspia) and one of the Double-crested Cormorant (Roby et al. 2005b). The Caspian Tern colony is at the east end of the island, whereas the Double-crested Cormorant colony is at the west end of the island. Our plot for the pelican study was immediately adjacent to the Double-crested Cormorant colony, and hybrid Glaucous-winged x Western Gulls (Larus glaucescens x L. occidentalis) nest all around the cormorant colony and adjacent to the pelican study plot. Activities of researchers on East Sand Island occasionally disturb roosting pelicans. Human disturbance due to researchers differed from disturbance caused by other human activities in that researcher disturbance was generally land-based, whereas other human disturbances were typically water- or air-based.

We hypothesized that the magnitude of effects of disturbance on time-activity budgets should predict the relative effect of various disturbance factors on Brown Pelicans at roost sites. This assessment will prove useful in efforts by resource managers to limit and regulate significant sources of disturbance around such roosts.

METHODS

Study Area

East Sand Island (46° 15' 45" N, 123° 57' 45" W) lies 8 km east of the mouth of the Columbia River. In the 1930s, government engineers built pile dikes on the south side of the island to reduce shoreline erosion (Brooke 1942), and rip-rap consisting of large boulders was added later on the west end of the island to form a jetty pointing west (Figure 1). The island is approximately 2 km long on an east–west axis, ranges from 10 to 300 m wide, and has an area of approximately 21 ha (Figure 1).

![Figure 1](image_url)

Figure 1. East Sand Island, Columbia River estuary, showing the location of the observation tower and study plot near the west end of the island.
We recorded the behavior of pelicans in a plot on the south shore of the island that was heavily used by roosting pelicans and visible from a nearby observation blind (Figure 1) with an elevated (5 m high) vantage point. In order to access the blind without disturbing pelicans on the plot, observers were dropped off by boat on the south shore of the island near the east end. They then walked across the island to the north shore, then west along the north shore to the entrance of an above-ground tunnel system (plastic fabric draped over a wooden framework) that led to the blind (Figure 1). We accessed the tunnel entrance only within 2 hours of low tide, when the beach was widest, or at night in order to minimize the possibility of disturbing pelicans roosting on the upland portions of the island.

The study plot extended from directly to the south of the observation blind for 136 m along the shore to the west, where a large and clearly visible driftwood stump was lodged high on the beach. This long, narrow plot was bounded to the south by the water’s edge and to the north by a grassy meadow, which was not used by roosting pelicans. The plot ranged from 10 to 20 m wide, depending on tide height. We categorized pelicans on the water within 50 m of shore directly off the study plot as “swimming.”

The substrate in the study plot consisted of large piles of flotsam and jetsam (mostly wood) and rip-rap boulders. When most pelicans were resting during inclement weather, we could not see from the blind as many as 10% of the pelicans in the study plot because they were obscured from view by driftwood (based on comparisons with boat-based censuses). Using image-stabilizing binoculars, we could count the total number of pelicans in the study plot more accurately from a skiff about 150 m offshore of the plot. Consequently, we used boat-based counts of pelicans roosting in the plot to assess seasonal trends in the pelicans’ use of the plot.

Time-Activity Budgets

We recorded time-activity data for Brown Pelicans from 1 June to 9 September 2001 and 4 June to 21 August 2002. We used scan-sampling techniques (Altmann 1974) to quantify the proportion of time the pelicans spent in several categories of activity. We divided each day into two equal blocks: morning (05:30–13:29 PDT) and evening (13:30–21:30 PDT). We used a random-number table to select six blocks in each 2-week period during the field season, with either two morning blocks and one evening block the first week, and two evening blocks and one morning block the second week, or vice versa. If weather or logistics precluded scan sampling in a selected block, we scanned during the next available block. During each 8-hr block, using 10 × 50 binoculars, we recorded the activity of all the visible pelicans on the study plot every 30 min. Although scan samples are intended to be instantaneous (Altmann 1974), ours required from 15 sec to 13 min, depending on the number of pelicans roosting in the study plot. We selected 30 min as the interval between samples in an attempt to avoid serial autocorrelation (Schreiber 1977). Using sketches from Schreiber (1977) as a reference, we categorized pelican activity as follows: (1) active (i.e., walking, agonistic behavior, stretching, picking up sticks, mounting), (2) vigilant (i.e., standing and alert, neck extended), (3) preening (i.e., plumage
FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS

maintenance), (4) resting (i.e., sitting or standing with neck not extended, not alert), (5) startled (i.e., standing, wings raised or flapping, flight-intention movements), or (6) swimming (i.e., in water within 50 m of study plot).

Before each scan, we recorded temperature (°C), percent cloud cover (increments of 5%), wind direction (in degrees, converted to Cartesian coordinates), wind speed (Beaufort scale), and precipitation (on a scale from 0 to 7, ranging from no rain to steady heavy rain). We used these variables as covariates in the analyses in order to account for variability in the data due to weather conditions.

Disturbance Monitoring

Within each 8-hr time block we monitored disturbance of the pelicans on the study plot between sunrise and civil evening twilight (approximately 40 min after sunset). We recorded the times of the start and end of all observations of potential disturbances. We defined a disturbance as any event when one or more pelicans were flushed from the study plot. When a disturbance caused pelicans to flush, we recorded the date, time of day (PDT), cause of disturbance (if discernible), and whether or not the disturbance occurred during a scan sample of pelican activity.

Statistical Analyses

We used S-Plus to run multiple linear regression to determine which variables predicted the time-activity budgets of pelicans on the study plot. In these analyses, we selected the two activity categories “resting” and “vigilant” as the response variables because they were common activities that we observed to change in response to disturbance. Vigilant behavior was sometimes a precursor to flushing from the roost, whereas resting was the most relaxed and least vigilant activity that we recorded. We included the following variables in the selection of factors potentially influencing the proportions of resting and vigilant pelicans: year, date, time of day (PDT), number of pelicans in the study plot, wind direction, wind speed, temperature, percent cloud cover, precipitation, tide height (meters of water from mean low tide), tide speed (tide data from the NOAA tide gauge at Tongue Point, Oregon, 46° 11' N, 123° 46' W, 17 km up-river from East Sand Island), time since last disturbance when one or more pelicans flushed from the study plot, and magnitude of response (defined as the proportion of pelicans in the study plot that flushed in response to a disturbance).

In addition, when determining the best model, we considered quadratic functions of explanatory variables and interactions between these variables because we expected some variables, such as time of day, to have a significant nonlinear effect on pelican behavior. The explanatory variables were not strongly correlated (r > 0.4). We used stepwise removal of nonsignificant variables (P > 0.05) to identify variables that explained a significant proportion of the variation in the proportion of pelicans in the plot that were resting or vigilant.

To meet the assumptions of parametric statistical tests, the response variables (proportions of pelicans on the plot) were logit transformed (log(Y/ (1 – Y))). Because of the many zero values in the response variables, to avoid
zero in the denominator or numerator of the logit-transformed values, we added 0.5 times the minimum nonzero value to the response variable. In an effort to avoid undue influence from single birds on the results, we excluded from analyses scans during which fewer than 10 pelicans were on the study plot. We examined graphs of residuals to ensure that autocorrelation or a lack of independence in the data did not confound the results (Ramsey and Schafer 1997).

We used odds ratios to compare the proportion of vigilant pelicans in 2001 and 2002. Multiple-regression models of logit-transformed response variables tend to exaggerate predicted odds ratios greater than 2.5 or less than 0.5 (Hosmer and Lemeshow 2000). We present means from actual data (not accounting for other variables) to document changes in behavior when we thought this exaggeration might occur. We also used odds ratios to compare pelican response to the type of disturbance.

To determine if there were immediate effects of disturbance on pelican behavior we compared the proportion of resting or vigilant pelicans in the study plot in the first 30-min scan following a disturbance to the overall mean proportion of resting or vigilant pelicans. We evaluated the recovery times for each disturbance category separately to determine whether the three types of disturbance affected pelican behavior differently. We treated each disturbance to pelicans in the study plot as an independent event and examined pelican behavior over time following the disturbance by using the estimated slope of the linear trendline fit to the scan data. We weighted each event by the number of scans we made following the disturbance and discarded from the analysis disturbances followed by fewer than two behavior scans. We were concerned that the analysis might fail to detect small differences in pelican behavior caused by disturbance, so we set the level of significance at $\alpha = 0.10$ in order to avoid type II statistical errors.

RESULTS

Number of Pelicans on the Plot

The mean number of pelicans on the study plot during boat-based censuses was 110 (SD = 48, $n = 41$) in 2001 and 202 (SD = 94, $n = 35$) in 2002. The average number of pelicans on the plot from June to August of 2002 was consistently higher than during the same period in 2001, regardless of time of day (Figure 2). The number of pelicans on the plot was lowest during early morning, increased until late morning, and declined again in late afternoon (Figure 2). In general, the number of pelicans roosting on East Sand Island increased through each summer of the study.

Time-Activity Budgets

In 2001 we recorded 522 scans of pelicans on the study plot, with 10–197 pelicans/scan (mean = 68 pelicans); in 2002 we recorded 455 scans, with 10–273 pelicans/scan (mean = 118 pelicans). The time-activity budgets of pelicans roosting in the study plot in the two years were similar (Table 1), although the proportion of vigilant pelicans was significantly greater in 2001. In both years resting and preening were the two most prevalent activities.
FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS

Figure 2. Mean number of pelicans roosting during daylight in the study plot on East Sand Island during 2001 and 2002.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>11.5%</td>
<td>11.1%</td>
</tr>
<tr>
<td>SE</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>( P_{\text{adj}} )</td>
<td>0.4955</td>
<td>0.4955</td>
</tr>
<tr>
<td>Vigilant</td>
<td>3.5%</td>
<td>2.4%</td>
</tr>
<tr>
<td>SE</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>( P )</td>
<td></td>
<td>0.0001</td>
</tr>
<tr>
<td>Preening</td>
<td>40.9%</td>
<td>40.4%</td>
</tr>
<tr>
<td>SE</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>( P )</td>
<td></td>
<td>0.6266</td>
</tr>
<tr>
<td>Resting</td>
<td>43.1%</td>
<td>45.0%</td>
</tr>
<tr>
<td>SE</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>( P )</td>
<td></td>
<td>0.1376</td>
</tr>
<tr>
<td>Startled</td>
<td>0.00032%</td>
<td>0.000025%</td>
</tr>
<tr>
<td>SE</td>
<td>0.00011</td>
<td>0.000025</td>
</tr>
<tr>
<td>( P )</td>
<td></td>
<td>0.0578</td>
</tr>
<tr>
<td>Swimming</td>
<td>1.0%</td>
<td>1.2%</td>
</tr>
<tr>
<td>SE</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>( P )</td>
<td></td>
<td>0.2893</td>
</tr>
</tbody>
</table>

*Based on two-sample t-tests for differences between years. Significant difference (\( P \leq 0.05 \)) highlighted in **bold**.
FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS

of pelicans roosting in the study plot (Figure 3). We recorded the behavior "startled" infrequently (Table 1) so eliminated it from further analysis.

Resting and preening were strongly correlated \( r = -0.84 \), making it difficult to separate effects of disturbance on time-activity budgets from a change in the proportion of pelicans engaged in other activities. The proportions of resting and vigilant pelicans were not strongly correlated \( r = -0.30 \) and clearly reflected whether pelicans were relaxed or alert, so we used these two activities as response variables in analyses of the effects of disturbance on time-activity budgets.

Factors Affecting Time-Activity Budgets

Brown Pelicans in the study plot at East Sand Island spent on average 44% (95% confidence interval [CI]: 42% to 46%) of the day resting. Approximately 33% of the variation in the proportion of resting pelicans was explained by time of day, number of pelicans on the plot, wind speed, precipitation, disturbance from research, other human disturbance, and natural disturbance \( F_{8,887} = 55.56, P < 0.0001 \). The proportion of resting pelicans was positively associated with wind speed \( r = 0.22, P < 0.0001 \) and increased by a factor of 1.22 (95% CI: 1.15 to 1.33) with each 10-knot increase in wind speed. The proportion of resting pelicans was also positively associated with precipitation \( r = 0.94, P < 0.0001 \) and increased by a factor of 1.51 (95% 

![Figure 3](image-url). The average proportion of time Brown Pelicans engaged in the top five categories of behavior in the study plot at East Sand Island during 2001 and 2002. The behavior "startled" accounted for <1% of time.
FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS

Cl: 1.41 to 1.61) with each incremental increase in precipitation intensity. Thus the pelicans spent more time resting during inclement weather. The ambient temperatures during this study ranged from 7.2 °C to 28.9 °C, with a mean of 16 °C; however, temperature did not significantly affect the proportion of resting pelicans ($r = 0.09$, $P = 0.9689$). The proportion of resting pelicans was negatively associated with the number of pelicans on the plot ($r = -0.12$, $P < 0.0001$) and decreased by a factor of 1.13 (95% CI: 1.01 to 1.25) with an increase of 100 pelicans. The proportion of resting pelicans increased from early morning (05:30 PDT) to midday (11:30–13:00 PDT; $P < 0.0001$), then decreased late in the evening ($P < 0.0001$).

Pelicans roosting on East Sand Island spent on average 3.5% (95% CI: 3.1 to 3.9) of the day vigilant in 2001 and 2.4% (95% CI: 2.0 to 2.8) of the day vigilant in 2002, a significant decrease from 2001 to 2002 ($t = 3.8; P = 0.0001$; Table 1). The odds of a pelican being vigilant in 2002 decreased by a factor of 2.05 (95% CI: 1.74 to 2.42) from those in 2001. Year, date, time of day, number of pelicans on the study plot, research-activity disturbance, other human disturbance, and natural disturbance together accounted for 27% of the variation in proportion of vigilant pelicans ($F_{9, 893} = 36.71$, $P < 0.0001$).

Unlike the proportion of pelicans resting, the proportion of pelicans vigilant was not related to any of the measured weather variables. The prevalence of vigilant pelicans increased slightly with date ($r = 0.19$, $P < 0.0001$). The proportion of vigilant pelicans was positively influenced ($r = 0.32$, $P < 0.0001$) by the number of pelicans in the study plot. The proportion of vigilant pelicans increased by a factor of 1.71 (95% CI: 1.45 to 2.01) with an increase of 100 pelicans in the study plot. The proportion of vigilant pelicans decreased from early morning (05:30 PDT) to midday (11:30–13:00 PDT; $P < 0.0001$), then increased through the evening ($P < 0.0001$).

Disturbances to Pelicans on the Plot

During behavioral observations, natural factors disturbed pelicans roosting in the study plot (17 instances) more frequently than did research (4 instances) or human activity not related to research (6 instances). Research-related disturbances flushed 9.9% (median) of the pelicans in the study plot per disturbance (range 2–56%, $n = 4$). Human disturbances not associated with research flushed 5.3% (median) of the pelicans in the study plot (range 1–25%, $n = 6$). Natural disturbances flushed 20.5% (median) of the pelicans in the study plot per disturbance (range 1–100%, $n = 17$; Figure 4). Bald Eagles were responsible for 75% of the total number of pelicans flushed from the study plot by natural disturbances in 2001 and 2002.

Effects of Disturbance on Time-Activity Budgets

All three types of disturbance (research, nonresearch human, and natural) were associated with a significant increase in vigilant behavior ($t = 4.2, 1.9, 2.4; P = 0.015, 0.045, 0.015$, respectively) and a decrease in resting behavior ($t = -4.1, -3.2, -6.9; P = 0.015, 0.007, <0.0001$, respectively) within the 30 minutes following a disturbance. There was a clear difference in the pelicans’ responses to research disturbances and natural disturbances, with a greater proportion of pelicans vigilant and a smaller proportion of
pelicans resting immediately after research disturbances than after natural disturbances. After a research disturbance in the study plot, the ratio of vigilant pelicans to nonvigilant pelicans was 6.9 times greater (Tukey-Kramer; 95% CI: 1.1 to 45.4 times greater) than after a natural disturbance.

After research disturbance of pelicans, the predicted time to recover to baseline vigilant behavior was 181 min (95% CI: 79 to 283 min; Figure 5A), to baseline resting behavior, 187 min (95% CI: 134 to 241 min; Figure 5B). After disturbance from nonresearch anthropogenic factors, the predicted time to recover to baseline vigilant behavior was 57 min (95% CI: −89 to 202 min; Figure 5C), to baseline resting behavior, 132 min (95% CI: 27 to 237 min; Figure 5D). After disturbance from natural factors the predicted time to recover to baseline vigilant behavior was 28 min (95% CI: −323 to 379 min; Figure 5E), to baseline resting behavior, 82.5 min (95% CI: 34 to 131 min; Figure 5F). Thus the predicted times for pelicans to recover to baseline (average) incidence of vigilant and resting behaviors were greater for anthropogenic disturbances than for natural disturbances. Differences in recovery times were particularly pronounced for resting, for which recovery to baseline behavior was much greater for disturbances caused by research than by natural causes.

Figure 4. Proportion of pelicans on the study plot flushed per disturbance by research activities (4 instances), non-research human disturbances (6 instances), and natural factors (17 instances) during behavior observations on East Sand Island in 2001 and 2002. Lines within the box plots represent the median proportion of pelicans flushed by each disturbance type, the top and bottom edges of the box are the upper and lower quartiles, respectively, and the whiskers encompass the entire range of the data.

Disturbance Types
Figure 5. Proportion of pelicans on the study plot that were vigilant or resting during the first 3 hours after a disturbance caused by research-related activities (A, B), nonresearch human disturbance (C, D), and natural disturbance (E, F) that caused pelicans to flush from the study plot on East Sand Island in 2001 and 2002 (after other factors were accounted for). The lines in A, B, C, and F represent the average slope of the response weighted by the number of observations following each disturbance. The slopes of the response in D and E were not significant.
DISCUSSION

At the East Sand Island roost, Brown Pelicans were more active in the early morning and late evening, less active around mid-day. The proportion of resting pelicans was lowest in the morning and evening and peaked in the middle of the day. Correspondingly, the proportion of vigilant pelicans was highest in the morning and evening and lowest in the middle of the day. We interpreted this pattern as reflecting early morning departure to forage, periodic return to rest through the day, and a late afternoon increase in activity associated with the return of large numbers of pelicans to the roost for the night—a pattern consistent with past observational studies of pelican behavior. A subadult California Brown Pelican fitted with a radio transmitter was inactive (not flying) less than 10% of the time from 04:30 to 07:30 and from 16:30 to 19:30, but spent approximately half its time active and inactive from 07:30 to 16:30 (Croll et al. 1986). At a Florida boat marina Brown Pelicans roosted in large numbers during the middle of the day, but were present in only small numbers during the mornings and evenings (Herbert and Schreiber 1975), indicating that the birds foraged early in the morning and used the marina for mid-day loafing.

Disturbance poses a risk to Brown Pelicans at their roost sites by adding an energetic cost and interrupting plumage drying. Pelicans have wettable plumage that becomes waterlogged if the birds are prevented from roosting on land to dry and maintain their plumage after feeding (Rijke 1970). Brown Pelicans roosting on East Sand Island during the day spent 85% of their time either resting or preening. Similarly, in Mississippi and Louisiana King and Werner (2001) found that nonbreeding American White Pelicans (Pelecanus erythrorhynchus) spent 72 to 96% of daylight hours (06:00 to 17:30) loafing and the remainder of the day foraging. In addition, for seabirds, plunge-diving is very costly; Black-legged Kittiwakes (Rissa tridac-tyla) spend energy at a rate at least 5 times that of flapping flight (Jodice et al. 2003). Between forays to feed, pelicans may need to rest—particularly the Brown Pelican, the only pelican that plunge-dives for food (Bent 1964, Schreiber et al. 1975, Shields 2002).

Disturbance of Brown Pelicans could translate into undue stress and associated physiological displacement, as evidenced by changes in their time-activity budgets. Disturbances from research activity and natural sources led to significant declines in resting behavior and increases in vigilant behavior among pelicans on our study plot, which was consistent with our original hypothesis. A change in activity from relaxed or resting to alert or vigilant has been shown to double the energy expenditure rate of captive birds (Buttemer et al. 1986) and increase the metabolic rate of free-living American Black Ducks (Anas rubripes) by a factor of 1.45 to 1.94 (Wooley and Owen 1978). Alert behavior in response to human presence can significantly increase birds’ heart rate above levels normal for walking, preening, and resting (Ely et al. 1999). In addition, wild birds may act normally in the presence of humans, but other physiological indicators, such as heart rate, may change dramatically (Bell and Amlaner 1980, Culik et al. 1990). Changes in avian behavior due to human disturbance can also lead to increased exposure to natural predators (Keller 1991) and reduced
FACTORS AFFECTING THE BEHAVIOR OF BROWN PELICANS


The median magnitude of natural disturbances in the study plot (20.5% of pelicans flushed) was much higher than that of the two categories of human disturbance, yet its effect on pelican behavior in the half hour after disturbance was smaller than that of research disturbance. This suggests that natural disturbances, although more frequent, did not influence the time-activity budgets of pelicans as much as research (land-based human) activities. Additionally, after a natural disturbance, resting behavior recovered to baseline levels in much less time than after a research-related disturbance. At East Sand Island pelicans may be more habituated to raptors than to humans.

While there was a significant difference between research and natural disturbance, there was no significant difference between nonresearch human and natural disturbance, suggesting that pelican behavior is more affected by human activities on the island than by human activities on the water near the island. The median magnitude of nonresearch human disturbances in the study plot (5.3% of pelicans flushed) was smaller than that of research disturbances (9.9% of pelicans in the study plot flushed), which may have contributed to the effect on pelican behavior of nonresearch human disturbances being smaller. Additionally, pelicans may have been able to see or hear (i.e., through gulls’ alarm calls) nonresearch and natural disturbance factors approaching from a considerable distance. Initiation of research disturbances was typically abrupt, with researchers emerging from hidden tunnels or blinds. The sudden appearance and disappearance of researchers nearby may have resulted in pelicans remaining vigilant after the disturbance longer.

Disturbance could degrade the quality of the Brown Pelican’s roost sites and result in the birds abandoning an otherwise suitable site. Flight is the most energetically expensive activity we observed in response to disturbance (Norberg 1996, Jodice et al. 2003). Each time a pelican is flushed from a roost due to disturbance, it spends energy that requires compensation. Energy deficits in the nonbreeding season could result in a less productive breeding season.

It is difficult to determine the disturbance threshold above which the pelican’s fitness is reduced. Conomy et al. (1998) observed that waterfowl spent 1.4% of their time swimming, flying, and alert in response to human disturbance, and they concluded that this energy investment was too low to have a significant effect on fitness. Our study indicates that human disturbance at roost sites is associated with significant and potentially detrimental changes in the time-activity budgets of roosting pelicans, which might result in abandonment of roost sites and lower fitness if left unchecked. Consequently, we recommend restrictions of human activity on islands that serve as Brown Pelican roost sites for so that roost-site availability will not be a factor limiting the species’ further recovery.

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LITERATURE CITED

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FACTORs AFFECTING THE BEHAVIOR OF BROWN PELICANS


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USE OF NEST BOXES BY CACTUS WRENS IN ORANGE COUNTY, CALIFORNIA

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ABSTRACT: Responding to studies identifying an apparent lack of suitable natural nesting sites for the Cactus Wren (Campylorhynchus brunneicapillus) in coastal southern California, we designed “cactus-like” nesting structures and nest boxes (1) to determine whether this wren would use such structures or boxes and (2) to assess the efficacy of different construction designs. Out of 32 nest boxes deployed, two supported Cactus Wren nests that successfully fledged young—one in 2010 and another in a different location in 2011. In fall 2010, another box in yet a third location was used for a brood nest. In contrast, we observed no nesting in the 13 cactus-like structures over three years of study. Our results provide “proof of concept” that Cactus Wrens will select and successfully use nest boxes even in areas of mature cactus scrub. Furthermore, all three boxes used by Cactus Wrens were mounted in a tilted position, in which the nest box was angled up to 45°, rather than level. In the summer of 2011, we retrieved the artificial structures and weathering nest boxes and mounted 21 new boxes in the tilted position and with a level floor inserted to prevent eggs from falling into the bottom. We expect that this and future experiments will evaluate the potential conservation value of nest boxes for Cactus Wrens in areas recovering from wildfire and at sites of cactus restoration.

The Cactus Wren (Campylorhynchus brunneicapillus) is a resident of spinescent scrub habitats in arid and semiarid regions in the southwestern U.S. and northern Mexico (AOU 1998). Although it is common across most of its range, populations in coastal southern California and northwestern Baja California have been in steep decline in recent decades (Rea and Weaver 1990, Small 1994, Unitt 2004, 2008, Garrett et al. 2006, Mitrovich and Hamilton 2007, Clark and Dodero 2008, Leatherman Bioconsulting 2009). The causes are not fully understood but almost certainly involve multiple stressors, one of which is fire, which can destroy the nesting habitat (Rea and Weaver 1990).

Cholla (Cylindropuntia spp.) and prickly-pear (Opuntia spp.) cacti are the Cactus Wren’s primary nesting substrates on the coastal slope of southern California (Rea and Weaver 1990), a region where the frequency and scale of wildfire have been increasing in recent decades as urbanization and population density have steadily increased (Keeley and Fotheringham 2001). In the past 20 years, large fires have burned extensive tracts of cactus scrub, rendering the habitat unusable by Cactus Wrens until the cactus recovers to the meter-plus height generally required for nesting, a process that takes decades (Rea and Weaver 1990, Flaggan 1996, Mitrovich and Hamilton 2007).

Recovery strategies developed to bolster populations of imperiled species often include provision of substrates for nesting. Examples include artificial nest burrows for the Atlantic Puffin (Fratercula arctica; Kress 1977) and Burrowing Owl (Athene cunicularia; Olenick 1990), platforms for the
USE OF NEST BOXES BY CACTUS WRENS

Osprey (*Pandion haliaetus*; Poole 1989, Ewins 1994) and Great Gray Owl (*Strix nebulosa*; Nero et al. 1974), and nest boxes for the Eastern Bluebird (*Sialia sialis*; Pinkowski 1976, 1977) and Tree Swallow (*Tachycineta bicolor*; Holroyd 1975). Such an approach may prove worthwhile for the Cactus Wren, given that post-fire shortage of suitable nesting sites appears to be contributing to the species’ regional decline (Mitrovich and Hamilton 2007, Unitt 2008). We are unaware of any other efforts to develop artificial nesting substrates for this species as a conservation tool, but the literature includes a few brief references to Cactus Wrens nesting opportunistically in man-made structures (Daggett 1904, Anderson and Anderson 1957, 1973).

The goal of this study was to develop an artificial substrate that Cactus Wrens would find acceptable for nesting, which could serve a conservation purpose in areas where cactus scrub is still recovering from wildfire.

INITIAL PROTOTYPE

Our first attempt at devising an acceptable nesting substrate involved constructing two types of “artificial cactus.” One design employed loops of barbed wire wrapped around a metal-pipe frame; the other consisted of branched PVC piping looped with barbed wire, with needles melted into the pipes. Both stood >1.5 m tall. We set out eight of the former and seven of latter structures during summer and fall of 2008, after completion of Cactus Wren nesting. The structures were set out in pairs at five sites in the San Joaquin Hills (Coastal Reserve of the Nature Reserve of Orange County/Irvine Ranch National Landmarks, IRNL) and two sites in the foothills of the Santa Ana Mountains (Central Reserve/IRNL); one site received an extra wire structure. We chose the sites on the basis of presence of at least one Cactus Wren at the site during the summer before installation. At the time of placement we inserted several clumps of long grass into each structure to help emphasize the potential of these structures as nesting substrates. We verified that Cactus Wrens were present at each site when the structures were installed. In March 2009, we placed up to three V-shaped wooden platforms into each structure in an effort to improve the structure’s ability to hold a Cactus Wren nest. Formal monthly monitoring of the structures between January and June 2009, and in February, March, and May 2010, yielded no observations of nesting by any species. Subsequent informal checks have continued to yield no evidence of nesting. We observed Cactus Wrens and other birds routinely perching on the structures, and numerous droppings accumulated on them, both indications that the birds were aware of structures but did not regard them as attractive nesting substrates. Therefore, we concluded that these prototype structures did not have good potential to serve as substrate for the Cactus Wren’s nesting.

NEST BOX DESIGN AND METHODS

The idea for a nest box arose in May 2009, when Lance Benner found Cactus Wrens nesting under a metal transmission box affixed to a telephone pole, at a height of approximately 4 m above dense cactus scrub in San Dimas, Los Angeles County. Similarly, Daggett (1904) reported an active
breeding nest between the cross-arm of a power pole and an insulator 9 m above ground near Azusa, Los Angeles County. Farley and Stuart (1994) noted that in Arizona and New Mexico Cactus Wrens occasionally construct nests in “a variety of non-native and non-spinescent vegetation” in otherwise typical desert scrub habitat; they found 12 nests placed 2.0–4.0 m above ground in non-spinescent substrates, compared with a mean height of 1.7 m above ground (range 1.1–2.7 m, n = 30) for nests in typical spiny vegetation in the same area (Farley 1995). From this we inferred that Cactus Wrens may select a taller substrate that affords increased protection from ground-based predators, even if the substrate provides less spiny armoring.

We designed the nest box to fit the size of a typical Cactus Wren nest (18 × 30 cm; Hamilton et al. 2011). It consisted of a four-sided painted box constructed of pieces of pine wood 0.63 cm thick (Figure 1). Three drainage holes were drilled into the bottom of the box, and holes of 5.0 and 7.6 cm were drilled into the end boards. The top was left open to mimic natural conditions in cactus substrate, with “hardware cloth” (quarter-inch wire mesh) covering the open top to provide protection against aerial predators. Folding up the bottom 5–8 cm of hardware cloth provided the birds another way of entering and exiting the box (in addition to the holes in the end boards). To mimic cactus spines, we used a pneumatic gun to stud the box liberally with 38-mm T-pin nails, and a few nails projected inward to help prevent slippage of the nest. We affixed the box to the top of a 2.4-m painted galvanized steel pipe with two metal screw bolts. All materials were spray-painted a mottled green with two tints of standard green spray paint. We pounded a primed and painted steel pipe into the ground to a height of approximately 2 m above ground (above the level of mature cactus in adjacent areas; see

![Figure 1. Schematic drawings showing the basic dimensions of the wren box. (A) “Level” nest box design with dimensions. (B) “Tilted” nest box mounted at an angle of ~20-45° with dimensions of second exit hole. (C) Modified design with box tilted at ~20° and 0.6-cm-thick wooden floor glued in. For each box, holes of two different sizes were drilled into the end boards and the wire mesh was bent back to leave a small gap, providing the birds with various choices for entering and exiting the box.](image-url)
Figure 2. The first “tilted” nest box in which Cactus Wrens nested successfully, Santiago Canyon, 9 June 2010. The opening of the nest is on the left.

Photo by Robert A. Hamilton

Figure 3. Closer view of the first “tilted” nest box in which Cactus Wrens nested successfully, Santiago Canyon, 9 June 2010.

Photo by Robert A. Hamilton
USE OF NEST BOXES BY CACTUS WRENS

Figure 4. Adult Cactus Wren exiting, via the gap beneath the wire mesh, another box in which it nested successfully, at Irvine Regional Park, 1 June 2011.

Photo by Robert A. Hamilton

Figure 2). A metal baffle was placed approximately halfway up the pole to thwart predators such as snakes. We oriented the boxes so that the end holes were on a roughly east–west axis and inserted clumps of dry grass into the boxes upon installation.

In December 2009 and early January 2010, we installed 32 nest boxes at 16 locations in the San Joaquin Hills and foothills of the Santa Ana Mountains. All but one location supported mature cactus scrub habitat dominated by tall (1–2 m) prickly-pear (Opuntia littoralis, O. oricola) and/or coastal cholla (Cylindropuntia prolifera) that had been occupied by Cactus Wrens at the time of installation or in the recent past. The location lacking in mature cactus was in the early stages of being restored from annual grasses and ruderal forbs to cactus scrub, and this location lacked Cactus Wrens at the time the boxes were installed. To compare use of the various models we set boxes at four of the original seven locations with artificial cactus structures. At each location we set two boxes, one mounted so that the base was horizontal (hereafter “level” nest box), the other mounted at an angle approximately 20–45° from horizontal (hereafter “tilted” nest box).

RESULTS

On 25 May and 15 June, Hamilton and Burger encountered an active Cactus Wren nest at 33.793° N, 117.726° W (“Fremont” site; Table 1) in a tilted nest box within mature cactus scrub near the juncture of Fremont and
Table 1 Sites of Artificial Structures and Cactus Wren Observations within the Irvine Ranch Natural Landmarks/Nature Reserve of Orange County

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
<th>Type of cactus scrub</th>
<th>Nest?</th>
<th>Lat.</th>
<th>Long.</th>
<th>Nearest wren (m)</th>
<th>Obs. 2009</th>
<th>Obs. 2010</th>
</tr>
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<td>Agua Chinon 1</td>
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- Prickly-pear (Opuntia spp.), coastal cholla (Cylindropuntia prolifera), or both.
- Distance to nearest territory or nest located in 2008 or 2009 by Nature Reserve of Orange County or by Hamilton before initiation of study.
- Cactus Wren observed during year 1 of the study.
- Cactus Wren observed during year 2 of the study.
- Cactus Wren observed on site by IRC or Hamilton before installation of box.
USE OF NEST BOXES BY CACTUS WRENS

Santiago canyons in the foothills of the Santa Ana Mountains. During limited observations, we saw the adults bringing food to the nest, indicating the presence of nestlings; the adults were seen entering and exiting the box only via the gap under the hardware cloth. On 17 and 30 June, Hamilton observed a pair of Cactus Wrens with at least two fledglings in cactus scrub adjacent to this box and presumed these to be the adults and fledglings from the box. Inspection of the box revealed an unhatched, presumably univiable Cactus Wren egg that had apparently been pushed through the bottom of the nest.

On 7 October 2010 we noted a Cactus Wren roost nest at 33.692° N, 117.684° W in a tilted nest box within mature cactus scrub adjacent to a grove of avocados (Persea americana) ("Agua Chinon1"; Table 1) within the city of Irvine’s Open Space Preserve North, approximately 12 km southeast of the first wren-occupied box. This nonbreeding nest was originally observed two weeks prior by Q. Sorenson of the Irvine Ranch Conservancy and was partially completed at that time.

During the winter, we examined all boxes and, if necessary, repaired them so they were ready for use by February 2011. No additional monitoring took place until 31 May 2011, when we found an active nest at 33.798° N, 117.741° W ("Irvine Park West"; Table 1), in the foothills of the Santa Ana Mountains, approximately 2 km west of the first wren-occupied box observed in 2010; this nest was also in a tilted box within mature cactus scrub (Figures 3, 4). Adults were bringing food to the nest on 1 June and had at least one fledgling on 10 June. These adults also chose to enter and exit the box via the gap underneath the hardware cloth rather than through the holes in the end boards.

Cactus Wrens have not yet been found nesting in boxes at sites closer to the coast, in the San Joaquin Hills, but the House Finch (Carpodacus mexicanus) has nested in two boxes in that area.

DISCUSSION

The scrub surrounding nest boxes used by Cactus Wrens for breeding and roosting included extensive stands of mature prickly-pear, and several sites also contained mature coastal cholla. Therefore, use of the boxes provides “proof of concept” that Cactus Wrens will select the boxes as an acceptable nesting substrate, even when tall, mature cactus replete with apparent natural nest sites is available. Presumably, the wrens should select boxes for nesting more frequently in scrub lacking tall cactus (unless other factors are preventing Cactus Wrens from settling in such an area); only one of our sites lacked tall cactus. Successful fledging of young from both boxes used for breeding suggests the suitability of the box’s design and placement. The boxes did not weather well, however; the boards separated and warped because of the use of nails to hold them together and lack of a protective primer coating. They have now been replaced with sturdier models held together with screws and hand-painted with primer and latex paint. The approximate cost of materials to construct a nest box by the new design is $50, including steel poles for installation in the field. Maintenance, such as cleaning out old nests, checking for warped pieces, and refastening hardware cloth should be done annually, before the breeding season.
USE OF NEST BOXES BY CACTUS WRENS

For reasons unknown to us the wrens seem to prefer the tilted boxes. The second set of 21 nest boxes installed in the field in August and September of 2011 as part of an Eagle Scout leadership service project includes only the tilted model. Scout George Carpenter and his team invested a total of 146 man-hours over 8 days to purchase supplies, construct nest boxes, and assist with installation. Other modifications to box’s design include the installation of a level floor to help prevent eggs from being pushed through the bottom of the nest (Figure 1C). We are attempting to thoroughly seal the “false bottom” of the nest to prevent this dead space from becoming a breeding ground for pests that could be harmful to nestlings. The new boxes have been placed primarily in cactus-restoration sites adjacent to more intact cactus in the foothills of the Santa Ana Mountains and in mature scrub in the San Joaquin Hills, where Cactus Wren densities are low. The goal is to test whether, in areas lacking suitable nest sites, the boxes can effectively increase the area of habitat occupied by Cactus Wrens and accelerate recovery of the local population.

The potential for harm to result from deploying nest boxes is remote; one would not expect the presence of a nest box to induce wrens to settle in a patch of habitat that does not satisfy other basic ecological requirements (e.g., food, cover). We suggest that judicious use of the boxes in burned habitat and at restoration sites should represent one useful component of a multifaceted approach to stabilizing and recovering Cactus Wren populations now in danger of extirpation. The boxes could also have value as a research tool for assessing the importance of other aspects of habitat suitability, such as foraging ecology and nest predation in relation to nest-site availability. We do not anticipate that nest boxes alone could possibly be sufficient to stem current declines in coastal populations of the Cactus Wren, since lack of appropriate nesting sites in burned landscapes represents only one of several potential stressors suspected of limiting the species’ productivity and/or survivorship in coastal southern California; others include habitat fragmentation, changes in habitat structure, disease, booming populations of Cooper’s Hawk (Accipiter cooperii), and possible food limitation. The Irvine Ranch Conservancy, Nature Reserve of Orange County, and others are pursuing additional studies in a combined effort to identify other adverse factors, and to develop remedies where feasible.

ACKNOWLEDGMENTS

This work was funded by a Local Assistance Grant (#P0750011) from the California Department of Fish and Game to the Irvine Ranch Conservancy. Special thanks to David Olson for spearheading initial research efforts, to Tom Williams and his Laguna Hills High School class and Eagle Scout George Carpenter for constructing nest boxes, and to IRC staff members (especially Adam Maywhort, Quinn Sorenson, Alyssa Penacho, Isaac Oliva, and Dustin Swenson) for completing nest-box modifications and assisting in installation. Orange County Parks, the city of Irvine, and the Irvine Company provided access to sites and supplementary funding for this study through management agreements. Thanks also to the Nature Reserve of Orange County for conducting basic research documenting the status, distribution, and dispersal of the Cactus Wren and cactus scrub habitat across its reserve system. The manuscript benefited greatly from reviews by Patrick Mock, Ryan Burnett, and Tom Gardali.
USE OF NEST BOXES BY CACTUS WRENS

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USE OF NEST BOXES BY CACTUS WRENS


Accepted 7 November 2011

Cactus Wren

Sketch by Narca Moore-Craig
NOTES
EXTENSION OF THE BREEDING RANGE OF COSTA’S HUMMINGBIRD IN SOUTHERN SONORA

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As currently known, the breeding range of Costa’s Hummingbird (Calypte costae) extends from the southwestern United States into Baja California and south to central Sonora, while the winter range extends south to the state of Nayarit (Baltosser 1989, Baltosser and Scott 1996, AOU 1998). Russell and Monson (1998) considered Costa’s Hummingbird a “poorly known species” in Mexico and reported evidence of breeding in Sonora as far south as Guasimas (27° 53’ N, 110° 35’ W). Cody (1983) reported observations of the species during the breeding season at Huatabampo, Sonora (26° 50’ N, 109° 38’ W), but did not document nesting. We report here the first evidence of breeding from southern Sonora.

From January through March of 2010 we located 16 Costa’s Hummingbird nests on an island and in adjacent coastline vegetation in the Agiabampo estuary, which straddles the borders of Sonora and Sinaloa on the coast of the Gulf of California (Figure 1). These observations extend the breeding range over 200 km south of that reported by Russell and Monson (1998).

The upland vegetation around the estuary is a unique coastal thornscrub (Martin et al. 1998) dominated by drought-deciduous trees and shrubs and a forest of columnar cactus (mostly Stenocereus thurberi). Felger et al (2001) considered it one of the rarest and least studied ecosystems in the world.

Average annual rainfall is ~320 mm (Friedman 1996), falling mostly in the summer monsoon. Fifteen of the 16 nests were found on Isla Masocarit (26° 22’ N, 109° 15’ W), an island in the estuary 0.5 km offshore from the Navopatia Field Station and the fishing village of Navopatia, 8 km north of the Sonora/Sinaloa border (Figure 2). Isla Masocarit covers approximately 740 hectares, lacks surface water, and is not settled. The vegetation on the island differs from that of the mainland largely as a result of the lack of livestock grazing. The island’s vegetation is dense and dominated by native grasses and a profusion of epiphytes (Tillandsia spp.) among the less abundant columnar cacti. Chuparosa (Justicia californica), a shrub that is a common food source for hummingbirds, is much more abundant than it is on the nearby mainland. The shoreline is occupied by mangroves (Avicennia germinans, Rhizophora mangle, and Laguncularia racemosa).

We searched for and found nests opportunistically during other surveys on the island and in mainland thornscrub. In this area, male Costa’s Hummingbirds commonly sing and display from mid-December through February. Our structured surveys from January to March thus encompassed the presumed peak of the nesting season. Although we were in the area continuously from October to April and occasionally from May to September, we observed no displaying Costa’s Hummingbirds from July through November.

All nests were 2 m or less from the ground in nine species of shrubs or trees less than 3 m tall. The three most common nest plants were Bursera laxiflora (25%), Euphorbia californica (18%), and Jatropha cimerea (12%). The nests contained grasses, spider silk, and lichens (Ramalina sp.) and were built and placed as described.
by Baltosser and Scott (1996). All completed clutches had two eggs. Of the 15 nests observed, at least seven were successful; we found evidence of predation at only one nest.

We found only one nest on the mainland, even though our effort was equal if not greater there. We completed area searches, as described by Ralph et al (1993), on
NOTES

fourteen 4-ha plots in upland habitats. On seven plots on the mainland over three winters, these searches yielded 105 detections of Costa’s Hummingbirds, while the species was detected 254 times on our seven island plots. We believe that the greater density of nectar-producing plants such as Justicia californica on the undisturbed island likely accounts for the difference in abundance between island and mainland. Isla Masocarit is legally protected and is one of the few refuges from livestock grazing in Sonora. If similar conditions exist to the south in Sinaloa, Costa’s Hummingbird may nest there as well.

We thank the staff, interns, and supporters of the Navopatia Field Station and the community of Navopatia for housing, field assistance, and support. Eric Antonio Martinez, Aaron Campbell, Juliet Frew, Sallie Herman, Margaret Lambert, and Jesse Vooz assisted with nest searching/monitoring and vegetation surveys. Steve Herman provided support, inspiration, and improvements to the manuscript. Kimball Garrett greatly improved the manuscript. Central Washington University provided assistance to A. Hannuksela in 2010. This is Alamos Wildlands Alliance contribution 2.

LITERATURE CITED


Accepted 9 January 2012
The Sage Sparrow (Amphispiza belli) is a rare vagrant on the floor of California’s Central Valley north of Fresno County. The few sight records are augmented by specimens from the Central Valley catalogued as three subspecies in the Museum of Vertebrate Zoology (MVZ) at the University of California, Berkeley: Bell’s Sage Sparrow (A. b. belli) and two interior forms, A. b. canescens (breeding in the southern Central Valley and Mojave Desert) and A. b. nevadensis (breeding in the Great Basin). However, we follow Patten and Unitt’s (2002) revision of the subspecies by regarding canescens as a synonym of nevadensis, here referred to as Interior Sage Sparrow. Although the specimens have been identified to subspecies, some sight records have not. Of the 37 records we have located for the Central Valley north of Fresno County, seven were not identified to subspecies. We echo Tim Manolis’s appeal (editor’s note in Stovall 1998) that birders should photograph and/or identify each extralimital Sage Sparrow to subspecies in order to clarify the status of each in the Central Valley and elsewhere. In this paper we summarize the records and provide tips to encourage and facilitate identification of these two distinctive subspecies.

In the Central Valley the Interior Sage Sparrow breeds, with some remaining year round, in saltbush (Atriplex spp.) and other lowland scrub in the Tulare Basin and adjacent western low foothills as far north as the Panoche Hills in Fresno County (Grinnell and Miller 1944, Martin and Carlson 1998). After breeding, the birds disperse upslope into chaparral dominated by chamise (Adenostoma fasciculatum), sagebrush (Artemisia californica), and black sage (Salvia mellifera) where Bell’s Sage Sparrow is resident. Johnson and Martin (1992) found no evidence of interbreeding between the two subspecies. On the basis of measurements, specimens of interior Sage Sparrows from north of the breeding range in the Tulare Basin and southern San Joaquin Valley have been attributed to nevadensis and not canescens; differing externally only in average measurements, they are indistinguishable in the field or from photographs (C. Cicero pers. comm.). As there is no evidence that these Interior Sage Sparrows (canescens) disperse northward, it is likely that these birds occurring north of the breeding range in the Central Valley are vagrants from populations breeding in the Great Basin. Interior Sage Sparrows from the Great Basin are highly migratory, while those nesting in the southern San Joaquin Valley and Tulare Basin are partial migrants, some moving as far south as the lower Colorado River valley and the Salton Sea (Martin and Carlson 1998, Patten and Unitt 2002). Of the winter specimens from the southern San Joaquin Valley in the MVZ, 5 have been identified as canescens, 4 as nevadensis. The degree to which locally nesting Interior Sage Sparrows vacate the Central Valley in winter is unknown. Of 28 specimen and sight records from north of the breeding range, 20 are for winter (December–February) and three are for fall migration: 8 and 22 September and 5 October (MVZ data, D. Yee, J. Gain, J. Trochet, J. Davis pers. comm., Stovall 1998).

In contrast, Bell’s Sage Sparrow has been described as sedentary (Johnson and Marten 1992) or migratory only in the northernmost section of its range (Glenn to
Shasta counties), though it may disperse elevationally in other areas (Martin and Carlson 1998). On the floor of the Central Valley, outside the subspecies’ breeding range in the surrounding hills, there are three records for spring migration (22 March–18 April) and three for fall migration (18–28 September; MVZ data, T. Manolis, editor’s note in Stovall 1998, J. Trochet, J. Davis pers. comm.), suggesting these birds were from the northern, migratory populations. The only winter record is from Chico, 31 December 1972–26 January 1973 (T. Manolis, editor’s note in Stovall 1998). If these extralimital birds were primarily dispersing downslope, a higher percentage of records should be for winter. In the Central Valley, most extralimital Sage Sparrows of both subspecies were found in atypical habitat, primarily annual grasslands, but also in ruderal vegetation along roads within agricultural landscapes.

As there are records of both Bell’s and Interior Sage Sparrows in the Central Valley, in the future any Sage Sparrow in the region should be scrutinized in detail, and, if possible, documented with photos. With care, and consideration for seasonal wear, these subspecies are readily distinguishable in the field. Especially when in fresh plumage (fall and winter; the species has only a single annual molt), Bell’s Sage Sparrow (lower photo on this issue’s back cover) is quite dark on the mantle and crown, with less contrast between the crown and facial markings. The chest spot is dark gray, standing out prominently on the white chest. The dark brown tail does not contrast markedly with the back. The streaks on the back are indistinct and can be hard to see without a close view.

Interior Sage Sparrows are much lighter than Bell’s Sage Sparrows, with lighter gray mantles, more distinct streaking on the back and flanks, smaller bills, and lighter, less distinct malar stripes and chest spots (upper photo on this issue’s back cover). Though paler than on Bell’s Sage Sparrow, the malar stripe on interior birds tends to contrast more with the light gray crown. The tail though paler than in Bell’s, on unworn birds, contrasts well with the lighter gray-brown back.

The two photos on this issue’s back cover contrast an Interior Sage Sparrow in fresh plumage photographed on Sherman Island, Sacramento County, California, 22 November 2011 with a Bell’s Sparrow in worn plumage photographed along Rayhouse Road, Yolo County, 19 May 2007. Thus the comparison is of the subspecies when their differences are muted. Bright sunlight (typical of the Sage Sparrow’s habitat) as well as plumage wear may make Bell’s Sage Sparrow seem paler than it is and be a source of confusion. In the field, observers should consider the factor of light as it affects perception of the paleness or darkness of the plumage.

We thank Jeff Davis, Andy Engilis, Jr., Jim Gain, Tim Manolis, John Trochet, Kent Van Vuren and David Yee for information on extralimital records in the Central Valley. Dan Williams discovered and documented the Interior Sage Sparrow on Sherman Island in late 2011 that prompted discussion that led to this paper. The MVZ’s online database was helpful in supplying information on specimen records. This paper was improved by the reviews of Jeff Davis, Scott Terrill, and Philip Unitt.

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Photo by © Thomas A. Blackman of San Diego, California: Curlew Sandpiper (*Calidris ferruginea*)
Southwest corner of San Diego Bay, Imperial Beach, California, 25 July 2011. A primarily Asian species, the Curlew Sandpiper breeds only casually in Alaska but has occurred dozens of times as a vagrant elsewhere in western North America. In agreement with the pattern typical of sandpipers during fall migration, adults (like the one in this photo) arrive first, in the case of the Curlew Sandpiper beginning in early July, while juveniles arrive later, in the case of the Curlew Sandpiper no earlier than late August.
**Western Specialty:**
Rock Sandpiper

Photo by © Brian E. Small of Los Angeles, California:
Rock Sandpiper (*Calidris ptilocnemis tochuktschorum*)
Seward Peninsula, Alaska, June 2011.
The Rock Sandpiper is unique among the sandpipers in its diversity in the Bering Sea region, with three subspecies endemic to islands: *quarta* on the Commander Islands, *couesi* on the Aleutian Islands, and nominate *ptilocnemis* on the Pribilof, St. Matthew, and Hall islands. Subspecies *tochuktschorum* breeds along the coasts of the Chukotski Peninsula and mainland Alaska, as well as on St. Lawrence and Nunivak islands; it is the only subspecies that migrates south of Alaska along the Pacific coast of North America. In breeding plumage, as seen in this photo, *tochuktschorum* has the edges on its back feathers and scapulars broader, brighter rufous than in the other subspecies. But it is nominate *ptilocnemis*, in spite of its central position in the Bering Sea with respect to the other subspecies around the periphery, that differs strongly from the others, in basic plumage even more than in alternate plumage.
Volume 43, Number 2, 2012

The California Condor in Northwestern North America
Brian E. Sharp .................................................................54

Abundance and Site Fidelity of Migratory Birds Wintering in
Riparian Habitat of Baja California  Steven C. Latta,
Horacio de la Cueva, and Alan B. Harper .........................90

NOTES
Type Locality and Early Specimens of the Mountain Chickadee
T. R. Jervis .............................................................................102

Recent Nesting and Subspecies Identity of the Merlin in Idaho
Bruce A. Haak and Scott Sawby ........................................105

Book Review  Kimball L. Garrett ........................................109

Featured Photo: First Documentation of a Juvenile Red-necked
Stint for the Lower 48 States  Todd B. Easterla
and Lisa Jorgensen .........................................................112

Thank You to Our Supporters .............................................115

Front cover photo by © Gary L. Woods of Fresno, California: Arctic
Loon (Gavia arctica), San Simeon Creek mouth, San Luis Obispo
County, California, 14 January 2012. Small numbers of this Old
World counterpart of the Pacific Loon (G. pacifica) breed in and
migrate through western Alaska. Elsewhere in western North
America the Arctic Loon is a casual vagrant, recorded as far south
as central Baja California and as far inland as Colorado.

Back cover “Featured Photos” of a juvenile Red-necked Stint
(Calidris ruficollis), Vic Fazio Wildlife Area, Yolo County, California, 30 August 2009, by © John Sterling of Woodland,
California (top), and by © Todd Easterla of Rancho Cordova,
California (bottom).

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THE CALIFORNIA CONDOR IN NORTHEASTERN NORTH AMERICA

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ABSTRACT: Native Americans, European and American explorers, fur trappers, and settlers observed the California Condor (Gymnogyps californianus) in the Columbia River basin, the Cascade Range, along the Snake River in Idaho, as far north as latitude 52° in British Columbia, and east of the Rocky Mountains in Alberta and Montana. Before European contact, indigenous people were familiar with and culturally connected to the California Condor in northwestern North America. The condor occurred year round and possibly persisted until the mid-20th century. Oral history of condor chicks kept in Indian villages attests to the condor’s nesting in the Pacific Northwest. Historical accounts of the condor’s food and foraging suggest that poisoning was the primary cause of the species’ extirpation from this region.

Most of what is known about the critically endangered California Condor is from detailed studies in California (Harris 1941, Koford 1953, Wilbur 1978, Snyder and Snyder 2000). In the American Southwest, the condor is known from at least 18 fossils 9600–22,000 years old (Emslie 1987), but there are only six 19th century records (Snyder and Rea 1998). In Baja California (Norte) a small population persisted until the 1930s (Grinnell 1928, Hill and Wiggins 1948, Wilbur and Kiff 1980).

In the Pacific Northwest, explorers, fur trappers, pioneers, ranchers, and naturalists encountered California Condors in the 18th, 19th and early 20th centuries; these reports have been summarized by Hall (1933, 1934), Harris (1941), Jewett et al. (1953), Gabrielson and Jewett (1940), and Wilbur (1973). Schaeffer (1951) presented oral accounts of condors from native American sources east of the Rocky Mountains. In the Pacific Northwest, condor bones have been found at three native American archaeological sites; those at Five Mile Rapids near The Dalles have been carbon-dated at 8000–9000 years before present (A. H. Miller 1942, L. H. Miller 1957, Hansel-Kuehn 2003). Wilbur (1973) stated that “Pacific Northwest condors were permanent residents with a long history,” and “records from the Pacific Northwest indicate condors may have been as plentiful in winter as at any time of year,” but
he did not present in detail, map, or graph the supporting data. Kiff et al. (1996:2) stated, inaccurately, that “by the time of the arrival of European man in western North America, California Condors occurred only in a narrow Pacific coastal strip... until the mid-1800s in the northern portion of the Pacific Coast region,” though they were known then to be more widespread and to have occurred more recently. Condors were presumed extinct in the Northwest after 1904, but little effort was made to verify the presumption.

An up-to-date, detailed consideration of the geographic and seasonal distribution of the California Condor in northwestern North America is needed. In this paper I summarize and analyze published and new data, including data from native American sources. The condor’s foraging ecology has been studied in California (Collins et al. 2000, Snyder and Snyder 2000:152), but data on its food and foraging in the Pacific Northwest are lacking. Here I also summarize and evaluate historical observations of condors foraging in the Pacific Northwest.

METHODS

I searched for and compiled records of the California Condor in the Pacific Northwest (Oregon, Washington, Idaho, and western Montana in the United States; British Columbia and southwestern Alberta in Canada) from journals, letters, and reports of explorers, fur traders, missionaries, pioneers, and early naturalists. For 4 years I also unearthed and compiled new data through interviews and conversations with native Americans, cultural anthropologists, biologists, condor researchers, and authors. Data obtained from interviews, conversations, and correspondence with informants are archived with the Wilson Ornithological Society at the University of Michigan.

I used the following criteria to evaluate the validity of condor observations: how well the birds were seen (“at close range, cannot be mistaken for any other species,” Snyder and Schmitt 2002:3); size (fur traders and native American observers referred to small and large vultures; A. Henry per Coues 1897, Ross 1956, Tolmie 1963); shape (extended unfeathered neck, ruff, wing angle); coloration (dark body, color of head and neck, white in wings); physical evidence (specimens, body parts, feathers, photograph); observer competence and familiarity with local fauna and species with which the condor could be confused, particularly the Bald Eagle (Haliaeetus leucocephalus), Golden Eagle (Aquila chrysaetos), and Turkey Vulture (Cathartes aura) (see below); whether the observation was corroborated by other observer(s); whether the observed bird was named as “vulture” (in the 1800s this usually referred to the California Condor, Wilbur 1978:19), “California vulture” (pers. obs., Snyder and Snyder 2000), or equivalent name in a native American language (see below); behavior; and other descriptive details.

In the Pacific Northwest the California Condor and Turkey Vulture are distinguishable on the basis of noncongruent geographical ranges and seasonal distributions (Kirk and Mossman 1998, Snyder and Schmitt 2002) and by differences in foraging behavior. There are records of “vultures” (condors) in the Northwest in winter, whereas the Turkey Vulture is migratory and absent in winter (Kirk and Mossman 1998, Gilligan et al. 1994, Marshall et al.
Figure 1. Locations of California Condors observed in northwestern North America. Using Google Earth (www.google-earth.com) and United States Geological Survey quadrangles, I mapped records with precise geographical locations to the nearest minute of latitude and longitude. I plotted records with imprecise locations to the nearest degree, identifying them by a different symbol on the map. Twentieth century condor records are identified with a unique symbol on the map, as are records with minimal details.
There are reports of “vultures” from northerly latitudes in British Columbia beyond the range of the Turkey Vulture, which is found only in the southern part of the province (Munro and McTaggart-Cowan 1947, Campbell et al. 1990); the Turkey Vulture has expanded northward in the last decade (pers. obs., H. Nehls pers. comm.), but the reports I discuss pertaining to vultures were all from the 19th century. Lewis and Clark stated, “saw some turkey buzzards this morning [9 April 1806] of the species common to the United states which are the first we have seen on this side the rocky mountains” (1990, vol. 7:97–98); they arrived at the Columbia River in October 1805, and all their observations of vultures during the winter of 1805–06 thus pertained to condors (they also left descriptions and took five specimens). From 1853 to 1860 the Turkey Vulture arrived in the Pacific Northwest in the middle of May (Cooper and Suckley 1860). Therefore, reports from mid-October to March, conservatively, represent the condor. As regards foraging behavior, condors appropriated, dismembered, and moved fresh deer and elk shot for human consumption (E. Saluskin, Lewis and Clark 1990, Harris 1941:32), whereas there are no records of Turkey Vultures doing so (Kirk and Mossman 1998). My minimum standard for whether a given record pertains to the condor is “preponderance of the evidence.” Some records provide few details, sometimes only size, location, season, or the competence and credibility of the observer; even though meager, these can be sufficient and convincing. Records with minimal details are mapped separately in Figure 1.

I obtained anthropological and cultural evidence on condors in the Northwest directly from indigenous sources, from interviews and correspondence with anthropologists, and from the literature. The cultural evidence includes linguistics, place names, basketry, petroglyphs, pictographs, sculpture, feathers, oral history, and specific sightings. The existence of names for the condor in indigenous languages implies that it was known well enough to native Americans to require a means of reference. Tribal names refer to the “thunderbird”/condor as both a biological, living bird and as a mythical entity with spiritual power (E. S. Hunn, University of Washington, Department of Anthropology, pers. comm.). It might have been possible to create a map of the condor’s distribution in the Northwest by mapping the distribution of tribes with a name for the species, but the latter would have required more precise information than is available, so in this study I used tribal names as corroboration or context for the records based on sightings and specimens. As with tribal names, I refer to place names in the text but not on the map. Native oral histories are an independent source of information; when an oral history is relevant to the identification, distribution, status, or ecology of the condor, I refer to it in the text.

I graphed records with dates by month and by season. “Winter,” “spring,” “summer,” and “fall” are defined as Dec–Feb, Mar–May, Jun–Aug, and Sep–Nov, respectively, and used chi-squared tests to assess whether monthly or seasonal observations were more or less than expected (Steel and Torrie 1960). I disregarded reports without dates or mappable locations, except those with ecologically intrinsic value, which are described at the end of Appendix A.

Data recorded on food and foraging included circumstances, kind of food, behavior, location, habitat, season or date, and association with human beings.
RESULTS

I located over 90 records of the condor in the Pacific Northwest, 74 with geographical locations (Figure 1) and 60 with data on month or season of occurrence (Figures 2 and 3; see Appendix A for details). They included 13 specimens, a historical photograph, and bones from three native middens. The remainder were sight records, all but one of which were of birds seen at close range; the exception is that of Peck (Appendix A). Distance as a source of misidentification is thus negligible for these records. A wealth of data from native American sources—linguistics, oral history, place names, and basketry (see Anthropological Evidence below)—reflect most tribes’ familiarity with the condor throughout the Pacific Northwest. These data provide context for the date- and location-specific records. Of the records, 25 have information on food or foraging (Table 1). Details are provided in Appendix B.

Geographical Distribution

Competent observers encountered condors on the Columbia River from its estuary to its headwaters in the Rocky Mountains of British Columbia, in eastern Washington, along the Snake River in Idaho, in both coastal and interior British Columbia north to latitude 52–53° N, and east of the Rocky Mountains in Alberta and Montana (Figure 1). More than half of the 74 observations of condors I compiled were along the middle and lower Columbia, the Willamette River, and in the Umpqua region of Oregon. The Lewis and Clark party observed condors along the lower Columbia River on nine occasions from October 1805 to April 1806 and once in the Rocky Mountains; they collected five specimens. Douglas (1829) encountered condors as far north as the Canadian border, as far south as the Umpqua River, and collected five specimens, including two while on an Indian-escorted excursion to Larch Mountain in September 1825 (Douglas 1829), related to me in astonishing detail in a native oral history passed down for 180 years (Ken Kachia Smith, Wasco elder, Corbett, Oregon, pers. comm. 2006).

Table 1  Observations of Food and Foraging of the California Condor in Northwestern North Americaa

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of observations</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bison</td>
<td>3</td>
<td>Plains</td>
</tr>
<tr>
<td>Salmon</td>
<td>6</td>
<td>Shoreline</td>
</tr>
<tr>
<td>Other fish species</td>
<td>1</td>
<td>Shoreline</td>
</tr>
<tr>
<td>Marine mammals</td>
<td>2</td>
<td>Shoreline</td>
</tr>
<tr>
<td>Winter-killed elk</td>
<td>1</td>
<td>Forested upland</td>
</tr>
<tr>
<td>Hunter-killed deer and elk</td>
<td>4</td>
<td>Forested upland, riparian</td>
</tr>
<tr>
<td>Domestic animals</td>
<td>3</td>
<td>Forested upland, grassland</td>
</tr>
<tr>
<td>Domestic animals, carcasses poisoned</td>
<td>2</td>
<td>Forested or cleared upland</td>
</tr>
<tr>
<td>Wild “cranberries” (Arctostaphylos uva-ursi?)</td>
<td>1</td>
<td>Forested upland</td>
</tr>
<tr>
<td>Human bodies</td>
<td>2</td>
<td>Shoreline, riparian</td>
</tr>
</tbody>
</table>

aSee Appendix B for source data.
THE CALIFORNIA CONDOR IN NORTHWESTERN NORTH AMERICA

![Graph](image)

Figure 2. Number of California Condor sightings in the Pacific Northwest by month.

**British Columbia.** Nine records of the condor in British Columbia include five at the coast and four in the interior. The coastal locations are Bella Bella at latitude 52° N in 1827 (Tolmie 1963) and the mouth of the Fraser River in the 1860s, 1880, and late 1880s (Lord 1866, Fannin 1891, Rhoads 1893). Lord (1866) simply stated without elaboration that condors occurred in interior British Columbia. Specific reports in the interior (Appendix A) include that of Alexander Ross (1956), who shot “a bird of the vulture tribe” on 17 September 1817 northwest of the Canoe River in central eastern British Columbia at latitude 52° 40' N, and De Smet (1978), a Catholic missionary, who on 4 September 1845 observed “vultures,” wolves, and grizzly bears at “the source of the Columbia,” latitude 52° N. A Sto:lo Salish native American saw a condor-sized bird in 1935 on the Fraser River near Spuzzum (S. McHalsie, Sto:lo tribal biologist, pers. comm.).

Brooks and Swarth (1925) stated that British Columbia records lacked “conclusive evidence.” Campbell and others (1990) listed the condor as “hypothetical,” but Bringhurst (2001) objected that the authors did not avail themselves of indigenous sources of information. A condor tarsometatarsus excavated at the site of a native village on Pender Island in 2006 provides physical evidence of the condor in the province (R. Wigen pers. comm. 2006).

**Idaho.** The condor record in Idaho includes four sightings from Euro-American sources in the 1800s: that of Lewis and Clark (1990, vol. 8:22–23) of vultures appropriating freshly killed game, two sightings, including one in winter, along the Snake River by the fur trader McKenzie (Ross 1956), and,
in a colorful description, Wilcox (1918). In addition, less specifically, Douglas (1959) stated that condors were seen on the Snake River 400 miles inland. A Nez Perce oral history placed condors in the Hells Canyon–Seven Devils area (Josiah Pinkham, Nez Perce tribal member, pers. comm.), and there is pre-contact Nez Perce and Shoshone–Bannock linguistic evidence from the Snake River (D. Walker, anthropologist, pers. comm.). Euro-American and native sources point to the lower Snake River as the condor’s center of abundance in Idaho. I failed to find accounts of petroglyphs of condors in the Snake River watershed (M. Pavesic, archaeologist, Boise State University, pers. comm.; J. Braga, petroglyph hunter, pers. comm.).

*Records east of the continental divide.* On 10 September 1896, Fannin (1897), curator of the British Columbia Museum, observed two “fine” condors in the Bow River valley between Calgary and the Rocky Mountains, stating, “I was not aware that this bird was found east of the Rocky Mountains, or so far north.” From interviews with members of the Blackfeet and Cree tribes east of the Rockies, in western Alberta and western and central Montana, Schaeffer (1951) obtained 19 observations of the condor, of which 11 were detailed and reliable enough to be mapped.

**Seasonal Distribution**

The 60 records with dates show that condors occurred in the Pacific Northwest year round, with more than the expected number of records in

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**Figure 3.** Number of California Condor sightings in the Pacific Northwest by season.
September ($\chi^2 = 25.308, P < 0.01, df = 11$) (Figure 2). By season, observations were more frequent in fall (24) than in winter (14), spring (10), or summer (12) ($\chi^2 = 7.197, df = 3, P < 0.10$) (Figure 3).

Anthropological Evidence of Condors in the Pacific Northwest

In this region, most tribes have names for the condor, either as a biological entity and/or as a creature with mythical power (the thunderbird). The list of these tribal names, not complete (some tribes and their languages are extinct, for example, the Rogue, Willamette, Cowlitz, and Clatsop), includes the Snoqualmie (Puget Sound Salish, Washington) hed-e-libsh or “broke down the weirs,” distinguished from c’ika’ud (“red” or “bay”) for the Turkey Vulture (Turner 1976); the Pyallup–Nisqually hedelabc, “a real bird,” “much stronger than eagle,” “devouring,” and “the biggest bird there was,” distinguished from the thunderbird as mythological/spiritual power (Smith 1940:69, 70); coastal Salish Sto:lo (Fraser River, inland British Columbia) sxwe-xwo:s or “opening his eyes” (Sonny McHalsie pers. comm.); Chinook–Wasco (lower Columbia) ha’-ness (Gill 1909, K. K. Smith pers. comm. 2004), also iakeshitl’nos, “sharp beak” (Demers et al. 1856, Long 1909, Thomas 1935, Shaw 1909, K. K. Smith pers. comm.), distinguished from hem-letet (“stinkhead”) for the Turkey Vulture (T. Johnson, Grande Ronde Tribe Cultural Affairs Program, pers. comm.); Sahaptan Wasco, Toppenish, and nearby tribes (Columbia River east of the Cascades) pach’anahuy (E. S. Hunn pers. comm.); Wasco (central Columbia River, Warm Springs) k’unwakshun, distinguished from q’shpa-ll’i for the Turkey Vulture (K. K. Smith pers. comm.; Wasco language program, Warm Springs Reservation, Oregon, pers. comm.); Colville–Okanagan Salish (upper Columbia River, eastern Washington) s-?itun (Hunn pers. comm.); Yakama (central Washington) patsami hu’u or “rough or crooked beak” (Lavina Wilkins, Yakama Cultural Center, pers. comm., Nisbet 2003); Nez Perce (eastern Washington and Snake River, Idaho) qu’nes, differentiated from q’ispa’laya, the Turkey Vulture, by “the bent shape of the [latter’s] wings” (J. Pinkham, Nez Perce Tribe, pers. comm., D. Walker pers. comm. 2006); Shoshone–Paiute–Bannock (Snake River, Idaho) quana (D. Walker pers. comm. 2006); and Blackfoot (western Montana, southwestern Alberta) omaxsap’tau or “big golden eagle” (Schaeffer 1951).

In British Columbia, at the condor’s northern geographical limit, as delineated by historical sightings and specimens, a vague mythology replaces specific observations. The Porteur Indians (Fort Alexander, upper Fraser River) described “thunderbirds” in mythical terms (Demers et al. 1856:164). The condor as biological entity was “unknown” to the Haida (Swanton 1898), who named only a creature with supernatural power (Tolmie 1963, Brinfin 2001). The terror of a native guide who accompanied Ross into interior British Columbia in 1817 was noteworthy (Ross 1956).

Several native place names in the Northwest refer to thunderbirds. In the vicinity of Orting, near Tacoma, Washington, a rocky face with alcoves, called “tisyaqwa’alku” or “thunderbird’s house,” was perhaps a nest site (D. Buerge, historian, pers. comm.). Near Lake City in the Seattle area of Puget Sound is a ridge called “Xwi-yah-qwa-di-A’l’t,” “thunderbird’s house,” said to be where thunderbirds nested in trees (Waterman 1922). Along the Fraser River, near Hope, British Columbia, a cave near the head of Pitt Lake

61
was called by the Sto:lo “xwexwo’sawtxw,” “home of the thunderbird” (Carlson 2001). Various locations in eastern Washington refer to condors (E. S. Hunn pers. comm.). In coastal Oregon, in the area of the Umpqua, a variety of place names referring to “buzzards” and “vultures” on U.S. Geological Survey quadrangles invite further investigation of any local oral history. Such place names may signify collectively remembered nest sites, roosts, or sightings.

On Wasco baskets from the Columbia River, a motif common in the 1800s and early 1900s was the depiction of condors with characteristically outstretched wings and long unfeathered necks (Schlick 1994, Oregon Art Museum, Portland, Oregon, pers. obs. 2005, Maryhill Museum, Goldendale, Washington, pers. obs. 2006; Figure 4). Petroglyphs depicting condors are said to exist along the river at sites not disclosed to prevent desecration (K. K. Smith pers. comm. 2006), but there are no photographs or drawings of petroglyphs with condor motifs in Keyser’s (1992) *Indian Rock Art of the*
Columbian Plateau. Depictions of condors in petroglyphs and basketry suggest that condors occurred in the area, though Wasco baskets were perhaps traded up and down the Columbia River.

The wealth of anthropological data implies that the California Condor was important in the culture of northwestern native American tribes. Culturally the Pacific Northwest was thus comparable with California (Simon 1983). However, cultural evidence of the condor in the American Southwest is meager, and such southwestern tribes as the Pima, Pueblo, Paiute, Navajo, and Apache do not have oral histories, basketry, petroglyphs, or names for the condor (A. Ferg, Arizona State Museum, Tucson; D. Zimmerman, Arizona State University, Flagstaff; G. Rice, Arizona State University, Tempe; K. Hays-Gilpin, C. Downum, and R. Riner, Northern Arizona University, Flagstaff; R. Johnson, Navajo cultural specialist; J. Mead, palaeontologist, Grand Canyon National Park, pers. comm. 2004). Only the Hopi have a name for the condor, kwaatoko, or “big eagle” (the Turkey Vulture is wisoko), but oral history is lacking (M. Yeatts, Hopi Cultural Office, pers. comm.). When the first condors were released in the Grand Canyon of Arizona in the 1990s, assembled Navajo elders created a name for them, jisho tsoh, simply “big buzzard” (R. Johnson pers. comm.).

Archaeology of Condors in the Pacific Northwest

Condor bones have been found at three native archaeological sites. The large midden at Five Mile Rapids, Oregon, contained bones from 63 individual condors (L. H. Miller 1957), which dated from 8770 ± 230 to 8470 ± 190 years before present. The distal ends of some wing bones bore cuts from implements, indicating ceremonial use of the feathers (Hansel-Kuehn 2003). A radius of a condor from a midden north of Brookings, coastal Oregon, predated native contact with Caucasians (A. H. Miller 1942). A condor metatarsus unearthed in 2006 at the site of a native village on Pender Island, British Columbia, was radiocarbon-dated at 2900 years (R. Wigen pers. comm.). No condor remains were found in nine middens around Puget Sound (L. H. Miller 1960) or in middens elsewhere on the Oregon coast (M. Moss, University of Oregon Department of Anthropology, pers. comm.).

Specimens

Nineteen records of condors from the Northwest, all but one from the 19th century, include 13 birds collected, 1 poisoned (not “shot” as per Wilbur 1978:72), and skins and feathers reported by native Americans, including one photograph by Edward S. Curtis (Schaeffer 1951, Hines 1991, www.memory.loc.gov/award/iencurt/ct07/ct07010v.jpg). Of five condors collected by Lewis and Clark, only one preserved head was taken back to Washington, D.C. None of the four specimens David Douglas sent to London are extant (he discarded a head-shot fifth specimen), and only one specimen from the Pacific Northwest, collected on the Willamette River near Oregon City in April 1835 (Townsend 1848), still exists. This Townsend gave or sold to J. J. Audubon, who presented it to Spencer Baird, secretary of the Smithsonian Institution; it is now in the National Museum of Natural History (catalog number 78005), its location mislabeled “the Columbia” (C. Angle, Smithsonian Institution, pers. comm.) and misreported as “mouth of

63
the Columbia” (Baird et al. 1858). The disposition of the “vulture” (condor) Ross shot in interior British Columbia in 1817 (Ross 1956) is unknown (he ate the Bald Eagle he shot at the time), as is that of the condor poisoned in the Umpqua area (Putnam 1928); both birds were probably discarded. The whereabouts of several condor skins and feathers valued as symbols of power by native Americans (Schaeffer 1951) are also unknown.

Abundance

Lewis and Clark observed “some flew” condors at the mouth of the Wind River in October 1805 (Lewis and Clark 1990, vol. 5:356). Douglas traveled extensively in the Northwest and saw condors on many occasions; he stated, “During the summer [condors] are seen in great numbers…from the ocean to the mountains four hundred miles in the interior. In winter they are less abundant” (Douglas 1959:241); “nowhere as abundantly as in the Columbian valley between the Grand Rapids and the sea” (Douglas 1829); “great numbers on the Umpqua river” (Douglas 1959:216); and in the Willamette Valley on 3 October 1826, “nine in one flock” (Douglas 1959:241). Townsend saw condors “in abundance” on the Columbia River in spring and summer in 1835, and “constantly found the Vultures at all points where the Salmon was cast upon the shores” (Townsend 1848). In the 1800s Henry, Tolmie, and Peck referred to vultures plural or in flocks. Scouler, Cooper, and Merriam observed single birds (Appendix A).

Wilbur (1973) hypothesized that “heavy” scientific collecting was the cause of the disappearance of condors from the Columbia River. Yet I could find record of only 13 condors collected there, 1805–1835, and Tolmie’s (1963) observation of flocks of condors in 1833 at two deserted Indian villages along the Columbia suggests that the species survived the early collecting.

Food and Feeding

The 25 reports of condors feeding are summarized in Table 1 and detailed in Appendix B. The condor’s diet included winter-killed elk, which are uncontaminated and benign, and hunter-killed deer and elk, contaminated with lead. Similarly, it included domestic animals, sheep and cattle, which are benign, and domestic animals laced with poison, which are not. The report of a condor eating “wild cranberries” is from a meadow at high elevation in the Cascades (Appendix A). Snyder and Schmitt (2002) did not mention vegetation as part of the condor’s diet, but Koford (1953:59) observed condors eating leaves and examined condor pellets consisting entirely of vegetation. The Turkey and Black (Coragyps atratus) are known to eat fruits (Kirk and Mossman 1998, Buckley 1999).

Condors fed on remains of bison killed by native peoples in Montana and Alberta before European contact (Schaeffer 1951). The condor’s occurrence east of the Rockies was apparently driven by food and seems not to have extended beyond the last bison drives by the Blackfoot tribe in 1872 and the bison’s extermination in 1882 (Ewers 1949). There are no reports of condors feeding on bison on their own, but such observations might not be as likely.

Because human settlements were located on shorelines and rivers were used for food gathering, travel, and trade, aquatic habitats may be over-
represented in the historical record. In Oregon west of the Cascades, condors were seen in areas burned by Indians (Douglas 1859, Peale 1848).

Condors fed on human carcasses: on dead slaves thrown out by their owners to be disposed of by scavengers and on unburied inhabitants of native villages dying en masse in an epidemic (Appendix B). In November 1830, fur trapper P. S. Ogden observed “foul birds” at a native American village on the Columbia River near Fort Vancouver (Ogden 1933), where 90% of the inhabitants were dead or dying from an epidemic of malaria. In 1833, when the epidemic was still virulent, Tolmie (1963) observed flocks of “large vultures” (condors) at two nearby abandoned villages. Turkey Vultures have migrated out of the Pacific Northwest by November, and a Wasco oral history of thunderbirds feasting on the corpses (Aguliar 2005) independently confirms that the unnamed “foul birds” were California Condors. Human carcasses have not been mentioned as a component of the condor’s diet in California (Koford 1953, Collins et al. 2000, Snyder and Schmitt 2002).

Association with Humans

The condor’s and human diet overlapped broadly. The condor–human association could be characterized as commensal. In 15 of 25 observations of foraging, condors were associating with humans for food at villages, settlements, camps, and ranches. Condors were attracted to fish offal around native villages on the Columbia River (Audubon 1839), and condors appropriated big game killed by hunters. In April and May, 1806, on their return trip east, the Lewis and Clark company shot and cached deer that condors located and ate (Lewis and Clark 1990, vol. 7:25, vol. 8:22–23). In the early 1800s condors frequented fur traders’ camps on the Columbia River for this reason, and Alexander Henry called condors “very troublesome” (Coues 1897:808, 817). Those data suggest that condors recognized and benefited from opportunities to forage in association with humans.

Sense of Smell

Several observations from the Pacific Northwest imply that condors may be able to smell (Douglas 1829, Coues 1897:817, Fleming 1924, Demers et al. 1856:180). Demers et al., relying on Chinook or Cowlitz informants along the lower Columbia River in 1843, reported that “the Vulture, said to be from California, a bulky black bird, very voracious, [was] noted for the keenness of its sense of smell. Alluding to this quality, the natives call it iakessitl’nos, who has a sharp nose. The odor of carrion attracts it from a great distance. It gorges itself so well...that it is then impossible to start flying, and then a club suffices for killing it. The feathers... are much sought after by the aborigines.” “Unable to fly” when gorged suggests the condor, already near the mass limit for flapping flight (Douglas 1829, Snyder and Schmitt 2002:5). However, the Chinook word iakessitl’ means “sharp” in the sense of “cutting,” rather than pertaining to smell or taste (Gibbs 1863, Thomas 1935, T. Johnson, K. K. Smith pers. comm.), and condors are noted for their strength and ability to demolish fresh carcasses. Nos is nose, beak, or prow of a boat (Shaw 1909, T. Johnson pers. comm.), rather than nose for smelling, which is e’-meets in Chinook (Long 1909). It is also possible that Demers misunderstood his informants and conflated characteristics of the condor and Turkey Vulture into one.
Twentieth Century Records, in Oregon and Washington

Most of the reports are from wilderness areas of the Cascade Mountains. In the 1920s and 1940s Yakama Indians reported condors near Mount Adams (M. Schlick pers. comm.; C. Mack, Gifford Pinchot National Forest archaeologist, pers. comm.; E. S. Hunn pers. comm.). From 1930 to 1935 Bill Brown, a fire lookout, observed single condors several times over 5 or 6 successive years at three lookout towers in the western foothills of the Oregon Cascades, in southern Douglas County within 32 km of Canyonville and Myrtle Creek. He and several other fire lookouts communicated the sightings to each other by radio at the time (J. Nisbet pers. comm.). In the 1950s K. K. Smith (pers. comm.) saw condors at close range on the upper Clackamas River and on the east slope of Mt. Jefferson on the Warm Springs Indian Reservation, feeding on winter-killed elk. John Krussow and a Forest Service road-survey crew observed three condors at close range on dozens of occasions at a roost on the Collawash River, December 1964–April 1965; the presence of “California Condors” in the area at the time was also known to local loggers (J. Krussow, road surveyor, Mt. Hood National Forest, Hood River, Oregon, pers. comm. 2006). Rebuilding the logging road washed out in 1964 entailed dynamiting rock below the roost, which put an end to the condors’ roosting at that location.

Elsewhere, condors continued to be observed at Celilo Falls in the early 1900s (K. K. Smith pers. comm.), and Jacqueline Cook (pers. comm.) stated that her father, a rancher, saw a condor on the Colville Reservation in eastern Washington in the 1930s, when the Grand Coulee dam was under construction.

The latest generally accepted records for condors in the Pacific Northwest are for 1903 and 1904 (Peck 1904, Finley 1908, Wilbur 1973, pers. comm.), but several unpublished reports suggest that condors survived later (Figure 1, Appendix A). Clearly, historical records from indigenous and lay sources do not meet current standards for reports of rare birds, but most were observations at close range. Even if a few are erroneous, collectively they suggest a few condors persisted in the Pacific Northwest into the mid-20th century.

DISCUSSION
Patterns of Occurrence

Fannin’s (1897) 1896 observation of “two fine condors” near Calgary was rejected by Macoun and Macoun (1909) for want of a specimen, was thought “startling” by Harris (1941), and was disputed by Wilbur (1978, pers. comm.). In his time, however, Fannin was perhaps the most highly respected ornithologist in British Columbia, and his observation gains credibility from multiple Blackfoot and Cree observations of omaxsapi’tau (“big eagle” or condor) in Alberta and western Montana in the 19th and early 20th century and the 1897 observation of a condor near Browning, Montana, in particular (Schaeffer 1951) (Appendix A).

Brown’s sightings of condors at fire lookouts in the Umpqua foothills in the 1930s were made near the area where Douglas and McCleod saw
"great numbers...on the Umpqua river, and south of it" in 1826 (Douglas 1959:241), where Titian Peale, ornithologist with the Wilkes expedition, saw two condors in the mountains between Umpqua and Rogue rivers in 1841 (Peale 1957), where a condor was poisoned at Yoncalla in the upper Umpqua River watershed in the winter of 1852 ("the largest wild bird... is the vulture...only an overgrown buzzard. I saw one measured [with a wingspan of] 10 to 11 feet"; Putnam 1928), and where G. and H. Peck saw condors on three occasions in 1903 and 1904 near Drain, 11 km from Yoncalla (Peck 1904, Finley 1908). A history of condor occurrences in the Umpqua area over a period of 110 years lends credibility to the 20th century observations of Brown.

Krussow’s three condors at a roost overlooking the Collawash River, from December 1964 to April 1965, were well described (necks long, unfeathered, and orange-pink), were contemporaneously known to loggers in the area, and are complemented by K. K. Smith’s independent observations of condors along the upper Clackamas River, to which Collawash is tributary, in the 1950s when he fished for salmon as a young man. The upper Clackamas was traditionally used for berry-picking by the Wasco, who were aware of condors in the area (K. K. Smith pers. comm.). According to Krussow, the condors left the roost and flew southeast in the direction of Mt. Jefferson, where Smith observed three condors at close range among Common Ravens (Corvus corax), Golden and Bald eagles at a winter-killed elk in a melting snow bank in early summer in the 1950s or 1960s. The distance between the Collawash roost and the Mt. Jefferson area is ~35 km, within the range of foraging condors in California (Koford 1953). Krussow and Smith neither met nor knew each other.

David B. Marshall, respected naturalist and co-author of Birds of Oregon, asked, "How could such a huge, charismatic species have been missed in the 20th century?" The explanation is quite simple: Euro-Americans did not explore parts of the Cascade Mountains until the mid-1900s. Gabrielson and Jewett wrote in 1940 of "the comparative isolation of...Mount Jefferson, even up to the last few years." The eastern slope of Mt. Jefferson is within the Warm Springs Indian Reservation and is not accessible except to the reservation’s residents. The upper Clackamas drainage was rarely visited by non-Indians before roads penetrated the Cascades in the 1950s (Taylor 1999, K. K. Smith pers. comm.) and before logging in national forests increased from the 1960s to a peak in the 1980s (Robbins 2004). Finally, wildlife agencies did not pay much attention to endangered species until the passage of Endangered Species Acts in 1966, 1969, and 1973, and nongame species were almost completely ignored until the 1970s and 1980s (pers. obs.). That federal and state wildlife biologists "missed" condors in roadless wilderness until the mid-1900s is not surprising. The condors were not really "missed" but were known to native Americans and early forest workers like Krussow, a road surveyor, and the first loggers.

Significance of Year-round Occurrence

Records with dates (n = 60; Figures 1 and 2) show that condors occurred in northwestern North America in almost every month and at all seasons of the year. Koford suggested (1953:9) that "condors moved northward in
summer to feed on the salmon” of the Columbia River, but they were not
most numerous in summer, and the year-round record is inconsistent with
“occurrence and disappearance” and a “southward withdrawal.” If “sum-
mer is the season of lowest [food] supply” and if condor movements into
the Northwest were driven by food scarcity, condors would be more likely
to move north in summer (Wilbur 1973). However, the data show not a
summer influx in the Pacific Northwest but a higher than expected number
of reports in the fall, in September. Peale (1848), A. H. Miller et al. (1965)
and Wilbur (1978) also considered food adequate in California.

The condor’s occurrence year round could be the result of random north-
ward movements from California regardless of season. But the distance
exceeds the condor’s regular movements between roosts and foraging areas
in California (Koford 1953), and Wilbur (1978:27) considered such move-
ments unlikely. Semi-permanent residence of condors in the Northwest is
conceivable, with a return to California to breed, but that implies nest sites
are lacking in the region or that condors could not maintain themselves
on the food supply available in the Northwest. However, suitable nest sites
seem abundant (pers. obs., D Moen pers. comm.), and in the Columbia and
other streams salmon ran year round, though in some of the major summer
runs they delay spawning until fall, with the result that salmon carcasses
are more available and abundant in the fall (B. Bakke, Native Fish Society, pers.
comm., Aguilar 2005, Taylor 1999). The simplest and most compelling
explanation of the seasonal pattern is that the northwestern population of
the condor was permanently resident.

Year-round occurrence does not exclude a northward dispersal in late sum-
mer or fall of nonbreeders, young condors, and/or post-breeding adults from
California, which may have augmented the Northwest’s resident population.
Northward post-breeding dispersal in late summer and autumn is known for
many species of birds. Phillips’ (1968:135) criticism of Koford’s hypothesis
of northerly movement as a “disservice to the general understanding of
Gymnogyps” thus might not be deserved. Though Wilbur (1973) stated
that condors made “a fairly definite movement to the Columbia in fall [to
breed] and away in spring,” he did not tabulate any supporting data. The
numbers of records I have compiled “at” and “away from” the river (8 and
5 in winter, 7 and 2 in spring, 3 and 10 in summer, 9 and 15 in fall, in
total 27 and 32, respectively) suggest that if anything the species was more
frequent at the river in winter and spring. During the presumptive breeding
season condors thus occurred both near the river and in the mountains.
Movement to the river probably should not be equated with movement to a
nesting area in any case, because northwestern condors may have nested
both along rivers and in uplands.

Probability of Condor Nesting in the Pacific Northwest

Evidence suggesting that California Condors nested in the Northwest
includes (1) the species’ occurrence year round, as concluded by Wilbur
(1973). (2) Archaeological and anthropological evidence, including lin-
guistics, demonstrating that before Caucasian contact native Americans
were familiar with the condor, implying it was more than an intermittent
or accidental visitor. In addition, according to Wasco oral history, young
condors were captured and kept in villages for protection against thunder and lightning, and if native villagers had local access to young condors, the species must have nested locally (Nelson Wallulatum, chief of the Warm Springs Confederated Tribes, per M. Schlick pers. comm.) (Appendix A). (3) Oral histories of Columbia River tribes refer to condors breeding at Saddle Mountain (overlooking the Columbia River estuary), in the Columbia River Gorge, and near Celilo Falls on the Columbia. For example, a Clatsop creation myth describes eggs from a condor nest at Saddle Mountain breaking open and generating the Clatsop people (Gill 1928, Hines 1991, Boas 2002, T. McAllister, The Oregonian, pers. comm., K. K. Smith pers. comm.). (4) Regular observations by Lewis and Clark of condors at the mouth of the Columbia (Figure 1, Appendix A), within sight of Saddle Mountain, which are consistent with native oral history of breeding at that location. Native American oral accounts have been found accurate for geological events in the Northwest such as tsunamis and volcanic eruptions. (5) Townsend’s statement (1848:267), that condors were “reputed to breed in the Umpqua country” at higher elevations, according to American Indians, which is consistent with repeated sightings of condors by Euro-Americans in the Umpqua area over 110 years. (6) Indians told Townsend that condors nested on the ground along the Columbia River (Audubon 1839, Finley 1908). Caves, cliffs, and jumbles of rocks along the Columbia River and in the Cascade Mountains provide an abundance of nest sites (pers. obs.). (7) Condor bones in Indian middens document the species’ presence in the Pacific Northwest for several thousand years, and ceremonial use of feathers by native Americans suggests more intimate cultural interaction with the condor than possible if it occurred only intermittently.

Altogether, the circumstantial evidence is strong and consistent with condor nesting in the Pacific Northwest; only physical confirmation is lacking. The remains of eggshells or nesting condors in caves would confirm nesting (Snyder and Snyder 2000), as would photographs of nestling or juvenile condors in native villages. Few potential nesting sites in Oregon have been explored, even in areas where clusters of condor records have been documented (Figure 1) (D. Moen pers. comm.).

The Columbia River as Organizing Principle

In the 19th century numerous condor records were concentrated along the Columbia River (Figure 1), which to some extent may reflect the river as a corridor of human travel. However, the Columbia and other rivers of the Northwest produced an abundance of salmonids (salmon and steelhead) year round, which condors used as a food supply, the river supported a dense population of human settlements with which foraging condors associated, and prevailing winds in the Columbia River Gorge gave mobility to foraging condors. According to native oral history, the Columbia also provided the condor with nesting sites.

Observations of condors in the Columbia River’s watershed extended inland to its headwaters in British Columbia, the Snake River in Idaho, and other tributaries such as the Willamette and Cowlitz (Figure 1, Appendix A). Transmontane sightings in Alberta and Montana can perhaps be best understood as an extension via passes across the continental divide (by a
route also used by the fur traders): the 90 km from the Columbia's headwaters to the Bow River near Calgary (the site of Fannin's observation) would present no obstacle to a foraging condor (Koford 1953).

Concurrent Declines of the Condor in California and in the Northwest

In the 19th century, the California Condor disappeared from county after county in California (Cooper 1871, Leach 1929, Willett 1931, Koford 1953:18,39-46, Wilbur 1978:57-69). Despite the establishment of protected areas, its numbers continued to decline through the 20th century because of lead and other poisons in the environment (Snyder and Snyder 2000, Mee and Hall 2007), and from 1985 to 1987, the remaining 27 individuals were taken into captivity for their protection (Snyder and Snyder 2000). In the Pacific Northwest, condors seem to have diminished in the late 19th century, a few persisted into the 20th century, perhaps in wilderness refugia, and the species declined to extirpation by the second half of the 1900s; the last sightings were in 1965. It thus appears that the condor’s decrease in the Northwest paralleled that in California.

A concurrent decline implies either that the condors in the Northwest and in California consituted one population, in which case a significant decline in California would also result in a decline in the Pacific Northwest, or, if the northwestern population was resident and independent, as appears to be the case, that the factors responsible for the decline were common to both regions.

Implications of the Condor–Human Association

The association between foraging condors and humans in the Pacific Northwest parallels that in California, where condors were “not averse” to foraging near humans or buildings (Koford 1953). “Flying condors show little fear of man and will often approach closely” (Wilbur 1978:35). “Despite their reputation as exceedingly wary birds, California Condors are often tame and inquisitive” (Snyder and Rea 1998:35). California Condors did not or do not avoid even nesting close to roads and trails in California (Snyder et al. 1986). Condors were evidently rewarded with food as a result of their association with humans, in the form of salmon offal at Indian villages, fresh carcasses of big game, and later, after white settlement, domestic animals. Condor bones from a native American midden at The Dalles have been carbon-dated at 4000–8000 years before present (L. H. Miller 1957, Hansel-Kuehn 2003), indicating that the relationship between the condor and people was of long standing, and the condor’s foraging behavior may have been genetically selected. The condor–human association is probably properly understood as an extension of the evolutionary relationship between the condor and the megafauna that was the major part of its food supply in the Pleistocene (Emslie 1987). But even if merely learned, the association was clearly an advantageous and adaptive component of the condor’s foraging niche. It was only after Euro-Americans introduced lead ammunition and poisons to kill predators and rodents that the condors’ association with humans became maladaptive, and some of their foraging strategies became dangerously dysfunctional.
Association with Salmon

The condor’s year-round presence in the Pacific Northwest reflects the year-round abundance of salmon, “in all 13 moons” (K. K. Smith pers. comm.), even winter (e.g., Aguilar 2005, B. Bakke, Oregon Native Fish Society, pers. comm.). “In the fall of the year after spawning time the old salmon would die and millions of them would float down the river.” (Aguilar 2005:120). The significantly higher than expected number of condor observations in the fall would be expected if salmon were more abundant in the fall. Live salmon were not more abundant in the fall, but because some spring and summer runs do not spawn until fall, salmon were more available then (Aguilar 2005, M. Newsom, Bureau of Reclamation, pers. comm.). Condors fed on both dead and live salmon, and the abundance of dead salmon, or of live and dead salmon combined, is consistent with the greater number of observations in the fall and with the statement that “the California vulture visits the Columbia River in fall, when its shores are lined with great numbers of dead salmon” (Cooper and Suckley 1860, Peale 1848).

It seems unlikely that a shortage of salmon caused the disappearance of the condor from the Northwest, which occurred largely before salmon populations began to reach their lows in the mid 1900s. However, given the apparent importance of salmon in the condor’s diet in this region, condors and their reintroduction into the Pacific Northwest would benefit from restoring salmonids in the Columbia River basin. Unfortunately, the Columbia River has been so extensively re-engineered for hydroelectricity, irrigation, and transportation (Harden 1996) that “nearly every population of naturally producing anadromous salmonids in the Columbia River Basin is now listed (or is a candidate for listing) under the [Endangered Species Act]” (U.S. Fish and Wildlife Service 2005). Some runs are extinct; for example, fall coho (Oncorhynchus kisutch), and dog salmon (O. keta) on the Wind River (Aguilar 2005), where Lewis and Clark first encountered the condor in October 1805. Despite federal agencies having been enjoined by the courts to restore endangered salmon populations, management of salmon in the Columbia River remains an unresolved issue.

Lead and Poisoning as Causes of Decline

Snyder and Synder (2000) discussed the significance of lead contamination of the condor’s food as a factor in its mortality. Church et al. (2006) confirmed that ingestion of lead from ammunition in carcasses of animals killed by hunters is the cause of most of the elevated levels of lead now found in the condor’s blood, and Cade (2007) stated, “lead exposure, indicated by blood samples, is [now] virtually ubiquitous among free-flying condors...an unmanaged, self-sustaining population probably cannot exist.” In the Pacific Northwest, condors fed on deer and elk killed by hunters, implying they were regularly exposed to lead in this region as well. The data from the Northwest are thus consistent with Snyder and Snyder’s inference (2000:252) that condors were exposed to lead poisoning for two centuries, with lethal consequences for both the California and Pacific Northwest populations.

As a wilderness, the Grand Canyon of Arizona was chosen as the “perfect” site for establishment of a second condor population as insurance against the adverse effects of human development in southern California (Rea
1981, Nielsen 2006:192). But foraging habitat in the surrounding area was contaminated, and condors released in the canyon experienced an annual mortality rate of 47%, primarily from lead poisoning (www.arizonaes.fws.gov, Nielsen 2006). A decision based on the characterization of the condor as a wilderness species unwittingly led to its introduction into a contaminated environment.

Poisons (strychnine, cyanide, and sodium fluoracetate or 1080) intended for large predators killed many condors (Snyder and Snyder 2000, contra Wilbur 1978). The foreman of the Tejon Ranch, a major area for the condor’s foraging in California, stated that “before this poisoning was done [in the 1870s], both wolves and condors were plentiful in the Tejon country” (Snyder and Snyder 2000), a statement almost identical with that of Wilcox (1918) in Idaho (Appendix B). The problem of poisoning persists: for example, in June 2006, up to 10 of 13 captive-reared and released condors were poisoned by an effort to control ground squirrels near Salinas, California (Monterey County Herald, 20 June 2006). In India and Pakistan, 98% of the vulture population has disappeared because of diclofenac poisoning (Green et al. 2004, Gilbert et al. 2006). In South Africa in 1984, “a single strychnine-poisoned cow carcass killed 42 Cape Vultures (Gyps coprotheres)...ten percent of the total population” and “a single dead cow in Botswana was found with 79 poisoned vultures dead nearby” (Mundy 1983). “In 1979 one poisoned elephant carcass in Caprivi [Namibia] killed six lions and 150 Cape Vultures...vultures collect in large numbers at a single feeding site, and come...from a considerable distance, [so] an isolated poisoning event can have a devastating influence on vulture populations over a whole country” (Houston 2001:62). At the Patuxent Wildlife Research Center tests of sodium fluoracetate fed to captive Turkey Vultures revealed a range of lethal and sublethal effects (Eisler 1995) including lethargy and incapacity. In the field, 1080 was the “preferred method of control” when ranchers killed thousands of Black and Turkey Vultures in Texas during 1950s (Parmalee 1954). Lethal and sublethal effects of 1080, lead, and other toxins, alone and in combination, may account for some of the “quantitatively conspicuous” rate of predation of reintroduced condors (Mee and Hall 2007:252).

Estimates of the deer population (550,000), harvest (50,000) (P. Test, Oregon Dept. Fish and Wildlife, pers. comm.), and losses to crippling suggest at least 1% of the carcasses available to condors in the Pacific Northwest are contaminated. This figure is similar to estimates of the rate of diclofenac contamination of ungulate carcasses available to the White-backed Vulture (Gyps bengalensis) in Asia, 1–3% (Gilbert et al. 2006) or 0.13 to 0.77% (Green et al. 2004), which were sufficient to cause a loss of 98% of that population. An early impression of loss to crippling can be gained from Lewis and Clark in 1806: “About noon 7 of our hunters returned with 8 deer; they had wounded several others and a bear but they did not get them” (Lewis and Clark 1990, vol. 8:22–23). From 1 December 1805 to 20 March 1806, the Lewis and Clark party consumed 131 elk and 20 deer, presumably crippling many more (Gass 1904:169, Lewis and Clark 1990, vol. 7:25, Ordway 1916:366). Since Lewis and Clark, continuous exposure to lead contamination seems sufficient to have caused the relentless decline and eventual extinction of the condor in the Pacific Northwest.
To my knowledge, there are no studies under laboratory or field conditions that have examined the combined effect on the condor of lead and other poisons.

Mortality from Collecting

Wilbur (1973, 1978) suggested that the northwestern condor population was small enough to have been exterminated by collectors, but the number of documented specimens taken in the Northwest was only 13, too few to explain the disappearance of even a small population. Furthermore, Tolmie’s observations in 1833 of groups of condors at deserted Indian villages (Tolmie 1963:185) are inconsistent with the hypothesis that the collecting in the first three decades of the 19th century (10 specimens) exterminated the condor along the Columbia River. In California the number collected was actually small, seven by 1860 (Wilbur 1973, 1978), yet the species was already extirpated from several counties; that is, the decline of the condor in California was well underway before scientific collecting peaked at the end of the 19th century. Furthermore, the decline continued throughout the 1900s after collecting of condors ended. Population declines in California, however, did coincide with the pervasive use of lead ammunition and poisoning for predator and rodent control. That condors were disappearing from the Pacific Northwest and California simultaneously suggests a common factor, but that factor doesn’t appear to have been collecting.

Reintroduction

Condors have been reintroduced into southern California, Arizona, and Baja California. High mortality has plagued reintroductions (www.arizonaes.fws.gov, Nielsen 2006), and productivity has also been low. Lack of uncontaminated food has been problematic (J. Grantham, D. Clendenen, G. McMillan, N. F. R. Snyder, pers. comm.). Factors responsible for mortalities were eliminated neither before nor since reintroductions began in 1992, even though Snyder and Snyder (2000) insisted that it was “axiomatic” that poisons in the condor’s food be eliminated before captive-reared condors are released into contaminated landscapes. Only by regular recapture and chelation of lead (Meretsky et al. 1999, Snyder and Snyder 2000) and by surgical removal of microtrash from the stomachs of chicks (Walters et al. 2008), can reintroduced condors be protected to some extent from life-threatening contamination.

The condor has an extensive record in northwestern North America, and a strong and competitive case can be made for reintroduction here. The paleontological record is proof of condors’ long-term presence in the region, cultural connections between the condor and northwestern native American tribes were rich and diverse, and there seems to be no shortage of nesting sites or food. But would the Pacific Northwest provide a functional, life-sustaining habitat for the condor’s foraging, or an environment that is life-threatening? It is as “axiomatic” here as elsewhere that the factors that caused the decline and extirpation of this population need to be addressed and corrected before an attempt to re-establish the condor in the Northwest.

The association between condors and humans was beneficial and adaptive, the condor’s diets and ours overlap, and lead and other environmental
contaminants that are lethal to condors are also a public health problem (Davis 2002, 2007). Eliminating such limiting factors as lead in the environment would benefit humanity as well as the condor. With public support, it is within the power and jurisdiction of the Environmental Protection Agency to effect such change. Past strategies for condor management such as establishing sanctuaries and food subsidy have failed. It seems to me that a more effective way, perhaps the only way, to protect the California Condor is for managing agencies and the public to recognize that protecting the public health and the recovery of the condor are related and to address both at the same time.

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Crossing paths with Ken Kachia Smith on Larch Mountain after a snowstorm kindled my interest in the California Condors of the Pacific Northwest. Condor researchers and observers shared their sightings and findings, and native Americans trusted me with their oral histories. I have benefited from the enthusiasm of anthropologists for this mainly ornithological project. Jack Nisbet, author of Visible Bones, Victoria Hansel-Kuehn, Mary Schlick, and Eugene S. Hunn blazed a trail to information that I may not have discovered. Janet Hinshaw at the Wilson Ornithological Society’s library located references for me over 4 years. J. Casey, W. Williams, and R. G. Ford of ECI, Inc., prepared the map, and N. L. Young prepared the graphs. The comments of colleagues and of reviewers Alan Contreras and Amadeo M. Rea improved the manuscript. I financed this research, and this paper is Ecological Perspectives Contribution 4 in the Public Interest. It was as though this work were a community effort, and indeed it was. I am fortunate that the condor became my purpose and focus for the past several years.

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Appendix A. Source data for Figures 1–3.

A. Fossils and prehistoric material

Indian midden, Five Mile Rapids, near The Dalles, OR: minimum of 63 individual condors (L. H. Miller 1957); radiocarbon dates from 8470 ± 190 and 8770 ± 230 years before present (Hansel-Kuehn 2003).

Indian midden, southern Oregon Coast, 10 km north of Brookings, OR: one condor radius (A. H. Miller 1942).

Native village site, Pender Island, BC, tarsometatarsus, radiocarbon date 2900 BP (Rebecca Wigen, University of Victoria, pers. comm. Feb 2006).

B. Native American oral history

Ellen Saluskin. Early 1800s, probably autumn, Sahalie-Tyee Lake, Indian Heaven Wilderness, Gifford Pinchot National Forest: “Ellen Saluskin’s great grandfather saw a ‘huge black bird’ that landed and began to devour a half-dressed deer. ‘It had eyes like fire. It appeared enormous. Its beak was long and yellow and it was constantly opening and shutting its beak.’ He carried a condor tail-feather as talisman the rest of his life.” (Transcript of interview by Cheryl Mack, U.S. Forest Service archaeologist, Mt, Adams Ranger District, Trout Lake, WA, pers. comm. 22 May 2006; Mary Schlick pers. comm. 17 Mar 2006). Appropriation of freshly killed big game was characteristic condor behavior.

Nez Perce oral history. “Qu’unes [condor] said to be in the area of Seven Devils Mountains [wilderness] and Hells Canyon.” ID (Josiah Pinkham, Nez Perce cultural office, pers. comm. 2006).

Wyam shaman. 1910, vicinity of Celilo Falls, junction of Deschutes and Columbia Rivers, east of The Dalles: photo of shaman with condor wing feather(s) (Hines 1991: plate 5), Curtis photo North American Indians, vol. 7, folio plate 20 (www.memory.loc.gov/award/htdocs/ct07/ct07010v.jpg). Corroborates Wasco oral history of condors at Celilo Falls (K. K. Smith pers. comm. 2004, Aguilar 2005, D. Moen pers. comm.). Condor feathers were a symbol of earned power; they could not be obtained as an article of trade, and could be given only within a kinship group (K. K. Smith pers. comm.).

Lila Walawitsa, of Toppenish, WA, recalled on 14 February 1977 that her father spoke of pach’anahúy (condor) at Potato Hill, north of Mt. Adams, probably 1890s (E. S. Hunn pers. comm. Jan 2006). Note record from Smartlowit in same area in 20th century.

Nelson Wallulatum, chief of the Wasco: “I did find my original notes from the meeting with the Wasco elders. Nelson Wallulatum’s exact comment was: ‘We kept big [condor] babies in camps to keep thunder and lightning spirit from striking.’ 11/11/89. Warm Springs. That is taken directly from my handwritten notes, however in my transcription typed when I came home, I write: ‘Said they kept a chick tied in camp to keep away thunder and lightning spirits.’ I suspect that I would not have written that it was tied if he had not said that” (Mary Schlick pers. comm. 2006).

C. Specimens and sightings with locations or dates

Lewis and Clark Company

30 Oct 1805, confluence Columbia and Wind rivers, WA: “Scattered about in the river, this day we Saw Some fiew of the large Buzzard. Capt. Lewis shot at one, those Buzzards are much larger than any other of ther spece or the largest Eagle white under part of their wings” (Lewis and Clark 1990, vol. 5:356), “some turkey buzzards which had white under their wings” (Ordway 1916:306).

18 Nov 1805, mouth of Chinook River, Baker Bay, WA: “Reuben Fields killed a Vultur”; “Rubin Fields Killed a Buzzard of the large kind near the whale we Saw... measured from the tips of the wings across 9½ feet... wing feather 2½ feet, weight 25 lbs (Lewis and Clark 1990, vol. 6:66). Annotation inserted in 1810: ‘head in Peale’s Museum”
THE CALIFORNIA CONDOR IN NORTHEASTERN NORTH AMERICA

(not extant, see text). Gass journal entry 20 Nov: Clark had killed a “remarkably large buzzard, of a species different from any I had seen. It was 9 feet across the wings, and 3 feet 10 inches from the bill to the tail.” (Gass 1904:153). “One of the party killed a very large turkey buzzard which had white under its wings, and was nine feet from the points of its wings, and 3 feet 10 inches in length.” (Ordway 1916:311–312).

29–30 Nov 1805, Columbia River estuary (editor’s annotation “Youngs Bay”): “I observe... The large Buzzard with white under their wings Grey & Bald eagle.” (Lewis and Clark 1990, vol. 6:94).

3 Jan 1806, mouth Columbia River: “the beautifull Buzzard of the columbia still continue with us” (Lewis and Clark 1990, vol. 6:164).

16 Feb 1806, near mouth Columbia River: “Shannon an[d] Labiesh brought in to us today a Buzzard or Vulture of the Columbia which they had wounded and taken alive. I believe this to be the largest Bird of North America....” A lengthy account describes the bird in detail with a drawing of the head; the wingspread measured “9 feet 2 Inches,” weight 25 lbs but “not in good order,” maybe 10 lbs heavier when healthy (Lewis and Clark 1990, vol. 6:319–323); “killed...a new kind of Turkey buzzard” (journal entry for 17 Feb) (Ordway 1916:325).

16 Mar 1806, near Fort Clatsop: “Yesterday [15 Mar] while I was absent, getting our meat home, one of the hunters killed two vultures, the largest fowls I had ever seen. I never saw any such as these except on the Columbia River and the seacoast.” (Gass 1904:169); cf. “nothing else extraordinary!” (Ordway 1916:328).

28 Mar 1806, Deer Island, OR: “The men who had been Sent after the deer returned with four only, the other 4 having been eaten entirely by the Vulture except the Skin.” (Lewis and Clark 1990, vol. 7:25). “The grey Eagles are plenty on this Island. They eat up three deer in a short time which our hunters had killed some of the hunters killed Severall of them.” “J. Fields even reported to Lewis ‘that the Vultures had draged a large buck which he had killed about 30 yards, had skined it and broken the back bone.’” (Ordway 1916:333, editor’s footnote).

5 Apr, near Sandy River: “we saw...crows, eagles, Vultures and hawks” (Lewis and Clark 1990). Burroughs (1961:204–208) has listed all Lewis and Clark’s many encounters with eagles, additional demonstration of their familiarity with those species.

6 Apr 1806, Columbia River, OR, near Beacon Rock, 14 km above the mouth of the Washougal River: “Jos. Field killed a vulture of that Species already discribed” (Lewis and Clark 1990, vol. 7:88).”

9 Apr 1806, near Multnomah Falls, Columbia River: “we saw some turkey buzzards this morning of the species common to the United States which are the first we have seen on this side the rocky mountains.” (Lewis and Clark 1990, Burroughs 1961:204). Therefore, all “buzzards” and “vultures” seen by the Lewis and Clark party previously in the Northwest were the condor.

13 Jun 1806, near Weippe, ID: “About noon 7 of our hunters returned with 8 deer; they had wounded several others and a bear but they did not get them. In the evening Labish and Cruzatte returned and reported that the buzzards had eaten up a deer which they had killed butchered and hung up this morning.” (Lewis and Clark 1990, vol. 8:22–23). “All the meat except Labuches was brought in & that the ravens and buzzards eat while he was hunting a little more.” (Ordway 1916:366). Burroughs’ (1961:203–204) assumed that this observation referred to the Turkey Vulture, but more likely this encounter was with the condor.

**Alexander Henry, fur trader**

19 Jan 1814, Strawberry (now Hamilton) Island, Columbia River: “Some extraordinarily large vultures were hovering over camp” (Coues 1897, vol. 2:808).

25 Jan 1814, Pudding River, tributary to Willamette River, OR: “I sent for the eight deer killed yesterday. The man brought in seven of them, one having been devoured by the vultures. These birds are uncommonly large and very troublesome to my hunters, by destroying the meat, which, though well covered with pine branches, they contrive to uncover and devour.” (Coues 1897, vol. 2:817).
Alexander Ross and Donald McKenzie, fur traders

On or about 19 Sep 1817, northwest of Canoe River, BC: “Not far from Eagle Hill, we shot two grizzly bears and a bird of the vulture tribe” (Ross 1956:105); no specimen saved. The location is inexact: landmarks passed before the shooting included Canoe River on 10 Sep, 7 days travel to the southeast; latitude north of Turkey Vulture records; mid-September date is late for the Turkey Vulture in BC even on the coast. “Turkey Vultures do not occur regularly at the Canoe River, although [since the 1990s] there may be one or two sightings from there” (W. Weber pers. comm. Feb 2008).

October 1818, Snake River, ID, location imprecise: For details of McKenzie’s itinerary, see Nielsen (1940). On McKenzie’s “outward journey [to Idaho]...eagle and vulture of uncommon size fly about the rivers” (Ross 1956:137).

Winter 1819, Snake River, ID, location vague: “On our way back nothing to be seen but dreary and forbidding winter, the leafless forests and snow-clad hills with scarcely an animal to attract attention, except a wolf or fox which now and then crossed our paths, or an eagle or vulture watching their prey about rapids when open water was still to be seen” (Ross 1956:137). McKenzie left the Boise River in Jan 1819, and after 600 miles on snowshoes arrived back at Ft. Nez Perces, Walla Walla River, in Apr 1819 (Ross 1956, Nielsen 1940).

John Scouler, botanist. 22 Sep 1825, near Ft George (Astoria, OR), down-stream from Mt. Coffin: “obtained specimens of Pelecanus onocrotalus [presumably P. erythrorhynchos], Falco—and a species of Vultur, which I think is nondescript [i.e., undescribed]. My birds were principally obtained from the Indians, who would go through any fatigue for a bit of tobacco” (Scouler 1905). Location of specimen unknown (Wilbur 1978); tentatively proposed by Harris (1941) to be the specimen seen by Bonaparte in London in 1827.

David Douglas, botanist, explorer

Between 2 Jan and Mar 1826, near Fort Vancouver: “A species of Buzzard or Vulture (Sarcoramphos Californianus of Vigors) is the largest bird seen here except the Wild Swan. I killed only one of these interesting birds, but the buzzshot which went through its head spoiled the specimen” (Douglas 1904). “On the Columbia there is a species of Buzzard, the largest of all birds here, the Swan excepted. I killed only one of this very interesting bird, with buzzshot, one of which passed through the head, which rendered it unfit for preserving; I regret it exceedingly, for I am confident it is not yet described...When they find a dead carcase or any putrid animal matter, so glutinous are they that they will eat until they can hardly walk and have been killed with a stick. They are the same color as the common small buzzard found in Canada [east of the Rockies]. The feathers of the wing are highly prized by the Canadian voyageurs for making tobacco pipe-stems (Douglas 1959:152,154).

South of and inland from Columbia River, 3–4 km southeast of Larch Mountain (30 km east of Portland, OR): “Specimens, male and female, of this truly interesting bird [Vultur califorinianus, described in detail], which I shot in lat. 45.30.15., long. 122. 3. 12. [Larch Mountain] were lately presented by the Council of the Horticultural Society to the Zoological Society, in whose Museum they are now carefully deposited” (Douglas 1829). No date was given, but Douglas had climbed Lookout Mountain north of the Columbia River from 3 to 5 Sep 1825 (Douglas 1959), where he saw “hawks, eagles, and vultures” (in early September probably Turkey Vultures); he then (perhaps 6–7 Sep) ascended a mountain south of the river [Larch Mountain is directly across the Columbia from Lookout Mountain]; his journals report being in that vicinity on no other occasion. K. K. Smith (pers. comm. 12 Feb 2006) related to me a story passed down orally through his family for over 180 years, of four to six Wasco who guided Douglas via the Oneonta trail for 2 days to the back side of Larch Mountain [however, condors were not mentioned].

Willamette Valley, OR, 3 Oct 1826: “The Large Buzzard, so common on the shores of the Columbia, is also plentiful here; saw nine in one flock” (Douglas 1959:216). Wilbur (1978:109) wrote “condors ‘plentiful’ on Umpqua River, Oregon, 3 Oct
1823—nine seen in one flock,” but the date and location are in error: Douglas did not arrive in the Northwest until 1825, and on 3 Oct 1826 (not 3 Oct 1823) he saw the nine condors in the Willamette Valley, not the Umpqua.

10–15 Oct 1826, Umpqua Mountains: “Several species of Clethra were gathered—one in particular, C. grandis, was very fine—and many birds of Sarcoramphos californica and Ortyx californica, and two other species of great beauty were collected.” (Douglas 1959:67). Douglas wrote two accounts of his journey, one an abbreviated sketch summarized by week or month, and a daily journal. The above quotation is from the sketch; grammatically ambiguous, it is the source of Harris’ (1941:20) and Koford’s (1953:8) inferences that Douglas collected a condor in the Umpqua. The more detailed daily journal refers pointedly to Clethra and a specimen of the quail, which was new to him, but makes no mention of condors in the period 10–15 Oct, presumably because he had previously described his encounters with condors and they were no longer the focus of his attention. In his publication on the condor, Douglas (1829) did not mention a specimen from the Umpqua, though he lost much of his collections from this trip in the Santiam River while returning to Fort Vancouver in Nov 1826.

23 Oct–4 Nov 1826, Umpqua River: Douglas’ journal for February 1827, in a periodic summary of what he knew about the occurrence of condors, stated “great numbers seen by myself on the Umpqua river” (Douglas 1959:241), though his actual daily journal for that period did not mention condors. Details included, “Feeds on all putrid animal matter and are so ravenous they will eat until they are unable to fly.... Their flight is swift but steady, to appearance seldom moving the wings; keep floating along with the points of the wings curved upwards. Of a blackish-brown with a little white under the wing; head of deep orange color; beak of a sulphur-yellow; neck, a yellowish-brown varying in tinge....” (Douglas 1959).

23 Oct–4 Nov 1826, Umpqua: “great numbers” of condors seen in the Umpqua area by fur trader McLeod, summarized in February 1827 (Douglas 1959:241), not in the daily journal. McLeod had separated from Douglas and traveled from the mouth of the Umpqua as far south as the Coquille and Elk rivers (Douglas 1959:228-233). (On this journey, Douglas’ primary purpose was to find sugar pine, Pinus lambertiana, in the Umpqua River area.) There is no first-hand report of McLeod’s findings, but Douglas reunited with him two weeks later. McLeod was traveling with Douglas when condors were seen on 3 Oct and 10–15 Oct 1826, and was himself therefore familiar with the species.

Feb 1827, Fort Vancouver, WA: “Killed a very large vulture, sex unknown.” (Douglas 1959:241); Barnston, the company clerk, stated “spring”; wingspan of the specimen measured 9’; the winter of 1827 was hard and many condors were seen (Fleming 1924).

“I have met with them as far to the north as 49° N. Lat. in the summer and autumn months” (Douglas 1829:329). No specific inland Columbia River locations were mentioned in his journal. A location “as far to the north as 49°” would not have been west of the Cascades, which Wilbur (unpubl. data) thought likely, because Douglas apparently did not travel north and west of the Cascades until 1833; the location in question was therefore probably the Columbia River east of the Cascades near the Canadian boundary, where in 1827 he was following the fur traders’ “express” route to eastern Canada.

Peter S. Ogden, fur trader. Nov 1830, downstream near Fort Vancouver: “Intermittent fever” (malaria) was “the single most important epidemiological event in the recorded history of...Oregon” (Boyd 1999:84); it arrived on the Columbia River in summer 1830 and lasted through November. McLoughlin (1948, letter number 134) wrote that by mid-October it had “carried off three fourths of the Indian population in our vicinity” [Fort Vancouver]. The epidemic recurred every year until at least 1834 (McLoughlin 1948, Boyd 1999). Ogden, sick with malaria in mid-October, after convalescing, probably in late October or November, visited two villages downriver, probably Multnomah and Clannahquah (Boyd 1999:232). He wrote of “utter destruction [by malaria] of every human inhabitant...why linger those foul birds around
the spot, gorged, and scarcely noticing my presence?... Let these unburied [human] carcasses resolve the question” (Ogden 1933:69). Wasco oral history identifies the “foul birds” as condors: “During the worst years [of the plague of the 1830s], some people could no longer bury or take care of their dead. The victims of these diseases fattened the huge Thunderbirds” (Aguilar 2005:12).

**William F. Tolmie, physician, fur trader, scholar**

19 May 1833, on Columbia River downstream from Sauvie Island, Tolmie had “coasted along right bank, on which several small vultures seen, tearing their prey” (Tolmie 1863:182).

21 May 1833, the malaria epidemic still virulent, 2 miles up Jolifie (“Pretty-girl”) River, presumably the Kalama River (Cowlitz Co., WA; Meany 1923:126), tributary to the Columbia, at the site of Callamaks, a deserted village formerly with 200 inhabitants (Boyd 1999:240), Tolmie’s party “scared some large vultures and crows from their feast” (Tolmie 1863:185).

22 May 1833, Cowlitz River, about 18 river miles from mouth, near the “forks of the Cowlitz” (junction with Toutle River, Cowlitz Co., WA): “Arrived about 11 at a deserted Indian village and startled some large vultures, who hovering above at length perched on the neighboring trees, awaiting our departure...fired twice at vultures” (Tolmie 1863:186). The Columbia River epidemic included the Cowlitz (Boyd 1999).

Nov 1834, Fort McLoughlin, BC, near present-day Bella Bella: “Monday, November 24: After breakfast went to the lake, coasted it in the canoe through... What I suppose a large species of vulture at the north end, along with some white headed eagles attracted probably by dead salmon.” (Tolmie 1863:293). Tolmie was a meticulous observer, interested in flora and fauna, medicine, science, agriculture, native culture and languages. He also commented on the local Bella Bella natives’ belief that “thunderbirds” were the cause of thunder and lightning (Tolmie 1863:292).

**John Kirk Townsend, ornithologist**

Apr 1835, Willamette River Falls, near Oregon City, Clackamas Co., OR: condor shot and specimen preserved: “In a journey of exploration which I made to the Willamet, in the month of April, when the river was crowded with Salmon, making their way up against the stream, urged by an abortive instinct to pass the barriers of the thirty feet fall, I observed dozens of Turkey Vultures constantly sailing over the boiling surges, with their bare heads curved downwards as if in search of prey. As I gazed upon them, interested in their graceful and easy motions, I heard a loud rustling sound over my head, which induced me to look upward; and there, to my inexpressible joy, soared the great Californian, seemingly intent upon watching the motions of his puny relatives below. Suddenly, while I watched, I saw him wheel, and down like an arrow he plunged, alighting upon an unfortunate Salmon which had just been cast, exhausted with his attempts to leap the falls, on the shore within a short distance. At that moment I fired, and the poor Vulture fell wounded” (Townsend 1848).

No date, Fort Vancouver, WA: “I once saw 2 near Ft. Vancouver feeding on the carcass of a pig that was dead,” in letter to Audubon (Audubon 1839).

Spring and summer, 1835, Columbia River: seen “in abundance” (Townsend 1848). See also Records without Locations or Dates.

**Titian Peale, naturalist with the United States Exploring Expedition**

Sep 1841, Willamette River, OR: “Cannot be considered a common bird in Oregon; we first saw them on the plains of the Willamette River...much more numerous in California, from the fact that the carcasses of large mammals are more abundant, which they certainly prefer to the dead fish on which they are obliged to feed in Oregon and all the countries north of the Spanish settlements...” (Peale 1848, www.sil.si.edu/digitalcollections/usenex/). “Plains of the Willamette” refers to the grasslands as far south as Eugene, which the Indians burned to set back or retard succession to forest (D. B. Marshall pers. comm. Nov 2005).

24 Sep 1841, north of Rogue River, OR (the next day Peale reached the Rogue River): “We saw today golden wing woodpeckers (red var.), Ravens, Crows, Stellar
and Florida Jays, California Vultures, and a few larks. The country was mostly burned by the Indians” (Peale 1957).

**Pierre-Jean De Smet, Catholic priest.** Week of 4 Sep 1845, Canoe River, source of the Columbia River, Canadian Rockies, interior British Columbia: “On arriving at the two lakes, I saw them covered with swarms of aquatic birds—coots, ducks, water-fowl, cormorants, bustards [Canada Geese], cranes, and swans; whilst beneath the tranquil water lay shoals of salmon in a state of exhaustion....I saw them pass in great numbers, cut and mutilated, after their long watery pilgrimage among the rapids...In the absence of man, the grey and black bear, the wolf, the eagle, and vulture assemble in crowds, at this season of the year. They fish their prey on the banks of the river, and at the entrance of the lakes” (De Smet 1978:130–131). The probability of the Turkey Vulture occurring in the Canoe River area, or at that latitude, at any time of year, is almost nil (W. Weber pers. comm. Feb 2008).

**Roselle Putnam, pioneer settler.** Winter 1851–52, upper Umpqua River, near Yoncalla, OR: “the largest wild bird in the country is the vulture which is only an overgrown buzzard...I saw one measured which I think was between ten and eleven feet from the point of one wing to the point of the other” (Putnam 1928, letter of 9 Feb 1852). In a previous letter, she commented on the poisoning of wolves: “there has been a great many of them killed this winter [1852], in this neighborhood with strychnine, Charles [her husband] put out upwards of 30 doses of it, and I suppose every one killed a wolf...have seen two that died near the house.” It is likely this condor was poisoned, not shot as stated by Wilbur (1978:72).

**James G. Cooper, ornithologist.** 1854, lower Columbia River: “In January 1854, I saw, during a very cold period, a bird which I took for this [a condor], from its great size, peculiar flight, and long, bare neck, which it stretched out as it sat on a high dead tree, so as to be scarcely mistakable for any other bird” (Cooper and Suckley 1860:141).

**T. E. Wilcox, brigadier general, surgeon, U.S. Army.** Fall 1879, Boise City, ID: “In the fall of 1879 I came upon two which were feeding on the carcass of a sheep. They hissed at me and ran along the ground for some distance before they were able to rise in flight. They were much larger than turkey buzzards, with which I was quite familiar, and I was very close to them so that I could not be mistaken in their identity. The cattle-men said that the California vulture or buzzard was not uncommon there before they began to poison carcasses to kill wolves” (Wilcox 1918).

**John Fannin, curator, Royal British Columbia Museum**

Sep 1880, Burrard Inlet, Vancouver, BC: “In September, 1880 I saw two of these birds at Burrard Inlet [mouth of Fraser River]. It is more than probable that they are accidental visitors here” (Fannin 1891).

Sep 1896, Bow River valley, between Calgary and the Rocky Mountains, Alberta: “two fine condors” seen; “I was not aware that this bird was found east of the Rocky Mountains, or so far north” (Fannin 1897). Because of multiple Blackfeet and Cree records of omak sani taul (CONDOR) in Alberta and Montana, including physical evidence (Schaeffer 1951, see below), Fannin’s observation can no longer be considered “startling” (Harris 1941) or deserving of being dismissed for lack of specimen (Macoun and Macoun 1909).

**C. Hart Merriam, Division of Economic Ornithology and Mammalogy, U.S. Department of Agriculture.** 30 Sep 1897, Coulee City, Grant Co., eastern WA: “In the early morning of September 30, 1897, Dr. Merriam saw a condor on the ground in open country a few miles east of Coulee City” (letter to S. G. Jewett, 4 Jan 1921) (Jewett et al. 1953:160). No details provided; observer’s competence and authority credible.

**George and Henry Peck**

Jun 1903, near Drain, Douglas Co., OR: George Peck saw 2 condors on 1 Jun 1903 “at great height and I could not have identified them if I had not often seen them in Los Angeles County, Cal” (Peck 1904). “Several” condors seen during June
(Peck 1904). Two condors flying high on 4 July 1903, related by Henry Peck, son of George, to Finley (1908); this may be a duplicate of the 1 Jun record, and is not mapped or graphed.

March 1904, near Drain, OR: H. Peck, “I saw 4 condors which were very close to me, almost within gun shot. I recognized them first by their size, and second by the white feathers under their wings” (Finley 1908). Finley, familiar with nesting condors in California, wrote that the Pecks were “both reliable ornithologists, and both well-acquainted with the bird in southern California.”

Late 1800s or early 1900s, coast of southern Oregon: H. Peck reported to Finley that a condor was “killed on the coast of southern Oregon a number of years ago” (Finley 1908).

**John Keast Lord, naturalist.** “Mouth of Fraser River” no date; “During his wanderings in British Columbia, Lord (1866) recorded this species at the ‘mouth of Fraser River’” (Campbell et al. 1990). Details sparse (Fig. 1).

**Samuel N. Rhoads, ornithologist.** “Seen on Lulu Island, no date, as late as ‘three or four years ago’ [late 1880’s] by Mr. W. London. ‘None seen since, used to be common.’” (Rhoads 1893). No information on London, I am relying on Rhoads. Sparse details (Fig. 1).

**Bill Brown, fire lookout.** 1930–1935, Umpqua Mountains, OR: As a young man, Brown worked summers (1 Jul–15 Oct) at fire lookouts in the Umpquas, at White Rock (23 km ENE of Myrtle Creek), Dutchman Butte (11 km SW of Canyonville), Silver Butte (31 km W of Canyonville), and “N. Sis” (probably North Sister, out of the Umpquas), saw single condors “multiple times” flying below the level of lookout tower; observed ruffs, white wing markings; lookouts at neighboring towers radiophone each other to “pass off the sightings from one tower to the next”; he met and talked to Jack Nisbet, author of Visible Bones, at meeting of Spokane Audubon Society, 4 May 2005; Nisbet, skeptical and not easily persuaded, found his account “convincing” and Brown well-informed and knowledgeable about the Bald Eagle (J. Nisbet pers. comm. Feb 2006, Feb 2008). I have not identified the site of the “N. Sis” lookout (not identified at www.firelookout.com/or.html but presumably near the peak North Sister), though according to a somewhat vague oral history, condors were known from the Three Sisters area (K. K. Smith pers. comm.). The other three sites are in southern Douglas Co.

**Jacqueline Cook.** Mid-1930s, Columbia River, Colville Reservation: Jacqueline Cook’s father, a rancher, saw a condor on Columbia River, between Coulee and Chief Joseph dams, near the latter, the Coulee Dam under construction (M. Schlick, friend of informant, author and authority on native basketry of Columbia River Indians, pers. comm. May 2006). No descriptive details available. Note Merriam 1897 observation in same area (above), and 20th century observations in eastern Washington by native Americans (below).

**Josephine Andrews Smartlowit.** 1920s and 1940s, Mt, Adams, WA: born 1914, she saw pachanahoo or canahoo (condor) as a child (thus 1920s) at Howard Lake, northeast of Mt. Adams; “last time I saw it when G. M. living; camping at Howard Lake, Jim Kwial and Otis Shiloh saw it”; when she was 28–30 years old (thus 1942–1944); “bald headed, like turkey but smoother; like k’shpali (Turkey Vulture)... much bigger than k’shpali but almost same; black and brown; no white on wing; sitting on horse, he could look you in eye standing.” From interview 11 May 1977 with E. S. Hunn, Department of Anthropology, University of Washington, Seattle (pers. comm. Jan 2006).

**James Fraser, Sto:lo First Nation.** about 1935, north of Spuzzum, Fraser River, BC: saw “a large bird,” “bigger than an eagle,” (Sonny McHalsie, biologist, Sto:lo Nation, pers. comm. Apr 2006). Details sparse.

**Ken Kachia Smith, Wasco tribe, Corbett, Oregon:**

Early summer, 1950s, east slope of Mt Jefferson OR, on the Warm Springs Reservation: Smith saw 3 condors at close range, “each perched on a different limb” of a large snag 150 feet away; after seeing them he came upon a winter-killed elk in a
snowbank on a north-facing slope, on which a flock of ravens, 3 Bald and 2 Golden Eagles were feeding, Turkey Vultures also present. Of the condors, he noticed large size, bald head, some of the bare neck; he stated emphatically they differed from Turkey Vultures (pers. comm. 2004).

1950–1965, upper Clackamas River: as a young man, Smith fished for salmon in that area every summer, during the time when new logging roads were beginning to open up the country. He regularly saw up to 4 condors at close range, sitting on boulders in the river, half a mile east of its junction with Collawash; noted white in wings, large size, that “sometimes they’d flush, and had difficulty getting up, flew against the wind coming upriver”; also mentioned seeing Mountain Goats (Oreamnos americanus) that used to be in the area (pers. comm. Feb 2008).

1950s, Mt. Hood: 2 or 3 seen on several occasions in higher-elevation meadows. Smith was familiar with birds from raptors to songbirds and with the area’s geography and Wasco oral cultural history (pers. comm. 2004).

John Krussow, surveyor (retired), Mt. Hood National Forest, resides Hood River, OR. Dec 1964–Mar 1965, Mt. Hood, upper Clackamas River area: 3 condors seen daily for 4 months, as many as 70-80 sightings, roosting in the morning on a rock outcrop overlooking the Collawash River; necks long, bare; heads red-orange-yellow, neck paler; did not note any birds with brown heads; huge size, “magnificent,” larger than the Turkey Vultures he saw on a visit to the site with D. Moen and me in Sep 2006; stated that wings were held outstretched, drooping, little white noted; said they seemed to be testing the air for lift; left roost 9:00–9:30 when the wind “seemed right,” jumped off and dropped 75 feet before “catching” the air; flew off to southeast toward Mt Jefferson. Area loggers were aware of the birds and called them by name, “the California Condors” (pers. comm. 6 May, 9 Sep 2006).

Blackfoot and Cree records of omaxsapi’tau (“big eagle”) in Montana and Alberta, per interviews in 1940s by Schaeffer (1951): Of 19 observations, 11 mapped, 8 discarded.

Raven (Big Crow): winter 1897, Little Badger Creek, Blackfoot Indian Reservation, near Browning, MT: “immense dark-colored bird with a feathered ruff and bald head”; from a distance, thought at first it was a cow; numerous accounts, this one from Richard Sanderville, age 82 about 1945; the year 1897 “became known as ‘that in which Big Crow saw the omaxsapi’tau’”; “Big Crow was not familiar with the species or with its native name” at the time (Schaeffer 1951:183).

George Bull Child: about 1908, Blackfoot reservation: 2 or 3 seen, “dark in color and about 4 feet high” (Schaeffer 1951:183).

Lewis Bear Child, a Piegan, stated that “about the period 1907–08 some Gros Ventre Indians of the Fort Belknap Reservation wrote Piegan friends that a great bird had been sighted in their part of north-central Montana”; considered a bad omen—next year an earthquake occurred (Schaeffer 1951:183).

Piegan elders: “Older Piegan, in 1945 or thereabouts, identified the species by its native name and recalled that it had visited the region at an earlier period” (Schaeffer 1951:183). Location vague.

Chewing Black Bones: According to his father Tail Feathers Coming Over a Hill, on a raid against the Crow, west of Crow reservation, southeastern Montana, 1860s, Chewing Black Bones reported seeing “a very large bird flying directly before them. Its wingspread and length of tail exceeded those of the eagle.... Heavy Runner...warned his companions, saying ‘I have never seen a bird of this kind....We had better turn back’... Most of the party...returned home. Of the six that continued on, five were killed.... Chewing Black Bones believed that the bird’s appearance...was prophetic of misfortune.” “Since Heavy Runner was killed in the Baker Massacre of 1870, the date of this raid may be set in the 1860s” (Schaeffer 1951:184).

Dog Takes a Gun, then age 85 (1945) born on Blood Reserve in Alberta, “recalls his parents’ account of an omaxsapi’tau near Calgary shortly before the time
of his birth (1860s). . . great size . . . emphasized. In feeding it was said to lean forward so far that is breast nearly touched the ground. A tail feather described as about 2 feet in length, was dropped by this particular bird in flight and picked up” (Schaeffer 1951:184). “Wing of another ‘big eagle’ killed in this region equaled, when fully extended, the distance from a man’s shoulder across his chest to the fingertips of his opposite outstretched arm (about 4 feet) . . . in the possession of a Calgary curiosity dealer in Calgary some 10 years ago, about 1935 (Schaeffer 1951:184).

Rides at the Door (age 87), Piegan warrior, “one of the few surviving Piegan with a record in intertribal warfare, is said to have seen ‘a big eagle’ while raiding for horses (mid-1800s) somewhere to the south” (Schaeffer 1951:184). Location vague.

Harry Under Mouse related that his grandfather White Bear, a Cree who lived with the Blood tribe of the Blackfeet in Alberta, and died 1905 about age 83 (born about 1820), was a conjuror and eagle trapper who used to trap and kill eagles for feathers for ceremonial purposes “in the region south of Edmonton.” About 1850, an immense bird circled his pit trap, landed, and warily approached the bait (a stuffed coyote skin), but he was afraid of it, so he took a stick and frightened it away. “Later he described it as the largest bird he had ever seen. It was dark in color with brown-striped tail feathers. Its head and hooked beak were large and its legs coarsely scaled.” (Schaeffer 1951:184–185). Note the size relative to the Golden Eagles he was accustomed to trapping and handling. Harry Under Mouse saw the stuffed body, wings and tail of a condor used as regalia in Grass Dance, kept by group of Cree, from the Hobbsena Reserve south of Edmonton, Alberta “as late as a decade ago” (or about 1935) (Schaeffer 1951:187).

Big Eagle. Alberta Blood tribe of Blackfoot, fasted on Devil’s Head Mt., northwest of Calgary, Alberta, had vision and omatsapi’tau power, which he used against enemies. He carried a condor’s tail feather throughout life; after he died in 1925, the feather came into possession of Small Eyes, “a prominent ritualist,” as told by Harry Under Mouse (Schaeffer 1951:187). Note the man’s assumed, earned name, Big Eagle, that is, “condor.” Devil’s Head in the Alberta Rockies is near the headwaters of the Columbia, where Ross shot and de Smet observed vultures north of the range of the Turkey Vulture.

2. Records without locations or dates:

Charles Lucien Bonaparte: Specimen, early 1800s: “Cathartes California-nus. A specimen from the Oregan, the second known in any collection” (Bonaparte 1827:49, Harris 1941:19). “The Oregan” is the Columbia River.

David Douglas: From the Columbia River to the Snake River: “During the summer are seen in great numbers . . . from the ocean to the mountains [of Snake River] four hundred miles in the interior. In winter they are less abundant” (Douglas 1859:241). Douglas traveled extensively in eastern Oregon and probably to the Snake River, as did Hudson’s Bay trappers and traders.

John Kirk Townsend: Wrote to Audubon of his experience with condors, their “strutting over the ground with great dignity; but this dignity is occasionally lost sight of, especially when two are striving to reach a dead fish, which has just been cast on the shore” “On the upper waters of the Columbia the fish intended for winter store are usually deposited in huts made of branches of trees interlaced. I have frequently seen Ravens attempt to effect a lodgement in these deposits, but have never known the Vulture to be engaged in this way, although these birds were numerous in the immediate vicinity” (Audubon 1839).

Peter Simon Pallas (?) per Harris (1941): Prior to 1856, specimen in Paris Museum labeled “‘Aquis par échance du Musée St. Petersbourg en 1856’ . . . possibly was taken by Pallas. I infer this by the fact that there were several other birds here which were received in exchange the same year from the same source. They are all by Pallas from ‘Nord-Ouest Côte d’Amerique’ [northwest coast] . . . It is of course entirely possible that . . . the St. Petersburg specimen referred to above, even though a juvenile, may have been taken on the coast even farther north” (Harris 1941:19).
APPENDIX B. Sources and details of records of foraging summarized in Table 1.

**Bison:** (1) Blackfeet tribes, pre-contact, Montana, 1700s to mid-1800s: “the abandonment by hunters of bison bones and offals, which in fall supplied tallow and meat for the manufacture of pemmican, afforded a source of diet for the condor and other carnivorous creatures.” (2) Sanderville, a tribal informant, stated condors attracted by bison carcasses (Schaeffer 1951). (3) Piegam oral history: *omaxispitau* (“big eagle”) appeared infrequently in summer, attracted by remains of bison slain by the Indians on the plains (Schaeffer 1951).

**Hunter-killed deer and elk:** (1) Gifford Pinchot National Forest, early 1800s, Ellen Saluskin’s grandfather killed a condor attracted by an elk he had killed, carried a condor tail-feather as talisman the rest of his life (Cheryl Mack, Forest Service archaeologist, pers. comm.; Mary Schlick pers. comm.). (2 and 3) Deer Island, 28 Mar 1806, and near Weippe, ID, 13 Jan 1806: see Appendix A, part C, Lewis and Clark company. (4) 25 Jan 1814, Pudding River, tributary to the Willamette River: see Appendix A, part C, Alexander Henry. The Turkey Vulture was (and still is) absent from that area in winter.

**Winter-killed elk:** Eastern slopes of Mt. Jefferson, condors, Turkey Vultures, and eagles seen at close range feeding on an elk in melting snowbank, early summer, 1950s (Ken Kachia Smith, Wasco tribe, pers. comm.).

**Salmon:** (1) The Snoqualmie name for condor was *hed-e-lipsh*, “the one who breaks down the weirs” (salmon traps made of willows) (Turner 1976:52). (2) Fort McLoughlin, near present-day Bella Bella, British Columbia, 24 Nov 1834: see Appendix A, part C, William F. Tolmie. (3) Willamette River Falls, Oregon City, Apr 1835: see Appendix A, part C, John Kirk Townsend. Townsend also made two general observations, not included in Table 1 though possibly based on observations other than this account, i.e., “during the spring, I constantly saw the Vulture at all points where the Salmon was cast upon the shores, their extreme shyness uniformly prevented an approach to within gun-shot,” and “Their food while on the Columbia is fish almost exclusively, as the food is always found in great abundance near the falls and rapids” (Audubon 1839). (4) Townsend wrote to Audubon of the condor “strutting over the ground with great dignity; but this dignity is occasionally lost sight of, especially when two are striving to reach a dead fish, which has just been cast on the shore” (Audubon 1839). (5) Salmon as offal: The condor “is also met with near the Indian villages, being attracted to the offal of the fish thrown around their habitations.” (Townsend per Audubon 1839). (6) Canoe River, British Columbia, on or about 4 Sep 1845: see Appendix A, part C, Pierre-Jean De Smet. Two less specific accounts, not included Table 1: “The California vulture visits the Columbia River in fall, when its shores are lined with great numbers of dead salmon” (Cooper and Suckley 1860), and, Sep 1841, “Cannot be considered a common bird in Oregon; we first saw them on the plains of the Willamette River...much more numerous in California, from the fact that the carcases of large mammals are more abundant, which they certainly prefer to the dead fish on which they are obliged to feed in Oregon and all the countries north of the Spanish settlements” (Peale 1848).

**Human beings:** (1) summer–Nov 1830, near Fort Vancouver: see Appendix A, part C, Peter S. Ogden. And in May 1833, Tolmie (1963:185) “scared some large vultures [distinguished from “small vultures,” which he had seen earlier] & crows from their feast” not far from Ogden’s location. (2) H. Perkins, missionary stationed at The Dalles 1838–1844, recorded that Wasco slaves were “thrown to the dogs! The wolves sometimes...share the carcasse with them. Sometimes, however, it is but just to say, a delicacy of feeling, causes the corpse to be dragged to the river and thrown in, to become food at length for the greedy vultures” (Boyd 1996:279). “Nearly all the Wascos and some Sahaptans had slaves, and it is safe to assume that about 30% (a conservative guess) of the population of the Warm Springs were slaves” (Aguilar
2005:169); slaves received no burial. “Late winter/early spring...was a particularly bad time, mortality-wise” for northwest coast peoples, especially slaves (Boyd 1999:285). If slaves died mostly in winter (the “lean period”), as is probable, the vultures referred to would have been condors, not Turkey Vultures, which are absent from the Columbia River in winter.

**Domestic animals:** (1) George Barnston observed condors feeding on winter-killed horses at Fort Vancouver in Feb 1827 (Fleming 1924); (2) At Fort Vancouver J. K. Townsend “saw 2 condors feeding on a pig” (Audubon 1839); (3) Boise City, ID, on sheep: see Appendix A, part C, T. E. Wilcox.

**Domestic animal carcasses laced with poison:** (1) Upper Umpqua Valley, winter 1851–1852: see Appendix A, part C, Roselle Putnam. (2) Near Boise, Idaho, fall 1879: “The cattle-men said that the California vulture or buzzard was not uncommon there before they began to poison carcasses to kill wolves” (Wilcox 1918).

**Marine mammals and salt-water fish:** (1) The Nuu-cha-nulth, a nation of 13 native tribes on the outer coast of Vancouver Island, viewed the condor as the enemy of killer whales (Matthew Williams, tribal elder and author, pers. comm. 2005), and “orcas and thunderbirds are often portrayed together in native art” (Bill McLennan, curator, Museum of Anthropology, University of British Columbia, pers. comm.). The association was probably food-related. (2) Of a condor wounded and collected Lewis and Clark (1990, vol. 6:66) wrote, “we have seen it feeding on the remains of the whale and other fish which have been thrown up by the waves on the Seacoast.”

**Berries:** High meadows. Mt. Hood, Oregon, mid-1900s: condors feeding on the ground on “wild cranberries” (K. K. Smith pers. comm.).

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26–30 September 2012

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ABUNDANCE AND SITE FIDELITY OF MIGRATORY BIRDS WINTERING IN RIPARIAN HABITAT OF BAJA CALIFORNIA

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ABSTRACT: The ecology of migratory landbirds in Baja California has been little studied, yet the nonbreeding season is of critical importance in the life cycle of any bird. We used mist netting to quantify the relative abundance and demographic indices of six species of landbirds wintering in riparian habitat at two sites in Baja California. In addition, we assessed their persistence at the sites through area searches for and recapture of individuals marked with a unique combination of color bands. From the winter of 2004–05 through the winter of 2006–07 we captured 561 individuals of the six species along the Río Santo Tomás and Río San Vicente. The most abundant species, the Hermit Thrush (Catharus guttatus), Yellow-rumped Warbler (Setophaga coronata), and Ruby-crowned Kinglet (Regulus calendula), together accounted for 83.1% of all net captures of target species. The sex ratios of the six target species were not significantly different from 1:1 except for the Yellow-rumped Warbler, of which we found significantly more males than females. Persistence beyond one day and annual rates of return of the color-banded target species were generally low and did not differ by sex.

The Baja California peninsula is considered an important area for avian conservation (Rodríguez-Estrella 2005), a critical region for wintering shorebirds, waders, and aquatic migrants (Massey and Palacios 1994, Mellink 2005), and large portions are included in two Endemic Bird Areas (Stattersfield et al. 1998). However, knowledge of the avifauna of Baja California is mostly limited to studies of the occurrence and distribution of breeding species and migrants (Erickson and Howell 2001, Rodríguez-Estrella 2005) and of the biology of waterbirds; few studies of the ecology of the region’s migratory landbirds have been published (Rodríguez-Estrella 2005).

Riparian ecosystems represent one of the most important habitats for landbirds, especially in arid regions of western North America. Riparian habitat is more diverse and more productive than surrounding uplands despite covering a small percentage of the landscape (Knopf et al. 1988, Skagen et al. 2005). The riparian areas of northwest Baja California are structurally similar to those of coastal southwestern California and share similar animal and plant communities (Mellink 2002, Roberts 2004, González-Abraham et al. 2010), despite the lower diversity of riparian plants in Baja California (Minnich and Franco-Vizcaino 1997). While many of the upland ecosystems of Baja California are in a very good state of conservation in comparison to those of similar areas in southern California (Minnich and Franco-Vizcaino 1998), this is not true for the riparian habitats, many of which have been
MIGRATORY BIRDS WINTERING IN RIPARIAN HABITAT OF BAJA CALIFORNIA

heavily affected by development, agriculture, and water extraction (Minnich and Franco-Vizcaino 1997).

This habitat is used not only by riparian-obligate songbirds but also often supports higher densities of non-obligate birds than do adjoining habitats during the breeding season and migration (Knopf et al. 1988, Finch and Yong 2000, Kelly and Hutto 2005, Skagen et al. 2005). In California, riparian areas have been identified as the single most critical habitat for the protection and conservation of songbirds (Miller 1951, RHJV 2004), with many terrestrial and aquatic species dependent on riparian systems during the breeding season (Knopf et al. 1988, Jensen et al. 1993). Among the many studies addressing birds’ use of California’s riparian habitats, Gardali et al. (2006) recorded breeding bird abundance with point counts in riparian remnant forests along the Sacramento River, while Nur et al. (2008) investigated relationships between abundance of breeding birds and characteristics of riparian vegetation. Songbirds’ use of riparian habitat has also been studied during fall migration; Humple and Geupel (2002) used mist netting and area censuses of landbirds to show that numerous migrants use remnant riparian sites.

For the nonbreeding season, similar data for riparian areas in western North America are few. The nonbreeding season is of critical importance in the ecology and life cycle of migratory species (Faaborg et al. 2010). Conditions in the nonbreeding season may affect a bird’s body condition or timing of migration and so its reproductive fitness in the following breeding season (Marra et al. 1998, Webster and Marra 2005). Abundance data for the nonbreeding season alone, however, can be a misleading indicator of population size and habitat preference because the latitudes and habitats used by many winter visitors vary with sex and age class (Ketterson and Nolan 1976, Morton 1984, Holmes et al. 1989, Latta and Faaborg 2001, 2002). Moreover, abundance cannot be equated with survival, so data on site fidelity, persistence at a site through the winter, and annual return rates are needed for habitat quality to be assessed. Thus, to investigate migrants’ winter ecology, recent studies have focused on their demography and site fidelity by habitat (Ketterson and Nolan 1982, Holmes et al. 1989; Latta and Faaborg 2001, 2002).

In this study we used mist netting to quantify the relative abundance and demographic indices of six species of landbirds wintering in riparian habitat at two sites in Baja California. In addition, we banded birds with unique combinations of colors and used area searches to assess their persistence at the sites. We use these data to discuss suitability of riparian sites for visiting migratory birds under the assumption that a greater proportion of males, and longer persistence at the site, indicate higher quality for a species.

METHODS

Study Sites

In October 2004 we established study plots at two sites of conserved riparian habitat with well-developed vegetative cover, of extremely high conservation importance in Baja California (Figure 1). The sites were typical of riparian habitats in northwestern Baja California, which are found in small
MIGRATORY BIRDS WINTERING IN RIPARIAN HABITAT OF BAJA CALIFORNIA

Figure 1. The location of San Vicente and Santo Tomás near the Pacific coast of Baja California.

canyons and along streams that run through coastal scrub and chaparral. One 12-ha site (Santo Tomás) was located at 31° 34' 14" N, 116° 28' 42" W, ~34 km south of Ensenada. The upper reaches of the Río Santo Tomás are nearly intact and roadless, but the lower reaches are affected by water extraction for agriculture. Although water flow is ephemeral, the streambed is not heavily modified by gravel extraction or other disturbances. The second 20-ha site (San Vicente) was a well-conserved riparian area along a seasonal stream ~60 km south of Ensenada and south of La Bocana de Santo Tomás (31° 22' 13" N, 116° 19' 12" W). The stream flows through some of the best-preserved coastal sage scrub in Baja California (Terra Peninsular unpubl. data). At both sites the surrounding uplands are vegetated with coastal scrub and chaparral. Both sites are located in the Northwestern Coastal Slope biogeographic region (Howell 2001).

Avian Sampling

At each site we sampled birds with 10 mist nets (12 m, 32-mm mesh). Nets were placed in fixed locations scattered to best sample each site’s habitat. At each site, we netted for 2 or 3 days 3 or 4 times each year from November to March, 2004–2007 (Table 1). A final round of mist netting in January 2008 provided data on annual return rates. When we netted for 2 days, we opened the nets at 07:30 (~15 min after sunrise) and closed them at 16:00. When we netted for 3 days, we opened mist nets for 3 hr the first afternoon, from 07:30 to 16:00 the next day, and 3 hr the last morning. The length of mist netting was always consistent at the two sites, so if nets were opened for 2 days at Santo Tomás then they were also opened for 2 days at San Vicente. Thus effort at both sites was equivalent.
Whenever possible we identified all mist-netted birds to species and sex by plumage and other criteria (Pyle 1997). We banded six target species, selected because the probability of their capture was high, with a numbered metal band and a unique combination of three color bands: the Ruby-crowned Kinglet (Regulus calendula), Hermit Thrush (Catharus guttatus), Orange-crowned Warbler (Oreothlypis celata), Yellow-rumped Warbler (Setophaga coronata), Lincoln’s Sparrow (Melospiza lincolni), and White-crowned Sparrow (Zonotrichia leucophrys). Color banding enabled us to identify individuals in the field and so to evaluate site fidelity. Such banding during the winter can provide information on birds’ survival and persistence at a site over the winter and can be helpful in determining individuals’ home ranges and habitat use (Latta et al. 2005).

Sampling by mist net is subject to several biases (Ralph and Scott 1981, Remsen and Good 1996). For example, in some habitats nets do not sample all strata of the vegetation, very small or very large birds may be ineffectively sampled, and nets may overestimate the abundance of species that travel widely in search of food in comparison to those that forage in a more limited area. While recognizing these biases, in this study we minimized most of them because the vegetation structure at the two sites was similar, the nets’ mesh size is effective in capturing the target species, the species differ relatively little in size, we limited analyses of net captures to comparisons within a species, and we assumed that the probabilities of capturing a species at the two sites were equal.

Resightings

To estimate winter site fidelity, we designed surveys for the color-banded birds to supplement recapture data from mist netting. After banding, two or
three observers searched each plot for color-banded birds for 3 or 4 days, with effort at the two sites consistent. Search areas extended approximately 100 m beyond the net lines or plot boundaries. Although very few color-banded birds in each plot may have remained unidentified, the number of newly resighted birds declined rapidly with effort such that we rarely encountered a newly identified bird in the last 12 person-hours of searching. We defined persistence as the proportion of birds detected (either resighted or by recapture in a mist net) at any time >24 hr after banding (Holmes et al. 1989, Latta and Faaborg 2001, 2002). We defined the annual return rate as the proportion of birds that persisted at the site at least 24 hr in the previous winter and returned to the same site the following winter.

Habitat Structure

In the winter of 2004–05, we used a method adapted from James and Shugart (1970) to characterize the species composition and vegetative structure of plants within an 11.3-m radius of 30 randomly selected points at each banding station, depending on site size. To create a foliage-height profile, we recorded the presence or absence (contacts with a pole) of broadleaf trees, shrubs, and ground cover at height intervals of 0–0.5 m, 0.5–1 m, 1–1.5 m, 1.5–2 m, 2–2.5 m, 2.5–3 m, 3–4 m, 4–6 m, 6–8 m, 8–10 m, 10–12 m, and 12–15 m.

Statistical Analyses

For statistical tests we used Excel and on-line worksheets provided by McDonald (2009). We accepted a probability of Type I error of 0.05 or less as significant unless otherwise noted. We did not analyze variation by year but pooled data for all years to increase sample sizes. Similarly, for the same reason, we did not analyze variation between the two sites but pooled their data. We used a two-tailed exact binomial test to test for significant differences in each species’ sex ratio, with the expectation that the sex ratio was 1:1. We used the same test to test for a significant difference in sex ratios of birds persisting at the sites. In these tests the expected sex ratio was based on the ratio observed in mist-netted birds.

RESULTS

Habitat Structure

The vegetation at the two sites was similar, with a well-developed understory, mid-story, and canopy at both (Figure 2). Mean canopy cover at Santo Tomás was 57.2% (standard error [SE] 6.1), at San Vicente, 44.5% (SE 5.8). The most abundant trees at the Santo Tomás site were the coast live oak (Quercus agrifolia), western sycamore (Platanus racemosa), and willow (Salix sp.); at San Vicente they were sycamore and willow.

Wintering Birds

Over the first three winters of our study we captured 561 individuals of the six target species (Table 2). The winter residents more frequently captured were the Hermit Thrush, Yellow-rumped Warbler, and Ruby-crowned
Kinglet, which together accounted for 83.1% of all net captures of our target species.

Our samples of three sexually dimorphic species were large enough for analysis. We found no significant difference in the sex ratio of the Ruby-crowned Kinglet (64% male, $P = 0.108$) or Orange-crowned Warbler (56% male, $P = 0.271$), but there were significantly more male than female Yellow-rumped Warblers at our sites (67% male, $P < 0.001$).

With both sexes combined, persistence at the site for ≥24 hr varied from zero for the White-crowned Sparrow to 13.7% for the Yellow-rumped Warbler (Table 3). In the latter species persistence of males and females did not differ significantly ($P = 0.334$). Because calculation of annual return rate is based on site-persistent individuals only, and because site persistence was universally low, small sample sizes allowed us to calculate annual return rates for only two species. This rate was low for the Hermit Thrush (19.0%) and only slightly higher for the Yellow-rumped Warbler (26.1%; Table 3).

**DISCUSSION**

The riparian habitats we studied supported substantial numbers of wintering migratory birds, especially the Hermit Thrush, Ruby-crowned Kinglet, and Yellow-rumped Warbler. The stratification, high foliage volume, and complex foliage-height profile of riparian woodland promotes bird diversity in similar habitat in California (Gaines 1977).
Table 2  Numbers of Six Species of Winter Residents Captured at Two Riparian Sites over Three Winters at Santo Tomás and San Vicente, Baja California

<table>
<thead>
<tr>
<th>Species</th>
<th>San Vicente</th>
<th></th>
<th></th>
<th>Santo Tomás</th>
<th></th>
<th></th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Ruby-crowned Kinglet</td>
<td>15</td>
<td>15</td>
<td>11</td>
<td>9</td>
<td>61</td>
<td>5</td>
<td>116</td>
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<tr>
<td>Hermit Thrush</td>
<td>31</td>
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<td>6</td>
<td>22</td>
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<td>0</td>
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<td>Yellow-rumped Warbler</td>
<td>58</td>
<td>24</td>
<td>15</td>
<td>40</td>
<td>19</td>
<td>12</td>
<td>168</td>
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<tr>
<td>Lincoln’s Sparrow</td>
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<td>6</td>
<td>6</td>
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<tr>
<td>White-crowned Sparrow</td>
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<td>0</td>
<td>0</td>
<td>28</td>
<td>32</td>
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</table>

However, site-fidelity data suggest that a relatively small proportion of these birds remained within the sites through the winter. No more than 14% of individuals of any of the six target species persisted within our sites for >24 hr. These results contrast with data from a companion study in remnants and restored patches of riparian woodland in the Central Valley of California (Latta et al. 2012). In these, we found higher rates of persistence in four species, the Hermit Thrush (56.3%), Fox Sparrow (Passerella iliaca; birds older than 1 year only; 57.1%), Lincoln’s Sparrow (59.7%), and White-crowned Sparrow (67.8%). Our data from Baja California are more similar to those of Sandercock and Jaramillo (2002), who estimated site persistence on the basis of mark–recapture models for some of the same species we report on here. Their estimates of site persistence of first-winter emberizids ranged from 6% for Lincoln’s Sparrow to 18% for the Golden-crowned Sparrow (Zonotrichia atricapilla), while those for older birds ranged from 8% for Lincoln’s Sparrow to 28% for the Golden-crowned Sparrow. Similar data from other sites across the range of species studied here are lacking, as few studies have attempted to measure site fidelity of winter residents. Other winter studies also based on resighting of color-banded birds (e.g., Latta and Faaborg 2001, 2002), focused on parulid warblers wintering in native forests and shade-coffee plantations in the Caribbean and Mexico, found site persistence ranging from 42 to 80% (Holmes et al. 1989, Wunderle and Latta 2000).

The annual rates of return of the two species of which we had adequate samples were also low. Rates of return of the Hermit Thrush and Yellow-rumped Warbler have not been quantified previously (Hunt and Flaspohler 1998, Jones and Donovan 1996), but a rate of 50% may not be unusual for warblers (Wunderle and Latta 2000). Although annual return rate has been used as a measure of habitat quality (Faaborg et al. 2010), it also reflects winter survival, breeding-season survival, two migrations, site fidelity, prob-
Table 3  Site Persistence and Annual Return Rate\textsuperscript{a} of Six Species of Winter Residents in Riparian Woodland at San Vicente and Santo Tomás, Baja California

<table>
<thead>
<tr>
<th></th>
<th>Ruby-crowned Kinglet</th>
<th>Hermit Thrush</th>
<th>Orange-crowned Warbler</th>
<th>Yellow-rumped Warbler</th>
<th>Lincoln’s Sparrow</th>
<th>White-crowned Sparrow</th>
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<tr>
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<tr>
<td>2004-05</td>
<td>15</td>
<td>31</td>
<td>6</td>
<td>58</td>
<td>4</td>
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<td>2005-06</td>
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<td>1</td>
<td>24</td>
<td>11</td>
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<td>6</td>
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<td>26.1</td>
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\textsuperscript{a}Because annual return rates are calculated on the basis of site-persistent birds only, annual return rates could not be determined when low site persistence reduced sample sizes.

ability of detection, and the birds’ vagility in response to changes in weather and their food supply. Faaborg et al. (2010) concluded that persistence at a site through a single winter may be a better measure of habitat quality.

It is generally thought that sites occupied longest can be considered higher in quality than those abandoned sooner (Holmes et al. 1989, Faaborg et al. 2010). A bird that remains at a site throughout the winter may be more familiar with food and other critical resources, better able to cope with resource fluctuations, and better able to avoid predators (Shields 1984, Dobson and Jones 1986). Whether the low rates of site persistence we observed suggest poor habitat quality or something else is unknown. Persistence would have been low if color-banded birds had simply moved into adjoining sage scrub and chaparral, but we think this is an unlikely explanation as we regularly searched
for color-banded birds up to 100 m outside of plot boundaries. Although these birds may have also avoided detection if they occupied unusually large home ranges, the size of territories or home ranges of these species has not been quantified other than by Ralph and Mewaldt (1975), who reported a home range of subspecies *gambelii* of the White-crowned Sparrow of about 20 ha, on a scale similar to that of our study sites. Alternatively, some individuals’ strategy may have been to wander through the winter (Lefebvre et al. 1994). In some species different individuals pursue different strategies, some remaining faithful to a site, others wandering, taking advantage of dispersed food sources (Brown and Sherry 2008, Faaborg et al. 2010).

We think it is more likely, however, that low site persistence results from species-specific differences in habitat preference that may vary by demographic group and geography. For example, Sandercock and Jaramillo (2002) showed that for some emberizids, rates of site persistence (or local survival) of first-year birds are lower than those of older birds. Because in this study we did not determine the age of our birds, we do not know whether first-year birds were represented disproportionately at our study sites, thus depressing mean rates of site persistence. Alternatively, or in addition, a species may segregate geographically, one age class or one sex wintering disproportionally at a different latitude than another (Komar et al. 2005, Faaborg et al. 2010). Using museum collections, Komar et al. (2005) found evidence of latitudinal sexual segregation in 9 of 45 migratory species wintering in Mexico. These included the Orange-crowned and Yellow-rumped warblers, in both of which males predominate in the northern part of the species’ winter range. Given that geographic variation in no species’ winter strategy is well understood (Faaborg et al. 2010), further studies of site persistence across the winter ranges of these migratory species are justified.

The use of riparian habitats at our study sites by numerous overwintering migratory species and individuals underscores the importance of this vegetation type for conservation. Riparian zones have been widely recognized as a priority for management because of their high conservation value (Rich et al. 2004, RHJV 2004) and the high levels of threats they face, as the recipient of uses and abuses upstream (Dudgeon et al. 2006). Further studies of the use of riparian zones by winter visitors, as well as by permanent residents and summer residents, are merited especially when the critically important demographic measures of survival and reproductive success are included.

ACKNOWLEDGMENTS

We thank both field and office personnel from Terra Peninsular, A.C., and the Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), including Juan Manuel García Caudillo, Eli Gonzalez, Victor Ortega Jiménez, Hernan León, Sergio Mata, Ricardo Olachea, and Hernan Rodriguez. We also thank Dick Hutto, David Krueper, and Steve Laymon for comments on the manuscript. F. Arenas provided the map of the study sites. Geoff Geupel (PRBO) helped with study design and in obtaining funding. Some work was supported by grants to Steven Latta from the U.S. Fish and Wildlife Service as provided by the Neotropical Migratory Bird Conservation Act and the Sonoran Joint Venture. Other support came from PRBO Conservation Science’s Latin American Program and the Department of Conservation and Field Research of the National Aviary. This is PRBO contribution 1863.
LITERATURE CITED


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NOTES

TYPE LOCALITY AND EARLY SPECIMENS OF THE MOUNTAIN CHICKADEE

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The type locality for the Mountain Chickadee (Poecile gambeli) has been somewhat confused in various editions of the American Ornithologists’ Union (AOU) Check-list of North American Birds. Consideration of the local geography and environmental conditions at the time the type specimen was collected in 1841 reveals that the type locality can, in fact, be identified more clearly, but not unambiguously.

William Gambel’s (1843) original statement, “This new and distinct species we first observed about a day’s journey from Santa Fe, in New Mexico, and from thence in all the ranges of the Rocky Mountains nearly to California,” was somewhat vague to begin with. In the first (1886) edition of the AOU checklist, Robert Ridgway quoted Gambel as to the locality but truncated that description after “New Mexico.” This was maintained in the second edition (AOU 1895).

The third edition of the AOU checklist (1910) described the site of Gambel’s initial observation as “about a day’s journey west from Santa Fe.” There was no citation or justification for the addition of “west.” The fourth edition (1931) repeated this description. In the fifth (1957), sixth (1983), and seventh (1998) “west” appears in brackets.

Coming by way of the Santa Fe Trail, the 18-year-old William Gambel arrived in the Mexican provincial capital of Santa Fe on 2 July 1841. He remained in Santa Fe until 1 September 1841, collecting plant and animal specimens in the area. These dates are well established in the historical record of the caravans with which he traveled.

By 1841 the immediate vicinity of Santa Fe was largely denuded of piñon–juniper woodland because of firewood gathering and grazing. If he was looking for undisturbed habitat for new plants or animals, Gambel would not have found it close to town or in more settled locales farther to the north or southwest along the Camino Real.

Nuttall’s (1848) specific descriptions of Gambel’s plant collections reveal that while he was in Santa Fe, Gambel explored along the Rio Grande, which flows to the south-southwest about 32 km to the west of Santa Fe. The basalt-capped Caja del Rio Plateau and White Rock Canyon preclude easy access to the Rio Grande to the west of Santa Fe. However, he found Gambel’s Oak (Quercus gambeli) “on the banks of the Rio del Norte [Rio Grande], but not abundant” and the Many-flowered Gilia (Gilia multiflora) in “sandy hills along the borders of the Rio del Norte.” To the northwest of Santa Fe there are sandy hills along the Rio Grande, about 16 km by trail from Santa Fe, over hills close to town and down the Cañada Ancha to the Rio Grande. This area northwest of Santa Fe is undoubtedly the type locality for the plants and some of the reptiles described on the basis of Gambel’s collections.

The areas of these collections, like many in the vicinity of Santa Fe, are vegetated with typical piñon–juniper savanna, and Gambel would have found the Mountain Chickadee there. If he had ascended into the higher mountains to the east of Santa Fe beyond the reach of firewood gatherers, he would have found it there also. Gambel clearly identified the locations along the Rio Grande for his botanical collections, but although he almost certainly observed the Mountain Chickadee in at least some of those areas, he made no mention of the Santa Fe vicinity in his description of the chickadee.

As wagon trains approached Santa Fe by way of the Santa Fe Trail, the final campsites prior to arrival in Santa Fe were near Glorieta in Santa Fe County (27 km southeast of Santa Fe) and near Pecos in San Miguel County (43 km southeast of Santa Fe), both about a day’s journey southeast of Santa Fe. Prior to reaching
NOTES

this area, the Santa Fe Trail passed through open grasslands skirting any Mountain Chickadee habitat. However, either of these campsite locales is suitable habitat for the Mountain Chickadee—and in camp Gambel would have had time for ornithological observations. His wagon train stopped at one or both of these places on 30 June and/or 1 July 1841. Gambel’s statement that the bird was found “from thence in all the ranges of the Rocky Mountains nearly to California,” together with the bird’s almost certain presence during his time in Santa Fe indicates that the bird was “first observed about a day’s journey” prior to his arrival in Santa Fe along the Santa Fe Trail. Subsequent observations would therefore not be noteworthy. Apparently, Phillips (1986:86) also suspected Gambel collected the Mountain Chickadee before arriving at Santa Fe, as he gave the type locality as “ca. 1 day’s journey (= 35–40 km SE?) from Santa Fe, New Mexico.”

Gambel’s specimen of the chickadee is apparently lost. Perhaps it did not survive the trip from Santa Fe, although a number of reptiles from the Santa Fe area—in ethanol, a popular fluid on the trail—did make it back. When Gambel returned to Philadelphia in 1845, John Cassin, curator of birds at the Academy of Natural Sciences of Philadelphia (ANSP), wrote to his friend Spencer Baird, “Eureka! Gambel is here with his California birds and others—not very many, but some of the most magnificent specimens I ever saw” (Stone 1910). Indeed, eight of Gambel’s holotype specimens, including that of Gambel’s Quail (Callipepla gambelii), collected on the trail between New Mexico and California, remain at the Academy. Four of Gambel’s holotype specimens, however, are in the National Museum of Natural History, Smithsonian Institution (USNM).

The Smithsonian’s original ornithological catalog, which is also the catalog of Baird’s personal collection, notes only that the birds were collected by Gambel and came “from Wilson.” From their position in the dated sequence, they were not cataloged until the fall of 1847, after the creation of the Smithsonian in 1846, and two years after Gambel returned from the West. Thomas Wilson, one of the trustees of the Academy of Natural Sciences of Philadelphia, was a great supporter of its ornithology department, buying a number of important European and Australian collections for it. It would appear that Wilson was also instrumental in the transfer of some of Gambel’s specimens from Philadelphia to the Smithsonian.

The name Gambel (1843) gave to the Mountain Chickadee, Parus montanus, was preoccupied by Parus montanus Conrad von Baldestein, 1827, the earliest name for the Willow Tit of Eurasia, currently classified as Poecile montanus. Robert Ridgway (in AOU 1886) introduced Parus gambelli as a substitute.

The earliest Mountain Chickadee in the Smithsonian collection (USNM 5643) was collected in Wyoming by W. S. Wood in 1856, and the earliest New Mexico specimen (USNM 37062) was collected by Elliot Coues in 1864. Probably the earliest extant specimen, dated 17 or 18 September 1845, is in the Academy of Natural Sciences of Philadelphia (ANSP 9329), but its collector and location are not identified. The history of the dispersal of Gambel’s collections between the two museums may contain clues to the disappearance of the holotype of the Mountain Chickadee.

The evidence suggests that Gambel based his description of the Mountain Chickadee on observations made shortly before he arrived in Santa Fe, probably southeast of the city on the Santa Fe Trail. However, since Gambel could have found the chickadee almost anywhere in the vicinity of Santa Fe, and in the absence of a holotype that might indicate a more precise location, the type locality should rest in Gambel’s words: “about a day’s journey from Santa Fe in New Mexico.”

LITERATURE CITED


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Mountain Chickadee

Sketch by George C. West
NOTES

RECENT NESTING AND SUBSPECIES IDENTITY OF THE MERLIN IN IDAHO

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Three subspecies of the Merlin (Falco columbarius) are recognized in North America. The Black Merlin (F. c. suckleyi) breeds in humid forests of the Pacific Northwest and has the darkest plumage of the three North American subspecies. Richardson’s Merlin (F. c. richardsonii) has pale plumage and breeds in the dry prairies of southwestern Canada and the north-central USA. The Taiga Merlin (F. c. columbarius) breeds in forests across much of Alaska and Canada, extending south in some northern states and in western North America to parts of Washington, Idaho, and Montana; it is intermediate in plumage between the other two subspecies (Warkentin et al. 2005).

Available records suggest the Merlin is an uncommon but regular migrant and winter resident in Idaho (Craig and Craig 1989). In a statewide survey in 1989, the Taiga Merlin was the most frequently observed subspecies, followed by Richardson’s and Black (Craig and Craig 1989). From 2007 to 2010, however, the Black Merlin was more common than Richardson’s Merlin in winter in southwestern Idaho (Haak 2012).

Merlins breed rarely in Idaho (Table 1), but their subspecies has been unclear. Idaho is on the southern edge of the Taiga Merlin’s breeding range and western edge of the Richardson’s Merlin’s breeding range (Craig and Craig 1989). The species typically uses abandoned stick nests built by other raptors, corvids, or other birds (Cade 1982:114), and nests of the Taiga Merlin are often associated with clearings and bodies of water (Trimble 1975). Of three Merlin nests Craig and Renn (1977) reported in southern Idaho, two were in Utah Juniper (Juniperus osteosperma) and one was in Quaking Aspen (Populus tremuloides). Here we review recent records of the Merlin nesting in Idaho and relate these to information from adjacent areas.

With the exception of Nevada (Alcorn 1988), Merlins have been reported breeding in all states bordering Idaho. The two subspecies breeding in Washington are the Black, which is limited to the western part of the state, and the Taiga, which nests in northeastern Washington between Okanogan County and the Idaho border (Gleason et al. 2005). Nests of Taiga Merlins were found in Republic, Ferry County, in 2004 (P. Debruyyn pers. comm.) and Colville, Stevens County, in 2004 (T. Munson pers. comm.). On 12 July 2011, Haak, A. Henderson, and W. Mulvihill located two pairs

Table 1 Historic Records of the Merlin Nesting in Idahoa

<table>
<thead>
<tr>
<th>Year</th>
<th>County</th>
<th>Adults seen</th>
<th>Evidence of nesting</th>
<th>Young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>1885</td>
<td>Bingham</td>
<td></td>
<td>eggs collectedb</td>
<td></td>
</tr>
<tr>
<td>&lt;1913</td>
<td>Bingham</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>&lt;1913</td>
<td>Bingham</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>Blaine</td>
<td>2</td>
<td>4 eggs</td>
<td>3</td>
</tr>
<tr>
<td>1975</td>
<td>Butte</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>Cassia</td>
<td>2</td>
<td>yes</td>
<td>—</td>
</tr>
<tr>
<td>1982</td>
<td>Bonneville</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1982</td>
<td>Bonner</td>
<td>—</td>
<td>—</td>
<td>yes</td>
</tr>
</tbody>
</table>

aSource: Craig and Craig (1989).
bWestern Foundation of Vertebrate Zoology 13343.
of Taiga Merlins in Spokane, Spokane County. And on 23 July 2011, Haak, E. Thomas, and J. Bradshaw located a family group of Taiga Merlins in Newport, Pend Oreille County. Table 2 details these records.

In Montana, Taiga Merlins nest on both sides of the continental divide (Trochelle 2002, J. Marks pers. comm.) and Richardson’s Merlins nest east of the divide (Ellis 1976, Becker and Sieg 1985). In the Wasatch Mountains of Utah, Merlin eggs were collected in 1868 and 1869 (Western Foundation of Vertebrate Zoology 15342, Hayward et al. 1976) and the species summers in small numbers (Behie 1985, who inferred the birds are Richardson’s Merlins). Sailer (1987) reported a pair, apparently of Richardson’s Merlin, near Bryce Canyon National Park and a male in Canyonlands National Park in June 1984. Richardson’s Merlin is the predominant subspecies in Wyoming, but the population breeding along the Green River, to the southeast of Idaho, was extirpated in recent decades (Ayers and Anderson 1999).

The current breeding range of the Black Merlin is closely associated with temperate rainforests in coastal western Washington, western British Columbia, including parts of Vancouver Island, and southern Alaska (Wheeler 2003, Warkentin et al. 2005). However, Black Merlins are known to nest outside this range. For example, in Oregon, a Black Merlin nest was found east of the Cascade Range crest in Klamath County in 1883 (Gabrielson and Jewett 1940), and eggs of the Black Merlin were collected in 1933 in the northern Willamette Valley near Rex, Yamhill County (Western Foundation of Vertebrate Zoology 44073). The distribution of nesting Black Merlins in British Columbia is not completely understood (Campbell et. al 1990, Haney and White 1999), but the subspecies has been documented as far east as the Okanagan Valley (Cannings et al. 1987). In fall and winter, Black Merlins spread beyond their currently known breeding range (Wheeler 2003, Stahlecker 2010), and they migrate and overwinter in Idaho (Burleigh 1972, Craig and Craig 1989, Haak 2012).

In the last several years we have accumulated five additional records of Merlin nests in Idaho (Table 3). In the spring of 2007, we observed a pair of Merlins in Sandpoint, Bonner County, approximately 70 km from Canada. The site is approximately 320 m from Lake Pend Oreille and at 650 m elevation. The pair used an American Crow (Corvus brachyrhynchos) nest situated 1.5 m below the top of a 36-m Western White Pine (Pinus monticola). The nest site was adjacent to a housing development with lawn and mature Western White Pine, Douglas-fir (Pseudotsuga menziesii), Western Larch (Larix occidentalis), and Western Red Cedar (Thuja plicata). Adults were first observed on territory on 11 April 2007. The adult female was typical of the Taiga Merlin, while the male had darker plumage. A rectrix molted by the adult male was identifiable as belonging to a Black Merlin (Hamilton and Schmitt 2000, N. J. Schmitt pers. comm.).

On 13 July 2010 Haak and R. Cavallaro visited a second Merlin nest on the eastern edge of the Snake River Plain in Jefferson County. This nest was located at 1536 m

NOTES

Table 2 Recent Records of the Merlin Nesting in Eastern Washington

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>County</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Republic</td>
<td>Ferry</td>
<td>eggs</td>
</tr>
<tr>
<td>2011</td>
<td>Colville</td>
<td>Stevens</td>
<td>3 young fledged</td>
</tr>
<tr>
<td>2011</td>
<td>Newport</td>
<td>Pend Oreille</td>
<td>4 young fledged</td>
</tr>
<tr>
<td>2011</td>
<td>Spokane</td>
<td>Spokane</td>
<td>4 young fledged</td>
</tr>
</tbody>
</table>

*Both adults Taiga Merlins in all cases.*
## NOTES

### Table 3  Recent Records and Subspecies of Merlins Nesting in Idaho

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>County</th>
<th>Subspecies of adults</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Sandpoint</td>
<td>Bonner</td>
<td>Taiga female, Black male</td>
<td>5 young fledged</td>
</tr>
<tr>
<td>2010</td>
<td>Jefferson</td>
<td>Jefferson</td>
<td>Richardson’s (both)</td>
<td>1 nestling</td>
</tr>
<tr>
<td>2011</td>
<td>Sandpoint</td>
<td>Bonner</td>
<td>Taiga (both)</td>
<td>2 young fledged</td>
</tr>
<tr>
<td>2011</td>
<td>Priest River</td>
<td>Bonner</td>
<td>Taiga (both)</td>
<td>2 young fledged</td>
</tr>
<tr>
<td>2011</td>
<td>Coeur d’Alene</td>
<td>Kootenai</td>
<td>Taiga (both)</td>
<td>4 young fledged</td>
</tr>
</tbody>
</table>

in elevation in remote rangeland vegetated with grasses, sagebrush (*Artemisia* sp.), and isolated Utah Junipers. We found a single nestling, approximately 3 weeks of age, inside an abandoned Black-billed Magpie (*Pica hudsonia*) nest, approximately 2.4 m off the ground in a Utah Juniper 4.5 m tall. We observed no eggs, egg fragments, or prey remains inside the nest cavity or nearby. Both adults and the juvenile had the pale plumage characteristic of Richardson’s Merlin (Temple 1972, Wheeler 2003, Warkentin et al. 2005).

In 2011 Merlins were confirmed breeding in three locations in Idaho. On 13 July 2011, Haak and E. Thomas watched an adult male Taiga Merlin with two fledged young fly to various perches in Priest River, Bonner County. On 14 July 2011, we observed two adult Taiga Merlins with two fledged young in an urban area on the southern edge of Sandpoint, Bonner County, adjacent to Lake Pend Oreille. The birds perched in a patch of trees dominated by mature Douglas-fir and Ponderosa Pine (*Pinus ponderosa*), 3.6 km from the 2007 nesting territory. On 15 July 2011, Haak and E. Thomas located a pair of Taiga Merlins with four fledged young in a patch of Western Larch in a commercial area of Coeur d’Alene, Kootenai County.

Craig and Craig (1989) considered the Merlin a rare breeding species in Idaho. It can be inconspicuous, possibly accounting for the dearth of records in Idaho over the last century. However, our observations of five nest sites, from 2007 to 2011, suggest its status has recently changed. Recently, Merlins have been found nesting in areas where they clearly had not nested previously (e.g., several examples in Washington; P. Debruyn pers. comm.). This pattern suggests that the Merlin is colonizing (or recolonizing) areas of the Pacific Northwest and northern Rocky Mountains, as has been documented in the northern Great Plains and the eastern United States (Snyder and Snyder 1991, Warkentin et al. 2005, Rucker 2009).

Our recent sample of nests included all three North American subspecies (three of the Taiga, one of Richardson’s, and one with both the Taiga and Black). Our record of a Black Merlin at a nest site in Idaho is unprecedented, though nests of the Black Merlin have been reported from interior sites in British Columbia (Cannings et al. 1987) and Oregon (Gabrielson and Jewett 1940).

Mixed pairs and intergrades of the North American subspecies of the Merlin have been recorded previously: pairings of the Black and Taiga in southwestern British Columbia and of Richardson’s and the Taiga Merlin in Montana (Wheeler 2003, Warkentin et. al. 2005). Because of Idaho’s proximity to the regions occupied by the three North American subspecies, the forests of the Pacific Northwest, northern boreal forests, and prairie parkland, it is perhaps not surprising that all three subspecies would be represented in Idaho’s breeding population. If Merlins have any preference for mating with their own subspecies, the mixed-subspecies pairing suggests that Merlins are still uncommon breeders in the region and that mates are limited in northern Idaho.

We are grateful to Joseph B. Buchanan, Leon R. Powers, Eric Yensen, R. Wayne Nelson, Lloyd Kiff, N. John Schmitt, Lynn Oliphant, Tony Leukering, and Loren Ayers for helpful criticisms of the manuscript. Rene Corado provided nest records.
LITERATURE CITED


Accepting 15 May 2012
BOOK REVIEW


It’s hard for seabirders today to imagine how little truly helpful popular literature existed about the field identification of the tubenoses (highly marine birds of the order Procellariiformes) just a couple of decades ago. Yes, Peter Harrison’s tour de force, Seabirds, An Identification Guide (1983, Houghton Mifflin, Boston), brought the world’s species into our consciousness, even if the painted illustrations sometimes strayed a bit from reality and many aspects of taxonomic and individual variation were not well understood at that time. Onley and Scofield’s Albatrosses, Petrels and Shearwaters (2007, Princeton University Press) incorporated considerable information coming to light in the two decades after Harrison’s guide, but it missed the mark on many details and used only paintings, albeit improved over Harrison’s. Some excellent journal articles have tackled particular identification issues, but Steve Howell’s new tubenose book represents a giant leap forward and one of the best single sources on seabird identification yet published.

Petrels, Albatrosses and Storm-Petrels of North America owes its considerable success primarily to three things: (1) the author’s relentless dedication to observing and scrutinizing the world’s procellariiform birds in the field, (2) the phenomenal advances in digital photography (skillfully applied by Howell, who took the great majority of the photos in the book) that now make a well-executed photographic guide far better than a guide using only painted plates, and (3) thoughtful and careful organization of the dense textual and visual material.

Howell’s approach, as in his Gulls of the Americas co-authored with Jon Dunn (2007, Houghton Mifflin), is to make liberal use of photographs with detailed interpretive captions. The photographs include not only stunning portraits but also a great many “real life” images (many also stunning) showing how birds really look in the field, often with comparison species in the same image. This is particularly important for tubenoses, a group whose appearance in the field varies wildly depending on lighting and cloud conditions, angle, distance, wind speed, etc.

The author casts a wide net in his species coverage. With full accounts for 70 species-level (or near-species level) taxa, corresponding to about 61 species as currently recognized by the American Ornithologists’ Union (AOU), he covers all tubenoses ever recorded in the waters off North America (defined here as within 200 nautical miles of Alaska and Canada south to Panama, including the Caribbean). Another 21 species are covered under “Similar Species” sections or have brief accounts of their own; most of these are illustrated with photographs. The result is that far more species are covered than in the two most popular North American field guides (51 in the National Geographic Society’s Field Guide to the Birds of North America, 28 in The Sibley Guide to Birds).

The must-read introductory sections discuss procellariiform biology, including information highly relevant to field identification such as topography, molt strategies, flight manners, and habitat preferences (yes, there are varied “habitats” on what looks to many of us like a uniform ocean surface). The introduction also includes a discussion of the realities of looking for and identifying tubenoses at sea, factoring in lighting, distance and wind effect; this is an art form at which the author excels and, importantly, is able to convey to the reader clearly.

The bulk of the book consists of species accounts, but each family, and within families each grouping (large shearwaters, small shearwaters, Atlantic and Pacific gadfly petrels, “other” petrels, North Pacific albatrosses, “vagrant albatrosses,” white-rumped...
storm-petrels, dark-rumped storm-petrels, and “distinctive” storm-petrels) receives an overview of characteristics, taxonomic issues, and helpful identification approaches. Each species is illustrated with roughly 10 to 20 photographs (from 5 to as many as 27). A single painted plate (p. 147; by Ian Lewington) of small black-and-white shearwaters is included to facilitate species comparisons and to acknowledge that acceptable photographs of some poorly studied taxa are simply not available (the book’s only photo of a Townsend’s Shearwater appears in the Conservation section of the Introduction). After the main species accounts are brief text accounts for two recently extinct species (the Jamaican Petrel and Guadalupe Storm-Petrel) and three species of “hypothetical” occurrence. The text uses standard author-year format to liberally cite published literature, and over 400 references are provided.

Howell has never shied away from tackling taxonomic issues in his guides. He rightfully considers the AOU slow to adopt changes, but his railing against that committee sometimes assumes Phillipsian proportions. It is incumbent on a guide such as this to treat all taxa, even if species status and field identification criteria are unclear. “Species-level decisions” are really not that important in such a guide, as long as the issues are explained. Howell generally does a good job of this. He “splits” several species (e.g., within the Band-rumped Storm-Petrel, Leach’s Storm-Petrel, Shy Albatross, and Wandering Albatross) not yet tackled by the AOU. Increasing genetic work with tubenoses seems to support a trend of more splits, but many groups have not received comprehensive study. The AOU’s conservatism stems in part from a reluctance to make piecemeal or incremental changes to incompletely studied groups and to await formal publication (preferably multiple corroborative publications) of taxonomic studies. In short, Howell’s decisions on taxa to treat in this guide are entirely defensible given the purpose of the guide, and, as we have seen with his departures in A Guide to the Birds of Mexico and Northern Central America (1995, Oxford University Press), many or most will ultimately be adopted.

In rare cases Howell is less well-served by his vitriol. He takes issue with the AOU’s adoption of the English name “Light-mantled Albatross” for Phoebetria palpebrata, suggesting this “insipid” name was coined by “emotionally castrated landlubbers” (p. 344). But, as is so often the case in nomenclature, the issue is more complex. Howell uses “Light-mantled Sooty Albatross” for this species and “Sooty Albatross” for its congener, P. fuscus, continuing the undesirable situation where the name of one species differs from another simply by the addition of an adjective. This brings to mind the British usage of the past when names like “Storm Petrel,” “Wheatear,” and “Crossbill” were used for the chosen few species, while their less deserving congeners required one or more adjectives to distinguish them. Howell is better off applying his considerable talents and, yes, venom, to the identification and biogeographical questions at which he excels.

Some of Howell’s conclusions are at variance with state and ABA checklist committees, entities for which he has been known to express disdain. He correctly mentions that a September Bulver’s Petrel off southern California was not accepted by the California Bird Records Committee (p. 274), though he, and a majority of the CBRC, believed the documentation was acceptable, but he fails to mention that a supposed July Tristram’s Storm-Petrel off southern California he includes (and personally identified in the field) was also not accepted by the committee because of the brevity of the views (p. 431). It was surprising to this CBRC member that the “Shy Albatross” (sensu lato) off northern California in 2001, tentatively assigned by the committee to Thalassarche [cauta] salvini, is considered by Howell to be North America’s first Chatham Albatross (T. [c.] eremita; p. 325); a photo can be found in North American Birds 55(4):507, 2001. Howell also considers a bird photographed off North Carolina in September 1995 to be North America’s first Zino’s Petrel (Pterodroma madeira; p. 188). The analysis of such records comes down to whether the documentation adequately proves the occurrence of the taxon involved, and there will always be
BOOK REVIEW

disagreements about such things (especially in a committee in which a small minority of votes not to accept will result in the rejection of a record). Is Howell right? I can’t judge, but when he speaks, we should listen.

The many strengths of the book include an expansive list of treated taxa, descriptions of flight styles under varying conditions, a detailed look at plumage variation within species (including effects of wear, fading and molt), excellent analyses of shape and structure characters, groundbreaking identification criteria, and photographs to back up all of these features. The distributional information is detailed, and the text is extremely well written and user-friendly. No important weaknesses come to mind, other than that we are all still learning a great deal about this fascinating order of birds and the coming years and decades will yield many important improvements to any successor to this fine volume.

Owning and devouring this guide is essential for all birders who go on pelagic trips anywhere off North America, who seawatch from coastal points, or who eschew boat trips but want to learn a great deal about one of the most intriguing groups of birds in the world. The broad taxonomic and geographic coverage also makes this book highly valuable for birders venturing anywhere in the oceans of the northern hemisphere and in fact almost anywhere apart from the Antarctic and Indian Ocean.

Kimball L. Garrett

Storm-Petrels

Sketch by Narca Moore-Craig
FEATUED PHOTO

FIRST DOCUMENTATION OF A JUVENILE RED-NECKED STINT FOR THE LOWER 48 STATES

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On the clear morning of 30 August 2009, I (Easterla) discovered a juvenile Red-necked Stint (Calidris ruficollis), which had never been fully documented in the lower 48 states. At approximately 09:00, while scanning for shorebirds on a large mudflat at the Yolo Wildlife Area in Yolo County, California (managed by the California Department of Fish and Game), I noticed a peep, smaller than nearby Western Sandpipers (C. mauri), with a long primary projection, a full set of tertials, black legs, and a very short bill. The bird’s fresh plumage and overall scaled appearance showed it to be a juvenile. On the basis of my prior observations of juveniles of another Old World species of black-legged stint in California, the Little Stint (C. minuta), on 22 September 1994 (Howell and Pyle 1997) and 14 September 2008 (Pike and Compton 2010), as well as my experience observing stints in Europe, Russia, and southeast Asia, I felt confident this bird was a juvenile black-legged stint from Eurasia (Veit and Jonsson 1987) and probably a juvenile Red-necked Stint. Upon realizing the possibility of such a discovery, I phoned John Sterling and other birders who joined me to verify my observation.

The many shorebirds on the mudflat that morning included 1400 Western Sandpipers, 1800 Least Sandpipers (C. minutilla), at least two Semipalmated Sandpipers (C. pusilla), and one alternate-plumaged adult Dunlin (C. alpina) foraging with the juvenile Red-necked Stint.

Fortunately, the sun was at our backs that morning, allowing optimal light for identification. In addition, the bird was foraging with Western, Least, and Semipalmated sandpipers and moved closer to where we were standing (approximately 18 m). With these three factors combined (good light, closeness of the bird, and similar species nearby), we were able to observe and photograph subtle differences in field marks (see photo on this issue’s inside back cover for comparison with a juvenile Western Sandpiper).

There are two field marks critical to distinguishing juveniles of the dark-legged Eurasian stints (Red-necked and Little) from bright juvenile North American peeps (the Western and Semipalmated sandpipers). The Semipalmated and Western sandpipers are the only species of Calidris with vestigial webbing between the toes; the Old World stints lack it (e.g., Hayman et al. 1986). Generally, ascertaining the presence of such webbing is less difficult than ascertaining its absence. In all cases, ascertaining the lack of webbing or palummation requires close views. During the initial observation of the Red-necked Stint at the Yolo Wildlife Area, I was not able to confirm the lack of palummation, but during the second day of observing it (1 September 2009), I was able to identify the lack of palummation clearly (see lower photo on this issue’s back cover).

The second critical field mark is the length of the primary projection. The Red-necked Stint had a long primary projection, longer than that of a Western or Semipalmated Sandpiper, but not as long as on the larger Baird’s (C. bairdii) or White-rumped (C. fuscicollis) sandpipers (Paulson 2005). Typically, on a Red-necked or Little stint, there is a long primary projection past the longest tertial feather, and these long primary projections can be confirmed only when all of the tertials are present (Veit and Jonsson 1987). Because this field mark may be difficult to assess if feathers are

missing or out of place, I made careful note of this bird’s tertials and primaries (see photos on this issue’s back cover for confirmation of the long primary projection). There were at least three primary tips visible, and, depending on the position of the bird (for example, when the bird was leaning forward), there often appeared to be four primaries visible. The Western and Semipalmated sandpipers, on the other hand, normally have two (sometimes three) primaries showing beyond the tertial tips, with smaller gaps between the primary tips. Therefore, this second field mark allowed us to narrow the identification to one of the dark-legged stints.

In juvenile plumage, the field marks distinguishing the Red-necked and Little stints overlap, so all need to be scrutinized. The most overt difference is the overall contrast in color. The colors of the Little Stint are normally more vibrant and contrasting than those of the juvenile Red-necked Stint (Hayman et al. 1986). The tertials on the bird at the Yolo Wildlife Area were thinly edged in buffy white, with the middle tertial having slightly more reddish tones. This is in contrast to the broad reddish or rufous edges on the juvenile Little Stint’s tertials (Jonsson 1992). Though it was apparent that this bird was not a Little Stint, it is important to note that the color of a juvenile Red-necked Stint’s tertials can be misleading (Veit and Jonsson 1987). For example, the apparent color of the tertials may vary with the bird’s position with respect to the sun and angle of the light. At times, the tertials appeared to be a flat blackish color, rather than the grayish more typical of a juvenile Red-necked Stint. In addition, the gray wing coverts on the juvenile Red-necked Stint are normally thinly edged with buff color and have a dark central shaft streak. This pattern was clearly seen on the bird at the Yolo Wildlife Area, as was the contrast between the darker back and scapulars and the gray wing coverts (Svensson et al. 2009) (see photos on this issue’s back covers). The juvenile Little Stint typically shows very black-centered coverts with a quite broad and distinctive rufous fringe (Paulson 2005).

Other field marks identifying the Yolo bird as a juvenile Red-necked Stint included a light gray wash and diffuse streaking on the sides of upper breast (see upper photo on this issue’s back cover). A juvenile Little Stint normally shows a more orange-buff wash with sharper, darker, more prominent streaks.

The crown did not contrast sharply with the supercilium. Rather, these areas appeared blended because of some streaking in the supercilium just above and behind the eye (see upper photo on back cover). A juvenile Little Stint normally shows a very dark-centered crown with a prominent, bright white supercilium and a lateral crown stripe, giving it the look of a split or forked supercilium (Hayman et al. 1986).

The feathers of the mantle and scapulars were noticeably rufous with darker centers, the mantle showing some bright but thin lines that ran the length of the bird’s back. These mantle lines appear variably in all of the small dark-legged species of Calidris. However, the juvenile Little Stint generally has vibrant, bright, broad, and contrasting mantle lines that help to distinguish it from the other species (Chandler 1989, Rosair and Cottridge 1995).

Finally, the overall build of the juvenile Red-necked Stint differs from that of the juvenile Little Stint. The Red-necked Stint has the longest wings (Hayman et al. 1986) of all the small Calidris species. Its tarsi are normally shorter, giving it a more squat and elongated look (Veit and Jonsson 1987). Because of its posture, the Yolo bird was more flat, lowered, and horizontal in profile than the more upright, rounder, and longer-legged Little Stint (and noticeably different from nearby Semipalmated and Western sandpipers as well). As we observed this bird numerous times, its structure made it easier to reclassify within the multitude of small sandpipers on the mudflat.

The bill length of the Red-necked and Little Stints overlaps broadly so is not a very conclusive field mark. However, the Yolo bird did seem to show the bill shape typical of a Red-necked Stint, being fairly thick at the base, slightly down-curved, very short, and entirely black. Though the structure of the juvenile Little Stint’s bill is similar, on average it is slightly more attenuated and longer with a rather fine, less laterally expanded tip.
(Hayman et al. 1986). The sandpipers at the Yolo Wildlife Area flushed periodically, but unfortunately during my two days of observation no one heard the bird vocalize.

The Red-necked Stint’s primary breeding range is in arctic and far eastern Siberia; its winter range encompasses southeast Asia and Australasia. In North America, it breeds in northern and western Alaska (Point Barrow and Seward Peninsula) (AOU 1998, O’Brien et al. 2006). Juveniles are rare but regular in fall migration in the western Alaskan islands (primarily St. Lawrence Island, Pribilofs, and western Aleutians) with most records from mid-August to early September (P. Lehman pers. comm.). Elsewhere in North America, the Red-necked Stint is a vagrant, though adults are now reported annually, mostly during late summer and early fall. The first record for the lower 48 states was of an adult in alternate plumage at Walnut Beach, Ashtabula, Ohio, on 21 July 1962 (Ahlquist 1964).

We are aware of only one other well-documented juvenile Red-necked Stint outside of its normal range, of one found dead at Fair Isle, Shetland Islands, 31 August 1994, now in the National Museum of Scotland (Riddington 1994). Note the coincidence of the date with that of our California bird.

Over the years, there have been many erroneous reports of juvenile Red-necked Stints in California and other lower 48 states. The bird we discuss in this note has been accepted by the California Bird Records Committee as the first record of a juvenile Red-necked Stint in California (Pyle et al. 2011). However, that committee has also accepted six records of juvenile Little Stints and a fairly even split of records of adult black-legged stints (14 of the Red-necked and 18 of the Little Stint). So, the question arises, “why are there no previous records of the juvenile Red-necked Stint in light of numerous records of adults and both age classes of the Little Stint?” The answer may be that adult Red-necked Stints and adult and juvenile Little Stints have a more conspicuous plumage during their southbound migration and are therefore easier to find than the juvenile Red-necked Stint, which is very similar to the Western and Semipalmated sandpipers and may have simply been overlooked or missed over the years (Mlodinow and O’Brien 1996).

With increased coverage from birders, including more detailed field guides, advanced optics and photographic equipment, and cell phone and Internet communications, documentation of rare juvenile stints may become more frequent.

We thank John Sterling for his review and for providing two photographs reproduced on this issue’s back covers, Oscar Johnson and Paul Lehman for their reviews, and Steve Howell and Guy McCaskie for their assistance with information on past records.

LITERATURE CITED


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The California Bird Records Committee of Western Field Ornithologists revised its 10-column Field List of California Birds in July 2009. The list covers 641 species, plus 6 species on the supplemental list. Please send orders to WFO, c/o Robbie Fischer, Treasurer, 1359 Solano Drive, Pacifica, CA 94044. Price for 9 or fewer, $2.75 each, for 10 or more, $2.50 each, which includes tax and shipping. Order online at http://checklist.westernfieldornithologists.org.
Comparison of the Red-necked Stint (left) and Western Sandpiper (right), Vic Fazio Wildlife Area, Yolo County, California, 30 August 2009. Note the very long primary extension of the Red-necked Stint and its slightly smaller size.

*Photo by Todd Easterla*

Juvenile Red-necked Stint, Vic Fazio Wildlife Area, Yolo County, California, 30 August 2009. Note how the pale wing coverts contrast with the bird’s brighter upperparts, the long primary projection past the tail, and the diffuse streaking on the breast.

*Photo by John Sterling*
Western Specialty:
Ashy Storm-Petrel

Photo by © Steve N. G. Howell of Bolinas, California:
Ashy Storm-Petrel (Oceanodroma homochroa)
Cordell Bank, Marin County, California, 6 August 2012
As a breeding bird the Ashy Storm-Petrel is virtually endemic to California, only a few pairs nesting on Los Coronados and Todos Santos islands of northern Baja California, Mexico. Nonbreeding birds range north rarely to waters off Washington and south to the central Baja California peninsula. During fall, most of the population gathers in rafts numbering thousands of birds at Cordell Bank and Monterey Bay, often in association with other species of storm-petrels. Many of these birds are in molt, which on this individual has just started with some of the longest tail feathers, hence it lacks the deeply forked tail typical of fresh-plumaged birds—and of field-guide illustrations. The strong ashy gray sheen of fresh plumage is best seen in winter and spring and is typically muted to ashy gray-brown in the worn plumage of late summer, as on this individual. To distinguish this bird from a dark-rumped Leach’s Storm-Petrel (O. leucorhoa chapmani), note the grayish uppertail coverts and the relatively short pale band on the upper side of the wing.
Volume 43, Number 3, 2012

Fall Bird Migration on Santa Barbara Island, California
   Nick Lethaby, Wes Fritz, Paul W. Collins, and Peter Gaede........ 118

A Population Census of the Cactus Wren in Coastal Los Angeles
   County Daniel S. Cooper, Robert A. Hamilton,
   and Shannon D. Lucas...................................................... 151

The 36th Annual Report of the California Bird Records Committee:
   2010 Records Oscar Johnson, Brian L. Sullivan,
   and Guy McCaskie............................................................ 164

NOTES

Snowy Plover Buried Alive by Wind-Blown Sand J. Daniel Farrar,
   Adam A. Kotaich, David J. Lauten, Kathleen A. Castelein,
   and Eleanor P. Gaines...................................................... 189

In Memoriam: Clifford R. Lyons Jon Winter............................ 192

Featured Photo: Multiple Color Abnormalities in a Wintering
   Mew Gull Jeff N. Davis and Len Blumin.............................. 193

Front cover photo by © Robert H. Doster of Chico, California:
   Short-tailed Albatross (Phoebastria albatrus), offshore of Ft.
   Bragg, Mendocino County, California, 20 May 2012. Since the
   species was brought to the brink of extinction in the 1930s, it has
   recovered to the point where small numbers are seen regularly
   in the northeastern Pacific and one pair colonized Midway Atoll,
   fledging young in 2011 and 2012.

Back cover: “Featured Photo” by © Len Blumin of Mill Valley,
   California: Aberrant Mew Gull (Larus canus) at Las Gallinas
   wastewater ponds in Terra Linda, Marin County, California, 22
   December 2007, representing the first record of a bird displaying
   four distinct color abnormalities.

Western Birds solicits papers that are both useful to and understandable by amateur
field ornithologists and also contribute significantly to scientific literature. The journal
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behavior, ecology, population dynamics, habitat requirements, the effects of pollution,
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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. For matters of style consult the Suggestions to Contributors to Western

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.
FALL BIRD MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

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ABSTRACT: Between 2001 and 2011, we made 15 visits during the fall migration period to study bird migration on Santa Barbara Island, off the coast of southern California. We kept daily records of the composition and numbers of migrants, which are summarized in this paper and compared with compiled records of previous sightings from Santa Barbara Island. The area of the island most attractive to migrant land birds is the stand of the shrubs Coreopsis gigantea and Eriogonum giganteum compactum near North Peak. Both overcast skies and Santa Ana winds favor migrants’ reaching the island, whereas northwest winds disfavor it. The island’s isolation, small size, and limited vegetative cover make it an ideal location for observing daily changes in the composition of migrating birds.

Santa Barbara Island has large populations of breeding seabirds and is regularly visited by seabird biologists during the spring and summer. In addition, bird biologists occasionally spend time on the island for other purposes, such as studying the relationship between rodent and owl populations (Drost and Fellers 1991, Drost and McCluskey 1992). A number of these biologists have made observations of migrant landbirds, including vagrants (Pemberton 1928, 1929, Hunt and Hunt 1974, Jones et al. 1989, Hamilton et al. 2008). Because seabird breeding largely finishes during July and August, however, such observations of landbirds have been concentrated during the spring migration period, with far fewer records from the fall. Santa Barbara Island has not received the more regular fall coverage received by San Clemente (Sullivan and Kershner 2005) and San Nicolas (R. A. Hamilton pers. comm., P. W. Collins and H. L. Jones unpubl. data, Wehtje 2000) islands. Furthermore, very little has been published on the relationship between

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weather and occurrence of migrant landbirds on the Channel Islands, with
the exception of a relatively brief summary by Sullivan and Kershner (2005)
for San Clemente Island.

From 2001 to 2011, we visited the island for 3 to 14 days each fall and
kept daily records of migrant birds, along with records of weather conditions
affecting both the island and adjacent mainland. In this article, we summarize
the records of all species we observed on the island, their habitat use, and the
relationship between various weather conditions and the arrivals of migrants.

GEOGRAPHY AND VEGETATION OF SANTA BARBARA ISLAND

Santa Barbara Island lies within the Channel Islands National Park and
is located 62 km off the closest point on the mainland at Point Dume, Los
Angeles County. The island is roughly triangular in shape, and, at about
260 hectares (just over 1 square mile), is the smallest of the eight Channel
Islands, slightly smaller than Anacapa. Its steep cliffs rise to a marine terrace
topped by two peaks—North Peak at 171 meters (562 feet) and Signal Peak
at 194 meters (635 feet), the latter lying at the south end of the island. The
coastline is almost entirely rocky, with a negligible amount of sandy shore-
line (Figure 1). In addition to its remoteness from the mainland, the island
is rather isolated from the other Channel Islands, with Santa Catalina, San
Nicolas, and Anacapa islands all at least 36 km away.

Santa Barbara Island has no permanent water, and trees are completely
absent, even in the canyons. Much of the island is open habitat, consisting of
extensive areas of the exotic South African Iceplant (Mesembryanthemum
crystallinum), grassland, patches of dirt laid bare by breeding Western Gulls
(Larus occidentalis), and scattered patches of California Sea-blite (Suaeda
california).

Taller vegetation consists primarily of isolated patches of Giant Coreopsis
(Coreopsis gigantea) and Prickly Pear (Opuntia littoralis var. littoralis
and O. oricola), which occur mainly in and around the canyons on the east
slope of the island and along the east side of North Peak. Giant Coreopsis
was much more extensive on the east slope prior to 1952, but most was
destroyed by a combination of introduced (but now extirpated) rabbits, fire,
and past ranching (Philbrick 1972), which also resulted in a substantial
expansion of the areas occupied by South African Iceplant. In addition, the
endemic subspecies of Giant Buckwheat (Eriogonum giganteum compac-
tum) occurs around some of the cliffs and associated rocky slopes, especially
on North and Signal peaks.

METHODS

From 2001 through 2011, except in 2004, one or more of us visited the
island annually during the fall migration period (Table 1). The dates of the
visits were determined largely by the availability of the boat service to the
island provided by Island Packers from Ventura, although starting in 2008
we were able to arrange some transportation with the National Park Service,
whose boat visits the island more frequently. As a result, the dates of our visits
cluster into two periods: 12–27 September and 11–29 October. The exact dates and number of party-hours per visit are listed in Table 1. We counted all birds seen or heard, visiting areas known to concentrate migrants. We visited North and Signal peaks, which are consistently the most productive areas, every day, as we did the nursery/campground area and Cave Canyon. We checked Graveyard and Middle canyons and the plateau on the southeast part of the island once or twice per visit, the northwest plateau only once per visit. Ascertaining which areas concentrate which migrants has been a process of trial and error, complicated by the fact that frequent unfavorable weather (e.g., persistent northwest winds for most of the 2001 visit) limited the opportunities for determining such locations. As a result, we did not fully understand the importance of North and Signal peaks for migrants until midway through the September 2002 visit; thus data from these initial visits are likely incomplete in comparison to those from subsequent visits.

Although migrants move around on the island, our experience is that most individuals tend to remain in one general area. Therefore, we consider individuals seen in the North Peak, east-side canyons, and Signal Peak areas, for example, as different birds. However, a bird seen at different spots in the

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Observers</th>
<th>Party-hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>21–23 Sep</td>
<td>Lethaby</td>
<td>25</td>
</tr>
<tr>
<td>2002</td>
<td>20–22 Sep</td>
<td>Lethaby, H. Higley</td>
<td>25</td>
</tr>
<tr>
<td>2003</td>
<td>20–21 Sep</td>
<td>Lethaby</td>
<td>14</td>
</tr>
<tr>
<td>2005</td>
<td>23–25 Sep</td>
<td>Lethaby</td>
<td>25</td>
</tr>
<tr>
<td>2006</td>
<td>15–17 Sep</td>
<td>Lethaby</td>
<td>25</td>
</tr>
<tr>
<td>2007</td>
<td>14–16 Sep</td>
<td>Lethaby, Fritz</td>
<td>25</td>
</tr>
<tr>
<td>2007</td>
<td>12–14 Oct</td>
<td>Lethaby, Fritz</td>
<td>23.5</td>
</tr>
<tr>
<td>2008</td>
<td>12–14 Sep</td>
<td>Lethaby, Fritz</td>
<td>25</td>
</tr>
<tr>
<td>2008</td>
<td>20–29 Oct</td>
<td>Fritz</td>
<td>90</td>
</tr>
<tr>
<td>2009</td>
<td>21 Aug&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Lethaby, O. Johnson</td>
<td>2.5</td>
</tr>
<tr>
<td>2009</td>
<td>25–27 Sep</td>
<td>Lethaby, Fritz</td>
<td>25</td>
</tr>
<tr>
<td>2009</td>
<td>14–16 Oct</td>
<td>Lethaby</td>
<td>23.5</td>
</tr>
<tr>
<td>2010</td>
<td>16 Aug&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Lethaby, M. E. Powers</td>
<td>1.5</td>
</tr>
<tr>
<td>2010</td>
<td>24–26 Sep</td>
<td>Lethaby</td>
<td>25</td>
</tr>
<tr>
<td>2010</td>
<td>20–24 Oct</td>
<td>Fritz, Lethaby (22–24 Oct)</td>
<td>42</td>
</tr>
<tr>
<td>2011</td>
<td>22 Aug&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Lethaby</td>
<td>2.5</td>
</tr>
<tr>
<td>2011</td>
<td>16–18 Sep</td>
<td>Lethaby, Gaede</td>
<td>26</td>
</tr>
</tbody>
</table>

<sup>a</sup>Party-hours are used because most of the time observers were in the field together. For example, if two observers spent 6 hr together then 2 hr each on his own, this would be represented as 10 party-hr.

<sup>b</sup>Brief single-day visits to install recording units for monitoring nocturnal migrants. They are included here as they provide some data on August migrants.
North Peak area would not be counted as different unless we clearly verified the presence of multiple individuals. Certain species, such as phoebes and kingbirds, proved much more mobile and occurred much more widely over the island in places that rarely hold other species. We estimated the number of individuals present with a daily total. This technique involved estimating the average, rather than the maximum, number of individuals consistently using each sector (North Peak, east coast terrace and canyons, Signal Peak, and northwest terrace), which is fairly straightforward for conspicuous species such as the phoebes, then summing these counts. Using the average counts for each sector reduced the risk of double counting as individuals sometimes ranged across multiple sectors.

Certain seabirds, such as grebes, rock-loving shorebirds, gulls, and terns we counted by observing feeding flocks offshore, rocky islets, and rocky shoreline, sometimes through a spotting scope. In addition, we checked concentrations of roosting cormorants and pelicans at least once each visit to determine if any booby species (Sula spp.) were present. Our effort for offshore and littoral species was neither systematic nor intensive, however, as our focus was on documenting migrant landbirds. Observation of rock-loving shorebirds was further complicated by the steep cliffs that make it difficult to view much of the shoreline.

We compiled and summarized the daily observations for each species and compared them to a database of bird records for Santa Barbara Island and the other Channel Islands assembled by P. W. Collins and H. L. Jones. This enabled us to assess the relative significance of our observations in relation to other records of migrants on Santa Barbara Island or on the Channel Islands in general.

Beginning in 2006, while on the island, we recorded weather conditions daily. Prior to 2006, we made only informal notes on the weather. We obtained weather data for Los Angeles from the National Oceanic and Atmospheric Administration’s website (www.wrh.noaa.gov/lox) immediately prior to departing for the island.

To analyze the effect of weather on bird migration, we created tables that compared the composition and total number of migrants on various dates under different weather conditions. We selected these dates from both September and October and included examples of all the weather conditions that occurred during our study. When possible we selected dates that were preceded by at least one and usually multiple days of the same weather pattern. This was done to avoid data being skewed by migrants that were lingering after arriving under different weather conditions. The species composition and total number of migrants shown in Tables 2 and 3 exclude certain species that occur on the island regardless of the weather conditions: resident breeding species, the Burrowing Owl (a winter resident), or littoral or marine migrants such as the Common Loon, Eared and Western Grebes, Black Turnstone, Wandering Tattler, Heermann’s and California Gulls, Common/Arctic Tern, and Royal Tern (see species accounts for scientific names). To further assist our study of the relationship between weather and migrants, we also compared the numbers of eastern wood warblers recorded under different weather conditions in September. These species were chosen because they demonstrated a clear pattern of arriving much more frequently under some conditions than others.
Table 2  Weather Conditions during September Surveys Relative to Effort and Numbers of Migrants on Santa Barbara Island

<table>
<thead>
<tr>
<th>Date</th>
<th>Weather</th>
<th>Party-hours</th>
<th>Number of species</th>
<th>Number of individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 Sep 2003</td>
<td><strong>Northwest winds</strong> and mostly clear the night before and the previous day.</td>
<td>8</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>17 Sep 2006</td>
<td>Calm and clear on the island the previous night, but strong <strong>Santa Ana winds</strong> on the mainland 16 and 17 Sep, northwest winds on 15 Sep.</td>
<td>8</td>
<td>35</td>
<td>147</td>
</tr>
<tr>
<td>16 Sep 2007</td>
<td><strong>Northwest winds</strong> the preceding night before and preceding 2 days.</td>
<td>7</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>14 Sep 2008</td>
<td><strong>Marine layer</strong> during the day and preceding night before and for over the preceding week.</td>
<td>8</td>
<td>48</td>
<td>204</td>
</tr>
<tr>
<td>25 Sep 2010</td>
<td>Previous night was clear with a WSW wind, 24 km/hr, in the evening that became calm after 9:30 PM through to the morning. At Los Angeles a light WSW wind in the evening became calm before yielding to weak <strong>Santa Ana winds</strong> in the early hours of the morning. Conditions the previous day were similar.</td>
<td>10</td>
<td>33</td>
<td>99</td>
</tr>
<tr>
<td>17 Sep 2011</td>
<td>A high <strong>marine layer</strong> during the night continued throughout the day. Santa Catalina Island was clearly visible. The previous day the marine layer was lower, visibility about 16 km.</td>
<td>12</td>
<td>63</td>
<td>236</td>
</tr>
</tbody>
</table>

RESULTS

Habitat for Migrants

On Santa Barbara Island, migrants typically occupy habitat quite different from that they use on the larger Channel Islands. On these other islands, birding is rather similar to what it is on the mainland, with observations concentrated on vagrant traps with mesic habitats such as Lemon Tank, San Clemente Island (Sullivan and Kershner 2005), or Army Springs, San Nicolas Island (R. A. Hamilton pers. comm.), or in ornamental plantings around residential areas. On Santa Barbara Island, such habitats are completely absent.

The patches of Giant Coreopsis, Giant Buckwheat, and prickly pear serve as “forests” that attract species that prefer some kind of cover. In September, warblers are especially attracted to Giant Buckwheat, which flowers at this time and attracts numerous insects. All these scrub patches are also attractive to most sparrows. Areas of open grassland or a mix of grass, bare dirt, *Suaeda*, and iceplant also attract some sparrows and are the habitat preferred by Horned Larks, pipits, longspurs, and Western Meadowlarks.
Table 3  Weather Conditions during October Surveys Relative to Effort and Numbers of Migrants on Santa Barbara Island

<table>
<thead>
<tr>
<th>Date</th>
<th>Weather</th>
<th>Party-hours</th>
<th>Number of species</th>
<th>Number of individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Oct 2007</td>
<td><strong>Overcast with persistent light rain</strong> and a light south wind starting around 20:00 the previous evening. By dawn the rain had stopped and there was a moderate W wind and broken cloud cover that enabled reasonably good visibility. The preceding days were clear.</td>
<td>10</td>
<td>28</td>
<td>210^a</td>
</tr>
<tr>
<td>14 Oct 2009</td>
<td><strong>Overcast with some rain.</strong> Persistent light rain fell the previous night, and in the morning the island was visible from 2–3 km away. Overcast had persisted for several days previously, although with less rain.</td>
<td>5.5</td>
<td>13</td>
<td>33</td>
</tr>
<tr>
<td>16 Oct 2009</td>
<td>Northwest winds and clear skies during the night until 08:00, when <strong>Santa Ana winds</strong> arrived. Santa Ana winds had blown during the night on the mainland.</td>
<td>7.5</td>
<td>34</td>
<td>310</td>
</tr>
<tr>
<td>22 Oct 2010</td>
<td><strong>Overcast with occasional brief showers</strong> during the night and day. The island was visible from 16 to 19 km away. The weather had been similar for several days previously.</td>
<td>10</td>
<td>37</td>
<td>213</td>
</tr>
<tr>
<td>24 Oct 2010</td>
<td><strong>Northwest winds</strong> and clear skies during the night and day. The previous day had been clear but with very little wind, while the days prior to that (see above entry) had been overcast with some rain.</td>
<td>7</td>
<td>20</td>
<td>86^b</td>
</tr>
<tr>
<td>20 Oct 2011</td>
<td><strong>Marine layer:</strong> calm and completely cloudy all night. Santa Catalina Island partly visible at dawn. Previous day was also cloudy but with WSW wind, 16 km/hr.</td>
<td>10</td>
<td>55</td>
<td>318</td>
</tr>
</tbody>
</table>

^a We estimated that about 70–75% of these birds were not new arrivals, as there were already large numbers of White-crowned and Savannah Sparrows on the island.

^b We estimated that <10% of these birds were new arrivals as the migrants present consisted of species such as the White-crowned Sparrow that were already present in some numbers.

The following areas (Figure 2) were the most attractive for migrant landbirds:

- The North Peak area, including the long strip of Giant Coreopsis and Giant Buckwheat (Figure 3) that extends down from the summit and the prickly pear patch somewhat lower on the southeast flank, is the area where migrants are found most reliably.

- The nursery by the campground and ranger’s residence has become attractive for migrants since it was created in 2007. The nursery is used to grow young plants to assist in restoration of native vegetation. In
addition to fresh green vegetation, this area often has water in plastic container tops under the tables storing the young plants. This is the only fresh water on the island available to migrant birds.

- Cave, Middle, and Graveyard canyons, immediately south of the campground, have extensive areas of coreopsis and prickly pear (Figure 4) that typically hold a few migrants.

- The extensive areas of Giant Buckwheat at the summit and along the seaward slopes of Signal Peak are attractive to migrants in September, but they are much less productive in October.

- The Suaeda and grass flats on the southeastern and, especially, northwestern “benches” of the island sometimes attract a variety of sparrows and, occasionally, roving flocks of insectivores.

As a result of the lack of wetlands and sandy shorelines, most waders, waterfowl, and shorebirds occur only sporadically, except for a few rock-loving shorebirds, with most sightings of other species being of birds flying over the island.

SPECIES ACCOUNTS

Here we summarize the status of each species observed during our visits and compare this information with that in the database of bird records for the Channel Islands (P. W. Collins and H. L. Jones, unpubl. data). Photographic documentation (“ph.”) is archived at the Santa Barbara Museum of Natural History.

We summarize the more frequent species as follows:

Recorded almost daily: The species was recorded on 75% or more of the days during the date range given.

Recorded regularly: The species was recorded on 50–74% of the days during the date range given.

Recorded fairly regularly: The species was recorded on 30–49% of the days during the date range given.

For species that occurred on fewer than 30% of the days, we list all records. For resident landbirds and seabirds, of which we made only casual observations, the accounts begin with the phrase “not formally counted.”

Greater White-fronted Goose (*Anser albifrons*). A flock of at least 49 birds circled the island several times on 19 Oct 2011 (ph.). This is the only record for Santa Barbara Island.

Cackling Goose (*Branta hutchinsii*). We noted single birds of the race *leucopareia* on 24 Oct 2010 (ph.) and 23 Oct 2011 (ph.). Four birds flew over the island on 22 Oct 2010, one of which had a prominent neck band, suggesting *leucopareia*. There are seven other records of the “Canada Goose” from the island, most preceding the split of the Canada and Cackling Geese, but including one assigned to the Cackling Goose.

Northern Pintail (*Anas acuta*). Eleven birds flew over the island on 22 Oct 2010. There are just two previous records, both from fall.

Green-winged Teal (*Anas crecca*). Two birds flew over the island on 20 Oct 2011. There is just one previous record, from spring.
FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Surf Scoter (*Melanitta perspicillata*). Not formally counted. Three immature or female birds were offshore 21–23 October 2011, and a flock of five flew past the north tip of the island on 24 Oct 2011 (ph.). There are just three other fall records for Santa Barbara Island.

Common Loon (*Gavia immer*). Not formally counted. A single bird was offshore 24-26 Sep 2010. There is no previous fall record for Santa Barbara Island.


Clark’s Grebe (*Aechmophorus clarkii*). Not formally counted. Single individual offshore on 21 Oct 2011. This is the only record for Santa Barbara Island and one of nine for the Channel Islands.

Northern Fulmar (*Fulmarus glacialis*). Not formally counted. A single individual was observed offshore on 24 Oct 2010.

Sooty Shearwater (*Puffinus griseus*). Not formally counted. A single individual was observed offshore on 21 Oct 2011.

Brown Pelican (*Pelecanus occidentalis*). Not formally counted, but hundreds seen daily, with frequent large feeding flocks, often associated with Brandt’s Cormorants.

Brandt’s Cormorant (*Phalacrocorax penicillatus*). Not formally counted, but hundreds were seen daily, with frequent large feeding flocks. Brandt’s is by far the most common cormorant on Santa Barbara Island.

Double-crested Cormorant (*Phalacrocorax auritus*). Not formally counted, but up to about 40 were seen most days.

Pelagic Cormorant (*Phalacrocorax pelagicus*). Not formally counted, but up to about 10 were seen most days.


Great Egret (*Egretta alba*). Three observed flying around the north tip of the island on 20 Oct 2011 (ph.). This is the only fall record and just the second for Santa Barbara Island.

Snowy Egret (*Egretta thula*). Single individual on 20 Sep 2002, two on 23 Oct 2008. These are two of four records for Santa Barbara Island.

Osprey (*Pandion haliaetus*). Two, an adult and immature seen separately, on 12 Oct 2007.

Northern Harrier (*Circus cyaneus*). Recorded regularly 12–29 Oct, with a high count of five (an adult male, two adult females, and two juveniles) on 12 Oct 2007. Single individuals were recorded on 15 Sep 2007, 26 Sep 2009, and 16–17 Sep 2011.

Sharp-shinned Hawk (*Accipiter striatus*). Single individual on 21 Oct 2008. This is one of only four records for Santa Barbara Island, three of which are from the fall.

American Kestrel (*Falco sparverius*). Resident breeder seen daily. It is unclear if the species also occurs as a migrant. High count of nine on 23 Oct 2011.
FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Merlin (*Falco columbarius*). Recorded fairly regularly 13 Sep–29 Oct with a high count of three on 25 Sep 2005. The latter were seen as a loose group, mobbing each other, as they headed southeast out to sea from Signal Peak.

Peregrine Falcon (*Falco peregrinus*). A resident pair, seen most days, has nested successfully on the island since 2008 (L. Harvey pers. comm.). The young are typically chased from the island by the parents prior to our September visits, although on 18 Sep 2011 we observed a juvenile being mobbed by the adult male. We observed single juveniles on 25–26 Oct 2008 and 20 Oct 2011. Otherwise, we have no evidence of a migratory movement of this species to Santa Barbara Island.


Semipalmated Plover (*Charadrius semipalmatus*). Two seen flying over the island and vocalizing on 14 Sep 2008, and two were heard on 17 Sep 2011. There are only two other Santa Barbara Island records, both in August and September.

Killdeer (*Charadrius vociferus*). Single individuals on 21 Oct 2008 (heard only) and 21–23 Oct 2011, with two present on 22 Oct 2010 and again on 20 Oct 2011 (ph.). There are only three other fall records for Santa Barbara Island, all of single birds.

American Oystercatcher (*Haematopus palliatus*). Two sightings of solitary birds, both photographed and accepted by the California Bird Records Committee (CBRC). One seen on 24 Sep 2005 (Iliff et al. 2007), the other on 16 Sep 2007 (Pike and Compton 2010). We have seen no indication of hybrid Black × American Oystercatchers on Santa Barbara Island.

Black Oystercatcher (*Haematopus bachmani*). Not formally counted, but fairly common resident along the rocky shoreline and offshore reefs, with up to 12 seen daily. We estimated an island-wide total of 18 from 20 to 29 Oct 2008.

Black-necked Stilt (*Himantopus mexicanus*). A single bird was standing on the rocky shoreline with a Black Oystercatcher on 24 Sep 2010. This is the second record for Santa Barbara Island.

American Avocet (*Recurvirostra americana*). Two birds seen to arrive at the island on 26 Oct 2011 (ph.). This is the only record for Santa Barbara Island and the latest in fall for the Channel Islands.

Solitary Sandpiper (*Tringa solitaria*). Single individuals heard on 13 Sep 2008 and seen flying over the island on 14 Sep 2008. These are the only records for Santa Barbara Island.

Wandering Tattler (*Tringa incana*). Not formally counted, but one to three birds regularly present along the island’s rocky shoreline.

Greater Yellowlegs (*Tringa melanoleuca*). Single individuals heard on 22 and 26 Oct 2008 and on 20 and 21 Oct 2011. One was seen flying over the island, vocalizing, on 17 Sep 2011. More unexpected was an individual that stayed by the campground 23–24 Oct 2011. There is only one previous Santa Barbara Island record.

Whimbrel (*Numenius phaeopus*). Seen flying over the island, 15 on 13 Sep 2008 and two on 17 Sep 2011. This species’ rarity on Santa Barbara Island is surprising, as it is a common migrant and winter visitor to San Clemente Island, where it frequents open upland habitats somewhat similar to those on Santa Barbara Island (Sullivan and Kershner 2005).

Marbled Godwit (*Limosa fedoa*). A flock was heard at night flying over the island on 23 Sep 2005. There are two previous fall records for Santa Barbara Island, both of single birds.

126
Black Turnstone (Arenaria melanocephala). Not formally counted but one to five birds present regularly.

Sanderling (Calidris alba). One seen on 22 Sep 2001. There are four other fall records and one winter record for Santa Barbara Island.

Western Sandpiper (Calidris mauri). Heard flying over the island on 14 Sep 2008. This is the first fall record for Santa Barbara Island.

Least Sandpiper (Calidris minutilla). Two seen and heard flying over the island on 17 Sep 2011. This is only the second fall record for Santa Barbara Island.

Pectoral Sandpiper (Calidris melanotos). One was seen and heard flying over the island on 26 Oct 2008, and a single juvenile was feeding near the campsite 16–17 Sep 2011. These are the only records for Santa Barbara Island.

Long-billed Dowitcher (Limnodromus scolopaceus). Two were seen and heard flying over the island on 22 Oct 2010; two were recorded on 23 Oct 2010. On the latter date, one of the birds was attacked and killed by a Peregrine Falcon. These are the only records for Santa Barbara Island.

Short-billed Dowitcher (Limnodromus griseus). One heard flying over the island on 14 Sep 2008.

Red-necked Phalarope (Phalaropus lobatus). One seen flying over the island on 13 Sep 2008.

Heermann’s Gull (Larus heermanni). Not formally counted but recorded on 13 dates from 12 Sep to 20 Oct, with a high count of six on 14 Oct 2007. Probably regular offshore in small numbers. The majority of these birds were in their first or second year. This species is certainly much less common on Santa Barbara than on many of the other Channel Islands such as San Clemente, where Sullivan and Kershner (2005) described it common, with a high count of 200 on just a single beach.

California Gull (Larus californicus). Not formally counted, but recorded regularly 14–29 Oct, with a high count of up to 20 from 20 to 29 Oct 2008. A single individual was seen earlier on 14 Sep 2008.

Western Gull (Larus occidentalis). Not formally counted, but hundreds seen daily, with many attending the frequent large feeding flocks of pelicans and cormorants.

Common/Arctic Tern (Sterna hirundo/paradisaea). Up to 70 observed feeding offshore from 15 to 17 Sep 2006. On the basis of closer views of birds seen just north of the island during the boat crossings immediately before and after this visit, some, if not all, were Common Terns.

Royal Tern (Thalasseus maximus). Not formally counted, but recorded almost daily, with a high count of 200 seen 12–14 Sep 2008. Most were resting on offshore rocks along the west and southwest coast of the island.


Pigeon Guillemot (Cepphus columba). A juvenile was off the boat dock on 16 Sep 2007, the latest fall record for Santa Barbara Island by over three weeks. This species is a common breeder on the island, but the birds typically depart by mid-to-late August.

Rock Pigeon (Columba livia). One seen on 14 Oct 2007; two seen on 13 Sep 2008. Another 19–23 Oct 2011 sported leg bands and was clearly a disoriented racing pigeon rather than a “wild” bird.

Eurasian Collared-Dove (Streptopelia decaocto). Single individuals on 13 Sep 2008, 16–17 Sep 2011, and 20 Oct 2011. These are the only fall records for Santa
FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Barbara Island, with the only other record being of remains found in a Peregrine Falcon nest.

White-winged Dove (Zenaida asiatica). Single individuals on 20 Sep 2002 and 25 Sep 2009. Sullivan and Kershner (2005) described this species as an uncommon migrant on San Clemente Island with counts of up to 15 in one day, conspicuously more numerous than on the adjacent mainland coast, where it is a rare migrant. On Santa Barbara Island we found this species is not obviously more frequent than on the mainland. Unlike most migrants reaching the Channel Islands, the White-winged Dove presumably originates from the east-southeast, from the Colorado Desert region of California. It seems possible that Santa Catalina Island, which lies on a path between Santa Barbara Island and the breeding range and is not well covered by birders, may be “capturing” White-winged Doves that stray offshore along this vector before they reach Santa Barbara Island.

Mourning Dove (Zenaida macroura). Recorded almost daily from 12 Sep to 29 Oct, with high counts of 12+ on 21 Sep 2002 and up to 20+ from 12 to 14 Sep 2008. This species has bred occasionally on Santa Barbara Island.

Barn Owl (Tyto alba). A resident breeder on Santa Barbara Island. We recorded it regularly, with a high count of 20 on 16 Sep 2011. We noted substantial annual variability in its abundance, which Drost and Fellers (1991) found linked to fluctuations in the island’s population of Deer Mouse (Peromyscus maniculatus).

Burrowing Owl (Athene cunicularia). Recorded regularly from 15 Sep to 29 Oct. The maximum count was ten on 22 Oct 2010; island-wide population estimates were six, six, and nine birds, respectively, for Oct 2008, 2009, and 2011. This species was not recorded 12–14 Sep 2008 or 14–16 Sep 2007, suggesting that it may not arrive in numbers until around 20–25 Sep. This agrees with the findings of Drost and McCluskey (1992), who first recorded the species in the “latter part of September.” The Burrowing Owl is a regular winter visitor and breeds intermittently on Santa Barbara Island in years with high rodent populations. Thus some of our records may pertain to resident breeders.

Long-eared Owl (Asio otus). Single individuals 22–23 Oct 2010 (ph.) and on 19 Oct 2011 (ph.). Historically, this species occurred much less frequently on Santa Barbara Island than the Short-eared Owl, with records ranging from 7 Sep to 26 May. There is no evidence that the Long-eared Owl has bred on the island, and suitable habitat is lacking, although there is a record from 5 July 1974.

Short-eared Owl (Asio flammeus). Single individuals on 14 Oct 2007, 14 Oct 2009, and 20 and 23 Oct 2010, and up to three 19–23 Oct 2011. In the past, this species was a frequent winter visitor to the island, with as many as 16 birds present. It breeds irregularly during periods of peak rodent abundance, with the last confirmed nesting in 2001.

Common Nighthawk (Chordeiles minor). One seen and heard to vocalize three times on 20 Oct 2011. There are four spring records from the Channel Islands, including one from Santa Barbara Island, but the species was previously unknown in fall. The Common Nighthawk is casual to accidental along the coast of southern California, where it occurs primarily as a late spring vagrant from early June into early July (Garrett and Dunn 1981). However, there are also several early-fall records and a 27 Oct specimen from Los Angeles County (Garrett and Dunn 1981).

Lesser Nighthawk (Chordeiles acutipennis). Single individuals on 14 Oct 2007, 16 Sep 2011, and (identified as a different bird because of the lack of primary wear) 17–18 Sep 2011; two on 13 Sep 2008. These represent four of only seven fall records for the island.

Vaux’s Swift (*Chaetura vauxi*). Seven on 21 Sep 2001, two on 17 Sep 2011, and single individuals on 24 Sep 2005, 17 Sep 2006, 13 Sep 2008, 16 Oct 2009, 16 Sep 2011, and 20–21 Oct 2011. Some of these birds were viewed at some distance and are perhaps best regarded as *Chaetura* sp.

White-throated Swift (*Aeronautes saxatilis*). One on 24 Sep 2005. There is only one other fall record for Santa Barbara Island.

Black-chinned Hummingbird (*Archilochus alexandri*). Up to three on 13 and 14 Sep 2008. This is the only fall record from Santa Barbara Island. This species is very rare offshore with just five records on Southeast Farallon Island off San Francisco between 1968 and 1999, all between late August and mid September (Richardson et al. 2003). There are only two other well documented fall records from the Channel Islands, both from San Clemente Island in early September. The birds on Santa Barbara Island, all females or immature, were initially detected by their call notes, clearly different from those of the regularly occurring Anna’s Hummingbird. Identification to the genus *Archilochus* was then confirmed through observation of the very narrow inner primaries. On one bird, the broad blunt tip of primary 10 was observed, eliminating the very similar Ruby-throated Hummingbird (*A. colubris*).

Anna’s Hummingbird (*Calypte anna*). Recorded fairly regularly 12 Sep–25 Oct, with high counts of up to three 19–25 Oct and three on 25 Sep 2010. A number of unidentified hummingbirds observed briefly were likely of this species.

Allen’s Hummingbird (*Selasphorus sasin*). A single adult male on 15 Sep 2007 and up to two from 20 to 25 Oct 2008. These are likely of the nonmigratory race *sedentarius*, which is resident on most of the other Channel Islands. Males of the nominate race have generally left California for their winter range well before September. These are the only fall records for Santa Barbara Island.

Belted Kingfisher (*Megaceryle alcyon*). Single individuals 23–24 Sep 2005 and on 26 Oct 2008. This species is regular on San Clemente Island, especially in fall and winter, and has been recorded several times previously on Santa Barbara Island.

Acorn Woodpecker (*Melanerpes formicivorus*). Single individuals 20–21 Sep 2003 and on 13 Sep 2008. There are six other records for Santa Barbara Island, five of which were from the fall. This species has colonized both Santa Cruz and Santa Catalina islands over the last century and appears to be somewhat prone to offshore dispersal.


Olive-sided Flycatcher (*Contopus cooperi*). Single individuals on 13 Sep 2008 and 16 Sep 2011, and two on 17 Sep 2011. There are only six fall records from the island, all from 9 to 20 Sep.

Western Wood-Pewee (*Contopus sordidulus*). Recorded fairly regularly from 12 to 23 Sep, with a high count of 12 birds on 17 Sep 2011. Single individuals also seen on 14 Oct 2007 and on 21 and 25 Oct 2011. The latter record is comparable to the latest dates for San Diego County (Unitt 2004), but the species has been recorded later elsewhere on the mainland coast, an example being one 3–6 Dec 2001 in Santa Barbara County (Lehman, unpubl. data).

Least Flycatcher (*Empidonax minimus*). Single individuals on 17 Sep 2006 and 17 Sep 2011 represent the only fall records for Santa Barbara Island.

Hammond’s Flycatcher (*Empidonax hammondii*). One on 13 Oct 2007 was in fresh plumage with a bright yellow belly. This species has seldom been recorded on Santa Barbara Island in fall.

Gray Flycatcher (*Empidonax wrightii*). Single individuals on 21 and 22 (believed different) Sep 2002, 13–14 Oct 2007, 12 Sep 2008 (ph.), and 17 Sep 2011, and three on 25 Sep 2010. These are the only fall records for Santa Barbara Island and constitute about half of the fall records for all of the Channel Islands.

Dusky Flycatcher (*Empidonax oberholseri*). Single individuals on 13 Oct 2007, 25 Sep 2009, 14 Oct 2009, and 26 Sep 2010 (ph.) represent the only fall records for Santa Barbara Island. The October records are quite late for California, but both birds were seen very well, although they were not heard to vocalize. All of the birds above were identified by a combination of structure, behavior, and plumage: relatively short to moderate primary projection beyond the tertials, rather long tail, relatively long, narrow, largely dark bill; olive mantle contrasting with gray head, lack of highly contrasting wing bars and tertial edges, and a lack of tail dipping. Our examination of the one on 25 Sep 2009 was somewhat cursory, as we were concentrating on the identification of a Blue-headed Vireo present in the same area. If correct, these records represent an unusual number of Dusky Flycatcher records for a location along the coast of California. The bird seen 26 Sep 2010 was extensively videotaped, and D. M. Compton, M. T. Heindel, A. Leukering, and S. G. Modinow (pers. comm.) concurred with the identification. The Dusky Flycatcher is very rare along the mainland coast of Santa Barbara County in fall, with only one published record through 2011 (Lehman 1994, Lehman unpubl. data). However, it appears to be slightly more frequent farther south, with Orange County having some 11 accepted coastal fall records (Hamilton and Willick 1996, B. E. Daniels pers. comm.) ranging from 6 Sep to 6 Nov. In coastal San Diego County the species is a very rare fall migrant from 11 Sep to 12 Oct, as attested also by four specimens from Point Loma (Unitt 1984, 2004). K. L. Garrett (pers. comm.) commented that no proper effort had been made to vet claims of this species in coastal Los Angeles County, although he was aware of a few reliable fall and winter records.

Pacific-slope Flycatcher (*Empidonax difficilis*). Recorded regularly 21 Aug–25 Oct. The latter date is the latest recorded for the species on Santa Barbara Island. Usually, up to six recorded per day, but ten were noted on 17 Sep 2011. We presume most or all of these individuals were the Pacific-slope rather than the Cordilleran (*E. occidentalis*) and have no information on whether any were of the subspecies endemic to the Channel Islands, *E. d. insulicola*.

*Empidonax* sp. A bird calling *whit* on 14 Sep 2008 was either a Dusky or Least Flycatcher, most likely the latter. A probable Least Flycatcher was seen on 21 Oct 2011. A bird photographed on 13 Sep 2008 was considered by experts to be a Least, Dusky, or Hammond’s Flycatcher. Another *Empidonax*, again one of the Least/Dusky/Hammond’s trio, was seen on 13 Sep 2008 but too briefly and at too great a distance for definite identification.

Black Phoebe (*Sayornis nigricans*). Recorded regularly 15 Sep–29 Oct, with a maximum count of up to eight 20–29 Oct 2008; otherwise, one to four birds were noted.


FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Tropical Kingbird (*Tyrannus melancholicus*). One from 22 to 24 Oct 2011. There are only eight fall records for the entire Channel Islands, all earlier than this individual, and just one previous fall record for Santa Barbara Island. This species is surprisingly rare on offshore islands, with only 13 recorded on well-watched Southeast Farallon Island between 1968 and 1999 (Richardson et al. 2003). In contrast, mainland Santa Barbara County recorded approximately 153 between 1968 and 2010 (Lehman unpubl. data).

Cassin’s Kingbird (*Tyrannus vociferans*). Single juvenile seen on 16 Sep 2006 is one of only four recorded on Santa Barbara Island in fall.

Western Kingbird (*Tyrannus verticalis*). Single individuals seen on 15 and 17 Sep 2006, 14 Sep 2008, 24 Sep 2010, and 16 and 18 Sep 2011, with four on 17 Sep 2011.

Eastern Kingbird (*Tyrannus tyrannus*). One on 12 and 13 Sep 2008 represents the only fall record for this species from Santa Barbara Island.

Loggerhead Shrike (*Lanius ludovicianus*). Single immature on 16 Aug 2010. The lack of records during our September and October surveys parallels the pattern on Southeast Farallon Island, where this species was recorded only eight times in fall between 1968 and 1999, with the latest date being 11 Sep (Richardson et al. 2003).

Gray Vireo (*Vireo vicinior*). One on 17 Sep 2011 (Figure 5) is the only one recorded for Santa Barbara Island and one of only nine for the Channel Islands, all of which have occurred between 5 and 24 Sep. This species is a casual vagrant on the mainland coast of California, with only two generally accepted records: a specimen taken at Pt. Fermin, Los Angeles County, on 9 Sep 1967 (Garrett and Dunn 1981) and an individual photographed near Oxnard, Ventura County, from 2 to 7 Oct 2011. There are five additional reports supported by documentation from the Channel Islands as follows: Santa Catalina 7 Sep 1973 (Am. Birds 28:109), Anacapa 14 Sep 1976 (Am. Birds 31:224), Santa Cruz 24 Sep 1977 (University of California Santa Barbara specimen 7343), San Clemente 23 Sep 1976 (Am. Birds 31:224), and San Nicolas 5 Sep 1988 (Am. Birds 43:170). Three additional undocumented reports from San Clemente Island are consistent with the pattern of the documented occurrences: 7 Sep 2000, 21 Sep 2000, and 21 Sep 2001 (Collins and Jones unpubl. data).

The greater frequency of migrant Gray Vireos on the Channel Islands than on the nearby mainland appears genuine, rather than the result of misidentifications of two potential confusion species, the Least Bell’s Vireo (*V. bellii pusillus*) and Plumbeous Vireo (*V. plumbeus*). At this season, all species are in fresh adult or formative plumage (Pyle 1997), which simplifies identification. Also, the pattern of occurrence does not support the notion of misidentification. There are only two records of the Plumbeous Vireo from the Channel Islands, both from Santa Rosa Island, indicating that this species is much rarer on the islands than on the mainland, where it is a rare but now annual migrant. In addition, the Plumbeous Vireo is a relatively late migrant to the California coast, most frequent in October, with early dates of 13 Sep in Santa Barbara County (Lehman 1994, Lehman unpubl. data) and 16 Sep in San Diego County (Unitt 2004). Therefore, the window of the Gray Vireo’s occurrence on the Channel Islands overlaps only slightly with that of the Plumbeous Vireo. Furthermore, of the three accepted Channel Island records of the Gray Vireo in the period of overlap with the Plumbeous Vireo, one is supported by a specimen, another by a photograph. Bell’s Vireo has occurred only four times in fall migration on the Channel Islands, between 26 Aug and 7 Oct, and is only a rare to very rare fall migrant along the coast of California away from sites where it breeds. Given the rarity of migrant Least Bell’s Vireos on both the Channel Islands and the mainland California coast, it appears improbable that misidentification of this subspecies could account for most of the Gray Vireo records from the Channel Islands.
Cassin’s Vireo (Vireo cassinii). Single individuals on 22 Sep 2001 and 20 Oct 2010. There is only one previous fall record for Santa Barbara Island.

Blue-headed Vireo (Vireo solitarius). Single individuals on 25 Sep 2009 and 16–17 Sep 2011 (ph.) are the only ones recorded on Santa Barbara Island. Both records have been accepted by the CBRC (Pyle et al. 2011, www.californiabirds.org).


Red-eyed Vireo (Vireo olivaceus). One on 17 Sep 2011 is one of only two recorded from Santa Barbara Island in fall.

Common Raven (Corvus corax). One on 15 Sep 2007, to our knowledge the only one recorded on Santa Barbara Island since 1982. The raven is a common resident on the other Channel Islands and formerly was also common on Santa Barbara Island, when the island was used as a ranch.


Purple Martin (Progne subis). Single female or immature seen on 21 Sep 2002, the only one recorded on the island in fall and one of only five at any season.

Tree Swallow (Tachycineta bicolor). Single individuals observed on 14 Oct 2007, 14 Sep 2008, 24 Oct 2008, and 20 Oct 2011; up to two seen from 27 to 29 Oct 2008. These are the only fall records for Santa Barbara Island.

Violet-green Swallow (Tachycineta thalassina). Nine observed on 20 Oct 2011; two remained to 21 Oct 2011. These are the only fall records for Santa Barbara Island.

Northern Rough-winged Swallow (Stelgidopteryx serripennis). Single individuals seen on 20 Sep 2002 and 14 Sep 2008; two seen on 12 Sep 2008. These are the only fall records for Santa Barbara Island.


Red-breasted Nuthatch (Sitta canadensis). Single birds on 14 Sep 2008, 24 and 25 (different individuals) Sep 2010, two on 20 Oct 2010, and four on 22 Oct 2010. These are the only fall records for Santa Barbara Island.

Brown Creeper (Certhia americana). One seen on 21 Oct 2008 represents the only fall record for Santa Barbara Island.

Rock Wren (Salpinctes obsoletus). Not formally counted, but recorded almost daily, with a high count of 12. This species is a resident breeder around the cliffs.

Bewick’s Wren (Thryomanes bewickii). One on 18 Sep 2011, the fourth and earliest recorded on Santa Barbara Island in fall.

House Wren (Troglodytes aedon). Recorded almost daily from 21 Aug to 29 Oct, with a high count of 14 on 25 Sep 2010. This species favors the canyons more than most other migrants.

Pacific Wren (Troglodytes pacificus). One on 17 Sep 2006. The distinctive vocalizations were heard, eliminating the recently split Winter Wren (T. hiemalis). This is one of only three Santa Barbara Island records of this species, which is most common on Santa Cruz Island, rare on the southern Channel Islands, and unrecorded on San Clemente Island.
Golden-crowned Kinglet (Regulus satrapa). One on 14 Oct 2007. There are only four fall and two spring records for Santa Barbara Island.

Ruby-crowned Kinglet (Regulus calendula). Recorded regularly 16 Sep–26 Oct. This species is infrequent prior to the last week of September but common in October, when present almost daily, with a maximum count of seven on 21 Oct 2011.

Blue-gray Gnatcatcher (Polioptila caerulea). Single individuals 23–24 Sep 2005, 12–14 Sep 2008, and 14–16 Oct 2009, and two daily 16–18 Sep 2011. These records are consistent with Garrett and Dunn’s (1984) statement that the species is an uncommon transient through the Channel Islands and a rare breeder on Santa Cruz and possibly Santa Catalina islands.

Swainson’s Thrush (Catharus ustulatus). Recorded regularly 12 Sep–25 Oct, although less frequently in October than in September. Usually two to eight birds noted per day, but on 14 Sep 2008 we counted about 25, many of which we saw departing the island shortly after dawn. These records include the latest date and highest daily count for Santa Barbara Island in fall. This species is a common nocturnal migrant over the island, most frequently heard calling just before dawn. Because of the sparseness of vegetative cover, we are certain that the vast majority of these migrants pass over Santa Barbara Island without stopping. Grounded birds are commoner than on the mainland coast of Santa Barbara County, where the species is rare to uncommon in fall (Lehman 1994), or of Orange County, where daily counts in fall seldom exceed six (B. E. Daniels pers. comm.). With daily counts in mid-September as high as 30 and 35, numbers on Point Loma in San Diego County (R. E. Webster fide P. Unitt) are exceptionally high as those on Santa Barbara and San Clemente islands.

Hermit Thrush (Catharus guttatus). Recorded regularly 16 Sep–29 Oct. This species has proven infrequent during September but is often common in October, when seen almost daily. High counts are 12+ on 21 Oct 2011, 18+ on 22 Oct 2010, and 23+ on 16 Oct 2009. Our record for 16 Sep 2007 is very early for coastal southern California. For comparison, Sullivan and Kershner (2005) listed 18 Sep as the earliest date for San Clemente Island and Hamilton and Willick (1996) 20 Sep as that for Orange County.

and 26 (different individuals) Sep 2010, and 17 Sep 2011. This species is a resident breeder on the larger Channel Islands.

Sage Thrasher (*Oreoscoptes montanus*). Recorded fairly regularly from 12 Sep to 27 Oct, with a high count of up to three on 13 and 14 Sep 2008. From 1974 through 2011, Santa Barbara Island had 29 fall records of the Sage Thrasher from 10 Aug to 4 Nov, with a high count of four on 21 Sep 1978. This species is a very rare fall migrant in Santa Barbara County (Lehman 1994) and rare migrant in coastal San Diego County (Unitt 2004). Hamilton and Willick (1996) noted only two fall records for Orange County. However, Garrett and Dunn (1981) noted that this species is commoner on the Channel Islands than on the nearby coast of the southern...
FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Figure 3. The scattered patches of Giant Buckwheat and long strip of Giant Coreopsis (the start of which can be seen in the background) at the summit of North Peak constitute Santa Barbara Island’s most productive location for migrants.

Photo by Peter Gaede

California mainland, and Sullivan and Kershner (2005) also noted that it is much more frequent on San Clemente Island than on the nearby mainland. It appears that the Sage Thrasher’s movement through Santa Barbara Island peaks in September rather than during October and November as it does on San Clemente Island.

European Starling (Sturnus vulgaris). One on 29 Oct 2008, up to four 19–25 Oct 2011, five 14–16 Sep 2007, and six 12–14 Oct 2007. This species was much more common on Santa Barbara Island during the 1970s and 1980s, when it bred locally. It has declined throughout the northern Channel Islands in recent decades, coinciding both with the widespread return of nesting Peregrine Falcons and the removal of many old buildings that served as nesting sites. It continues to breed commonly on San Nicolas, Santa Catalina, and San Clemente islands, where the Peregrine Falcon is only now beginning to establish resident breeding populations and where there are the man-made habitats (planted trees and buildings) that the starling prefers.

Red-throated Pipit (Anthus cervinus). Single individuals were seen and heard flying over the island on 21 and 25 Oct 2008, which was a minor invasion year for this species in California. These are the island’s only records of the Red-throated Pipit.

American Pipit (Anthus rubescens). In September, single individuals on 17 Sep 2011 and 23 Sep 2001 only, but regularly noted in October, with a maximum of 19 on 23 Oct 2008. This species is seen mostly in flight, making it difficult to judge whether birds are different or seen repeatedly. We suspect the former is more likely, as we have seen few pipits on the ground.

Sprague’s Pipit (Anthus spragueii). One seen 24 Sep 2005 (Iliff et al. 2007), another 21 Oct 2008 (Pike and Compton 2010). These are the only CBRC-validated records of Sprague’s Pipit for the Channel Islands.
FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Figure 4. The canyons on the east side have Santa Barbara Island's most extensive stands of taller vegetation, primarily Giant Coreopsis and prickly-pear cacti, but they typically attract only low numbers of migrants.

Photo by Peter Gaede


Golden-winged Warbler (Vermivora chrysoptera). One seen 20–21 Oct 2010 (ph.) is the only Golden-winged Warbler recorded from Santa Barbara Island. This record is accepted as CBRC 2010-181 (www.californiabirds.org). The only other accepted record from the Channel Islands is of one seen on San Nicolas Island 4 Jun 1977 (Binford 1983).

Black-and-white Warbler (Mniotilta varia). One immature female on 18 Sep 2011; one immature male on 24 Oct 2011 (ph.). There are three other fall records for Santa Barbara Island from 3 to 26 Oct.

Orange-crowned Warbler (*Oreothlypis celata*). Recorded almost daily 12 Sep–28 Oct. Typically, one to 10 birds present, but at least 40 recorded 17 Sep 2006. This species is typically the most common warbler on Santa Barbara Island prior to the arrival of Yellow-rumped Warblers in October. Although we have not studied the birds’ subspecific identifications, it is clear from collected specimens that most Orange-crowned Warblers stopping on Santa Barbara Island do not belong to *O. c. sordida*, the dark subspecies that breeds throughout the Channel Islands.


Virginia’s Warbler (*Oreothlypis virginiae*). One seen on 14 Sep 2008 is the earliest of the five recorded on Santa Barbara Island in fall.


American Redstart (*Setophaga ruticilla*). Single individuals seen 23–25 Sep 2005, 25 Sep 2010, 20–23 Oct 2010 (ph.), and 24 Oct 2011 (adult male, ph.), a total of five, including an adult male, 12–14 Sep 2008 (ph.), and a total of seven, including an adult male, 16–17 Sep 2011 (ph.). High count of five on 16 Sep 2011. These records include the highest count and latest fall date for Santa Barbara Island.

Cape May Warbler (*Setophaga tigrina*). An immature male around the nursery and east coast canyon area 22–25 Oct 2011 (ph.) is the only Cape May Warbler recorded for Santa Barbara Island in fall and is accepted by the CBRC (www.californiabirds.org). On 24 Oct 2011, the same or another was seen in a mixed flock of warblers, including several newly arrived eastern vagrants, at the North Peak.
coreopsis patch. It seems possible that this was a second bird, but comparison of photographs was inconclusive.

Northern Parula (Setophaga americana). One, the only one recorded on Santa Barbara Island in fall, seen on 17 Sep 2011.


Bay-breasted Warbler (Setophaga castanea). Single individuals seen 21–22 Sep 2002 (ph.) and 22 Oct 2008 provide the only fall records for Santa Barbara Island.

Blackburnian Warbler (Setophaga fusca). One seen on 24 Sep 2010 is the first recorded on the island in fall.

Yellow Warbler (Setophaga petechia). Recorded regularly from 12 Sep to 25 Oct. Typically we saw one to three birds daily but recorded up to 10 from 12 to 14 Sep 2008 and up to eight from 16 to 18 Sep 2011.

Chestnut-sided Warbler (Setophaga pensylvanica). Single immatures seen on 13 Sep 2008 (ph.), 17 Sep 2011 (ph., Figure 6), and 21 Oct 2011. There is only one other fall record for Santa Barbara Island.


Black-throated Blue Warbler (Setophaga caerulescens). Single males on 20 Oct (ph.) and 25 Oct 2011 (ph.), the only ones recorded on the island.

Figure 6. In September, blooming Giant Buckwheats attract large numbers of insects and act as a magnet for migrant warblers, such as the Chestnut-sided and Wilson’s Warblers foraging on this buckwheat.

Photo by Peter Gaede

Yellow-rumped Warbler (*Setophaga coronata*). Recorded regularly 16 Sep–29 Oct. This species does not typically arrive until late September but is present daily in October, with an island-wide high estimate of 60 on 20 Oct 2011. This species is very mobile and is also often seen flying over, making accurate counts difficult. We did not systematically record the subspecies. The vast majority of birds seen were *S. c. auduboni*, although we observed a few of *S. c. coronata*.

Yellow-throated Warbler (*Setophaga dominica*). One on 19 Oct 2011 (ph., Figure 7) was the second recorded for Santa Barbara Island, the first in fall, and one of only five in fall for the Channel Islands as a whole. This record has been accepted by the CBRC (www.californiabirds.org).

Prairie Warbler (*Setophaga discolor*). Single individuals seen on 12 Oct 2007 and 14 Sep 2008. There is only one other Santa Barbara Island record.


Townsend’s Warbler (*Setophaga townsendi*). Single individuals seen 22 Sep 2001 and 17 Sep 2006, up to two 20–25 Oct 2011, up to three 12–14 Sep 2008, and up to four 16–17 Sep 2011. This species’ scarcity on Santa Barbara Island is surprising, as Townsend’s Warbler is one of the commonest migrant warblers along the mainland coast of southern California. Consideration of all the historical records for the island also shows this species as being less common than the Black-throated Gray Warbler, which is less common as a fall migrant along the mainland coast.

Figure 7. Yellow-throated Warbler, Santa Barbara Island, 19 October 2011.

*Photo by Wes Fritz*
Hermit Warbler (*Setophaga occidentalis*). Single individuals seen on 20 Sep 2002 and 15 Sep 2006, two on 16 Sep 2011. These represent three of only six fall records for Santa Barbara Island.

Canada Warbler (*Cardellina canadensis*). Different individuals seen on 20 Sep and 21 Sep (ph.) 2002, one on 13 Sep 2008 (ph.), and one on 21 Oct 2008 (ph.). These represent the only records for Santa Barbara Island.

Wilson’s Warbler (*Cardellina pusilla*). Recorded fairly regularly 12 Sep–25 Oct. One to five birds typically noted daily, but up to ten seen from 12 to 14 Sep 2008 and up to 14 from 16 to 18 Sep 2011. This species is markedly more frequent in September than in October.

Yellow-breasted Chat (*Icteria virens*). Two each seen on 13 Sep 2008 (ph.) and 24 Sep 2010. There are only two other fall records for Santa Barbara Island.

Green-tailed Towhee (*Pipilo chlorurus*). Single individuals seen on 15 Sep 2007, 14 Oct 2007, and 20–25 Oct 2011 (ph.), five seen 25–27 Sep 2009 (high count of four on 27 Sep), and at least seven birds present 25–26 Sep 2010 (high count of six on 25 Sep). From 1974 through 2011, this species was observed on Santa Barbara Island on 20 separate days between 12 Sep and 23 Oct. Six on 25 Sep 2010 is the highest single-day total for any of the Channel Islands. The Green-tailed Towhee is a rare regular migrant along the coast of mainland southern California, but records are almost invariably of single birds (e.g., Unitt 2004). Thus the notably high counts on Santa Barbara Island support the suggestion by Garrett and Dunn (1981) that the Green-tailed Towhee is a disproportionately frequent fall migrant to the Channel Islands, in comparison to its status on the nearby mainland, yet Sullivan and Kershner (2005) commented that it has been recorded only singly on San Clemente Island. It seems likely that the small size of Santa Barbara Island concentrates this species and other rare migrant sparrows.


Chipping Sparrow (*Spizella passerina*). Recorded almost daily 21 Aug–29 Oct, with a high count of 20 on 21 Sep 2002. It is common on Santa Barbara Island to see mixed *Spizella* flocks containing Chipping, Clay-colored, and Brewer’s Sparrows.

Clay-colored Sparrow (*Spizella pallida*). Recorded fairly regularly from 16 Sep to 27 Oct, with high counts of four on 20 Oct 2011 and five on 17 Sep 2011. Although this species is one of the most frequent fall migrants to the coast of southern California, it is even more frequent, proportionately, on Santa Barbara Island.

Brewer’s Sparrow (*Spizella breweri*). Recorded regularly 12 Sep–25 Oct. Typically one to four birds are present on any given day, but exceptionally there were up to 20 from 12 to 14 Sep 2008 and up to eight from 17 to 18 Sep 2011. The count in Sep 2008 is the highest in fall for the Channel Islands and much higher than any for the mainland coast, where records typically involve just one or two birds. Sullivan and Kershner (2005) noted only ten fall records each of the Brewer’s and Clay-colored, so both species, especially Brewer’s, appear to be commoner on Santa Barbara Island. On San Clemente Island, however, desert scrub habitat is rarely checked for migrants (B. Sullivan pers. comm.), so the occurrence of Brewer’s there may be underestimated.

Black-chinned Sparrow (*Spizella atrogularis*). Single individuals seen on 13 Sep 2008 (ph.) and 25 Sep 2010 represent the only fall records for Santa Barbara Island. This species is a casual migrant along the mainland coast. Hamilton and Willick (1996) listed no coastal fall migrants for Orange County, and Lehman (1994) and Unitt (2004) listed just two or three such records each for Santa Barbara and San Diego counties. Richardson et al. (2003) listed only two from Southeast Farallon Island, on 30 Aug and 13 Sep. There are eight other Channel Island records between 21 Aug and 28
FALL MIGRATION ON SANTA BARBARA ISLAND, CALIFORNIA

Sep. Two much later records from San Clemente Island in mid-November and early December are perhaps better regarded as representing birds attempting to winter, as the limited data indicate that this species is a rather early fall migrant, peaking between mid-August and mid-September.


Lark Sparrow (Chondestes grammacus). Recorded fairly regularly (typically one to three birds per day) from 13 Sep to 27 Oct. Most common in September, with a high count of seven on 18 Sep 2011.

Black-throated Sparrow (Amphispiza bilineata). Single juveniles seen on 20 Sep 2002, 23–25 Sep 2005, and 17–18 Sep 2011 (ph.), and up to four (all juveniles) 12–14 Sep 2008 (ph.). From 1973 through 2011, Santa Barbara Island had seven fall records, one of five birds on 12 Sep 1976. A record of a juvenile on 23 Jun 1973 also represents postbreeding dispersal. This species appears to be more frequent on Santa Barbara Island than on the mainland coast, where it is a very rare migrant with birds occurring singly (Garrett and Dunn 1981, Lehman 1994, Hamilton and Willick 1996, Unitt 2004).

Sage Sparrow (Amphispiza belli). One A. b. belli was closely observed for several minutes on North Peak on 23 Sep 2001. The dark, unstreaked mantle and well-defined malar stripe characterizing belli were seen well. This record is surprising as that subspecies is essentially sedentary (Garrett and Dunn 1981, Lehman 1994, Unitt 2004). Some birds may make limited altitudinal movements after breeding, and both Unitt (2004) and Hamilton and Willick (1996) noted a few instances of individuals that must have wandered at least a few kilometers away from breeding habitat. The bird seen on Santa Barbara Island was over 60 km from the nearest mainland breeding habitat. But the population resident on San Clemente Island suggests that this subspecies is capable of offshore dispersal, as that island has always been isolated from the mainland. There are several other fall records of the Sage Sparrow from Santa Barbara Island, one of multiple birds 19–21 Sep 1978. Unfortunately, their subspecies was not noted.

Lark Bunting (Calamospiza melanocorys). One on 18 Sep 2011 (ph.), fewer than expected given there are four previous fall records and the species is a rare but regular fall migrant on San Clemente Island (Sullivan and Kershner 2005).

Savannah Sparrow (Passerculus sandwichensis). Recorded almost daily 12 Sep–29 Oct. Usually between one and five seen during most September visits, but up to 25 observed from 12 to 14 Sep 2008. Larger numbers occur in October, with at least 60 counted on 12 Oct 2007 and 30 on 25 Oct 2008. Single Large-billed Savannah Sparrows (P. s. rostratus) were seen on 22 Sep 2001, 16 Sep 2006, 16 Sep 2007, 25 Oct 2008, 15 Oct 2009, and 25 Sep 2010, all on the flat bench on the northwest side of the island, which has many Suaeda bushes. These are the island’s only records of rostratus.


Fox Sparrow (Passerella iliaca). Recorded fairly regularly from 17 Sep to 29 Oct. Although the subspecies are not always identifiable in the field, we present the records by subspecies groups. Single birds observed 21–23 Oct 2010 (ph.) and 21 Oct 2011 showed two wing-bars and some faint mantle streaking so represented either subspecies xaboria or, more likely, altiagans. Slate-colored Fox Sparrows (schistacea group; back gray, spots on underparts black, bill small) recorded on seven dates
between 14 and 25 Oct 2008, with a high count of six on 21 Oct 2011. Thick-billed Fox Sparrows (megarhyncha group; back gray, spots on underparts black, bill larger, distinctive call like that of a California Towhee, Melozone crissalis) recorded on 14 dates between 13 Sep and 22 Oct. Typically one to three birds noted but at least ten were present on 17 Sep 2006. Sooty Fox Sparrows (unalaschensis group; back and spots on underparts brown, mandible yellow basally) recorded regularly between 14 and 29 Oct, with a high count of three on 16 Oct 2009 and 21 Oct 2010. One early arrival on 25 Sep 2005. Clearly, Thick-billed Fox Sparrows arrive earlier than do the other subspecies.


Song Sparrow (Melospiza melodia). Single individuals seen on 23 Oct 2010 and 17 Sep 2011 appeared to be of the coastal southern California subspecies M. m. heermanni or the Channel Island subspecies M. m. graminea, on the basis of their small size and dark upperparts with contrasting rich reddish wing coverts, distinctly gray face, and sharp blackish streaking below contrasting markedly with the white underparts. These represent the only fall records for Santa Barbara Island since 1988. The formerly resident population of M. m. graminea (type locality Santa Barbara Island) was extirpated some time between 1959 and 1972. Patten and Pruett (2009) synonymized the subspecies described from the other Channel Islands with graminea.


White-crowned Sparrow (Zonotrichia leucophrys). Recorded regularly from 16 Sep to 29 Oct, although much less frequent in September. High counts are of 120+ on 12 Oct 2007 and 180 on 16 Oct 2009. To date, we have noted only subspecies gambelli.

Golden-crowned Sparrow (Zonotrichia atricapilla). Recorded fairly regularly from 12 to 24 Oct. Typically one to three birds present; the high count is of five on 20 Oct 2011.

Dark-eyed Junco (Junco hyemalis). Recorded almost daily from 12 to 28 Oct. The high count was 15 on 25 Oct 2011. An early arrival was seen on 21 Sep 2003. All birds were Oregon Juncos except for a single female Slate-colored Junco on 14 Oct 2007 and a hybrid Pink-sided × Gray-headed Junco on 21 Oct 2011 (ph.). This latter bird was identified by the combination of features typical of the Pink-sided with a bright reddish-brown back as described by Hamilton and Gaede (2005).

Summer Tanager (Piranga rubra). Single females seen 25–26 Sep 2009 and 20 Oct 2011 (ph.) provide the only fall records for Santa Barbara Island.

Scarlet Tanager (Piranga olivacea). A single male seen on 23 Oct 2008 (ph.) is the only Scarlet Tanager recorded for Santa Barbara Island.

Western Tanager (Piranga ludovicianus). Recorded fairly regularly from 21 Aug to 23 Oct, with high counts of eight on both 17 Sep 2006 and 17 Sep 2011.

Black-headed Grosbeak (Pheucticus melanocephalus). Single individuals on 17 Sep 2006, 15 Sep 2007, 12–13 Sep 2008, and 22 Oct 2010, and four from 16 to 18 Sep 2011. This species is a common migrant on the mainland coast and is also regular on San Clemente Island (Sullivan and Kershner 2005). The reasons for its comparative scarcity on Santa Barbara Island are unclear. The complete absence of Rose-breasted Grosbeaks (P. ludovicianus) during our visits was also somewhat
surprising as that species is one of the more regular eastern vagrants to coastal California, and at least 17 have been noted in fall on San Clemente Island (Sullivan and Kershner 2005).

Blue Grosbeak (Passerina caerulea). Single individuals 13–14 Sep 2008 and on 24 Sep 2010. There are only two other fall records for Santa Barbara Island.

Lazuli Bunting (Passerina amoena). Recorded regularly from 12 to 25 Sep. One to three birds are typically noted, but up to eight were present 16–18 Sep 2011. The earliest fall record for Santa Barbara Island is of two birds seen on 16 Aug 2010.


Painted Bunting (Passerina ciris). Single juveniles seen on 13 Sep 2008 (ph.) and 18 Sep 2011 are the first recorded on Santa Barbara Island.

Dickcissel (Spiza americana). Single individuals seen on 13 Sep 2008 and 17 Sep 2011 and two on 14 Sep 2008 (ph.). One 19–21 Oct 2011 represents a relatively late record for California. For example, of 48 fall records for Santa Barbara County from 1971 to 2010 (P. E. Lehman unpubl. data), only three are later than 21 Oct. There are two other fall records for Santa Barbara Island, both in mid-September.

Bobolink (Dolichonyx oryzivorus). One on 23 Oct 2010 (ph.), two on 16 Sep 2006, and up to two 13–14 Sep 2008 (ph.). The 23 Oct 2010 record represents the latest fall date for Santa Barbara Island and is quite late, although not exceptionally so, for California.


Yellow-headed Blackbird (Xanthocephalus xanthocephalus). Three on 18 Sep 2011 (ph.) and one 21–22 Oct 2011 (ph.).

Brewer’s Blackbird (Euphagus cyanocephalus). Recorded regularly 14–29 Oct, with a high count of eight on 20 Oct 2011. In addition, we recorded one 20–22 Sep 2002 and one on 23 Sep 2005.


Orchard Oriole (Icterus spurius). One immature 21–22 Sep 2001, the first recorded on Santa Barbara Island.

Hooded Oriole (Icterus cucullatus). Single individuals 25 Sep 2010 and 22 Aug 2011, up to four seen 12–14 Sep 2008, and up to five 16–18 Sep 2011. This last is the highest count for Santa Barbara Island. All birds observed have been immatures or females.

Bullock’s Oriole (Icterus bullockii). Different individuals 17 and 18 Sep 2011, and up to four immatures 12–14 Sep 2008. Bullock’s Oriole is a common migrant on the mainland coast and San Clemente Island (Sullivan and Kershner 2005). The reasons for its comparative rarity on Santa Barbara Island are unclear.

Baltimore Oriole (Icterus galbula). Single immature males on 15 Oct 2009 and 22 Oct 2011 (ph.), the only Baltimore Orioles recorded on Santa Barbara Island in fall.
Purple Finch (Carpodacus purpureus). A single female heard and seen on 21 Oct 2011 (ph.) was the first recorded on Santa Barbara Island in fall.

House Finch (Carpodacus mexicanus). Recorded fairly regularly from 15 Sep to 27 Oct, but no evidence of a resident or breeding population. High count of 12 on 21 Oct 2008. The lack of a resident population and occurrence of many of these birds with large numbers of migrants suggests that they originated from the mainland and do not represent the purported endemic southern Channel Islands race C. m. clementis, which is alleged to have bred on Santa Barbara Island in the past (AOU 1957).

Red Crossbill (Loxia curvirostra). One on 19 Oct 2011 was the first recorded on Santa Barbara Island. This species has been reported from only four of the Channel Islands.

Pine Siskin (Carduelis pinus). Single individuals heard on 14 Oct 2007 and 21 Oct 2011, and one seen and heard on 24 Oct 2010. All birds were passing over the island. There are only two other fall records for Santa Barbara Island.


Lesser Goldfinch (Carduelis psaltria). Recorded regularly from 12 Sep to 27 Oct with most sightings of one to three birds. Up to 12 noted on 14 Oct 2007, up to six from 23 to 25 Sep 2005, and up to nine from 16 to 18 Sep 2011.

American Goldfinch (Carduelis tristis). At least two seen on 14 Oct 2007, representing the only fall record for Santa Barbara Island.

THE RELATIONSHIP BETWEEN WEATHER CONDITIONS AND ARRIVALS OF MIGRANTS

During our study, we identified four primary weather patterns:

- **Northwest winds**: Moderate (8–25 km/hr) or occasionally stronger northwesterly winds with low fog or clear skies. If it is clear, other islands and the mainland are visible. In low fog, much of the island is invisible, although there is often a partially clear area about a mile or so out to the sea on the east side.

- **Santa Ana winds**: When a Santa Ana condition brings offshore winds to the mainland of southern California, the island itself is windless, becoming warm in the afternoon. The surrounding islands and mainland are all clearly visible.

- **Marine layer**: Calm or light winds and continuous low cloud cover that reaches to the mainland, where it generally penetrates only the coastal lowland. Most frequently the cloud layer is at an elevation of 300–500 m. During such conditions, the island is usually visible from about 15 km away (as confirmed by observations from incoming boats), but the other islands are not visible from Santa Barbara Island. We have occasionally encountered a higher marine layer with an elevation of around 1000 m when it is possible to see Santa Catalina Island or even the lights of the mainland. Possibly because the peaks on Santa Barbara Island are relatively low, we have not observed the top of the island rising above a low-level marine layer. Our use of the term marine layer does not include low fog banks that obscure the island completely.
• **Overcast with variable precipitation**: Frontal systems bringing variably low but continuous cloud cover and occasional to prolonged periods of light rain. The wind is very light to light, becoming occasionally stronger during squalls, and varies from southeasterly to southwesterly in direction. Under such conditions, the island may be visible from as little as 2 km away to as far away as at least 36 km (with Santa Catalina Island visible). We have experienced these conditions just three times, all during mid-October: 13 Oct 2007, 14 Oct 2009, and 20–23 Oct 2010. An important distinction between this condition and the marine layer is that the cloud cover typically extends over much of mainland California rather than just over the coastal lowlands.

There was a clear association between certain weather patterns and the number and variety of migrants on Santa Barbara Island. Tables 2 and 3 illustrate several examples under different conditions in September and October, respectively, and demonstrate several key points:

- Persistent periods of northwest winds are poor for both variety and number of migrants;
- Both the marine layer and Santa Ana winds consistently result in arrivals of migrants;
- The effect of overcast with variable precipitation on migrants’ arrivals is highly variable;
- In both September and October the greatest variety of migrants occurs under heavy overcast (marine layer or overcast with variable precipitation); and
- In October, Santa Ana winds can produce total numbers of migrants similar to those of the best conditions of marine layer or overcast with variable precipitation.

We report details of all three instances of overcast with variable precipitation because during the fall migration such conditions are relatively rare this far south in California. For example, B. L. Sullivan (pers. comm.) did not recall experiencing them during the four years he spent on San Clemente Island, which is little more than 60 km to the south of Santa Barbara Island. The October data do not demonstrate such a wide difference between northwest winds and the other conditions as shown by the September data. This is because large numbers of White-crowned and Savannah Sparrows, both of which winter on the Channel Islands, may remain for some days. The presence of these flocks often results in much higher totals of migrants being present on days of northwest winds, even though few new birds are actually arriving.

**DISCUSSION**

Effects of Weather on Arrivals of Migrants

The relationship between weather conditions and the arrival and departure of migrants has been studied in considerable detail at Southeast Farallon Island, farther north off the coast of California (Pyle et al. 1993). Those researchers found that the most important factors causing large
numbers of arrivals were continuous cloud cover, light southerly or no wind, and moderately low visibility of 5 to 15 km. They concluded that the continuous cloud cover and associated reduced visibility caused migrants to stray out over the ocean and subsequently prevented them from finding the mainland coast, thus forcing them to take advantage of any land they could find. However, Pyle et al. (1993) also noted that moderate numbers of migrants also arrived under clear skies when the wind blew offshore and presumably drifted migrants (especially diurnal migrants) over the ocean. Extremely low visibility, resulting from dense fog, had a major negative effect on arrivals, as birds presumably could not locate the island. In fall, the predominant weather pattern at Southeast Farallon, which features steady northwest winds, often combined with fog, is poor for arrival of migrants. Although days with rain were few, that condition’s association with arrival of large numbers of migrants was negative. Departures were most strongly associated with clear weather and little or no wind. Because the conditions affecting migration are likely the same on Southeast Farallon and the nearby mainland, Pyle et al. (1993) suggested the immediate effect of the ocean on the weather is greater along the Pacific coast than elsewhere in North America. For example, it is common for continuous low clouds, the “marine layer,” to form over the ocean and along the California coast while clear, calm conditions prevail inland. As a result, conditions that trigger a large number of birds to migrate, then cause them to become disoriented over the ocean and unable to locate the mainland, can coexist, allowing for large fallouts on isolated offshore islands. Such conditions are less frequent in other areas where migration has been studied, such as along the coasts of eastern North America or northwestern Europe, where cloud cover is not typically confined to coasts.

Although there has been no comparably detailed study of the association of weather conditions with migration in the Channel Islands, Sullivan and Kershner (2005) discussed this topic as it relates to San Clemente Island. They reported that light southeast winds and a “mid-level marine layer” produced the largest fallouts in spring and were also productive in fall. They also noted, however, that the largest number of arrivals in fall was associated with Santa Ana winds from the northeast. Because the coast of southern California is oriented northwest–southeast, Santa Ana winds create an offshore flow. Under such conditions, visibility is extremely good, with the mainland visible from 64 to 80 km away. Therefore, the largest numbers of fall migrants arrive on San Clemente Island under conditions quite different from those at Southeast Farallon, although it should be noted that Southeast Farallon does not typically experience offshore flows as strong as those that reach San Clemente Island and is considerably closer to the nearest point of the mainland.

We considered two hypotheses to explain why a greater variety of species generally reaches Santa Barbara Island under a marine layer or overcast with variable precipitation than during Santa Ana winds. One is that more species become disoriented under such conditions. The second is that certain species for which Santa Barbara Island lacks suitable habitat overfly the island when other land is clearly visible, as is the case during Santa Ana winds. To investigate these hypotheses further, we analyzed occurrences of vagrant
eastern wood-warblers in September under a marine layer and during Santa Ana winds. During September, 10 days of marine layer have produced a total of 36 eastern wood-warblers of 12 species whereas 7 days of Santa Ana winds have produced just 4 individuals of 4 species. In contrast, on San Clemente Island, eastern wood-warblers are frequent during Santa Ana winds with, for example, a remarkable 18 individuals of 5 species under such conditions on 11 October 2003 (Sullivan and Kershner 2005, B. L. Sullivan pers. comm.). San Clemente is a large island that offers some localized suitable habitat for warblers—water, limited riparian vegetation, and ornamental plantings—giving migrants less incentive to continue to the mainland. This difference between the two islands suggests that warblers simply choose not to make landfall on Santa Barbara Island when potentially more promising destinations are visible. The pattern of our data for eastern warblers in October is rather similar, with more frequent occurrences under a marine layer or overcast with variable precipitation that was effectively similar to a marine layer. Further corroborating the hypothesis that some species choose not to land or remain on the island under clear skies, we have on several occasions observed warblers fly to the summit of North Peak but either never land or land only briefly before continuing to fly toward Santa Catalina Island.

The observations on Santa Barbara Island concur with those on Southeast Farallon, where arrivals of migrants diminish greatly when the mainland is visible. In comparison to that for warblers, Santa Barbara Island’s habitat for sparrows is relatively attractive, so it is unsurprising that during October, when migration of many sparrows peaks, the number of arrivals during Santa Ana winds can equal that under optimal marine-layer conditions.

During the fall of 2011, we experienced at least two days in which the marine layer was sufficiently high for Santa Catalina Island to be visible from Santa Barbara Island, in one case completely visible. This did not appear to affect the variety and numbers of migrants arriving on Santa Barbara Island negatively and suggests that only truly clear skies cause large numbers of birds to bypass Santa Barbara Island. Possibly, under a marine layer, birds become more disoriented and have spent longer over the ocean by the time they reach Santa Barbara Island, resulting in them being too tired to continue. This hypothesis is supported by observations on both these two days that many birds were still arriving 3 hours or more after first light. During Santa Ana winds most birds apparently reach the island by or immediately after dawn, but further study is needed.

CONCLUSIONS

The small size, limited vegetative cover, and relative isolation of Santa Barbara Island combine to make this location well suited for gathering data on migrant birds and how their numbers fluctuate in relation to different weather conditions. On the basis of our observations, we draw these tentative conclusions about weather and migrants’ arrivals on the Channel Islands:

- During northwest winds, as on Southeast Farallon Island, very few landbirds arrive. However, if the northwest winds are localized to the
vicinity of the islands, large numbers may still arrive if Santa Ana winds are prevailing along the mainland coast.

- The most suitable weather for arrival of fall migrants varies with the size and elevation of the island, its isolation from other islands and the mainland, and its habitats. It appears that a marine layer or similar overcast are the conditions best for causing the largest variety of migrant landbirds to be grounded on Santa Barbara Island. On larger islands such as San Clemente and San Nicolas, however, Santa Ana winds are best for large numbers of arrivals.

- On Santa Barbara Island, the largest fallouts of migrants in terms of total number of birds occur in October under a marine layer or during Santa Ana winds. These totals are driven by the large numbers of sparrows, especially under Santa Ana conditions.

- Overcast with variable precipitation has a variable effect on arrival of migrants, with some days being very good but others very poor. Possibly, the island may be visible only from a mile or so away during persistent rain, thus making it difficult for migrants to locate it. Also, such weather conditions may also be accompanied by widespread cloud cover and precipitation on the mainland of California, inhibiting migrants’ departures and greatly reducing the number of birds aloft.

Our study provides support for earlier assertions that certain species breeding in inland mountains and deserts, such as the Sage Thrasher, Gray Vireo, and Green-tailed Towhee, occur more frequently on the Channel Islands than on the nearby mainland coast. As a result of our study, we can now add Brewer’s Sparrow to this list, as we encountered numbers unprecedented for a coastal location. Conversely, several migrant species that are common on the mainland appear to be less so on Santa Barbara Island, such as swallows, Townsend’s Warbler, and the Golden-crowned Sparrow. In addition to western breeding species, we recorded numerous vagrants originating from central and eastern North America.

While additional data for any period of the fall migration will have value, the greatest priority for future research should be given to periods not covered by our study. Evidently some migrants from the interior, such as the Black-chinned and Black-throated Sparrows, are most regular in late August and early September, and this is when many common migrant species first appear. Although our study addressed the period between mid-September and late October, there is a substantial gap from 29 September to 11 October, which is typically one of the most productive periods of fall migration, on the basis of records for San Clemente Island and the mainland coast of southern California. Visits from late October to mid-November would likely be productive for determining the peak migration period for species such as longspurs, sparrows, and blackbirds.

Further data on more regular migrants may indicate if any species are following a route directly across the Southern California Bight rather than along the mainland coast. Data from Santa Barbara Island may also be able to demonstrate more precise migration periods for species that are common residents on the mainland, such as Brewer’s Blackbird, Spotted Towhee,
Song Sparrow, and Red-winged Blackbird, because there is no need to differentiate between residents and migrants. Further weather data and their correlation with arrivals of migrants are needed to clarify which species are associated most with particular atmospheric conditions.

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Palm Warbler

Sketch by George C. West
A POPULATION CENSUS OF THE CACTUS WREN IN COASTAL LOS ANGELES COUNTY

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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 and alluvial fan scrub on the coastal slope of 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 2009, we organized a volunteer effort to map the entire population on the coastal slope of Los Angeles County and found 155 active, accessible territories. With the addition of scattered groups believed to occupy inaccessible areas, our maximum estimate for the county is around 200 pairs, most of them in the eastern San Gabriel Valley. We also document the loss of several historical populations in the area and present a revised distribution map for the Los Angeles area indicating connectivity among extant populations.

The San Diego Cactus Wren (Campylorhynchos brunneicapillus sandiegensis) is a California bird species of special concern (Unitt 2008), affording it some measure of protection under the California Environmental Quality Act (CEQA). Coastal populations of the Cactus Wren north of southern Orange County occupy the same types of cactus scrub habitats and may show plumage characters typical of the San Diego Cactus Wren, but the plumage of the population as a whole is closer to that of the desert subspecies C. b. anthonyi (Rea and Weaver 1990). Because they are classified as part of a widespread subspecies they possess no special status under the law, and efforts to list the coastal population as endangered at the federal level have been unsuccessful (USFWS 1994). Nevertheless, many land managers and regulatory agencies in the region treat all coastal Cactus Wrens as having special status under CEQA, and the Cactus Wren has been identified as a focal species of large-scale conservation and management plans (e.g., County of Orange and U.S. Fish and Wildlife Service 1996, Dudek and Associates 2003, City of Rancho Palos Verdes 2004, LSA Associates, Inc. 2007). During spring 2009, The Nature Conservancy teamed with Cooper and Hamilton to organize a survey team of more than 20 volunteer birders to develop a baseline estimate of the number and distribution of the Cactus Wren in coastal Los Angeles County. The volunteers mapped and surveyed all potentially suitable cactus scrub accessible to the public on the county’s coastal slope, making multiple visits to active territories from March through June 2009. Volunteers were able to survey all of the known populations,
A CENSUS OF THE CACTUS WREN IN COASTAL LOS ANGELES COUNTY

excepting an estimated 30–40 pairs on private lands and within gated communities. Here we present an updated distribution and population estimate, along with a historical overview of the species' range and status in Los Angeles County.

Systematics and Ecology

Across most of its wide range, the Cactus Wren is a quintessential bird of desert scrub. Exceptional are populations of the Pacific coastal slope from southeastern Ventura County, California, south to northwestern Baja California, Mexico, that occupy cactus-containing variants of sage, bluff, and alluvial scrub (Small 1994, Clark and Dodero 2008). Rea (1986) described populations on the coastal slope between southern Orange County and northwestern Baja California as the San Diego Cactus Wren (C. b. sandiegensis), while Rea and Weaver (1990) considered the populations farther north on the coastal slope part of the widespread desert subspecies, anthonyi. Because of lack of specimens from many areas, the geographic limits of sandiegensis remain open to question (Rea and Weaver 1990, Eggert 1996, Atwood and Lerman 2007), and birds from farther north along the coast, including Los Angeles County, could ultimately be considered part of this taxon (see Hamilton et al. 2011). We use the term "coastal Cactus Wren" in reference to the entire population of the coastal slope.

As recently summarized by Hamilton et al. (2011), coastal Cactus Wrens are wholly confined to extensive stands of mature prickly-pear (Opuntia spp.) or cholla (Cylindropuntia spp.), mainly below 600 m elevation, though records range up to approximately 950 m. The birds are extremely sedentary, highly susceptible to extirpation, and presumably isolated from desert populations, a situation that has been recognized for nearly a century (Dawson 1923, Grinnell and Miller 1944). Unlike in Arizona, where the Cactus Wren is characterized as having an “adaptable nature [that] allows it to nest regularly in residential neighborhoods and parks” (Wise-Gervais 2005), the coastal Cactus Wren is essentially confined to wild lands or to sites bordering large tracts of open space. The species may persist in small habitat patches within suburban development, where high-density residential neighborhoods alternate with “fingers” or islands of open space on steep hillsides, but it is highly prone to extirpation from such areas and unlikely to recolonize them quickly, if ever (Soulé et al. 1988, Crooks et al. 2001).

METHODS

Prior to the start of the survey, we reviewed the literature to establish where Cactus Wrens had been observed or collected on the coastal slope of Los Angeles County, drawing from such sources as the Los Angeles County Breeding Bird Atlas data (K. L. Garrett and L. W. Allen unpubl. data) and records of nests and specimens from several museums and the Western Foundation for Vertebrate Zoology (Table 1). We used Google Earth Pro to search for suitable habitat, identifiable from the distinct signature in aerial photographs of large cactus patches (grass-green, roughly circular areas within coastal scrub and chaparral, typically on south-facing slopes or along
A CENSUS OF THE CACTUS WREN IN COASTAL LOS ANGELES COUNTY

Table 1  Summary of Coastal Cactus Wren Specimens, Nests, and Egg Sets from Los Angeles County.

<table>
<thead>
<tr>
<th>Region and nearest city/feature</th>
<th>No. nests/egg sets (WFVZ)</th>
<th>No. specimens, nests, and egg sets (institutions other than WFVZ)</th>
<th>Years</th>
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</thead>
<tbody>
<tr>
<td>San Gabriel Valley/foothills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alhambra</td>
<td>4</td>
<td>0</td>
<td>1896–1923</td>
</tr>
<tr>
<td>Arcadia</td>
<td>2</td>
<td>12</td>
<td>1900–1918</td>
</tr>
<tr>
<td>Azusa</td>
<td>8</td>
<td>5</td>
<td>1906–1940</td>
</tr>
<tr>
<td>Bassett</td>
<td>3</td>
<td>0</td>
<td>1936</td>
</tr>
<tr>
<td>Claremont</td>
<td>24</td>
<td>23</td>
<td>1894–1921</td>
</tr>
<tr>
<td>Monrovia</td>
<td>2</td>
<td>0</td>
<td>1902–1903</td>
</tr>
<tr>
<td>Pasadena*</td>
<td>3</td>
<td>20</td>
<td>1896–1908</td>
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<td>Puente Hills/San Jose Hills</td>
<td>15</td>
<td>2</td>
<td>1887–1977</td>
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<td>0</td>
<td>1</td>
<td>1890</td>
</tr>
<tr>
<td>Los Angeles/coast</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Baldwin Hills</td>
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<td>3</td>
<td>1928–1964</td>
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<tr>
<td>&quot;Los Angeles&quot;</td>
<td>16</td>
<td>0</td>
<td>1880–1904</td>
</tr>
<tr>
<td>Palos Verdes</td>
<td>0</td>
<td>1</td>
<td>1996</td>
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<td>San Fernando Valley</td>
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<td>6</td>
<td>39</td>
<td>1890–1930</td>
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<tr>
<td>Burbankb</td>
<td>4</td>
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</tr>
<tr>
<td>North Hollywoodc</td>
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<td>1913–1917</td>
</tr>
<tr>
<td>San Fernando</td>
<td>1</td>
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<td>1893–1911</td>
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<td>&quot;San Fernando Valley&quot;</td>
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<td>1895–1914</td>
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<tr>
<td>Van Nuysc</td>
<td>1</td>
<td>5</td>
<td>1902–1915</td>
</tr>
<tr>
<td>Santa Clara River valley</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castaic</td>
<td>4</td>
<td>0</td>
<td>1910–1916</td>
</tr>
<tr>
<td>Mint Canyon</td>
<td>17</td>
<td>0</td>
<td>1936–1942</td>
</tr>
</tbody>
</table>

*a*Includes “Arroyo Seco.”

*b*Includes “Toluca (Lake).”

*c*Includes “Lankershim.”

*d*Includes “Roscoe.”

*e*Includes “Garnsey.”

washes below approximately 950 m). After soliciting volunteers from on-line birding listserves, we selected more than 20 experienced observers to serve as lead volunteers. We sent each lead volunteer aerial images of potentially suitable cactus patches and instructed them to drive around the neighborhoods checking for access points for future surveys.

Survey methods were similar to those developed for Cactus Wren surveys conducted throughout the Nature Reserve of Orange County (Mitrovich and Hamilton 2007). The first step was to map all habitat potentially suitable for the Cactus Wren. This entailed using an aerial photograph to outline all areas of cactus scrub judged capable of supporting nesting Cactus Wrens (i.e., stands with at least some cactus plants ≥1 m tall). We divided large, contiguous areas of cactus scrub—areas capable of supporting more than
one pair of Cactus Wrens—into multiple sites. In such areas, we typically defined survey areas by ridgelines or drainages, with a goal of minimizing the likelihood of Cactus Wrens moving between sites (i.e., maximizing independence of sites).

We then assigned each site to a “cactus scrub type” on the basis of its extent and the quality of its cactus resources:

Type 1: Highest quality. Site includes at least 1.0 contiguous acre (0.4 hectare) with ≥20% estimated cover of mature cactus (generally ≥1 m tall). Site may also include habitat with sparser cactus cover.

Type 2: Site covers ≥1.0 acre. Well-developed cactus patches may be present, but site does not include 1.0 contiguous acre with ≥20% estimated cover of mature cactus (generally ≥1 m tall).

Type 3: Site (a) covers less than 1.0 acre and (b) includes at least one cholla plant ≥1 m tall. Density of cactus within the polygon is irrelevant.

Type 4: Small, isolated stands of mature cactus without cholla. Site (a) covers less than an acre and (b) does not include at least one cholla plant ≥1 m tall. Density of cactus within the polygon is irrelevant.

Surveyors were instructed to first map all Type 1 and Type 2 stands and to search them for Cactus Wrens and their nests; where nests were found, surveyors recorded whether they appeared to be old or fresh. As time permitted, surveyors also mapped Type 3 and Type 4 stands near the higher-quality stands, with the thought that birds could be using suboptimal stands nearby if they were in the vicinity of the larger patches.

After the initial mapping, the observers visited all Type 1 and Type 2 stands three to seven times during March and April, the peak months for territory establishment, to search for wrens and their nests, and to refine the initial mapping of cactus scrub. Sites were dropped from the survey if wrens or their nests were not detected after three visits. This made the best use of volunteers’ time and avoided potential population overestimates that could result from double-counting any territories established mid-season by birds dispersing from sites occupied earlier.

As part of a separate study, Hamilton mapped and surveyed public lands on the Palos Verdes Peninsula twice between 5 March and 19 May 2009. These were focused Cactus Wren surveys that employed techniques comparable to those described here but also included broadcast recordings of Cactus Wren vocalizations to elicit responses from birds (as authorized under a memorandum of understanding with the California Department of Fish and Game). The broadcast of vocalizations likely made up for any possible decrease in detections of wrens in this area relative to other sites resulting from the reduced number of surveys. The results we report for the Palos Verdes Peninsula are from these surveys.

In spring 2011, Cooper found a small population of Cactus Wrens on private land in the Industry Hills, an isolated range in the central San Gabriel Valley that was not surveyed during 2009; we incorporate results from this site with those from 2009. Our survey teams were denied access to the Montebello Hills, an oil field on the southern edge of the San Gabriel Valley that has been proposed for residential housing, but we believe that every other substantial population on the coastal slope of Los Angeles County was surveyed.
RESULTS

Current Distribution

Reflecting results of the surveys in 2009 and supplemental observations in 2011, Figure 1 shows the current distribution of the Cactus Wren on the coastal slope of Los Angeles County, as well as locations where the species is now extirpated. We estimate the total population on the coastal slope of Los Angeles County is

Figure 1. Current and historical distribution of the Cactus Wren on the coastal slope of Los Angeles County. Populations persist in three main areas: the San Gabriel Valley (at right), the Palos Verdes Peninsula (bottom), and Big Tujunga Wash (top).
Los Angeles County is currently 155–193 pairs (Table 2). The great majority of Cactus Wren territories (122–167, or 79–87% of the total) occur in the eastern San Gabriel Valley, in an area extending from the Puente Hills (Whittier/Hacienda Heights to Diamond Bar/Pomona) north through the San Jose Hills (San Dimas and Walnut) and up to the base of the San Gabriel Mountains from Azusa east through Glendora to San Dimas (including South Hills Park in Glendora and Santa Fe Dam in Irwindale). In our 2009 survey, all but two territories in the San Gabriel Valley were found east of the San Gabriel River. On the basis of our review of a biological report available to the public (Natural Resource Consultants 2009) and observations made from adjacent public lands, few territories appear to remain in the Montebello Hills. That population, together with any additional territories that may exist in other inaccessible areas (especially in the Glendora–San Dimas foothills), accounts for up to 37 pairs that could not be confirmed during our 2009 census.

Approximately 28 pairs (14–15% of the total) were mapped on the Palos Verdes Peninsula in 2009. The birds occurred in groups of up to five pairs each, clustered on the southwestern edge of the peninsula. While follow-up surveys of the same areas by Cooper in subsequent years yielded similar results, several additional pairs, not included in the 2009 estimate, were discovered at a new preserve here in 2012. Nearly all cactus scrub on the

**Table 2** Summary of Cactus Wren Territories, Confirmed and Estimated, on the Coastal Slope of Los Angeles County, 2009–2011.

<table>
<thead>
<tr>
<th>Region and subregion</th>
<th>Nearest cities</th>
<th>Documented</th>
<th>Estimated (additional)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Gabriel Valley/foothills</td>
<td>Montebello</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Puente Hills, West</td>
<td>Whittier, La Habra Heights</td>
<td>23</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>Puente Hills, East</td>
<td>Diamond Bar, Pomona</td>
<td>38</td>
<td>0</td>
<td>38</td>
</tr>
<tr>
<td>San Gabriel foothills, incl. South Hills Park</td>
<td>Glendora, San Dimas, Azusa</td>
<td>24</td>
<td>19</td>
<td>43</td>
</tr>
<tr>
<td>San Jose Hills, Industry Hills</td>
<td>Walnut, Cal Poly Pomona</td>
<td>27</td>
<td>12</td>
<td>39</td>
</tr>
<tr>
<td>Santa Fe Dam</td>
<td>Irwindale</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Los Angeles/coast</td>
<td>Rancho Palos Verdes, Rolling Hills</td>
<td>28</td>
<td>0</td>
<td>28</td>
</tr>
<tr>
<td>Palos Verdes</td>
<td>Los Angeles (Tujunga)</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>San Fernando Valley</td>
<td>Santa Clarita</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Big Tujunga Wash</td>
<td>Santa Clarita</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>155</td>
<td>38</td>
<td>193</td>
<td></td>
</tr>
</tbody>
</table>

*aIncludes four pairs estimated for Industry Hills, discovered in 2011.*
peninsula has been set aside as protected open space, managed by the Palos Verdes Peninsula Land Conservancy.

Six territories (3–4% of the total) were along Big Tujunga Wash, in the northeastern San Fernando Valley, all but one located along a 2-km stretch of wash east of the Hansen Dam Recreation Area (Department of Recreation and Parks, city of Los Angeles), west of Interstate 210. Because of the relatively limited extent of cactus habitat and the large amount of time our volunteers devoted to repeatedly hiking and inspecting all areas of potential cactus habitat along the wash, we are also confident of this estimate.

Adjacent to but outside Los Angeles County (and therefore not included in this analysis), our volunteers also mapped 12 territories in the west Coyote Hills in Fullerton, Orange County (within Ward Nature Park). We estimate that the entire Coyote Hills support approximately 26 territories, roughly half of which are located in an active oil field closed to the public.

**Habitats Used**

We found Cactus Wrens primarily in three distinct habitat types on the coastal slope of Los Angeles County. Most pairs occupied very large patches of cactus scrub on low hills surrounding the inland valleys, often on marine deposits on southern or western exposures. In these areas, the main cactus species were native prickly-pears (*Opuntia littoralis, O. oricola*), sometimes hybridized with non-native mission cactus (*O. ficus-indica*). Important co-dominants included California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), laurel sumac (*Malosma laurina*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*).

On the Palos Verdes Peninsula, most Cactus Wrens used a form of coastal bluff scrub dominated by prickly-pear and/or coastal cholla (*Cylindropuntia prolifera*); frequent co-dominants included California sagebrush, California encelia (*Encelia californica*), ashy-leaf buckwheat (*Eriogonum cinereum*), and lemonade berry (*Rhus integrifolia*).

Finally, limited numbers of wrens were found in alluvial scrub with cane cholla (*Cylindropuntia californica* var. *parkeri*; formerly *Opuntia parryi*) and various sandy-wash plants such as yerba santa (*Eriodictyon* spp.). Stands of alluvial fan scrub are now essentially limited to Big Tujunga Wash upstream of Hansen Dam and the San Gabriel River wash (mainly upstream of Santa Fe Dam), but this community formerly occurred along the Santa Clara River and its tributaries and was also likely more widespread in the San Gabriel Valley. Early records of the Cactus Wren from San Gabriel and the Arroyo Seco (Pasadena) probably refer to birds in alluvial scrub habitat that is now lost (though occasional reports of single birds continue from the Arroyo Seco near Devil’s Gate dam; see www.ebird.org).

**Historical Distribution**

During the late 1800s and early 1900s, Cactus Wrens were collected at several locations on the coastal slope of Los Angeles County subsequently lost to development or habitat conversion (loss of cactus scrub, typically through repeated wildfire). Grinnell (1898) considered the Cactus Wren a
“common resident locally on cactus covered washes in the mesa regions” of Los Angeles County (“mesa” here refers to the gently sloping lands at the base of the San Gabriel Mountains). By the middle of the 20th century, populations were known from scattered locales in the San Fernando and San Gabriel valleys (Willett 1933, Grinnell and Miller 1944). Specimens and egg sets, the latter in the Western Foundation of Vertebrate Zoology (WFVZ), indicate that the historical range probably included most of the eastern San Fernando Valley (specimens from Burbank, San Fernando, Toluca Lake, etc.), the western San Gabriel Valley (San Gabriel, Pasadena, Arcadia, and Monrovia), and the Santa Clara River at Castaic and Mint Canyon (habitat now essentially eliminated) (Table 1). A population that persisted in the Baldwin Hills near Culver City until the mid-1990s (Molina 2001) appears to be extirpated. Oddly, the Palos Verdes peninsula was not listed as a location for the species by early (pre-1950) authors and collectors, although Bradley (1980) considered the species “fairly common” there; most likely, the birds were simply overlooked by early collectors, as territories were in areas that would have been remote and very difficult to reach in the early 1900s prior to road-building at mid-century.

DISCUSSION

Population Connectivity

Prior to the 2009 census, the Cactus Wren’s range in Los Angeles County was poorly represented in published literature, with coastal populations alternately depicted as contiguous from Ventura County east through the Santa Monica Mountains in the Los Angeles Basin (Garrett and Dunn 1981) or extending from Ventura County north and east through the San Gabriel Mountains into the western Mojave Desert via Cajon Pass (Solek and Szijj 2004), neither of which appears to have been the case either historically or in recent years. In fact, all populations in Los Angeles County are isolated from those in eastern Ventura County to the west (the northernmost extent of the species along the coast), though the Ventura County population previously extended northeast into northwestern Los Angeles County (to Mint Canyon) via the Santa Clara River valley. Today, birds in Ventura County appear to be restricted to a narrow band of cactus scrub from near Point Mugu on the coast northeast to Moorpark (Cooper and L. S. Hall, unpubl. data).

In Los Angeles County, “interior” Cactus Wrens reach the western edge of the Mojave Desert near Acton in upper Soledad Canyon and Agua Dulce on the north slope of the San Gabriel Mountains, where they occur in Joshua Tree woodland and desert scrub, as cactus is scarce (during the mid-2000s one or two pairs were resident briefly in planted Joshua Trees [Yucca brevifolia] and prickly-pear near Davenport Road northeast of Santa Clarita, fide J. Moore) (see Figure 1). At higher elevations between the coastal and the desert slopes of the San Gabriel Mountains, these thorny habitats were originally replaced by dense mixed chaparral that is now widely converted to annual non-native grassland. These habitats, unsuitable for the Cactus Wren, represent an effective barrier at least 20 km wide between the interior and coastal-slope populations.
On the coastal slope of Los Angeles County, Cactus Wrens have always occupied more or less isolated patches of mature, cactus-rich scrub at low elevation. Historically, populations were separated from each other by expanses of chaparral, grassland, and other natural habitats that lack cactus. In recent decades, extensive clearing for agriculture followed by intensive urban sprawl have exacerbated this natural tendency toward isolation of coastal Cactus Wren populations. The imposing, east/west-trending San Gabriel Mountains clearly represent a major barrier to the birds’ dispersal between the desert and coastal-slope populations. To the west, the Santa Susana Mountains appear to effectively block the movement of wrens between the alluvial scrub of the eastern San Fernando Valley and similar habitat in the Santa Clara River valley. Their minimum elevation in this area, approximately 524 m at Newhall Pass, is toward the upper end of the coastal Cactus Wren’s typical elevational range, and the Santa Susanas generally lack the tall cactus or other large, spiny vegetation that characterize Cactus Wren habitat.

Cactus Wrens of the San Fernando Valley (including Big Tujunga Wash) have been similarly isolated from those of the San Gabriel Valley to the east by the chaparral-cloaked Verdugo Mountains, Santa Monica Mountains (including Griffith Park), and San Rafael Hills. The savanna of valley oak (Quercus lobata) that formerly covered the western San Fernando Valley would not have supported Cactus Wrens, and expanses of dense chaparral and coast live oak (Q. agrifolia) woodland in the Santa Monica Mountains and Simi Hills would have inhibited interchange with populations along the coast in Ventura County. Cactus Wrens probably did not occur widely on the coastal plain toward Santa Monica Bay, which supported mainly coastal prairie and riparian scrub, but the birds did find areas of suitable habitat wherever low, rocky hills emerged, including in the Baldwin Hills (now extirpated) and on the Palos Verdes Peninsula.

Populations in the San Gabriel Valley were likely contiguous with those to the south in Orange County, via the Puente–Chino Hills (see Cooper 2000), and with those in in San Bernardino and western Riverside counties, via alluvial washes at the base of the San Gabriel and San Bernardino mountains, such as San Antonio Creek in Claremont (which supported Cactus Wrens until a major fire in 2003, fide D. A. Guthrie), east to Lytle Creek and the Santa Ana River wash, where they persist today (fide M. R. Aimar). The status of birds east of the upper Santa Ana River toward San Gorgonio Pass has been poorly documented and deserves attention, to evaluate whether this area might continue to facilitate exchange between interior and coastal-slope populations.

As for the idea that birds on the coastal slope of Los Angeles County necessarily originated in the desert (as is implied by their being classified as part of the interior subspecies anthonyi), it seems equally likely that birds moved north along the coast from San Diego County/Baja California or that both sources are represented. This latter scenario would explain the intermediate appearance of birds of at least some coastal-slope populations. For example, many birds on the Palos Verdes Peninsula show extensive white barring in the tail, consistent with C. b. sandiegensis, but otherwise resemble C. b. anthonyi (see Hamilton et al. 2011). Scattered reports of Cactus Wrens on the coastal
slope far from known populations lend credence to coastal dispersal. These include one along the Santa Ana River in Anaheim, 11–15 August 1992 (Hamilton and Willick 1996), one at Terminal Island in San Pedro, 7 May 2007 (N. Am. Birds 61:513), and a description of the species and photograph of a nest near Millard Canyon, Pasadena (sent to Cooper in August 2009).

Conservation Challenges

Coastal populations of the Cactus Wren in Los Angeles County and elsewhere in the region have been in decline for at least the past 100 years. Willett (1912) remarked on the wren’s apparent disappearance from a site near Santa Paula (along the Santa Clara River valley, where now apparently extirpated, *fide* P. E. Lehman) during the early 20th century, and two decades later he (1933) characterized the species as having become “much less plentiful” in Ventura County because of large-scale clearing for agriculture. Dawson (1923) memorably expressed concern for the wren’s future in an increasingly urbanizing landscape, observing, “The Cactus Wren has receded from many parts of the San Diego–Ventura section already, and is in danger of being altogether cut off.”

Of the three remaining populations in Los Angeles County, the San Fernando Valley population may have experienced the greatest reduction in extent. It is particularly threatened, having been reduced from a large area of the eastern valley to just a handful of birds along a limited stretch of poorly protected alluvial fan scrub on property in Tujunga Wash managed by multiple agencies with limited presence on the ground. Approximately 40% of this area’s alluvial scrub habitat was converted to a golf course in the early 2000s, and today the area is frequented by homeless people who light fires and smoke at makeshift campgrounds, often within wren territories (Cooper pers. obs.). It may be only a matter of time before this highly isolated population (see Table 1) blinks out, as did that of the Baldwin Hills in the 1990s.

Intensive surveys on the Palos Verdes Peninsula from 1993 to 1996 yielded annual counts in the range of 50–63 breeding pairs of Cactus Wrens (Atwood et al. 1996); thus the current estimate of 28 pairs represents a halving of this isolated population during the past 15 years or so. Additional years of surveys are needed to confirm this decline, which has taken place despite the population occurring almost entirely on lands protected and managed on behalf of the Cactus Wren and other native scrub species. It is conceivable that this population may continue to decline, contract, and perhaps even quietly vanish. Similarly, the San Gabriel Valley population, which currently extends along the base of the foothills of the San Gabriel Mountains from Azusa east to La Verne, once extended west to Pasadena and east to Claremont and has therefore contracted in area by about half.

Many pairs of Cactus Wrens occupy lands slated for potential residential development, such as in the Montebello Hills, and private property within residential neighborhoods, especially in the northeastern San Gabriel Valley. Additional pairs occur within zones subjected to aggressive brush-clearing for fire control. Indeed, during our 2009 study, observers noted various factors such as a recent fire that killed cactus plants outright, clearing for brush control (by machine, hand, and goats), and invasion of cactus patches by both non-native and native plants.
It seems likely that continued misunderstanding over the distribution and systematics of Cactus Wrens on the coastal slope of Los Angeles County, at least some of which exhibit a mix of both coastal and desert plumage characters, contributed to a perception that these populations are secure (like those of the abundant and widespread subspecies *anthonyi*) or that their numbers would continually be "replenished" by birds from the desert. In turn, coastal Cactus Wrens have received less attention and less protection than has the California Gnatcatcher (*Polioptila californica californica*), a listed taxon that is much more plentiful than the wren on the coastal slope of southern California and less threatened by wildfires. As Rea and Weaver (1990) observed more than two decades ago, by the time the coastal Cactus Wren's plight in the region is widely acknowledged, it may be too late to effectively conserve its remaining populations.

Fortunately, Cactus Wren populations are persisting within several large protected areas on the coastal slope of Los Angeles County, including lands managed by the Puente Hills Habitat Conservation and Preservation Authority in the western Puente Hills, Frank G. Bonelli Regional Park in San Dimas (County of Los Angeles Department of Parks and Recreation), the Santa Fe Dam Recreation Area in Irwindale (County of Los Angeles Department of Parks and Recreation), and in South Hills Park in Glendora (city of Glendora). Recent experience on the Palos Verdes Peninsula and at other large open-space reserves elsewhere in the region, however, is that the setting aside of even extensive tracts of cactus scrub may be inadequate to conserve populations of coastal Cactus Wrens over the long term, largely because of the potential for wildfires to destroy extensive stands of cactus, the very slow regrowth of those stands, and the wren’s limited capacity to recolonize isolated cactus stands (see Hamilton et al. 2011).

Other possible problems, which may be related to fire damage, include dense growth of non-native grasses and weeds in the understory of cactus scrub (which appears to interfere with the wrens’ ability to forage effectively on the ground) and a recent dramatic increase in the regional breeding population of Cooper’s Hawk (*Accipiter cooperii*), a potential wren predator regularly observed hunting near cactus scrub. Research into some of these issues is continuing, as is a study of the genetics and systematics of the Cactus Wren across the coastal slope of southern California, and population census/mapping efforts are taking place throughout the region. The 2009 census of wren territories across Los Angeles County establishes a current baseline by which future population changes may be measured and exemplifies the important contributions that volunteers can make toward these urgent and ambitious campaigns to save the Cactus Wren in this region.

ACKNOWLEDGMENTS

We thank Trish Smith of The Nature Conservancy and Andrea Gullo of the Puente Hills Habitat Preservation Authority for funding our 2009 survey. Steven Choy and Natalie Uriarte (California Department of Fish and Game) assisted in the digitization of territory maps. Ann Dalkey and Danielle LaFe of the Palos Verdes Peninsula Land Conservancy provided access and information on additional territories on the peninsula, and Kimball Garrett (Los Angeles County Museum of Natural History) provided unpublished data, largely from the Los Angeles County Breeding Bird Atlas (Larry Al-
len/Los Angeles Audubon Society). We extend a special thanks to our hardy volunteers on the 2009 survey: Lance Benner, Diane Bonanno, Karlene Campos, Bill Cullen, Ron Cyger, Anne Dalkey, Kathi Ellsworth, Frank and Susan Gilliland, Gerry Hans, Rod Highie, Andrew Lee, Mickey Long, Cathi McFadden, Craig Olsson, Jonathan Rowley, and Stephen Tabor, and we thank the entire “Coastal Cactus Wren Working Group,” organized by Trish Smith, for keeping interest in these birds high among resource agencies’ staff and land managers. For sharing supplemental information on the distribution of Cactus Wrens in the region, thanks to Melody R. Aimar, Daniel A. Guthrie, Linnea S. Hall, Paul E. Lehman, and Jim Moore. Philip Unitt, Kimball Garrett, and Kathy Molina provided helpful comments on an earlier draft of the manuscript.

LITERATURE CITED


A CENSUS OF THE CACTUS WREN IN COASTAL LOS ANGELES COUNTY


Accepted 22 June 2012
ABSTRACT: The California Bird Records Committee reached decisions on 244 individuals of 79 species and two species pairs documented since the 35th report (Pyle et al. 2011a), endorsing 170 of them. The Eastern Whip-poor-will (Antrostomus vociferus) was added to the California state list, bringing the total accepted to 644 species, 10 of which are non-native. Notable records of the Ivory Gull (Pagophila eburnea), Black-tailed Gull (Larus crassirostris), and Great-winged Petrel (Pterodroma macroptera) are detailed in this report. At its 2012 annual meeting, the committee removed the Trumpeter Swan (Cygnus buccinator) and Yellow-throated Warbler (Setophaga dominica) from its review list.

This 36th report of the California Bird Records Committee (hereafter CBRC or the committee), a formal standing committee of Western Field Ornithologists, summarizes decisions on 207 records of 79 species and two species pairs involving 244 individuals. We accepted 156 of the 207 records, involving 170 individuals of 68 species and two species pairs, for an acceptance rate of 75%. We consider 18 records to represent returning or continuing birds. Forty-seven reports of 28 species were not accepted because the identification was not substantiated, and four reports of three species were not accepted because the natural occurrence was not substantiated. Reports of multiple individuals together are given the same record number for purposes of review; the committee reports 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 2010, the period covered spans the years 1974 through 2011.

Highlights of this report include the first acceptance to the California state list of the recently split Eastern Whip-poor-will (Antrostomus vociferus), the second state record of the Ivory Gull (Pagophila eburnea), the third state records of the Great-winged Petrel (Pterodroma macroptera) and Black-tailed Gull (Larus crassirostris), notable records of the Wedge-rumped Storm-Petrel (Oceanodroma tethys), Elf Owl (Micathene whitneyi), and Brown Shrike (Lanius cristatus), and the first record of breeding of the White-eyed Vireo (Vireo griseus). The committee has recently accepted first California records of the Common Ringed Plover (Charadrius hiaticula) and Common Snipe (Gallinago gallinago), the details of which will be published in the next CBRC report. In addition, the committee is currently reviewing potential first state records of the Taiga/Tundra Bean-Goose (Anser fabalis/serrirostris) and Common Crane (Grus grus).

Species account headings are organized with English and scientific names first, followed in parentheses by the total number of accepted state records
(number of individuals) and the number of new records accepted in this report. Following the heading are accounts for records accepted (as applicable), followed by records not accepted—identification not established and records not accepted—natural occurrence questionable (as applicable). An asterisk (*) preceding the species’ name indicates that the species is no longer reviewed by the CBRC. 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 an audio recording, (†) indicates submission of a video, and (#) precedes a specimen number. The absence of a symbol following the observer's initials indicates the submission of a sight record alone. Additional details regarding minutiae of formatting and abbreviations may be found in previous CBRC reports, available at www.californiabirds.org/, and in Hamilton et al. (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 2009. Age terminology follows that used by Hamilton et al. (2007). In this annual report we revert to the format of Pike and Compton (2010) and previous reports while recognizing that the information in the tabular format of Pyle et al. (2011a) can be accessed online via the update to Rare Birds of California (Hamilton et al. 2007) available at www.californiabirds.org/cbrc_book/update.pdf.

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). 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.

SPECIES ACCOUNTS

*TRUMPETER SWAN Cygnus buccinator (96, 7). Two family groups, including two adults with two first-winter birds and an adult with two first-winter birds, were in the Surprise Valley south of Eagleville, MOD, 31 Dec 2010 (SCR†; 2011-035). IDENTIFICATION NOT ESTABLISHED: A report of a first-spring swan from Modoc N.W.R., MOD, 19 Mar 2009 (2009-064) went several rounds in the committee, but most members ultimately thought that the description did not adequately rule out a first-spring Tundra Swan (C. columbianus). A first-winter swan reported at the intersection of highways 108 and 395, MNO, 15–19 Nov 2010 (2010-152) showed characteristics of a first-winter Tundra Swan. Identification of lone first-year swans is very difficult, and a better study of the head and bill would have been needed for these birds to be confirmed as the Trumpeter. NATURAL OCCURRENCE QUESTIONABLE: A first-spring Trumpeter Swan at Auburn Regional Park, PLA, 6–9 Apr 2009 (RPet†; RPot, SR†; EP; 2009-122) was accepted on the first round of voting, but when it returned the following year with another bird 17 Feb–23 Mar 2010
REPORT OF THE CALIFORNIA BIRD RECORDS COMMITTEE: 2010 RECORDS

(Yellow-billed Loon; 2010-014), local birders provided information about a waterfowl breeder who might have released Trumpeters nearby, convincing the committee that these were likely escapees, and both records were rejected on the basis of questionable natural occurrence. The committee reviews records of the Trumpeter Swan through 2011.

ARCTIC LOON Gavia arctica (7, 0). IDENTIFICATION NOT ESTABLISHED: One reported at Stone Lagoon, HUM, 24 Nov 2010–2 Jan 2011 (2010-186) was not well documented, and some of the original observers retracted their support for the record after submitting it. The photos show a loon with some white on the flanks, but the white is toward the center instead of near the thighs. Nothing else in the description rules out the Pacific Loon (G. pacifica). One at Dillon Beach, MRN, 31 Dec 2010–1 Jan 2011 (2010-187) received mild support in the first round but did not pass a second round of voting. The sketches of the bird are suggestive of an Arctic Loon, but again, the white was more prominent on the sides than on the rear flanks. Pacific Loons often show white sides that extend highest in the middle. See Reinking and Howell (1993) and Birch and Lee (1997) for a discussion of the identification of the Arctic and Pacific loons.

YELLOW-BILLED LOON Gavia adamsii (88, 4). The four new accepted records are of one at L. Havasu, SBE, 28 Mar 2002 (TABt; 2010-133), which was thought to be the same bird as one seen on the Arizona side of the lake 1 Feb–13 Apr 2002 (Rosenberg et al. 2007), one at Castaic Lagoon, LA, 8 Mar–30 Apr 2010 (JAt; AAAt, MSanMt, LSAt, WTTt, ABLt; 2010-023; photo in N. Am. Birds 64:498), an adult in breeding plumage flying past Pt. Piedras Blancas, SLO, 8 May 2010 (RIr; 2010-054), and one first-winter individual moving between the Berkeley Pier, the Alameda shoreline, and the Hayward Regional Shoreline, ALA/CC, 26 Nov 2010–5 Jan 2011 (BPt, BMAt, LTt, SBtt, ADt, MN, BR; 2010-155). IDENTIFICATION NOT ESTABLISHED: Reports that lacked sufficient documentation were of two together at O’Neill Forebay, MER, 14 Nov 2008 (2008-199), single birds at Pt. Piedras Blancas, SLO, 21 Apr 2010 (2010-052) and 5 May 2010 (2010-053), and three together at the latter location 22 May 2010 (2010-055). Given the difficulty of identification of distant and flying first-year loons, the committee believes that the extraordinary number of Yellow-billed Loons reported from the latter location over the years requires further documentation, in the form either of multiple-observer sightings or photographs.

SHORT-TAILED ALBATROSS Phoebastria albatrus (32**, 1). One in its first fall was photographed 48 km west-southwest of Bodega Head, SON, 20 Nov 2010 (DSSAt, TMcGt, GTt; 2010-153). This species continues to be found increasingly in California waters, where it is now annual. The committee reviews records of the Short-tailed Albatross from 1900 onward.

GREAT-WINGED PETREL Pterodroma macroptera (3, 1). One was well photographed and observed by many over Cabrillo Canyon, roughly 29 km southwest of Santa Cruz, SCZ, 18 Sep 2010 (DBrt, DSSAt, RW, MVet; 2010-104; color photo on the cover of W. Birds 42:1; color photo in N. Am. Birds 65:197). This is the third record for California, and it falls seasonally between the previous two records, 21 Jul–24 Aug 1996 (1996-133, 1997-068, Rottenborn and Morlan 2000) and 18 Oct 1998 (1998-163, Rogers and Jaramillo 2002). Like the other two recorded in California, this bird showed the pale face typical of the subspecies P. m. gouldi, which is sometimes elevated to species status (Howell 2012).

HAWAIIAN PETREL Pterodroma sandwichensis (13, 1). One 16 km southwest of Ft. Bragg, MEN, 15 Aug 2010 (PPt, SBt; 2010-087; photos in N. Am. Birds 65:157) fit well with the pattern of occurrence established by this species. Twelve of 13 accepted records have fallen between 15 Jul and 6 Sep, with 10 of those in August. This individual showed head and other markings allowing identification to species (see below; Force et al. 2007, Pyle et al. 2011b). Satellite tracking has revealed Hawai-
ian Petrels tagged on Maui reaching California waters, and the species may in fact be a regular component of California’s offshore avifauna (Adams and Flora 2010).

GALAPAGOS/HAWAIIAN PETREL *Pterodroma phaeopygia/sandwichensis* (24, 3). Three sightings were accepted as this pair of species difficult to distinguish from each other (see Force et al. 2007). One 289 km southwest of San Clemente I., LA, 4 Apr 2010 (GSM; 2010-037) had some support as a Hawaiian Petrel, but the majority of the committee believed that the details did not conclusively support the species-level identification. One 61 km southwest of Salt Pt. S.P., SON, 30 Apr 2010 (TSHa, RM; 2010-051) was seen well enough to be acceptable as the species pair. One 101 km southwest of Pt. Sur, MTY, 25 Jul 2010 (PP; 2010-074) better fit the late-summer pattern of occurrence typical of this species pair but was also not seen well enough for species identification. IDENTIFICATION NOT ESTABLISHED: Six reports from experienced observers aboard offshore research vessels were not adequately documented to establish the species pair: one 327 km west of Pt. Saint George, DN, 12 Aug 2008 (2009-016), one 319 km west of Cape Mendocino, HUM, 22 Sep 2008 (2009-017), one 332 km west of Cape Mendocino, HUM, 22 Sep 2008 (2009-018), one 190 km southwest of Pt. Arguello, SBA, 14 Apr 2010 (2010-038), one 218 km west-southwest of Pt. Arguello, SBA, 16 Apr 2010 (2010-039), and one 40 km west of Pt. Arena, MEN, 30 Apr 2010 (2010-071).

STEJNEGER’S PETREL *Pterodroma longirostris* (9, 1). One was 148 km southwest of Pt. Conception, SBA, 14 Apr 2010 (GSM; 2010-036). This spring record falls outside of the window of occurrence for the other eight California records, which are about evenly split between July and mid-October to mid-November. IDENTIFICATION NOT ESTABLISHED: The report of one 282 km west-southwest of Punta Gorda, HUM, 21 Oct 2008 (2009-031) was likely correct, but the documentation was not strong enough to support it.

STREAKED SHEARWATER *Calonectris leucomelas* (18, 0). IDENTIFICATION NOT ESTABLISHED: One reported on Monterey Bay, MTY, 9 Sep 2010 (2010-100) was seen briefly by only a few people aboard an organized pelagic trip, and while the majority of the committee believed that the bird was likely correctly identified, there was not enough detail in the documentation to support the report.

GREAT SHEARWATER *Puffinus gravis* (8, 1). One photographed at Cordell Bank and vicinity, MRN/SON, 26 Apr 2010 (SNGH†; KS; 2010-035; photo in N. Am. Birds 64:493) represents the first spring record for California. The previous seven records are spread widely through the fall and winter.

WEDGE-RUMPED STORM-PETREL *Oceanodroma tethys* (8, 1). One was photographed with a large flock of Least (*O. microsoma*) and Black (*O. melania*) storm-petrels southeast of 30-Mile Bank off San Clemente I., LA, 2 Oct 2010 (JSF†, WTH†, PEL, MSa†; 2010-120; Figure 1). Although the bird was not seen well in the field, an excellent series of photographs allowed the committee to assess key field marks, and the record was accepted unanimously. California’s only specimen is of the southern breeding subspecies *O. t. kelsalli* (Yadon 1970). This record falls at the tail end of the expected window of occurrence, in early October. The date span for seven of the eight state records is 23 Jul–9 Oct; one winter record—the only one for California and North America—is of a bird found in a backyard in Carmel, MTY, 21 Jan 1969 (1797-123, Yadon 1970).

MAGNIFICENT FRIGATEBIRD *Fregata magnificens* (12**, 2). Because of a decrease in records since 2000, the CBRC added this species back to the review list in 2009, after a hiatus of 35 years. A juvenile was photographed being chased by Common Ravens (*Corvus corax*) at Sutro Park in San Francisco, SF, 13 Jan 2010 (JM†; 2010-006; photo in N. Am. Birds 64-646), and another juvenile was near
REPORT OF THE CALIFORNIA BIRD RECORDS COMMITTEE: 2010 RECORDS

San Clemente and Carlsbad, ORA/SD, 28–29 Jun 2010 (BF†; MJB†, GMcC, MSa†; 2010-063).

MASKED BOOBY Sula dactylatra (15, 1). An adult seen at China Pt., San Clemente I., LA, 10 Jul 2010 (RLS S, AEW; 2010-069) was satisfactorily substantiated by a beautiful sketch.

MASKED/NAZCA BOOBY Sula dactylatra/granti (10, 2). A one-year-old individual 22 km west-southwest of Pt. Loma, SD, 23 Jul 2010 (MHSt†; 2010-077) was just beginning its second prebasic molt yet was not showing characters definitive of either species. A juvenile at Nine-Mile Bank off Pt. Loma, SD, 29 Aug 2010 (BJS†; 2010-090) was thought to be a different individual.

BLUE-FOOTED BOOBY Sula nebouxii (112, 2). Two birds found dead at the Salton Sea were photographed but not collected: an adult at Red Hill, IMP, 21 Dec 2009 (OJ†; 2009-242) and a first-winter bird at Obsidian Butte, IMP, 26 Dec 2009 (ES†; 2010-020). These two records followed an influx of at least 15 immature Blue-footed Boobies at the Salton Sea during late summer and fall 2009 (see CBRC records 2009-139, 2009-159, 2009-201, and 2009-211; Pyle et al. 2011a). The committee ultimately accepted the second bird (2010-020) as a new individual while admitting that there was no way to be certain if it was the same as any of the previous 15 individuals from summer/fall 2009.

"BROWN BOOBY Sula leucogaster (122, 1). A first-winter bird at Estero Bay near Morro Rock, SLO, 20 Dec 1997 (BB; TME; 2010-132) adds to California’s long list of records for this species. The identification was not in question, but some committee members thought that the bird could have been the same as the one at San Simeon, SLO, 19 Jan 1998 (1998-054, Erickson and Hamilton 2001). As is often the case with “same bird” issues, a definitive conclusion could not be drawn, and thus this record is treated as representing a new individual. The committee reviews records of Brown Booby through 2007.

RED-FOOTED BOOBY Sula sula (18, 0). NATURAL OCCURRENCE QUESTIONABLE: One in its first fall landed on a sport-fishing boat in Mexican waters, then rode into San Diego Bay, 29–30 Sep 2008 (JMcD†; DWA†, TABI, DK, JW†; 2008-126). The identification was not in question, but the committee had a difficult time reaching a consensus on “natural occurrence,” given the bird’s behavior. The decision was made to reject the record on grounds of questionable natural occurrence, to stay in keeping with the decision made on the state’s only report so far of the Nazca Booby (S. grantii), which also rode a boat from Mexican waters into San Diego Bay (2001-107, Garrett and Wilson 2003).

NEOTROPIC CORMORANT Phalacrocorax brasilianus (25, 7). Numbers of Neotropic Cormorants in California continue to increase, with four new accepted records involving seven birds, all from Imperial County: an adult was at Ramer L., 13 Jun 2010 (KLG†; 2010-057), a two-year-old was at Ramer L., 10 Jul 2010 (DAB†; 2010-067), up to four adults were at Fig Lagoon near Seeley, 23 Sep–12 Dec 2010 (GMcC; MJM†, EGK†, MSa†, RBMcN†, JMr†; 2010-108), and one adult was at the north end of Lack Rd., Salton Sea, 5 Nov 2010 (GMcC; 2010-139). Four together (2010-108) represents a new state high count: one 23 Sep was joined by another 20 Nov, then two more on 28 Nov.

TRICOLORED HERON Egretta tricolor (58**, 0). IDENTIFICATION NOT ESTABLISHED: The report of one at Bolinas Lagoon, MRN, 14–15 May 2010 (2010-064) was likely correct but lacked the details Lagoon necessary for verification. The Tricolored Heron was added to the California review list in 1990.

YELLOW-CROWNED NIGHT-HERON Nyctanassa violacea (51, 5). One in its
second winter was at Goleta, SBA, 29 Jan–19 Mar 2010 (WTF†; DiR†, DMC†, DVP†, OJ†; 2010-008). Two adults were in the San Diego R. flood-control channel, SD, 15 May–8 Aug 2010 (RC†, GMCC, DMf†, TAB†, LP†, JPF, BeMF, PEL; 2010-041). These two adults were considered to be the same birds as those present at the same location off and on since 27 Apr 2006 (2006-056, 2007-166, 2008-092, and 2009-085; Pyle et al. 2011a) and an adult first present at this location 10 May–30 Jul 2009 (2009-085; Pyle et al. 2011a). One in its second spring at the San Diego R. flood-control channel, 15 May–12 Jul 2010 (GMCC, DMf†, JPF; PEL; 2010-042) was considered to be the same as a one-year-old seen there 9 Jul–20 Aug 2009 (2009-112; Pyle et al. 2011a). Three juveniles were in a nest at the Imperial Beach Sports Park, Imperial Beach, SD, 14 Aug 2010 (GMCC; MSat†; 2010-086), and a juvenile was at Encinitas, SD, 5 Oct 2010 (SB†; 2010-116). IDENTIFICATION NOT ESTABLISHED: The report of an adult at the north end of Poo Road, IMP, 19 Nov 2010 (2010-151) was likely correct but lacked the necessary documentation, especially for this unusual inland location. A juvenile night-heron at Malibu Lagoon, LA, 4 Aug–31 Oct 2010 (CY†; TMCG†, CA†, HK†, KLG, DTT†; 2010-082; Figure 2) was endorsed as a hybrid Yellow-crowned × Black-crowned (Nycticorax nycticorax), an intergeneric hybrid recorded previously in southern California. A mixed-species pair has been successfully producing young in San Diego since 2007 (Platter-Rieger et al. 2008), and another attempted breeding unsuccessfully at La Jolla, SD, in 1989 and 1992 (Pyle and McCaskie 1992, Heindel and Patten 1996). A hybrid was collected in Arizona in 1951 (Monson and Phillips 1981).

GLOSSY IBIS Plegadis falcinellus (25, 2). Adults were photographed at Sierra Valley, PLU, 10 Jun 2010 (RoL†; 2010-060) and at Yolo Basin Wildlife Area near Davis, YOL, 25 Jul 2010 (RFo†; 2010-119). Reports of non-adult Glossy Ibis continue to confound the committee, as does the issue of hybrids between the common White-faced Ibis (P. chihi) and the vagrant Glossy Ibis. All reports of non-adult Glossy Ibis in California should be supported by extensive photos and written details to allow accurate identification to age and species. IDENTIFICATION NOT ESTABLISHED: An adult reported at the intersection of Brewer and Kempton roads, SUT, 2 Sep 2008 (2009-041) was problematic. There was no written documentation, and the bird’s age was not clear from the photos provided, making it difficult to identify conclusively. While it was perhaps a Glossy, more detail was required for committee support. A report of a one-year-old at Mill Cr. in Chino, SBE, 23–24 Jul 2010 (2010-076) was also a complicated record to assess. Because of an apparent reddish cast to bird’s eyes, a majority of the committee believed that a hybrid could not be ruled out.

BLACK VULTURE Coragyps atratus (4, 1). On the basis of details of molt sequence and facial-skin patterns, the committee concluded that four separate records represented the same wandering adult. It was first seen in Goleta, SBA, 10–13 Sep 2009 (HPRT†; BKST†, DWA†, CAM†, DMC, MV†, JLD, MSanM; 2009-156), then at Santa Paula, VEN, 29 Nov–4 Dec 2009 (DP†, DVP†, TAB†, CAM†; 2009-221) and at L. Casitas and Ojai, VEN, 4 Jan–22 Feb 2010 (JVHT†; KEKT, MM, EL†, DAB; 2010-016) before returning to the area where it was first seen in 2009 in Goleta, SBA, 18 Jul–6 Nov 2010 (NA†, DMC, RFi, OJ, GMCC, MSat†; 2010-073; photo in N. Am. Birds 64:647). This individual represents the first record for both Ventura and Santa Barbara counties.

HARRIS’S HAWK Parabuteo unicinctus (53, 3). Always a difficult species to assess on the basis of natural occurrence and numbers of individuals, and in this report we add three new records. An adult at Aguanga and Warner Springs, RIV/SD, 30 Jun–23 Nov 2008 (FB†, CS†, SQ†, EE†, JCH†; 2008-085) was thought to be the same bird as that at Dripping Springs Campground and Oak Grove, RIV/SD, 20 Sep 2006–14 Feb 2007 (2007-044, Heindel and Garrett 2008) and again at Warner Springs, SD, 15–19 Feb 2010 (MMar, SR†; 2010-013). Additional adults were at Brawley, IMP,
3–18 Jan 2010 (BoM†, PEL; 2010-002), at Yucca Valley, SBE, 2 Apr 2010 (DBr; 2010-029), and at Borrego Springs, SD, 6–17 Oct 2010 (SBi, PDJ, BJS†, JN†, LMD†, EGK†, TRS†; 2010-124). NATURAL OCCURRENCE QUESTIONABLE: An adult at El Casco Substation, Beaumont, RIV, 11–13 Nov 2010 (LJ†; 2010-146) was thought to be an escapee because it was very approachable.

CRESTED CARACARA Caracara cheriway (11, 0). The committee concluded that three records from 2008 represented the same wandering second-winter individual, at Pogonip, SCZ, 27 Feb 2008 (JH†; 2011-187), at Coyote Valley near Morgan Hill, SCL, 7 Mar 2008 (RPf†; 2008-041), and at Santa Barbara, SBA, 21 Mar 2008 (JDa; 2008-080). And that these three records also represented the same individual observed in its first winter at Hansen Dam, LA, 29 Jan–1 Feb 2007 and four more times in Santa Barbara, Monterey, and San Mateo counties through Jul 2008 (PiKe and Compton 2010, Pyle and Sullivan 2010, Pyle et al. 2011a, Nelson and Pyle in press). On the basis of the bird’s age, molt, flight-feather condition, and pattern of migration the committee has recently reviewed and revised the number of records by uniting multiple previous records as, instead, multiple records of recognizable individuals. This reassessment lowers the total number of Crested Caracaras in California from 32 to 11 through Oct 2011. For example, age, regional clustering, and behavior patterns typical of other individuals in California imply that the first caracara accepted for California, in Mono County during fall 1987, at the time in its second plumage cycle, was the same as the one in its third cycle in Siskiyou County the following fall and winter, after which it moved north into Del Norte County and southern Oregon. The same criteria, plus lack of overlapping dates, similar patterns of migration, fidelity to certain locations, molt, and flight-feather condition were consistent with one first observed in Santa Barbara in Oct 2001 in its first cycle, observed 11 more times along the central coast (Santa Barbara to San Mateo counties) in its second cycle and 20 more times in definitive basic plumage as it traveled up and down the coast from central to California to Oregon and back before settling in Del Norte county from 2008 to 2012. This analysis not only presents a conservative view of the number of Crested Caracaras to have reached California but also greatly clarifies this species’ movement patterns in the state and in western North America (Nelson and Pyle in press).

GYRFALCON Falco rusticolus (11, 0). IDENTIFICATION NOT ESTABLISHED: One reported at Tule L., N.W.R., SIS, 19 Feb 2010 (2010-017) was at a reasonable location for the species in California, and several committee members thought that the identification was likely correct, but the brevity of the observation and the lack of supporting details caused the committee to withhold support.

PURPLE GALLINULE Porphyrio martinica (5, 2). A juvenile was at the San Gabriel R. in Pico Rivera, LA, 2–13 Sep 2010 (NV†; 2010-096), and one in its second fall was at the San Gabriel R. at Peck Road, between Pico Rivera and South El Monte, LA, 21 Sep–8 Oct 2010 (NV†; JSF†, CAM†, MMt†, RaR†, LJL†, GMcC, SBT†, DVP†; 2010-106; photo in N. Am. Birds 65:162). It is remarkable that two birds were found at nearly the same location and by the same observer, given this species’ rarity in California. It underscores how secretive rallids can be during migration and how little we know about their vagrancy.

*AMERICAN GOLDEN-POLER Pluvialis dominica (52, 1). One was on the east side of Goose L., MOD, 27 Sep 2008 (SCR†; 2009-043). This record went three rounds, poor photos and bad lighting of a distant bird causing concern, but finally was accepted unanimously. The committee reviews records of the American Golden-Plover from 2004 to 2009.

WILSON’S PLOVER Charadrius wilsonia (16, 3). Occurrences of Wilson’s Plover seem to be on the rise in California. The three accepted records are of one at the Santa Margarita R. mouth, SD, 2 Apr 2010 (JJF; 2010-030), one in partial alternate
plumage, possibly a first-spring male, well photographed at Bolsa Chica, ORA, 12–16 Apr 2010 (LJLt; LS†, MMT†, RHo†; 2010-033; photo in N. Am. Birds 64:498), and an adult in alternate plumage at Border Field S.P., SD, 17 Jun 2010 (MSa†; PEL; 2010-058; photo in N. Am. Birds 64:647). IDENTIFICATION NOT ESTABLISHED: The report of one at the San Diego R. mouth, SD, 17 Jun 2010 (2010-059) lacked detail sufficient for acceptance.

WOOD SANDPIPER Tringa glareola (1, 0). IDENTIFICATION NOT ESTABLISHED: The report of one at the Ventura County Game Preserve, Port Hueneme, VEN, 9 Sep 2010 (2010-102) lacked detail sufficient for acceptance, though several committee members believed that the identification was likely correct. As it would have represented only the second state record, extensive notes—and preferably photos—should support such an observation.

HUDSONIAN GODWIT Limosa haemastica (46, 6). Two adults were at Pluie Ponds on Edwards Air Force Base near Lancaster, LA, 15–25 May 2010 (KH-L†, MSanM†; CY†, CAM†, DC†, JSF†, GMcC; 2010-040; color photo on the cover of W. Birds 41:3; photo in N. Am. Birds 64:499), a juvenile was at the Tulare Lake Drainage District’s North Evaporation and Nevada ponds just northwest of Corcoran, KIN, 22–28 Aug 2010 (MES†; 2010-088), a juvenile was at Ocean Ranch at the Eel R. delta, HUM, 5 Sep 2010 (SEM†; 2010-097), one of unknown age was at Arcata Marsh, HUM, 6 Sep 2010 (DMx; 2010-129), and a juvenile was at Cock Robin I. at the Eel R. estuary, HUM, 6–7 Oct 2010 (SEM†; KMB†; 2010-121).

BAR-TAILED GODWIT Limosa lapponica (38, 2). An adult male was at Camp Surf, Imperial Beach, SD, 3–7 Aug 2010 (TABI†; DWA†, GMcc, MSa†; 2010-081) and a juvenile was on the Morro Bay sandspit, Los Osos, SLO, 28 Aug–5 Sep 2010 (JRy; BED†, MDH†, CAM†, BKST†, KJZ†; 2010-091), falling on the early end of the expected window for juveniles. Both birds were identified as the Alaska-breeding subspecies, L. l. baueri. IDENTIFICATION NOT ESTABLISHED: An alternate-plumaged bird reported at Little R. S.B. near Arcata, HUM, 12 Jul 2009 (2009-167) was ultimately not accepted because of the brevity of the description and concerns that the Marbled Godwit (L. fedoa) was not eliminated.

RED-NECKED STINT Calidris ruficollis (14, 1). An adult was at Morro Bay, SLO, 10 Jul 2010 (BB; TME, AS; 2010-066). The written details were acceptable even in the absence of photos. With the proliferation of digital photography, however, California birders should strive to document all reports of stints with photos. IDENTIFICATION NOT ESTABLISHED: A juvenile reported at L. Talawa, DN, 30 Aug 2007 (2011-005) was determined to be a juvenile Sanderling (C. alba).

LITTLE STINT Calidris minuta (13, 2). Most unusual, an adult was inland at Owens L., INY, 6 Aug 2010 (JLD†, SLS; 2010-083) at nearly the same location as an adult found the previous year, 29–30 Aug 2009 (2009-142, Pyle et al. 2011a). A well-photographed juvenile was at south San Diego Bay, SD, 31 Aug 2010 (MSa†, RTP; 2010-101; color photo in N. Am. Birds 65:200; Figure 3).

LONG-TOED STINT Calidris subminuta (1, 0). IDENTIFICATION NOT ESTABLISHED: The report of a juvenile at Abbott’s Lagoon, MRN, 6 Aug 1996 (2010-099) lacked detail sufficient for acceptance. Although the committee was intrigued, a second record of the Long-toed Stint for California should be supported by extensive documentation, including photos.

CURLEW SANDPIPER Calidris ferruginea (39, 1). A molting adult at Seal Beach N.W.R., ORA, 7 Nov 2010 (MF†, TDF†; 2010-138) retained quite a bit of color below for this late date and is the latest adult observed during fall migration in California. IDENTIFICATION NOT ESTABLISHED: One reported at the San Diego R. mouth, SD, 17 Jan 2010 (2010-098) showed characteristics consistent with a Dunlin (C.
alpina), including a thick bill that was only slightly decurved. The rump pattern was not seen. There are no winter records of the Curlew Sandpiper for California.

IVORY GULL Pagophila eburnea (2, 1). An adult was at Pismo Beach, SLO, 4–7 Nov 2010 (MS†, LH†, MSanM; CAM†, JM†, GMcC, SH†, VM†, BS†, JMr†, MEl†; 2010-136; Figure 4; color photo on the cover of W. Birds 42:2; color photos in N. Am. Birds 65:200). California’s second Ivory Gull was found by a casual birder and reported to a local listserv. The report was pursued, and the bird was found two days later feeding on a sea lion carcass on a beach heavily trafficked by people. Over the next two days, it was enjoyed by hundreds of people and was well photographed and filmed by many observers. The only previous state record is of a juvenile at Doheny S.B., ORA, 5 Jan 1996 (1996-012, Weintraub and San Miguel 1999).

LITTLE GULL Hydrocoloeus minutus (103, 1). An adult returned to L. Perris, RIV, 1–14 Mar 2010 (HBK, WT†; 2010-019; photo in N. Am. Birds 64:499) for its second year, presumed to be the same individual there 1–10 Mar 2009 (2009-056). One in its first fall was at the Eel R. delta, HUM, 31 Oct 2010 (CM†, SEM†; 2010-134).

BLACK-TAILED GULL Larus crassirostris (3, 1). An adult at Alamitos Bay in Long Beach, LA, 8–21 Nov 2010 (RA†, KLG, SG†, MMJ†, CAM†, GMcC, TMcG†, SJM†, LS†, SLS†, CT†; 2010-140; Figure 5; photo in N. Am. Birds 65:163) was enjoyed by many. It was not seen between 11 and 19 Nov. There are just two previously accepted California records, of an adult female at the north end of San Diego Bay, SD, 26–28 Nov 1954 (1977-143; UMMZ #136176; Monroe 1955; Heindel and Patten 1996) and an adult at Half Moon Bay, SM, 29 Dec 2008 (2009-003, Pike and Compton 2010). This species is being found increasingly as a vagrant throughout North America. IDENTIFICATION NOT ESTABLISHED: Two reports of adults were not adequately documented: one at L. Merced, SF, 6 Apr 2010 (2010-031) lacked details that would have ruled out the more likely California (L. californicus) or Western (L. occidentalis) gulls, and one at the Elk Cr. mouth, Crescent City, DN, 20 Oct 2009 (2011-006) had features inconsistent with adult Black-tailed Gull, particularly an irregular and narrow tail band more typical of an immature California Gull.

LESSER BLACK-BACKED GULL Larus fuscus (79, 12). With 15 accepted records involving 12 new individuals in this report, it is clear that the Lesser Black-backed Gull is a regular part of today’s California avifauna. The newly accepted records are of a second-winter bird at the Whitewater R. mouth, Salton Sea, RIV, 3 Dec 2008 (CAM†; MSanM; 2008-208), an adult at Salton City, IMP, 13 Oct 2009 (BS†; 2009-203), a third-winter bird at the Point Mugu Naval Air Station, VEN, 3 Jan 2010 (MSanM; 2010-004), providing a first county record, a second-winter bird at the Davis landfill/sewage-treatment facility, YOL, 16 Jan 2010 (ToE†; 2010-005), an adult at Red Hill, Salton Sea, IMP, 13 Feb 2010 (GMcC; KH-L; 2010-011), an adult at Mystic L., RIV, 24–27 Mar 2010 (CMcG†; 2010-027), a first-summer bird at 84th Street at the north end of the Salton Sea, RIV, 31 Jul 2010 (CAM†; CMcG†; 2010-075), a juvenile at Topaz L., MNO, 30 Oct 2010 (KNN; 2010-147), a third-winter bird at Mecca Beach, Salton Sea, RIV, 9 Nov 2010 (CMcG†; 2010-143), a second-winter bird near Obsidian Butte, Salton Sea, IMP, 30 Nov 2010 (GMcC; 2010-160), a third-winter bird near Obsidian Butte, Salton Sea, IMP, 13 Dec 2010 (GMcC; MA†; 2010-170), and an adult at a chicken farm 14 km northwest of San Jacinto, RIV, 28 Dec 2010–26 Mar 2011 (CMcG†; CAM†; 2010-188). The committee concluded that three additional individuals at the Salton Sea represented returning birds: an adult at Mecca Beach, RIV, 10–28 Feb 2010 (DW†; WT†; CMcG†; 2010-015) was thought to be the same as the one there 18 Jan–15 Feb 2009 (2009-013; Pyle et al. 2011a), an adult at Red Hill, IMP, 23 Sep 2010–1 Jan 2011 (GMcC; SB†; TM†; JG; 2010-109) was thought to be the same as the one there 8 Oct 2009–13 Feb 2010 (2009-176; Pyle et al. 2011a), and an adult at Obsidian Butte, IMP, 6 Oct 2010 (GMcC; 2010-117).
Figure 1. Birders on an organized pelagic trip off San Clemente I., Los Angeles Co., 2 Oct 2010, noticed this small storm-petrel with a white rump amid a massive flock of Least (Oceanodroma microsoma) and Black (O. melania) storm-petrels. Although the bird was not seen well in the field, subsequent review of photos showed the very extensive white rump patch extending only slightly onto the undertail coverts and the shallow tail fork diagnostic of the Wedge-rumped Storm-Petrel (O. tethys).

Photos by Matt Sadowski

was thought to be the same bird as the one there 28 Nov 2009–15 Feb 2010 (2009-220; Pyle et al. 2011a). IDENTIFICATION NOT ESTABLISHED: The report of one at the intersection of Keystone and Dogwood roads 7 km south of Brawley, IMP, 6 Jan 2010 (2010-003) lacked details sufficient to rule out other similar species. One reported at Torrance Beach, LA, 27 Dec 2009 (2010-154) was possibly correctly identified, but the report lacked sufficient detail.

SOOTY TERN Onychoprion fuscatus (12, 0). An adult returned to Bolsa Chica, ORA, 4 Apr–18 Jul 2010 (BED, SSot†, BLC, JN†, CAM, GMcC, MSa†, BJS†, LP†, OJ; 2010-062), the same bird having been present 28 Jul–30 Aug 2009 (2009-154, Pyle et al. 2011a).

THICK-BILLED MURRE Uria lomvia (50, 1). An adult was photographed 7–15 km west of Noyo Harbor, MEN, 16 May 2010 (ToEt†; KAH, RHuf†, RJK†, JCS†; 2010-043; Figure 6).

LONG-BILLED MURRELET Brachyramphus perdix (28, 2). An adult was 1 km off the Eel R. mouth, HUM, 31 Jul 2009 (EAE†, MMot†; 2009-123), and one was off Houda Pt. near Westhaven, HUM, 31 Aug 2009 (SC, TK; 2009-151).

PARAKEET AUKLET Aethia psittacula (86, 0). IDENTIFICATION NOT ESTABLISHED: Sixteen reported well offshore of SCZ/SM/SF/SON/MEN 30 Apr 2010.
Figure 2. Although this juvenile night-heron photographed at Malibu Lagoon, Los Angeles Co., on 31 Oct 2010 (2010-082) was submitted as a Yellow-crowned Night-Heron (Nyctanassa violacea), the committee decided that it more likely represented a hybrid with Black-crowned Night-Heron (Nycticorax nycticorax). The extensive yellow-green on the lower mandible and large whitish spots on the tips of the wing coverts and scapulars suggest the Black-crowned, whereas other characters such as the long legs (not particularly noticeable in this photo), bill structure, and overall coloration suggest the Yellow-crowned.

Photo by Todd McGrath

(2010-072) were likely correctly identified, as the observer was experienced with the species, but none was documented well enough to establish an acceptable record. Five adults reported flying past Pt. Piedras Blancas, SLO, 8 May 2010 (2010-056) were not documented well enough to support such an unprecedented record of this species from shore.

ELF OWL Micrathene whitneyi (3**, 3). Two adults found nesting in a palm snag at an oasis in eastern RIV, 14 Apr–6 Aug 2010 (BEST; BED†, CAM§, TABΔ, CMcG†, JCSt†, ToEt†, FOt†, DAB†; 2010-050) were seen feeding at least one young on 19 Jun. Since the Elf Owl was first recorded in California, on 17 May 1903 on the Colorado River at Imperial Dam (Brown 1904), small numbers have been recorded breeding at scattered sites along the Colorado River and at nearby desert oases. The original population in California was undoubtedly very small, and surveys in 1978, 1979, and 1987 found fewer than 20 pairs along the Colorado River and at desert oases combined (Cardiff 1978, 1980, Halterman et al. 1989). Some of the birds located in 1987 might have been on the Arizona side of the river. Subsequent surveys and incidental observations implied that the California population was reduced to only a few pairs along the Colorado River by 2002 (N. Am. Birds 51:1054, LCR MSCP 2004, CDFG 2005), while surveys in 2008 and 2009 failed to find any Elf Owls in California (Sabin 2010). In addition to breeding individuals, the Elf Owl may
Figure 3. Identification of juvenile stints is notoriously difficult, but this juvenile Little Stint (*Calidris minuta*) was photographed at south San Diego Bay, San Diego Co., 31 Aug 2010 (2010-101) in direct comparison with a juvenile Western Sandpiper (*C. mauri*). The bright rufous edgings on the wing coverts, prominent white “V” on the mantle, and split supercilium are sufficient to eliminate the Red-necked Stint (*C. ruficollis*). Additionally, the long primary projection, numerous plumage differences, and the unwebbed toes (not visible here) distinguish it from the Western and Semipalmated (*C. pusilla*) sandpipers.

*Photo by Matt Sadowski*

Figure 4. This striking adult Ivory Gull (*Pagophila eburnea*) was photographed extensively over the course of its four-day stay, 4–7 Nov 2010 (here on the day of its discovery) at Pismo Beach, San Luis Obispo Co. (2010-136).

*Photo by Mike Stensvold*
also reach California in migration, as there are two records of fall migrants far from breeding habitat: one photographed near Calipatria, IMP, 21 Sep 1995 (Field Notes 50:115), and one turned into a rehabilitation facility on the coastal slope at Whittier Hills, LA, 29 Sep 2001 (N. Am. Birds 56:107). Because of habitat degradation along the Colorado River and the paucity of records since 2002, the committee voted in 2010 to add the Elf Owl to the review list and to review all reports from 2010 on.

EASTERN WHIP-POOR-WILL Antrostomus vociferus (1, 1). As a result of the split of the Eastern Whip-poor-will and Mexican Whip-poor-will (A. arizonae) (Chesser et al. 2010), the committee now reviews all records of the Eastern. A first-fall male photographed in the hand at Pt. Loma, SD, 14 Nov 1970 (JTC, PD†; 2010-079; Craig 1971; Figure 7) represents the first record for California and one of only a handful of records for western North America. A combination of plumage characters and measurements taken at the time (primarily wing chord) helped confirm this bird as the Eastern Whip-poor-will. The identification of the Eastern and Mexican whip-poor-wills is still poorly understood, and although the color and length of the rictal bristles may be important in distinguishing these two species (black in the Eastern and brown-based in the Mexican), more study is needed to determine if these differences provide reliable identification and if they vary by age and/or sex (Craig 1971, Hubbard and Crossin 1974). IDENTIFICATION NOT ESTABLISHED: The committee was unwilling to support the identification as the Eastern of whip-poor-wills at Coronado, SD, 25 Dec 1971–25 Mar 1972 (2010-112) and Goleta, SBA, 2 Nov 1982 (2010-113) because of the lack of measurements and calls for both. Both records were endorsed as whip-poor-wills (sensu lato).
Figure 6. This alternate-plumaged Thick-billed Murre (*Uria lomvia*) photographed on 16 May 2010 off Noyo Harbor, Mendocino Co. (2010-043), wore a plumage rarely seen in California. The vast majority of the state’s 50 records are for the fall and winter, when the birds are in basic plumage, while only seven previous records are for April–June. Note the very black upperparts, stout bill, and pale tomail strip that distinguish it from the Common Murre (*U. aalge*).

*Photo by John Sterling*

Figure 7. This Eastern Whip-poor-will (*Antrostomus vociferus*) captured and measured at Pt. Loma, San Diego Co., 14 Nov 1970 (2010-079) provided the first record of the species for California.

*Photo by Pierre Devillers*
Figure 8. This female White-eyed Vireo (Vireo griseus) (2011-064) successfully bred and fledged four young with a male Least Bell’s Vireo (V. bellii pusillus) near Oceanside, San Diego Co., providing both the first breeding record of the White-eyed Vireo for California and the first known interbreeding of the White-eyed and Bell’s Vireos (Blundell and Kus 2011).

Photo by Lisa D. Allen

BROAD-BILLED HUMMINGBIRD Cynanthus latirostris (78, 2). Adult males were well photographed at Sunnyslope Park in Nestor, SD, 17 Dec 2010–17 Feb 2011 (MBr†, OJ; EGK†, GMcM; 2010-175) and east Ventura, VEN, 27 Dec 2010–29 Jan 2011 (RMcM†; 2011-038). Both were wintering in coastal southern California, where expected.

MAGNIFICENT HUMMINGBIRD Eugenes fulgens (2, 0). IDENTIFICATION NOT ESTABLISHED: A hummingbird photographed on Rice-Midland Road, just northwest of Blythe, RIV, 1 Mar 2010 (2010-025) was thought by most committee members to be an Anna’s Hummingbird (Calypte anna).

RUBY-THROATED HUMMINGBIRD Archilochus colubris (13, 2). An adult female was well photographed in Bolinas, MRN, 9–12 Aug 2010 (KHa†; SNGH†, JCS†, OJ†, AW†, RFi, JMr†; 2010-085), and a first-fall female was captured and banded on Southeast Farallon I., SF, 29 Aug 2010 (OJ†; MBr†, JRT†; 2010-095).

GREATER PEWEE Contopus pertinax (41, 2). Singing individuals were at upper Arrastre Cr. in the San Bernardino Mts., SBE, 1–2 Jun 2010 (SR†; TABe†, CAM†; 2010-044; photo in N. Am. Birds 64:648) and at Mission Springs in the San Bernardino Mts., SBE, 27 Jun–5 Jul 2010 (ET†; SR†, TEW; 2010-070). These birds were 14 km apart in similar habitat, but the majority of committee members considered them likely different individuals. The summer dates and montane locations fit nicely with the three most recent state records, although the first 36 state records are for the lowlands between September and April.
Figure 9. The committee ultimately decided that this unidentified Petrochelidon swallow photographed at Blythe, Riverside Co., 28 Jul 2009 (2009-121) was not a Cave Swallow (*P. fulva*) but more likely represented the southwestern subspecies of the Cliff Swallow (*P. pyrrhonota melanogaster*). Characters supporting that identification include a dark forehead that is not contrastingly darker than the throat, a nape somewhat paler than the throat, and pale lores. This single photo does not show the rump color, however, and a portion of the head is in shade, obscuring the true color.

*Photo by Roger Higson*


*Photos by Ryan Terrill (A) and Matt Brady (B)*
YELLOW-BELLED FLYCATCHER *Empidonax flaviventris* (23, 1). One in its first fall was banded on Southeast Farallon I., SF, 8 Oct 2010 (OJ; MBr†, AP†; 2010-178).

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer* (82, 3). Single individuals were at the Humboldt State University Marine Lab in Trinidad, HUM, 2–4 Dec 2010 (LET†; 2010-165), at the historic “E” Ranch on Pt. Reyes, MRN, 18–21 Dec 2010 (MBr†, OJ S; 2010-183), at Wilder Ranch S.P. in Santa Cruz, SCZ, 18 Dec 2010–20 Feb 2011 (SG†; MWE†, SBT†; 2010-184), and at La Mirada Cr. Park, La Mirada, LA, 15 Dec 2010–6 Apr 2011 (MBr†, OJ S; 2010-183). The last was returning for its fourth winter (2008-040, 2008-187, and 2009-222; Pyle et al. 2011a). IDENTIFICATION NOT ESTABLISHED: Most committee members considered the report of one at the Los Angeles National Cemetery, Westwood, LA, 13 Dec 2010 (2010-174) to be likely correct, but sparse documentation led the majority of members to withhold support.

GREAT CRESTED FLYCATCHER *Myiarchus crinitus* (54, 1). One was at the San Francisco Zoo, SF, 28–31 Oct 2010 (HC†; LP†, SBT†; 2010-150).

THICK-BILLED KINGBIRD *Tyrannus crissirostris* (19, 1). One wintered in Otay Valley in south Chula Vista, SD, 16 Dec 2010–16 Apr 2011 (MBr†, OJ S, GMcC, MSa†, TRS†, TAB†, CAM; 2010-176). Excellent photos showing the narrow and slightly notched outer primaries indicate that it was an adult, probably female.

BROWN SHRIKE *Lanius cristatus* (4, 1). One in its first winter at Clam Beach in McKinleyville, HUM, 21 Nov 2010–18 May 2011 (GSL; CAM†, RFo, DWW†, SEM†, CO, KR†, MFF†, GMcC, MMR†, LS†; 2010-158) provided the first record for Humboldt County. The extensive field notes and photos submitted allowed the committee to determine that it was in formative plumage and of the nominate subspecies. See Pyle et al. (2011a) for a discussion of the subspecific identification of the Brown Shrike in California.

WHITE-EYED VIREO *Vireo griseus* (69, 2). An adult female along the San Luis Rey R. near San Luis Rey, SD, 12 May–9 Jun 2010 (BEK; LDA†; 2011-064; Figure 8).
bred with a male Least Bell’s Vireo (*V. bellii pusillus*), successfully fledging four hybrid young—the first records of the White-eyed Vireo breeding in California and interbreeding with Bell’s Vireo (Blundell and Kus 2011). A singing male in its first summer was at Muir Beach, MRN, 13–27 Jul 2010 (MBc, KHaŠ, OJ; RFo; 2010-080) and likely oversummered locally.

**BLUE-HEADED VIREO Vireo solitarius** (66, 3). A singing fall migrant at Redwood Park in Eureka, HUM, 26 Oct 2010 (SEM†; RFo; 2010-130) was supported by excellent written documentation, although its appearance varied in different photos. Two individuals wintered at Pt. Loma, SD, with one there 1 Mar 2009 (DWA†; 2009-059) and a first-winter male present 30 Dec 2010–24 Mar 2011 (DLB†; DWA†; EGK†; PEL, MSa, JK, CAM; 2011-001). IDENTIFICATION NOT ESTABLISHED: One reported at the mouth of Arroyo Grande Cr., SLO, 2 Oct 1990 (2008-191). One reported at South L. Merced, San Francisco, SF, 19 Sep 2010 (2010-111) was not photographed and viewed only briefly. This species continues to give the committee trouble, as apparent color and contrast may vary even in good photos of the same bird.

**YELLOW-GREEN VIREO** *Vireo flavoviridis* (100, 5). All five records involved fall migrants, which account for all but one of the records from California. Single individuals were noted at Princeton Harbor, Half Moon Bay, SM, 3 Oct 2009 (MBe; DMcK†; 2009-244), Pt. Loma, SD, 26 Sep 2010 (CAM; BJSt; 2010-110), Desert Center, RIV, 2–3 Oct 2010 (CAM; BED†; TAB†; 2010-115), Oceano, SLO, 5 Oct 2010 (MSm†; 2010-118), and in tamarisks along Wolff Road, Oxnard, VEN, 11–19 Oct 2010 (RMcM†; 2010-122).

**CAVE SWALLOW** *Petrochelidon fulva* (5, 0). IDENTIFICATION NOT ESTABLISHED: Most committee members agreed that a bird at Blythe, RIV, 28 Jul 2009 (2010-121; Figure 9) was not a Cave Swallow but was more likely of the southwestern subspecies of the Cliff Swallow, *P. pyrrhonota melanogaster*, which has yet to be fully documented in California. The single photo available was inconclusive, however, so the committee was unwilling to assign a name to this individual.

**WINTER WREN** *Troglodytes hiemalis* (5, 4). One wintering at Pt. Loma Nazarene University, SD, 3 Nov 2010–6 Mar 2011 (PEL; TBUŠ, GMcC, JNŠ, MSa†, GLR, DWA†, CAM, TAB†, TRS†, MBr, TJŠ; 2010-135; color photo in N. Am. Birds 65:200) was supported by numerous photos and recordings of call notes and provided the first record for San Diego County. See Pyle et al. (2011a) for a discussion of the identification of the Pacific (*T. pacificus*) and Winter wrens. In addition to the recent record, the committee endorsed three earlier records, of single individuals at Furnace Cr. Ranch, Death Valley, INY, 8 Nov 1987–7 Feb 1988 (JLD; GMcC, RAE, JCSŠ; 2010-161), Southeast Farallon I., SF, 22–23 Oct 2002 (KNN†; RDGT§, DLH; 2010-149), and Lundy Canyon near Lee Vining, MNO, 18 Dec 2004 (BaM; 2011-032). All three of these records were the first for their respective counties. The last record was not accompanied by photos or recordings and the plumage was not described beyond Pacific/Winter Wren, but the observer described the diagnostic call in great detail. IDENTIFICATION NOT ESTABLISHED: One reported at Goleta, SBA, 2 Jan 2000 (2010-162) was heard by an experienced observer, but the bird was never seen.

**VEERY** *Cattharus fuscescens* (14, 2). One singing at Chester, PLU, 20–21 Jun 2010 (DLH; MBb†, Toē†; FH; 2010-061; color photo in N. Am. Birds 64:666) represents the first record for Plumas County and the second for the Sierra Nevada. The committee also endorsed the identification of one at Arcata, HUM, 3 Nov 2010 (LET; 2010-177), which, despite the lack of photos, was documented with wing measurements that ruled out Swainson’s Thrush (*C. ustulatus*) and written details that eliminated all other species of *Cattharus*. IDENTIFICATION NOT ESTABLISHED: One reported from San Clemente I., LA, 21 Oct 2010 (2010-126) was described well but seen only briefly and not photographed.
GRAY-CHEEKED THRUSH Catharus minimus (22, 1). One in its first fall at Southeast Farallon I., SF, 9 Oct 2009 (RSTfS; MBrf, KNN, JRT†; 2009-189; Figure 10) provoked much discussion of distinguishing the Gray-cheeked Thrush from Bicknell’s Thrush (C. bicknellii) and from dark individuals of the Veery (C. fuscescens). The photos of the Farallon thrush showed spotting below more extensive and a back browner than would be expected in even the darkest Veeries. The warm brown upper surface of the tail caused some members to consider Bicknell’s Thrush, but several marks pointed away from that species and toward the Gray-cheeked, including the large size in comparison to nearby Hermit Thrushes (C. guttatus), presumably of the smaller subspecies guttatus or nanus, the yellowish base to the lower mandible (orangish in Bicknell’s Thrush), and the long primary projection. The committee acknowledges that some records of the Gray-cheeked do not adequately eliminate the very similar Bicknell’s, which is far less likely in California.

WOOD THRUSH Hylocichla mustelina (22, 1). A singing bird photographed and videotaped at Cottonwood Cr., Tejon Ranch, KER, 22 Jun–2 Jul 2010 (EP, DK†t, 2010-068) was found by a team of biologists surveying for Purple Martins (Progne subis).

CURVE-BILLED THRASHER Toxostoma curvirostre (27, 3). Single individuals were at El Centro, IMP, 3 Jan–21 Mar 2010 (KZK†; GMcM, TMG†; 2010-001; photo in N. Am. Birds 64:322), the Wister Unit of the Imperial Wildlife Area near Niland, IMP, 9 Nov 2010–14 Feb 2011 (PWW†, CAM†, LMD†, GMcC, DVP†, JMr, LPt, MSAt, MBrt; 2010-144), and Central Park in Huntington Beach, ORA, 14 Nov 2010–21 Feb 2011 (BED†; DAB†, DCA†, CAM, JMr, DSS†; 2010-145). The last was on the coastal slope and the first recorded in Orange County. Additionally, the committee inferred that one along the Colorado R. at Black Meadow Landing, SBE, mid Oct 2010–3 Feb 2011 (SR†, LH†, DVP†; 2011-003) was the same as one of two at the same location 1 Nov 2009–28 Feb 2010 (2009-205; Pyle et al. 2011a). All were of the westernmost subspecies T. c. palmeri.

SMITH’S LONGSPUR Calcarius pictus (8, 1). A well-photographed female in its first fall at Southeast Farallon I., SF, 6–8 Nov 2010 (NS†; JRT†; 2010-142) provided a long-awaited first record for this well-birded location and the first record for San Francisco County.

WORM-EATING WARBLER Helmitheros vermivorum (119, 2). Spring migrants were at Salton Sea S.P., RIV, 24 Apr 2010 (DLB†; 2010-034) and Butterbredt Springs, KER, 9–10 Jun 2010 (AH; VH; 2010-049).

GOLDEN-WINGED WARBLER Vermivora chrysoptera (73, 1). A male in its first fall at Diaz L. near Lone Pine, INY, 23–24 Oct 2010 (KH-L, JH†; SLS, BED†, CAM†; 2010-127) showed no apparent signs of hybridization with the Blue-winged Warbler (V. cyanoptera).

BLUE-WINGED WARBLER Vermivora cyanoptera (45, 0). IDENTIFICATION NOT ESTABLISHED: Written details for a bird in southeastern HUM, 17 Aug 2010 (2010-137) were scant and inconsistent with the identification as a Blue-winged Warbler.

CONNECTICUT WARBLER Oporornis agilis (112, 1). One at Southeast Farallon I., SF, 14 Sep 2010 (MBr†; OJ†, JRT†; 2010-128) was at an location and time of year with ample precedent.

MOURNING WARBLER Geothlypis philadelphia (140, 1). One in its first fall was banded on Southeast Farallon I., SF, 12 Sep 2010 (OJ†; 2010-103). Given that the Mourning and McGillivray’s (G. tolmiei) warblers hybridize in a narrow contact zone in northeastern British Columbia (Irwin et al. 2009) and Alberta (Cox 1973, Hall 1979), care should be taken to distinguish the Mourning Warbler from hybrids. The
Farallon bird showed thin yellow eye arcs, a yellow throat, long undertail coverts, and measurements that fell within the range of Mourning Warbler. The range of variation of hybrids is still poorly known, however, especially in females and immatures. See Pyle and Henderson (1990) and Dunn and Garrett (1997) for additional information on the identification of the Mourning Warbler.

CERULEAN WARBLER Setophaga cerulea (18, 1). A female in its first fall banded at the Humboldt Bay Bird Observatory near Arcata, HUM, 3 Oct 2010 (LET; RFo†, KHo†, VJ†; 2010-114; Figure 11) provided the second record for Humboldt County. This represents only the third California record since 1997, underscoring this species’ significant decline across its range (Robbins et al. 1992). IDENTIFICATION NOT ESTABLISHED: One reported from Rubidoux, RIV, 21 Aug 2010 (2010-089) was seen briefly, described incompletely, and at atypical habitat. Although Cerulean Warblers start migrating in the East by early August, this date is almost two weeks earlier than the earliest fall migrant recorded in California.

PINE WARBLER Setophaga pinus (101, 8). Wintering birds included one at the Santa Barbara Municipal Golf Course in Santa Barbara, SBA, 2 Feb 2009 (MAH; 2009-047), a first-winter female at Allan Hancock College in Santa Maria, SBA, 25 Nov-31 Dec 2010 (JMC†; ARAt; 2010-180), a first-winter male at Hansen Dam, LA, 27 Nov 2010-11 Apr 2011 (KLG†; TABt; LPt; 2010-159), one at Bard, IMP, 7 Dec 2010 (GH; 2010-173), a first-winter female at Allen School in Bonita, SD, 11 Dec 2010-23 Jan 2011 (PEL; EGK†, GMCC, MSAt, MBt; 2010-167), a first-winter male at Evergreen Cemetery in El Centro, IMP, 12 Dec 2010-16 Jan 2011 (MSAt; CAM†, GMCC, KZK†; 2010-172; photo in N. Am. Birds 65:340), a male at Heartwell Park in Long Beach, LA, 18 Dec 2010-6 Jan 2011 (RAH†; 2011-040), and a male at the Palos Verdes Country Club, Palos Verdes Estates, LA, 26 Dec 2010 (JEP†; 2011-025). The two records for Imperial County were inland, where unusual.

*YELLOW-THROATED WARBLER Setophaga dominica (132, 4). The four individuals found in 2010 include a singing first-summer male at Mt. Davidson, SF, 7-10 Jun 2010 (DMo; MWE†, RFi, LSt†, AW; 2010-047), one at Butterbredt Springs, KER, 9 Jun 2010 (AH; MSAm†, SLS; 2010-048), one at Los Osos, SLO, 30 Sep 2010 (MSh†; 2010-125), and one in its first winter at Lindo L. in Lakeside, SD, 27 Nov-17 Dec 2010 (JF; EGK†, GMCC, CAM†, MMt†, MBt†, LPt; 2010-156). The committee reviews records of the Yellow-throated Warbler through 2011.

GRACE’S WARBLER Setophaga graciae (59, 0). Two individuals returned for multiple winters: one at the Bella Vista Open Space in Goleta, SBA, 26 Sep 2010-4 Apr 2011 (DMC†, RMt†, AAb, DTh†; 2010-179) returned for its third consecutive winter (2009-046 and 2009-217, Pyle et al. 2011a), and another at Black Hill in Morro Bay S.P., SLO, 21 Feb 2010 (TME; 2010-021) presumably wintered locally and was considered by the committee to be the same as the one at that location 14 Dec 2007-15 Feb 2008 though not recorded during the intervening winter of 2008-2009 (2008-006, Singer and Terrill 2009).

*CANADA WARBLER Cardellina canadensis (20, 1). A fall migrant in the Tijuana R. valley, SD, 24-25 Oct 1974 (JLD, GMCC; 2010-107) was published (Am. Birds 29:124), but documentation had not been submitted to the CBRC until recently. The committee reviews records of the Canada Warbler through 1978.

CASSIN’S SPARROW Peucaea cassinii (51, 1). A fall migrant at Orick, HUM, 13-14 Oct 2010 (KI; TK†, SEM†; 2010-123) provided the second record for Humboldt County.

FIELD SPARROW Spizella pusilla (8, 0). IDENTIFICATION NOT ESTABLISHED: A report of one at Glen Helen Regional Park in Devore, SBE, 27 Oct 2009 (2009-206) received little support because aspects of the description better fit the eastern
subspecies of the Field Sparrow, *S. p. pusilla*, rather than the more expected western subspecies, *S. p. arenacea*, including uniform pale gray underparts and a bright, unstreaked rufous cap. The bird was not photographed and was not found again despite extensive searching later that day.

LE CONTE’S SPARROW *Ammodramus lecontei* (34, 1). A wintering bird was at the Imperial Irrigation District’s managed marsh near Niland, IMP, 14 Dec 2010–13 Mar 2011 (OJ, PEL, CAM†, GMcC, MSa†, KAR†, EGK†; 2010-171).

PYRRHULOXIA *Cardinalis sinuata* (25, 2). A male at Furnace Cr. Ranch in Death Valley N.P., INY, 27 Sep 2009 (KHop; 2009-245) and a female 7 km southwest of Brawley, IMP, 9 Aug—5 Sep 2010 (GMcC; AAlt†, MSa†; 2010-084) provided the first fall records for California. The male (2009-245) was the first Pyrrhuloxia recorded for Inyo County. All previous California records of the Pyrrhuloxia are for the spring, summer, and winter months.

RUSTY BLACKBIRD *Euphagus carolinus* (18**, 2). One at Guadalupe, SBA, 7–13 Nov 2010 (WTF†; MBt†, OJ†; 2010-182) and a female at Legg L. just southwest of South El Monte, LA, 11 Dec 2010 (JF†; 2010-168) were likely late fall migrants. IDENTIFICATION NOT ESTABLISHED: An adult male blackbird in alternate plumage photographed on Nelson Ave. about 8–10 km west of Oroville, BUT, 28 Aug 2010 (2010-094) received no committee support. Concerns were raised regarding the exceedingly early date, which is a month too early for a migrant even in the Northeast or upper Midwest, the atypical grassland habitat, and the apparent gloss to the head, all of which suggested Brewer’s Blackbird (*E. cyanoccephalus*). The committee reviews reports of the Rusty Blackbird between 1972 and 1974 and from 2006 onward.

COMMON GRACKLE *Quiscalus quiscula* (84, 4). Single individuals at Newberry Springs, SBE, 14–16 Feb 2010 (TABe†; 2010-012) and El Dorado Park in Long Beach, LA, 1 Mar 2010 (JW†; 2010-032) were likely wintering locally. A fall migrant was at San Pedro, LA, 27 Oct 2010 (DF†; 2010-131), and a clearly wintering bird was at Willowbrook, LA, 9 Dec 2010–15 Mar 2011 (RB†; LP†, KLG†; 2010-169).

BLACK ROSY-FINCH *Leucosticte atrata* (15, 1). A male at Aspendell, INY, 7 Mar 2010 (SLS; JLD†, NO†, BS†; 2010-022; photo in *N. Am. Birds* 64:500) was not seen subsequently, despite substantial effort. This location has accounted for one third of California’s records of the Black Rosy-Finch.

ADDENDUM

At its 2012 annual meeting, the CBRC voted to increase the number of Yellow-crowned Night-Herons (record 2009-085) at Famosa Slough and the adjoining San Diego R. channel, SD, 10 May–30 Jul 2009 from 1 to 2—a yellow-legged and a red-legged adult—after the committee reviewed the photographs submitted by Jim Pea as part of the record.

MISCELLANEOUS

Force et al. (2006) reported that “up to 12 northbound Manx Shearwaters have been seen in spring during a shore-based Gray Whale (Eschrichtius robustus) population survey off the southern Big Sur coast.” The CBRC has received documentation for only five individuals, with three in May 2001 being the most in any spring. The CBRC reviews records of the Manx Shearwater through 2007.


Sightings for 2010 published in North American Birds for which the CBRC has received no documentation include three Trumpeter Swan west of Loma Rica, YUB, 23 Jan (N. Am. Birds 64:316), one at Shingleton, SHA, 11 Feb (N. Am. Birds 64:316), three near Nelson, BUT, 24 Nov (N. Am. Birds 65:156), and eight near Richvale, BUT, 11 Dec (N. Am. Birds 65:335), a Gyrfalcon at Red Bluff, TEH, 4 Mar (N. Am. Birds 64:494), a Lesser Black-backed Gull at the Davis waste-treatment plant, YOL, 9 Nov (N. Am. Birds 65:158), a Ruby-throated Hummingbird in Bolinas, MRN, 24 Aug (N. Am. Birds 65:159), and a Yellow-green Vireo on Pt. Reyes, MRN, 19 Sep (N. Am. Birds 65:159). We welcome submission of documentation for these birds. Until the committee has reviewed and accepted them, we recommend the records not be considered valid.

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LITERATURE CITED


Accepted 13 August 2012
NOTES

SNOWY PLOVER BURIED ALIVE BY WIND-BLOWN SAND

J. DANIEL FARRAR, ADAM A. KOTAICH, DAVID J. LAUTEN, KATHLEEN A. CASTELEIN, and ELEANOR P. GAINES, Oregon Biodiversity Information Center, Institute for Natural Resources, Portland State University, P. O. Box 751, Portland, Oregon 97204; deweysage@frontier.com

On 12 June 2010 Farrar and Kotaich visited a Snowy Plover (Charadrius nivosus) nest at the mouth of Tahkenitch Creek, Douglas County, Oregon. On their arrival at 09:52, they found a female plover with a single chick near the nest site. The uniquely color-banded male was discovered moments later when Kotaich found him on the nest, buried in sand up to his neck (Figure 1). Only his head protruded, with the bill pointing upward. He faced north in the direction of the prevailing winds, the typical incubation posture during windy periods. The weather during the previous several days had included gale-force winds (www.wunderground.com/history/airport/KOTH/2010/6/12/WeeklyHistory.html) strong enough to cause exposed nests to be buried by wind-blown sand.

Farrar and Kotaich dug out the limp, unresponsive male. His skin was cool to the touch and his legs were fully extended as if he had stood as tall as possible to keep his head above the accumulating sand. Two cold eggs, between his feet, showed no signs of imminent hatching; they were not pipped and no calls from the chicks within were

Figure 1. Buried adult male Snowy Plover, Tahkenitch Creek, Douglas Co., Oregon, 12 June 2010.

Photo by Adam A. Kotiach
audible. Farrar warmed the male in his hands and sheltered him from the wind inside his coat. After 20 min of warming the plover began to recover. He opened his eyes and rolled over in the hand to be on his belly rather than on his back. He accepted drops of fresh water (Figure 2) by tilting his head back to ingest the droplets from the observers’ hands. At 10:30, he made his first attempt to escape. We then placed him on warm sand where he began to sun himself by extending his wings (Figure 3). We gave him additional warm breaths but he soon avoided further handling. By then he was able to stand but still remained in the immediate area. At 10:45 he moved 5 m, stumbling during his first steps. After another 15 min he appeared alert and the observers left. He was alive and apparently healthy at the site on 15 June. He acted as though he might still have a brood, though we subsequently determined that no chick from his nest fledged. Eventually, he courted another female on the same territory, but no nest of this pair was found. The male survived the winter and returned in 2011.

Incidents of Snowy Plovers buried by blowing sand while incubating have not been previously described (see Page et al. 2009) and are probably rare in most of the species’ breeding range. However, we found other adult Snowy Plovers buried in sand on two other occasions. On 20 June 1998, at Floras Lake, Curry County, after several days of strong northwest winds, we found a dead female buried under sand while attending her nest placed under a log. It appeared that sand accumulating around the log had collapsed on her. On 4 August 2007, at New River, Coos County, we also found a dead, buried female that had also been incubating a nest under a log. Apparently wind blew sand from under the log, causing the log to collapse on top of her.

The incident concerning the male differed from those of the females in that there were no objects near his nest on a relatively open, flat, sandy area. We are uncertain if the male permitted sand to accumulate slowly until he was buried or whether a buildup of sand suddenly engulfed him.

Figure 2. Adult male Snowy Plover accepting water from a finger, Tahkenitch Creek, Douglas Co., Oregon, 12 June 2010.

*Photo by Adam A. Kotiach*
Figure 3. Adult male Snowy Plover warming itself after found buried, Tahkenitch Creek, Douglas Co., Oregon, 12 June 2010.

Photo by Adam A. Kotiach

We thank Gary W. Page and an anonymous reviewer for reading and editing this article.

LITERATURE CITED


Accepted 12 July 2012
IN MEMORIAM

CLIFFORD R. LYONS, 1942–2012

In the late 1960s a group of San Diego field ornithologists gathered regularly to discuss matters of interest in the formation of a new society dedicated to birds and bird issues in California. *California Birds* later morphed into *Western Birds*, which now is a widely respected journal circulated world-wide, and the California Field Ornithologists became the Western Field Ornithologists. Cliff Lyons was a founding member of the California Field Ornithologists. During that time it became apparent to Cliff and his contemporaries that the face of field ornithology in California was rapidly changing and records of rare birds were proliferating at an astounding rate. The need for a formal review of such records was clearly apparent. North America’s first committee reviewing records of rare birds was formed by active field ornithologists throughout California in 1970. Cliff was a member of that committee until 1977 and a co-author of the California state list published in the very first issue of *California Birds* (G. McCaskie, P. Devillers, A. M. Craig, C. R. Lyons, V. P. Coughran, and J. T. Craig, 1970, A checklist of the birds of California, Calif. Birds 1:4–28).

Cliff passed away on 27 January 2012 in Post Mills, Vermont, at age 69 from a series of illnesses that plagued him late in his life. His vision along with that of his contemporaries helped field ornithology reach a plateau that was years ahead of its time and has since had a major influence on the formation of similar groups across the country.

I first met Cliff when I was an undergraduate student at San Diego State University in 1971 and we spent a good deal of time in the field together. Cliff and I were members of a team that included Guy McCaskie and Scott Terrill that recorded 227 species of birds in a single day from the Salton Sea to San Diego in April 1972. Cliff was very active and dedicated during those years in San Diego.

In the 1980s I had more contact with Cliff when he assisted me regularly with graduate field work in the central Sierra Nevada at Ackerson Meadows. At the time Cliff was residing in Mariposa, a short drive to my study area. He often spent the night at my cabin and we talked about a vast range of subjects often to late in the night. Those conversations had a definite influence on my thinking.

Cliff was a trained chemist who worked in private industry for many years, and he had a keen, incisive mind that could approach a problem from a perspective few of his contemporaries could match. His insight formed the basis of a lasting legacy that will not be forgotten by those who knew him.

Cliff moved to Vermont in 1990, and I rarely saw him after that, but we talked on the telephone regularly. His suffered a series of health problems that proved difficult in his later years and ultimately took his life.

I am proud to have called him a friend, and his lack of publications is not the measure of his influence on those who knew him. He took life as it came and did not complain that it did not always seem fair. He was an excellent field companion and will be sorely missed by those who knew and cared about him.

*Jon Winter*
Reports of aberrant plumages and bare-part colors appear now and then on electronic mailing lists and in journals, including this one (Garrett 2001). Typically they pertain to birds with single color aberrations (Collins 2003). Such birds generally are abnormally pale or entirely white, have white spotting, or less frequently are unusually dark (Howell et al. 1992). Occasionally they are yellow where they should be red or have orange instead of yellow bills, legs, or feet (Bell 2010). Exceptionally, birds display two color abnormalities (Sage 1962). An example was a blackish brown Mew Gull (Larus canus) with white patches scattered over the body and wings (Winter 1985). Here we present photographic documentation of a Mew Gull affected by four color abnormalities, apparently more than have been reported in any bird species.

On 3 February 2002, Ron Storey photographed an oddly plumaged presumed adult Mew Gull at Las Gallinas wastewater-treatment ponds in Terra Linda, Marin County, California. The bird has been detected at the same location each winter since then, most recently in January 2012. In subsequent years the plumage did not change, indicating that the bird was an adult when first found in 2002. Compared with a normal Mew Gull in definitive basic plumage, this bird had (1) pure white wings, lacking the normal black wingtips and gray upper surface; (2) pale gray rather than medium gray scapulars, of a shade similar to that of a Ring-billed Gull (Larus delawarensis); (3) a white rather than smudgy gray-brown forehead and forecrown; (4) dusky markings on the back of the head darker than normal; (5) a broken black band across the middle of the tail instead of an all-white tail; and (6) a bright orange rather than dull greenish yellow bill, legs, and feet (see this issue’s back cover, both inside and outside).

Under conventional terminology, this bird might be dismissed as simply leucistic, albinistic, or partially albinistic. Such unfocused terms, however, obscure the details and means by which the effects have been produced. More precisely, this gull appears to be affected by four previously defined conditions (Davis 2007): amelanism, hypermelanism, hypomelanism, and carotenism. The white wings, forehead, and forecrown result from the abnormal absence of melanin in those areas (partial amelanism). In contrast, an abnormally high concentration of melanin accounts for the partial dark hood and broken black band on the tail (partial hypermelanism). The scapulars owe their ashen hue to an abnormal reduction in melanin concentration (partial hypomelanism), while the orange rather than yellow bare parts may be caused by an abnormal increase in carotenoid concentration or a change in type of carotenoid pigment (carotenism). Alternatively, the apparent change in carotenoid pigmentation could have resulted from a lack of melanin in the bird’s bare parts.

In reviews of aberrant coloration in North American birds, Gross (1965a) cited 33 cases of albinism among the Laridae involving 10 species, which he did not list, and (1965b) two cases of melanism, one in the Herring Gull (Larus argentatus), another in the Laughing Gull (Leucophaeus atricilla). Gross’s review of albinism addressed birds affected by amelanism and hypomelanism. There have been no subsequent reviews of such cases, but searching online images with the terms “albino gull” and “leucistic gull” revealed numerous occurrences involving at least a dozen species of North American gulls, including the Black-legged Kittiwake (Rissa tridactyla) and the Bonaparte’s (Chroicocephalus philadelphia), Franklin’s (Leucophaeus pipixcan), Heermann’s

(Larus heermanni), Mew, Ring-billed, Western (Larus occidentalis), California (Larus californicus), Herring, Lesser Black-backed (Larus fuscus), Glaucous-winged (Larus glaucescens), and Great Black-backed (Larus marinus) gulls. Searching for “melanistic gull” produced substantially fewer cases involving three North American species, the Laughing, Ring-billed, and Lesser Black-backed. A published case of apparent hypermelanism involved a California Gull (King 1999). Gulls also are known to be subject to carotenism, with orangish yellow instead of greenish yellow legs in the California Gull (Wilson 2003), orange instead of pink legs in the Glaucous-winged Gull (Vermeer et al. 1963) and Western Gull (Davis 2007), and pink flushes through normally white body feathers of the Ring-billed Gull (Hardy 2003, McGraw and Hardy 2006). There are very few published reports of birds with more than one aberrant color condition (see discussion in Winter 1985, for example), and we know of no case of a wild bird with more than two color aberrations.

Genetic mutations as well as environmental factors such as diet, injury, and stress influence the expression of pigments in birds (Sage 1962). In this case, the Mew Gull’s color abnormalities, which remained consistent from winter to winter over 10 years, are presumably due to permanent genetic rather than temporary environmental factors. Plumage-color aberrations due to environmental factors are likely to change with each molt as a function of exposure to different foods or recovery from injury or stress. Bare-part colors probably would change on a shorter time scale. However, the potential genetic and physiological mechanisms responsible for all of this Mew Gull’s color abnormalities are unknown. Pigmentation is a complex biological process controlled by the products of numerous genes on multiple loci. Furthermore, the metabolic pathways for the expression of melanins and carotenoids are independent (Hill and McGraw 2006). Nevertheless, parsimony favors a single cause of the observed aberrations rather than independent mutations in several different genes. A single mutation in a regulatory gene controlling the expression or activity of pigmentation genes lying downstream could be responsible for the unusual color of this Mew Gull. Although such mutations often also influence traits other than pigmentation (Mundy 2005), this bird showed no evidence of other abnormalities.

Birds with color abnormalities, particularly with amelanism, are generally thought to have lower survivorship than their normally colored counterparts (Ellegren et al. 1997). Yet this bird was at least 12 years old when last observed. Although probably well shy of the North American longevity record of nearly 21 years (Lutmerding and Love 2011), it had reached or exceeded the maximum age of normally colored birds of 12 years for males and 8 years for females recorded by Craik (1997 cited in Moskoff and Bevier 2011) in Scotland.

We thank Jocelyn Hudon and Alvaro Jaramillo for comments on a draft of this note.

LITERATURE CITED


CUBA WITH JON DUNN: 18–30 MARCH 2013

Western Field Ornithologists is collaborating with the Caribbean Conservation Trust, Inc., on this U.S. government-approved trip, which will visit rarely explored parts of Cuba, the Caribbean’s largest and most ecologically diverse island nation. This is the fourth program on which WFO has collaborated with the Caribbean Conservation Trust since 2006.

To register, go to the "WFO Tours" page at www.westernfieldornithologists.org/tours.php, download and review the “Trip Details” document, click the “Register Now” button, and reserve your spot. You will need to choose whether you want single or shared accommodations and mail a deposit check for $1000 to the address specified on the registration site.

Along with WFO leader Jon Dunn, our team will include a bilingual Cuban tour leader and local naturalists.
WESTERN BIRDS
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The California Bird Records Committee of Western Field Ornithologists revised its 10-column Field List of California Birds in July 2009. The list covers 641 species, plus 6 species on the supplemental list. Please send orders to WFO, c/o Robbie Fischer, Treasurer, 1359 Solano Drive, Pacifica, CA 94044. Price for 9 or fewer, $2.75 each, for 10 or more, $2.50 each, which includes tax and shipping. Order online at http://checklist.westernfieldornithologists.org.
Aberrant Mew Gull (*Larus canus*) at Las Gallinas wastewater ponds in Terra Linda, Marin County, California, 22 December 2007. In comparing it with the normally colored Mew Gulls in the foreground, note the brighter bill color, the white forehead and forecrown, the darker feathering on the back of the head, the paler gray scapulars, the white wings, and the partial black band on the tail.

*Photo by Len Blumin*
Western Specialty:
Narrow-fronted Acorn Woodpecker

Photo by © Larry Sansone of Los Angeles, California:
Narrow-fronted Acorn Woodpecker (*Melanerpes formicivorus angustifrons*)
Baja California Sur, Mexico, 24 April 2004
The subspecies of the Acorn Woodpecker endemic to the Sierra de La Laguna of the
cape region of Baja California differs from those ranging to the north, *M. f. bairdi*
of the Pacific states and *M. f. formicivorus* of the southern Rocky Mountains and
mainland Mexico north of the Isthmus of Tehuantepec, by the narrow pale band on
its forehead, dark eyes, yellower throat, more streaked underparts, and proportionately
longer bill but smaller overall size. This individual with its entirely red crown is a
male; females of *angustifrons* have the red more extensive than in *bairdi* and nominate
*formicivorus* and have the black band on the forecrown correspondingly reduced.
Volume 43, Number 4, 2012

Robert W. Dickerman: A Brief Introduction  Andrew B. Johnson  ...198
Geographic Variation in Wintering Greater
White-fronted Geese  Richard C. Banks  .........................200
Alaska Records of the Asian White-winged Scoter
Jon L. Dunn, Daniel D. Gibson, Marshall J. Iliff,
Gary H. Rosenberg, and Kevin J. Zimmer  220
A Vaux’s Swift Specimen from New Mexico with a Review of Chaetura
Records from the Region  Andrew B. Johnson  .................229
Differential Migration by Sex in North American Short-eared
Owls  Christopher C. Witt and Robert W. Dickerman  236
On Two Fronts: Occurrence of the House Sparrow in Alaska
Daniel D. Gibson  ..................................................248

NOTES
The Wretched Riddle of Reduced Rectrices in Wrens
Kevin Winker  ..................................................255
First North American Record of the Common Moorhen
(Gallinula chloropus) Confirmed by Molecular Analysis
Jack J. Withrow and Michael T. Schwitters  259
Classification of the House Finch of the Channel Islands,
Southern California  Philip Unitt  266
Book Review  M. Ralph Browning  271
Featured Photo: First Documented Record of a Common Ringed
Plover (Charadrius hiaticula) for California
John C. Sterling and Todd B. Easterla  274
Index  Daniel D. Gibson  ...........................................276

Front cover photo by © Vivek Khanzode of Sunnyvale, California:
Falcated Duck (Anas falcata), Colusa National Wildlife Refuge,
Colusa County, California, 31 December 2011. In western North
America, the Falcated Duck is known from only a few occurrences,
and most away from the islands of western Alaska have been thought
to represent escapees from captivity. The California Bird Records
Committee has accepted three records for California, including this.

Back cover: “Featured Photos” by © Todd Easterla of Rancho
Cordova, California: Common Ringed Plover (Charadrius hiaticula),
Davis Wetlands, Yolo County, California, 21 August 2011. This Old
World counterpart of the Semipalmated Plover breeds on St. Lawrence
Island, Alaska, and is a rare migrant elsewhere in western Alaska,
but these photos are the first taken of the species in western North
America outside Alaska.

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manuscripts to Daniel D. Gibson, P. O. Box 155, Ester, AK 99725; avesalaska@gmail.com. For matters of style consult the Suggestions to Contributors to Western
ROBERT W. DICKERMAN: A BRIEF INTRODUCTION

ANDREW B. JOHNSON, Division of Birds, Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico 87131; ajohnson@unm.edu

It is my greatest pleasure that I have the opportunity to introduce Dr. Robert W. Dickerman. The year 2011 marked the beginning of the seventh decade of Bob’s career as a publishing author, and it is fitting that Western Field Ornithologists publish an issue of *Western Birds* to honor his contribution to biology. Although I and most others know him as a specimen-based ornithologist *par excellence*, Bob has also made lasting contributions in mammalogy, animal behavior, and human health. In order to celebrate his remarkable career thus far, the editors of *Western Birds* have solicited from Bob’s friends and colleagues manuscripts on subjects of interest to Bob. Those papers constitute the festschrift you see before you. We hope Bob approves.

I first met Bob in the latter part of June 2000, days after I had arrived at the University of Alaska Museum to start graduate school. I found him as I have grown accustomed to seeing him: sitting in the prep room. He was wearing shorts, sandals, heavy-rimmed glasses, and a yellow t-shirt that said “pendejos” with a circle around it and a line through it. In the 13 years I have known him, I have found that to be one of the most customary situations in which to find him: in a prep room, preparing specimens. My advisor Kevin Winker introduced us, and Bob said to me, “All the stories you’ve heard about me are true!” From that moment, I began to know the man behind the initials “RWD” that are Bob Dickerman with RWD 27413, a Helmeted Guineafowl (*Numida meleagris*), Free State, South Africa, January 2011.
ROBERT W. DICKERMAN: A BRIEF INTRODUCTION

so ubiquitous on the labels of museum specimens throughout North America.

Bob was one of three boys of a farming family in upstate New York. He was drafted into the army and served during the occupation of Japan after World War II. After his military service, he attended Cornell University on the G.I. Bill. Although he was an undergraduate student, he was as old as the graduate students and was given an office among them, which afforded him opportunities younger undergraduates might not have had. He worked with Brina Kessel on her dissertation on the European Starling (Sturnus vulgaris) and prepared many of the specimens that resulted from her research. At other times, they worked together on preparing the study skins. “I was ‘Skinny’ and she was ‘Stuffy,’” he says of their division of labor. He left Cornell with his bachelor’s degree and an ethic of specimen-based science that serves him to this day. He completed a master’s degree in range ecology at the University of Arizona, where he forged a lasting friendship with his mentor, Allan R. Phillips. It seems to be through Allan’s influence that Bob’s true calling in ornithology was cemented: avian taxonomy. Bob discovered this underexplored world in the context of Mexican bird subspecies under the tutelage of Phillips, and together they revised many genera and species of New World birds. He then took this expertise and revised taxa wherever such revision was warranted, and has described new taxa of birds from four continents over his remarkably productive career as an ornithologist.

Bob’s contribution to ornithology is legendary. He is the quintessential field naturalist: a keen observer and a tireless collector and preparator of scientific specimens. He also is a prolific author, with 224 papers published to date and with more in the works. He is best known for his work in northern Latin America, especially Mexico, having collected over 8000 bird specimens in ~35 years of fieldwork in that country alone (Navarro-Sigüenza 2010; Wilson J. Ornithol. 122:813). He did his dissertation on the Song Sparrows (Melospiza melodia) of the Mexican Plateau and had a special affinity for marshes and other wet habitats. “My advisor [Dwain Warner] joked that I had webbed feet,” he says. He made his mark on the ornithological world exploring Mexico, especially its marshes, mostly during the 1960s and 1970s, describing many new taxa and rediscovering at least one, Goldman’s Yellow Rail, Coturnicops nhowboracensis goldmani (Dickerman 1971; Wilson Bulletin 83:49–56).

Although he has worked primarily in the ornithological realm, Bob also is an accomplished mammalogist. His first field work in Mexico was as a mammalogist, collecting for E. Raymond Hall at the University of Kansas from 1953 to 1955. He worked primarily in northern Mexico, with half of his 3132 KUMNH mammal specimens coming from the northern two tiers of Mexican states and additional significant collections from Chiapas, Oaxaca, Tabasco, Michoacán, Guerrero, and México. These specimens were used in taxonomic and systematic studies by Hall and his students and also resulted in the description of a new species of mallophagan louse, Geomyoecus dickermani (Price and Emerson 1972, J. Med. Entomol. 9: 463–467). Bob and his Mexican colleagues also revolutionized the task of preserving animals in the field by freezing specimens on dry ice in insulated chests (Dickerman and Villa 1964, J. Mammal. 45:141–142).

Bob has a naturalist’s eye and is keenly interested in the world around him. He takes an interest in all taxa about him. This is demonstrated through his publication record and the myriad species in his personal catalog, but even more in his observations afield: the uniform size of individual saguaros in a vast stand on a Sonoran desert hillside, the morphology of termite mounds in Botswana, regional differences in human social interactions in southern Africa, patterns of defoliation in broadleaf trees in the Sangre de Cristo Mountains, or the behavior of guppies in his fish tank in his home. He always has an eye open for interesting natural phenomena.

Although he spent his professional career as a virologist at the Cornell University Medical College in New York, he held an appointment in the Bird Department at the American Museum of Natural History and published most of his scientific work on bird
ROBERT W. DICKERMAN: A BRIEF INTRODUCTION

taxonomy, with additional notes on the behavior and natural history of birds and some mammals. At first it seems incongruous that such an accomplished avian taxonomist had a career in something other than ornithology. Yet Bob was part of a team of biologists studying encephalitis and arboviruses in Latin America. A component of this research was screening wild populations of vertebrates for these viruses, and thus Bob, who already had the skills as a collector to obtain and preserve specimens, was in a perfect position to use the specimens not only for virus research but also to archive them as scientific specimens and to use them for taxonomic studies.

In 1989 he retired and moved southwest to Albuquerque and adopted the collection at the Museum of Southwestern Biology, University of New Mexico, as his own. This fortuitous association gave an energetic retiree a focus for his enthusiasm and resulted in the transformation of a small regional collection to one of the most rapidly growing research collections of birds in the world. He was soon appointed acting curator and spent the next 18 years curating and building the collection from a modest 6000-specimen teaching collection to one of the southwestern United States’ best regional collections, which exceeded 24,000 specimens when he stepped down as acting curator in 2007. He did this through active collecting, trades with other institutions, and tireless salvage. Of particular importance in the salvage realm was the relationship he forged with New Mexico’s wildlife-rehabilitation community.

By demonstrating that the collection was growing and properly curated, he also garnered donations of small to medium-sized personal collections, including that of Amadeo Rea, an invaluable collection primarily from Arizona. In conjunction with New Mexico bird expert John Hubbard, Bob also began an effort to “repatriate” important specimens from New Mexico that had been deposited elsewhere. For instance, via trade, the Museum of Southwestern Biology now holds the first New Mexico specimen of the Aplomado Falcon (Falco femoralis), collected by Frank Stephens.

It was through his tireless effort in building the collection that Bob generated a need for full-time dedicated curatorial staff for the Division of Birds. He was able to garner support for a collection-manager position and showed that the collection was active enough to warrant hiring a specimen-focused faculty member to replace the retiring faculty curator. Thus through Bob’s hard work and generosity, the Museum of Southwestern Biology’s Division of Birds finally has full-time curator and collection-manager positions and remains one of the most active collections in North America. Bob, meanwhile, is enjoying his second retirement but still keeps actively involved in the museum. He prepares birds several times per week (his personal catalog is over 27,000), and he continues to tackle the taxonomic problems of southwestern birds, including the Northern Flicker, Common Nighthawk, Flammulated Owl, and Common Poorwill.

Apart from his contributions to biology, Bob is an artist: a sculptor in clay and a painter. He also is a collector of fine art and erotica. Bob is a proud and loving father and grandfather, a warm friend, and a great colleague to many around the country. He still travels regularly, rarely missing meetings of the American Ornithologists’ Union or Western Field Ornithologists, and although his trips generally are research-related, he takes plenty of time to visit his friends along the way, relishing time with his people. He maintains a broad network of friends across the continent, and his house is always available to unexpected visitors. I have found him to be a great friend, a patient mentor, and a strong supporter of my efforts professional and otherwise.

This issue of Western Birds is a tribute to a legend in specimen-based science, a man who has had a significant impact on the field of biology, the ornithological world, and the lives of scores of field biologists along the way.

A complete bibliography of Bob Dickerman’s 229 publications is available at westernfieldornithologists.org/dickermanbibliography.pdf. And an annotated list of the 59 subspecies of birds he described is at westernfieldornithologists.org/dickermantaxa.pdf.
GEOGRAPHIC VARIATION IN WINTERING GREATER WHITE-FRONTED GEESE

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ABSTRACT: There is relatively little variation in size, expressed mainly in bill dimensions, between or among most wintering populations of the Greater White-fronted Goose (Anser albifrons). In the British Isles, slightly larger and darker birds, from the Greenland breeding population, winter in Ireland and Scotland and associated islands, while smaller birds winter in England. Winter birds in continental Europe are the same size as those in England. Asian winter birds average slightly larger than those of Europe; the population is more variable and includes some larger individuals. In western North America, some birds in the Sacramento Valley of northern California, the famed Tule Goose (A. a. elgasi), are the largest of the species. There is a great range of variation in smaller birds of the Sacramento Valley and elsewhere in the west coast states. Birds in the midcontinent states, east of the Rocky Mountains, average about the same as smaller California birds but vary widely.

The Greater White-fronted Goose, Anser albifrons (Scopoli, 1769), is an abundant and important game bird in much of the Holarctic. It is recognized as being geographically variable; five subspecies (including the nominate) have been named on the basis of wintering birds. Despite this, the nature and extent of geographic variation in nonbreeding birds has not previously been assessed on a world-wide basis. Ely et al. (2005) reviewed variation in the breeding range of the species but did not relate this to the winter distribution. Banks (2011) recently reviewed the taxonomy of the species.

METHODS

The following measurements were made on nearly 1000 specimens: wing chord, culmen length from base of feathering, bill depth at base, bill width at base, and length and width of the bill nail. Measurements were taken of adult birds and immature (first-year) birds collected after 1 January. In only a few instances were first-fall birds measured. Birds presumed to be on the breeding grounds were measured but are not included in this analysis. Measurements were entered into a SYSTAT data base and analysis was done with versions of SYSTAT, finally with SYSTAT 12. Although basic statistics were calculated for wing and nail measurements, these were not used for detailed analysis.

Orthmeyer et al. (1995) used discriminant function analysis to categorize live white-fronted geese from the North American Pacific coast by size. They developed discriminant function models for males and females, using two bill measurements for each. I modified their formulas slightly to account for a probable difference between live birds and museum specimens due to shrinkage in the drying of the skins. I then used these formulas:

\[
\begin{align*}
\text{FEMOV} & = 2.479 \text{ bill width} + 0.889 \text{ culmen length} + 1 \\
\text{MALOV} & = 1.692 \text{ bill width} + 0.986 \text{ bill depth} + 2
\end{align*}
\]

to calculate “Orthmeyer values” (OVs) for each specimen. Because the formulas combined bill measurements in a way useful at least for some populations
GEOGRAPHIC VARIATION IN WINTERING GREATER WHITE-FRONTED GEESE

(Orthmeyer et al. 1995), I used these values as supplementary characters to help define size classes on a world-wide basis. Because I suspected that some museum specimens may have been wrongly sexed, I applied the OV formulas for both females and males to each specimen, in the hope that I might be able properly to classify mis-sexed or unsexed specimens. That hope was in vain except in suggesting that larger specimens were actually male and smaller ones female, and I excluded unsexed specimens from further analyses.

Because the purpose of this study was to investigate patterns, if any, in geographic variation in migrant and wintering birds and not to distinguish and characterize such populations, I did not perform high-powered statistical analyses, which would have been superfluous if not misleading.

Early attempts to assign specimens to color classes were abandoned because of the great extent of individual variation due to age, the season, degree of wear, etc. Color notes were made for individual specimens where it seemed important, and are discussed as appropriate.

RESULTS

In the species as a whole, variation in any measurement, with the sexes combined, has a normal bell-shaped distribution (Figure 1). In any geographic subsample or population, males are slightly larger than females, but there is generally significant overlap.

British Isles

Wintering Greater White-fronted Geese are abundant in appropriate habitats in the British Isles and have been well sampled. Specimens are available from England, Ireland, Scotland, the Hebrides, and the Orkney Islands. The specimens from Ireland and Scotland and the associated islands are generally

![Figure 1. Distribution of measurements (mm) of culmen and wing length in the entire sample of nonbreeding Greater White-fronted Geese worldwide, sexes combined. The grouping at the left in culmen length is a subset of Lesser White-fronted Goose, Anser erythropus, entered into the same data base and not separated for this figure. That subset is less noticeable in wing length.](image-url)
dark and brown and fit the description of A. a. flavirostris, known to breed in Greenland (Dalgety and Scott 1948). Indeed, most of those specimens, especially the large series in the British Museum (Natural History), were so labeled previously. I included two migrants from Iceland in my samples, being aware of the presumed origin of these birds.

Scatterplots of OVs and bill measurements of females in the combined British sample reveal a near complete separation into two size classes. One group has a culmen length less than 45 mm, bill depth less than 23 mm, and bill width less than 23.5 mm (Figures 2 and 3). A second group with culmen length greater than 45 mm is more variable in both depth and width of the bill; generally bill depth is greater than 22 mm and width is greater than 23 mm, and both may be more than 24 mm. The first, smaller, group is composed of birds from England, the larger of birds from Ireland, the Hebrides, Orkneys, and Scotland, or A. a. flavirostris. The separation is shown well in a plot of the OVs (Figure 4). There are some minor exceptions to this division. Two birds from England (AMNH 730640 from the Severn River; FM 402139 from Bleadon, Somerset) fall into the larger size class. It is possible, or probable, that both are mis-sexed, as they fall within the limits of males from England. One bird from Wells, Norfolk, has a wider than expected bill. One female flavirostris from Ireland with small bill depth and width (CAS 66023) is either mis-measured or an unusually small bird.

Males from the British Isles also fall into two size groups, with the same geographic limits, although the distinctions are not as clear. Birds from England (and one from Wales) have culmens shorter than 50 mm, those from elsewhere generally greater than 48 mm, and there is overlap of a few individuals between 48 and 50 mm. Most of the birds from Ireland and Scotland, or flavirostris, have both bill width and bill depth 23 mm, or greater.

Figure 2. Bill depth (BD) versus culmen length, in mm, of female Greater White-fronted Geese from Britain; e = England, f = Ireland and Scotland. Note the separation at culmen 45 and bill depth 23 mm. Birds marked e with culmen >45 are probably mis-sexed.
GEOGRAPHIC VARIATION IN WINTERING GREATER WHITE-FRONTED GEESE

Figure 3. Bill width (BW) versus culmen length, in mm, of female Greater White-fronted Geese from Britain; e = England, f = Ireland and Scotland. Note the separation at culmen 45 and bill width about 23.5 mm. Birds marked e with culmen >45 are probably mis-sexed.

Figure 4. Separation of females from England (e) from those of Ireland at Scotland (f) at FEMOV 100. Specimens marked e at 100 or above are probably mis-sexed. See Methods for derivation of variables FEMOV and MALOV.
The range of variation in males from England is greater than that of females in the latter characters. As in the females, there are a few individuals that do not fit the pattern. One individual with a small bill in all characters (BM 1936-2-18-1) may be mis-sexed. Two large birds I first placed in the sample from England are from the Leadenhall Market in London, taken in 1881 and 1890 (see Collinson 2012). The label on an unsexed bird associated with those indicates that they were actually taken in Scotland, so later I included them in that sample.

With the few exceptions noted above, the available specimen record shows no overlap in winter distribution of the two size classes, although more recent observations (Parkin and Knox 2010:37) indicate at least some winter sympatry of A. a. flavirostris and A. a. albifrons, which would be the smaller English birds.

Variation in A. a. flavirostris.—Birds of the population here considered to be A. a. flavirostris are rather uniformly distributed in a narrow range of measurements (Appendix 1), although a few individuals of either sex seem to increase the range of variation in any character; these may be mis-sexed birds. In females, there is a slight suggestion, based on bill depth, of two groups within the sample, with a break at 23 mm. Although these birds can generally be distinguished from neighboring wintering birds on the basis of bill measurements, they are more easily distinguished by their darker brown color and usually much more heavily marked underparts. Bill color, for which the race is named, is not a reliable character in older museum specimens.

Variation in England.—Birds of both sexes in England are distributed over a rather narrow range of bill measurements (Appendix 1), but a few possibly mis-sexed individuals of either sex extend the apparent range of variability. In males there is a slight suggestion of a break into two size classes at a bill depth of about 22 mm.

Continental Europe

The European continental sample consists of 37 males and 15 females, mainly from countries of western Europe but with individuals from Serbia, Palestine, and Egypt. Males average slightly larger than females in every character measured, but overlap is extensive in some (Appendix 1). Some males are smaller in some characters than any females, and some females are larger than any males. Bills are slightly wider than deep, and nails are slightly longer than wide. Males are fairly uniform in culmen length, ranging from 44 to 49 mm. Females are slightly smaller, with most culmens 41–44 mm in length. There is near complete separation of males and females at culmen length 44 mm (Figure 5). In this sample three birds labeled females are more like males in bill dimensions. Three birds labeled as male but with culmens less than 44 mm long may be wrongly sexed. Thus the mean measurements given in Appendix 2 may be slightly low for males and slightly high for females. However, these measurements of culmen length are almost identical to those for bill length given by Cramp and Simmons et al. (1977:409) for birds from Netherlands, although my measurements of wing length (chord) average somewhat less.
England plus Europe

Mean measurements of all characters are virtually identical, in both sexes, in the samples from England and continental Europe, and I combined data into a single sample for further analysis. The combined samples included 63 males and 34 females. Although scatterplots of bill measurements against one another show no patterns, the comparison of OVs yields some interesting suggestions. In males there is an indication of a separation into two classes at MALOV about 62.5 and FEMOV 98. In females, there is a slightly stronger indication of a separation at MALOV 61. In both sexes, about a third of the sample is below the separation, and about two-thirds above it. Birds from both England and the continent are in both groups. It is possible that the total European wintering population represents two slightly different size classes of geese, which may breed in different areas.

Asia

The Asian sample (26 of each sex) is composed primarily of birds from China, Japan, and Korea but includes three birds from Pakistan and two from India. Most are wintering birds, but those in a small series from Manchuria are spring migrants. There are also single October birds from Lake Baikal and Bering Island.

Asian males average slightly larger than European ones in all bill dimensions (Appendices 1, 2). They are also more variable than are European ones, with most culmens ranging from about 45 to about 55 mm in length; the increased variability is toward larger size. The few birds with shorter culmens may be mis-sexed. The birds with the longer and deeper bills are primarily from Korea and Japan, although there are larger and smaller birds in every region.

As is the case with males, females of the Asian sample average slightly larger than their European counterparts and with the exception of bill width have a greater range of variation. Culmen length is generally 44-48 mm, about the range of most males in the European sample. Two birds with culmen greater than 50 may actually be males. Even the small Asian females are slightly larger than the European females in culmen length.

There is some indication that the Asian males can be divided into two size classes on the basis of bill depth (Figure 6); there seems to be a division in bill depth at about 23.5 mm, with eight birds above that mark. Similarly, several birds stand out as having wider bills than most. Six specimens are among the largest in at least two of the bill characters, but 13 others are among the largest in one character. There is also some indication of division

![Figure 5. Culmen lengths (mm) of specimens of the Greater White-fronted Goose from continental Europe. Circles represent males, × females, + unsexed. With the exception of some possibly mis-sexed birds, there is near complete separation of the sexes at culmen length about 44 mm.](image-url)
into two size classes in females, with a break in bill width at about 23 mm; plotting bill depth versus bill width shows that gap and its relationship to bill depth (Figure 7). In both sexes, but especially females (Figure 8), comparison of OVs more strongly suggests a division into two size classes. Given the uncertainty as to where to draw the line in a continuum in most measurements and the fact that some birds may be mis-sexed, division of the sample into two size classes is somewhat subjective and tentative. Nonetheless, I separated subsamples of larger and smaller individuals of both sexes for comparison (Appendix 1). Mean measurements of the two groups do not differ much, and there is considerable overlap in ranges of the two groups. If there are in fact two size classes of birds in Asia, these winter specimens do not reveal it well, and there is no separation by geography. The winter specimens seem to reflect a cline in size of breeding birds across Eurasia (Dement’ev and Gladkov 1967, Ely et al. 2005). In general, the smaller Asian birds are about the same as the European sample.

Western North America

White-fronted Geese migrate south from coastal Alaska west of the Rocky Mountains through British Columbia, Washington, and Oregon to winter primarily in California, some going on to western Mexico. Birds from interior Alaska and western and arctic Canada migrate east of the Rockies through the plains states, wintering primarily in Texas and Louisiana, some traveling on to eastern Mexico. Specimens are available from scattered localities along the migration routes, but most are from winter concentrations. Few specimens are available from Mexico. This analysis concentrates on areas from which large samples are available.

Northern California.—Specimens from northern California are from two general areas, around the head of Suisun Bay and Grizzly Island in Solano County...
Figure 7. Bill depth (BD) versus bill width (BW) of female Greater White-fronted Geese from Asia, showing a break into two possible size classes at about bill width 23 mm.

Figure 8. Separation of female Greater White-fronted Geese from Asia into two possible size classes based on a break at MALOV about 64. See Methods for derivation of variables FEMOV and MALOV.
County, and the marshlands of the Sacramento Valley. Although the specimens’ dates span a long period, they are concentrated in the first half of the 20th century after the discovery and description of the Tule Goose, now known as A. a. elgasi, by Swarth and Bryant (1917) until the beginning of World War II. Most were taken at hunting clubs, many by scientists/sportsmen/collectors from the California Academy of Sciences and Museum of Vertebrate Zoology who were aware of the existence of the larger form.

There is a wide range of variation in all bill measurements in both the 61 males and 47 females in the Sacramento Valley sample. Linear plots of measurements indicate that distribution is essentially continuous but also suggest a division into two or more size classes in both sexes. The best indication of such a division is in the OV ratios. In males (Figure 9), FEMOV breaks at 114–115, and all above that have MALOV of 70 or greater. In this group culmen length is greater than 55 mm and bill depth is 25 mm or greater (Appendix 1). Males with FEMOV less than 114 could be further divided into two groups with a break in MALOV at about 67, and the smaller of these could be even further divided on the basis of MALOV or culmen length. Although such divisions become increasingly arbitrary, they point out that the wintering population is far from uniform. A group of nine individuals with culmens less than 49 mm, plus one bird with the shortest bill depth, make up the “smallest” sample, which emphasizes the difference between the largest birds and the smallest (Appendix 1).

In females, FEMOV breaks between 105.5 and 108.8 (Figure 10), with a single individual (possibly mis-sexed) in that gap. All birds with the higher values of FEMOV have MALOV of 65 or greater. These birds also have a culmen of 52 mm or greater, bill depth 22.9 mm or greater, and bill width 24.2 mm or greater. Smaller females with FEMOV 105.5 or less have a culmen 51.6 mm or less, bill depth 23.9 mm or less (except for one with bill depth 27.4 mm), and bill width 24.4 mm or less. There are four females for which bill width, and therefore either OV, is not available, but all have a culmen less than 52 mm. Data for the small Sacramento Valley females in Appendix 1 include the possibly mis-sexed bird in the FEMOV gap. It might be possible to divide the small Sacramento Valley females into two or more groups, with a break at MALOV 63, but, as with males, such divisions are arbitrary. One group of four individuals (lower left in Figure 10) would constitute a “smallest” female group but are not separated in Appendix 1.

Large Sacramento Valley males have culmens more than 54 mm long, considerably longer than European and all but one of the Asian males. Culmens in large females are more than 52 mm long, much longer than females in Europe or Asia. Width and depth of the bill in both sexes also exceeds those of most or all the European and Asian birds. The sample of smaller Sacramento Valley birds averages slightly larger than their European or Asian counterparts, and there is considerable overlap in the ranges of measurements, although the Sacramento birds are at the high end of the range of the other birds. There is some indication that the smallest Sacramento Valley males average about the same as European or Asian males.

The sample of specimens from Grizzly Island and Solano County is less numerous than that from the Sacramento Valley, but it shows essentially the same range of measurements and the same division into two size classes.
Figure 9. Orthmeyer values of male Greater White-fronted Geese from the Sacramento Valley of California, showing a break at FEMOV 114–115. Smaller birds, labeled p, correspond to what are generally called Pacific white-fronts, whereas larger birds, marked T, would be called Tule Geese. See Methods for derivation of variables FEMOV and MALOV.

Birds of the smaller size class are too few for statistical analysis. In both sexes birds of the larger size classes are nearly identical to the larger Sacramento Valley birds (Appendix 1).

Southern California.—Specimens from the southern half of California are primarily from the San Joaquin Valley in the vicinity of Los Banos, Merced County. There are two large series, one taken 1908–1909 and one taken 1911–1912. In both sexes, bill measurements (Appendix 1) are about the same as in the smaller of the Sacramento Valley size classes. A single male from Los Banos is as large in most measurements as the larger birds in the larger Sacramento Valley sample.

Other West Coast Birds.—Other specimens are migrants or wintering birds from localities scattered throughout the western states and provinces, but there are no localities represented by a series of birds large enough to be analyzed as a sample. From the Northwest, there are seven males and five females ranging from the Queen Charlotte Islands, British Columbia, to the Columbia River. Judged from culmen length alone, all are in the size class of the smaller Sacramento Valley specimens; only one male and one female are near the upper limits of that class. Another set from Tule Lake National Wildlife Refuge in Siskiyou Co., California, with one from nearby Klamath Co., Oregon, has eight males and three females. All these also are of the class of smaller Sacramento Valley specimens. One bird captured at an unspecified locality in Oregon and held in captivity for some time has
GEOGRAPHIC VARIATION IN WINTERING GREATER WHITE-FRONTED GEESE

Figure 10. Orthmeyer values of female Greater White-fronted Geese from the Sacramento Valley, showing a break at FEMOV 106–109 and another break at MALOV 63. Smaller birds, labeled p, correspond to what are generally called Pacific white-fronts, whereas larger birds, marked T, would be called Tule Geese. See Methods for derivation of variables FEMOV and MALOV.

a culmen in the range of the larger Sacramento Valley birds. Specimens from scattered localities in California are all of the smaller size class, as are individual vagrants from Nevada and Arizona (Phillips et al. 1964).

Mexico.—I have seen only 7 specimens from Mexico (Jalisco and Sonora), of which two are not sexed. One male and one unsexed bird have culmens of 54.3 and 54.0 mm and thus are at the low end of the range of the large Sacramento Valley birds. Overall, however, they all are in the small size class.

Central Flyway

This large sample consists of both spring and fall migrants and wintering birds from east of the Rocky Mountains and primarily west of the Mississippi River. The largest winter samples are from Texas and Louisiana; there is one group of spring migrants from Saskatchewan. Subdivision by season or geography yields samples that are too small for meaningful statistical comparison.

Of 12 males from Louisiana, five have culmens 54–55 mm, three have culmens 51–53 mm, and two have culmens less than 49 mm. Two birds stand out as the largest in all bill measurements and thus in OVs, equaling some of the large Sacramento Valley birds. These two specimens (CAS 57734, LSU 5609) were taken together, along with several smaller individuals. This small Louisiana sample could break into two or three size classes depending on which character one chooses. A small sample of eight
wintering males from Texas breaks into two size classes. The 14 migrant males from Saskatchewan are fairly uniform, with no apparent division into size classes. Neither spring nor fall migrants from scattered localities in the mid-continent states and provinces show any tendency to break into size classes, although variation is extensive.

Overall, males of the Central Flyway sample seem fairly evenly distributed through a large range of variation in each bill measurement (Appendix 1), although a few individuals stand out in one measurement or another. On average, the Central Flyway birds are about the same size as the smaller Sacramento Valley birds, although there are some larger individuals. Comparison of the OVs suggest that males might be of three size classes, although the largest and smallest are represented by only a few birds each. The breaks are in MAlov, at about 69.5 and 64.5, with eight individuals above or below those arbitrary indicators. There is a considerable difference in the means of all bill measurements between the larger and smaller birds (Appendix 1).

Eleven wintering females from Louisiana break into two size classes based on bill measurements. Three of 10 Texas females lack bill width data, but four individuals stand out as large on the basis of other measurements. Three of 11 spring birds from Saskatchewan stand out as larger than the others in combined bill measurements. Of 24 other spring migrants from mid-continent, two stand out as large in individual or combined bill measurements; the others might arbitrarily be divided into two size classes, but variation is fairly uniform.

Overall, females in the Central Flyway seem to break into only two rather than three size classes, the break being at about 106.5 FEMOV and about 65 MAlov. Culmen length is evenly distributed between 45 and 55 mm, but both bill width and bill depth are more variable. The sample of “large” females (Appendix 1) is probably not strictly analogous to the similar sample of males, and there is no sample of “smallest” females.

In both sexes, there are large individuals in the Central Flyway that equal, or nearly equal, the large Sacramento Valley or Grizzly Island birds. Two males from Louisiana, noted above, are distinguished by their wide bills; their culmens are also long, and one also has a deep bill. One male in the Saskatchewan group has a very long culmen, well within the range of the large Sacramento Valley birds. Four females taken in April 1925 at Whitewater Lake in Manitoba are all large and include the two largest females from the Central Flyway (Table 1).

Eastern North America.—There is no winter concentration of these geese in eastern North America, where the species occurs only as wandering vagrants. There are relatively few available specimens, from eastern Canada (Labrador) to the southern United States (Georgia). Some specimens taken in the birds’ first autumn have been reported (e.g., Godfrey 1986) but were not examined for this study. Most of the 18 specimens seen (6 male, 7 females, 5 unsexed) were first-year birds. The origin of these birds is problematic. Culmen length indicates that most could have come from the Central Flyway population or from Greenland. Several specimens have been identified as A. a. flavirosstris, but most were labeled and cataloged before that subspecies was named, and some may not have been critically examined since. Bill color in old specimens is not a useful character. The culmens of two specimens
GEOGRAPHIC VARIATION IN WINTERING GREATER WHITE-FRONTED GEESE

(FM 96688, Massachusetts; USNM 419879, North Carolina) are so short as to suggest the birds are from the European population.

Large Specimens

Several times in the previous comments I have noted large individual specimens, out of the normal size range of the wintering populations of which they were a part. These large individuals, about the size of the large Sacramento Valley or Grizzly Island birds, A. a. elgasi, are scattered across arctic Canada and through the Central Flyway (Table 1). The more northerly of them were the basis for attributions of the breeding range of the large California birds (when they were known as A. a. gambelli) to eastern arctic Canada. Kuroda (1927:176) mentioned the British Museum specimen from “Arctic Coast, E. of Ft Anderson” as proof of the hypothesis of Swarth and Bryant (1917) that gambelli (meaning the large California birds, now A. a. elgasi) might breed in arctic America east of Alaska. Kortright (1942:124) discussed birds reported as Tule Geese by A. Gavin near the Perry River in 1941; colonies of both large and small geese were found about 6 miles apart, and one of each was shot. Unfortunately, “neither photographs nor specimens were taken” (Gavin

Table 1  Large North American Specimens of Anser albifrons Collected Outside the Sacramento Valley, Californiaa

<table>
<thead>
<tr>
<th>Museum and catalog number</th>
<th>Sex</th>
<th>Locality</th>
<th>Year</th>
<th>Culmen (mm)</th>
<th>FEMOVb</th>
<th>MALOVb</th>
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</thead>
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<tr>
<td>USNM 607220</td>
<td>—</td>
<td>Washington, DC</td>
<td>1856</td>
<td>57.5</td>
<td>114.8</td>
<td>71.7</td>
</tr>
<tr>
<td>USNM 16788</td>
<td>—</td>
<td>Hudson Bay Territory</td>
<td>&lt;1860</td>
<td>55.6</td>
<td>111.2</td>
<td>68.6</td>
</tr>
<tr>
<td>USNM 20138</td>
<td>—</td>
<td>Fort Resolution, Great Slave Lake</td>
<td>1860</td>
<td>58.5</td>
<td>116.5</td>
<td>68.7</td>
</tr>
<tr>
<td>BM 483112</td>
<td>—</td>
<td>Repulse Bay, NWT</td>
<td>—</td>
<td>61.9</td>
<td>120.7</td>
<td>72.5</td>
</tr>
<tr>
<td>BM 922365</td>
<td>F</td>
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<td>1865</td>
<td>56.0</td>
<td>117.5</td>
<td>75</td>
</tr>
<tr>
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aOther large birds reported: Perry River, by Gavin in 1941; specimens shot, apparently not preserved (Kortright 1942). Adult male captured alive, Buffalo Coulee Lake, Saskatchewan, 23 September 1963; culmen 54 mm, wing 470 mm (Alex Dzubin pers. comm.).

bSee Methods for derivation of variables FEMOV and MALOV.
1947), although weights of 5 and 9 pounds were estimated. No difference in
the birds’ taste was noted. Todd (1950) mentioned the 1942 specimens from
the Mackenzie Delta in support of Kuroda. Hanson et al. (1956) obtained large
specimens from the Perry River area in 1949. In most instances, however, these
large birds were taken at the same time and place as smaller individuals, often
not mentioned in the reports, suggesting that they are merely large individuals
and not representatives of a population of large birds. In some reports, “large”
was not quantified, and large birds were found by workers attempting to prove
the breeding grounds of the birds wintering in the Sacramento Valley. On the
other hand, the possibility that there is (or was) a numerically small population
of very large birds widely scattered through the Arctic and sympatric with but
ecologically separated from smaller birds cannot be ruled out.

CAVEATS

This is a study of museum specimens and so has several possible pitfalls. Most of the specimens seen, in museums in the United States, eastern
Canada, and parts of Europe, were taken many years ago; relatively few
specimens of this species have been entered into museum collections since
the 1940s. The museum age of the specimens probably has little effect on
their measurements, but one must remember that they represent conditions
at the time of collecting and not those of the present. The winter distribution
of some breeding populations may have changed in the last century or so,
as certainly have the numerical sizes of some wintering populations (Banks
and Springer 1994, Mooij 2000). Furthermore, such a study is limited by
where past collectors chose, or were able, to work.

ACKNOWLEDGMENTS

Most measurements were made by my wife, Gladys C. Banks, who volunteered as
my research assistant for many years of this study. She also entered the data into the
SYSTAT data base. I appreciate access to specimens and other courtesies extended
by personnel at the following museums and institutions where specimens were
measured (abbreviations are given where particular specimens are mentioned): Academy
of Natural Sciences of Philadelphia; American Museum of Natural History (AMNH),
New York; Bell Museum of Natural History, University of Minnesota, Minneapolis;
California Academy of Sciences (CAS), San Francisco; Canadian Museum of Nature
(OTT), Ottawa; Carnegie Museum of Natural History (CM), Pittsburgh; Cincinnati
Museum of Natural History, Cincinnati; Denver Museum of Natural History, Denver;
Field Museum of Natural History (FM), Chicago; Museum of Comparative Zoology,
Harvard University, Cambridge, MA; Muséum d’Histoire naturelle, Paris; Museum of
Natural Sciences, Louisiana State University (LSU), Baton Rouge; Museum of Vertebrate
Zoology, University of California, Berkeley; Museum of Zoology, University of
Michigan, Ann Arbor; [British] Natural History Museum (BM), Tring, England; Natural
History Museum, University of Kansas, Lawrence; Naturhistorisches Museum Wien,
Vienna, Austria; Peabody Museum, Yale University, New Haven, CT; Royal Ontario
Museum, Toronto; San Diego Natural History Museum, San Diego; University of
Montana, Missoula; U.S. National Museum of Natural History (USNM), Washington,
DC. Daniel D. Gibson provided measurements of specimens in the University of Alaska
Museum. Welder Wildlife Foundation sent specimens to LSU for my use. Craig Ely
sent me copies of several references and was a cooperative correspondent throughout
most of the study. Brian K. Schmidt assisted in preparing the figures.
LITERATURE CITED


Hanson, H. C., Quineau, P., and Scott, P. 1956. The geography, birds, and mammals of the Perry region. Arctic Inst. N. Am. Spec. Publ. 3.


Accepted 6 March 2012
## Appendix 1. Summary of measurements (mm) of wintering populations of the Greater White-fronted Goose.

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| **Females**        |      |        |            |            |            |             |        |        |
| Ireland-Scotland   | 398  | 49.3   | 23.6       | 23.1       | 11.2       | 14.1        | 103    | 65     |
| England            | 388  | 43.0   | 22.5       | 21.8       | 11.4       | 12.8        | 95     | 62     |
| Continental Europe | 387  | 43.3   | 22.1       | 21.8       | 11.4       | 12.6        | 94     | 61     |
| Europe + England   | 387  | 43.1   | 22.4       | 21.8       | 11.4       | 12.7        | 95     | 61     |
| Asia—all specimens | 391  | 46.0   | 23.0       | 22.2       | 11.7       | 13.6        | 99     | 63     |
| Asia—large specimens | 397  | 47.0   | 23.9       | 23.1       | 12.0       | 13.7        | 102    | 65     |
| Asia—small specimens | 386  | 45.0   | 22.2       | 21.3       | 11.4       | 13.5        | 96     | 61     |
| Sacramento Valley—large specimens | 422  | 55.0   | 25.5       | 25.2       | 12.5       | 15.4        | 113    | 70     |
| Sacramento Valley—smallest specimens | 402  | 47.5   | 22.8       | 22.5       | 11.6       | 13.5        | 100    | 63     |
| Grizzly Island     | 423  | 54.9   | 25.1       | 25.4       | 12.2       | 15.6        | 112    | 69     |
| Merced Co.         | 390  | 47.1   | 23.0       | 22.1       | 11.7       | 13.5        | 100    | 63     |
| Central Flyway     | 397  | 50.4   | 23.5       | 23.3       | 11.8       | 14.3        | 104    | 65     |
| Central Flyway—large specimens | 404  | 53.3   | 24.7       | 24.3       | 11.8       | 14.8        | 110    | 68     |
| Louisiana          | 396  | 51.5   | 23.8       | 24.0       | 11.9       | 14.2        |        |        |
| Texas              | 397  | 50.1   | 23.7       | 23.0       | 11.7       | 14.5        |        |        |
| Saskatchewan       | 401  | 50.3   | 22.4       | 23.0       | 12.3       | 14.7        |        |        |
| Central Flyway—spring specimens | 398  | 50.4   | 23.7       | 23.3       | 11.6       | 14.1        |        |        |
ALASKA RECORDS OF THE ASIAN WHITE-WINGED SCOTER

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ABSTRACT: The three widely recognized taxa of “white-winged” scoters Melanitta—fusca, deglandi, and stejnegeri—are discussed variously in the literature as one, two, or three species. Adult males of the east Asian stejnegeri are distinguished from the American deglandi primarily by their black rather than brown flanks, yellow rather than black lamellae in the bill, and usually more hooked knob on the bill. Since 2002, there have been four well-supported records of stejnegeri in Alaska, two at St. Lawrence Island and two near Nome. Although we saw up to four adult males of stejnegeri at St. Lawrence Island in 2009, deglandi appears to predominate there. More study is needed for the status of stejnegeri as species or subspecies to be settled.

In the absence of consensus on the systematic relationships among the “white-winged” scoters, the Velvet Scoter and the White-winged Scoter have long been discussed as either (1) a single circumboreal species Melanitta fusca (American Ornithologists’ Union [AOU] 1983, AOU 1998, OSJ 2000, Banks et al. 2007) comprising three subspecies (fusca, deglandi, and stejnegeri—Phillips 1926, Delacour 1959, Vaurie 1965, Palmer 1976, Cramp and Simmons 1977, Madge and Burn 1988, Sibley and Monroe 1990, del Hoyo et al. 1992, Brown and Fredrickson 1997, Dickinson 2003) or (2) as two species, M. fusca and M. deglandi (AOU 1886, 1895, 1910, 1931, 1957), the latter polytypic with two subspecies (deglandi and stejnegeri—Collinson et al. 2006; see also Dement’ev and Gladkov 1952, Stepanyan 1990, Koblik et al. 2006). On the basis of supposed differences in the bill, Brooks (1915) described a fourth taxon, dixoni, from arctic Alaska (see Appendix), but “an examination of a good series from both coasts and the interior [of North America] leads to the conclusion that the differences in the length and shape of bill on which the name...is based are merely individual and not geographical variations” (Hellmayr and Conover 1948:393). Subsequently, dixoni has been generally maintained as a junior synonym of deglandi. We follow here the AOU (1998) in discussing the “white-winged” scoters as a single polytypic species, Melanitta fusca.

Of the three well-differentiated taxa, fusca is the bird of western Eurasia, nesting from Fennoscandia to central Siberia and south to west-central Russia; deglandi is the North American bird, nesting from western Alaska to Labrador and Newfoundland; and stejnegeri is the bird of eastern Eurasia, nesting “from the Achinsk Steppe and the upper Chulym River basin west of the upper Yenisei, north to the upper parts of the basins of the Podkamennaya and Nizhnaya Tunguskas and Khatanga rivers, and about the northern limits of the taiga farther east, to Anadyrland, Koryakland, and Kamchatka...northern Amurland (Stanovoi Range), valley of the lower Amur, Sakhalin, and Kuriles” (Vaurie 1965:133). Both fusca and deglandi have
been recorded extralimitally in Greenland (AOU 1957, Boermann 1994), which lies between their respective nesting ranges, and extralimital occurrences of stejnegeri have been documented in many countries of western Eurasia, with records (all of adult males) from Finland (Lindroos 1997), Poland, Denmark, France (specimen), and Ireland (Farrar and Jones 2011), Spain (Gantlett 2012), and Iceland (Garner et al. 2004).

The absence of authoritative agreement on the species/subspecies status of fusca, deglandi, and stejnegeri has sometimes resulted in confusing reference to “white-winged” scoters in Alaska. Certainly Nelson sowed confusion long ago when in successive publications he discussed Alaska birds as “Melanetta fusca Velvet Scoter” (Nelson 1883:102) and as “Oidemia deglandi White-winged Scoter” (Nelson 1887:81). In the latter he appended, “the notes under Melanetta fusca...[Nelson 1883] really belong under deglandi.” And, almost a century later, Portenko’s (1972:181–182) discussion of the birds of the northeastern Russian Far East—under the heading Melanitta fusca stejnegeri—made reference to “white-winged” scoters in nearby Alaska, citing Nelson (1883, 1887) and Fay and Cade (1959). But none of those Alaska citations specified stejnegeri. The St. Lawrence Island specimen cited by Portenko was in fact a bird that Fay and Cade (1959:109) had identified and published as deglandi (University of Alaska Museum 30431 [life mount], adult ♂ in heavily worn plumage, collected 2 July 1929 by O. W. Geist). We have examined the specimen and confirmed the identification.

ALASKA RECORDS OF MELANITTA FUSCA STEJNEGERI

Occurrence of Melanitta fusca stejnegeri in Alaska was not reported until the beginning of the 21st century, when a male was observed 1–3 June 2002 on salt water at Northwest Cape, St. Lawrence Island, by a Wings tour group (Dunn, S. N. G. Howell, Rosenberg, and others)—not 2–4 June as reported by Garner et al. (2004). At that locality the White-winged Scoter is a regular spring migrant in small numbers (pairs often seen flying northwest past the point), but seldom is a bird seen on the water and close enough to shore for detailed study. Flank color is an important feature distinguishing North American deglandi (brown flanks) from Asian stejnegeri (black flanks), so Dunn concentrated effort so all participants in the tour might see that feature well during the three days the bird was present, and indeed all observers agreed the bird exhibited the black flanks of stejnegeri. Photographs by Rosenberg record this and other features (see below) that substantiate the record (Figure 1).

Garner et al. (2004) also published an earlier photo (B. Bergstrom) of an adult male stejnegeri taken 30 May 2001 at Cape Nome, and the identification was accepted by the Alaska Checklist Committee (Gibson et al. 2008). A third record involved a male photographed 17 June 2005 on Safety Sound, near Solomon, east of Nome, by a Victor Emanuel Nature Tour group led by Iliff and B. R. Zimmer. Iliff took multiple digiscoped photos that support the identification as stejnegeri. From 1 to 5 June 2009 Dunn and others saw a flock of up to 15 White-winged Scoters that included adult males of both stejnegeri and of deglandi at a cove some 6 km south of Gambell. Of stejnegeri, we noted one adult male on 1 and 3 June, four adult males
on 4 June, and at least two on 5 June. On the last date, Zimmer was able to get identifiable photos of both taxa. There were females present as well, which we did not identify to subspecies. Lewington (in Garner et al. 2004) illustrated differences in females of the three subspecies in bill shape and in feathering out the sides of the bill, but these differences are subtle and require very close views to be discerned with confidence. Even in adult males,
reasonably close and prolonged views on the water are necessary for the differences in bill color and flank color to be noted accurately. With this in mind, we regard some additional reports as tentative identifications (e.g., adult male fly-by, 10 June 2005, N. Am. Birds 59:640). For comparison, see Figure 2, a photo of an adult male deglandi.

The difficulty of seeing these birds close enough for identification at this level is a problem in the Aleutian Islands as well, where White-winged Scoters are also usually seen in flight over the sea at great distance, allowing identification to species only. Though stejnegeri was described from winter specimens from the Commander Islands, just 333 km west-northwest of Attu, it has not been reported from the Aleutians (Gibson and Byrd 2007).

Although the four records above are at this time the only substantiated records of stejnegeri in Alaska, after multiple adult males were recorded at Gambell in 2009 it appeared that this taxon might prove to be of regular occurrence at this location, perhaps even as numerous as deglandi. At Gambell, the White-winged Scoter is an uncommon or fairly common spring migrant in late May and early June, with daily totals sometimes over 30 birds. But prior to 2009 the majority of birds seen were in flight at a distance (often pairs flying north) or were at great distance on the sea. Occasionally adult males at close range were identifiable as deglandi (e.g., one on the water, 3 June 2005, Dunn). In late May and early June 2010, 2011, and 2012, we again found small numbers of White-winged Scoters off the same cove south of Gambell, often in the company of hundreds of King Eiders (Somateria spectabilis). Of the perhaps several dozen adult males close enough for identification, we saw only deglandi, probably the more numerous of the two subspecies. If most of these scoters at Northwest Cape are indeed deglandi, then that taxon quite likely occurs as well on the Chukotski Peninsula, less than 80 km away (and where not recorded by Portenko 1972).

Saint Lawrence Island lies north and east of the known nesting range of stejnegeri (above). Subspecies deglandi nests on islands in, and in the brush zone about (and even a distance from), freshwater lakes and ponds within and at the edge of the zone of boreal forest (Brown and Fredrickson 1997). Over most of the Seward Peninsula deglandi is rare or uncommon in spring and summer, but it is a locally common probable breeder in the Imuruk Basin; it is the latest species of waterfowl arriving in spring on the Seward Peninsula (Kessel 1989).

FIELD IDENTIFICATION

Garner et al. (2004) presented a key to identifying these three taxa, and much of the following is taken from that article. They included a superb color plate of both males and females and a plethora of color photos of both sexes of all three taxa. Another very good color plate (by Allan Brooks) detailing the heads of adult males was published by Phillips (1926). All three taxa are illustrated (by Peter Scott) in Delacour (1959). Finally, Dunn and Alderfer (2006, 2011) included an illustration of adult male stejnegeri. Nominate fusca is widely illustrated in European field guides (and by Dunn and Alderfer 2011), and deglandi is in all North American guides. The least well known of the three taxa, stejnegeri, is also the least often illustrated.
Identification of adult males, if seen close enough for the color of the flanks, the markings on the head, the presence and shape of the protuberance on the bill, and especially the color and pattern on the bill to be discerned, is straightforward. Males of all three taxa are largely black; male deglandi alone has brownish flanks. In the field, the visibility of this character varies, but under favorable conditions it can be detected at considerable range. When the birds surface briefly during feeding, the flanks can be partly obscured. Adult males of the other two taxa have black flanks (although worn black feathers can sometimes have a brownish cast—Garner et al. 2004). In head and bill pattern nominate fusca is the most distinct, with the least amount of white under the eye and the smallest knob, on a largely yellow bill. There is a distinct white mark under the eye and a knob on the bill of deglandi. Below the rather oval naris there is a bit of yellow, but other than the blackish lamellae seen along the bill edge, the remainder of the bill is pinkish red. In stejnegeri the white mark under the eye is similar to that of deglandi, though often broader at the rear and slightly more upswept. The bill knob is well developed, often forming a hooked tip—thus the Russian name, gorbonosii turpan (hook-nosed scoter). Below a more circular naris, the bill of stejnegeri is pinkish red, except for the distinct yellow lamellae seen along the bill edge. There are slight differences in the bill feathering and in the head shapes of the three taxa, in both sexes and at all ages. The differences are well detailed and illustrated by Garner et al. (2004) but in the field require close study. Garner et al. characterized stejnegeri as having the most "Roman-nosed" look to the head and bill profile, recalling the Common Eider (Somateria mollissima).

SYSTEMATICS

The taxonomy of these three taxa has recently been in flux. Melanitta fusca and M. deglandi were maintained as separate species by the AOU (1886, 1895, 1910, 1931, 1957) in editions 1–5 of the Check-list of North American Birds. More recently, however, the AOU (1983, 1998) relegated deglandi to status as a component of M. fusca and noted (AOU 1983:92), "some authors regard the two groups as separate species...the latter [deglandi] also including the eastern Asiatic form M. f. stejnegeri...whose relationships appear to be with deglandi but whose status is uncertain."

Many additional authorities (e.g., Phillips 1926, Delacour 1959, Vaurie 1965, Palmer 1976, Madge and Burn 1988, Sibley and Monroe 1990, del Hoyo et al. 1992, Brown and Fredrickson 1997, Dickinson 2003) have also maintained the "white-winged" scoters as a single polytypic species, but others have separated M. fusca from M. deglandi (e.g., Hellmayr and Conover 1948, Koblik et al. 2006). Madge and Burn (1988) wrote, "as the ranges of the three forms are not known to overlap and as the three seem to differ vocally, they could be treated as three separate species, or perhaps more safely as two, with stejnegeri maintained as subspecies of M. deglandi. This same relationship was postulated by Sibley and Monroe (1990). In his investigation of the phylogeny of the Mergini by cladistic analysis of 137 morphological characters, Livezy (1995) included M. fusca and M. deglandi as sister species and stejnegeri within the latter—but (to our reading) left
ambiguous whether he meant to include stejnegeri as a junior synonym or as a subspecies of deglandi.

To consider this issue, as well as the status of the Common and Black scoters, the British Ornithologists' Union (BOU) Records Committee, Taxonomic Subcommittee, reviewed the evidence to date and recognized five species of scoters: M. nigra (Common Scoter), M. americana (Black Scoter), M. fusca (Velvet Scoter), M. deglandi (White-winged Scoter), and M. perspicillata (Surf Scoter) (Collinson et al. 2006). They maintained stejnegeri provisionally with M. deglandi, but with caveats (see below).

Collinson et al. (2006) considered a wide variety of morphological, behavioral, and acoustic factors. In addition to the morphological differences we have described, their analysis focused on structural differences of the trachea of fusca and deglandi, first described and illustrated by Miller (1926). Johnsgard (1961) investigated the taxonomic significance of tracheal anatomy in the Anatidae and found it a useful tool though its value differed from group to group. The tracheal differences in these scoters are likely responsible for the described vocal differences between fusca and deglandi: the courtship call of fusca is a higher-pitched double skryck rather than the whistled double whur-er of deglandi (Collinson et al. 2002), but there has been some confusion of vocalizations with sounds made by wing movement, and some intensive studies have detected no vocalizations by the male during courtship (Myres 1959, Brown and Fredrickson 1997). That finding agrees with our own field experience, in which we have found deglandi on the breeding grounds to be silent. One wonders how important can be differences in vocalizations if the birds are usually silent! Might the modifications of the trachea be vestigial? The silence of the White-winged contrasts strikingly with the noisiness of the Black Scoter (M. americana), which vocalizes frequently year round, even in its winter range. The difference in voice was one of the reasons why Collinson et al. (2006) split M. nigra into two species, the call of americana being longer. The tracheal structure and vocalizations of stejnegeri remain unstudied. Although scoters have interbred with other waterfowl, we have not seen any reference to intergradation of characters among any of the "white-winged" scoters. The breeding ranges of fusca and stejnegeri are slightly separated (just east of the Yenisei River, Siberia); similarly, nigra and americana are also separated, but their zone of separation lies farther east, around the Lena River, Russian Far East. The Bering Sea and habitat unsuitable for nesting (arctic and subarctic tundra, beyond the taiga) separate stejnegeri from deglandi.

Collinson et al. (2006) concluded that it is "reasonable to suggest that deglandi and fusca should be treated as separate species under criterion 4.1 of Helbig et al. (2002), as allopatric taxa that are 'fully diagnosable in each of several discrete or continuously varying characters, related to different functional contexts.' Slightly more problematic is...whether to retain stejnegeri as conspecific with deglandi: stejnegeri is similar to deglandi in many respects and is the taxon for which there is the...[least information]. On the basis of what is known—diagnosability on the basis of male bill shape and colour (a potentially reproductively important character), facial feathering (perhaps trivial) and male flank colour (perhaps trivial)—the argument for splitting deglandi and stejnegeri may appear to be almost as good as that for splitting.
nigra and americana. Given the lack of published information on stejnegeri, however, ... further research into vocalizations, and genetics is required; hence we provisionally retain stejnegeri as a subspecies of M. deglandi.”

Thus it might be concluded that stejnegeri has suffered from benign neglect. The BOU (Sangster et al. 2005) split M. americana from M. nigra, and the AOU (Chesser et al. 2010:731) followed suit, “on the basis of courtship calls (Sangster 2009) and color, form, and feathering of the bill in adult males and most adult females (Collinson et al. 2006).”

Garner et al. (2004) discussed the three taxa of “white-winged” scoters as separate species, using the English names Velvet, White-winged, and Stejneger’s scoters. Other names used for the last taxon include Asiatic Velvet Scoter (Phillips 1926), Asiatic White-winged Scoter (Delacour 1959, Palmer 1976), Gorbonosii turpan (Portenko 1972, Lobkov 1986, Nechaev 1991, Koblik et al. 2006), and Vostochnosibirsksii turpan (East Siberian Scoter; Dement’ev and Gladkov 1952). The subspecies epithet honors Leonhard Stejneger, the Norwegian-born American natural historian whose discoveries and writings provided seminal information on the ornithology of northeastern Asia; if an English name be needed for this taxon, we think that simply translating the Russian name in wide use respects the name used where the bird occurs: Gorbonosii turpan = Hook-nosed Scoter.

ACKNOWLEDGMENTS

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LITERATURE CITED

Chesser, R. T., Banks, R. C., Barker, F. K., Cicero, C., Dunn, J. L., Kratter, A. W., Lovette, I. J., Rasmussen, P. C., Remsen, J. V. Jr., Rising, J. D., Stotz, D. F., and
ALASKA RECORDS OF THE ASIAN WHITE-WINGED SCOTER


Accepted 22 June 2012

APPENDIX. Original names, authors, literature citations, and type localities of the four “white-winged” scoter taxa, in chronological order.

Anas fusca Linnaeus (Systema Naturae, ed. 10, vol. 1:123, 1758) [coast of Sweden]
= Melanitta fusca fusca
Oedemia deglandi Bonaparte (Revue Critique de l’Ornithologie Européenne, p. 108, 1850) [North America]
= Melanitta fusca deglandi
O[idenia]. Stejnegeri Ridgway (Manual of North American Birds, p. 112, 1887) [Bering Island, Commander Islands]
= Melanitta fusca stejnegeri
Oidenia deglandi dixoni Brooks (Bulletin of the Museum of Comparative Zoology 59:393, 1915) [Humphrey [= Griffin] Point, arctic Alaska]
= Melanitta fusca deglandi
A VAUX’S SWIFT SPECIMEN FROM NEW MEXICO
WITH A REVIEW OF CHAETURA RECORDS FROM
THE REGION

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ABSTRACT: Vaux’s Swift has finally been documented in New Mexico on the
basis of two observational records supported by photographs and a specimen. Here
I report on the circumstances of collection of the specimen and review the status of
Vaux’s and Chimney Swifts in the region. In New Mexico, Vaux’s Swift appears to be
a rare but regular migrant in the fall and perhaps the spring, with most records from
the southwestern part of the state. The Chimney Swift is established as an annual
summer resident on the eastern plains of New Mexico with a tendency to wander
farther west. More data from Chihuahua are needed.

Small dark swifts of the genus Chaetura occur regularly in New Mexico
(Hubbard 1978), but these birds are often left identified only to the genus.
New Mexico lies between the core ranges of the two northern species of
Chaetura, the Chimney Swift (C. pelagica) to the east and Vaux’s Swift (C.
vauxi) to the west (AOU 1957). Until recently, all of these swifts definitively
identified in New Mexico had proven to be Chimney Swifts (e.g., Bailey
1928, Hubbard 1978). The Chimney Swift is now a confirmed breeder on
the eastern plains of New Mexico (Williams 2001), and Vaux’s Swift is a
transient in the southwestern United States (e.g., Phillips et al. 1964). This
pattern of occurrence along with the two species’ similarity makes every
Chaetura observed in New Mexico an identification challenge.

The Chimney Swift is larger (Table 1) and darker ventrally than Vaux’s
Swift. Their vocalizations are different, but most observations of Chaetura
in New Mexico are of silent birds. Indeed, accounts of Vaux’s Swift from the
early to mid-20th century cautioned against attempting to distinguish these
two species in the field (Lowery 1939, Oberholser 1974).

Vaux’s Swift is in general more likely in the southwestern part of the state,
and the Chimney Swift occurs primarily in the eastern plains (Figure 1).
However, specimens of Chimney Swifts in New Mexico as far west as
the Mimbres and Rio Grande valleys (Figure 1), records from the extreme
southwestern part of the state and in Arizona, and at least intermittent breeding
in California (Hamilton et al. 2007) demonstrate that every Chaetura
in New Mexico needs to be identified with the utmost caution, especially

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Table 1  Wing Chords of Females of Three Taxa of Chaetura

Western Birds 43:231–235, 2012
Figure 1. Distribution of records of *Chaetura* swifts in New Mexico. Data from eBird, Ornis, NMOS Field Notes database, and NMOS records courtesy S. O. Williams.

during migration. Here, I report on the first specimen of Vaux’s Swift for New Mexico, collected in the Peloncillo Mountains, Hidalgo County, and I review the occurrence of Vaux’s Swift as a migrant in the southwest United States and northwest Mexico.

**METHODS**

archive courtesy of S. O. Williams. I also solicited observations from surrounding states, especially those in Mexico. I could not evaluate the validity of each of these records myself but relied instead on the judgment of those who published the records.

On 20 September 2009, I visited the Peloncillo Mountains, Hidalgo County, New Mexico, accompanied by Shane G. Dubay and Michael J. Lelevier. That evening, as we scanned for birds along the lower reaches of Clanton Canyon, we saw up to three small ashy brown swifts that we identified only as Chaetura species. Knowing that bodies of water often attract swifts, we proceeded up the canyon to Geronimo Tank (31° 31.231′ N, 109° 0.991′ W), a small earthen tank ~100 m in diameter. We had brief views of Chaetura swifts, but at great distances. The next morning, 21 September 2009, we returned to Geronimo Tank and found what we estimated to be six Chaetura swifts flying over the tank and apparently foraging in the company of about 15 Violet-green Swallows (Tachycineta thalassina). The swifts were pale ventrally, and we tentatively identified them as Vaux’s Swifts. I was able to secure a specimen, confirming its identification as a Vaux’s Swift.

I prepared the specimen as a study skin and deposited it in the Division of Birds at the Museum of Southwestern Biology (MSB 29000; Figure 2). The specimen weighed 15.6 g, with a wing chord in the dry specimen of 114.2 mm. Its ovary was 3.5 × 1.5 mm, and the presence of a bursa 6 × 4 mm indicated that the bird hatched that year. Its stomach was full of small insects. It was carrying light fat and had trace amounts of molt on its head and neck.
RESULTS

Vaux’s Swift has a breeding distribution from southeast Alaska to Central America and Venezuela (AOU 1957). There are five recognized subspecies, with the nominate subspecies nesting in the Pacific Northwest and migrating largely to southern Mexico (Bull et al. 2007). Most records of Vaux’s Swift in the United States are assumed to refer to the nominate subspecies, but C. v. tamaulipensis has been collected in south-central Arizona (Phillips 1954) and may nest in the mountains of west-central Mexico (Phillips and Webster 1957). I compared MSB 29000 to the small series of C. vauxi at MSB, and although I did not see any indication that this specimen represents anything other than the nominate form, comparison to a larger series would be informative. Subspecies tamaulipensis differs from nominate vauxi in its darker underparts, more glossy upperparts, and lack of a fine whitish supercilium (Sutton 1941).

The nominate form of Vaux’s Swift nests in forests from southeast Alaska and adjacent British Columbia southeast to western Montana and south to Santa Cruz County, probably Monterey County, California (AOU 1998). The bulk of the population migrates through the Pacific coastal states, with diffuse records from the Great Basin east regularly to southeast Arizona (eBird). Dates of migration for Arizona extend from mid-April to mid-May and mid-September to mid-October (Phillips et al. 1964; eBird). Hayward et al. (1976) considered Vaux’s Swift casual in Utah. There are no confirmed records from Colorado or trans-Pecos Texas. Eastern Texas has several sight records (Oberholser 1974, Rappole and Blacklock 1994), and Louisiana (Lowery 1939, S. W. Cardiff in litt) and Florida (Webber and Collins 1995) host small wintering populations during at least some years. Two of the three records for New Mexico accepted by the New Mexico Bird Records Committee are from the southwestern part of the state; the third is from Albuquerque in the middle Rio Grande valley (Table 2).

Dates of autumn migration for Vaux’s Swift in the state are roughly September through mid-October, with most records for the last two weeks of September through the first week of October. Spring has fewer records over a shorter interval, 12 April through 25 April.

In adjacent Mexican states, Vaux’s Swift is poorly known, despite presumed passage of nearly the entire population through Sonora (Russell and Monson 1998) and perhaps Chihuahua during migration. Friedmann et

<table>
<thead>
<tr>
<th>Date</th>
<th>County</th>
<th>Locality</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 Sep 2007</td>
<td>Hidalgo</td>
<td>San Simon Cienega</td>
<td>Lone bird; photographed (Williams 2001)</td>
</tr>
<tr>
<td>21 Sep 2009</td>
<td>Hidalgo</td>
<td>Geronimo Tank</td>
<td>One of ~6; specimen collected (MSB 29000)</td>
</tr>
<tr>
<td>1–2 Oct 2009</td>
<td>Bernalillo</td>
<td>Albuquerque; Rio Grande Nature Center</td>
<td>Lone bird; photographed (Williams 2009)</td>
</tr>
</tbody>
</table>
A VAUX’S SWIFT SPECIMEN FROM NEW MEXICO

al. (1950) listed C. v. vauxi as a spring migrant through Sonora and Baja California but noted that its distribution and season of occurrence were imperfectly known. I was able to find only two records from Chihuahua, of a flock of eight observed near Madera on 28 August 2010 (eBird; W. H. Howe in litt.) and of a possible Vaux's Swift at Basaseachic Falls 14 August 1997 (N. Moore-Craig in litt.). Russell and Monson (1998) considered Vaux’s Swift to be a rare transient in spring and fall in Sonora, with small groups of birds observed near the Gulf of California and additional records from the Sierra Madre Occidental. Spring dates for Sonora are 11 April–22 May; fall 16 September–19 October (eBird).

The Chimney Swift was once restricted to nesting in hollow trees in the forests of eastern North America (Cink and Collins 2002) and historically did not occur on the southern Great Plains. It spread west as the building of chimneys accompanied settlement (e.g., Sutton 1967). Observations of this species on the eastern plains of New Mexico go back to at least 1962, and it has been an annual summer visitor to the eastern plains of New Mexico since 1978 (NMOS database), with records from Carlsbad to Clayton (Figure 1) and confirmed nesting at Carlsbad in 2001 (Williams 2001). Farther west, Chimney Swifts have been reported from Silver City, Redrock, and San Simon Cienega. Supporting these observational records are three specimens from New Mexico: as far west as Rinconada (near Dixon), Rio Arriba Co. (U.S. National Museum of Natural History 193249), 1 May 1904; the Mimbres River valley at Canagra Place 30 miles southeast of Silver City, Luna Co. (Cincinnati Museum of Natural History 24449), 22 May 1921; and San Antonio, Socorro Co., 22 April 1952 (MSB 20287; Figure 1).

In surrounding states, Chimney Swifts have been known to breed in Colorado since 1938 (Bailey and Niedrach 1965). There are two specimens from the University of Arizona campus, Tucson, 18 June 1952 (Phillips et al. 1964) and scattered sight records (eBird). In California, the Chimney Swift was first documented in Imperial County, a specimen collected along the Colorado River 6 May 1930 (Huey 1960). It was reported “in numbers” in California from 1968 to 1974, and the first documented nest was at Fort Bragg in 1975 (Small 1994). It is currently a rare but annual summer visitor to Los Angeles from 30 April to 12 October, though since the late 1990s its numbers have apparently diminished (Hamilton et al. 2007).

Birds thought to be Chimney Swifts have been reported in New Mexico as early as early March, but the majority of records come from the third week of April through the third week of September. There are no fall specimens of the Chimney Swift, and reports of it after the third week of September seem highly speculative, so I don’t include them in Figure 1.

DISCUSSION

This summary of occurrence of Chaetura in New Mexico is only as good as the data it is based on. Some of these birds were likely misidentified. I use the records because most of the observers are experienced with birds in New Mexico and understand the difficulties in identification of swifts. Many of these observers have reported “Chaetura sp.,” from parts of the state where one species is much more likely than the other, implying that
they are making their identifications on the birds’ field marks, not simply geographic location.

Field identification of *Chaetura* swifts will always be among the greatest challenges to field ornithologists in New Mexico. Observers have been reporting probable Vaux’s Swifts for years, mostly from the southwestern part of the state, but also up to the middle Rio Grande valley (Figure 1). The NMOS has accepted three records of Vaux’s Swift that mirror these unsubstantiated reports, so it seems likely that many of these identifications of Vaux’s Swift are correct. There are no accepted spring records of Vaux’s, and all Chimney Swift specimens from New Mexico are from the Rio Grande valley or farther west, making definitive documentation of Vaux’s Swift during the spring highly desirable. In northwest Mexico, Chihuahua is devoid of published records, and further documentation of passage of Vaux’s Swift should be a priority in this little-known state.

The confirmation of Vaux’s Swift in New Mexico seems long overdue, given the proximity of records from adjacent Arizona, where the species is known as close as the Chiricahua Mountains (Phillips et al. 1964). Many sight records from southwestern New Mexico by experienced birders were conservatively reported as *Chaetura* sp. because definitive details could not be documented (eBird, NMOS database). There now is definitive evidence that Vaux’s Swift occurs in New Mexico. Additional specimens and careful documentation will be critical to elucidating the status of both species of *Chaetura* in New Mexico further.

ACKNOWLEDGMENTS

Many people helped me in developing the manuscript. Discussions with John Hubbard provided me with the initial idea, and my conversations with him at various times since the specimen was first collected were informative. Sartor Williams patiently discussed this problem with me several times and selflessly provided me with much information on observations of *Chaetura* from New Mexico. Narca Moore-Craig, Bill Howe, Charles Collins, and Steve Cardiff provided me with observations from beyond the state. Robert Dickerman, Charles Collins, and Christopher Witt kindly reviewed an earlier version of the manuscript.

LITERATURE CITED


A VAUX’S SWIFT SPECIMEN FROM NEW MEXICO


Accepted 6 March 2012
DIFFERENTIAL MIGRATION BY SEX IN NORTH AMERICAN SHORT-EARED OWLS

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ABSTRACT: Differential migration of the sexes is known in over 60 bird species and may be the predominant pattern in migratory birds. Identifying the causes of differential migration has been difficult, in part because sex-specific migratory patterns have yet to be described for a majority of species. We used the Internet specimen-data portal Ornis to compile sex-specific data on the seasonal distribution of the Short-eared Owl (Asio flammeus), a species that cannot be reliably sexed by external characteristics. We found 1188 specimen records from North America with data on sex, locality, and date of collection. Although the winter distributions of males and females overlapped almost entirely, the mean latitude of females was significantly lower than that of males for the months of November to March. The magnitude of the difference averaged 3.1° between December and February but increased to a peak of 6.0° in March, reflecting earlier onset of spring migration in males. The pattern of differential migration in the Short-eared Owl is compatible with the widely accepted hypothesis that males winter closer to breeding areas because they gain a reproductive advantage from early arrival and establishment of breeding territories (arrival-time hypothesis). Female specimens predominate during late fall and winter and male specimens predominate during the nesting season, suggesting differential seasonal mortality by sex. The skewed sex ratio suggests that differential migration may be caused in part by intrinsic sex differences in foraging efficiency, cold tolerance, or dominance. Comparisons with other raptors reveal that patterns of differential migration are highly species-specific. We conclude, conservatively, that the longer distance female Short-eared Owls migrate is the result of each sex optimizing its migration strategy in light of the higher likelihood of fall and winter mortality of females and the reproductive benefits to males of early arrival on breeding territories.

Differential migration expresses the situation of different demographic classes within a species migrating different distances, by different routes, or on different schedules. As reviewed by Cristol et al. (1999), differential migration by sex has been well documented in over 60 species of mostly North American and European birds, and additional cases are steadily being described (e.g., Olson and Arsenault 2000, Jenkins and Cristol 2002, Stouffer and Dwyer 2003, Catry et al. 2004, Komar et al. 2005, Palacin et al. 2009, Bai and Schmidt 2012). In 85% of the 48 cases described by Cristol et al. (1999), females migrate farther and correspondingly winter at a lower latitude than do males. Three major hypotheses have been recurrently proposed to explain differential migration of the sexes: (1) the body-size hypothesis holds that different latitudes of wintering are driven by different degrees of cold tolerance as mediated by body size (Ketterson and Nolan 1976), (2) the dominance hypothesis proposes that the socially subordinate sex is forced to migrate farther as a way of escaping competitive pressure (Gauthreaux 1978), and (3) the arrival-time hypothesis proposes that the sex whose reproductive fitness will be most enhanced by early arrival on the breeding grounds will make a shorter migration (King et al. 1965, Myers 1981). Each of these three hypotheses is compatible with approximately
Differential migration by sex in the Short-eared Owl

three-quarters of described cases (Cristol et al. 1999), suggesting that there is no univariate, universal explanation. For example, the hypothesis that a difference in distance of migration is due to greater tolerance of the larger-bodied sex to cold is easily refuted by the fact that in many species in which females migrate to lower latitudes the female tends to be larger than the male (e.g., in the families Accipitridae, Falconidae, Strigidae, and Scolopacidae). The early-arrival hypothesis is a viable alternative explanation for most species with such reverse sexual size dimorphism, but it fails to explain, for example, the Rough-legged Hawk (Buteo lagopus) and the Snowy Owl (Bubo scandiacus), in which males migrate longer distances but are still thought to establish breeding territories before the arrival of females. In those two species, it has been hypothesized that dominant females may drive males farther south by territorial defense of winter foraging areas (Russell 1981, Kerlinger and Lein 1986), but the direct evidence for that mechanism is weak (Olson and Arsenault 2000). While it is clear that migration strategies are commonly sex-specific, identifying the sex differences that cause divergent migratory behavior will require more detailed descriptions of sex-specific patterns of seasonal distribution than are currently available for most species.

One of the key limitations to our understanding of differential migration has been the inability to distinguish males from females of some species through field observation or banding. This leads to bias because the available data on differential migration are skewed to species that are dimorphic. In the cases of species that are difficult to sex without direct examination of gonads, museum specimens provide a unique record of sex-specific distribution (Kerlinger and Lein 1986, Jenkins and Cristol 2002, Stouffer and Dwyer 2003). For example, the Short-eared Owl (Asio flammeus) has no plumage markers that distinguish males from females, and although females average ~20% larger in body mass, the vast majority of individuals cannot be sexed by measurements (Earhart and Johnson 1970, Wiggins et al. 2006). Fortunately, specimen databases are becoming increasingly accessible as a result of digitization projects at individual museums and informatics initiatives such as Ornis (ornisnet.org) and GBIF (gbif.org) that are aimed at facilitating multi-collection searches through convenient Internet portals.

While evaluating the 29 Short-eared Owls in the collection of the Museum of Southwestern Biology, Dickerman noticed that the sex ratio of New Mexico, Arizona, and Texas specimens was heavily skewed toward females (68% female). The preponderance of females in the southern portion of the species’ winter range led us to hypothesize that the migration of the Short-eared Owl may differ by sex. In this paper we test this hypothesis and describe the seasonal latitudinal distributions of male and female Short-eared Owls, using the compilation of 170 years worth of specimen data for this species newly available through Ornis.

METHODS

During December 2011, we searched all specimen repositories available through Ornis for Asio flammeus, making multiple searches as not all institutional servers returned data on every search. We recovered a total of 2584 specimen records from 35 museum collections. We eliminated specimen
records that likely represented subspecies other than A. f. flammeus (e.g., all records from Caribbean or Hawaiian islands), all records outside of North or Central America, and all records that did not have sex, month, and locality data. After applying these filters we were left with 1188 specimens—619 females and 569 males. The record was substantial in all parts of the year, with monthly totals varying from a low of 52 in April to a high of 180 in November. Approximately 60% of the records were associated with latitude and longitude coordinates. We georeferenced the remainder of records from the locality named or described, using Biogeomancer Workbench software (version 1.2.4).

We analyzed the latitude of the specimens after categorizing the records by sex and calendar month, with all years (1841–2009) combined. Within each subset, the latitudes were approximately normally distributed, allowing for the application of parametric statistics. We applied independent-samples Student’s t tests to compare the latitude of each sex in each month. A nonparametric Mann-Whitney U test yielded qualitatively identical results. We evaluated the total number of specimens in each month as an indicator of seasonal variation in mortality rate. We recognize that the number of specimens is an imperfect indicator of mortality, but obtaining accurate mortality estimates is a major challenge in population biology (Newton 1979). Although the museum record comprises a mix of birds shot and salvaged, in other raptors specimens from these two sources of mortality produce highly similar age and sex ratios (Haukioja and Haukioja 1970). To examine sex-differential mortality by season, we tested the sex ratio for departure from 50:50 with a binomial sign test. Finally, to evaluate whether females’ vulnerability to seasonally challenging environmental conditions differs from that of males we compared the sex ratio in each month to the total number of specimens with a nonparametric Spearman’s rank correlation.

RESULTS

Latitudes of males during the winter months (December–February) overlapped almost entirely with those of females during the same period but averaged 3.1° higher, the equivalent of ~344 km farther north (Figure 1). Latitudes of male specimens were significantly farther north than those of female specimens for each month from November through March and nearly significantly farther north in October and April. There was no significant variation with longitude (Table 1, Figure 2). The statistical results were nearly identical for the Student’s t test and the Mann–Whitney U (Table 1). The difference in latitude peaked in March, at which time males shifted northward to 6° of separation from females, on average (~666 km). Although males initiate spring migration before females, our data revealed no apparent difference in the timing of fall migration (Figure 2), though the coarse scale of the data when grouped by month may limit our power to resolve such differences. The total number of specimens was highest during the colder months (October–January), with a secondary peak during June (Figure 3). The sex ratio of the specimens was heavily skewed toward females during the fall and winter, corresponding to the period from September to January (396 females, 308 males; binomial test, two-tailed uncorrected \( P = 0.001 \),

240
Differential migration by sex in the Short-eared Owl

Figure 1. Localities of 1188 North American specimens of the Short-eared Owl collected during December, January, and February, by sex. The dashed lines represent the specimens’ mean latitude, 38.9° N for females, 41.9° N for males.

although the only month that was significantly biased toward females by the binomial test was October (86 females, 61 males; binomial test, two-tailed uncorrected $P = 0.048$). The sex ratio was skewed toward males during the spring and early summer, the proportion of males increasing from April to June (82 females, 116 males; binomial test, two-tailed uncorrected $P = 0.019$; Figure 3). The single month that was significantly biased toward males was June (30 females, 51 males; binomial test, two-tailed uncorrected $P = 0.026$). It should be noted that when we applied a Bonferroni correction to these binomial tests, the only difference that remained significant at the 5% level was the excess of females from September to January; however, the Bonferroni correction is likely to be overly conservative, especially when the seasonal trends in sex ratio visible in Figure 3 are considered. The number of total specimens per month was correlated with the proportion of females (Spearman’s $\rho = 0.587$; two-tailed $P = 0.045$).
**DIFFERENTIAL MIGRATION BY SEX IN THE SHORT-EARED OWL**

**Table 1** Sources of Data on Specimens of *Asio flammeus* Including Sex and Locality

<table>
<thead>
<tr>
<th>Institution</th>
<th>No. of specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Museum of Natural History, Smithsonian Institution (USNM)</td>
<td>194</td>
</tr>
<tr>
<td>Royal Ontario Museum (ROM)</td>
<td>149</td>
</tr>
<tr>
<td>University of Michigan Museum of Zoology (UMMZ)</td>
<td>89</td>
</tr>
<tr>
<td>American Museum of Natural History (AMNH)</td>
<td>87</td>
</tr>
<tr>
<td>Museum of Comparative Zoology, Harvard Univ. (MCZ)</td>
<td>82</td>
</tr>
<tr>
<td>Canadian Museum of Nature (CMN)</td>
<td>77</td>
</tr>
<tr>
<td>California Academy of Sciences (CAS)</td>
<td>55</td>
</tr>
<tr>
<td>Charles R. Conner Museum, Washington State University (CRCM)</td>
<td>55</td>
</tr>
<tr>
<td>University of Washington Burke Museum (UWBM)</td>
<td>54</td>
</tr>
<tr>
<td>James R. Slater Museum, University of Puget Sound (PSM)</td>
<td>53</td>
</tr>
<tr>
<td>University of Kansas Biodiversity Institute (RU)</td>
<td>41</td>
</tr>
<tr>
<td>Los Angeles County Museum of Natural History (LACM)</td>
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</tr>
<tr>
<td>Museum of Southwestern Biology, University of New Mexico (MSB)</td>
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</tr>
<tr>
<td>Dickey Collection, University of California, Los Angeles (UCLA)</td>
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</tr>
<tr>
<td>Western Foundation of Vertebrate Zoology (WFVZ)</td>
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</tr>
<tr>
<td>University of Nebraska State Museum (UNSM)</td>
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<tr>
<td>Delaware Museum of Natural History (DMNH)</td>
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<tr>
<td>Oklahoma Museum of Natural History (OMNH)</td>
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<td>Utah Museum of Natural History (UMNH)</td>
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<td>San Diego Natural History Museum (SDNHM)</td>
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<td>University of Arizona Museum of Natural History (UAZ)</td>
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<td>University of Colorado Museum of Natural History (CUMNH)</td>
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<td>Texas Cooperative Wildlife Collection (TCWC)</td>
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<td>Louisiana State University Museum of Natural Science (LSUMZ)</td>
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<tr>
<td>Michigan State University (MSU)</td>
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</tr>
<tr>
<td>Sternberg Museum of Natural History, Fort Hays State University</td>
<td>4</td>
</tr>
<tr>
<td>(MHP)</td>
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<tr>
<td>Western New Mexico University (WNMU)</td>
<td>4</td>
</tr>
<tr>
<td>Illinois State University (ISU)</td>
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</table>


**DISCUSSION**

The specimen record for the Short-eared Owl in North America shows strong evidence of differential migration of the sexes, with females migrating farther than males by ~344 km, on average (Figure 1). This pattern was previously unrecognized because of the difficulty of distinguishing the sexes without direct examination of the gonads (Wiggins et al. 2006). The fact that females are slightly larger and migrate to lower latitudes directly contradicts the body-size hypothesis. The dominance hypothesis is a potential explanation for the longer migration of females because Short-eared Owls are territorial during both the breeding season and winter and males tend to be more aggressive than females (Clark 1975). If the presence of dominant males directly limits the latitude at which females winter, however, then we might predict that females shift northward during March in response
Table 2  Comparison of Latitudes of Specimens of the Short-eared Owl by Sex and Month

<table>
<thead>
<tr>
<th>Month</th>
<th>t</th>
<th>df</th>
<th>P (2-tailed t test)</th>
<th>Mean difference</th>
<th>Lower bound</th>
<th>Upper bound</th>
<th>P (2-tailed Mann-Whitney U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>-2.64</td>
<td>129</td>
<td>0.009</td>
<td>-3.03</td>
<td>-5.31</td>
<td>-0.76</td>
<td>0.009</td>
</tr>
<tr>
<td>Feb</td>
<td>-2.74</td>
<td>96</td>
<td>0.007</td>
<td>-3.15</td>
<td>-5.44</td>
<td>-0.87</td>
<td>0.032</td>
</tr>
<tr>
<td>Mar</td>
<td>-4.09</td>
<td>66</td>
<td>&lt;0.001</td>
<td>-5.98</td>
<td>-8.91</td>
<td>-3.06</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Apr</td>
<td>-1.52</td>
<td>50</td>
<td>0.135</td>
<td>-2.14</td>
<td>-4.98</td>
<td>0.69</td>
<td>0.152</td>
</tr>
<tr>
<td>May</td>
<td>-0.12</td>
<td>63</td>
<td>0.904</td>
<td>-0.31</td>
<td>-5.45</td>
<td>4.82</td>
<td>0.878</td>
</tr>
<tr>
<td>Jun</td>
<td>-0.09</td>
<td>79</td>
<td>0.930</td>
<td>-0.21</td>
<td>-5.01</td>
<td>4.58</td>
<td>0.710</td>
</tr>
<tr>
<td>Jul</td>
<td>-0.79</td>
<td>60</td>
<td>0.430</td>
<td>-1.47</td>
<td>-5.18</td>
<td>2.24</td>
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<tr>
<td>Aug</td>
<td>-0.40</td>
<td>56</td>
<td>0.687</td>
<td>-0.86</td>
<td>-5.12</td>
<td>3.40</td>
<td>0.607</td>
</tr>
<tr>
<td>Sep</td>
<td>-0.60</td>
<td>67</td>
<td>0.550</td>
<td>-1.46</td>
<td>-6.29</td>
<td>3.38</td>
<td>0.567</td>
</tr>
<tr>
<td>Oct</td>
<td>-1.82</td>
<td>145</td>
<td>0.071</td>
<td>-1.60</td>
<td>-3.35</td>
<td>0.14</td>
<td>0.114</td>
</tr>
<tr>
<td>Nov</td>
<td>-2.33</td>
<td>178</td>
<td>0.021</td>
<td>-1.89</td>
<td>-3.49</td>
<td>-0.29</td>
<td>0.009</td>
</tr>
<tr>
<td>Dec</td>
<td>-3.90</td>
<td>175</td>
<td>&lt;0.001</td>
<td>-3.22</td>
<td>-4.85</td>
<td>-1.59</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Equal variance assumed. Variances were equal for all months except November by Levene’s test, but relaxing the assumption of equal variance made no substantial difference to the November result.

*Negative values indicate that females are at lower latitudes than males.

*The nonparametric independent-samples Mann-Whitney U test produced results qualitatively identical to those of the t test.

Figure 2. Mean latitude of North American specimens of the Short-eared Owl by sex and month. Vertical bars represent one standard error.
Differential Migration by Sex in the Short-eared Owl

Figure 3. (A) Proportion of North American specimens of the Short-eared Owl that are female by month. The dashed line represents an even 50:50 sex ratio. The seasonal trend emerges although June and October were the only months that deviated significantly from 50:50 by a binomial sign test. (B) Total number of Short-eared Owl specimens by month from searches of www.ornisnet.org in December 2011.
to males' departure in spring migration, but this is not the case (Figure 2). Therefore, if dominance is driving differential migration, it is not mediated by a decline in winter territory quality at lower latitudes but by the higher cost of longer migration, as has been suspected previously (Cristol et al. 1999). The arrival-time hypothesis is consistent with the specimen record because males winter closer to the breeding range. This hypothesis is also consistent with the earlier spring migration of males (Figure 2) and with previous observations that males compete intensely for high-quality breeding territories (Clark 1975). Interestingly, the specimen data indicate a slowdown in the northward migration of males in March and April (Figure 2), suggesting that males return to their breeding grounds in stages. The latter pattern needs to be investigated with higher-resolution data.

Although the arrival-time hypothesis fits well with the observed pattern, comparisons with similar species reveal that it is not likely to be the only mechanism causing differential migration of the sexes in the Short-eared Owl. Cristol et al. (1999) reported four species of owls—the Snowy, Northern Hawk (Surnia ulula), Boreal (Aegolius funereus), and Long-eared Owl (Asio otus)—to be differential migrants and another, the Great Gray (Strix nebulosa), possibly to be one. In each of these species except the Snowy Owl females migrate farther south than males. In the Snowy Owl, males migrate farther than females, a pattern that may be related to the dominance of females over males on winter feeding territories (Kerlinger and Lein 1986). After controlling for latitude, Kerlinger and Lein (1986) showed that winter temperature could not explain the relative proportions of male and female Snowy Owls, effectively ruling out the body-mass hypothesis. In the Rough-legged Hawk, another boreal raptor, males also migrate farther (Russell 1981, Olson and Arsenault 2000). Female Rough-legged Hawks appear to be socially dominant and are thought to force males to lower latitudes during winter (Russell 1981), although a body-mass effect cannot be ruled out (Olson and Arsenault 2000). The Northern Harrier (Circus cyaneus) should be an ideal species to compare to the Short-eared Owl because of its similarity in habitat, distribution, and foraging style. In Europe, male Northern Harriers migrate farther than females (Watson 1977) and females are socially dominant, but in North America data are insufficient to establish the direction of differential migration of the sexes, if it exists (Smith et al. 2011). Furthermore, there are some species, such as the Green-winged Teal (Anas crecca), for which none of the major hypotheses adequately explains differential migration of the sexes, and the underlying mechanisms remain a mystery (Guillemain et al. 2009).

The latitudes of Short-eared Owl specimens in each month reveal sex-specific timing of migration. The fall migration appears to be slightly more protracted than spring migration, with the largest southward shift occurring in September and October; however, the timing of fall migration does not differ by sex at this level of resolution. There is no evidence that males remain on the breeding grounds longer than females, potentially to increase their breeding success, as male Ospreys (Pandion haliaetus) are known to do (Bai and Schmidt 2012). The difference in mean latitude of the sexes becomes evident between October and December (Figure 2). The mean latitude of each sex holds steady from December through February. The timing of the
sexes' spring migration clearly differs, as in many other bird species (Mills 2005). The sexes diverge sharply in latitude during March, at which time males' latitude shifts northward (Figure 2). Females catch up to males by May, with the single largest shifts in latitude for each sex constituting the northward movement between April and May (Figure 2).

The total number of specimens in each month was highly variable and likely reflects different seasonal levels of mortality (natural and anthropogenic), especially because a large proportion of the specimens represents birds that were salvaged rather than actively collected. Although mortality is notoriously difficult to estimate (Newton 1979), Haukioja and Haukioja (1970) found that the age structure of Northern Goshawks (Accipiter gentilis) shot or salvaged was closely similar, suggesting that different sources of mortality are correlated. It should be noted, however, that the exact proportion of salvaged specimens remains unknown because collectors and curators did not systematically preserve data on the method of collection until very recently, and some information on specimen labels has not been recorded in databases. Numbers of specimens averaged twice as many from October to February as from March to September (Figure 3). This peak in the specimen record might indicate differential seasonal mortality during fall migration and winter, but it is likely also affected by the disproportionate numbers of young birds at these seasons and the possible higher probability of salvage at lower latitudes, where the human population density is higher. Although we could find no published data on seasonal patterns of mortality in the Short-eared Owl (Wiggins et al. 2006), the observed pattern is compatible with existing data on seasonal mortality in other species of migratory raptors (Newton 1979, Bildstein 2006).

Interestingly, sex ratios of the specimens are also nonrandomly distributed through the year. The specimen record overall is 52.1% female, and the period from September through January is strongly biased toward females (Figure 3). In contrast, the period from April to June is strongly biased toward males (Figure 3). The latter could be explained by the increased demand on males to provision the female and nestlings during the breeding season (Clark 1975) and the correspondingly higher likelihood of their dying or being collected. It is difficult to explain the vastly higher number of female specimens during the fall and winter, the seasons of highest apparent mortality for the species as a whole. We offer six possible explanations that are not mutually exclusive: (1) the specimen record is biased toward females during late fall and winter because, at lower latitudes, they are more likely to be found and/or collected; (2) the sex ratio of offspring produced is skewed toward females; (3) females' longer migration increases their mortality; (4) reduced flight and foraging efficiency increases female's mortality; (5) dominance by males reduces females' access to high-quality habitats, thus increasing females' mortality; or (6) reduced thermogenic capacity independent of body mass increases females' mortality. We find the first explanation to be unlikely because the relatively small 3.1° difference in mean winter latitude is not sufficient to explain the radically skewed sex ratios even if there were a negative correlation between latitude and the probability of an individual bird's being collected or salvaged; furthermore, the months closest to parity in sex ratio are January to March, when the collection bias should be strongest.

246
The second explanation is feasible, considering that it has been shown that female Tawny Owls (Strix aluco) facultatively produce female-biased clutches in response to abundant prey (Appleby et al. 1997). The third explanation implies that differential mortality may be a direct consequence of differential migration, a mechanism that fits with the peak proportion of females occurring during September and October, and that is compatible with both the arrival-time and dominance hypotheses. The fourth, fifth, and sixth explanations imply that differential migration and differential mortality are both caused by intrinsic behavioral or physiological differences between the sexes. These explanations are compatible with the dominance hypothesis, but not with the arrival-time hypothesis. One important intrinsic sex difference may be wing loading. Clark (1975) measured the surface area of the wings of two male and two female Short-eared Owls and found that the females had wing loading 37% higher than that of males. Although based on a small sample, the magnitude of the difference suggests that females fly and forage with lower energetic efficiency. Differences in foraging efficiency have been proposed to explain differential migration among age classes of Accipiter hawks, immatures migrating farther because of their greater vulnerability to deteriorating conditions (Delong and Hoffman 1999). The stark division of labor between the sexes of the Short-eared Owl during breeding, with males performing all of the provisioning at the nest, predicts correspondingly stronger selection on males for foraging efficiency. This type of sex-based specialization in ecology or breeding roles has been proposed as a driver of spatial segregation of the sexes in other bird species (Catry et al. 2005).

The specimen record for the Short-eared Owl is consistent with the arrival-time hypothesis, but it also implicates intrinsic differences between males and females or possible differences in the sex ratio of offspring as potential causes of differential migration. Sex differences in breeding roles and territoriality can lead to dimorphism in morphology, physiology, and foraging behavior that should be expected to engender different tradeoffs associated with migration. To understand these tradeoffs, more data are needed on sex differences in flight energetics, thermogenesis, and social dominance in the Short-eared Owl and other species with differential migration. Detailed studies of seasonal mortality rates and sex ratios of offspring would also be invaluable to the interpretation of patterns in the specimen record. Finally, the specimen record itself needs to be improved through continued collecting, salvaging, and systematic digitization of data to provide a higher-resolution picture of large-scale ecological phenomena such as differential migration.

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LITERATURE CITED


Differential Migration by Sex in the Short-eared Owl


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Short-eared Owl

Sketch by George C. West
ON TWO FRONTS: OCCURRENCE OF THE HOUSE SPARROW IN ALASKA

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ABSTRACT: The first Alaska records of the House Sparrow (Passer domesticus), comprising birds reaching southeastern (132° W) and far western (171° W) localities in the state, probably reflect short-distance dispersals from adjacent Canada (British Columbia) and from the adjacent Russian Far East (Chukotka), respectively. Both source populations are the results of human introductions.

THE ALASKA RECORDS

There was no certain Alaska record of the House Sparrow (Passer domesticus) until late in the 20th century, when the first two records were established some 2200 km apart, one in southeastern and one in western Alaska (Figure 1). A lone female observed on 23 October 1987 at Petersburg (56° 48' N, 132° 58' W) provided the first (Am. Birds 42:121, 1988; Gibson and Kessel 1992; see Appendix for details of all Alaska specimens). A lone male observed 13–14 June 1993 (during a field trip following an AOU convention) at the landfill at Gambell (63° 47' N, 171° 45' W), Saint Lawrence Island, provided the second (N. Am. Birds 47:1140, 1993).

Nine years after the Petersburg occurrence, a House Sparrow was recorded on 26 October 1996 in southeasternmost Alaska, at Ketchikan (55° 20' N, 131° 38' W), where there were five records in the ensuing years through 2004 (Heinl and Piston 2009) and where the first Alaska nesting records were established in 2009 and 2010 (N. Am. Birds 63:488, 63:642; 64:137, 64:484, and 64:635). Fourteen years after the isolated Saint Lawrence Island record, a group of about five House Sparrows was present from mid- to 22 October 2007 at Shishmaref (66° 15' N, 166° 04' W), a barrier-beach village on the Chukchi Sea coast of the Seward Peninsula (N. Am. Birds 62:135); at least two of those birds persisted through the winter and into spring (62:291, 62:465). One was found dead and was preserved.

For completeness I append here two earlier, published, nominal reports attributed to Alaska—one House Sparrow reported 15 July 1967 at the Annette Island airport (55° 09' N, 131° 28' W), near Ketchikan (Eastman and Eastman 1968), and four or five birds reported “in June 1981” at the Anchorage airport (61° 13' N, 149° 53' W) (Summers-Smith 1988:129, 1993:62).

INTRODUCTIONS AND EXPANSION OF RANGE—NORTH AMERICA

Early in the 21st century it is difficult to fathom the mid-19th century zeal that led to the many and scattered introductions into North America of the House Sparrow, a species introduced “partly because European immigrants longed for the familiar birds of their homeland and partly because they believed this bird would serve a useful purpose in controlling insect pests”
Figure 1. Locations of records of the House Sparrow between 140° E and 120° W mentioned in text.
ON TWO FRONTS: OCCURRENCE OF THE HOUSE SPARROW IN ALASKA

(Robbins 1973:3). Multiple releases, of subspecies nominate domesticus from Great Britain and Germany, took place primarily from 1850 to the early 1870s in New York City, Portland (Maine), Boston, New Haven, Philadelphia, Halifax, Québec, and various points in Ohio (e.g., Cleveland, Cincinnati), Michigan, Wisconsin, and Galveston, Texas (Barrows 1889). “But no sooner had they become fairly numerous at any of these points than people began to take them thence to other places, sometimes in large numbers, but more often only a few pairs at a time...and it is only within the past year that we have come to realize something of the magnitude of the ‘craze’ which led so many people to foster and distribute this serious pest” (Barrows 1889:18). In that fashion were birds transplanted from New York City and elsewhere in eastern North America to Alabama, Arkansas, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, and beyond.

Farther west, 20 House Sparrows were introduced in Salt Lake City in 1873 or 1874 and an unknown number was introduced in San Francisco in 1871 or 1872. Barrows (1889:23) was the first to discuss the influence of railroads on this bird’s North American distribution: “there is no doubt that the great railroads along which vast quantities of grain are transported have been so many great highways along which the Sparrows have traveled slowly from place to place.” Regarding the first California records, Grinnell and Miller (1944:573) cited Barrows and wrote, “it is supposed to have been purposely introduced from some point in the eastern United States where the species already had become abundant. Probably, however, it has repeatedly entered the State along railroad lines, of its own volition or through adventitious transportation in grain and stock cars.” In the Pacific Northwest, the species was introduced in Oregon (Gabrielson and Jewett 1940), where known since 1888 (Marshall et al. 2006); it was apparently not introduced within Washington, where first reported about 1895 (Jewett et al. 1953, Wahl et al. 2005), but it was introduced in adjacent southwestern British Columbia about 1890 (Brooks and Swarth 1925). In British Columbia today House Sparrows are most plentiful in the human-populated areas of the south coast and in the dry southern valleys of the interior, but they are resident as far north and west as Smithers, Terrace, and Prince Rupert and as far north and east as Fort Nelson (Campbell et al. 2001). They had reached Fort Nelson by 1943, when Rand (1944) reported having seen a flock of about a dozen on 16 September.

As discussed by Barrows (1889) and by Grinnell and Miller (1944), “freight trains...probably played a big part in the spread of the House Sparrow, as many of the reports from western states at the turn of the [20th] century mentioned the bird as being well-established in cities along the railroads” (Robbins 1973:7). That means of dispersal alone probably explains the northwestern limits of the North American range at turn of the 21st century: Prince Rupert (54° 19' N, 130° 20' W) and Fort Nelson (58° 49' N, 122° 32' W) (Godfrey 1986, Campbell et al. 2001; see also Gibson and Kessel 1992)—the northwestern terminus and the northeastern terminus, respectively, in British Columbia of railroads connecting directly to the south and east. Because the species is “among the most sedentary of wild birds” and “extent of movement is...limited” (Summers-Smith 1988:141), the birds in
southeastern Alaska can reasonably be surmised to be dispersals from Prince Rupert, 125 km south of Ketchikan, or from another not-distant community on the Canadian Pacific Railway. The possibility of long-distance dispersal by individual House Sparrows has not been studied, but there seems to be no evidence of such behavior (Lowther and Cink 2006).

In Eurasia, the House Sparrow has long been associated with human communities north of 60° N (Cramp and Perrins 1994), ranging, for example, north to 66° N on the Ob', Taz, and Yenisei rivers, in the Ural and Siberian federal districts of Russia (Stepanyan 1990). For decades it has occurred in west-central North America in Northwest Territories at Yellowknife (62° 27' N, 114° 21' W) and Fort Simpson (61° 45' N, 121° 14' W) (see AOU 1957, Godfrey 1966). But in northwestern North America the House Sparrow—the legacy distribution of North American introductions vs dispersals from Asia—has been recorded north of 60° N only since the 1990s. In Yukon Territory the first, present August–December 1996 at Whitehorse (60° 43' N, 135° 03' W) (Alexander et al. 2003), was followed by eight, 14, and 38 birds reported on Whitehorse Christmas Bird Counts in December 2007, 2008, and 2009, respectively (http://birds.audubon.org/historical-results).

**EXPANSION OF RANGE AND INTRODUCTIONS—NORTHEASTERN ASIA**

House Sparrows (nominate *domesticus*) followed the Trans-Siberian Railway (completed 1916) across Russia, via which corridor they reached Khabarovsk (48° 30' N, 135° 06' E), capital of the Far Eastern Federal District of Russia, soon thereafter, and thence, in dispersal north down the Amur River, reached Nikolaevsk-on-Amur (53° 09' N, 140° 42' E) in 1929 (Dement'ev and Gladkov 1954, Vaurie 1959, Summers-Smith 1988, Stepanyan 1990). Birds apparently dispersed from there to nearby Okha (53° 34' N, 142° 56' E), at the north end of Sakhalin Island, “where [the species had been present] for three decades in June 1987” (Kde v tret'ey dekade iuniya 1987), when Nechaev (1991:570) counted about 20 pairs; he saw broods there in July 1987 and in July 1988. Elsewhere in northeastern Asia, the House Sparrow was first recorded between 1990 and 1994 in Japan (Brazil 1991, Ornithological Society of Japan 2000), where Summers-Smith and Taguchi (2010:273) considered “colonisation...unlikely.”

In the Russian Far East, in the last three decades of the 20th century, House Sparrows were introduced north and east of the Amur River mouth in the 1970s on the north coast of the Sea of Okhotsk at Magadan (59° 34' N, 150° 48' E), in which area A. Ya. Kondratyev (in litt.) reported the species thriving in farms and villages in the mid-1990s. Farther east, *P. d. domesticus* was introduced near the Pacific coast of southern Kamchatka in 1981—24 birds from Moscow released at Yelizovo (53° 11' N, 158° 23' E), where they nested successfully at least through 1984, in which year no fewer than 50 young were fledged (Lobkov 1986). At the close of the 20th century it was regarded by Artyukhin et al. (2000) as established at Yelizovo, as well as in the villages of Korf (60° 19' N, 165° 49' E) and Tilichiki (60° 28' N, 166° 06' E), on Kofa Bay, northern Kamchatka/coastal Koryakland—where not known earlier (see Kistchinski 1980).
ON TWO FRONTS: OCCURRENCE OF THE HOUSE SPARROW IN ALASKA

North of Kamchatka, from 1993 to 1995 House Sparrows persisted in sheds and greenhouses in the community of Markovo (64° 40’ N, 170° 25’ E), upper Anadyr River basin, and a flock of 10 fledged young was seen there on 31 July 1995 (Tomkovich 2008). Not known to Portenko (1973), they were first reported as far east as the Chukotski Peninsula—the easternmost extremity of the Russian Far East—in the 1990s, at Provideniya (64° 22’ N, 173° 14’ W), where birds were introduced (Summers-Smith and Taguchi 2010), probably by Russian aircrews: “fairly common,” 7–8 July and 27 July 1993 (K. A. Russell in litt.); none seen mid-July 1994 (D. R. Paulson in litt.); a few, July–August 1995 (D. Banin in litt.). A. Ya. Kondratyev (in litt.) regards their long-term survival there as unlikely. The most parsimonious explanation for the June 1993 occurrence at Saint Lawrence Island is direct dispersal from Provideniya, 100 km away.

In the first decade of the 21st century, in 2009 House Sparrows bred commonly in the village of Meynypil’gyno (62° 32’ N, 177° 02’ E), on the Bering Sea coast west of Cape Navarin, had almost disappeared by summer 2010, then in 2011 the number increased, but not to the level of 2009 (P. S. Tomkovich in litt.). Farther north, they were nesting in the town of Anadyr (64° 44’ N, 177° 31’ E), at the mouth of the Anadyr River, in 2000 (P. S. Tomkovich in litt.). Much farther north, at arctic Pevek (69° 42’ N, 170° 18’ E), on Chaun Bay, East Siberian Sea, the species appeared in the early 2000s and was numerous and building nests in 2007 (Tomkovich 2007, in litt.). It seems only likely, therefore, that the birds that reached Shishmaref, Alaska, in fall 2007 were dispersals from a site of introduction on the adjacent Chukotski Peninsula, 160+ km away, like the earlier bird at Saint Lawrence Island.

“[A] commensal of man, almost invariably closely attached to cultivated land and vicinity of habitations from the largest cities to isolated farms...occasionally, chiefly in the eastern [Asia] part of the range...[Passer domesticus has nested] in free colonies away from man along river banks, or in the open forest or along its fringes” (Vaurie 1959:568). A lone female seen several times in 1992 about the Balaganchik River mouth (V. G. Krivosheeva in Tomkovich 2008), Anadyr River basin, was an example of a House Sparrow distant from a human community.

SUMMARY

At this juncture, the House Sparrow has been recorded in both easternmost and far western Alaska. The few records represent birds from two geographically disparate sources. Though from two different proximate origins, they are all (1) the same subspecies, Passer domesticus domesticus, and (2) the direct or indirect results of releases by humans, either examples of dispersal by the legacy of long-ago releases (in North America) or of dispersal by recent releases (in Russian Far East). There is to date no record of Passer domesticus in northwestern North America between 135° W (Whitehorse, Yukon Territory) and 166° W (Shishmaref, Alaska), but the species warrants continued attention in this region.
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LITERATURE CITED


ON TWO FRONTS: OCCURRENCE OF THE HOUSE SPARROW IN ALASKA


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APPENDIX


256
NOTES

THE WRETCHED RIDDLE OF REDUCED RECTRICES IN WRENS

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Hwat dostu godes a-mong monne?
Na mo þene dop a wrecche wrenne.
(What good do you do among men?
No more than does a wretched wren.)

(The Owl and the Nightingale, Middle English poem, 13th century, lines 563–566; Wells 1907)

Most bird species possess 12 rectrices in six pairs, although the number of rectrices varies among all species from 6 to 32 (Van Tyne and Berger 1976). Within a species, variations from the typical number of rectrices also occur, commonly in some species, and it is this type of variation that has probably attracted most attention. Audubon (1831:139, 140), for example, reported a female Carolina Parakeet (Conuropsis carolinensis) with a pair of supernumerary rectrices; he recognized it as an individual aberration and chose to highlight it in his painting of this species. Somadikarta (1984) used the term “polyrectricily” for supernumerary rectrices, and Hanmer (1985) coined the term “anisorectrical” for an abnormal number of rectrices, whether in an asymmetrical or symmetrical context.

Variation among lineages also occurs. Nitzsch (1867:86) recorded 10 rectrices in these genera: Cypselus, Trochilus, Caprimulgus, Cuculus, Centropus, Phaenicophas, Scythrops, Crotophaga, Bucco, Micropogon, Pogonias, Rhamphastus, Bucerós, Upupa, Colius, Musophaga, and Opisthocomus (Nitzsch did not report which species of these genera he examined, so I give his partly antiquated nomenclature verbatim). Van Tyne and Berger (1976:137) provided a brief review of the distribution of taxa with 10 rectrices: “hummingbirds, swifts, most cuckoos, most of the motmots, the toucans, etc.,” the genus Dicrurus, and some Furnariidae. Also, the family Acanthisittidae of New Zealand has only 10 rectrices (Newton 1896). It seems that a modern taxonomic survey of the distribution of species with 10 rectrices does not yet exist. Nor does there seem an explanation for this reduction. It is not well known (indeed, I have not yet seen it recorded) that 10 rectrices are the norm in several species of wrens (Troglohytidae). Here I investigate the taxonomic distribution of this condition at the genus level in the Troglohytidae and consider possible reasons for its occurrence.

I examined specimens and counted rectrices. Sample sizes were three or more individuals per species except where indicated. I was unable to sample all species of wrens, but I endeavored to sample all of the genera. The genus Thryothorus as historically configured is paraphyletic, and generic limits for the taxa that no longer belong in that genus (all but T. ludovicianus) are neither statistically nor phenotypically clear (Mann et al. 2006). Resurrection of the genus Pheugopedius is the simplest taxonomic solution at present, although future molecular and phenotypic research is likely to change generic limits as relationships become clearer (both through increased genomic and taxonomic sampling). Mann et al. (2006) proposed a three-genus solution (Pheugopedius, Thryophilus, and Cantorchilus), but this required naming a new genus (Cantorchilus) based entirely on mtDNA characters because no phenotypic characters are yet known to define this molecular clade of nine species. Because I am
not comfortable using molecular characters exclusively to define the limits of a genus (any well-supported multi-species molecular clade could thus be a genus), I use the genus _Pheugopedius_ with subgenera _Thryophilus_ and _Cantorchilus_ here, sampling each of these three mtDNA clades reported by Mann et al. (2006).

The following 16 taxa have 12 rectrices: _Odontorchilus branickii_ (Gray-mantled Wren, *n* = 1), _Campylorhynchus b. brunnecapillus_ (Cactus Wren), _Troglodytes hiemalis_ (Winter Wren), _Cistothenus platensis stellaris_ (Sedge Wren), _C. palustris_ (Marsh Wren), _Ferrinia cerverai_ (Zapata Wren, *n* = 2), _Salpinx obsoletus_ (Rock Wren), _Catherpes mexicanus conspersus_ (Canyon Wren), _Thryomanes b. bewickii_ (Bewick’s Wren), _Thryothorus l. ludovicianus_ (Carolina Wren), _Uropsila leucaogastra_ (White-bellied Wren), _Pheugopedius fasciatoventris albicularis_ (Black-bellied Wren), _P. (subgenus _Thryophilus_) rufalus castanotus_ (Rufous-and-white Wren), _P. (subgenus _Cantorchilus_) thoracicus_ (Stripe-breasted Wren), _P. (C.) m. modestus_ (Plain Wren), and _P. (C.) nigricapillus costaricensis_ (Bay Wren).

These seven taxa have 10 rectrices: _Thryorchilus browni_ (Timberline Wren), _Microcerculus marginatus luscinia_ (Scaly-breasted Wren), _Cinnycerthia unirufa chakei_ (Rufous Wren), _Henicorhina leucosticta prostheleuca_ (White-breasted Wood Wren), _Cyphorhinus phaeoccephalus_ (Song Wren), _Pheugopedius atrogularis_ (Black-throated Wren), and _P. coraya ridgwayi_ (Coraya Wren). I was not able to access adequate material of _Hylorchilus_ (Sumichrast’s and Nava’s wrens).

I mapped the distribution of 12 and 10 rectrices onto a phylogenetic tree of the family (Figure 1) based on the molecular phylogeny of Mann et al. (2006; their figure 2 and text), collapsing nodes with weak support (<54% nonparametric bootstrap support). It is clear that the reduction to 10 rectrices represents a derived condition and that it arose multiple times. The genus _Pheugopedius_ (sensu stricto) comprises some species with 12 rectrices and others with 10, so the number of rectrices is not a reliable indicator of generic limits.

Because I did not sample all species, and the phylogeny of the wrens remains uncertain at key nodes, elucidation of the full evolutionary history of 10 rectrices in the family will require further study. For example, the large, unresolved clade of _Pheugopedius_ and its allies has a particularly complex and unresolved history of rectrix number. From these data, it is possible that the ancestor of this clade had 10 rectrices and that there were four reversions to 12 rectrices (see Figure 1). However, a great deal more genetic and morphological study will be required to resolve this. Two key results will not change, though: the reduction to 10 rectrices arose independently at least three times, and this character can occur within a genus in which some species have 12 rectrices.

Newton (1896) provided additional examples of intrageneric variation in rectrix number in _Oreocinclia_ (thrushes now in _Zoothera_), _Phalacrocorax_ (cormorants), and _Gallinago_ (snipe). Vaurie (1971) gave the furnariids _Synallaxis_ and _Certhiaxis_ as two more examples of intragenic variation. Hamner’s (1985) results imply another example in _Colius_, _C. striatus_ (Speckled Mousebird) having 12 rather than the 10 given for the genus by Nitsch (1867).

I cannot figure out any evolutionary hypothesis other than stochasticity that might explain the distribution of this trait within the _Troglodytidae_. Thus there may be no answer to the titular riddle. (The riddle is why some wrens have reduced rectrices—a conundrum form of the literary device whose answer is yet to be determined.) Simple potential explanations such as tail length or habitat fail to explain 10 rectrices in this family. Newton (1896:770) commented, “Indeed, the number of Rectrices seems to have but little significance, very nearly-allied species differing in this respect.” Vaurie (1971:20) wrote that “The number of tail feathers is therefore very clearly not of generic importance.”

The frequency of individual variation within species is sufficiently high that rectrix variation could be considered in the context of a rare, largely neutral allele subject
to the stochastic processes of genetic drift. For example, Hanmer (1985) reported that among ~22,800 birds sampled in Mozambique and Malawi, 126 individuals of 45 species had an abnormal number of rectrices, and he reported the frequency of abnormality within a species to range from 0.13 to 12.5%. Zwickel et al. (1991) summarized evidence for variable numbers of rectrices in nine species of North American grouse and found frequencies of intraspecific variation of 0–14%. Interestingly, in the Dusky Grouse (Dendragapus obscurus) these authors found rectrix number to vary with subspecies (modal values of 18 versus 20).

Across the class Aves, some of the more extreme variations on the usual 12 rectrices occur among species in which tails are used in courtship displays (Van Tyne and Berger 1976). Thus rectrix number can apparently at times be under strong sexual selection. However, it is possible that single-pair variation in rectrix number, especially in taxa that do not use their tails in courtship displays, represents effectively neutral phenotypic evolution and that stochasticity is responsible for its occurrence and distribution among lineages. This seems at present to be a reasonable null hypothesis.
I dedicate this paper to my good friend Bob Dickerman, whose works with variation in birds (including wrens), links between science and poetry, museum specimens, and other endeavors have been an inspiration to many. Deyanira Etain Varona Graniel stimulated my examination of wren tails through her careful field work and by reporting in her tesis profesional at the Universidad Nacional Autónoma de México (UNAM) that Henicorhina leucosticta has only 10 rectrices. I thank Daniel Gibson, Philip Unitt, and an anonymous reviewer for helpful comments and staff at the U. S. National Museum of Natural History for allowing me access to their wrens. Additional material was examined from the University of Alaska Museum.

LITERATURE CITED


Accepted 7 May 2012
NOTES

FIRST NORTH AMERICAN RECORD OF THE COMMON MOORHEN (GALLINULA CHLOROPUS) CONFIRMED BY MOLECULAR ANALYSIS

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MICHAEL T. SCHWITTERS, P. O. Box 143, Choteau, Montana 59422; schwit@3rivers.net

On 12 October 2010 Schwitters briefly observed a gallinule or moorhen in a small interior wetland on Shemya Island, Alaska (52° 43' N, 174° 07' E). In spite of considerable effort, he could not find the bird again until the evening of 14 October 2010, when it was relocated foraging in another interior wetland (Figure 1) and was collected (University of Alaska Museum [UAM] 27369). The bird likely arrived on Shemya with a decaying typhoon (Malakah) that passed just north of the island on 27 September 2010 but went undetected in the intervening time because of its secretive behavior. The specimen is a juvenile male with the following characteristics: mass 269 g, trace amounts of fat, left testis 4 x 2 mm, wing chord 169 mm, tail 62 mm, tarsus 50.1 mm, bill (from anterior edge of nares) 14.5 mm, bill height (at same point) 8.8 mm, bill width 5.2 mm, feet/legs yellow-green (Figure 2).

The American Ornithologists’ Union’s checklist committee (Chesser et al. 2011) recently split the Old and New World populations of Gallinula chloropus into two species, the New World Common Gallinule (G. galeata) and the Old World Common Moorhen (G. chloropus), on the basis of differences in vocalizations (Constantine et al. 2006) and mitochondrial DNA (Groenenberg et al. 2008).

In North America, G. galeata ranges primarily in the eastern and southern regions, occurring locally from southeastern Minnesota, central Wisconsin, the northern lower peninsula of Michigan, southern Ontario, extreme southern Quebec, eastern New Brunswick, and western Nova Scotia south to Costa Rica and the coast of the Gulf of Mexico, as well as on Bermuda and throughout the West Indies. West of the Great Plains it is local in New Mexico, Utah, Arizona, Nevada, and California. Northern populations are migratory, while the localized western populations are largely sedentary (Bannor and Kiviat 2002). North of California there are few records: 10 from Oregon (two in winter, one in April, and seven in May, all but one of single birds—H. B. Nehls, Oregon Bird Records Committee, in litt., October 2011), none from Washington (see Wahl et al. 2005), and one in extreme southwestern British Columbia (one, May–June 1981, Campbell et al. 1990).

In the Old World, G. chloropus is widely distributed, breeding in the Azores, northern Africa, and the greater part of Eurasia (Vaurie 1965, Cramp and Simmons 1980), east to Japan (Hokkaido) and the southern Kuril Islands (OSJ 2000). North and east of the Kuriles, there have been three extralimital records in the Russian Far East: two in southern Kamchatka (Balshaya River, in October 1974, and Nalicheva River, 29 October 1981; Artyukhin et al. 2000) and one in the Commander Islands (Bering Island, 24 April 1956; Marakov 1962, Artyukhin et al. 2000). More northerly populations are migratory (Vaurie 1965), with most birds leaving northern Japan by mid-October (Brazil 1991).

With over a dozen described subspecies, geographic variation in the former G. chloropus is considerable, although it is mostly clinal within each hemisphere (Cramp and Simmons 1980, del Hoyo et al. 1996). The birds of eastern Asia, sometimes separated as subspecies indica (Vaurie 1965), average smaller than birds from elsewhere in the Old World—all of which average smaller than New World birds. Measurements of Old World and New World birds overlap considerably (see Ridgway and Friedmann 1941, Cramp and Simmons 1980, Pyle 2008), however, and they
could not be used to indicate the origin of the Shemya bird. Similarly, the age of the Shemya bird prevents use of several important defining characters useful in identifying adult specimens, e.g., size, coloration, and shape of the bill and ornamental shield. Determining the origin of the Shemya bird therefore required a molecular comparison.

To provide a molecular framework for comparison, we obtained 17 sequences of cytochrome oxidase subunit I from GenBank, and we sequenced this gene in a sample of one additional Old World bird at UAM. These sequences represented eight specimens of Old World *G. chloropus* and 10 of New World *G. galeata* for comparison with the Shemya bird (Table 1).

We extracted DNA from frozen tissues with a DNeasy tissue kit (Qiagen, Valencia, CA) by following the manufacturer’s protocol. To amplify the DNA by the polymerase chain reaction (PCR) we followed the protocols of Kerr et al. (2007). The High-Throughput Genomics Unit of the University of Washington, Seattle, cleaned the product of the PCR by an ExoSAP process, cycle-sequenced the DNA with BigDye (Applied Biosystems, Foster City, CA), using an internal forward primer (AGGCTTTGGCAACTGACTAGTACC) and an internal reverse primer (AGATGGCTAGGTC-TACTGAAAGCAC), and sequenced it on a high-throughput capillary sequencer. We aligned and edited the sequences with Sequencher 4.7 (Gene Codes, Ann Arbor, MI) and archived them in GenBank with accession numbers JN982467 and JN982468.

We sequenced 416 base pairs of cytochrome oxidase subunit I from the Shemya bird. Comparison of homologous sections of the 18 reference sequences obtained from GenBank and UAM tissue’s protocol revealed 15 positions with fixed differences between Old and New World specimens and two sites with variations that the Old and New World clades shared. At all 15 of these positions the Shemya bird had the bases characteristic of Old World specimens, indicating it was probably of Old World origin (Table 1). Similarly, a parsimony analysis with 1000 bootstrap replicates (run in PAUP version 4.0b10; Swoford 2003) of the cytochrome oxidase subunit I data from the 19 gallinules and moorhens and five sequences from four close relatives (Table 2) clearly placed the Shemya bird with other Old World birds (Figure 3).

Rails as a group are known for their propensity to appear far from their normal ranges (Ripley 1977, Taylor 1998), and moorhens/gallinules in particular are adept at colonizing remote islands (Olson 1973). They have been recorded as vagrants in Greenland, where all records are of the North American *G. g. cachinnans* (Boertmann 1994). Nominate *G. c. chloropus* has been recorded from Iceland and Spitsbergen (AOU 1998); Taylor (1998:499) misread AOU (1983) in attributing *cachinnans* to the Commander Islands. Given the distribution of *Gallinula* in Eurasia and North America and the Asian origins of most migrant birds reaching the western Aleutian Islands (Gibson and Byrd 2007), it is not surprising that the Shemya bird came from Asia.

Schwitters’s field work on Shemya Island was funded by the U.S. Air Force in conjunction with the U.S. Department of Agriculture’s Animal, Plant, and Health Inspection Service, with logistical support from the Chugach-Eareckson and Del-Gen corporations. Support for the molecular work was provided by the University of Alaska Museum and the Friends of Ornithology. Kevin Winker and Daniel D. Gibson read drafts of the manuscript and provided helpful comments. Richard C. Banks reviewed the final draft.

LITERATURE CITED


Table 1  The 17 Variable Positions in the 416 Base Pairs of Cytochrome Oxidase Subunit Ia

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<tr>
<th>GenBank accession number</th>
<th>Location</th>
<th>Variable sites</th>
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</tr>
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<td>JN982467</td>
<td>Germany</td>
<td>TACAGCCCTGCTTCCCTT</td>
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<tr>
<td>JF498859</td>
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</tr>
<tr>
<td>HQ896036</td>
<td>Old World</td>
<td>TACAGCCCTGCTTCCCTT</td>
</tr>
<tr>
<td>EF515779</td>
<td>S. Korea</td>
<td>TACAGCCCTGCTTCCCTT</td>
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<td>GQ481956</td>
<td>Russia</td>
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<tr>
<td>JN982468</td>
<td>Shemya</td>
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<td>Gallinulala galeata</td>
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<td>JF498856</td>
<td>Hawaii</td>
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</table>

aOf these, 15 are fixed in the New World or Old World populations; the Shemya bird has all of the fixed Old World variants. Sites correspond to positions 6904, 6958, 6967, 7000, 7003, 7108, 7150, 7159, 7165, 7198, 7207, 7216, 7236, 7240, 7243, 7279, and 7300, respectively, in the mtDNA genome of the chicken.
Figure 1. The Shemya Common Moorhen (Gallinula chloropus) in life on 14 October 2010.

Photo by Michael T. Schwitters

Figure 2. Prepared specimen of the Common Moorhen collected 14 October 2010 on Shemya Island, Alaska.

Photo by Jack J. Withrow


Table 2  GenBank Accession Number, Source, and Vouchers Numbers of Specimens Used in Molecular Comparisons

<table>
<thead>
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<th>Species and location</th>
<th>Genbank accession</th>
<th>Source</th>
<th>Voucher</th>
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<td></td>
</tr>
<tr>
<td>Shemya</td>
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<td>this study</td>
<td>UAM 27369</td>
</tr>
<tr>
<td>Germany</td>
<td>JN9824677</td>
<td>this study</td>
<td>UAM 18775</td>
</tr>
<tr>
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<td>GQ481956</td>
<td>Kerr et al. 2009</td>
<td>ZMMU RYA 1902</td>
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<td>Johnsen et al. 2010</td>
<td>NHMO-BC46</td>
</tr>
<tr>
<td>Sweden: Skane</td>
<td>GU571907</td>
<td>Johnsen et al. 2010</td>
<td>BISE-Aves92</td>
</tr>
<tr>
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<td>Kan and Li unpubl.</td>
<td>?</td>
</tr>
<tr>
<td>Japan: Chugoku</td>
<td>JF499135</td>
<td>Kerr and Dove unpubl. data</td>
<td>USNM 641876</td>
</tr>
</tbody>
</table>

| Gallinula galeata            |                   |                |              |
| Argentinia: Corrientes       | FJ027609          | Kerr et al. 2009 | MACN-Or-ct 1788 |
| Argentinia: Corrientes       | FJ027608          | Kerr et al. 2009 | MACN-Or-ct 1414 |
| Canada: Quebec               | DQ433655          | Kerr et al. 2007 | CWS42847     |
| Canada: Ontario              | DQ434600          | Kerr et al. 2007 | LMA865-05699 |
| Canada: Quebec               | DQ433657          | Kerr et al. 2007 | CWS42846     |
| Canada: Ontario              | DQ433656          | Kerr et al. 2007 | AXBS003      |
| Canada: Ontario              | DQ433654          | Kerr et al. 2007 | CWS42845     |
| USA: Florida                  | DQ432936          | Kerr et al. 2007 | USNM 622527  |
| USA: Hawaii                   | JF498859          | Kerr and Dove unpubl. data | USNM 643457  |

| Gallinula melanops (Spot-flanked Gallinule) |                   |                |              |
| Argentinia: Corrientes       | FJ027612          | Kerr et al. 2009 | MACN-Or-ct 3055 |
| Argentinia: Corrientes       | FJ027611          | Kerr et al. 2009 | MACN-Or-ct 1692 |

| Fulica atra (Eurasian Coot)  |                   |                |              |
| Japan: Chugoku               | JF499133          | Kerr and Dove unpubl. data | USNM 641834  |

| Fulica alai (Hawaiian Coot)  |                   |                |              |
| USA: Hawaii                  | JF498858          | Kerr and Dove unpubl. data | USNM 643398  |

| Fulica americana (American Coot) |                   |                |              |
| Canada: Ontario              | DG434598          | Kerr et al. 2007 | LMA1046-29312 |


NOTES

Figure 3. Parsimony analysis of 416 base pairs of cytochrome oxidase subunit I, in which sequences of the Old World Common Moorhen (Gallinula chloropus), the New World Common Gallinule (G. galeata), and outgroups (G. melanops, Fulica alai, F. americana, and F. atra) cluster by species. The Shemya bird (boxed) groups with the Old World birds. Numbers above nodes are the percentage of 1000 bootstrap replicates in which the node appeared. Letters and numbers after location (for moorhens and gallinules) or taxon name (for outgroups) are GenBank accession numbers.


Accepted 26 January 2012

THANKS TO WESTERN BIRDS’ REVIEWERS AND ASSOCIATE EDITORS

Peer review is a critical step in the publication of a scientific journal. I thank the following people for their generosity in taking the time to provide this essential service sustaining the scientific quality of *Western Birds* for volume 43: Loren Ayers, Richard C. Banks, F. Keith Barker, M. Ralph Browning, Ryan Burnett, Charles T. Collins, Dave Compton, Alan Contreras, John P. DeLong, Kimball Garrett, Daniel D. Gibson, Robert E. Gill, Laurie Harvey, Steven C. Heinl, Richard Hutto, Deborah Jaques, Dave Krueper, Tony Leukering, Patrick J. Mock, Michael A. Patten, Amadeo M. Rea, L. Jay Roberts, Kristofer Robison, Nathan Senner, Philip C. Stouffer, Brian Sullivan, and Scott Terrill.

I also thank our hard-working associate editors, Kenneth P. Able, Doug Faulkner, Thomas Gardali, Daniel D. Gibson, Robert E. Gill, Paul Lehman, Ron LeValley, Kathy Molina, and Dan Reinking, plus featured-photo editor John Sterling, all of whom also serve as reviewers as they coordinate the review of manuscripts. *Western Birds* is not possible without their dedication.

After 13 years as associate and assistant editor, Kathy Molina stepped down this year. It’s with much regret I make this announcement, as Kathy has played a critical role in sustaining the scientific quality of *Western Birds* since 1999. As the person coordinating the reviews of manuscripts, our associate editors, and recruiting many reviewers, reviewing many manuscripts, and providing feedback to many authors herself, Kathy has made a monumental and lasting contribution to WFO and to ornithology. Her leadership in developing the scientific content of *Western Birds* has been central to our success, and I cannot thank her enough for lending her expertise, diligence, and valuable time to our journal.

At the same time, I’m delighted to announce that Daniel D. Gibson is stepping into the role of assistant editor. Dan Gibson has played many key roles in WFO for many years—associate editor, board member, vice-president, reviewer, indexer, author, and tireless promoter—and his commitment to *Western Birds* is something for which we should all be thankful. Dan spearheaded the festschrift in honor of Bob Dickerman that constitutes this issue. It’s with much fondness as well as gratitude that I call both Kathy and Dan colleagues and friends.

*Philip Unitt*
NOTES

CLASSIFICATION OF THE HOUSE FINCH OF THE CHANNEL ISLANDS, SOUTHERN CALIFORNIA

PHILIP UNITT, San Diego Natural History Museum, P. O. Box 121390, San Diego, California 92112-1390; birds@sdnhm.org

The Channel Islands of southern California are renowned for their many endemic plants and animals. Among land birds, 22 endemic species or subspecies have been described. Not all of these are valid, however, and their distinctiveness spans a wide spectrum. Johnson (1972) categorized the islands’ land birds in five strata ranging from the Island Scrub-Jay (Aphelocoma insularis) of Santa Cruz Island to those not known to differ from mainland populations. The last includes both species of which no subspecies endemic to the islands have been proposed, such as the Bushtit (Psaltriparus minimus), and described subspecies whose supposed differences have been discredited or found to be insufficient to meet the criteria for recognition. These synonymized names include Colaptes cafer sedentarius van Rossem, 1944 (with C. auratus collaris; AOU 1952), Vireo maillardi Grinnell, 1903 (with V. h. huttoni; AOU 1908), Salpinctes obsoletus pulverius Grinnell, 1898 (with S. o. obsoletus; Grinnell 1929), Amphispiza bellii clementae Ridgway, 1898 (with A. b. bellii; Patten and Unitt 2002), and Melospiza melodia micronyx and M. m. clementae (the last two with M. m. graminea; Patten and Pruett 2009).

The status of the supposed subspecies of the House Finch (Carpodacus mexicanus clementis) has also been questioned. In the original description, Mearns (1898:259) reported the House Finches of the Channel Islands to differ from those of the mainland (C. m. frontalis) in their larger legs and feet, broader streaking on the underparts, shorter wings, and “bill much larger and more convex above.” He designated a type specimen from San Clemente Island, U.S. National Museum of Natural History 134784, collected 25 August 1894. In comparing clementis to frontalis Ridgway (1901:140) wrote, “wing and tail averaging shorter, the bill decidedly and feet slightly larger; coloration somewhat darker.” But Willett (1912:73) wrote, “I have examined specimens from several of the islands and fail to see that they differ appreciably from the mainland bird,” and Howell (1917) synonymized clementis, discrediting the differences in color and pattern and pointing out that the average differences in wing and tail length are trivial. Grinnell (1915:108) recognized clementis but restricted its range to the four southern islands (Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) and wrote “the characters of this form are most extremely developed in the birds on San Clemente Island. Birds from certain other islands of the Santa Barbara group are variously intermediate toward the mainland form.” Van Rossem (1927:177) argued for retention of clementis, citing the heavier bill, brighter color of the male, and heavier streaking of the female as the diagnostic characters, though noting the differences “become apparent only when good series are compared.” He identified the features of clementis as best developed on San Clemente and Santa Barbara islands and called the birds from Santa Catalina and Los Coronados islands (off Tijuana, northernmost Baja California) “clementis, intermediate toward frontalis.” Willett (1933:162) responded, “while birds from San Clemente and Santa Barbara islands appear to show very slight average differences from mainland specimens, their differences are so minute, and there are so many specimens that are identifiable only by the locality of their capture, that the value to ornithology of continuing the use of the name clementis seems doubtful.” Moore (1939:193) wrote that “clementis is certainly one of the weaker races” of the House Finch but maintained it on the basis of the heavier bill and supposedly buffer plumage of the female. He gave its range as “San Clemente Island, where its characters are expressed best. Birds of Catalina, Santa Barbara, San Nicolas, and Los Coronados islands are variously intermediate.”
Grinnell and Miller (1944:454) also continued to recognize clementis, ascribing the House Finches of all four southern islands to it, though calling it “questionable.” The last AOU checklist to list subspecies (AOU 1957) also gave clementis a range consisting of the four southern Channel Islands plus Los Coronados. In his table 1 Johnson (1972) specified the same range and in his table 2 mentioned only the heavier bill as a distinguishing character. He ranked clementis at the lowest level of distinctness, “weak differentiation.”

Power (1971, 1979, 1980) wrote extensively on the House Finch, emphasizing patterns of variation and processes of evolution. He quantified the pattern noted by earlier writers: a trend in average bill size from small to large from the mainland, through the northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz, Anacapa), to the southern islands other that San Clemente, to San Clemente. He integrated this pattern with that of the islands off Baja California, where the trend toward a large bill culminates on the most isolated island, Guadalupe, with the well-marked subspecies amplus. Scaling bill measurements to body weight, Power (1980) noted that in frontalis and clementis bill size varies in proportion to body size; only in amplus (and probably in the extinct mcgregori of the San Benito Islands, off central Baja California) is the bill disproportionately large.

Power sidestepped the question of classification, writing (1980:635) “it is clear that assigning island and west coast populations to the subspecies clementis or frontalis is an oversimplification and that we are dealing with a situation of almost clinal variation on which the subspecific designations are imposed.” His appendices 4–6 (Power 1980:647–649) provide all the data with which the overlap of clementis and frontalis can be quantified, however, and the century of vacillation can be put to an end. In any of the measurements listed, <75% of the specimens lie outside the zone of effective overlap, as shown in a comparison by the criteria and procedure outlined by Patten and Unitt (2002) (Tables 1, 2). This result is the same whether the comparison is with frontalis from the mainland of southern California or from the area of Moscow, Idaho, and Pullman, Washington, where the bill averages slightly smaller (Power 1980).

In 2005, Robb S. A. Kaler, working at the time on San Clemente Island, expressed an interest in this question. We measured the bills of the House Finches in the San Diego Natural History Museum, generating data independent of those of Power. The means and standard deviations for bill depth, length, and width are almost identical to Power’s. But these data also enabled me to quantify overlap in a combination of variables. For each specimen, I multiplied the three values for bill dimensions and took the cube root, for a variable representing bill “heaviness.” In this comparison clementis does not reach the criterion of diagnosability either (Kaler in Sullivan and Kershner 2005; Tables 1, 2).

In considering Tables 1 and 2, note that in every case the value of $\hat{x} - St_{0.25 \text{ or } 0.01}$ for clementis is smaller than the value of $\hat{x} + St_{0.25 \text{ or } 0.01}$ for frontalis. That is, whether the comparison is evaluating overlap of 25% of clementis with 1% of frontalis or of 1% of clementis with 25% of frontalis, the lower tail of the distribution of clementis overlaps with the upper tail of the distribution of frontalis to such an extent that >25% of either subspecies falls within the range of 99% of the other.

Even though the differences between these populations do not meet the threshold of diagnosability for recognition as subspecies, they exemplify evolution below this level, as Power’s studies have shown. Populations below the level of subspecies clearly contribute to a species’ phenetic and genetic diversity and merit conservation regardless of how they are classified. The question of whether a population meets the criterion of subspecies may look like hair splitting, as in the checkered history of Carpodacus mexicanus clementis. But for subspecies to maintain their usefulness for understanding of birds’ dispersal and migration, they should be defined by objective, consistent criteria. Eliminating invalid subspecies is a step toward an accurate
Table 1 Quantification of Overlap in Bill Size of Males of Carpoda-
cus mexicanus frontalis and C. m. clementis

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<td>x ± St&lt;sub&gt;0.01 or 0.25&lt;/sub&gt;&lt;sup&gt;e&lt;/sup&gt;</td>
<td>8.09</td>
<td>8.49</td>
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<tr>
<td>DLW&lt;sup&gt;1/3&lt;/sup&gt;</td>
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<tr>
<td>Mean (x)</td>
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<tr>
<td>SD (S)</td>
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<tr>
<td>n</td>
<td>45</td>
<td>74</td>
</tr>
<tr>
<td>x ± St&lt;sub&gt;0.25 or 0.01&lt;/sub&gt;&lt;sup&gt;d&lt;/sup&gt;</td>
<td>8.15</td>
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<td>x ± St&lt;sub&gt;0.01 or 0.25&lt;/sub&gt;&lt;sup&gt;e&lt;/sup&gt;</td>
<td>7.70</td>
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<sup>a</sup>Specimens from San Clemente Island only.
<sup>b</sup>Specimens from area of Moscow, Idaho, and Pullman, Washington.
<sup>c</sup>Specimens from mainland southern California.
<sup>d</sup>St<sub>0.25</sub> for clementis, t<sub>0.01</sub> for frontalis.
<sup>e</sup>St<sub>0.01</sub> for clementis, t<sub>0.25</sub> for frontalis.

understanding of biodiversity. Other subspecies from the Channel Islands especially in need of reevaluation are Callipepla californica catalinensis, Thryomanes bewickii nesophilus, and T. b. catalinae.

It is a pleasure to contribute this paper in honor of Robert W. Dickerman, whom I first met while examining specimens from the Channel Islands. Thanks to Robb Kaler for his painstaking work in measuring House Finch bills and for raising the question. And thanks to Daniel D. Gibson and Michael A. Patten for prompting me to complete this analysis.

LITERATURE CITED

Table 2  Quantification of Overlap in Bill Size of Females of *Carpodacus mexicanus frontalis* and *C. m. clementis*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Power (1980:647)</th>
<th>SDNHM specimens</th>
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<td></td>
<td>clementis&lt;sup&gt;a&lt;/sup&gt;</td>
<td>frontalis&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>(\bar{x} \pm S_{0.25 \text{ or } 0.01}^d)</td>
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<td>(\bar{x} \pm S_{0.25 \text{ or } 0.01}^d)</td>
<td>[8.11]</td>
<td>[8.54]</td>
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<td>(\bar{x} \pm S_{0.01 \text{ or } 0.25}^e)</td>
<td>[7.58]</td>
<td>[8.02]</td>
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</table>

<sup>a</sup>Specimens from San Clemente Island only.

<sup>b</sup>Specimens from area of Moscow, Idaho, and Pullman, Washington.

<sup>c</sup>Specimens from mainland southern California.

<sup>d</sup>\(t_{0.25}\) for *clementis*, \(t_{0.01}\) for *frontalis*.

<sup>e</sup>\(t_{0.01}\) for *clementis*, \(t_{0.25}\) for *frontalis*.


NOTES


Accepted 29 May 2012

Note added in proof: In the 53rd supplement to its *Check-List of North American Birds*, the American Ornithologists' Union Checklist Committee (Auk 129:573–588) adopted the genus *Haemorhous* Swainson, 1837, for the three North American species of *Carpodacus* and *Artemisiospiza* Klicka and Banks, 2011, for the Sage Sparrow. For the sake of consistency within the index for a volume, *Western Birds* will adopt these changes in volume 44, issue 1.
BOOK REVIEW


The term “feathered tribe” in the title is much too cute for what is principally a work aiming at scholarship. The author states in the preface that the “book is about what it meant to be a professional studying birds in the last quarter of the nineteenth century, how a professional class emerged, what it looked like, what roles amateurs played, and how these changes led to the science of ornithology as we practice it today” (p. ix-x). All of these are touched upon at various levels. Lewis’s chronicle includes a brief history of the Smithsonian Institution, the early growth and importance of its bird collection, the development of professional ornithology, and the influence of the American Ornithologists’ Union (AOU), with Robert Ridgway as the principal person of the story. According to the author, Ridgway was a world-renowned ornithologist who “is largely forgotten today.” Forgotten!? Countless birders and ornithologists do remember Ridgway today.

Chapter 1 of the seven chapters reveals a teenage Ridgway communicating with Spencer Baird, then assistant secretary of Smithsonian. The relationship between the two individuals led to Ridgway accompanying the Fortieth Parallel Survey, where he recorded observations and collected birds in 1867. At the end of the expedition, Ridgway became a paid illustrator at Smithsonian. Chapter 2, “The Smithsonian Years,” outlines some of the important people Baird mentored, including Ridgway, and others such as Elliott Coues (pronounced “cows,” according to oral history), Henry Henshaw, William H. Dall, Leonhard Stejneger, and others whose names now appear in the English and scientific names of North American avifauna. Ridgway was paid $1000 per year beginning in 1874. Not mentioned by Lewis, Ridgway’s salary equates to only $3.84 per day, assuming he worked only a 40-hour week. Ridgway might have earned more had it not been for the Long Depression, a 23-year worldwide economic crisis beginning in 1873. Even so, salaries from museums traditionally were/are low. By 1882, Smithsonian’s collection of birds was 50,000 specimens, which Lewis states (p. 38) “allowed Ridgway to see synonyms, antonyms, homonyms, and other parts of speech among the morphological language of birds.” Perhaps Lewis is using poetic license or betraying a lack of understanding since nomenclatural matters such as synonyms, etc., are not necessarily contingent on the number of available specimens. The last part of Chapter 2, “The Division of Birds,” may disappoint anyone who has visited or worked in the Division of Birds. Lewis mentions the pride of working there and might have mentioned that that holds true today, as do descriptions of crowding, low budgets, and maintaining a well-curated collection while contributing to the influence of the Smithsonian.

Chapter 3 is less about Ridgway and more about the founding of ornithological organizations beginning with the Nuttall Ornithological Club in 1873 and, in 1883, the AOU. Lewis writes of the organization and founding of the Auk and that the Nuttall’s Ornithological Club and AOU fostered a new kind of bird professionalism. Part of the new professionalism would grapple with differences between science and the lay, with the concept of evolution (Darwin’s theory was then relatively new to science, as Lewis reminds the reader more than once) and devising a code to clarify and stabilize avian nomenclature. Chapter 4 includes discussion of early bird collections, which provides the worm for Chapter 5 on the code of nomenclature and the importance of checklists. Those were subjects important to Robert Ridgway, who described more new species and subspecies of birds than did any other North American ornithologist. Ridgway’s studies of specimens helped determine aspects of geographic variation, and his naming groups of similar specimens, guided by a code
BOOK REVIEW

of nomenclature, further contributed to the science of evolution. Ridgway was among the five men who formed the first Committee on Classification and Nomenclature of the AOU that today is a committee of twelve. Lewis writes about the power of the committee that, with a mere three votes could either “enshrine” a name or “banish” it to the “waste-bin of history.” But sending a name to the “waste-bin” does not mean it is unavailable for use. Furthermore, we cannot know the truth about how the committee voted without knowing the details of any particular judgment, and Lewis does not provide such information. As dramatic as it might have seemed, voting by the early committee, although surely not without debate, should not have produced histrionics as implied, particularly votes by Ridgway, whose taxonomy at the time was far more often right than wrong by current knowledge. Lewis notes that the AOU code became the framework for the Code of the International Congress, now the International Code of Zoological Nomenclature, which, in brief, promotes stability and universality in nomenclature.

The last two chapters concern publications by Robert Ridgway. The first of these discusses aspects of technical writing and Ridgway’s wish to get information out to as large an audience as possible on a timely schedule. Ridgway published 17,000 pages in 553 papers and 23 monographs, including his multivolume Birds of North and Middle America (U.S. National Museum Bulletin 50, parts 1–11), which he began in 1901. The last part Ridgway wrote, part 8, was completed in 1919; the final three volumes were published posthumously. Lewis relates those volumes as popularly known as Bulletin 50. To most of those using and often depending on them, the volumes are known simply as “Ridgway.” In part 1, Ridgway attempted to appease the different camps about popular and scientific approaches to birds. In fact, one theme in The Feathery Tribe is to what extent, if any, the scientific community should present articles in popular style. Whether there was a virtual caste system of people interested in birds in the United States, the method of presentation separating those who pursue birds as science and those who engage with birds strictly for pleasure may have been an issue that has since eroded. Perhaps this is what Lewis is alluding to in the undefined “Modern Study of Birds” part of the title. Without some sort of boundary, “modern” in the title has little meaning.

Among Robert Ridgway’s formidable output is his work to standardize terms for colors of birds. Lewis rated the Color Standards and Color Nomenclature (1912, self-published) as the reason why Ridgway “is most widely known.” Use of those standards by later ornithologists and adherents of other disciplines is certainly true. Among ornithologists and birders, however, Ridgway is more widely known from Bulletin 50 and his other useful publications.


Other omissions and errors include the use of Hirundinidae for the family name of flycatchers (p. 178), lack of clarity without an English name (Lark Sparrow) for Chondestes grammacus (p. 9), use of the word species vs. specimen (p. 136), and “dies” instead of “dyes” for substances that impart color (p. 190). In Chapter 3, the caption of a photo of Ridgway at his desk mentions two of his fingers as blackened by arsenic, and Lewis mentions the hazards of arsenic as a preservative for specimens. Had the author checked (e.g., back issues of Who’s Who in America, Chicago, A. N. Marquis), he would have found museum ornithologists exposed to arsenic living far beyond the normal life span of workers in other professions.

History repeats itself. We learn that Ridgway found Empidonax troubling, experienced frequent changes in nomenclature, and coped with funding problems, events
familiar in this century. Dedication and diligence allowed Ridgway to overcome pesky flycatchers and adverse budgets. Lewis (p. 211) believes that Bulletin 50 “put the nail in the coffin of systematics as a key means to study birds as a profession.” On the contrary. Historically, Ridgway kept up to date, and, like others to follow, built upon the heroic Bulletin 50. Systematics today relies not merely on genetics, but on behavior, morphology, and correct nomenclature as well.

A time line would have helped set the stage for the various players. Also missing from The Feathery Tribe is reference to Richard Banks’s chapter (pp. 33–54) on the U.S. National Museum (Mem. Nuttall Ornithol. Club 12, 1995) that concisely summarizes considerable subject matter relevant in Lewis’s pages. Robert Ridgway’s career overlapped with that of eminent ornithologist Alexander Wetmore, who became secretary to the Smithsonian. Wetmore also did a stint with the National Biological Survey (now under the Department of Interior), which houses its specimens with those in Smithsonian. The survey, which Lewis does not seem to mention, provided thousands of specimens of birds useful to Ridgway. I never heard Wetmore offer anything but praise for Ridgway.

In the preface, Lewis hopes more will be written about these subjects. I look forward to that and, in the interim, believe prospective readers will learn from and enjoy the present work. Both casual and seasoned birders may find the book useful in helping them understand some of the elements of early ornithology.

M. Ralph Browning
FEATHERED PHOTO

FIRST DOCUMENTED RECORD OF A COMMON RINGED PLOVER (CHARADRIUS HIATICULA) FOR CALIFORNIA

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On 19 August 2011, Easterla discovered a second-year male Common Ringed Plover (Charadrius hiaticula) in alternate plumage—a species that had never been fully documented in California. While scanning for shorebirds on a large mudflat at the Davis Wetlands, about 7.5 km northeast of the center of Davis in Yolo County, California, he noticed a plover, slightly larger than nearby Semipalmated Plovers (C. semipalmatus), with a wide, black ring across its chest, no visible eyering, a white “Nike swoosh” above its eye, and the black lores extending to the gape. It was in full alternate plumage, but because of its worn greater wing coverts, it appeared to be in its second year (P. Pyle pers. comm.). Eventually the bird called—a whistled, mournful “too-ll” that was very distinct from the call of the Semipalmated Plover. On the basis of his prior experience with this species in Russia, and with many Semipalmated Plovers, Easterla felt confident this bird was a Common Ringed Plover. He phoned Sterling and e-mailed him photographs so that Jon Dunn, Bob Gill, Dan Gibson, Guy McCaskie, and others were able to confirm the identification while attending the Western Field Ornithologists’ meeting in Sierra Vista, Arizona. Over the ensuing week, hundreds of birders observed and photographed the plover. A local television news crew recorded its calls during an interview in the field with Easterla. The record has been accepted by the California Bird Records Committee as record 2011-118 (www.californiabirds.org).

With good light, close observation (to ~3 m), and the two similar species together, we were able to observe and photograph subtle differences. Though difficult to assess in the field, one character critical to distinguishing the Common Ringed Plover from the Semipalmated Plover is the former’s lack of vestigial webbing or palamation between the inner and middle toes (Prater et al. 1977, Hayman et al. 1986, O’Brien et al. 2006)—visible in photographs of the Common Ringed Plover at Davis taken at close range (see lower image on this issue’s back cover). Another important field mark is the bold white stripe (“Nike swoosh”) above the auriculars of the Common Ringed Plover; the Semipalmated Plover lacks or has a greatly reduced white spot above the auriculars (O’Brien et al. 2006).

Other identifying field marks discussed by Dunn (1993), observed on the bird at Davis and consistent with its being an adult Common Ringed Plover in alternate plumage, include (1) lack of a noticeable eyering (the Semipalmated Plover has a distinct yellow-orange eyering), (2) bill longer and thinner than that of the Semipalmated Plover, (3) broader wingbars, visible in flight, (4) paler back, heightening the contrast with the black on the auriculars, (5) thicker black breast band, consistently much thicker than the breast band of nearby Semipalmated Plovers regardless of the effects of posture, and (6) larger size, by at least 10% overall.

Dunn (1993) suggested that the width of the black ring on the hindneck and the black feathering of the lores meeting the base of the bill (a pattern rare or lacking in the Semipalmated Plover) may prove useful in identifying adult Common Ringed Plovers. On the Common Ringed Plover at Davis, the black lores extended down to the gape, a pattern evident in photographs such as the upper image on this issue’s
outside back cover and consistently distinct from the loral pattern on the adjacent Semipalmated Plovers. The black visible on the hindneck varied greatly with the bird’s posture, but at some instances it appeared much wider than we have seen on Semipalmated Plovers.

What may prove most useful in distinguishing the species is the difference in calls. We heard the distinctive call of the Common Ringed Plover on several occasions. On the final day of the bird’s visit on 26 August, Easterla was several miles away from the original observation site, heard the Common Ringed Plover call in a rice field, and observed the bird on the ground and then in flight as it flew south, never to be seen again.

In western North America, most confirmed records of the Common Ringed Plover are from western Alaska, including St. Lawrence Island (of breeding as well as of migrants), the Pribilof and Aleutian islands, and the Seward Peninsula (Sealy et al. 1971, Kessel and Gibson 1978, Byrd et al. 1978, Lehman 2005, Gibson and Byrd 2007). There is an unconfirmed report of the species breeding on St. Matthew Island (Winker et al. 2002). Farther south along the Pacific Coast, an immature was well described and sketched at Port Susan Bay, Washington, on 23 September 2006 by Jessie Barry and Cameron Cox, a record accepted by the Washington Bird Records Committee (B. Waggoner pers. comm.). A single-observer report from Point Reyes, California, on 9 September 1996 was not accepted by the California Bird Records Committee because of the lack of photographic documentation or voice recording. The Common Ringed Plover’s primary breeding range stretches across the Palaearctic Region, including Greenland, and west into the Nearctic Region on Ellesmere, Bylot, and eastern Baffin islands. The species winters primarily in Europe, the Middle East, and Africa (Hayman et al. 1986, AOU 1998). In western North America, it is a vagrant anywhere away from St. Lawrence Island (AOU 1998).

We thank Robert E. Gill, Jr., for his review, Steve Heinitz for his summary of Alaska records, and Dan Gibson, Paul Lehman, Brad Waggoner, and David Irons for their assistance with information on previous records for western North America.

LITERATURE CITED


Accipiter striatus, 125
Aechmophorus clarkii, 125
occidentalis, 125
Aleronates saxatilis, 129
Aethia psittacula, 173
Agelaius phoeniceus, 143
Ahler, Darrell D., see Sechrist, J. D.
Albatross, Short-tailed, 166
albifrons, Anser albifrons, 201–219
albigularis, Pheugopedius fasciatus, 256
americanus, Coccystus americanus, 8
Ammodramus lecontei, 184
savannah, 141
Amphispiza bellii, 50–51, 141
bilineata, 141
Anon, Susan H., see Hamilton, R. A.
Anser albifrons, 201–219
fabalis/serrirostris, 164
Anthony, Robert G., see Wright, S. K.
anthonyi, Campylorhynchus brunnicepilus, 151–163
Anthus cervinus, 135
rubescens, 135
spraguei, 135
Archilochus alexandri, 129
colubris, 178
Ardea herodias, 125
Arenaria melanocephala, 127
Asio flammeus, 128, 236–247
otus, 128
Athene cunicularia, 128
Auklet, Parakeet, 173
Avocet, American, 126
Banks, Richard C., Geographic variation in wintering Greater White-fronted Geese, 201–219
Bean-Goose, Taiga/Tundra, 164
bewickii, Thryomanes bewickii, 256
Blackbird, Brewer’s, 143
Red-winged, 143
Rusty, 184
Yellow-headed, 143
Blumin, Len, see Davis, J. N.
Bobolink, 143
Bombycilla cedrorum, 136
Booby, Blue-footed, 168
Brown, 168
Masked, 168
Masked/Nazca, 168
Red-footed, 168
Brachyramphus perix, 173
Brady, Matt, see Sterling, J. C.
brunnicepilus, Campylorhynchus brunnicepilus, 256
Bunting, Indigo, 143
Lark, 141
Lazuli, 143
Painted, 143
Burger, Jutta C., see Hamilton, R. A.
Calamospiza melanocorys, 141
Calcarius lapponicus, 136
ornatus, 136
pictus, 182
Calidris alba, 127
ferruginea, 171
mauri, 127
melanotos, 127
minuta, 171
minutilla, 127
ruficollis, 113–116, 171
subminuta, 171
californicus, Pelecanus occidentalis, 31–46
Calonectris leucomelas, 167
Calypte anna, 129
costae, 47–49
Campylorhynchus brunnicepilus, 21–30, 151–163, 256
Caprimulce vociferus, 176
Caracara cheriway, 170
Caracara, Crested, 170
Cardellina canadensis, 140, 183
pusilla, 140
Cardinalis sima, 184
Carduelis lawrencei, 144
pinus, 144
psaltria, 144
tristis, 144
Carlisle, Jay D., Irruptive migration of Chestnut-backed Chickadees to southwestern Idaho, 12–20
Carpodacus mexicanus, 144, 266–270
purpureus, 144
INDEX

castanonotus, Pheugopedius rufalbus, 256
Castelein, Kathleen A., see Farrar, J. D.
Catharus fuscescens, 181
guttatus, 90–101, 133
minimus, 182
ustulatus, 133
Catherpes mexicanus, 256
Cepphus columba, 127
Certhia americana, 132
Chaetura pelagica, 229–235
vauxi, 129, 229–235
chakei, Cinnycerthia unirufa, 256
Charadrius hiaticula, 164, 274–275
nivosus, 189–191
semipalmatus, 126
vociferus, 126
wilsonia, 170
Chat, Yellow-breasted, 140
Chickadee, Chestnut-backed, 12–20
Mountain, 102–104
chloropus, Gallinula chloropus, 259–265
Chondestes grammacus, 141
Chordeiles acutipennis, 128
minor, 128
Cinnycerthia unirufa, 256
Circus cyaneus, 125
Cistothorus palustris, 256
platensis, 256
clementis, Carpodacus mexicanus, 266–270
Coccothraustes americanus, 1–11
Colaptes auratus, 129
Collared-Dove, Eurasian, 127
Collins, Paul W., see Lethaby, N.
Columbia livia, 127
columbarius, Falco columbarius, 105–108
Condor, California, 54–89
conspersus, Catherpes mexicanus, 256
Contopus cooperi, 129
pertinax, 178
sordidulus, 129
Coragyps atratus, 169
Cormorant, Brandt’s, 125
Double-crested, 125
Neotropic, 168
Pelagic, 125
Corvus brachyrhynchos, 106
corax, 132
costaricensis, Pheugopedius nigricapillus, 256
Cowbird, Brown-headed, 143
Crane, Common, 164
Creeper, Brown, 132
Crossbill, Red, 144
Crow, American, 106
Cuckoo, Yellow-billed, 1–11
Cygnus buccinator, 165
Cynanthus latirostris, 178
Cyphorhinus phaeocephalus, 256
Davis, Jeff N., and Blumin, Len,
Multiple color abnormalities in a wintering Mew Gull, 193–195
deglandi, Melanitta fusca, 220–228
de la Cueva, Horatio, see Latta, S. C.
Dendroica, see Setophaga
Dickcissel, 143
Dickerman, Robert W., see Witt, C. C.;
see Johnson, A. B.
Dolichonyx oryzivorus, 143
domesticus, Passer domesticus, 248–254
Doster, Robert H., see Sechrist, J. D.
Dove, Eurasian Collared-,
Mourning, 128
White-winged, 128
Downer, Long-billed, 127
Short-billed, 127
Easterla, Todd B., and Jorgensen, Lisa,
First documentation of a juvenile
Red-necked Stint for the lower 48 states, 113–116; see Sterling, J. C
Egret, Great, 125
Snowy, 125
Egretta alba, 125
thula, 125
tricolor, 168
elgasi, Anser albifrons, 201–219
Empidonax difficilis, 130
flaviiventris, 180
hammondii, 130
minimus, 130
INDEX

oberholseri, 130
sp., 130
traillii, 129
wrightii, 130
Eremophila alpestris, 132
Eugenes fulgens, 178
Euphagus carolinus, 184
cyanoccephalus, 143
Falco columbarius, 105–108, 126
peregrinus, 126
rusticolus, 170
sparverius, 125
Falcon, Peregrine, 126
Ferminia cerverai, 256
Finch, Black Rosy-, 184
House, 144,
Purple, 144
flammeus, Asio flammeus, 236–247
flavirostris, Anser albifrons, 201–219
Flicker, Northern, 129
Flycatcher, Ash-throated, 130
Dusky, 130
Dusky-capped, 180
Gray, 130
Great Crested, 180
Hammond’s, 130
Least, 130
Pacific-slope, 130
Willow, 129
Yellow-bellied, 180
Fregata magnificens, 167
Frigatebird, Magnificent, 167
Fritz, Wes, see Lethaby, N.
Fulmar, Northern, 125
Fulmarus glacialis, 125
fusca, Melanitta fusca, 220–228
Gaede, Peter, see Lethaby, N.
Gaines, Eleanor P., see Farrar, J. D.
Gallinago gallinago, 164
Gallinula chloropus, 259–265
Gallinule, Purple, 170
gambelli, Anser albifrons, 201–219
Gavia adamsii, 166
arctica, 166
immer, 125
Geothlypis philadelphica, 182
tolmieti, 137
trichas, 137
Gibson, Daniel D., On two fronts: Occurrence of the House Sparrow in Alaska, 248–254; see Dunn, J. L.
Gnatcatcher, Blue-gray, 133
Godwit, Bar-tailed, 171
Hudsonian, 171
Marbled, 126
Golden-Plover, American, 170
Goldfinch, American, 144
Lawrence’s, 144
Lesser, 144
Goose, Greater White-fronted,
201–219
Taiga/Tundra Bean-, 164
Grackle, Common, 184
Grebe, Clark’s, 125
Eared, 125
Western, 125
Grosbeak, Black-headed, 142
Blue, 143
Grus grus, 164
Guillemot, Pigeon, 127
Gull, Black-tailed, 172
California, 127
Heermann’s, 127
Ivory, 172
Lesser Black-backed, 172
Little, 172
Mew, 193–195
Western, 127
Gymnogyps californianus, 43–89
Gyrfalcon, 170
Haak, Bruce A., and Sawby, Scott, Recent nesting and subspecies identity of the Merlin in Idaho, 105–108
Haematopus bachmani, 126
palliatus, 126
Haemorhous, 270
Hamilton, Robert A., Burger, Jutta C., and Anon, Susan H., Use of nest boxes by Cactus Wrens in Orange County, California, 21–30; see Cooper, D. S.
Hannukela, Adam, Skiba, Teresa, Zyla, Benjamin, and Proudman, Amanda, Extension of the breeding range of Costa’s Hummingbird in southern Sonora, 47–49
INDEX

Harper, Alan B., see Latta, S. C.
Harrier, Northern, 125
Hawk, Harris’s, 169
Sharp-shinned, 125
Helmitheros vermicorum, 182
Henicorhina leucosticta, 256
Heron, Great Blue, 125
Tricolored, 168
Yellow-crowned Night-, 168
Himantopus himantopus, 126
Hummingbird, Allen’s, 129
Anna’s, 129
Black-chinned, 129
Broad-tailed, 178
Costa’s, 47–49
Magnificent, 178
Ruby-throated, 178
Hydrocoloeus minutus, 172
Hylocichla mustelina, 182
Ibis, Glossy, 169
Icteria virens, 140
Icterus bullockii, 143
cucullatus, 143
galbula, 143
spurii, 143
Iliff, Marshall J., see Dunn, J. L.
Jaeger, Pomarine, 127
Jervis, T. R., Type locality and early specimens of the Mountain Chickadee, 102–104
Johnson, Andrew B., Robert W.
Dickerman: A brief introduction, 198–200; A Vaux’s Swift specimen from New Mexico with a review of Chaetura records from the region, 229–235
Jorgensen, Lisa, see Easterla, T. B.
Junco, Dark-eyed, 142
Junco hyemalis, 142
Kestrel, American, 125
Killdeer, 126
Kingbird, Cassin’s, 131
Eastern, 131
Thick-billed, 180
Tropical, 131
Western, 131
Koach, Alman, 129
Kinglet, Golden-crowned, 133
Ruby-crowned, 133
Kotaich, Adam A., see Farrar, J. D.
Lanius cristatus, 180
ludoviciana, 131
Lark, Horned, 132
Larus californicus, 127
canus, 193–195
crassirostris, 172
fuscus, 172
heermann, 127
occidentalis, 127
Latta, Steven C., de la Cueva, Horatio, and Harper, Alan B., Abundance and site fidelity of migratory birds wintering in riparian habitat of Baja California, 90–101
Lauten, David J., see Farrar, J. D.
Lethaby, Nick, Fritz, Wes, Collins, Paul W., and Gaede, Peter, Fall bird migration on Santa Barbara Island, California, 118–150
Leucosticte atrata, 184
Limnodromus griseus, 127
tscolopaceus, 127
Limosa fedoa, 126
haemastica, 171
lapponica, 171
Longspur, Chestnut-collared, 136
Lapland, 136
Smith’s, 182
Loon, Arctic, 166
Common, 125
Yellow-billed, 166
Loxia curvirostra, 144
Lucas, Shannon D., see Cooper, D. S.
ludoviciana, Thryothorus ludoviciana, 256
luscinia, Microcerculus marginatus, 256
Magpie, Black-billed, 107
Martin, Purple, 132
McCaskie, Guy, see Johnson, O.
Meadowlark, Western, 143
Megaceryle alcyon, 129
Melanerpes formicivorus, 129
Melanitta fusca, 220–228
perspicillata, 125
Melospiza lincolni, 93, 142
melodia, 142
Merlin, 105–108, 126

281
INDEX

Micrathene whitneyi, 174
Microcerculus marginatus, 256
Mimus polyglottos, 133
Mniotilta varia, 136
Mockingbird, Northern, 133
modestus, Pheugopedius modestus, 256
Molothrus ater, 143
Moorhen, Common, 259–265
Murre, Thick-billed, 173
Murrelet, Long-billed, 173
Myiarchus crinitus, 180
tuberculifer, 180
Nighthawk, Common, 128
Lesser, 128
Night-Heron, Yellow-crowned, 168
Numenius phaeopus, 126
Nuthatch, Red-breasted, 132
Nyctanassa violacea, 168
occidentalis, Coccyzus americanus, 1–11
Oceanodroma tethys, 167
Odontorchilus branickii, 256
Onychoprion fuscatus, 173
Oporornis agilis, 182
Oreoscoptes montanus, 134
Oreothlypis celata, 93, 137
peregrina, 136
ruficapilla, 137
virginiae, 137
Oriole, Baltimore, 143
Bullock's, 143
Hooded, 143
Orchard, 143
Osprey, 125
Ovenbird, 136
Owl, Barn, 128
Burrowing, 128
Elf, 174
Long-eared, 128
Short-eared, 128, 236–247
Oystercatcher, American, 126
Black, 126
Pagophila eburnea, 172
Pandion haliaetus, 125
Parabuteo uncinctus, 169
Parula, Northern, 138
Parus montanus, see Poecile gambeli
Passer domesticus, 248–254
Passerculus sandwichensis, 141
Passerella iliaca, 96, 141
Passerina amoena, 143
cerulea, 143
ciris, 143
cyanea, 143
Paxton, Eben H., see Sechrist, J. D.
Pelecanus occidentalis, 31–46, 125
Pelican, Brown, 31–46, 125
Petrel, Galapagos/Hawaiian, 167
Great-winged, 166
Hawaiian, 166
Stejneger's, 167
Wedge-rumped Storm-, 167
Petrochelidon fulva, 181
Peucaea cassinii, 183
Pewee, Greater, 178
Western Wood-, 129
Phalacrocorax auritus, 125
brasilianus, 168
pelagicus, 125
penicillatus, 125
Phalaenoptilus nuttallii, 129
Phalaropus fulicarius, 127
Phalaropus lobatus, 127
Pheucticus melanoleucus, 142
Pheugopedius atrogularis, 256
braya, 256
fasciatoventris, 256
modestus, 256
nigricapillus, 256
rufalus, 256
thoracicus, 256
Phoebe, Black, 130
Say's, 130
Pica hudsonia, 107
Pigeon, Rock, 127
Pipilo chlorurus, 140
maculatus, 140
Pipit, American, 135
Red-throated, 135
Sprague's, 135
Piranga ludoviciana, 142
olivea, 142
rubra, 142
Plegadis falcinellus, 169
Plover, American Golden-, 170
Black-bellied, 126
Common Ringed, 164, 274–275
Semipalmated, 126
Snowy, 189–191
Wilson's, 170
Pluvialis dominica, 170
squatarola, 126

282
INDEX

Podiceps nigricollis, 125
Poecile gambeli, 102-104
montanus, see P. gambeli rufescens, 12-20
Polioptila caerulea, 133
Pooecetes gramineus, 141
Poorwill, Common, 129
Porphyrio martinica, 170
Progne subis, 132
prostheleuca, 157
Henicorhina leuco-sticta, 256
Puffins gravis, 167
griseus, 125
Pyrrhuloxia, 184
Quiscalus quiscula, 184
Raven, Common, 132
Recurvirostra americana, 126
Redstart, American, 137
Regulus calendula, 133
satrapa, 133
richardsonii, Falco columbarius, 105-108
ridgwayi, Pheugopedius coraya, 256
Roby, Daniel D., see Wright, S. K.
Rosenberg, Gary H., see Dunn, J. L.
Rosy-Finch, Black, 184
Ryan, Vicky M., see Sechrist, J. D.
Salpinctes obsoletus, 132, 256
Sanderling, 127
sandiegensis, Campylorhynchus brun-neicapillus, 151-163
Sandpiper, Curlew, 171
Least, 127
Pectoral, 127
Solitary, 126
Western, 127
Wood, 171
Sawby, Scott, see Haak, B. A.
Sayornis nigricans, 130
saya, 130
Schwitters, Michael T., see Withrow, J. J.
Scoter, Surf, 125
White-winged, 220-228
Sechrist, Juddson D., Paxton, Eben H., Ahlers, Darrell D., Doster, Robert
H., and Ryan, Vicky M., One year of migration data for a Western Yellow-billed Cuckoo, 1-11
Seiurus aurocapilla, 136
Selasphorus sasin, 129
Setophaga americana, 138
ceruleans, 138
castanea, 138
cerulea, 183
coronata, 90-101, 139
discolor, 139
dominica, 139, 183
domina, 96, 141
domina, 96, 141
fusca, 138
gracilis, 183
magnolia, 138
neglecta, 139
occidentalis, 140
palmarum, 139
pensylvanica, 138
petechia, 138
pinus, 138
rutilata, 137
striata, 138
tigrina, 137
townsendi, 139
Sharp, Brian E., The California Condor in northwestern North America, 54-89
Shearwater, Great, 167
Sooty, 125
Sooty, 125
Sooty, 125
Shrike, Brown, 180
Loggerhead, 131
Siskin, Pine, 144
Sitta canadensis, 132
Skiba, Teresa, see Hannuksela, A.
Snipe, Common, 164
Sparrow, Black-chinned, 140
Black-throated, 141
Brewer’s, 140
Cassin’s, 183
Chipping, 140
Clay-colored, 140
Field, 183
Fox, 96, 141
Golden-crowned, 96, 142
Grasshopper, 141
House, 248-254
Lark, 141
Le Conte’s, 184
Lincoln’s, 93, 142
Sage, 50-51, 141
Savannah, 141
Song, 142

283
INDEX

Vesper, 141
White-crowned, 93, 142
White-throated, 142
Spiza americana, 143
Spizella atrogularis, 140
  breviri, 140
  pallida, 140
  passerina, 140
  pusilla, 183
Sterling, European, 135
  stejnegeri, Melanitta fusca, 220-228
Stelgidopteryx serripennis, 132
stellaris, Cistothorus platensis, 256
Stercorarius pomarinus, 127
Sterling, John C., and Brady, Matt,
  Extralimital Sage Sparrows on the Central Valley floor north of the Tulare Basin with notes on subspecies status and identification, 50-51; and Easterla, Todd B., First documented record of a Common Ringed Plover (Charadrius hiaticula) for California, 274-275
Sterna hirundo/paradisaea, 127
Stilt, Black-necked, 126
Stint, Little, 171
  Long-toed, 171
  Red-necked, 113-116, 171
Storm-Petrel, Wedge-rumped, 167
Streptopelia decaocto, 127
Sturnella neglecta, 143
Sturnus vulgaris, 135
suckleyi, Falco columbarius, 105-108
Sula dactylatra, 168
dactylatra/granti, 168
  leucogaster, 168
  nebouxi, 168
  sula, 168
Sullivan, Brian L., see Johnson, O.
Swallow, Barn, 132
  Cave, 181
  Northern Rough-winged, 132
  Violet-green, 132
Swan, Trumpeter, 165
Swift, Vaux's, 129, 229-235
  White-throated, 129
Tachycineta thalassina, 132
tamaulipensis, Chaetura vauti, 229-235
Tanager, Scarlet, 142
  Summer, 142
  Western, 142
Tattler, Wandering, 126
Tern, Common/Arctic, 127
  Royal, 127
  Sooty, 173
Thalasseus maximus, 127
Thrasher, Curve-billed, 182
  Sage, 134
Thrash, Gray-cheeked, 182
  Hermit, 90-101, 133
Swainson’s, 133
  Wood, 182
Thryomanes bewickii, 132, 256
Thryorchilus browni, 256
Thryothorus ludovicianus, 256
Towhee, Green-tailed, 140
  Spotted, 140
Toxostoma curvirostre, 182
Tringa glareola, 171
  incana, 126
  melanoleuca, 126
  solitaria, 126
Trogodytes aedon, 132
  hiemalis, 181, 256
  pacificus, 132
Troglydytidae, 255-258
Turnstone, Black, 127
Tyrannus crassirostris, 180
  melanochlolicus, 131
  tyrannus, 131
  verticalis, 131
  vociferans, 131
Tyto alba, 128
Unitt, Philip, Classification of the House Finch of the Channel Islands, southern California, 266-270
Uria lomvia, 173
Uropsila leucoagastra, 256
vauxi, Chaetura vauti, 229-235
Veery, 181
Vermivora chrysoptera, 136, 182
cyanoptera, 182
Vireo, Blue-headed, 132, 181
  Cassin’s, 132
  Gray, 131
  Red-eyed, 132
  Warbling, 132
  White-eyed, 180
  Yellow-green, 181
Vireo cassini, 132
  flavoviridis, 181
  gilvus, 132
  griseus, 180
INDEX

olivaceus, 132
solitarius, 132, 181
vicinior, 131
Vulture, Black, 169

Warbler, Bay-breasted, 138
Black-and-white, 136
Blackburnian, 138
Blackpoll, 138
Black-throated Blue, 138
Black-throated Gray, 139
Blue-winged, 182
Canada, 140, 183
Cape May, 137
Cerulean, 183
Chestnut-sided, 138
Connecticut, 182
Golden-winged, 136, 182
Grace’s, 183
Hermit, 140
MacGillivray’s, 137
Magnolia, 138
Mourning, 182
Nashville, 137
Orange-crowned, 93, 137
Palm, 139
Pine, 183
Prairie, 139
Tennessee, 136
Townsend’s, 139
Virginia’s, 137
Wilson’s, 140
Worm-eating, 182
Yellow, 138
Yellow-rumped, 90–101, 139
Yellow-throated, 139, 183

Waxwing, Cedar, 136
Whimbrel, 126
Whip-poor-will, Eastern, 176
Winker, Kevin, The wretched riddle of reduced rectrices in wrens, 255–258
Winter, Jon, In Memoriam: Clifford R. Lyons, 1942–2012, 192
Withrow, Jack J., and Schwitters, Michael T., First North American record of Common Moorhen (Gallinula chloropus) confirmed by molecular analysis, 259–265

Witt, Christopher C., and Dickerman, Robert W., Differential migration by sex in North American Short-eared Owls (Asio flammeus), 236–247
Woodpecker, Acorn, 129
Wood-Pewee, Western, 129
Wren, Bay, 256
Bewick’s, 132, 256
Black-bellied, 256
Black-throated, 256
Cactus, 21–30, 151–163, 256
Canyon, 256
Carolina, 256
Coraya, 256
Gray-mantled, 256
House, 132
Marsh, 256
Pacific, 132
Plain, 256
Rock, 132, 256
Rufous, 256
Rufous-and-white, 256
Scaly-breasted, 256
Sedge, 256
Song, 256
Stripe-breasted, 256
Timberline, 256
White-bellied, 256
White-breasted Wood, 256
Winter, 181, 256
Zapata, 256

Wright, Sadie K., Roby, Daniel D., and Anthony, Robert G., Factors affecting the behavior of Brown Pelicans at a post-breeding roost, 31–46

Xanthocephalus xanthocephalus, 143

Yellowlegs, Greater, 126
Yellowthroat, Common, 137

Zenaida asiatica, 128
macroura, 128
Zimmer, Kevin J., see Dunn, J. L.
Zonotrichia albicollis, 142
atricapilla, 96, 142
leucophrys, 94, 142
Zyla, Benjamin, see Hannuksela, A.
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Only recently has it been appreciated that the Tahiti Petrel is a fairly common non-breeding visitor off the Pacific coast of Middle America. This adult completing primary molt was photographed only 19 km offshore.