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Cover photo by © Brian E. Small of Los Angeles, California: Nutting's Flycatcher (*Myiarchus nuttingi*), Mason Regional Park, Irvine, California, January, 2001. If accepted, this will be the first record of Nutting's Flycatcher for the State of California.

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WESTERN BIRDS

Volume 32, Number 1, 2001

HISTORICAL CHANGES IN THE ABUNDANCE AND DISTRIBUTION OF THE AMERICAN AVOCET AT THE NORTHERN LIMIT OF ITS WINTER RANGE

MARK A. COLWELL, TAMAR DANUFSKY, RYAN L. MATHIS, and STANLEY W. HARRIS, Department of Wildlife, Humboldt State University, Arcata, California 95521

ABSTRACT: Humboldt Bay, California, is the northern limit of the winter distribution of the American Avocet (*Recurvirostra americana*) on the Pacific coast. After the first record in 1935, avocets were uncommon (17 observations) until the early 1960s, when a wintering population of <100 birds became established in North (Arcata) Bay. Numbers increased to approximately 1000 by the early 1990s but have since declined to approximately 500. From 1968 to 1985, avocets consistently used intertidal habitats and oxidation ponds in the northeast quarter of Arcata Bay. Beginning in the mid-1990s they expanded their use of Arcata Bay and into South Bay. During February and March 1998 and February 2000, up to 32 occasionally fed in flooded pastures adjacent to the bay; only two avocets had been observed there in the previous 40 years. At low tide, avocets aggregated in intertidal habitats of Arcata Bay and South Bay. We hypothesize that they increased because of a rangewide population increase and that in Humboldt Bay they concentrate where small particle size of sediments makes for better feeding habitat. Altered habitat quality, especially during wet years (late 1990s), may have changed avocet distribution in Humboldt Bay.

Understanding changes in the abundance and distribution of a species is a central theme of animal ecology, and research at the limits of an organism's range can provide valuable insight into factors limiting a species' distribution, especially when conducted over a long period. The American Avocet (*Recurvirostra americana*) winters in intertidal and freshwater habitats along the Atlantic, Gulf, and Pacific coasts of North America (Robinson et al. 1997). Along the Pacific coast, Humboldt Bay, California represents the northern extreme of the species' winter range (Evans and Harris 1994, Robinson et al. 1997); there are no winter records from the Pacific Northwest (Paulson 1993). Evans and Harris (1994) showed that avocets were a recent addition to the wintering avifauna of the northern California coast, first recorded in 1935. Beginning in the 1960s, a growing population of wintering avocets concentrated in the northeast quarter of

Humboldt Bay (Evans and Harris 1994). Since 1989, we have collected information on avocet abundance and distribution at Humboldt Bay and have noticed changes in the patterns reported by Evans and Harris (1994). Here, we summarize changes in avocet distribution and abundance on Humboldt Bay and discuss possible reasons for these changes.

STUDY AREA

Humboldt Bay (40° 46′ N, 124° 14′ W) is the largest bay between San Francisco Bay, California, 370 km south, and Coos Bay, Oregon, 335 km north (Barnhart et al. 1992). Costa (1982) characterized the bay as a tidal coastal lagoon with limited freshwater input. The bay consists of three sections, each of which is at the end of a different tributary. The largest section, Arcata Bay, receives fresh water from Jacoby and Freshwater creeks. Broad intertidal habitats of Arcata Bay consist of sediments varying from clayey silts of intertidal flats to sandy substrates lining main channels. Much of the lower intertidal reaches of the center of Arcata Bay supports eelgrass (*Zostera marina*), but the extent of this habitat has been reduced by oyster culture (Barnhart et al. 1992). Oxidation ponds of the Arcata marsh and sewage-treatment facility lie on the northeast shore of Arcata Bay. A narrow shipping channel connects Arcata Bay to Entrance Bay. The channel and Entrance Bay are dredged to provide access to ships, hence most intertidal habitats have steep banks and coarse substrates. The Elk River empties into the main channel and provides some intertidal flats, which are partially covered by eelgrass. South Bay consists of extensive intertidal habitats and substrates varying from sand to clayey silt. Large relatively pristine eelgrass beds cover much of the lower intertidal reaches of South Bay. Salmon Creek enters the southeast corner of South Bay through Humboldt Bay National Wildlife Refuge (HBNWR). Since 1850, people have converted much of the bay's salt marsh and intertidal habitats to agricultural lands, especially pasture. Barnhart et al. (1992) described Humboldt Bay in detail.

METHODS

Our examination of avocet population size and distribution relies on several independent sources of data collected over the last 50 years. The quality of this information varies with the different objectives of researchers and unequal sampling effort.

Field notes. Harris has kept regular field notes on bird distribution and abundance around Humboldt Bay since 1959. From these notes, we collated maximum annual estimates and locations of avocets.

Christmas Bird Counts. Two CBC circles cover virtually all intertidal habitats of Humboldt Bay and abut at the harbor entrance. The Centerville CBC, conducted for 41 years, covers all of South Bay. Harris has coordinated this count and collated data since 1973. To the north, the Arcata CBC, conducted since 1984, covers all of Arcata Bay and the main channel leading to the bay entrance. Because we were able to identify most locations at which observers recorded avocets, CBC data offer an important historical perspective on the species' use of the bay.

Graduate theses. Two graduate theses provided data on avocet distributions. In 1968 and 1969, Gerstenberg (1972) surveyed all shorebirds at nine locations on Humboldt Bay. Evans (1988) summarized avocet distribution baywide during three winters (1982–83 through 1984–85); he made 76 surveys at 11 sites within Arcata Bay and 42 surveys from 11 locations in South Bay. Since each used different survey methods and collated data differently, we summarized their information as follows. Using Gerstenberg's (1972) maximum winter count of avocets at each of his survey locations, we summed all avocet observations at the nine locations and calculated the proportion at each site (yielding a proportional abundance). Evans (1988) summarized his results as the average monthly high- and low-tide count at each location. We used the maximum average winter (October–February) count for each location to represent use of a site. Next, we calculated the proportion of these summed maximum counts for each location.

Baywide shorebird surveys. From 1989 to 1994 and again in 1998, Colwell coordinated multiple observers who surveyed Humboldt Bay simultaneously to estimate seasonal use by shorebirds (Colwell 1994). Surveys were shore-based counts of intertidal habitats of the bay, adjacent pastures and freshwater sloughs, and ocean beaches fronting the bay. The survey protocol entailed four sequential half-hour scans (Altmann 1974) during which observers estimated the number of shorebirds using an area. The start of each half-hour scan was synchronized among observers to reduce the likelihood that birds moving between areas would be counted by more than one observer. We surveyed shorebirds during rising tides so that foraging birds were pushed by the advancing tide toward shore, improving observers' estimates of abundance (Colwell and Cooper 1993). Observers conducted surveys from prominent observation points around the bay to maximize observation area and minimize overlap between adjacent observers (further details in Colwell and Cooper 1993, Colwell 1994).

During the five years of surveys, sampling effort varied greatly with weather and the number of observers (Colwell 1994); many locations were not surveyed every year, although some sites received regular coverage, often by the same observers. Consequently, we selected the single maximum count of avocets at each site from 10 winter survey dates (November and February, 1989–1994). We summed these maximum counts and calculated the proportional abundance of observations at each location. In this form, data were corrected for possible changes in avocet population size at Humboldt Bay. We summarized 1998 survey data separately by the same method.

Winter 1998–1999 surveys. At 19 locations around the bay, we used a protocol similar to that of the shorebird surveys to esitmate winter (November 1998–January 1999) shorebird numbers. Unlike baywide surveys (see above), which took place during flood tides, we did these surveys during ebb tides, when intertidal flats were exposed. Areas surveyed varied from 3.5 to 52.1 ha; we based their boundaries on edges of channels, salt marsh, and other prominent habitat features. We summarized these data as the maximum count of four surveys at each site and present data as the proportion at each location of total avocet observations (Danufsky 2000).

Low-tide avocet mapping. At five tides <0.33 m (January, February, and October 1999; January and February 2000), we mapped avocets on high-

resolution images of the bay, overlaid by a UTM-based grid system. Observers mapped avocets from the same shoreline observation points used in the baywide surveys (see above) and from boats moving through the bay's main channels. We marked the location of avocets on images by means of topographic features like channels, islands, and saltmarsh points and we recorded the number of avocets observed within each 500-m grid. We standardized data by calculating the number of avocets in a grid cell within five observation periods (January and February 1999 and 2000, October 1999). For cells including intertidal habitats exposed at low tide, we calculated the average number of avocets per grid cell and variance. We compared observed avocet distributions to a random model by using the index of dispersion (I, variance-to-mean ratio; Krebs 1989). If avocets were randomly distributed among grid cells, this ratio equaled one; if they were aggregated it was greater than one; if they were evenly distributed it was less than one. We compared each survey's I value to a random distribution by means of a two-tailed t test.

RESULTS

Population estimates. Over 40 years, avocet numbers have varied significantly (Kruskal–Wallis test, $\chi^2 = 36.4$, $P = 0.00002$) among the five-year intervals (Figure 1). Beginning in the 1950s, a small population established itself at Humboldt Bay. Numbers nearly doubled over the next two decades.

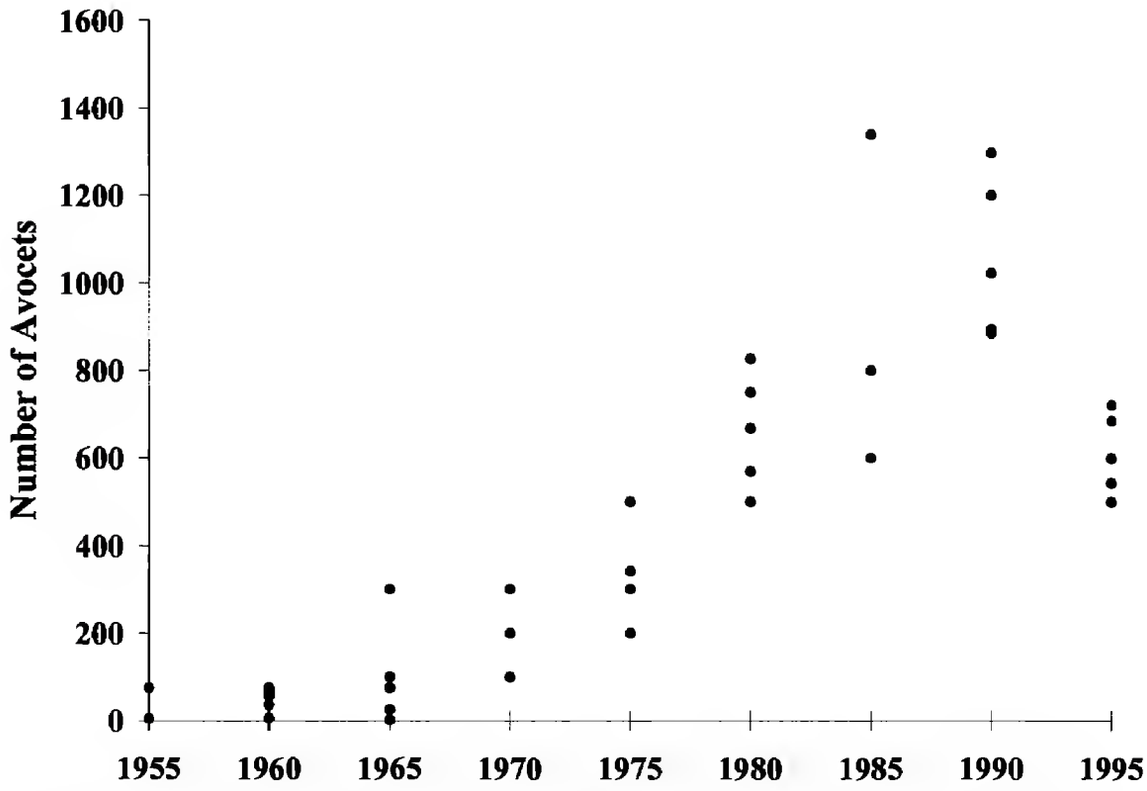

Figure 1. Estimates (maximum counts) of American Avocets wintering at Humboldt Bay, California, from 1955 to 1999, based on field notes (1955–1967; 1970–1981; 1995–1997), graduate theses (1968–1969; 1982–1985), shorebird surveys (1989–1994; 1998) and baywide mapping of avocet distributions (1999–2000).

Table 1 Estimates of the Number and Spatial Distribution of Nonbreeding American Avocets at Humboldt Bay, California, Based on Bay-wide Mapping During Diurnal Low Tides

	30–31 Jan 1999	27–28 Feb 1999	23 Oct 1999	29–30 Jan 2000	13 Feb 2000
Number of avocets	543	343	182	475	479
Mean (per grid cell)	1.65	1.04	0.55	1.44	1.45
Variance (per grid cell)	62.33	21.97	17.43	90.89	70.97
Dispersion index	37.9	21.1	31.6	63.1	48.9
t value	758.1	261.6	217.2	1118.1	869.0
P	<0.01	<0.01	<0.01	<0.01	<0.01
Observed low tide (m)	−0.31, −0.51	−0.02, −0.10	0.10	0.55, 0.49	0.63
Time of low tide	1712, 1748	1618, 1724	1642	1300, 1424	1212

By the early 1990s, estimates ranged from 850 to 1200 birds, after which numbers declined during the late 1990s. During January/February low-tide mapping in 1998–1999 and 1999–2000, we estimated an average of 460 ± 84 (range 343–543) avocets on Humboldt Bay (Table 1).

Historical distributions in Humboldt Bay. Avocets occurred on 20% of Centerville CBCs over the count's 41-year history; 98% of the 372 avocets occurred between 1994 and 1999 (Table 2). Except for records of no more than four individuals in 1969, 1975, and 1978, avocets first appeared on the Centerville CBC in 1994, when 39 were in the Eel River lowlands. In 1995 none were reported; in 1996, when inclement weather compromised survey efforts, eight were at HBNWR adjacent to South Bay. From 1997 to 1999, 98 to 99% of avocets occurred on HBNWR; no more than four were reported in the Eel River lowlands.

Avocets occurred on all 16 Arcata CBCs (Table 2). Total numbers varied greatly (mean 763 ± 379); high numbers reported from 1993 to 1995 almost

Table 2 Averages and Ranges of American Avocet Numbers on the Centerville and Arcata Christmas Bird Counts by Five-Year Periods

5-Year Interval	Centerville CBC	Arcata CBC
1955–1959	0[a]	—
1960–1964	0	—
1965–1969	0.2 (0–1)	—
1970–1974	0	—
1975–1979	1 (0–4)	—
1980–1984	0	839[a]
1985–1989	0	590 (500–800)
1990–1994	8 (0–39)	825 (564–1806)
1995–1999	65 (0–165)	665 (382–1176)

[a]One estimate only; CBC began the last year of this interval.

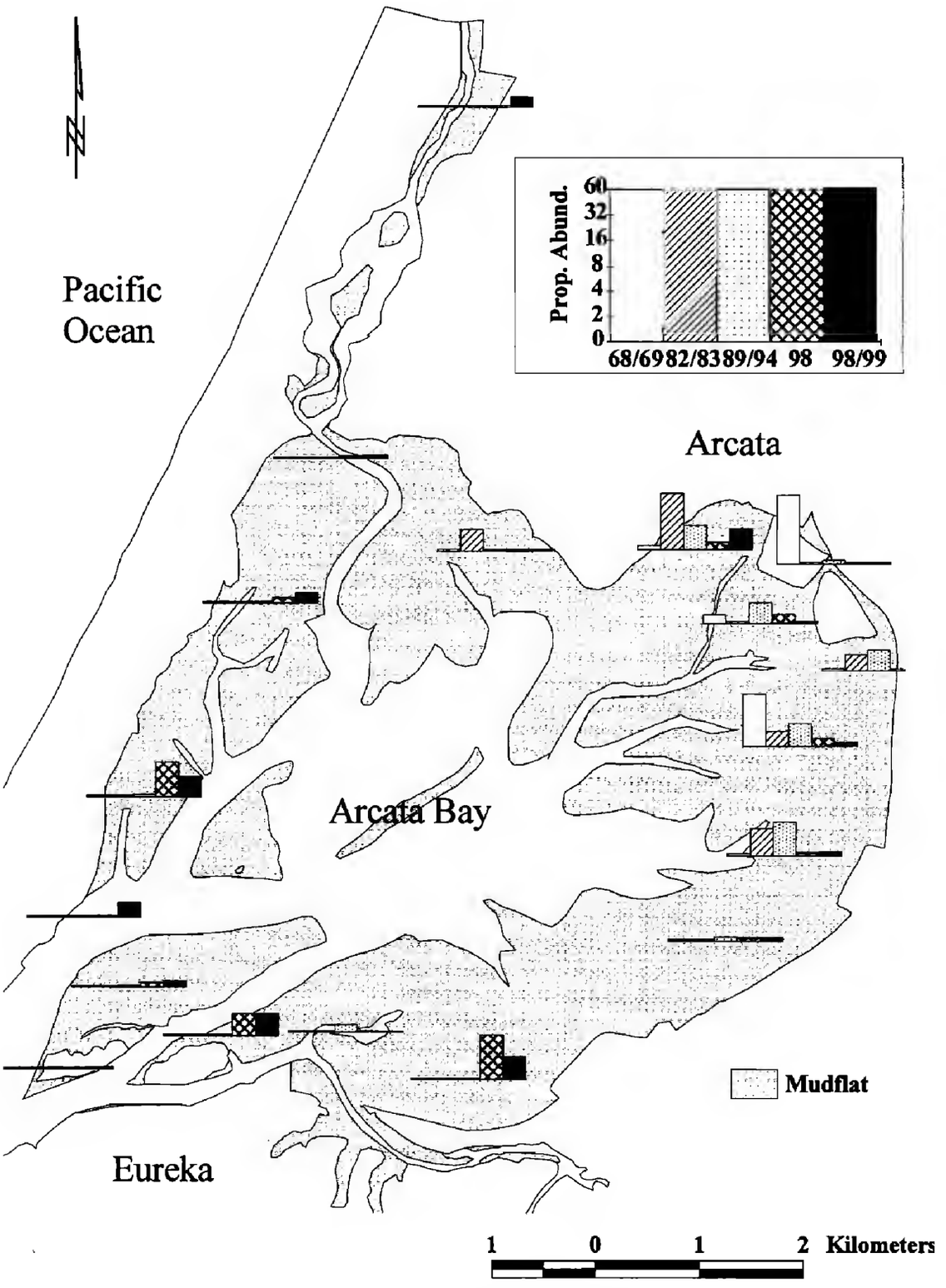

Figure 2. A 30-year history of changes in the proportional abundance of American Avocets around Arcata Bay, California, based on field notes, graduate theses, shorebird surveys, and recent research. Data are from shore-based surveys and do not include the center of Arcata Bay.

certainly represent summed counts from different observers. A decline in avocet observations in Arcata Bay paralleled the increase in South Bay.

Over the past three decades, the spatial distribution of avocets in intertidal habitats of Humboldt Bay has changed (Figure 2). During the late 1960s (Gerstenberg 1972) and mid-1980s (Evans 1988), avocets used the north and east parts of Arcata Bay nearly exclusively. During the early 1990s, baywide surveys revealed a similar pattern, but a few avocets (6.1%) occurred on the south and west shores of Arcata Bay; only six occurred outside Arcata Bay in the southwest corner of South Bay (1992 and 1993). During January and February 1998, avocet use of the north and east sectors of Arcata Bay declined, whereas use of south and west areas increased sharply. From November 1998 to January 1999, avocets were more evenly distributed around Arcata Bay than they were 10–30 years earlier. On numerous occasions during January and February 1998, S. Manion and Mathis observed 5–32 avocets feeding at low tide in flooded pastures north and west of Arcata Bay. On 16 February 2000, Colwell observed 15 avocets feeding in flooded fields of HBNWR.

Avocet densities during winter 1999 and 2000. From the total number of birds in each grid cell, we determined that avocets were concentrated (Table 1) along channels and on intertidal flats of Arcata Bay and in the southeast corner of South Bay (Figure 3).

DISCUSSION

The number of nonbreeding avocets at Humboldt Bay clearly has varied greatly over the past 50 years. Although Grinnell and Miller (1944) listed no coastal records for the avocet north of Marin County (Novato), they omitted two specimens collected at Humboldt Bay 17 and 18 August 1935 (Humboldt State University; Davis 1939). From 1945 through 1958, 17 avocets occurred on Humboldt Bay on six occasions. Beginning in 1959, their numbers increased steadily from 75 (1959) to 800–1400 (1980s–90s). A similar increase occurred in the Point Reyes region, another important wintering area on California's north coast (G. W. Page pers. comm., Shuford et al. 1989). More recently, the number of avocets wintering at Humboldt Bay appears to have declined by 50% to approximately 500.

Virtually all early records of avocets were concentrated in the northeast quarter of Arcata Bay. Nelson (1989) surveyed waterbirds in South Bay from July 1987 to June 1988 and listed avocets as seen irregularly, with numbers insufficient to warrant analysis. CBC data corroborate the early differences between Arcata Bay and South Bay. Beginning in the 1990s, avocets expanded to the south and west shores of Arcata Bay. CBC data show that in 1994 a small number of avocets began to feed on intertidal flats in the southeast corner of South Bay; at high tide they roosted in freshwater habitats of HBNWR. Most recently, during the winters of 1998 and 2000, avocets fed in flooded pastures adjacent to Arcata Bay, which had rarely been observed previously (Harris unpubl. data).

Establishment and growth of the Humboldt Bay population. At least two explanations, not mutually exclusive, exist for the establishment and increase in numbers of avocets at Humboldt Bay: (1) the avocet's breeding

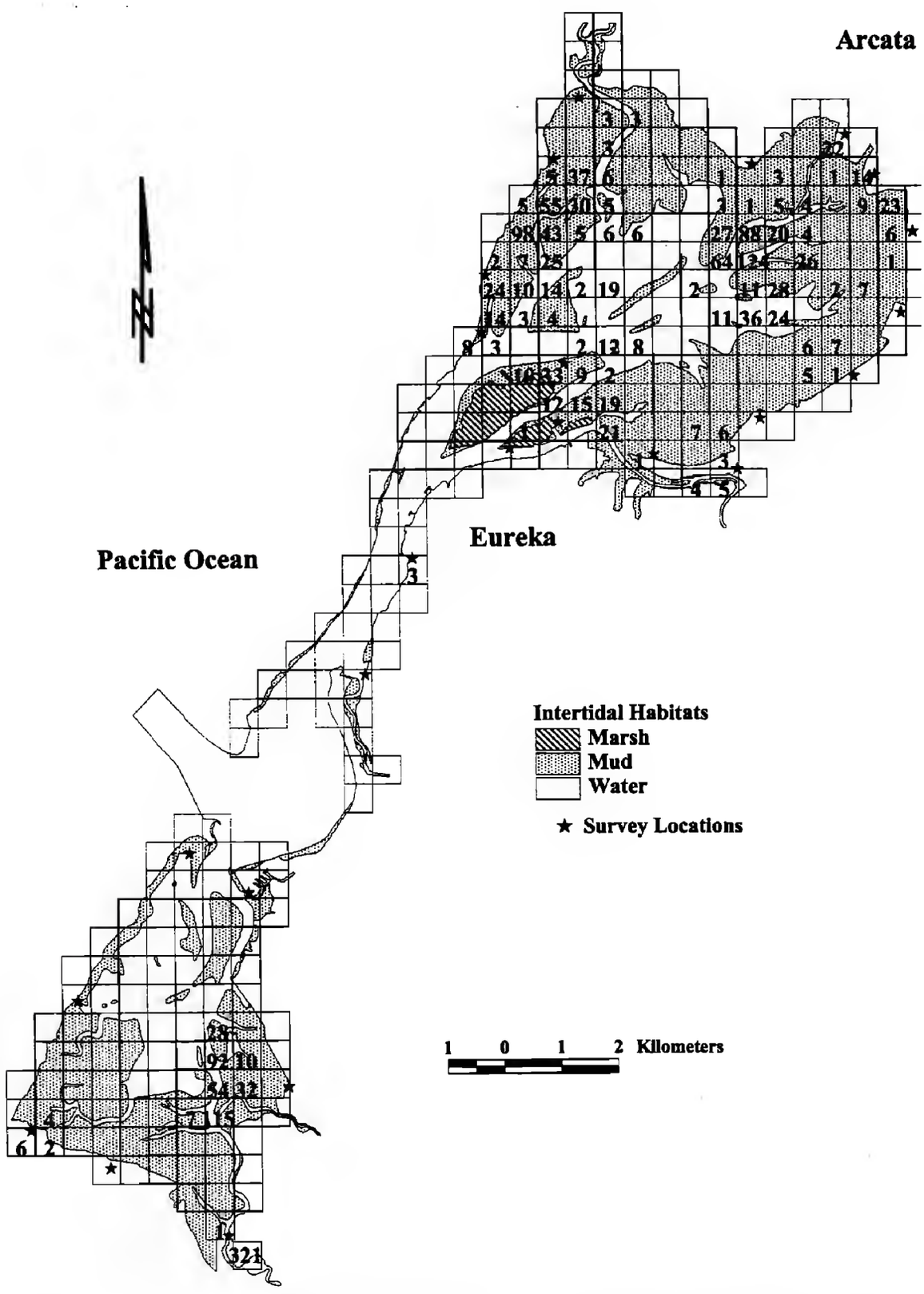

Figure 3. Low-tide distribution of wintering American Avocets in intertidal habitats of Humboldt Bay during winter mapping surveys (see Table 1). Numbers represent the total number of avocets observed in each grid cell (500 × 500 m).

population has increased in the region supplying winter visitors to Humboldt Bay; (2) nonbreeding habitat has changed, allowing avocets to expand their range into formerly unoccupied areas. On the basis of the Breeding Bird Survey, Robbins et al. (1986) reported that from 1965 to 1979 the population of the American Avocets increased significantly. This increase coincided with the major period of growth in the Humboldt Bay avocet population. Breeding Bird Survey data for 1966 to 1996 suggest that the population increased at >0.25% per year in Oregon, California, and Nevada, all breeding locales for color-marked birds observed at Humboldt Bay (Robinson and Oring 1996, Plissner et al. 1999).

Evaluating the habitat hypothesis is difficult. Specimens show that nonbreeding avocets visited Humboldt Bay occasionally earlier in the 20th century (and probably before that). In the late 1950s local numbers began to increase. Evans and Harris (1994) speculated that construction of sewage-oxidation ponds in the northeast corner of Arcata Bay in 1957 offered important habitat that was previously unavailable. Their habitat-limitation argument was based on spatial and temporal coincidence and seems plausible—numbers increased dramatically after the ponds' construction, and avocets occurred only in their vicinity. From 1980s data, Evans and Harris (1994) described an "avocet home range" (868 ha) in the north-east corner of Arcata Bay where avocets occurred predictably; they recorded only 30 observations of avocets outside this home range during 1142 hours observation.

The habitat-limitation hypothesis posits that, prior to the construction of oxidation ponds, Humboldt Bay lacked one or more habitat requirements (e.g., food, water, sanctuary from predators) necessary to support wintering avocets (Evans and Harris 1994). Evans (1988) reported that avocets used these oxidation ponds to feed on cladocerans (*Daphnia magna*), especially during October and November; most other times, however, avocets fed on nearby intertidal flats exposed during low tide. In addition to food, oxidation ponds may provide an important source of fresh water for avocets occupying saltwater habitats (Evans and Harris 1994). Evans and Harris (1994) discounted the importance of fresh water because avocets breed in hypersaline environments and have a well-developed salt gland (Mahoney and Jehl 1985). In hypersaline habitats, however, avocets concentrate in areas of fresh water (L. W. Oring pers. comm.). This suggests that although avocets possess the physiological adaptation to tolerate these habitats, they pay an energetic cost in doing so, possibly influencing their distribution.

Avocet distributions within Humboldt Bay and along the Pacific coast. An extension of the habitat-limitation hypothesis posits that the absence of avocets from some areas of Humboldt Bay stemmed from an absence of essential habitat requirements. A partial explanation for the patchy distribution of avocets within the bay (Figure 3) may be related to the distribution of intertidal sediment types—avocets occurred in areas characterized by fine (silty-clay) sediments and were absent from areas with coarse (sandy) sediments (Thompson 1971). Danufsky (2000) found support for this hypothesis in an inverse relationship between avocet occurrence and substrate particle size. The aggregated baywide distribution of avocets probably stems from a relationship between substrate composition, prey availability,

and the manner in which avocets feed. At Humboldt Bay, most avocets feed with a single scything maneuver (Evans and Harris 1994), a tactile foraging method of sweeping the bill through the upper film of sediment (Hamilton 1975). Sediment type influences habitat use by avocets. For example, Quammen (1982) experimentally manipulated substrates at Newport Bay, California, and found that avocets moved more quickly through and scythed less (pecked more) where sand was added to a mud substrate. We hypothesize that avocet distributions are related to their scything for prey in fine substrates, which vary in their distribution in Humboldt Bay.

If substrate particle size influences distributions of foraging avocets, then historical changes in avocet distribution in Humboldt Bay suggest that this habitat characteristic changed abruptly in the 1990s. In the mid-1990s, avocets began using areas of the bay that they rarely used during the period of population expansion (1960–1995). We speculate that wet years (1995–1999), coupled with logging of Humboldt Bay's watershed, increased the amount of fine sediments in the bay, altering avocet foraging habitat. Interestingly, the February 1998 observations of avocets feeding in flooded pastures adjacent to Arcata Bay coincided with the strongest (wettest) El Niño on record.

Furthermore, we speculate that, in part, the northern limit of the avocet's winter range on the Pacific coast also may be related to the preference for feeding in fine sediments (Robinson et al. 1997). Specifically, the broad flats and fine sediments of Humboldt Bay are uncommon at bays along the Oregon and Washington coast. At least 17 major estuaries occur on the Oregon coast; Washington has five such estuaries. Fifteen of the estuaries in Oregon (e.g., Nestucca, Nehalem, and Rogue) are steep-banked with sandy substrates. Grays Harbor and Willapa Bay, Washington, and perhaps Coos Bay and Tillamook Bay, Oregon, offer broad intertidal flats and fine substrates of the type apparently favored by avocets. During migration, avocets occur occasionally on the Oregon–Washington coast. Paulson (1993) reported two avocets at Coos Bay on 12 December 1980, but they were not observed after that date. In summary, the combination of Humboldt Bay's fine sediments, abundant prey (e.g., crustaceans, oligochaetes, polychaetes) linked to these substrates (Robinson et al. 1997), and moderate climate provide conditions sufficient to support avocets. These conditions are generally absent farther north on the Pacific coast.

CONSERVATION IMPLICATIONS

During January and February 1998 and February 2000, avocets fed in flooded pastures adjacent to Humboldt Bay. In this area, avocets had been observed in pastures rarely—Gerstenberg (1972) reported two in pastures during September 1969. Pastures commonly flood each winter following heavy rain. These observations strongly suggest that during winter 1998 food availability in intertidal habitats was reduced because of habitat changes.

In 1997–1998, winter use of flooded pastures coincided with two noteworthy environmental events. First, on 7 November 1997, an oil spill (~5000 gallons Bunker C fuel) occurred in Humboldt Bay, and oil contaminated intertidal flats throughout the west and southwest portions of Arcata Bay, the main channel, and limited areas of

South Bay. As yet, the effect of this oil on avocets remains undetermined, but oil may have killed some proportion of the avocets' invertebrate prey, forcing the birds to feed in pastures. Second, the record rainfall generated by El Niño of winter 1998–1999, coupled with soil exposed by timber harvesting, may have increased the amount of sediments deposited on flats during winter storms. We speculate that during winter 1998 these factors reduced invertebrate populations and habitat, forcing avocets to seek food in alternative foraging habitats.

The hypothesis that avocets and their prey were influenced by heavy sedimentation in the bay is bolstered by similar observations for another bay-dependent species with a very different feeding ecology, the Black Brant (*Branta bernicla nigricans*). During winter, and more so during spring migration, thousands of Brant stage at Humboldt Bay where they feed nearly exclusively on eelgrass. During winter and spring 1998, Brant fed extensively in pastures adjacent to Arcata Bay and South Bay. This pattern was observed only once before, during winter 1953, another El Niño year. During winter 1998–1999, K. Kovacs (pers. comm) and Mathis commented independently on the poor quality of eelgrass and its covering by sediment.

Historical accounts of avocets and recent studies seeking to estimate their population and distribution within Humboldt Bay establish the foundation for long-term monitoring of avocets. Moreover, features of the American Avocet make it an ideal subject for monitoring changes in population size, distribution, and habitat use at Humboldt Bay and elsewhere. Its conspicuous pied plumage, large size, and loose flocking tendencies make it easy to identify, observe, and count. Its use of fine sediment in intertidal habitats and dependence on prey taken from surface sediments render it a strong candidate as an indicator species for habitat change, which may influence other coastal waterbirds. We urge researchers at other locations to monitor avocets and expand our understanding of the relationships between avocet population size, distribution, and changes in the habitats in which they forage.

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REPORT OF THE CALIFORNIA BIRD RECORDS COMMITTEE: 1998 RECORDS

RICHARD A. ERICKSON, LSA Associates, One Park Plaza, Suite 500, Irvine, California 92614

ROBERT A. HAMILTON, 34 Rivo Alto Canal, Long Beach, California 90803

ABSTRACT: The California Bird Records Committee assessed 269 records of 92 species in 1998, accepting 195 of them. New to California were the Bulwer's Petrel (*Bulweria bulwerii*), photographed on Monterey Bay, Monterey Co., the Bristle-thighed Curlew (*Numenius tahitiensis*), photographed and videotaped at Crescent City, Del Norte Co., and Pt. Reyes, Marin Co., the American Woodcock (*Scolopax minor*), photographed at Iron Mountain Pumping Plant, San Bernardino Co., the Iceland Gull (*Larus glaucoides*), photographed at Bodega Harbor, Sonoma Co., and Otay, San Diego Co., the Bridled Tern (*Sterna anaethetus*), sketched and described at Bolsa Chica, Orange Co., and the Olive-backed Pipit (*Anthus hodgsoni*), photographed at Southeast Farallon Island, San Francisco Co. The Harris's Hawk (*Parabuteo unicinctus*) is no longer considered extirpated from California. With these additions, California's bird list stands at 613 species, eight of which are nonnative.

This 24th report of the California Bird Records Committee (hereafter the CBRC or the Committee) details the evaluation of 269 records of 92 species. Although most records pertain to birds found in 1998, the period covered by this report spans the 25 years from 1974 to 1999. Accepted were 195 records involving 73 species. The acceptance rate of 72.5% was typical for the last decade but below the overall Committee average (Rottenborn and Morlan 2000). Sixty-three records were not accepted because of insufficient documentation or descriptions were inconsistent with known identification criteria. Six additional records were not accepted because of questions concerning the bird's natural occurrence or establishment of introduced populations. Counties best represented by accepted records were Monterey (14 records), Kern (13), Orange (13), San Diego (13), Marin (11), San Francisco (11), and Riverside (10). Records were accepted from 20 other counties.

Highlights of this report include the addition of six species new to the California list: Bulwer's Petrel (*Bulweria bulwerii*), Bristle-thighed Curlew (*Numenius tahitiensis*), American Woodcock (*Scolopax minor*), Iceland Gull (*Larus glaucoides*), Bridled Tern (*Sterna anaethetus*), and Olive-backed Pipit (*Anthus hodgsoni*). Potential first state records not accepted include the Lesser White-fronted Goose (*Anser erythropus*), Barnacle Goose (*Branta leucopsis*), Falcated Duck (*Anas falcata*), Ross's Gull (*Rhodostethia rosea*), and McKay's Bunting (*Plectrophenax hyperboreus*). Also reported here is the Committee's decision to readmit the Harris's Hawk (*Parabuteo unicinctus*) to the list of extant species in California. With these additions, California's list stands at 613 species, of which eight are nonnative and two have been extirpated in historical times. Potential first state records of the Shy Albatross (*Thalassarche cauta*), Glossy Ibis (*Plegadis falcinellus*), Northern Bobwhite (*Colinus virginianus*), Slaty-backed Gull (*Larus schistisagus*), Eastern Bluebird (*Sialia sialis*), and Gray Silky-fly-

catcher (*Ptilogonys cinereus*) are currently being considered.

Other highlights include accepted records of the Wedge-tailed Shearwater (*Puffinus pacificus*), Neotropic Cormorant (*Phalacrocorax brasilianus*), Whooper Swan (*Cygnus cygnus*), Common Pochard (*Aythya ferina*), Gyrfalcon (*Falco rusticolis*), Mongolian (*Charadrius mongolicus*) and Wilson's (*C. wilsonia*) plovers, Sooty Tern (*Sterna fuscata*), Long-billed Murrelet (*Brachyramphus perdix*), Ruby-throated Hummingbird (*Archilochus colubris*), Veery (*Catharus fuscescens*), and Field Sparrow (*Spizella pusilla*). Also accepted were California's first spring Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*) and the first CBRC-reviewed Blue-headed Vireos (*Vireo solitarius*). The Committee's decision not to accept a long-standing record of the Red-necked Stint (*Calidris ruficollis*; the state's only purported specimen record) is reported. Species recorded in especially high numbers in 1998 included the Short-tailed Albatross (*Phoebastria albatrus*; 3 records), Lesser Black-backed Gull (*Larus fuscus*; 10), Eastern Wood-Pewee (*Contopus virens*; 5), Dusky-capped Flycatcher (*Myiarchus tuberculifer*; 8), Philadelphia Vireo (*Vireo philadelphicus*; 8), Yellow-green Vireo (*Vireo flavoviridis*; 8), Gray Catbird (*Dumetella carolinensis*; 16), Painted Bunting (*Passerina ciris*; 7), and Common Grackle (*Quiscalus quiscula*; 5).

The list of species reviewed by the CBRC is posted at the Western Field Ornithologists' web site (http://www.wfo-cbrc.org). This site also includes the entire California state list, the Committee's bylaws, a reporting form for direct e-mail submission of records to the CBRC, the addresses of current Committee members, a photo gallery of recent submissions including several birds published in this report, a list of relevant publications by CBRC members, and other information about the CBRC, WFO, and *Western Birds*.

All records reviewed by the CBRC (including copies of descriptions, photographs, videotapes, audio recordings and Committee comments) are archived at the Western Foundation of Vertebrate Zoology, 439 Calle San Pablo, Camarillo, California 93012, and are available for public review. The CBRC solicits and encourages observers to submit documentation for all species on the review list, as well as species unrecorded in California. Documentation should be sent to Guy McCaskie, CBRC Secretary, P. O. Box 275, Imperial Beach, CA 91933-0275 (e-mail: guymcc@pacbell.net).

Committee News. The Committee's voting membership after the 6 January 2001 annual meeting consisted of Jon L. Dunn, Richard A. Erickson (chairman), Kimball L. Garrett (vice chairman), Robert A. Hamilton, Bert McKee, Joseph Morlan, Michael A. Patten, Peter Pyle, Scott B. Terrill, and John C. Wilson. Guy McCaskie will serve as non-voting secretary. Recent Committee members who also voted on many of the records in this report include Matthew T. Heindel, Steve N. G. Howell, Alvaro Jaramillo, Guy McCaskie, Michael M. Rogers (outgoing secretary), Stephen C. Rottenborn, Mike San Miguel, and Daniel S. Singer.

At its 15 January 2000 meeting the Committee decided to publish its *Annotated List of the Birds of California*—for the first time including nesting annotations created by the Committee—in *California Fish and*

Game, to remove the Gray Catbird (*Dumetella carolinensis*) and the species pair of the White/Black-backed Wagtails (*Motacilla alba/lugens*) from the CBRC review list, the latter to conform with all other species pairs/groups where records must be attributed to a single species, to place the Harris's Hawk (*Parabuteo unicinctus*) on the review list but to review records in five-year increments (see species account below), and to review records of the Iceland Gull (*Larus glaucoides*) in one-year increments (see species account below). Also, see Miscellaneous Decisions below.

Format and Abbreviations. As in other recent CBRC reports, records are generally listed geographically, from north to south, and/or chronologically by first date of occurrence. Included with each record is the location, county abbreviation (see below), and date span. The date span usually follows that published in *North American Birds* (formerly *American Birds* or *Field Notes*) but, if the CBRC accepts a date span that differs from a published source, the differing dates are italicized. Initials of the observer(s) responsible for finding and/or identifying the bird(s)—if known and if they have supplied supportive documentation—are followed by a semicolon, then the initials, in alphabetized order by surname, of additional observers submitting supportive documentation, then the CBRC record number consisting of the year of observation and chronological number assigned by the secretary. All records are sight records unless otherwise indicated: a dagger (†) indicates the observer supplied a supportive photograph, (‡) videotape, (§) a voice recording, and (#) a specimen record, followed by the acronym (see below) of the institution housing the specimen and its catalog number.

An asterisk (*) prior to a species' name indicates that the species is no longer on the CBRC review list. The first number in parentheses after the species' name is the number of records accepted by the CBRC through this report; the second is the number of new records accepted in this report (because this number excludes records thought to pertain to returning individuals, it may be zero). Two asterisks (**) after the species' total indicate that the number of accepted records refers only to a restricted review period or includes records accepted for statistical purposes only; see Roberson (1986) for more information.

When individual birds return to a location after a lengthy or seasonal absence, each occurrence is reviewed under a separate record number, and Committee members indicate whether or not they believe the bird is the same as one accepted previously. Such decisions follow the opinion of the majority of members and, if a bird is considered a returning individual, the total number of records remains unchanged.

Although the CBRC does not formally review the age, sex, or subspecies of each bird, information on these subjects is often provided during the review process (and in some cases a strong or unanimous consensus is achieved). We report much of this information.

The CBRC uses standard abbreviations for California counties; those used in this report are ALA, Alameda; BUT, Butte; CC, Contra Costa; DN, Del Norte; HUM, Humboldt; IMP, Imperial; INY, Inyo; KER, Kern; LAS, Lassen; LA, Los Angeles; MRN, Marin; MEN, Mendocino; MNO, Mono; MTY, Monterey; ORA, Orange; PLA, Placer; RIV, Riverside; SAC, Sacra-

mento; SBE, San Bernardino; SD, San Diego; SF, San Francisco; SJ, San Joaquin; SLO, San Luis Obispo; SM, San Mateo; SBA, Santa Barbara; SCL, Santa Clara; SCZ, Santa Cruz; SIS, Siskiyou; SON, Sonoma; TRI, Trinity; VEN, Ventura; YUB, Yuba. A full list of county abbreviations is available on the WFO–CBRC web site. Other abbreviations used: I., island; L., lake; Mt., mountain; n. miles, nautical miles; N.W.R., national wildlife refuge; Pt., point; R., river; W.M.A., wildlife management area.

Museum collections housing specimens cited in this report, allowing access to Committee members for research, or otherwise cited are the California Academy of Sciences, San Francisco (CAS), Natural History Museum of Los Angeles County, Los Angeles (LACM), Pacific Grove Museum of Natural History (PGMNH), San Bernardino County Museum, Redlands (SBCM), San Diego Natural History Museum (SDNHM), Santa Barbara Museum of Natural History (SBMNH), and the Museum of Vertebrate Zoology, University of California, Berkeley (MVZ).

RECORDS ACCEPTED

YELLOW-BILLED LOON *Gavia adamsii* (65, 1). A first-winter bird was at Field's Landing, HUM, 18 Jan 1998 (MHM; 1998-023). An alternate-plumaged adult off Otter Pt., Pacific Grove, MTY, 24 Nov 1998–19 Mar 1999 (DR; 1999-059) returned for its sixth winter, as summarized by Rottenborn and Morlan (2000).

SHORT-TAILED ALBATROSS *Phoebastria albatrus* (7**, 3). The long-predicted increase in records of this endangered species in California waters may be underway. Immatures about 20 miles W of Bodega Head, SON, 28 Aug 1998 (GL†, DnWN†; BDP, DGS; 1998-148), 15 n. miles W of Pt. Reyes (38° 03′ N, 123° 21′ W), MRN, 26 Oct 1998 (BMcK†; ADeM, SWe; 1998-179), and 3 n. miles WNW of Pt. Pinos (36° 40′ N, 122° 00′ W), MTY, 21 Dec 1998 (SNGH, ADeM; RJA, SFB, RLB†, JEG, GGr, PKe, DLSh†, MS, RLT†; 1998-231) were considered separate individuals by the Committee and provided the first accepted records since 1987. On the basis of photographs, Pyle considered the first two birds "somewhat worn whereas the third was immaculate (also per SNGH description)," leading him to conclude that the first two birds were >1 year old and the third was in its first year (ca. 6 months old). This also explains the pale eye crescents apparent on the first two birds but not the third, the first sign of adult plumage (H. Hasegawa pers. comm. to Pyle). A photograph of the third bird appeared in *N. Am. Birds* 53:203 and on the cover of *Western Birds* vol. 31, no. 1 (2000).

BULWER'S PETREL *Bulweria bulwerii* (1, 1). One seen well by a boatload of observers on Monterey Bay, MTY, 26 July 1998 (JD, BMcK†; AB, GB†, JEG, JMo†, DLSh, RLT†, DW†; 1998-119) represented the first well-documented record for North America—preceding a bird off North Carolina (LeGrand et al. 1999) by only days. Therefore the record was forwarded to the American Birding Association's Checklist Committee for its review. The similar Jouanin's Petrel (*B. fallax*) has been recorded as close as Hawaii (Clapp 1971) but is stockier (thicker winged, larger headed, and larger billed) and typically has proportionally shorter outer rectrices. The Committee's unanimous acceptance of the record on a single circulation is a testament to the exceptional package of documentation compiled by veteran trip organizer Debra L. Shearwater. Photographs appeared in *Field Notes* 52:498 and 519.

WEDGE-TAILED SHEARWATER *Puffinus pacificus* (3, 1). A dark-morph individual was on Monterey Bay, MTY, 10–21 Oct 1998 (EWG†, TMcG; BB†, RLB†‡,

DC†, ADeM†, PG†, JEG, AK†, GMcC, BMcK†, DR†, MMR†, DMS, DLSh, WDS, JS†, RLT†; 1998-162). Another exceptionally complete set of documentation (cf. Bulwer's Petrel) made the decision of Committee members easy. The previous California records were from Monterey Bay, MTY, 31 Aug 1986 (Stallcup et al. 1988, Bevier 1990) and the Salton Sea, RIV, 31 Jul 1988 (McCaskie and Webster 1990, Pyle and McCaskie 1992). A photograph of the 1998 bird appeared on the cover of *N. Am. Birds* vol. 53, no. 1 (1999).

MANX SHEARWATER *Puffinus puffinus* (43, 6). A record of one seen from shore at Pigeon Pt., SM, 5 May 1996 (GD, NL; 1996-077A) received the requisite number of accept votes only on its fourth and final circulation. Five accepted records in 1998 represented only half of the previous year's record total (Rottenborn and Morlan 2000): Cordell Bank, MRN, 11 Jul (MI; 1999-144), three on Monterey Bay, SCZ, 8 Aug (MI, BMcK; 1998-021; BMcK†, MI; 1998-022; MI; 1999-134), and one at SE Farallon I., SF, *3 Oct* (WR; 1999-032). One additional record from 1998 is still under Committee review.

MASKED BOOBY *Sula dactylatra* (11, 1). The recent surge in records of this species continued with an adult at Año Nuevo I., SM, 19 Jun–6 Aug 1998 (MF, MM, CAM, JM, JDP, RWR, MMR, SCR, DGS, FT; 1998-098). The bird was clearly a Masked Booby in the now limited sense that excludes the Nazca Booby (*S. granti*), newly recognized as a species (Pitman and Jehl 1998, Roberson 1998, AOU 2000). *Field Notes* 52:499 refers to a videotape that the CBRC has not seen.

BLUE-FOOTED BOOBY *Sula nebouxii* (80**, 0). A subadult near Obsidian Butte, IMP, 19–28 Feb 1998 (JEP, DSP; RJN; 1998-111) was considered probably the same individual as one seen at Salton City, IMP, 29 Nov 1997 (Rottenborn and Morlan 2000).

BROWN BOOBY *Sula leucogaster* (58, 7). Four records in 1998 were uncomplicated, but records of three birds found earlier were not. The former were an immature at San Simeon State Beach, SLO, 19 Jan 1998 (TME, KH; 1998-054; what may have been the same bird was reported at Morro Bay, SLO, 20–22 Dec 1997—*N. Am. Birds* 52:256), an adult at Morro Rock, SLO, 5 Jul 1998 (MG; 1998-122), an adult male at Pt. Reyes, MRN, 7 Jun 1998 (KB, GGa, KCK, LML‡, JM, RS†; 1998-088), and a second-year male at SE Farallon I., SF, 12–24 Oct 1998 (WR, PP†; 1999-007). The Pt. Reyes bird was the northernmost ever recorded in California; one was in northwestern Washington 18 Oct–9 Nov 1997 (*Field Notes* 52:114-115).

Most interesting of the other three records was an immature seen from a boat 12 n. miles SSW of Santa Barbara, SBA, 31 Aug 1996 (BS; DG, KAH, AH, DK†, CAM, MMR; 1996-117A; Figure 1). The record received 80% acceptance in its first round of circulation as a Red-footed Booby (*S. sula*; 1996-117) before failing acceptance by the same margin. It was then resubmitted as a Brown Booby (1996-117A) and gained a unanimous decision on its second round. Descriptions of the bird's foot color varied, so observers were not of one mind concerning the bird's identity. The Committee's initial reliance on reported reddish feet (also suggested by photographs) eventually gave way to a full consideration of other characters (i.e., underwing pattern, dark brown coloration, bill color and bill/head shape, heavier structure, uniform color of central rectrices) and a realization that apparent foot color can be influenced greatly by lighting.

An immature 15 miles SE of East Pt., Santa Rosa I., SBA, 30 Sep 1997 (BD†; 1998-069) was supported by a single color photograph and was accepted (unanimously) only after its third circulation (a second bird reported without documentation was not accepted). This may have been the same bird seen between Santa Rosa I. and Santa Cruz I., SBA, 19 Oct 1997 (Rottenborn and Morlan 2000). Another immature at Newport Beach, ORA, 7 Dec 1997–7 Feb 1998 (LRH; GMcC, JEP, DGS; 1997-211) was

initially identified as a Red-footed Booby. Only after circulating the record three times did the Committee consider the entire date span to pertain to the same bird.

NEOTROPIC CORMORANT *Phalacrocorax brasilianus* (10, 2). Adults were near Obsidian Butte, Salton Sea, IMP, 28 Apr–12 Jul 1998 (KZK†; GMcC, MAP†, SCR, DGS; 1998-079) and 3 miles S of Mecca, Salton Sea, RIV, 14 Jun–16 Jul 1998 (MAP†; GMcC; 1998-097).

TRICOLORED HERON *Egretta tricolor* (26**, 1). Returning adults were at the Tijuana R. estuary, SD, 25 Jul 1998–12 Feb 1999 (GMcC; 1998-112; same as 1997-184, Rottenborn and Morlan 2000) and Bolsa Chica, ORA, 31 Oct 1998–7 May 1999 (RF, MTH, PKn†, VL, JM, MMR†, SS; 1998-200; same as 1997-167 and 1998-004, Rottenborn and Morlan 2000). Another adult was 4 miles S of Mecca, Salton Sea, RIV, 31 Jan–7 Mar 1998 (MAP; KLG†, CAM, GMcC; 1998-048).

REDDISH EGRET *Egretta rufescens* (78, 3). An immature around Johnson Rd. and Colfax St. at the N end of the Salton Sea, RIV, 11 Jul–*1 Aug* 1998 (RC, GMcC, MJSM, DGS; 1998-101) was considered the same as an immature at Obsidian Butte, Salton Sea, IMP, 2–8 Aug 1998 (GMcC; MJSM; 1998-114). On the coast, an adult was at Seal Beach N.W.R., ORA, 17 Apr 1998 (JF; 1998-071), and an immature was at the Tijuana R. estuary, SD, *29 Aug*–4 Oct 1998 (GMcC; 1998-121).

YELLOW-CROWNED NIGHT-HERON *Nyctanassa violacea* (18, 0). The adult that has been reported at La Jolla, SD, for nearly 20 years (Rottenborn and Morlan 2000) was seen again 30 Apr–26 May 1998 (DGS; 1998-083).

EMPEROR GOOSE *Chen canagica* (63, 1). One was on the Garcia R. Flats, MEN, 28 Dec 1996–24 Feb 1997 (ERH; MG†, MMR†, PMS; 1997-091). Two birds were initially reported with marginal written documentation, but photographs received subsequently documented the presence of only one.

TRUMPETER SWAN *Cygnus buccinator* (24, 2). Adults were 7.5 miles NNE of Marysville, YUB, 3 Feb 1994 (TM, BEW†; 1998-077) and on Rindge Tract, SJ, 17 Dec 1995 (WH; 1998-215). A second adult accompanying the latter bird, also reported as a Trumpeter Swan, was not accepted.

WHOOPER SWAN *Cygnus cygnus* (5, 1). An adult at Lower Klamath N.W.R., SIS, 28 Jan 1998 (TCB; 1998-026) was in the same area as ones seen in 1991–92 and 1994 (McCaskie and San Miguel 1999) and may have been the same individual. Patten (2000) summarized recurring doubts concerning the provenance of Whooper Swans in North America.

GARGANEY *Anas querquedula* (21, 1). One at the Salinas sewer ponds, MTY, 25 Apr–4 May 1998 (CHo; DR, SCR, JS†; 1998-084) fit the pattern of males in spring established by most records of this species (Spear et al. 1988) and was the first to be found in Monterey County.

COMMON POCHARD *Aythya ferina* (2, 1). Two males photographed at Bolsa Chica, ORA, 26 Dec 1994 (PK; 1995-082; Figure 2) made California's second record, following a male at Silver Lake, SBE, during falls and winters between February 1989 and November 1992 (Patten 1993). The current record struggled through four rounds because the birds were identified from photographs well after the sighting, and the prints that accompanied the record through three rounds were inadequate for some members to rule out hybrids. Communication between Committee members and the photographer and inspection of the original slides led to eventual acceptance by a 9–1 plurality.

KING EIDER *Somateria spectabilis* (34, 1). Record 1998-014 involved a female seen at Laguna Beach, ORA, 23 Dec 1995 (JEP) and at Huntington Beach, ORA, 28 Dec 1995 (DSP).

MISSISSIPPI KITE *Ictinia mississippiensis* (27, 1). A first-summer bird at Furnace Creek Ranch, Death Valley, INY, 6–7 Jun 1998 (SCR, MJM, MMR†, MJSM, SBT; KSG, MSM; 1998-087) was at the site of more records than anywhere else in California but was the first in the state since 1994 (Howell and Pyle 1997).

HARRIS'S HAWK *Parabuteo unicinctus* (4**, 4). Following the appearance of a number of Harris's Hawks in southwestern California in 1994, the Committee packaged several records together under number 1996-080 so it could reconsider its designation of the California population as extirpated. After a single circulation, we decided to consider the individual reports separately to avoid the possibility of different members accepting different records and no single record achieving acceptance on its own. After three more circulations, four records had been accepted: up to eight at Borrego Valley, SD, 15 Apr 1994–22 Sep 1996 (RT; AME, RAE, PJ, PEL, CAM, GMcC, MAP†, DR†; 1996-080A; Figure 3), up to five (including two that constructed a nest) at Boulevard, SD, 1 Jun 1994–31 Oct 1995 (PEL, ADS; 1996-080B), one in the Coachella Valley, RIV, 31 Dec 1994–29 Jan 1995 (SJM; MAP; 1996-080D), and up to five at George AFB, SBE, 2–21 Jan 1995 (EAC†, CAM, MAP, MSM; 1996-080E). Thus the Committee no longer considers the species extirpated from California. Four more records from the same period are still under review.

At its January 2000 meeting the Committee decided to review subsequent records only once every five years. Patten and Erickson (2000), using primarily CBRC data, summarized the reappearance of this species in California and northern Baja California, emphasizing the cyclic nature of this species' occurrence in those areas over the past 150 years. Erickson et al. (in press) reported additional recent records for northern Baja California.

*ZONE-TAILED HAWK *Buteo albonotatus* (54, 3). An adult was in Mission Viejo, ORA, 18 Oct 1975 (SJG; 1999-178), an adult was near Lake Henshaw, SD, 13 Jun 1998 (PU; 1999-039), a returning adult (cf. Rottenborn and Morlan 2000) was at Goleta, SBA, 21 Oct 1998–24 Mar 1999 (FE; SS; 1998-206), and two adults were at San Diego Wild Animal Park, San Pasqual, SD, 19 Nov 1998–15 Mar 1999 (GMcC, JM; 1999-024), one judged to be a returning bird (cf. Rottenborn and Morlan 2000).

GYRFALCON *Falco rusticolus* (8, 1). A gray-morph juvenile at Tule Lake N.W.R., SIS, 24 Nov 1998 (RE; 1999-058) was the fifth to be recorded in the California portion of the Klamath Basin.

YELLOW RAIL *Coturnicops noveboracensis* (70, 2). Females were found in weakened condition in Manhattan Beach, LA, 20 Oct 1998 (#LACM 110747; 1999-097) and Santee, SD, 16 Dec 1998 (#SDNHM 50186; 1998-232). There were only four previous accepted records for southern California, three in the period 1896–1917.

In comments, Patten noted the light weight of both specimens (perhaps merely a result of their poor condition) and questioned how the similar Swinhoe's Rail (*C. exquisitus*) of east Asia was eliminated from consideration. Although the chance of Swinhoe's Rail reaching California is remote and these specimens do match other Yellow Rail specimens, specimens for comparison with Swinhoe's Rail are not available at either museum. This question seems relevant to other California specimens as well, so an eventual review of all records may be in order.

MONGOLIAN PLOVER *Charadrius mongolicus* (8, 2). Juveniles were at Bodega Harbor, SON, 2–3 *Sep* 1996 (DnWN†; KB, LML, BDP; 1996-118) and the Eel River Wildlife Area, HUM, 2–3 Oct 1998 (SNGH, SWe; WB, AJ, JSM, GMcC, JM, MSM; 1998-150). Previous California records, all coastal from Marin County through Ventura County, span the period 12 July to 25 September.

WILSON'S PLOVER *Charadrius wilsonia* (8, 1). An adult male was at Coronado, SD, 27 Apr–1 May 1998 (NBB, BF†, PAG, RL, JOZ; 1998-072); reports of it as late

Figure 1. Immature Brown Booby, *Sula leucogaster*, 12 nautical miles south-southwest of Santa Barbara, Santa Barbara County, 31 Aug 1996 (1996-117A). This individual was originally identified as a Red-footed Booby, *S. sula*, and was nearly accepted as such. Note the seemingly red feet but also apparent whitish mottling on the underwing coverts and the bill's shape (relatively thick with flat forehead and culmen) and color (bluish gray with no hint of pinkish).

Photo by David Koeppel

Figure 2. Male Common Pochard, *Aythya ferina*, one of two at Bolsa Chica, Orange County, 26 Dec 1994 (PK; 1995-082) that represent the second record for California.

Photo by Peter Knapp

Figure 3. Adult Harris's Hawk, *Parabuteo unicinctus*, in Borrego Springs, San Diego County, 13 Jan 1995 (1996-080A), one of up to eight there beginning in April 1994. On the basis of this record and three others, the species is no longer considered extirpated in California.

Photo by Don Roberson

as 2 May were not accepted. Surprisingly, of six California records in the latter half of the 20th century, only one other was south of Ventura County.

AMERICAN OYSTERCATCHER *Haematopus palliatus* (16, 1). An adult was at San Nicolas I., VEN, 28 Jun–3 Sep 1998 (RAH; 1998-117); nine of California's accepted records are from the Channel Islands.

BRISTLE-THIGHED CURLEW *Numenius tahitiensis* (2, 2). California's first accepted records, of one at Battery Pt., Crescent City, DN, 14–16 May 1998 (ADB†; BED, GE†, GMcC, JM, DvWN, DR†; 1998-075) and one at Kehoe Beach, Pt. Reyes, MRN, 16–25 May 1998 (LML‡; KB, LC, MF, BG, SCH, SNGH†, KCK, MJM, JSM, JLM, JM, BDP, MAP, RWR, JR, MMR, SCR, TR, MSM†, DGS, RS†; 1998-076), were part of a larger phenomenon involving 13–17 birds from Washington through central California and discussed in detail by Patterson (1998) and Mlodinow et al. (1999). Photographs of the accepted birds were published by Patterson (1998), in *Field Notes* 52:384, and on the cover of *Western Birds* vol. 30, no. 3 (1999). Two other records were not accepted (see below).

Figure 4. Adult Iceland Gull, *Larus glaucoides*, at Bodega Harbor, Sonoma County, 13 Jan 1985 (1985-007), the first accepted record for California.

Photo by Albert Ghiorso

BAR-TAILED GODWIT *Limosa lapponica* (23, 2). An adult was at Ravenswood Open Space Preserve, SM, 12–29 Sep 1998 (RST; AME, MF, DGS; 1998-138), and a juvenile was at the confluence of Alviso and Coyote sloughs, SCL/ALA, 2 Oct 1998 (SCR; 1998-204).

AMERICAN WOODCOCK *Scolopax minor* (1, 1). One was at Iron Mt. Pumping Plant, SBE, 3–9 Nov 1998 (MAP, GMcC; RF, KSG, JM, DR†; 1998-177). Patten et al. (1999) provided details of this record, California's first.

LITTLE GULL *Larus minutus* (72, 4). An adult was at Mystic L., near Lakeview, RIV, 15 Nov 1998–27 Mar 1999 (MAP†; DSC, RF, RL, CAM, GMcC, JM; 1998-181). An adult or bird in second alternate plumage at Alviso, SCL, 28 Apr–2 May 1998 (SCR; MWE, MF, NL, MJM, RWR; 1998-070) was followed by one in first alternate plumage there 8–17 May 1998 (SCR; NL, JM; 1998-078). One in first alternate plumage at Lower Klamath N.W.R., SIS, 14–16 Jun 1998 (ADB, RE; 1998-140) was at a less traditional time and place.

BLACK-HEADED GULL *Larus ridibundus* (20, 0). An adult at Santa Barbara, SBA, 17 Nov–24 Dec 1997 (DSW; 1997-204) returned for its sixth winter at the same location.

ICELAND GULL *Larus glaucoides* (2, 2). After nearly 15 years of intermittent review (cf. Heindel and Garrett 1995, Rottenborn and Morlan 2000) and the formal input of at least 12 outside consultants from throughout North America and Europe (E. A. T. Blom, Davis Finch, Roger Foxall, Daniel D. Gibson, Michel Gosselin, Peter J. Grant, Raymond Henson, Ted Hoogendoorn, Dennis Paulson, J. V. Remsen, Jr., Stuart Tingley, Thede Tobish), this species was finally added to the state list at the January 2000 meeting, on the basis of two records: an adult at Bodega Harbor, SON, 30 Dec 1984–18 Jan 1985 (KFC, DDeS; JRA†, LCB, RAE, AG†, RLeB†, GMcC,

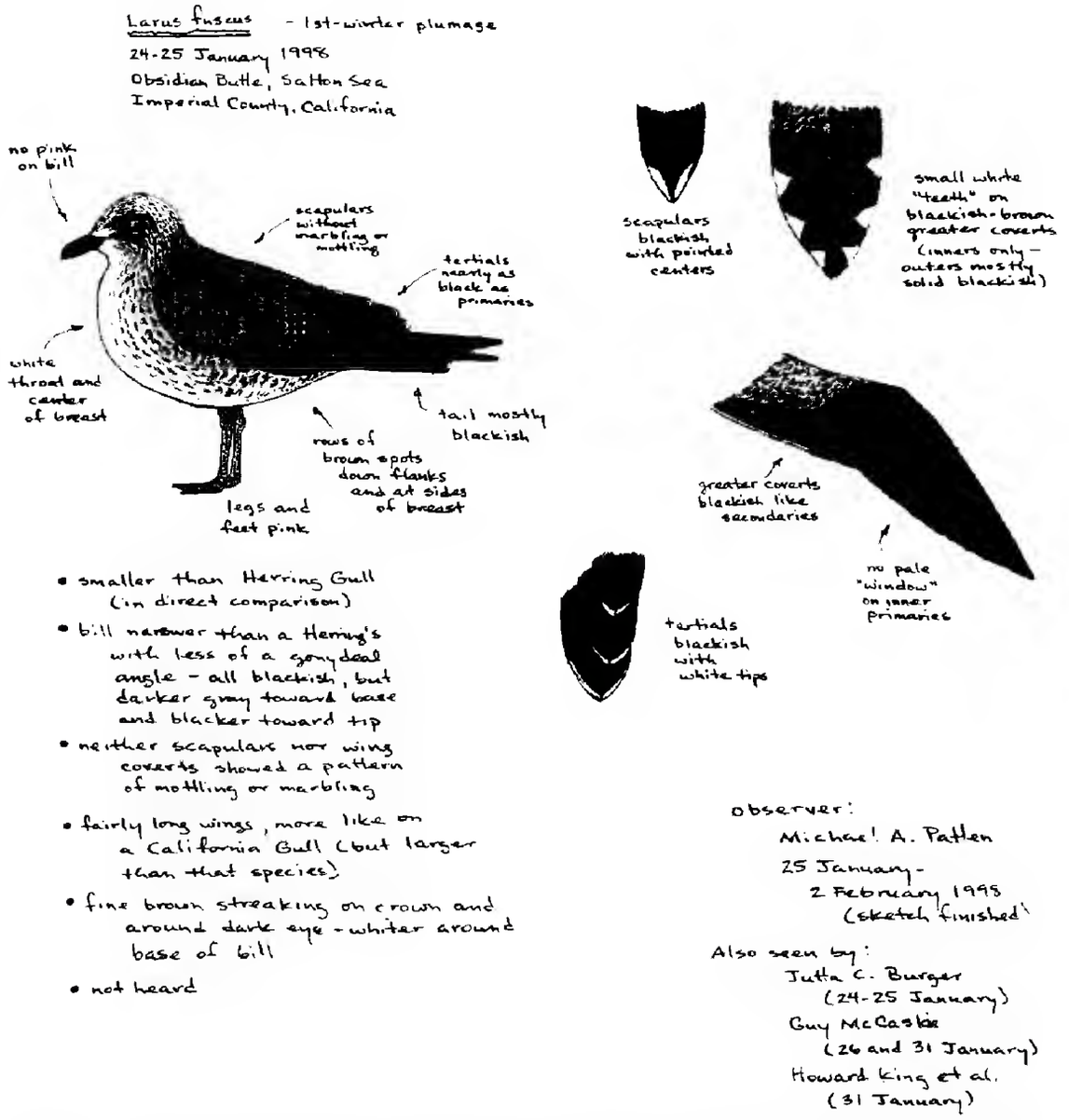

Figure 5. First-winter Lesser Black-backed Gull, *Larus fuscus*, at Obsidian Butte, Salton Sea, Imperial County, 25 Jan 1998 (1998-042), the first record of this plumage in California.

Sketch by Michael A. Patten

JM, DnWN†, JOl†, BDP, DGS†, RS†, SWi†; 1985-007; Figure 4) and a juvenile at the Otay dump, SD, 17–25 Jan 1986 (REW†; LRB†, JLD†, JML, MJL, GMcC, DR, AS†; 1986-015). Perhaps not surprisingly, both of these birds were at the pale end of the spectrum (i.e., more like nominate *glaucoides* than the expected Kumlien's Gull, *L. g. kumlieni*, of North America); birds closer in appearance to *kumlieni* (and thus pale Thayer's Gulls, *L. thayeri*, as well) have not fared well in the CBRC review process (see Rottenborn and Morlan 2000 and Records Not Accepted below).

Many Committee members expressed skepticism of the current taxonomic treatment of the Iceland/Thayer's Gull complex in America (AOU 1973, 1983, 1998)—indeed, that skepticism was largely responsible for the temporary suspension of CBRC review of these records—but all eventually agreed that such taxonomic considerations are beyond the scope of the CBRC and that the treatment here matches better what has been done with extralimital records elsewhere in North

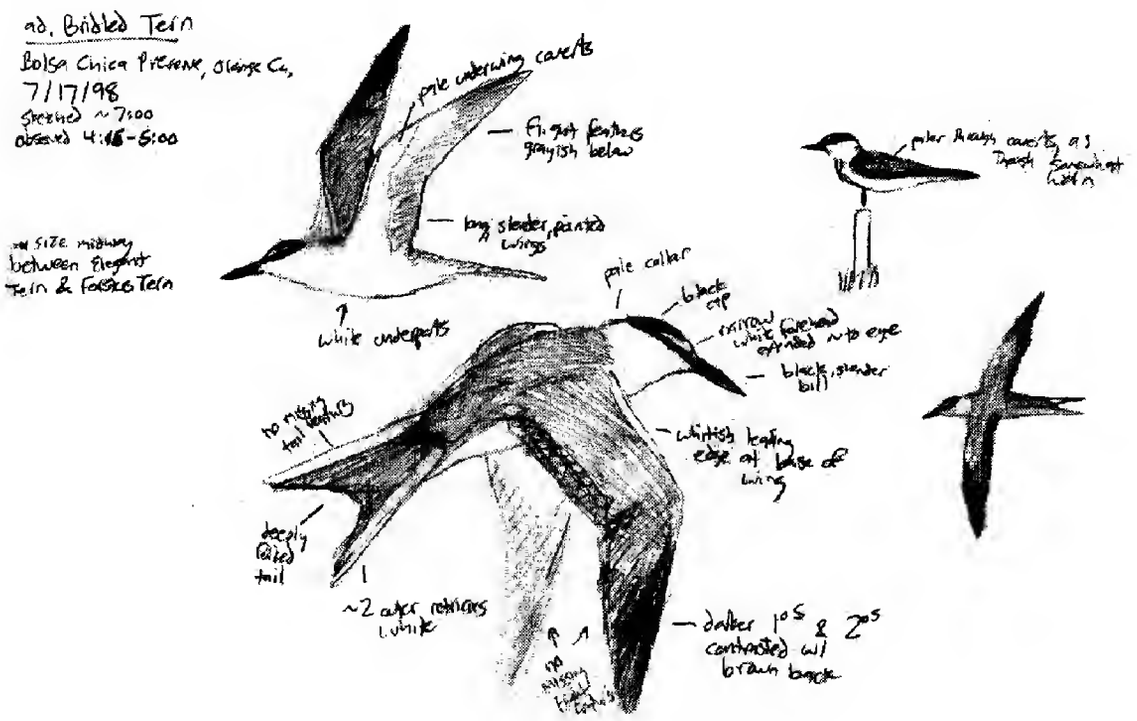

Figure 6. Adult Bridled Tern, *Sterna anaethetus*, at Bolsa Chica, Orange County, 17 Jul 1998 (1998-105), the first accepted record for California.

Sketch by Marshall Iliff

America. Because of the complex taxonomy and identification of this species, records will be handled differently than for other species; records will not begin circulation as received but will be held until the next annual meeting, when they may or may not undergo an expedited review. Rottenborn and Morlan (2000) addressed the Committee's latest dealings with these birds.

LESSER BLACK-BACKED GULL *Larus fuscus* (17, 8). California is not immune from the population expansion of this species in North America, as ten individuals were seen in 1998: a returning adult at Alviso, SCL, 11 Oct 1997–23 Jan 1998 (MJM; MWE, MF, JM, RWR; 1997-150) and again in the Alviso area, SCL/ALA, 21 Oct–8 Dec 1998 (SCR; MMR†; 1998-203), a second-winter bird at L. Cunningham, San Jose, SCL, 31 Oct 1997–31 Mar 1998 (SCR‡, MMR†; MF, MTH, NL, MJM, GMcC, JM, RWR, DR†, RMS†, MSi;1997-178), returning in its third winter *20* Dec 1998–14 Mar 1999 (SCR; MJM, MMR†; 1999-001), an adult at L. Cunningham, San Jose, SCL, 8 Jan 1998 (BMcK; 1998-003), a returning adult at Doheny State Beach, ORA, 8 Oct 1997–4 Mar 1998 (JDW†; TC, MTH†, MF, GMcC; 1997-156) and again 4 Nov 1998–10 Mar 1999 (LML‡, JM, DSP; 1998-201) with a second adult there 30 Nov–7 Dec 1998 (DSP; MTH; 1998-207), an adult at the Whitewater R. delta, Salton Sea, RIV, 14 Feb–8 Mar 1998 (MAP; CAM, GMcC; 1998-049), an adult at Salton Sea State Recreation Area, RIV, 21 Jan–7 Mar 1998 (DSP; TC, KLG†, MTH, RL, CAM, GMcC, KM, MAP; 1998-025), an adult at Obsidian Butte, Salton Sea, IMP, 19 Jan 1998 (GMcC, PEL; 1998-039), a first-winter bird at Obsidian Butte, IMP, 24 Jan–8 Mar 1998 (MAP; KLG, MTH†, CAM, GMcC; 1998-042; Figure 5), and an adult at the Brawley landfill, IMP, 30 Dec 1998–1 Feb 1999 (SJT; 1999-048), considered probably different from one at the same locality 22–27 Jan 1996 (McCaskie and San Miguel 1999). A photograph of the first San Jose bird was published in *Field Notes* 52:253.

Figure 7. Possible Blue-headed Vireo, *Vireo solitarius*, on San Nicolas Island, Ventura County, 20 Oct 1998 (1998-216). The extensively white-edged outer rectrices, blackish tertials with thick whitish edges, brilliant white throat, bluish head, and seemingly sharp demarcation between throat and auricular support identification as Blue-headed, but using known identification criteria most members could not rule out a bright Cassin's Vireo.

Photo by Sandra G. Harvill

Several CBRC members expressed the concern that not all California birds may be of European/eastern North American origin (i.e., *L. f. graellsii*) and that certain Asian taxa (e.g., *heuglini, taymirensis*) may be involved as well. In the end, the AOU's (1998) regarding all of these taxa as subspecies of the Lesser Black-backed Gull rendered such concerns outside the scope of CBRC review. In the future, if the AOU defines a less inclusive Lesser Black-backed Gull, some or all of these records may be reconsidered.

BRIDLED TERN *Sterna anaethetus* (1, 1). An adult at Bolsa Chica, ORA, 17 Jul 1998 (MI; KSG, JEP; 1998-105; Figure 6) represents the first accepted record for the state; another record from Bolsa Chica 12 Jun 1993 (Erickson and Terrill 1996) has been resubmitted in light of the 1998 sighting. The Bridled Tern becomes one of five species on the state list supported by only sight records.

After some initial confusion concerning potential differences between the west Mexican *S. a. nelsoni* and the Caribbean *S. a. recognita/melanoptera* (i.e., the bird had a pale collar and white on at least the two outer rectrices), the record was accepted unanimously on the second circulation. Ridgway (1919) said only that *nelsoni* is "similar to *S. a. recognita* but averaging larger, with relatively longer or more slender bill, and under parts of body tinged with pale gray." The tail pattern also eliminates the only other similar species, the Gray-backed Tern (*S. lunata*) of the central Pacific.

SOOTY TERN *Sterna fuscata* (6, 0). A returning adult (cf. Rottenborn and Morlan 2000) was at Bolsa Chica, ORA, 12–19 Apr 1998 (PEL; 1998-080).

LONG-BILLED MURRELET *Brachyramphus perdix* (3, 1). Birds in "basic" plumage (first alternate?) at Pt. Saint George, DN, 21 Jul 1998 (ADB; 1998-118A), 29 Jul 1998 (ADB; 1998-118B), and 22–23 Aug 1998 (BED; 1998-118) were judged to be the same individual, contra *N. Am. Birds* 53:101. Rottenborn and Morlan (2000) reported the first accepted records of this species and summarized other records that remain unreviewed by the CBRC, including several specimens.

RUDDY GROUND-DOVE *Columbina talpacoti* (69, 3). An immature male was found dead 22 km N of Blythe, RIV, 26 Nov 1992 (#LACM 107326; SC; KLG, MAP; 1994-72), an immature male was at Furnace Creek Ranch, Death Valley, INY, 7 Oct 1998 (JHe†; TH; 1998-212), and a male was at Independence, INY, 2 Nov 1998 (RAHu; 1998-213). Patten took the Blythe specimen to Moore Laboratory of Zoology at Occidental College, there confirming its identity as *C.t. eluta* of western Mexico (the subspecies believed to account for all California records). Acceptance of the last bird was not unanimous, as Morlan felt that the description failed to rule out a Plain-breasted Ground-Dove (*C. minuta*), a southern species that seems very unlikely to reach California as a natural vagrant (its status in captivity is unknown). The larger size and black axillars of *talpacoti* are distinctive, as are purple markings on the wing coverts of *minuta*.

GROOVE-BILLED ANI *Crotophaga sulcirostris* (11, 1). One at Desert Center, RIV, 4 Oct 1998 (MAP, BDS; 1998-155) provided the seventh fall record from the interior, conforming to the predominant pattern developing in California.

BROAD-BILLED HUMMINGBIRD *Cynanthus latirostris* (54, 2). Lone females presumably wintering were at San Elijo Lagoon, SD, 5–8 Jan 1998 (MBS; MMR; 1998-027) and Goleta, SBA, 28 Nov 1998–28 Feb 1999 (RAH; GMcC, DR, SCR; 1999-062).

RUBY-THROATED HUMMINGBIRD *Archilochus colubris* (4, 1). An immature female captured at SE Farallon I., SF, 25 Aug 1998 (PP‡; SD, DH, MH†; 1999-008) fit the species' incipient pattern of early fall vagrancy to California (the previous two fall records, also from this location, were on 21–22 Aug 1985 and 7 Sep 1994). Howell and Pyle (1997) discussed its separation from other small hummers, particularly the Black-chinned (*A. alexandri*); Pyle (1997) authored the definitive treatment for this species in the hand (as all accepted California records have been).

GREATER PEWEE *Contopus pertinax* (32, 1). An individual that wintered at Brock Research Center, IMP, 24 Dec 1998–*27* Feb 1999 (MAP†; RF, KSG, KZK†, CAM, GMcC, JM, MMR†, MJSM, DMS; 1999-043) was identified as an adult because of its fresh, truncate rectrices and unworn tertials (the Greater Pewee is unique among North American *Contopus* in retaining the juvenal flight feathers during the first prebasic molt; Pyle 1997). A color photograph of this bird was published in *N. Am. Birds* 53:221.

EASTERN WOOD-PEWEE *Contopus virens* (9, 5). A virtual invasion of this eastern flycatcher in spring/summer 1998 more than doubled the state's accepted records, with individuals found at Bodega Head, SON, 3 Jun 1998 (ANW; PCo§, BDP; 1998-115), Pt. Reyes, MRN, 22 Jun 1998 (JM; TB†; 1998-004), Mono L. County Park, MNO, 4–8 Jul 1998 (SH†, RSt; MWE§, DL, DP§, JiP, DR†, AW; 1998-103), Galileo Hill Park, KER, 10 Jun 1998 (MTH; 1998-120), and South Fork Wildlife Area, KER, 27 Jun–9 Jul 1998 (SAL; MTH, MAP; 1998-102). With vocalizations critical to distinguishing this species from the Western Wood-Pewee (*C. sordidulus*), audio tape nicely supported the Bodega and Mono Lake records (photos of the latter bird supported the record but were not definitive). A photo of the Pt.

Reyes bird showed a relatively pale breast and entirely yellow-orange lower mandible, marks highly suggestive of the species claimed, but probably more important to this record's acceptance was an hour the finder spent listening to and describing the bird's somewhat variable clearly whistled songs mixed with frequent call notes, none of which were like those of its western counterpart. The Galileo bird, a first for Kern County, gave only frequent "chip" call-notes with an occasional "Dusky-capped Flycatcher-like peeeeeah" (described as the typical Eastern Wood-Pewee song minus the final syllable). These vocalizations, combined with the bird's appearance (the lower mandible was "all orange-yellow" and its "very crisp" plumage featured a "white throat, faint vest, and fairly light undertail coverts") and the observer's skill and experience levels, were considered adequate for CBRC endorsement. The bird at South Fork Wildlife Area was observed and heard singing by several observers.

YELLOW-BELLIED FLYCATCHER *Empidonax flaviventris* (12, 1). A silent immature at California City, KER, 7 Sep 1998 (MTH; RC, MSM, MJSM, JCW†; 1998-124) was the fifth for Kern County, which now claims nearly half the state's records. All California records but one (Carpinteria, SBA, 16–17 Oct 1987; Pyle and McCaskie 1992) are for September. Although sight records of this species are still somewhat contentious within the Committee because of the high potential for confusion with the Western Flycatcher complex (*E. difficilis/occidentalis*) and the Acadian Flycatcher (*E. virescens*), this record received unanimous endorsement during the first round of voting. Photographs of this bird were not definitive, but they supported prolonged close observations by several experienced observers, and submission of the photos was considered important by at least one member. The spacing of the primaries on this bird was not inspected (cf. DeSante et al. 1985, Heindel and Pyle 1999), but independent review of museum specimens by Howell (in litt.) and Patten (in litt.) suggests that this feature's utility may be limited because of overlap in the pattern of primary spacing of the Yellow-bellied and Western flycatchers.

DUSKY-CAPPED FLYCATCHER *Myiarchus tuberculifer* (52, 7). Acceptance of one at Bolinas, MRN, 12 Jan–21 Mar 1998 (KH; PP; 1998-002) and one inland at Finney L., IMP, 12 Jan–28 Mar 1998 (BDCW; KLG†, GMcC, MAP; 1998-051) yields a seasonal total of eight for 1997–98. In 1998–99, a returning bird was at Santa Cruz, SCZ, 19 Dec 1998 (SG; 1999-027, same as 1998-062), and new individuals were at Bodega Bay, SON, 22–27 Dec 1998 (BDP; JEPa, DnWN; 1999-005), nearby at Bodega Dunes Campground, SON, 23 Dec 1998–16 Jan 1999 (DnWN†; BDP, JEPa; 1999-006), Los Osos, SLO, 12–19 Dec 1998 (TME; KH; 1999-096), Ventura 28 Dec 1998–2 Jan 1999 (WW; DDesJ†; 1999-029), and Long Beach, LA, 27 Dec 1998–28 Mar 1999 (KSG; RF, MJSM, MSM†, JM; 1999-016). Records of this southern flycatcher follow an upward trend and scatter fairly evenly northward along the coast to Sonoma County, with outliers farther north and in the interior. San Diego County claims only three records, suggesting that this corner of the state may lie southwest of the vector followed by most vagrants to California. All accepted records are thought to pertain to late fall migrants or, particularly, overwintering birds.

GREAT CRESTED FLYCATCHER *Myiarchus crinitus* (42, 2). Individuals were at Twenty-nine Palms, SBE, 12 Sep 1998 (BiD, EAC†; 1998-221) and in Manhattan Beach, LA, 18 Oct 1998 (KL†; KSG, TEW; 1998-208). The former record was the state's third earliest and only the fifth inland. Despite being underexposed, photographs helped this report gain unanimous acceptance since they showed important field marks, particularly pale edging to the inner tertials that appears thicker basally than expected on a Brown-crested Flycatcher (*M. tyrannulus*; Heindel and Patten 1996, Pyle 1997).

SULPHUR-BELLIED FLYCATCHER *Myiodynastes luteiventris* (13, 1). California's first spring record, at Gazos Creek, SM, 14 Jun 1998 (RST; BMcK†, AME; 1998-106), was the first of its kind for San Mateo County and the fourth for northern California. Photographs were inadequate to eliminate the similar Streaked Flycatcher (*M. maculatus*), but all three observers described the Sulphur-bellied's distinctively thick blackish malar streak. Those with the best views also noted blackish streaks on a whitish background from the throat to the lower breast and flanks, unstreaked belly, undertail coverts washed with yellow, lack of yellow in the face, and only a very limited amount of pale on the lower mandible (cf. Howell and Webb 1995, Pyle 1997). A report of this bird continuing on 15 Jun 1998 received no CBRC support, as members were not convinced that the description ruled out a female Black-headed Grosbeak (*Pheucticus melanocephalus*).

THICK-BILLED KINGBIRD *Tyrannus crassirostris* (14, 1). One at Pomona, LA, 14 Oct 1998–1 Mar 1999 (MJSM; 1998-175) returned for its seventh winter at this location, while an immature at Half Moon Bay, SM, 19 Dec 1998–7 Mar 1999 (AWK; GEC, MD, MWE†, RF, NL, LML ‡, MMa, JM, CL, DvWN, MMR†; 1998-233) was a first for San Mateo County and one of the northernmost records for this species. The age of the latter bird was inferred from the rufous edgings to the rectrices and wing coverts, fresh tertials, and bright yellow underparts (cf. Pyle 1997).

WHITE-EYED VIREO *Vireo griseus* (38, 2). A singing male at Butano Creek, SM, 18 Jun 1998 (DLSu; 1999-026) furnished a county first, while another at Pt. Saint George, DN, 27 Jun 1998 (ADB; 1998-141) was well north of the state's previous northernmost records (in Marin County). Approximately 75% of accepted records are from spring (8 May to late June).

YELLOW-THROATED VIREO *Vireo flavifrons* (69, 2). One at Pt. Reyes, MRN, 13 Jun 1998 (AME; 1998-108) was in spring, season of approximately 70% of California's records. The state's third in winter was at Westminster, ORA, 29 Dec 1998–15 Feb 1999 (KSG, SSo, RF, JM, GMcC, MTH, DR; 1999-018).

BLUE-HEADED VIREO *Vireo solitarius* (5**, 5). This recently recognized species was added to the review list in 1998 (records from 1997 and later), with the following records being the first to gain formal CBRC acceptance: likely immature female on SE Farallon I., SF, 1 Oct 1998 (PP; 1999-011), immature (likely male) banded on SE Farallon I., SF, 11 Oct 1998 (WR; PP†; 1999-012), immature male banded at the Big Sur R. mouth, MTY, 28 Sep 1998 (JBo†; 1999-057), one at Arroyo Grande Creek, SLO, 14 Oct 1998 (BS; 1998-157), and a wintering bird in Orange, ORA, 31 Oct 1998–16 Jan 1999 (DRW; 1999-095). At least some pre-1997 records will undergo a form of review, and anyone who has observed this species in the state in any year is urged to submit contemporaneous documentation to the Committee.

Blue-headed Vireos are difficult to separate from bright Cassin's Vireos (*V. cassinii*) under field conditions (Heindel 1996, Pyle 1997), and evaluation of many records is troublesome, even with a fairly detailed description and/or photographs (see Figure 7). Accepted birds were described as possessing or photographed exhibiting (1) an immaculate white throat sharply demarcated from the auriculars (no blending at the border), (2) white center of breast and belly, (3) blue or blue-gray head contrasting with a green back (some with greenish napes), and (4) lemon-washed flanks (often very bright). One bird in hand was reported to have outer rectrices with pale outer edges approximately 1 mm thick. Until identification criteria are better delineated, the Committee requests unusually detailed and precise descriptions of suspected Blue-headed Vireos.

*PHILADELPHIA VIREO *Vireo philadelphicus* (116, 8). Individuals found within the typical autumn window of occurrence (mid September to late October) were at Fairhaven, HUM, 2 Oct 1998 (BED, DRi; RF, JM, MMR, GMcC, MSM; 1998-152),

Pt. Reyes, MRN, 30 Sep 1998 (PU; JFH, DGS; 1998-189), El Granada, SM, 4 Oct 1998 (RST; 1999-046), Big Sur R. mouth, MTY, 27 Oct 1998 (JBo; 1999-056; banded immature), Los Angeles R. near Glendale, LA, 26 Sep–11 Oct 1998 (KLG; 1999-037), and Huntington Beach, ORA, 12–22 Oct 1998 (KSG, MSM; 1998-199). One at Bodega Head, SON, 5–10 Sep 1998 (DnWN; KCK, BDP, DGS; 1998-134) arrived a day later than the state's earliest fall record. A singing male at the Parker Creek Diversion Dam, MNO, 21 Jun 1998 (ES; DMa†, DP§, JiP; 1998-104) furnished California's eleventh in spring, with Mono County accounting for six of these records (the previous five occurred at Oasis). Although photographs of this bird appear to be diagnostic, and the record was accepted unanimously, a recorded song included phrases that some members considered similar to those of a Warbling Vireo (*V. gilvus*) and thus seemingly atypical for a Philadelphia Vireo.

YELLOW-GREEN VIREO *Vireo flavoviridis* (63, 8). This vireo's impressive showing in fall 1998 matches the previous seasonal high set in fall 1988; as in that year, seven occurred along the coast. Individuals were at Fort Funston, SF, 30 Sep–4 Oct 1998 (LC, MWE, MJM, JM; 1998-151), Lighthouse Field State Beach, SCZ, 15 Oct 1998 (SG; 1998-220), Oso Flaco L., SLO, 28 Sep 1998 (BS; 1998-145), Oxnard Plain, VEN *13*–16 Sep 1998 (GMcC, MSM; 1998-139), Oxnard Plain, VEN, 26 Sep–4 Oct 1998 (SJT; JLD; 1998-229), Oxnard Plain, VEN, 29–30 Sep 1998 (MSM; JLD; DSP; 1998-154), and Pt. Loma, SD, 17 Oct 1998 (GMcC; GLR; 1998-165). Few of these birds were aged specifically, but none was thought to be an adult. An immature at Galileo Hill Park, KER, 6 Oct 1998 (MTH; 1998-219) provided the second record for Kern County and only the state's fourth inland.

VEERY *Catharus fuscescens* (10, 1). An immature banded at the Big Sur R. mouth, MTY, 21 Sep 1998 (JBo†; 1998-174) made the state's seventh fall record. This bird's appearance was consistent with *C. f. salicicola*.

GRAY-CHEEKED THRUSH *Catharus minimus* (20, 1). An immature at Galileo Hill Park, KER, 9 Oct 1998 (MTH; DSP, JCW; 1998-184; Figure 8) was the second identified inland in California, the first having been at the same park 14–18 Sep 1989 (Patten and Erickson 1994).

WOOD THRUSH *Hylocichla mustelina* (14, 1). An immature at California City, KER, 11–13 Oct 1998 (KSG, MTH, GMcC, MAP, MJSM, SBT†, JCW; 1998-160) was a first for Kern County and the state's fifth Wood Thrush inland.

*GRAY CATBIRD *Dumetella carolinensis* (101, 16). After a single spring record in 1998—of a one-year-old bird banded near the Carmel R. mouth, MTY, 20 Jun 1998 (KN; 1998-109)—Gray Catbirds arrived in bulk in fall 1998; the final tally of 15 records eclipsed the previous high seasonal total of seven from fall 1991. Remarkably, seven of these were inland, including four in Kern County (just one previous fall occurrence there). Individuals were at Chico, BUT, 7–8 Oct 1998 (RW; HO, JOs, RER, MSk; 1998-167), Bodega Head, SON, 22 Sep–8 Oct 1998 (DnWN; DGS; 1998-188), Pt. Reyes, MRN, 22–23 Sep 1998 (KB, JFH, DGS; 1998-156), SE Farallon I., SF, 31 Oct 1998 (WR; IS†; 1999-033; immature; Figure 9), Tunitas Creek, SM, 23 Oct 1998 (AW; 1998-168), near Año Nuevo State Reserve, SM, found dead 30 Dec 1998, likely wintering (BMcK†; #LACM 111151; 1999-070), Galileo Hill Park, KER, 14 Oct 1998 (KSG; 1999-034), near Cantil, KER, 23 Oct 1998 (MTH; 1998-218), California City, KER, 18 Oct–31 Dec 1998 (JHu; MTH, MAP†, DMS, GMcC, MSM, MJSM, JCW†; 1998-171; adult), California City, KER, 20 Oct–16 Nov 1998 (JHu; MTH, GMcC, MSM; 1998-180; immature), Iron Mt. Pumping Plant, SBE, 24 Oct 1998 (MAP; BiD; 1998-169; immature), Horsethief Springs, Kingston Range, SBE, 6 Oct 1998 (BiD; 1998-122), McGrath State Beach, VEN, 19 Sep 1998 (NF; 1999-040), San Nicolas I., VEN, 11–17 Oct 1998 (RAH; WW; 1999-045; banded), and San Diego, SD, 27–28 Oct 1998 (GLR; GMcC; 1998-170). The

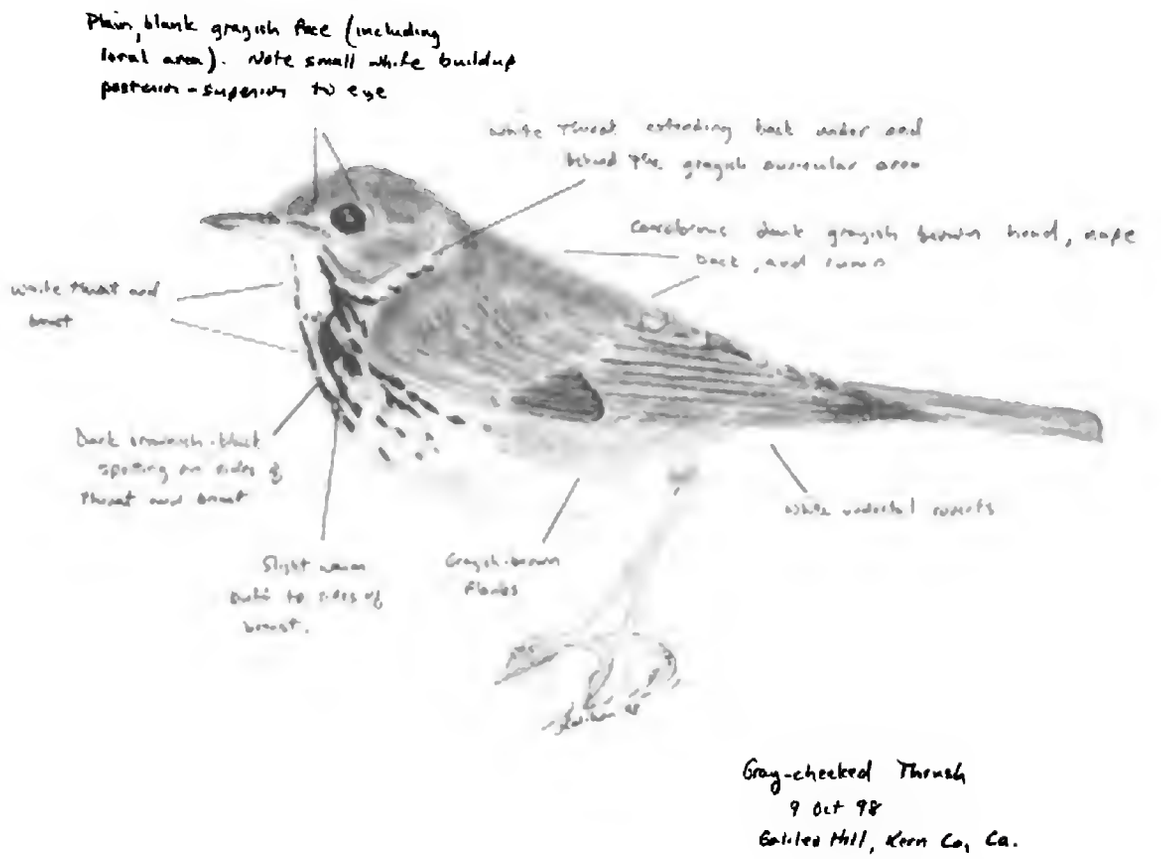

Figure 8. Gray-cheeked Thrush, *Catharus minimus*, at Galileo Hill Park, Kern County, 9 Oct 1998 (1998-184). Key features include dominance of cool gray tones to the upperparts, brownish-black spotting on white underparts, whitish border to the lower auriculars, and incomplete whitish eye-ring.

Sketch by John C. Wilson

number of accepted records indicates that the Gray Catbird is a rare, regular component of California's avifauna, and records after 1999 will not be reviewed.

WHITE/BLACK-BACKED WAGTAIL *Motacilla alba/lugens* (5, 3). In 1993, Howell and David Sibley were asked independently to review five vexing northern California records (1988-290, 1989-130, 1989-210, 1990-189, 1990-200); we thank them for their effort and advice, provided both in letters to the Committee and via publication of Sibley and Howell (1998), which included their updated opinions on all California records. The three records discussed here (among the five reviewed by Howell and Sibley) were originally considered by the CBRC in the early 1990s, then re-reviewed following publication of Sibley and Howell's enlightening paper. Unfortunately, members were still unable to reach consensus on the age and sex of these birds, a step critical to identifying them to species (Pyle 1997). For two of these records, pitfalls inherent in the identification process were compounded by differing opinions regarding the likelihood that each pertained to a single bird that wintered in the same general area for four consecutive years. Finally, given that these wagtails are known to interbreed, at least occasionally (e.g., Kishchinski and Lobkov 1979, Badyaev et al. 1996), the potential for hybridization naturally affected members' opinions (although Sibley and Howell suspected that "fewer than 5%" of the 216 wagtail specimens they inspected might have been hybrids). Though records such as these frustrate the field ornithologist (and bird records committees), they are instructive reminders that the natural world does not always conform neatly to our organizing

Figure 9. Gray Catbird, *Dumetella carolinensis*, on Southeast Farallon Island, San Francisco County, 31 Oct 1998 (1999-033), one of a record 16 accepted records in 1998. The four inner greater coverts have been replaced and thus contrast with the duller outer greater coverts and primary coverts, a "molt limit" not shown by fall adults. Note also the lackluster remiges, typical of immatures.

Photo by Ivan Samuels

schemes and that some birds may simply not be identifiable to species, even by skilled observers studying them at close range.

An early fall vagrant at the Eel River Wildlife Area, HUM, 1–3 Sep 1994 (NL, DEQ†, DSa; 1994-133A) was submitted as a White Wagtail and received four "accept" votes, along with six votes for acceptance at the species-pair level. Upon its 1998 re-submission the voting results after two rounds were identical to the original results (four votes for the White Wagtail, six votes for the species pair). Most members were nearly convinced that the bird was, in fact, an adult White Wagtail, but some were troubled that a well-regarded observer (one of many who observed this bird without submitting documentation) verbally reported having observed dark scapular lines not visible in two distant photographs. Sibley and Howell (1998) identified this individual only to the species-pair level.

A widely seen and closely studied bird at Moss Landing, MTY, 21 Dec 1990–21 Jan 1991 (DEG; JLD, SNGH, GMcC, PEL, RJO'B†, MAP, DR†, DAS, SWe; 1990-200A; photograph in *Am. Birds* 45:317) was generally thought to be an adult female White or immature Black-backed Wagtail. The record was twice submitted as a "White/Black-backed Wagtail," receiving unanimous support to the species-pair level each time. After the first review (as 1990-200), Morlan accepted it as a Black-backed, while Roberson and Pyle accepted it as a White that had wintered in the general area the preceding three years (Moss Landing, MTY, 23 Dec 1988–21 Jan 1989 [1988-290]; Sunset State Beach, SCZ, 3–11 Dec 1989 [1989-210]; Pajaro R. mouth/ Sunset State Beach SCZ/MTY 7 Nov–3 Dec 1990 [1989-210]). In the second review (as 1990-200A), Pyle's opinion remained unchanged, while the remaining votes went

to the species pair (Roberson was then off the Committee). Lars Svensson kindly reviewed a photograph of this bird but was unable to state anything conclusive regarding the appearance of birds of the subspecies *ocularis* of NE Siberia and NW Alaska (i.e., those known to reach California). Sibley and Howell (1998) identified this bird only to the species-pair level, opining that it was probably an adult female White Wagtail, although probably not the same individual involved in previous records from the general vicinity (because the appearance changed too rapidly from that ascribed to 1990-189A, discussed in the following paragraph; S. Howell pers. comm.).

One at the Pajaro R. mouth/Sunset State Beach, MTY/SCZ, 7 Nov–3 Dec 1990 (BMe; JSM, JMS; 1990-189A) was seen by fewer observers and supported by much sparser details than were the preceding two records. It was first submitted as a White Wagtail and received three "accept" votes (all members accepting the species pair). In 1993, commenting at the CBRC's request, Sibley (in litt.) regarded the descriptions of this bird as "just too little to go on," while noting that they suggested an immature White Wagtail; Howell (in litt.) simply considered the documentation insufficient to support a species-level identification. Sibley and Howell (1998) erroneously published this record as an immature White Wagtail (S. Howell in litt.). Upon its resubmission in 1998, four members accepted it as a White Wagtail, with all members accepting the species pair. Among those accepting, Jaramillo, McCaskie, and Pyle reckoned it was likely a returning bird; Rottenborn, following Sibley and Howell (1998), considered it more likely an immature.

OLIVE-BACKED PIPIT *Anthus hodgsoni* (1, 1). A first-fall bird observed and banded at SE Farallon I., SF, 26-29 Sep 1998 (RB, PC, WR; DMa†, PP†; 1999-010) marked the debut of this distinctive Old World species in California. This individual belonged the "expected" subspecies *yunnanensis* of northern Eurasia, which has accounted for all vagrant Olive-backed Pipits of known race in the New World. Capitolo et al. (2000) presented a full account of this record, including photographs and a summary of the North American records.

SPRAGUE'S PIPIT *Anthus spragueii* (27, 1). Imperial County's second record, comprising at least 12 wintering near Calipatria, IMP, 10 Jan–21 Feb 1998 (KLG, MTH, PEL, RL, CAM, GMcC, TRC, MAP; 1998-040), exceeded the largest flocks previously recorded in California (flocks of up to five near Needles, 2–27 Nov 1986, Langham 1991, and near Lancaster, LA, 22 Nov 1981–7 Mar 1982, Binford 1985). The birds were in a field of cut Bermuda Grass (*Cynodon dactylon*) near the intersection of Sinclair Road and Highway 111.

BLUE-WINGED WARBLER *Vermivora pinus* (26, 1). An immature male at Birchim Canyon, NW of Bishop, INY, 6 Sep 1998 (DP, JiP; JHe, TH; 1998-214) was the second recorded in Inyo County. This eastern warbler's pattern of vagrancy is atypical in that inland records account for most of the state total (61%); perhaps even more unusual, 58% of the fall records are away from the coast.

GOLDEN-WINGED WARBLER *Vermivora chrysoptera* (60, 1). A male at SE Farallon I., SF, 29–30 Sep 1998 (IS; RB, PP, WR; 1999-013) was the island's third fall record and seventh overall.

YELLOW-THROATED WARBLER *Dendroica dominica* (85, 3). One at the Carmel R. mouth, MTY, 9 Sep 1998 (DR; 1998-142) was judged to be of the more regularly occurring subspecies *albilora*, while an immature male at San Nicolas I., VEN, 7–14 Sep 1998 (RAH; SGH; 1998-193) with some yellow in the lores was not ascribed a race (some *albilora* can show this). A bird presumed to be wintering was in Eureka, HUM, 14 Jan 1998 (MHM; 1998-022).

GRACE'S WARBLER *Dendroica graciae* (34, 1). The state's northernmost coastal record was at Jacks' Peak Regional Park, MTY, 12 Dec 1998–3 Feb 1999 (RFT; JA, DPH, CH, DR, MMR; 1999-004).

PINE WARBLER *Dendroica pinus* (56, 1). A male that wintered at El Dorado Park, Long Beach, LA, 25 Nov 1998–10 Apr 1999 (KSG, CAM, MSM, MJSM, JM, SSo; 1998-202) began singing by the end of its stay. This bird was judged to be probably different from 1997-193, a likely immature male that wintered in a different part of this large park in 1997–98. Although this species winters in the state with some regularity, no individual is believed to have returned for a second year. One reported in Fountain Valley, ORA, 17–18 Nov 1998 (*N. Am. Birds* 53:106) was not submitted for review.

WORM-EATING WARBLER *Helmitheros vermivorus* (84, 1). One at San Pedro, LA, 23 Nov–14 Dec 1996 (DMH; KLG; 1997-025) required three circulations because a submitted photograph was not identifiable and the only submitted description covered just the bird's call notes and behaviors, plus a sketch depicting the undertail coverts. Additional documentation was eventually submitted and the record was accepted unanimously, but other widely seen birds routinely fare poorly in CBRC review for similar reasons (cf. the account for this species under Records Not Accepted). One reported at Moss Landing, MTY, 16 Nov 1998 (*N. Am. Birds* 53:102) was not submitted for review.

MOURNING WARBLER *Oporornis philadelphia* (106, 3). Accepted were an immature male banded at SE Farallon I., SF, 15–16 Sep 1998 (PP; WR†; 1999-014), an immature at Chorro Creek, Morro Bay, SLO, 20 Sep 1997 (JSR; WB; 1998-038), and an immature banded at San Nicolas I., VEN, 12–13 Sep 1998 (RAH; 1998-136). The first two birds were described as showing the distinctly yellow throats typical of this species, while the last had a throat described in the hand as being "pale gray with pale yellow tips; the yellow coloration was quite muted and would have been difficult to discern in the field." While members were somewhat concerned with this description, all distinctive measurements, appearances, and the call were consistent with a Mourning Warbler and eliminated congeners. In-hand photographs of this interesting bird were, unfortunately, destroyed by the developer.

RED-FACED WARBLER *Cardellina rubrifrons* (11, 1). One photographed at Bishop, INY, 20–21 May 1998 (BT; NBB, KSG, JHe†, TH, DP, JiP; 1998-085) constituted the state's eighth spring record, all but one at inland locales. This bird's relatively dull plumage suggested perhaps a one-year-old female, but Pyle (1997) urged caution in assessing age and sex in this species.

SCARLET TANAGER *Piranga olivacea*. (99, 5). A female was photographed at Pt. Reyes, MRN, 1 Jun 1998 (RS; GGr†; 1998-096). A male observed there on 30 Sep 1998 (RS; JFH, DGS, SCH, PU; 1998-158) was described by all viewers as having entirely black remiges and wing coverts, indicating an adult (it was termed a "young male" in *N. Am. Birds* 53:102). Additional fall males were at Galileo Hill Park, KER, 1 Oct 1998 (DSP; 1998-183), Chatsworth, LA, 27 Oct 1998 (JWS†; 1998-190; immature), and Huntington Beach, ORA, 31 Oct–1 Nov 1998 (KSG; 1999-113; immature).

CASSIN'S SPARROW *Aimophila cassinii*. (40, 1). A male was voice-recorded as it sang and skylarked in the North Domenegoni Hills, RIV, 26 May 1995 (KFC§; 1999-198). Whereas the species' diagnostic primary song was captured on tape, several members noted that a second song (presumed to be from the same bird) sounded atypical for a Cassin's Sparrow. Spring vagrants in May and June account for most California records.

FIELD SPARROW *Spizella pusilla* (6, 1). Kern County's first was photographed at Inyokern, KER, 1–4 Nov 1998 (SSt†; MTH; 1998-205). Like previous California Field Sparrows', this bird's appearance was consistent with the pale western subspecies *arenacea*.

SNOW BUNTING *Plectrophenax nivalis* (64, 2). One was at Arcata Marsh, HUM, 28 Oct 1998 (PL; 1999-055), and a female was photographed on SE Farallon I., SF, 1 Nov 1998 (PP†; 1999-035). Each fit the predominant pattern of late fall records from the northern coast.

PAINTED BUNTING *Passerina ciris* (65, 7). First-fall birds on the Shasta R. NE of Grenada, SIS, 19 Sep 1998 (RE; 1999-036) and at Pt. Reyes, MRN, 29 Sep 1998 (GE; JMR; 1998-172) were county firsts. Other immatures were at Furnace Creek Ranch, Death Valley, INY, 24 Sep–10 Oct 1997 (RJN; JHe, TH, GMcC, MAP; 1997-146, 1997-146A) and 21 Sep 1998 (GMcC; MSM; 1998-144), at Ridgecrest, KER, 24–27 Sep 1998 (LSu; 1998-210), and near Cantil, KER, 6–7 Sep 1998 (MTH; 1998-217). These records fit the predominant pattern of Painted Bunting records in California, of immatures occurring from late August through mid October.

An adult male at Twentynine Palms, SBE, 8 Oct 1998 (BiD; 1998-223) was accepted 8–2 as a natural vagrant in the first round on the strength of its relatively remote desert location and appropriate date. While the Committee shares a general uneasiness that released/escaped birds may account for a considerable proportion of the state's adult male Painted Bunting records (see this species' account under Records Not Accepted, Natural Occurrence Questionable), this vote demonstrates that those concerns can be overcome.

COMMON GRACKLE *Quiscalus quiscula* (44, 5). Records were of a weakened male taken as a specimen from Rohnert Park, SON, 15 Nov 1997 (SE†; 1999-101; #Sonoma State University 1985), a spring migrant photographed at Pt. Sur, MTY, 21 Apr 1998 (JBo; DR†; 1998-089), a male photographed and voice recorded at Bishop, INY, 13 Sep 1998 (DP†§, JiP; 1998-211), a singing male videotaped in Wildomar, RIV, 21 Jan–15 Feb 1998 (CHa‡; TRC, GMcC, CAM, MAP; 1998-041), and a singing male voice recorded at Twentynine Palms, SBE, 27 Mar–11 Apr 1998 (MF, MAP, DGS, JOZ§; 1998-061). Like the previous California records, all birds identifiable to subspecies were of the expected Bronzed race *versicolor*. The Rohnert Park and Pt. Sur birds were county firsts.

Through spring 1988, 15 of 22 accepted records were of apparent spring migrants occurring between 12 April and 12 June. From fall 1988 through fall 1998, only four of 22 accepted records fell within this spring window. During the latter period, 15 records pertained to apparent fall migrants. Inyo County claims a remarkable 18 records, more than triple the total for any other county.

RECORDS NOT ACCEPTED, identification not established

LEAST GREBE *Tachybaptus dominicus*. The description of a bird in Golden Gate Park, SF, 22 Jan 1998 (1998-043) was insufficient to establish its identity.

STREAKED SHEARWATER *Calonectris leucomelas*. One reported on Monterey Bay, MTY, 6 Dec 1998 (1999-003) received no support.

MANX SHEARWATER *Puffinus puffinus*. The documentation for a small black and white shearwater S of Santa Cruz I., SBA, 20 Sep 1998 (1998-143) was considered inadequate to support the record; the species remains unconfirmed in California waters south of Morro Bay or north of Bodega Bay.

RED-TAILED TROPICBIRD *Phaethon rubricauda*. The report of one seen briefly from shore off south Vandenberg Air Force Base, SBA, 10 September 1998 (1998-038) received limited support through two circulations.

BLUE-FOOTED BOOBY *Sula nebouxii*. A bird reported at Battery East, SF, 26 Sep 1998 (1999-075) was not identified by all observers present. Several Committee members accepted that a booby was seen, but all but one agreed with those observers who considered the identification only probable.

LESSER WHITE-FRONTED GOOSE *Anser erythropus*. The report of one at Tule Lake N.W.R., SIS, 15 Mar 1998 (1998-057) received but a single vote to accept.

TRUMPETER SWAN *Cygnus buccinator*. The Committee's traditional tough stand on this species continued, as evidenced by the following records not accepted: adult near Lower Klamath N.W.R., SIS, 14 Feb 1998 (1998-194), adult at Ash Creek W.M.A., LAS, 15 Feb 1998 (1998-195), adult at Cosumnes R. Preserve, SAC, 16 Nov 1998 (1998-227), one heard only N of Marysville, YUB, 16 Dec 1998 (1998-228), and two adults and three immatures on Clair Engle L., TRI, 29 Dec 1998 (1999-023). Only the last record received any accept votes. We appreciate the efforts of the Trumpeter Swan Society to compile reports of this species in California, but records lacking adequate documentation will ultimately fail to receive the Committee's blessing.

FALCATED DUCK *Anas falcata*. The report of a male seen briefly at Gray Lodge W.M.A., BUT, 15 Feb 1998 (1998-046) was interesting but received little support from Committee members.

AMERICAN BLACK DUCK *Anas rubripes*. Votes on a record of a bird seen briefly at Cosumnes R. Preserve, SAC, 14 Mar 1997 (1997-069) were initially split almost evenly among "accepted," "not accepted—natural occurrence questionable," and "not accepted—identification not established." Votes for the last option dominated in the third and final circulation.

KING EIDER *Somateria spectabilis*. One at Pt. Reyes, MRN, 29 Jan–16 Feb 1997 (1997-061) received a split vote on its fourth and final circulation. Most Committee members agreed that this bird (seen by many, including at least one CBRC member) was probably identified correctly, but the documentation was considered inadequate.

* ZONE-TAILED HAWK *Buteo albonotatus*. Individuals at Carlsbad, SD, 20 Nov 1997 (1998-031) and 4.2 miles SE of Onyx Summit, SBE, 30 Aug 1998 (1998-124) were not documented to the Committee's satisfaction.

YELLOW RAIL *Coturnicops noveboracensis*. One seen briefly, and only in flight, at Fort Bragg, MEN, 5 Oct 1995 (1998-132) received majority acceptance initially but only a minority on the second and final round.

GRAY-TAILED TATTLER *Heteroscelus brevipes*. A report of one at Bodega Head, SON, 30 May 1998 (1998-093) received no support, whereas one heard, and seen as a silhouette only, at Princeton Harbor, SM, 6 Jun 1998 (1998-164) received three and two "accept" votes on two rounds. Another report from Pt. Reyes during the same period is still under CBRC review.

BRISTLE-THIGHED CURLEW *Numenius tahitiensis*. Reports of two birds at Kehoe Beach, Pt. Reyes, MRN, 6 May 1998 (1998-090) and one at Big Lagoon, HUM, 9 May 1998 (1998-081) corresponded with the 1998 landfall (see accepted records) but were not accepted by simple majorities on a single circulation. The Marin birds were identified about ten days after the sighting, and the Humboldt bird was seen only in flight.

RED-NECKED STINT *Calidris ruficollis*. The identity of a male stint in presumed first alternate plumage collected at the mouth of the Alamo R., Salton Sea, IMP, 17 Aug 1974 (#SDNHM 38887; GMcC, JBu†; 1984-085) remains unresolved. The record was published as a Red-necked Stint by McCaskie (1975), Roberson (1980), Garrett and Dunn (1981), AOU (1983), Veit (1988), and Small (1994), but the CBRC has never accepted it; since receiving a simple majority vote on its first circulation in 1985, the record never reached even a split vote on four subsequent rounds. All have agreed that the bird was either a Red-necked or a Little Stint, but most have been

unwilling to go beyond that. In 1993, the specimen was sent to the National Museum of Natural History where M. Ralph Browning and the late Claudia Wilds compared it with approximately 100 specimens of Red-necked and Little stints but were unable to identify it. Nevertheless, the record did receive three accept votes on its final circulation, and many members believe the specimen may yet be identified. The Committee would welcome the chance to review any significant reanalysis of the specimen.

LITTLE STINT *Calidris minuta*. A reported juvenile at Eureka, HUM, 16–21 Sep 1992 (1993-050, 1993-050A) received three to six "accept" votes during five circulations (the review process was restarted following receipt of better photographs), and most Committee members agreed that the bird may have been a Little Stint. In contrast, a bird reported from Abbott's Lagoon, Pt. Reyes, MRN, 9 Aug 1998 (1998-125) received no support.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis*. One reported from the Santa Maria R. estuary, SBA, 6 Sep 1997 (1998-032) received but a single vote to accept on its second circulation. The observers failed to note a white rump, and the plumage described matched neither an adult or a (very early) juvenile.

JACK SNIPE *Lymnocryptes minimus*. A report from Kern N.W.R., KER, 31 Dec 1998 (1999-002) received no CBRC support.

ICELAND GULL *Larus glaucoides*. Records not accepted included an adult at Arcata, HUM, 6–23 Feb 1987 (1987-072), two juveniles at Alviso, SCL, 16–28 Jan 1998 (1998-091), a juvenile at Moss Landing, MTY, 15–20 Feb 1998 (1998-059), a juvenile near Milpitas, SCL, 24 Feb 1998 (1998-107), and a second-winter bird at Año Nuevo Pt., SM, 27 Feb 1998 (1998-056). The first bird resembled a typical Kumlien's Gull (*L. g. kumlieni*) but was not photographed and received only five or six votes to accept on each of four circulations. The other records scored more poorly, with only one to three votes to accept per record per circulation, except for six votes for the Alviso birds in the initial round. Rottenborn and Morlan (2000) provided more information on records of this species not accepted by the CBRC; Terrill et al. (1999) discussed the situation in the San Jose area in more detail. Howell (2000; in votes) emphasized another potential confounding factor in review of potential Iceland Gulls: hybrid Glaucous-winged (*L. glaucescens*) × Herring (*L. argentatus*) Gulls.

ROSS'S GULL *Rhodostethia rosea*. An adult reported from Berkeley, ALA, 14 Jan 1998 (1998-100) was described with too little detail for a first state record.

RUDDY GROUND-DOVE *Columbina talpacoti*. Most members felt that a bird at Twentynine Palms, SBE, 24 Oct 1998 (1998-225) was likely this species, but by the third round of voting only four members considered the description adequate to support the record. Several comments referenced the Plain-breasted Ground-Dove (*C. minuta*), a situation discussed under Records Accepted.

RUBY-THROATED HUMMINGBIRD *Archilochus colubris*. A female reported at Pt. Reyes, MRN, 26 Aug 1998 (1999-054) received no votes for acceptance after two voting rounds. In light of cautionary treatment by Pyle (1997), and considering other tantalizing encounters with *Archilochus* hummingbirds in the state that ultimately proved to involve likely or definite Black-chinneds, most members indicated unwillingness to accept sight records of this species without definitive observations of the shapes of the primaries (cf. Howell and Webb 1995, National Geographic Society 1999, Sibley 2000). We urge observers claiming vagrant Ruby-throated Hummingbirds to obtain definitive photographs (including the primaries) and/or in-hand data.

GREATER PEWEE *Contopus pertinax*. Nine positive votes cast in the first round for a bird photographed at SE Farallon I., SF, 1 June 1998 (1998-116) would normally have constituted Committee endorsement of the state's first spring record of

a Greater Pewee, but Heindel requested recirculation to further consider a fairly bold breast pattern, relatively bold wing-bars, missing greater wing-coverts, and fresh tertials contrasting with wings that otherwise looked worn to most members (Figure 10). Howell and Jaramillo, the members most familiar with the Greater Pewee and potentially confusing tropical species, considered this record to be fairly straightforward; nonetheless, a majority voted not to accept in the third and fourth rounds, believing that the bird looked atypical (at least in photographs) and was inadequately supported by written details. Morlan and Patten opined that the bird may have been an Eastern Wood-Pewee (*C. virens*), partly because of an unprecedented incursion of that species to California in spring 1998. Given that the bird was seen at close range over the course of a day by at least two observers (only one of whom submitted a report), questions raised by the equivocal photographs might have been resolved by recording more detailed observations of the bird's appearance and size. Comments on Figure 10 are welcome.

EASTERN WOOD-PEWEE *Contopus virens*. A single observer briefly described a singing Eastern Wood-Pewee at Pt. Reyes, MRN, 1 Jun 1998 (1998-196). Though the distinctive "pee-a-wee" song was mentioned, the rest of the description was too superficial, with the problematic claim that the "head, upperparts, and tail were all brown." The record therefore received no Committee support, although it could be revived with submission of corroborating information from others reported to have seen this bird. Also from the same observer were reports of a vocalizing bird at Greenhorn Summit, KER, 1 Aug 1998 (1998-197) and another bird at Pt. Reyes, MRN, 24 Sep 1998 (1998-198). Lacking convincing detail, these reports received no support.

ALDER FLYCATCHER *Empidonax alnorum*. A widely studied immature *Empidonax* at Galileo Hill Park, KER, 7–11 October 1998 (1998-161; Figures 11 and 12) may well have been an Alder Flycatcher, but whereas the calls (most commonly "a bunting-like pit" but with occasional "soft whits") were atypical for western Willow Flycatchers (*E. traillii brewsteri*, *E. t. adastus*, *E. t. extimus*), they fell short of the more powerful "peep" or "beck" calls normally heard from Alder Flycatchers. After examining slides of 1998-161 with a large number of specimens of both the Willow and Alder at hand, Philip Unitt concluded that the western subspecies of Willow Flycatcher were eliminated on the basis of tertial pattern and that the bird was likely an Alder Flycatcher. Without specimens of first-fall eastern Willow Flycatchers (*E. t. traillii*) for comparison, however (juveniles certainly identified as *E. t. traillii* are almost lacking in collections), he was unwilling to state with certainty that the bird was an Alder Flycatcher. The record was defeated 1–9 after two rounds of voting, with most members opining that they would likely have voted differently if the bird had sounded like a typical Alder Flycatcher. Two singing birds in spring comprise California's only accepted records.

BLUE-HEADED VIREO *Vireo solitarius*. Individuals were not accepted from Mono L. County Park, MNO, 5 Sep 1995 (1999-128), Eureka, HUM, 19 Dec 1998 (1999-116), Pt. Reyes, MRN, 19 Sep 1998 (1998-187), Los Osos, SLO, 15-22 Sep 1998 (1999-071), San Nicolas I., VEN, 20 Oct 1998 (1998-216; Figure 7), and Pilarcitos Creek, SM, 1 Nov 1998 (1999-047). As might be expected, reports of this taxon have surged following the three-way split of the Solitary Vireo complex, but identification of this vireo is more problematic than many observers seem to appreciate, and the CBRC is unlikely to endorse records of incompletely or ambiguously described birds. The field marks discussed under Accepted Records are particularly important. Note also that most Blue-headed Vireos appear to pass through California from late September through October and that reports from outside this window may require exceptionally complete details for CBRC endorsement.

Figure 10. Possible Greater Pewee, *Contopus pertinax*, on Southeast Farallon Island, San Francisco County,1 June 1998 (1998-116). This bird's crest and bill appear more or less typical for a Greater Pewee, but most members considered the whitish wing-bars and edging to the inner secondaries and tertials to be outside the species' typical range of variation.

Photo by Clyde Morris

*PHILADELPHIA VIREO *Vireo philadelphicus*. Descriptions of a bird at Galileo Hill Park, KER, 4 Oct 1998 (1998-153) failed to rule out the similar Warbling Vireo and received no votes for acceptance.

YELLOW-GREEN VIREO *Vireo flavoviridis*. One reported at the Marin Headlands, MRN, 5 Oct 1996 (1997-049) fell a vote shy of acceptance after four voting rounds, while one reported from Moss Beach, SM, 4 Oct 1998 (1998-226) received only four votes to accept in the first round. In each case, members expressed concern that a bright Red-eyed Vireo (*V. olivaceus*) was not eliminated. Yellow-green Vireos are most reliably identified by the extension of yellow tones from the shoulder to behind the auriculars and by yellow edges to the remiges and rectrices (Terrill and Terrill 1981, Erickson and Terrill 1996).

VEERY *Catharus fuscescens*. Descriptions of a rusty *Catharus* thrush at the Carmel River mouth, MTY, 21–22 Sep 1998 (1999-052) pointed toward this species, but most members ultimately concurred that the observers' views were too brief to permit the bird's confident identification.

BLUE-WINGED WARBLER *Vermivora pinus*. One reported at Birchim Canyon, NW of Bishop, INY, 22 May 1998 (1998-082) was seen rather briefly by a lone observer and received only one "accept" vote during the first round. Apart from most members' unwillingness to accept uncorroborated records from the observer, the

Figure 11. Alder/Willow Flycatcher, *Empidonax alnorum/traillii* at Galileo Hill Park, Kern County, 11 Oct 1998 (1998-161). Alder-like features evident in this photo include the whitish chin and throat, generally grayish underparts, prominent wing bars, fairly obvious eye-ring, and relatively short bill.

Photo by Larry Sansone

description of the wings and back was atypical for a Blue-winged Warbler, and the bird could not be refound by others later in the day.

PINE WARBLER *Dendroica pinus*. Reports of brightly colored individuals at Arroyo de la Cruz, SLO, 25 Sep 1998 (1999-042) and Oceano, SLO, 1 Oct 1998 (1999-041) each garnered four votes of acceptance during the first round. Members are generally skeptical of Pine Warblers reported in September and early October, and the CBRC is presently re-reviewing the three accepted records from before 13 October. It appears that observers underestimate the variability of Blackpoll (*D. striata*) and Bay-breasted (*D. castanea*) warblers, which can appear nearly plain backed during their first fall. Observers should also be aware that a Pine Warbler's tail is no longer than that of a Blackpoll or Bay-breasted (Pyle 1997); thus, descriptions of this feature should relate the undertail coverts to the tail tip. Early fall claims of the Pine Warbler should be backed by impeccable details, preferably by multiple observers, or by definitive photographs.

WORM-EATING WARBLER *Helmitheros vermivorus*. A report of one in Ventura, VEN, 6–25 Jan 1997 (1997-085) ultimately foundered after four rounds, despite having been seen by multiple observers during an extended stay. The only description

submitted for CBRC review pointed toward this rather distinctive warbler, but most members were concerned by mention of "a few small brown streaks at the top of the chest," which this species would not show unless wet or otherwise mussed. This debacle again demonstrates how CBRC review can be undermined when observers assume that others will submit adequate supporting details. If additional details are received, the record will be re-reviewed.

CONNECTICUT WARBLER *Oporornis agilis*. One reported at the Big Sur Ornithology Lab, MTY, 13 Sep 1998 (1998-192) was supported by fairly extensive notes that most members took as supporting the observer's claim. Another person present on the day of the sighting, however, submitted a note to the Committee stating that the observer "considered the record tentative" on that day, and conveying an "impression [from the observer] that the bird was seen very, very briefly (1–2 seconds) only." In light of this testimony, the record garnered only four votes in the first round.

MOURNING WARBLER *Oporornis philadelphia*. The Committee withheld endorsement of individuals claimed at Santa Barbara I., SBA, 31 May 1974 (1980-021A; resubmitted after prior nonacceptance as a Connecticut Warbler), Ferndale, HUM, 31 Aug 1996 (1997-048), Hansen Dam Park, Los Angeles, LA, 24 Sep 1996 (1997-026), Big Sur R. mouth, MTY, 19 Sep 1998 (1999-066), and Mt. Diablo State Park, CC, 16 Oct 1998 (1999-064). Most members opined that the bird at the Big Sur R. mouth was most likely a Common Yellowthroat (*Geothlypis trichas*). The revived report from Santa Barbara I., which four members voted to accept, seemingly suffered more from the baggage of prior submission (the observer having previously argued for another species) than from weakness of the documentation, which indicated an alternate-plumaged female Mourning Warbler. The remaining three reports involved birds described as showing little or no yellow in the throat, which in fall should indicate an adult female, which should account for a very small percentage of vagrants; an aberrant bird or hybrid (the latter unproven; Pitocchelli 1993, Heindel and Patten 1996); or the observer's failure to detect pale yellow (cf. earlier discussion of 1998-136). Though most members considered these reports to be likely correct, observer inexperience and other factors ultimately turned the voting decisively against them. For further information on identification of this species and congeners see Pyle and Henderson (1990), Pyle (1997), and Dunn and Garrett (1997).

SCARLET TANAGER *Piranga olivacea*. Members generally agreed that a male was seen at Furnace Creek Ranch, Death Valley, INY, 10 Nov 1997 (1998-060), but after four rounds three members remained unconvinced that the record was adequately documented.

SMITH'S LONGSPUR *Calcarius pictus*. A report of one at Galileo Hill Park, KER, 10 Oct 1998 (1998-185) received no votes for acceptance, a few members suggesting that the details better fit a Vesper Sparrow (*Pooecetes gramineus*). A report from San Nicolas I., VEN, 18 Oct 1998 (1999-030) was thought to have greater potential of being correct, but after two rounds this report also received no votes to accept because the Vesper Sparrow and other longspurs were not convincingly ruled out.

McKAY'S BUNTING *Plectrophenax hyperboreus*. A nearly white bird associating with Dark-eyed Juncos (*Junco hyemalis*) west of Orleans, HUM, 18 Sep 1998 (1998-147) was considered by the Committee to have almost certainly been a partially albinistic Dark-eyed Junco.

VARIED BUNTING *Passerina versicolor*. An adult male reported at Lancaster, LA, 21–23 Apr 1996 (1996-100) received no votes for acceptance after four rounds, the tallies being evenly split between "identification not established" and "natural occurrence questionable." Although most members considered the identification to be

likely correct, several were concerned that one description likened the bird's size to that of a Lark Sparrow (*Chondestes grammicus*) and that the only other description appeared to have been written several weeks after the sighting. Members' standards of acceptance are generally quite high for this species owing to its extreme rarity in California (two accepted records to date) and to its potential for escape from captivity. Hamilton (in press) has seen as many as 42 for sale in northwestern Baja California (Rosarito, 5 July 2000). For such species, observations should be detailed enough to detect signs of possible earlier captivity (e.g., atypical coloration in any feather tract, broken remex tips, frayed rectrices, abnormally long claws, bill deformities), and the description should indicate that such an inspection was conducted.

PAINTED BUNTING *Passerina ciris*. The description of one reported at San Elijo Lagoon, SD, 20 Aug 1996 (1997-028) included relatively little detail, and the bill was described as being "very small and black." Since the Painted Bunting's bill is relatively large for a *Passerina* bunting and is typically dusky with a pinkish tinge, documentation of this record was considered deficient by all but one member after the third round of voting.

COMMON GRACKLE *Quiscalus quiscula*. Brown-headed individuals reported at the Honey Lake Wildlife Area, LAS, 11 May 1998 (1998-074) and at Panamint Springs, INY, 17 Oct 1998 (1999-063) received almost no Committee support because the descriptions did not match any post-juvenal plumage of the Common Grackle. Members opined that the latter description better fit a small female Great-tailed Grackle (*Q. quiscula*), with Patten suggesting the possibility of a small bird of the subspecies *nelsoni* in a flock of the substantially larger *monsoni*; these races have colonized California rapidly in recent decades (Dinsmore and Dinsmore 1993, W. Wehtje pers. comm.) and appear to be forming a "hybrid swarm" north and west of the species' historic range (Rea 1969, W. Wehtje pers. comm.). Another possibility mentioned was a Great-tailed Grackle × Brewer's Blackbird (*Euphagus cyanocephalus*), a hybrid combination believed to have occurred recently in Santa Maria, SBA (unpubl. CBRC record 1999-122).

RECORDS NOT ACCEPTED, NATURAL OCCURRENCE QUESTIONABLE (IDENTIFICATION ACCEPTED)

BROWN BOOBY *Sula leucogaster*. Another immature initially identified as a Red-footed Booby (see accepted records above) was at a fishing pier on Pt. Loma, SD, 17 Nov 1997 (CT‡; AM†, SW; 1998-008). The bird was exceptionally tame (even for a booby), in abnormal plumage (white feathers on the mid breast), entangled in fishing line, and emaciated when taken into captivity that day. According to Meryl Faulkner, an experienced wildlife rehabilitator specializing in seabirds, the condition of the feet, bill, and feathers clearly indicated the bird had been in captivity for some time prior to 17 Nov 1997 (McCaskie, in comments). The fourth and final vote on the record was five "accept" and five "not accept, natural occurrence questionable."

BARNACLE GOOSE *Branta leucopsis*. One was at Granite Bay, PLA, at least 1 Jan–10 July 1998 (JAT; 1998-045). The record received no support as representing a natural vagrant, from the observer or the Committee, but the archiving of records of all long-distance migratory species is strongly encouraged.

PYRRHULOXIA *Cardinalis sinuatus*. Although occurring at an "expected" time of year for natural strays of this species in California (May through July), a female at Pt. Loma, SD, 10 Jun 1998 (REW; 1999-044) "appeared ragged" and was close enough to the international border that six members considered it more likely an escapee. Recent investigations (Hamilton in press) have yielded multiple sightings of

Pyrrhuloxias (and many other wild-caught birds) at pet stores in northwestern Baja California.

PAINTED BUNTING *Passerina ciris*. Records not endorsed by the Committee include a spring adult male at Big Pine, INY, 9 Jun 1996 (JHe; 1996-105), a fall adult male at Victorville, SBE, 12 Oct 1997 (BiD; 1997-165), and an adult male with an adult female at Niland, IMP, 22–24 Dec 1998, with the female present to *18 Jan 1999* (MSM; GMcC, MAP; 1999-017). Interestingly, the observer of the Victorville bird also found the adult male at Twentynine Palms, SBE, 8 Oct 1998 (see accepted records above). The former record failed to gain acceptance because Victorville is far more urbanized than is Twentynine Palms (increasing, perhaps, the likelihood of escape/release) and the underparts and rump of the Victorville bird were described as being "salmon reddish" versus the Twentynine Palms bird's "typical" shade of red. The pair at Niland included the first green Painted Bunting detected wintering in California (none of the seven prior reports of wintering adult males gained CBRC endorsement). Nine members considered natural occurrence unlikely in this case because the record involved a pair of adults and the likelihood that caged Painted Buntings are kept and sold in fair numbers in the Mexicali region. The Big Pine bird, which received seven votes for acceptance after four rounds, was well described by a seasoned observer as showing normal bright coloration, and both the date and location were perhaps ideal for a naturally occurring spring vagrant. It is, therefore, not surprising that this record was highly controversial. We provide the following condensation of Hamilton's ongoing research into the Painted Bunting's unusual status in California to help clarify the Committee's reasoning in this case.

Painted Buntings have, since 1962, established a pattern of fall vagrancy to California consistent with that exhibited by other eastern landbirds, with 69 accepted fall records between 17 August and 3 December. Green birds of unknown age excluded, immatures account for 30 of 41 fall records (73%). With the exclusion of eight fall records of adult males rejected by the Committee because of questionable natural occurrence, the proportion of immatures rises to 91%. A share of first-year birds in the range 73–91% matches expectations for naturally occurring vagrant songbirds (e.g., Robbins et al. 1959, Ralph 1971, Gathreaux 1982, DeSante 1983). During the remainder of the year, however, birds less than a year old account for just one of 19 records (5%), with colorful males accounting for 17 of the 18 records of adults (94%). Patterns of vagrancy such as these are, to our knowledge, unknown in nature.

Painted Buntings are the single most abundant wild-caught species at bird markets that we have monitored in Baja California, with a high count of 40 colorful males and 37 green birds at a Rosarito pet store 5 July 2000 (Hamilton in press). In addition, birders note apparent escapees (colorful males with abnormal appearance) south of the border with some regularity (Erickson et al. in press). Just as troubling, a colorful male collected at the Sagehen Field Station, NEV, 17–18 Apr 1985 (1988-229) was yellow below and scarred between the orbits, strong indications of prior captivity (Hawthorne 1972). This record's remote northeastern location and spring timing might best be explained by a wild-caught escapee responding to migratory restlessness and attempting northward migration (alternate scenarios have not been articulated).

A fundamental CBRC objective is to distinguish between natural patterns of occurrence and those relating to captivity. Therefore, some members consider it best to withhold CBRC endorsement of adult male Painted Buntings outside of fall migration until it becomes clear that the preponderance of adult males in winter, spring, and/or summer results from some unique natural phenomenon, not simply wild-caught escapees adapting to their new surroundings in winter and yielding to *Zugunrhue* in spring. Whereas winter and late summer records generally receive little

Figure 12. Alder/Willow Flycatcher, *Empidonax alnorum/traillii* at Galileo Hill Park, Kern County,11 Oct 1998 (1998-161). The bold tertial edging and eye-ring rule out western subspecies of the Willow Flycatcher, though not an eastern bird. The appearance of a gray nape contrasting with the greener back results from exposure of the grayish bases of green-tipped nape feathers.

Photo by Larry Sansone

support, most members believe that Painted Buntings are likely to wander occasionally to the eastern deserts in late spring/early summer. Furthermore, colorful male Painted Buntings may be more likely than females or nonbreeding green males to "overshoot" their breeding grounds. Seemingly supporting this hypothesis are photos in *N. Am. Birds* 53:343–344 of definitive alternate-plumaged males in Saskatchewan 1–13 May 1999 (underparts not clearly visible) and near Aztec, New Mexico, 28 April–2 May. Note, however, that an adult male photographed in northern Ontario 15 May 1998 (*N. Am. Birds* 52:406) had faded red underparts, suggesting diet deficiencies and possible prior captivity. Because of such considerations, California's five spring/early summer records of colorful males in the eastern deserts are particularly difficult to assess. Two accepted records from the 1980s (1986-262, 1987-138) are presently being reassessed, while two later records (1996-092, 1996-105) are not accepted, and the fifth (2000-086) is circulating for the first time. All members recognize the potential for each of these records to pertain to a naturally occurring vagrant, but the lack of green birds causes a minority of members to withhold endorsing them at this time.

With continued research and the accumulation of records, the Painted Bunting's natural patterns of vagrancy should become better established, perhaps prompting reevaluation of certain records in light of more complete knowledge of the species' natural history. In the meantime, we hope that increased understanding of the issues will help replace current hostility over the fate of individual records with the positive energy of a larger mystery to be solved. We strongly encourage the continued submission of documentation of Painted Buntings, as these records are needed to build a more complete picture of the species' status and distribution in California. We also welcome responses to this discussion.

RECORDS NOT ACCEPTED, Identification accepted but establishment of introduced population questionable

TRUMPETER SWAN *Cygnus buccinator*. A neck-collared adult NW of Roseville, PLA, 22–23 Dec 1998 (BEW; REM; 1998-230) was captured in northern Idaho, released in southern Idaho in November 1996, and seen in various states and provinces in the interim. McCaskie and San Miguel (1999) explained the CBRC's position on such records.

MISCELLANEOUS DECISIONS

The following decisions were made at the January 2000 meeting.

WHITE IBIS *Eudocimus albus* (2, 0). Two records at the Salton Sea in the 1970s are now considered as pertaining to the same individual. We infer an adult at the N end of the sea, RIV, 10–24 Jul 1976 and at the S end of the sea, IMP, 5 Aug 1976 (1976-045) was the same as one at Unit 1, Salton Sea N.W.R., IMP, 25 Jun–14 Jul 1977 (1978-049). These records were originally reported by Luther et al. (1979, 1983). The only other California record is of one collected in San Diego, SD, 15–20 Nov 1935 (Huey 1936, Dunn 1988).

GRAY SILKY-FLYCATCHER *Ptilogonys cinereus*. This species joined the Falcated Duck (*Anas falcata*), Crested Caracara (*Caracara cheriway*), and Oriental Greenfinch (*Carduelis sinica*) on the Supplemental List of California birds (Patten and Erickson 1994) on the basis of these three records "not accepted, natural occurrence questionable": one photographed at Ventura, VEN, 9 Apr 1976 (1980-115, Binford 1985), one at Pt. Loma, SD, 24 May 1993 (1993-115, McCaskie and San Miguel 1999), and one photographed at Poway, SD, 10–12 Mar 1994 (1994-075, Howell and Pyle 1997). A more recent record from Orange County is still under review.

CORRIGENDA TO THE TWENTY-THIRD COMMITTEE REPORT (Rottenborn and Morlan 2000)

The date of the accepted Wedge-rumped Storm-Petrel (1996-114) was not given. This bird was recorded 31 July 1996.

CONTRIBUTORS

Mark Ackerman, R. J. Adams, John R. Arnold, Jonathan Ausubel, John Ayres (JAy), Stephen F. Bailey, Alan Baldridge, Thomas C. Barber, Alan D. Barron, John Barrow (JBa), Tony Battiste, Louis R. Bevier, Laurence C. Binford, Shauna Bingham, Jim Booker (JBo), William Bouton, Bill Boyce, Ronald L. Branson, Greg Brinkley, N. Bruce Broadbooks, Eric Brooks, Ryan Burnett, Kenneth Burton, John Butler, Kurt F.

Campbell, Phil Capitolo, Eugene A. Cardiff, Kris K. Carter, George E. Chaniot, Jr., Ryan Chornock, Janis Christian, Sue Clark, Therese R. Clawson, Luke Cole, Daniel S. Cooper, Don Cunningham, Jim Danzenbaker, Stephen J. Davies, Gary Deghi, Al DeMartini, Bill Deppe, David F. DeSante, Don DesJardin, Bruce E. Deuel, Bruce Dexter, Sandy Dierks, Vladimir Dinets, Matthew Dodder, Jon L. Dunn, Mark W. Eaton, Demian A. Ebert, Thomas M. Edell, Alan M. Eisner, Ray Ekstrom, F. Emerson, Richard A. Erickson, Sandy Etchell, Gil Ewing, Michael Feighner, George Finger, Shawneen E. Finnegan, Robbie Fischer, John Fitch, Brian Foster, Nick Freeman, Peter Gaede, Sylvia J. Gallagher, Gray Gallogly, Kimball L. Garrett, Douglas E. George, Bruce Gerow (BGe), Steve Gerow, Albert Ghiorso, Karen S. Gilbert, Martin Gilbert, Peter A. Ginsburg, Steven A. Glover, Dave Goodward, Ed Greaves, Eric W. Greisen, Jennifer E. Green, Bill Grenfell, George Griffeth, Mary Gustafson, Charity Hagan, Frank A. Hall, Robert A. Hamilton, Steve C. Hampton, Keith Hansen, Denise Hardesty, Sandra G. Harvill, David P. Haupt, Karen A. Havlena, Loren R. Hays, Scott Hein, D. Mitchell Heindel, Jo Heindel, Matthew T. Heindel, Tom Heindel, Pablo Herrera, Michelle Hester, Craig Hohenberger, James F. Holmes, Waldo Holt, Andrew Howe, Steve N. G. Howell, Robert A. Hudson (RAHu), E. Rae Hudspeth, Joan Humphrey, John E. Hunter, Marshall Iliff, Richard Irvin, Alvaro Jaramillo, Curtis Johnson, H. Lee Jones, Paul Jorgensen, Robert J. Keiffer, Paul Keller, Alison Kent, Peter Knapp, David Koeppel, Andrew W. Kratter, Kenneth Z. Kurland, Keith C. Kwan, Debi Lamm, Jeri M. Langham, Kevin Larson, Stephen A. Laymon, Rick LeBaudour, Paul E. Lehman, Gary S. Lester, Lauren P. Lester, Nick Lethaby, Ron LeValley, Cindy Lieurance, Leslie M. Lieurance, Roger Linfield, Michael J. Lippsmeyer, Paul Lohse, Guy Luneau, Rolf E. Mall, Michael J. Mammoser, Tim Manolis (TM), Curtis A. Marantz, John S. Mariani, Dave Marquart (DMa), Bruce Marshall (BMa), Doug Martin (DM), John Martin (JMa), Jennifer L. Matkin, Robert E. Mauer, Jr. (REMa), Sean McAllister, Guy McCaskie, Todd McGrath, Bert McKee, Patrick McNulty, Anthony Mercieca, Bob Merrill, Peter J. Metropulos, Mark Miller, Kathy Molina, Joseph Morlan (JM), Clyde Morris, Michael H. Morris, Steve Morris, Jim Mountjoy (JMo), Dan Murley (DMu), Stephen J. Myers, Dan W. Nelson, David W. Nelson, Kristie Nelson, Richard J. Norton, Robert J. O'Brien, Jerry Oldenettel, Helen Ost, John Ost, Debby Parker, Jim Parker, John E. Parmeter (JEPa), Benjamin D. Parmeter, Michael A. Patten, Courtenay Peddle, Dharm S. Pellegrini, J.D. Phillips, James E. Pike, Jeff Poklen, Gary W. Potter, Peter Pyle, David E. Quady, Kurt Radamaker, Richard E. Redmond, Robert W. Reiling, David Rice (DRi), Will Richardson, Jean M. Richmond, Janet Robbins, Don Roberson, Geoffrey L. Rogers, Michael M. Rogers, Stephen C. Rottenborn, James S. Royer, Ruth A. Rudesill, Tamiko Ruhlen, Edd Russel, Ron M. Saldino, Ivan Samuels, Michael J. San Miguel, Mike San Miguel, Daan Sandee, Larry Sansone, Paul M. Saraceni, Brad Schram, David M. Shaw, Douglas G. Shaw, Debra L. Shearwater, W. David Shuford, David A. Sibley, Mary Simpson, Daniel S. Singer, Mike Skram, Arnold Small, Brenda D. Smith, Reed V. Smith, Ron Smith (RSm), Jim Snowden (JSn), John Sorensen, Steve Sosensky, Jean Marie Spoelman, Rich Stallcup, Susan Steele, Daniel M. Stoebel, Mary Beth Stowe, Emilie Strauss, Jeffrey W. Streb, David L Suddjian, Robert Sutherland (RSu), Mac Sutherlin, Lee Sutton, Ann D. Swart, Craig Taylor, Monte M. Taylor, Richard L. Ternullo, Scott B. Terrill, Robert Thériault, Ronald S. Thorn, Robert F. Tintle, Francis Toldi, Gerald L. Tolman, Bob Toth, John A. Trochet, Steve J. Tucker, Philip Unitt, Sven Wahlberg (SvW), Stan Walens (SWa), Bruce E. Webb, Sophie Webb, Dave Weber, Richard E. Webster, Walter Wehtje, Joel D. Weintraub, Alan N. Wight, David S. Wilcove, Brian D.C. Williams, Douglas R. Willick, Rob Willis, John C. Wilson, Steve Wilson, Adam Winer, Thomas E. Wurster, David G. Yee, James O. Zimmer.

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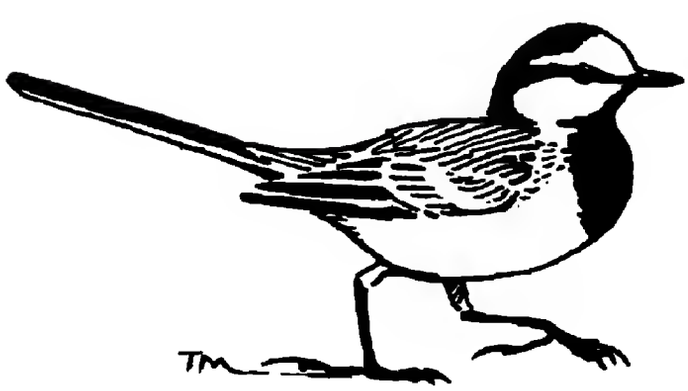

ARIZONA BIRD COMMITTEE REPORT: 1996–1999 RECORDS

GARY H. ROSENBERG, P. O. Box 91856, Tucson, Arizona 85752-1856

ABSTRACT: The Arizona Bird Committee assessed 218 records, accepting 138. These included Arizona's first records of the Leach's (*Oceanodroma leucorhoa*), Black (*O. melania*), and Least (*O. microsoma*) Storm-Petrels, Short-tailed Hawk (*Buteo brachyurus*), Pacific Golden Plover (*Pluvialis fulva*), Yellow-footed Gull (*Larus livens*), and Carolina Wren (*Thryothorus ludovicianus*), bringing the number of bird species recorded in Arizona to 522.

This is the fourth report of the Arizona Bird Committee (hereafter ABC) (see Speich and Parker 1973, Speich and Witzeman 1975, and Rosenberg and Witzeman 1998, 1999). This report covers records mainly from the period between 1996 and 1999 but also includes some from prior to 1996 previously not reported on by the ABC. A total of 218 reports submitted to the ABC are addressed here, with 138 (63%) accepted. Seven species were added to the Arizona list, Leach's Storm-Petrel (*Oceanodroma leucorhoa*), Black Storm-Petrel (*Oceanodroma melania*), Least Storm-Petrel (*Oceanodroma microsoma*) (first physical documentation), Short-tailed Hawk (*Buteo brachyurus*), Pacific Golden-Plover (*Pluvialis fulva*), Yellow-footed Gull (*Larus livens*), and Carolina Wren (*Thryothorus ludovicianus*). This brings the total number of species recorded in Arizona to 522, which includes four species that have been accepted by the ABC but have not been physically documented within the state: Leach's Storm-Petrel, Swallow-tailed Kite (*Elanoides forficatus*), Black Swift (*Cypseloides niger*), and Blue-headed Vireo (*Vireo solitarius*).

Other highlights reported on here include acceptance of Arizona's second Wandering Tattler (*Heteroscelus incanus*), fifth Pomarine Jaeger (*Stercorarius pomainus*), second Black-billed Cuckoo (*Coccyzus erythropthalmus*), third Eastern Wood-Pewee (*Contopus virens*), second Nutting's Flycatcher (*Myiarchus nuttingi*), first breeding Winter Wren (*Troglodytes troglodytes*), third breeding Black-capped Gnatcatcher (*Polioptila nigiceps*), first photographed Blue-winged Warblers (*Vermivora pinus*), second and third photographed Prairie Warblers (*Dendroica discolor*), first sound-recorded Fan-tailed Warbler (*Euthlypis lachrymosa*), first winter Rufous-capped Warblers (*Basileuterus rufifrons*), and third Field Sparrow (*Spizella pusilla*).

The current Arizona Bird Committee (2000) consists of Chris D. Benesh, Troy Corman, Roy M. Jones, David Krueper, Narca Moore-Craig, Gary H. Rosenberg (secretary), Will Russell, and Mark M. Stevenson. Recent committee members who also voted on records in this report include Doug Danforth, Kenn Kaufman, Chuck LaRue, G. Scott Mills, Dave Stejskal, and Carl Tomoff. Janet Witzeman serves in a non-voting capacity as assistant secretary.

The list of species on the ABC's review list can be found on its web page (http://personal.riverusers.com/~ghrosenberg/GaryRosenbergHomePage.html). Included on this web site as well are the ABC's bylaws, a current list of committee members, a brief history of the ABC, the past two reports by the

ABC (as published in *Western Birds*), a reporting form for electronic submission of reports to the ABC, a selection of photographs of rarities from Arizona, and a varying selection of photographs and discussions concerning field-identification topics (e.g., the Black-capped Gnatcatcher). This site is a work in progress.

The ABC encourages observers to submit documentation for species on the review list, as well as new species for Arizona. All material should be sent to Gary H. Rosenberg, ABC secretary, P. O. Box 91856, Tucson, AZ 85752-1856 (e-mail ghrosenberg@theriver.com). The committee would like to emphasize the importance of submitting sightings directly to the ABC for review. The listing of reports, including those with written descriptions, on local list-servers on the Internet may not make it to the ABC. Only those reports submitted to the ABC, or to the regional editor for *North American Birds* (who turns the material on review-list species over to the secretary of the ABC), will be considered by the committee. The ABC thanks the many observers from Arizona and around North America who have submitted their documentation of sightings to the ABC.

Each record listed below includes a locality, county (abbreviation: see below), date (span normally as published in *Field Notes/North American Birds*), and initial observer if known. Additional observers who submitted reports, photographs, and recordings are also listed. All records are sight records unless noted otherwise with a symbol for a photograph, sound recording, or specimen. It has not been customary for the ABC to review individuals returning for multiple years, but these dates are normally included within the accounts. The ABC emphasizes that the listing of reports under Reports Not Accepted does not necessarily mean that the members of the ABC "do not believe" the observer, simply that the documentation supplied to the committee for evaluation was not detailed enough to substantiate the sighting as a record.

The ABC's abbreviations for counties in Arizona are APA, Apache; COS, Cochise; COC, Coconino; GIL, Gila; GRA, Graham; GRE, Greenlee; LAP, La Paz; MAR, Maricopa; MOH, Mohave; NAV, Navajo; PIM, Pima; PIN, Pinal; SCR, Santa Cruz; YAV, Yavapai; YUM, Yuma. Other nonstandard abbreviations commonly used within this report include *, specimen; B.T.A., Boyce Thompson Arboretum; L.C.R.V., lower Colorado River valley; N.I.R., Navajo Indian Reservation; N.M., national monument; N.W.R., national wildlife refuge; ph., photograph; P.A.P., Pinal Air Park; P.R.D., Painted Rock Dam; S.P.R., San Pedro River; S.T.P., sewage treatment plant; s.r., sound recording; UA, University of Arizona; v.t., video tape.

RECORDS ACCEPTED

RED-THROATED LOON *Gavia stellata*. A single individual was at L. Havasu City, MOH, 25 Jan 1998 (TC). There have been about ten previous accepted records for Arizona.

LEAST GREBE *Tachybaptus dominicus*. A single individual was at a small pond in E. Turkey Creek, Chiricahua Mts., COS, 1–2 Aug 1997 (ph. DF; see NAS Field Notes 52:101), and another was at Willcox, COS, 3 Nov 1998–10 Jan 1999 (DM; ph. MMS). These represent the ninth and tenth state records.

LEACH'S STORM-PETREL *Oceanodroma leucorhoa*. Although no physical documentation was obtained, excellent written details were submitted for at least one individual seen during Tropical Storm Nora at L. Havasu City, MOH, 26 Sep 1997 (BH). This tropical storm brought unprecedented numbers of both Black and Least Storm-Petrels to L. Havasu, L.C.R.V. This sighting represents one of the few inland records of Leach's Storm-Petrel for the western U.S. (see Jones 1999).

BLACK STORM-PETREL *Oceanodroma melania*. After Tropical Storm Nora as many as 40 were at L. Havasu City, MOH, 26 Sep 1997, with at least three remaining there until 30 Sep 1997 (ph. TC, BGr, BH; Figure 1; see *W. Birds* 30:187). These represent the first records of this species from Arizona (see Jones 1999).

LEAST STORM-PETREL *Oceanodroma microsoma* . After Tropical Storm Nora aproximately 200 were on L. Havasu, MOH, 26 Sep 1997, with several remaining there until 30 Sep (ph. TC, BGr, BH, m.ob.; *UA; see *W. Birds* 30:188). The photographs and two specimens provided the first physical documentation for this species in Arizona; there were two previous accepted sight reports from the state (Rosenberg et al. 1991). Similar storms have brought this species to the Salton Sea previously (see Jones 1999, Kaufman 1977).

REDDISH EGRET *Egretta rufescens*. Accepted records are of one at P.R.D., MAR, 24 Aug 1997 (CBa), one at Avra Valley S.T.P., PIM, 17 Jul 1998 (ph. MMS), and one at Gila Farms Pond, MAR, 10–11 Aug 1998 (ph. RMJ), bringing the total number of accepted records for the state to nine.

WHITE IBIS *Eudocimus albus*. One was at Nogales S.T.P., SCR, 6 Jul–15 Sep 1999 (JSa; ph. MMS, GHR); there were five previous accepted records for Arizona.

Figure 1. These were some of the nearly 40 Black Storm-Petrels found on Lake Havasu after Tropical Storm Nora 27 September 1998.

Photo by Bill Grossi

Figure 2. This Pacific Golden-Plover at the Western Sod Farm near Arizona City 8-10 August 1998 provided a first Arizona record.

Photo by George Hentz

ROSEATE SPOONBILL *Ajaia ajaja*. Single individuals were at Gillespie Dam, MAR, 19–22 Jul 1997 (SPe, MMS, DAl) and at Picacho Res., PIN, 25 Sep–4 Oct 1997 (DC; ph. MMS); these represent the fourth and fifth records since 1992.

ROSS'S GOOSE *Chen rossii*. A stunning blue-morph individual of this species at Nogales, SCR, 28 Dec 1998 (MP, ph. MMS) represents the first sighting of this form in Arizona.

BRANT *Branta bernicla*. Three at Cornville, YAV, 6 Apr 1998 (RR; ph. RR, MMS), with one remaining until 19 Apr, represents the first report from Yavapai County; there are fewer than ten records ever for Arizona, all of the subspecies *nigricans*.

WHITE-WINGED SCOTER *Melanitta fusca*. Accepted records are of one at Castle Rock Shores, L.C.R.V., LAP, 27 Dec 1985 (SGw), one in Tempe, MAR, 13–31 Mar 1996 (RMJ), one at Ganado L., N.I.R., APA, 28 Nov 1997 (MMS, BHo, GHR), and one at Green Valley, PIM, 3–6 Nov 1998 (RP, ph. MMS). This species is now seen in Arizona nearly annually and has been removed as a review species (Rosenberg and Witzeman 1998).

BLACK SCOTER *Melanitta nigra*. A single individual at Parker Dam, LAP, 1 Feb–14 Apr 1996 (RMJ; ph. MMS) represents only a seventh record for Arizona.

RED-SHOULDERED HAWK *Buteo lineatus*. Accepted records are of one in s.w. Phoenix, MAR, 17 Dec 1985 (RWi), one in Tucson, PIM, 20 Feb 1997 (RH), and one in Scottsdale, MAR, 14 Apr 1998 (JBl). Although this species is reported in Arizona nearly annually, very few are properly documented (see under Reports Not Accepted). The ABC encourages observers to attempt to document all sightings of this species in the state carefully, as many of the written descriptions of Red-shouldered Hawks

Figure 3. Arizona's third Northern Jacana was at Arivaca Lake 19 October 1998.

Photo by Mark Stevenson

Figure 4. Arizona's first Yellow-footed Gull was at Wahweep Marina, Lake Powell, 23 April 1999.

Photo by Gary H. Rosenberg

Figure 5. Arizona's second documented Nutting's Flycatcher spent the winter of 1997-1998 at Patagonia Lake State Park.

Photo by Larry Sansone

submitted to the committee for review fail to eliminate confusing species such as the Broad-winged Hawk.

BROAD-WINGED HAWK *Buteo platypterus*. Accepted records are of one at Keams Canyon, N.I.R., NAV, 23 May 1992 (CL; ph. JBu), one at Cave Creek Canyon, COS, 13 May 1994 (ph. BZ), one at Granite Creek near Prescott, YAV, 4 May 1997 (CT), and one at Cornville, YAV, 9 Apr 1998 (TL, IT). As with Red-shouldered Hawk, we receive reports of this species nearly annually, but many of these fail to exclude similar species such as the Red-shouldered and Gray (*B. nitidus*) hawks. We encourage observers to use care in identifying this species in Arizona.

SHORT-TAILED HAWK *Buteo brachyurus*. A dark-morph individual photographed on Miller Peak in the Huachuca Mts., COS, 31 July–4 Sep 1999 (ph. RH; ph. GHR) established a first documented record for Arizona. A light-morph individual seen earlier at the same location 26 July–4 Sep 1999 (RH) has been accepted as well, given that the dark bird was photographed. There were three previous sight reports from the state (see Rosenberg and Witzeman 1998), and these will now be re-evaluated.

AMERICAN GOLDEN-PLOVER *Pluvialis dominica*. Reports of one at Western Sod Farm near Arizona City, PIN, 27 Sep 1999 (RH, MMS; ph. MMS) and one in s.w. Phoenix, MAR, 16 Oct 1999 (TC) were the only ones accepted. This species will

Figure 6. This male Black-capped Gnatcatcher was found nesting at Brown Canyon 22 April 1997.

Photo by Gary H. Rosenberg

remain a review species even though it is found annually because of the difficulty in separating it from the very similar Pacific Golden-Plover.

PACIFIC GOLDEN-PLOVER *Pluvialis fulva*. A single individual at Western Sod Farm near Arizona City, PIN, 6–12 Aug 1998 (RH; ph. GHe, MMS: s.r. RMJ; Figure 2) provided Arizona with its first record. This species is a regular fall visitor to the California coast, with adults and one-year-old birds arriving during the first week of August; therefore, one in Arizona at that season, while unprecedented, was not unexpected. This sighting does represent one of the few noncoastal records of this species.

NORTHERN JACANA *Jacana spinosa*. A stunning adult at Arivaca L., PIM, 15–23 Oct 1998 (EB; ph. GHR, MMS; Figure 3) provided Arizona with its third accepted record; the previous two records are both for June.

WANDERING TATTLER *Heteroscelus incanus*. A well-described individual at Tucson S.T.P., PIM, 12 Sep 1991 (BL) was only the second for Arizona; the state's only previous tattler was found 18 Sep 1971 in Phoenix (see Witzeman 1997).

UPLAND SANDPIPER *Bartramia longicauda*. A single bird at Western Sod Farm near Arizona City, PIN, 16 Aug 1999 (ph. RH) provided one of only a few accepted Arizona records; interestingly, this species is regular as a fall migrant east of the continental divide as close to Arizona as Las Cruces, New Mexico.

POMARINE JAEGER *Stercorarius pomarinus*. An adult was at Paloma Ranch near Gila Bend, MAR, 8–12 Oct 1999 (ph. BGr, MMS; v.t. GHR). There were only four previous Arizona records.

PARASITIC JAEGER *Stercorarius parasiticus*. One individual was on L. Havasu, MOH, during Tropical Storm Nora 26 Sep 1997 (RMJ; see Jones 1999). There are

Figure 7. This Blue-winged Warbler was mist-netted along the San Pedro River near Hereford 17 July 1999.

Photo by Lisa Walraven

Figure 8. Arizona's second documented Prairie Warbler was at Wahweep, Lake Powell, 30 November 1997.

Photo by Gary H. Rosenberg

fewer than ten previous sight reports from Arizona, many of which have not been reviewed by the ABC (see Rosenberg and Witzeman 1998). Also, a jaeger of undetermined species was at the Bill Williams arm of L. Havasu, LAP, 26 Nov 1999 (CBa); the description, while detailed enough to determine the bird to be a jaeger, was not complete enough to establish the species.

LAUGHING GULL *Larus atricilla*. An adult was at Patagonia L., SCR, 13–15 Aug 1998 (GHR). There have been fewer than fifteen previous Arizona records.

MEW GULL *Larus canus*. Single individuals were at Lake Havasu City, MOH, 22 Feb 1998 (RH) and at Davis Dam, MOH, 29 Jan 1999 (JPi). Virtually all of the previous Arizona records are from the Colorado River during winter.

YELLOW-FOOTED GULL *Larus livens*. A subadult bird at Wahweap, L. Powell, COC, 21–23 Apr 1999 (CL; ph. GHR, MMS; v.t. GHR; Figure 4; see *N. Am. Birds* 53:344) provided Arizona with its first record, although this species is regular at the Salton Sea and at the northern end of the Gulf of California. This bird also represented the first Utah record, and there is at least one record from Nevada (Lake Mead).

GLAUCOUS GULL *Larus hyperboreus*. An immature at Fisher's Landing along the L.C.R.V. n. of Yuma, YUM, 28 Nov–29 Dec 1992 (JT) is only the third accepted Glaucous Gull for Arizona.

Figure 9. Arizona's first winter record of Rufous-capped Warbler was along the San Pedro River near Hereford in December 1998.

Photo by Jim Burns

BLACK-LEGGED KITTIWAKE *Rissa tridactyla*. Accepted records are of one at Parker Dam, LAP, 11–19 Nov 1978 (BW) and of one adult at Willcox, COS, 15 Nov 1998 (JHa; ph. GHe). This species was more regular during the 1970s and 1980s; there have been only five sightings in Arizona since 1990.

ARCTIC TERN *Sterna paradisaea*. A well-described immature from Many Farms L., APA, 19 Sep 1993 (CL) furnished only a fourth Arizona record.

BLACK-BILLED CUCKOO *Coccyzus erythopthalmus*. An individual photographed in Pinery Canyon, Chiricahua Mts., COS, 7 Oct 1984 (ph. RHi) represents the first physically documented record for Arizona. The only other accepted record for the state was from nearby Portal on 3 Oct 1984 (see Rosenberg and Witzeman 1998), suggesting the possibility that both records involved the same individual.

GROOVE-BILLED ANI *Crotophaga sulcirosrtis*. Accepted records are of one at Buckeye, MAR, 30 Jul 1985 (TC) and one at Lake Montezuma, COC, 24 Sep 1998 (DHo). This species is still casual in Arizona and remains on the review list.

BERYLLINE HUMMINGBIRD *Amazilia beryllina*. Accepted records are of one in Ramsey Canyon, COS, 29 May–13 Jun 1998 (CMa), another there 18–20 Jul 1999 (BCa), and one in Miller Canyon, COS, 5 Jul–early Aug 1999 (MMS). In recent years this species appears to have become a regular summer visitor to feeders in the Huachuca Mts. and likely breeds in canyons such as Ramsey and Miller in small numbers. Observers need to be careful with the identification of the Berylline because of the recent discovery of a hybrid Berylline × Magnificent Hummingbird in Arizona (Heindel and Howell 2000).

PLAIN-CAPPED STARTHROAT *Heliomaster constantii*. One was in Madera Canyon, SCR, 7 Jul–31 Aug 1997 (NC; ph. MMS). There have been about 20 sightings of this Mexican species in Arizona, ten of which have been reviewed by the ABC.

LUCIFER HUMMINGBIRD *Calothorax lucifer*. Accepted records away from the Portal region are of one in French Joe Canyon, COS, 19 Jul 1997 (NCr) and a pair, with a female sitting on a nest, in Chino Canyon, SCR, 13–20 Apr 1997 (NC,DNe; ph. MMS, GHR), providing only a second nesting report from the state. The Lucifer Hummingbird remains a review species for all reports away from the Portal area.

EARED TROGON *Euptilotis neoxenus*. Accepted records are of one along the Black River, APA, 13 Jun 1992 (DF), one in Haunted Canyon, near Globe, PIN, 1 Jan–14 Mar 1996 (DPi, MMa), and one in Cave Creek Canyon, COS, 10–28 Nov 1999 (JBo; ph. JOl). The birds in Haunted Canyon and along the Black River were in obscure canyons probably never birded before, making one wonder how many Eared Trogons wander around Arizona without being found.

RED-HEADED WOODPECKER *Melanerpes erythrocephalus*. One at the P.A.P. pecan grove, PIN, 25 Oct 1997–Apr 1998 (PS; ph. MMS) provided only a seventh documented record from the state (Rosenberg and Witzeman 1998).

EASTERN WOOD-PEWEE *Contopus virens*. One singing individual in Madera Canyon, SCR, 23 Jun–20 Aug 1998 (MMS, ph. MMS, s.r. GHR, RMJ) represents only a third documented record for Arizona (see Rosenberg and Witzeman 1999).

LEAST FLYCATCHER *Empidonax minimus*. One well-described individual at Arivaca L., PIM, 28 Nov 1996 (NCr) represents one of the few accepted reports of this species for the state. Given the difficulty in distinguishing the Least from the Dusky Flycatcher, the ABC still encourages observers to document all sightings of this species physically.

NUTTING'S FLYCATCHER *Myiarchus nuttingi*. A well-documented individual at Patagonia Lake State Park 14 Dec 1997–21 Mar 1998 (WR; ph. GHR, LSa, MMS, BZ;

s.r. GHR, RMJ; v.t. CDB; Figure 5; see cover *N. Am. Birds* 52, no. 2; 52:148) represents only the second confirmed report of this species from the United States. The only other documented occurrence was of an individual collected at Roosevelt Lake, PIN, 8 Jan 1952 (Monson and Phillips 1981). The ABC has not reviewed one mist-netted near Elgin, SCR, 15 Jul 1985, but photos published (Bowers and Dunning 1987) suggest that the bird was likely a worn Ash-throated Flycatcher (*M. cinerascens*). Observers are encouraged to attempt to document any report of this species in Arizona with tape recordings of voice, which are useful for acceptance by the ABC, and not rely solely on difficult-to-ascertain visual characters such as color of mouth lining.

WHITE-EYED VIREO *Vireo griseus*. The only accepted record was of one in Portal, COS, 19 Aug 1998 (GHR); there were eleven previous records for Arizona.

BELL'S VIREO *Vireo bellii*. A report from the confluence of the Salt and Verde rivers n.e. of Phoenix, MAR, 26 Dec 1993 (TC) represents one of the few accepted winter sightings in the state.

PHILADELPHIA VIREO *Vireo philadelphicus*. Accepted records are of one in French Joe Canyon, COS, 14 Apr 1996 (CCa) and one in s.w. Phoenix, MAR, 16 Oct 1999 (TC). The April report marks the earliest ever for spring in Arizona.

RED-EYED VIREO *Vireo olivaceus*. One at Kingfisher Pond along the upper San Pedro R., COS, 16 May 1997 (DK) represents the only accepted record. This species has certainly declined over the past 20 years, and, because of its similarity to the Yellow-green Vireo (Terrill and Terrill 1981), it remains a review species.

YELLOW-GREEN VIREO *Vireo flavoviridis*. Two July reports accepted, of one at Guadalupe Canyon, COS, 11 Jul 1988 (NMC; ph. MMS; s.r. CDB) and one at Patagonia, SCR, 21–24 Jul 1999 (RH, JLD, MMS). Four of the five accepted Yellow-green Vireos in Arizona were discovered in late June or July (Rosenberg and Witzeman 1999).

BLUE JAY *Cyanocitta cristata*. One individual at River Mile 175 in the Grand Canyon, COC, 7 May 1998 (CL; ph. NBr) was the sixth recorded in Arizona.

CAROLINA WREN *Thryothorus ludovicianus*. A singing individual at Cook's Lake along the San Pedro R. near Dudleyville, PIN, 18 Jun 1999–fall 2000 (TK, TC; ph. TC, MMS; s.r. TC, GHR, CDB) provided Arizona with its first record. This species has been expanding its range in Texas and New Mexico and was not unexpected.

WINTER WREN *Troglodytes troglodytes*. Although the Winter Wren is not a review species, the committee did review the first summer reports from Arizona. One individual was along the w. fork of Oak Creek Canyon, COC, 25 Jun 1994 (FBr) and has been reported from there in subsequent years. Another individual was seen carrying food (presumably to a nest) along Christopher Creek, COC, 21 Jul 1999 (KN, TC). The known breeding location nearest Arizona is northern California or northern Idaho, but a singing male has been seen in the Jemez Mts. in northern New Mexico in recent years (B. Howe pers. comm.).

BLACK-CAPPED GNATCATCHER *Polioptila nigiceps*. Accepted records are of two pairs in Brown Canyon, PIM, 22 Apr 1997 (NC, RT; ph. GHR, MMS; s.r. GHR; v.t. CDB; Figure 6), with at least one of the pairs attempting nesting and remaining there until Jan 1998, one male at Patagonia, SCR, 25 May 1998 (DS, RT; s.r. DS), one female in Chino Canyon, SCR, 23 Feb 1999 (RH), and a pair in California Gulch, SCR, 23–31 Jul 1999 (RH; s.r. CDB; ph., s.r. DS). This species has been an irregular breeder in Arizona, with the first record in the early 1970s (Phillips et al. 1973) and the most recent in the late 1980s (possibly early 1990s). Extreme caution should be exercised in identifying this species in Arizona because of apparent hybridization with the Black-tailed Gnatcatcher (*P. melanura*).

WOOD THRUSH *Hylocichla mustelina*. One was at Agua Caliente Park, Tucson, PIM, 25–27 Oct 1997 (WLe, MMS). There are fewer than fifteen accepted records for Arizona.

RUFOUS-BACKED ROBIN *Turdus rufopalliatus*. One was in Guadalupe Canyon, COS, on the late dates of 3–4 Jun 1980 (CBr), one was at Kino Springs, SCR, 14 Dec 1986–1 Apr 1987 (RBa), one was well north in Prescott, YAV, 10 Dec 1988–6 Jan 1989 (LF), one was along Sonoita Cr. below Patagonia L., SCR, 19 Dec 1992 (GH), one was netted along the San Pedro R. near Sierra Vista, COS, on the very late date of 5 Jun 1996 (ph. DK), one wintered along the San Pedro R. near Hereford, COS, 5 Dec 1998–2 Jan 1999 (JLe; v.r. CDB), two were at the B.T.A., PIN, 19–30 Jan 1998 (CT, m.ob.), and one was at the Arizona–Sonora Desert Museum, PIM, 4–6 Nov 1999 (JKr; ph. MMS). This species is one of the more regular of the Mexican strays to occur in Arizona; the June record is the first in summer for the state. The Rufous-backed Robin is no longer a review species.

BOHEMIAN WAXWING *Bombycilla garrulus*. A large flock of at least 150 individuals in Flagstaff, COC, from early February into March (with one remaining to 10 Apr 1984) was photographed 15 Mar 1984 (ph. JCo, TC). To our knowledge, this is the most recent sighting of this species in Arizona.

BLUE-WINGED WARBLER *Vermivora pinus*. Accepted records are of one in Sycamore Canyon, SCR, 20 Dec 1998 (GSM), one along the Santa Cruz R. in Tucson, PIM, 13–28 Mar 1999 (RGr; ph. RMJ, MMS; v.t. GHR; see N. Am. Birds 53:311), and one along the San Pedro R. near Hereford, COS, first seen 16 May 1999 (HKo) and later (probably the same individual) netted 17 Jul (ph. MSM; Figure 7). There were only five previous records for Arizona.

GOLDEN-WINGED WARBLER *Vermivora chrysoptera*. An accepted report of one in Sabino Canyon, PIM, 15 Feb 1997 (CGo) provided one of the few winter records for the state. Other accepted records are of one along the San Pedro R. near Dudleyville, PIN, 18 Jun 1999 (TC) and one in Madera Canyon, SCR, 1–3 Nov 1999 (ph. MMS). This species is still considered casual in Arizona with about 20 records.

TENNESSEE WARBLER *Vermivora peregrina*. Records accepted by the committee are of one along the S.P.R. s. of Charleston, COS, 24 Sep 1986 (DK), one along Granite Cr. near Prescott, YAV, 1 May 1997 (CT), and one in Cave Creek Canyon, COS, 24–26 May 1997 (CHo). The Tennessee Warbler has now been removed from the review list.

MAGNOLIA WARBLER *Dendroica magnolia*. Accepted records are of one at the B.T.A., PIN, 29–30 Sep 1997 (RMJ) and one near Topock, MOH, 30 Nov 1997 (DWi). There are fewer than 25 records for the state.

CAPE MAY WARBLER *Dendroica tigrina*. Winter still appears to be the best season to find this warbler in Arizona; records accepted are of one in Patagonia, SCR, 16 Dec 1984 (AMo), one at Fountain Hills, MAR, 22–24 Dec 1986 (RBr), and one at the Forty-Niners Country Club in n.e. Tucson, PIM, 28 Nov–3 Dec 1998 (RH, MMS). There are still fewer than 15 total records for Arizona.

BLACK-THROATED GREEN WARBLER *Dendroica virens*. The only report submitted to the committee and accepted was of one at Portal, COS, 29 Oct 1993 (ph. DJa). This species was once thought of as regular in Arizona, but this record represents only the second accepted record since 1990, with only a few reports not submitted to the committee.

BLACKBURNIAN WARBLER *Dendroica fusca*. One accepted record of a male from along the S.P.R. e. of Sierra Vista, COS, 27 May 1999 (DEd). There are still fewer than 20 records for Arizona, about six of which have not been reviewed by the ABC.

YELLOW-THROATED WARBLER *Dendroica dominica*. One was at Reid Park in Tucson, PIM, 31 Oct–7 Dec 1997 (CGr; ph. GHR, MMS), representing about a 20th record for Arizona.

PINE WARBLER *Dendroica pinus*. Winter is certainly the best season to find this warbler in the state; accepted reports were of one in Reid Park in Tucson, PIM, 26 Dec 1997–15 Feb 1998 (ph. MMS), one along the Santa Cruz R., PIM, 5–25 Jan 1998 (RBo; ph. RH), and one at Sweetwater Wetlands, Tucson, PIM, 23–26 Jan 1999 (TC; ph. MMS). There were only four previously accepted records for Arizona (see Rosenberg and Witzeman 1999).

PRAIRIE WARBLER *Dendroica discolor*. Amazingly, one was photographed at Wahweap, Lake Powell, COC, 30 Nov–1 Dec 1997 (ph. GHR, MMS; Figure 8), and another individual was found and photographed by the same observer the next day, 1 Dec 1997, remaining until at least 11 Jan 1998, in Tucson, PIM (ph. MMS, GHR). There was only one previous documented record for the state.

BAY-BREASTED WARBLER *Dendroica castanea*. The only accepted record is of one in Horseshoe Canyon, Chiricahua Mts., COS, 7 Nov 1998 (NMC). There were about 10 previously accepted records for Arizona.

BLACKPOLL WARBLER *Dendroica striata*. One accepted record of one at Granite Reef Picnic Area along the Salt R. n.e. of Phoenix, MAR, 27 Oct 1991 (ph. SGa). A large percentage of the Arizona reports have not been submitted to the ABC.

LOUISIANA WATERTHRUSH *Seiurus motacilla*. Accepted records are of one in Cave Creek Canyon, COS, 27 Dec 1992 (CSa), one in Sycamore Canyon, SCR, late Nov 1996–24 Jan 1997 (RH), one along the S.P.R. near Hereford, COS, 10 Sep 1998 (DK), one in Sycamore Canyon, SCR, 1 Feb 1999 (ph. MMS), and one along Queen Creek near Superior, PIN, 7 Nov 1999 (MMS). It has been well demonstrated that this species is a rare but regular winter visitor to rocky streams in s.e. Arizona. It has been removed as a review species by the ABC, but sketch details are still requested for inclusion of reports in *N. Am. Birds*.

KENTUCKY WARBLER *Oporornis formosus*. Accepted records are of one at Kino Springs, SCR, 28 Oct 1978 (GHR), one in Flagstaff, COC, 11 May 1997 (FBr), one in Scottsdale, MAR, 19 Nov 1997 (JBl), and one at the Roger Road Wastewater facility, Tucson, PIM, 8–15 Oct 1998 (ph. MMS). This species has been removed as a review species in Arizona, but sketch details are requested for inclusion of reports in *N. Am. Birds*.

MOURNING WARBLER *Oporornis philadelphia*. A well-described individual from Navajo, NAV, 1 Oct 1988 (DS) made the only accepted record. There are only five previously accepted records of the Mourning Warbler in Arizona, only one of which has been documented with a photograph or specimen.

FAN-TAILED WARBLER *Euthlypis lachrymosa*. A singing male at Patagonia, SCR, 21–27 May 1997 (JBo, WR, BPr; s.r. DS) provided Arizona with its sixth record.

RUFOUS-CAPPED WARBLER *Basileuterus rufifrons*. Two winter reports were accepted, of one along the S.P.R. near Hereford, COS, 4–30 Dec 1998 (MPr; ph JBu, GHR; Figure 9) and one in lower Sycamore Canyon, SCR, 23 Dec 1998 (ph. GHR, CDB). These represent the first winter records for Arizona and the ninth and tenth records overall.

SCARLET TANAGER *Piranga olivacea*. Reports of one breeding-plumaged male at the Hassayampa River Preserve near Wickenburg, MAR, 26 Apr 1998 (EHo) and one at Paloma, MAR, 25 Oct 1998 (RMJ) were the only ones accepted. There are

only 14 accepted records for the state, with an additional eight reports not submitted to the ABC.

FLAME-COLORED TANAGER *Piranga bidentata*. Two accepted records of females were of one in Miller Canyon, COS, 29 May 1997 (TC) and one nesting, and apparently mated with a Western Tanager (*P. ludoviciana*), in Whitetail Canyon, COS, 16 May–mid-Jun 1998 (RT; ph. MMS). There have been only five previously accepted records for Arizona, three of which were of nesting pairs. The first recorded male, in April 1985 (Morse and Monson 1985), was also mated with a Western Tanager, and a hybrid male tanager at Bog Spring in Madera Canyon (1995 and 1996) showed characteristics of both the Flame-colored and Western tanagers.

FIELD SPARROW *Spizella pusilla*. One along the S.P.R. near Hereford, COS, 12 Dec 1998–21 Feb 1999 (CSm, CDB, GHR; ph. MMS, GHR) provided only a third Arizona record.

LAPLAND LONGSPUR *Calcarius lapponicus*. Accepted records are of one near Elfrida, COS, 20 Feb–4 Mar 1984 (AMo) and one near Topock, L.C.R.V., MOH, 27 Nov 1999 (RMJ). This species is still considered casual in Arizona with fewer than ten accepted records in all.

RUSTY BLACKBIRD *Euphagus carolinus*. One accepted record of a bird seen on both sides of the Colorado R. near Ehrenberg, LAP, 24 Nov 1988 (ph. PL).

COMMON GRACKLE *Quiscalus quiscula*. One on the Salt River Indian Res., MAR, 21 Dec 1987 (RBr) represents only the eighth accepted record for the state. A very low percentage of reports from Arizona have been submitted to the ABC.

ORCHARD ORIOLE *Icterus spurius*. One female remained at Fountain Hills, MAR, 2 Jan–10 Feb 1992 (JSo, ph. SFi, PL). Additional accepted records are of one at the Phoenix Zoo, MAR, 20–24 Dec 1997 (RMJ; ph. RD) and one in the Avra Valley, PIM, 31 Jan–28 Feb 1998 (HMc; ph. MMS). As with the previous species, very few of the Arizona reports have been written up and submitted to the ABC. The Orchard Oriole is still casual in the state at best and remains a review species.

STREAK-BACKED ORIOLE *Icterus pustulatus*. One well-described individual from the bottom of the Grand Canyon (RM 246), MOH, 22 Jan 1998 (CL) represented the first n. Arizona record. Critical in the identification (distinguishing the Streak-backed from the immature Bullock's Oriole) was a combination of reddish orange in the face and a lack of orange-yellow in the tail (see Kaufman 1983 for a discussion of this complex). This record is only the fourth accepted of this species away from the lower S.P.R., where it has bred in the recent past.

BALTIMORE ORIOLE *Icterus galbula*. Accepted records are of one male in Chino Valley, YAV, 3 May 1991 (LMu), one male 6 mi. n. of Camp Verde, YAV, 29 Apr 1998 (TLi), and another male in s.w. Phoenix 30 May–11 Jun 1998 (RWi, RMJ). There have been very few recent reports of this species from Arizona. Because of the difficulty of distinguishing females from Bullock's Oriole this species remains on the review list.

REPORTS NOT ACCEPTED

RED-THROATED LOON *Gavia stellata*. The description of one seen at a great distance at P.R.D., MAR, 13 Jan 1993 did not rule out a Pacific Loon (*G. pacifica*).

LEAST GREBE *Tachybaptus dominicus*. Details of one reported in Scottsdale. MAR, 16 Apr 1998 did not rule out the Eared (*Podiceps auritus*) or Pied-billed (*Podilymbus podiceps*) grebes.

LEACH'S STORM-PETREL *Oceanodroma leucorhoa*. One reported after Tropical Storm Nora from Lake Havasu, MOH, 27 Sep 1997 lacked details specific enough to rule out other storm-petrel species. A photograph submitted with the report was intriguing, but most committee members believed that a pale area appearing on the rump was a photographic artifact and that the bird in the photo was likely a Black Storm-Petrel.

YELLOW-CROWNED NIGHT-HERON *Nyctanassa violacea*. An immature reported from Kino Springs, SCR, 10 Jul 1992 may have been correctly identified, but the description was not complete enough to rule out a Black-crowned Night-Heron (*Nycticorax nycticorax*). Furthermore, the observer was not confident of the identification, a refreshing admission!

WHITE IBIS *Eudocimus albus*. A brief description of two at P.R.D., MAR, 23 Jul 1995 was not detailed enough for acceptance, and the sighting coincided with the occurrence of a Sacred Ibis (*Threskiornis aethiopicus*) there. A report of three adults at Mittry L. near Yuma, YUM, 26 Sep 1998 was thought by many of the committee (after two rounds) to be correct, but three members were still troubled by the lack of description of bill and leg characteristics.

RED-SHOULDERED HAWK *Buteo lineatus*. Single reports from near Chino Valley, YAV, 9 Jan 1990, from Picacho Res., PIN, 5 Aug 1992, from near Mayer, YAV, 21 Feb 1999, and from near Liguarta, Gila Mts., YUM, 15 Apr 1999, were all lacking details specific enough to eliminate similar species.

BROAD-WINGED HAWK *Buteo platypterus*. An immature hawk reported from Patagonia, SCR, 2 Dec 1998 was described as lacking a "dark trailing edge border" to the wing, which committee members thought better fit a Gray Hawk.

WHITE-TAILED HAWK *Buteo albicaudatus*. Two reports, one from near Kirkland, YAV, 30 Dec 1996, the other from the Empire Cienega Ranch, SCR, 6 Mar 1997 were not detailed enough to accept. Because of the lack of substantiated reports this century (see Rosenberg and Witzeman 1998), the committee requires at least photographic evidence accompanying any report of this species.

APLOMADO FALCON *Falco femoralis*. A description of a falcon from n.e. of Douglas, COS, 24 Sep 1999 lacked the detail to substantiate this sighting as the first credible record of the Aplomado Falcon for Arizona since 1940 (Monson and Philips 1981). As the number of valid records from New Mexico has been on the increase in recent years, it is only a matter of time until an Aplomado Falcon is sighted again in Arizona. The ABC encourages that any report of this species include some sort of physical documentation.

SAGE GROUSE *Centrocercus urophasianus*. One male reported near Globe, PIN, 15 Sep 1995 was thought perhaps to have been a raptor; the closest that the Sage Grouse occurs to Arizona is central Colorado.

ELEGANT QUAIL *Callipepla douglasii*. An adult present for several months in Douglas, COS, first seen 17 Jan 1998, was considered by the committee to likely have been an escapee. As this species ranges north to within 100 miles of Arizona's border with Sonora, it is possible that one could occur naturally in Arizona. The committee would like to see a pattern of vagrancy before accepting one as a first Arizona (and United States) record.

AMERICAN GOLDEN-PLOVER *Pluvialis dominica*. The description of one reported from Willcox, COS, 16 Sep 1992 lacked sufficient detail to be accepted.

YELLOW-FOOTED GULL *Larus livens*. An adult gull with a "black" mantle was described from Willow L., YAV, 8 May 1999, but the bird was seen at a distance of at

least 3000 feet, so critical features that would eliminate other dark-mantled species were not discerned.

WESTERN GULL *Larus occidentalis*. A description of a juvenile or first-winter gull from Willow L., YAV, 16 Dec 1998 lacked enough critical detail to determine the species and did not eliminate a Herring Gull (*L. argentatus smithsonianus*).

BLACK-BILLED CUCKOO *Coccyzus erythropthalmus*. An intriguing report of one near Carrizo, NAV, 26 May 1995 included a fairly good description, but the call was said to be a series of six to eight "coo" notes, incorrect for this species.

GROOVE-BILLED ANI *Crotophaga sulcirostris*. The description of one reported from Camp Verde, YAV, 2 May 1998 lacked enough detail for acceptance.

BUFF-COLLARED NIGHTJAR *Caprimulgus ridgwayi*. A very interesting report of a nightjar on the road at night (seen in the headlights) in Guadalupe Canyon, COS, 28 Jan 1995 was perhaps of this species, but the details did not rule out other nightjars (particularly the Whip-poor-will, *C. vociferus*) which, at times, can show a tawny collar. As this record would be a *first* in winter for the U.S., the ABC was unable to accept it without more substantiation.

BERYLLINE HUMMINGBIRD *Amazilia beryllina*. The following reports of this species lacked detail sufficient for acceptance: one in Guadalupe Canyon, COS, 27 May 1985, one at Patagonia, SCR, 8 Jun 1985, one in Cave Creek Canyon, COS, 31 Jul 1996, and one in Madera Canyon, SCR, 6 Aug 1998. It should be noted once again (see Rosenberg and Witzeman 1998) that virtually all Arizona records for this species are from a narrow elevation zone (5000–6000 feet) within oak woodland.

EARED TROGON *Euptilotis neoxenus*. The description of a trogon from open pine–oak habitat at 7000 feet in the Huachuca Mts. (exact location not mentioned!), COS, 21 May 1989 certainly suggested this species, but at least three committee members believed the report was too marginal for acceptance.

YELLOW-BELLIED FLYCATCHER *Empidonax flaviventris*. A report of one from Spruce Mt. near Prescott, YAV, 20 Aug 1991 was not detailed enough to determine the species within this difficult complex of flycatchers.

LEAST FLYCATCHER *Empidonax minimus*. A winter report from Buenos Aires N.W.R., PIM, 19 Dec 1993 did not eliminate other *Empidonax* species. Another mid-winter report of a silent individual from Patagonia, SCR, 20 Feb 1999 had too many inconsistencies with the Least Flycatcher (general shape and eye-ring shape); the committee felt that Hammond's and Dusky flycatchers were not eliminated.

NUTTING'S FLYCATCHER *Myiarchus nuttingi*. On the heels of a well-documented Nutting's Flycatcher from Patagonia Lake during the winter of 1997–98 (see under Accepted Records), two additional reports of this species were received, one from Kino Springs, SCR, 29 Dec 1998, the other from Patagonia L., SCR, 11 Jan 1999. In both cases, vocalizations were not described well enough (not heard in the Patagonia L. bird) to rule out the Ash-throated Flycatcher. Furthermore, other observers reported an Ash-throated Flycatcher from Kino Springs during the same period that showed a tail pattern more suggestive of a Nutting's. The separation of Nutting's and Ash-throated Flycatchers is subtle enough that only well-documented (tape-recorded or extensively photographed) individuals are acceptable to the ABC.

GREAT CRESTED FLYCATCHER *Myiarchus crinitus*. A sketchy report of this species from along the Hassyampa R. near Wickenburg, MAR, 5 Sep 1998 was felt to have not dealt properly with the range of variation within this genus; most committee members felt that Brown-crested Flycatcher (*M. tyrannulus*) was not eliminated.

GREAT KISKADEE *Pitangus sulphuratus*. An honest account of a strange flycatcher at the Grand Canyon, COC, 2 Aug 1995 was thought to apply to this species, but the description was not detailed enough to accept this report as a third Arizona record.

FORK-TAILED FLYCATCHER *Tyrannus savana*. The description of one reported from along the S.P.R. near Dudleyville, PIN, 2 Aug 1995 lacked detail sufficient to substantiate a first Arizona record.

WHITE-EYED VIREO *Vireo griseus*. A report from Safford, GRA, 25 JUN 1996 did not include enough detail for acceptance.

YELLOW-THROATED VIREO *Vireo flavifrons*. Details of one from s. of Willcox 1 Apr 1993 were not sufficient to accept a sighting of this species nearly a month earlier than the next earliest record in s.e. Arizona.

BLUE-HEADED VIREO *Vireo solitarius*. A description of an individual reported from Phoenix, MAR, 8 Jan 1990 did not adequately rule out Cassin's Vireo. The committee urges extreme caution in the differentiation of these two species (see Heindel 1996).

RED-EYED VIREO *Vireo olivaceus*. A report from Chiricahua N.M., COS, 4 Oct 1985 did not rule out other vireos, such as the Yellow-green.

YELLOW-GREEN VIREO *Vireo flavoviridis*. The details of one reported from Cave Creek Canyon, COS, 9 Mar 1982 were insufficient to support a sighting far outside the span of dates of the species' regular occurrence in Arizona.

BLACK-CAPPED GNATCATCHER *Polioptila nigriceps*. A single individual reported from Sabino Canyon, PIM, 18 Apr 1998 was well away from areas of previous occurrence, and the description did not rule out the common Black-tailed Gnatcatcher. Another report of one wintering in Sycamore Canyon, SCR, 26 Dec 1985 was almost certainly correct (there are accepted reports from that locality from before and after this sighting), but the details submitted did not substantiate the record. One additional report from Sycamore Canyon 4 Jun 1994 also lacked the critical detail necessary to eliminate the Black-tailed or a hybrid between the Black-capped and Black-tailed. A male at Chino Canyon, SCR, from April 1995 through 1999 is suspected of being such a hybrid. Its head pattern was perfect for a Black-capped, but the amount of white in the tail, the bill length, and the vocalizations all appeared intermediate between the two species. It was originally found with a female Black-capped but was subsequently found mated with a female Black-tailed.

VEERY *Catharus fuscescens*. Reports of individuals at Watson Wood near Prescott, YAV, 4 Apr 1997, at Madera Canyon, SCR, 6 Apr 1997, and at the Hassayampa River Preserve near Wickenburg, MAR, 17 May 1998 all lacked detail sufficient to eliminate other species in this complex genus. There is only one physically documented record of the Veery in Arizona away from historic nesting areas near Springerville (Rosenberg and Witzeman 1999).

WOOD THRUSH *Hylocichla mustelina*. One reported from Ramsey Canyon, COS, 18 May 1997 was not described adequately for acceptance.

RUFOUS-BACKED ROBIN *Turdus rufopalliatus*. Reports of individuals at Hereford, COS, 28 Mar 1981, at Tucson Mt. Park, PIM, 21 Dec 1988, and in Huachuca Canyon, COS, on the late date of 5 Jun 1999 were likely correct, but the details supplied did not substantiate the reports.

BLUE MOCKINGBIRD *Melanotis caerulescens*. An individual seen in n.w. Tucson, PIM, 23 Sep 1992 was not accepted mainly because the observer felt it was likely an escapee and because the observation time was so short. The committee

believed it better to wait for additional early fall reports before perhaps reevaluating this report.

RED-THROATED PIPIT *Anthus cervinus*. A very intriguing report from two highly experienced observers of a calling individual heard only at the P.A.P. pecan grove 26 Oct 1991 was not accepted because several members of the committee (as well as the observers themselves) felt uncomfortable accepting such a rarity in the state (second Arizona record) on the basis of call alone. Whereas many on the committee had little doubt that the bird was correctly identified, they felt that an identification based solely on a call and descriptions written several years after the "sighting" did not constitute an acceptable record. It should be noted that the fall of 1991 was far and away the best ever for Red-throated Pipits in California, with several found at desert oases as in Kern County and Death Valley.

GRAY SILKY-FLYCATCHER *Ptilogonys cinereus*. An interesting report of two adults and one juvenile along Ruby Road w. of Sycamore Canyon, SCR, 10 Aug 1993 did not include enough information to support a first state record. Also, the brief descriptions of both the juvenile and female did not support the identification.

BLUE-WINGED WARBLER *Vermivora pinus*. A report of one from Tempe, MAR, 14 May 1995 was likely correct but not thorough enough for the record to be accepted. A description of one near Hereford, COS, 1 May 1998 also lacked enough critical detail for acceptance.

TENNESSEE WARBLER *Vermivora peregrina*. Reports not accepted by the ABC are of one from Yuma, YUM, 20 Dec 1986, one from the Empire Cienega Ranch, SCR, 6 May 1993, and one from along Granite Creek near Prescott, YAV, 14 Sep 1994.

BLACK-THROATED GREEN WARBLER *Dendroica virens*. A report of one from Phoenix, MAR, 13 Aug 1981 did not adequately eliminate similar species such as Townsend's (*D. townsendi*) and Hermit (*D. occidentalis*) warblers.

BLACKBURNIAN WARBLER *Dendroica fusca*. A report of one in Sawmill Canyon, COS, 20 May 1999 was not detailed enough for acceptance.

WORM-EATING WARBLER *Helmitheros vermivorus*. A report from below Glen Canyon Dam, COC, 15 Jun 1992 was too brief for acceptance. This species has been removed as a review species.

KENTUCKY WARBLER *Oporornis formosus*. Two reports were not accepted, one from Beaver Dam Creek, MOH, 24 May 1997 and one from near Kirkland, MOH, 22 Jun 1997.

MOURNING WARBLER *Oporornis philadelphia*. A report from Florida Wash, PIM, 31 Aug 1993 lacked certain critical features necessary to substantiate it.

SLATE-THROATED REDSTART *Myioborus miniatus*. An odd report of one associating closely with a juvenile Painted Redstart (that apparently wanted to be fed) in Cave Creek Canyon, COS, 18 Jun 1995 lacked certain critical characters. Perhaps not coincidentally, a researcher at the Southwest Research Station in Cave Creek Canyon was apparently coloring the white parts of Painted Redstarts in the canyon, possibly accounting for the report.

SCARLET TANAGER *Piranga olivacea*. A winter report from near the confluence of the Salt and Verde rivers, MAR, 10 Dec 1988 was likely correct, but the observer did not note characters to eliminate a greenish-yellow Summer Tanager definitively. There is only one winter record accepted for the state (see Rosenberg and Witzeman 1999).

RED-HEADED TANAGER *Piranga erythrocephala*. A male reported from Carr Canyon, COS, 14 May 1996 was, from the description of voice and plumage,

thought by most on the committee to likely have been a one-year-old Summer Tanager with a yellow-green body and red head. Some form of physical documentation is needed for acceptance of a first Arizona (and United States) record.

AMERICAN TREE SPARROW *Spizella arborea*. Two reports, one from near Gadsden s. of Yuma, YUM, 20 Jan 1981, the other from Gila Farms Pond s. of Phoenix, MAR, 25 Dec 1994 were both too sketchy for acceptance. There still remains only one accepted southern Arizona record (see Rosenberg and Witzeman 1999).

FIELD SPARROW *Spizella pusilla*. A report of a flock of five from Kitt Peak, PIM, 24 Sep 1997 clearly pertained to some other sparrow, perhaps the Chipping.

LAPLAND LONGSPUR *Calcarius lapponicus*. One reported from near Elfrida, COS, 4 Feb 1997 was likely correctly identified, but the details were too sketchy for acceptance.

COMMON GRACKLE *Quiscalus quiscula*. A report of an individual seen only in flight at Springerville, APA, 26 Jun 1994 was almost certainly correct, but, given that the bird was never seen perched, the committee felt the report was best left not accepted.

ORCHARD ORIOLE *Icterus spiurus*. Descriptions of one at Cave Creek Canyon, COS, 24 Apr 1994 and one at Madera Canyon, SCR, 21 May 1996 were both too brief to be accepted.

BALTIMORE ORIOLE *Icterus galbula*. Two reports of females lacked enough detail to eliminate the similar Bullock's Oriole: one at Springerville, APA, 24 Sep 1985 and one at Prescott, YAV, 19 Aug 1987.

PINE GROSBEAK *Pinicola enucleator*. A report of three from Sedona, YAV, 31 Jan 1998 was intriguing but lacked enough detail for acceptance of an extralimital record of this species in Arizona. Similarly, a report from Glendale, MAR, 9 Mar 1999 was not conclusive enough to support a first lowland record for the state.

PURPLE FINCH *Carpodacus purpureus*. One reported from Sedona, YAV, 1 Apr 1999 did not eliminate the similar Cassin's Finch (*C. cassinii*).

CORRIGENDA

The following records were inadvertently published in the previous Arizona Bird Committee reports (Rosenberg and Witzeman 1998 and 1999) as "accepted" when in fact they were not accepted by the committee. The ABC apologizes for the errors: Eurasian Wigeon (*Anas penelope*) at the confluence of the Salt and Verde rivers, MAR, 10 Dec 1991; Red-shouldered Hawk 16 mi s. of Chino Valley, YAV, 9 Jan 1990; Red-shouldered Hawk at Picacho Res., PIN, 5 Aug 1992; Broad-winged Hawk at Barfoot Lookout, Chiricahua Mts., COS, 6 Aug 1995; Purple Gallinule (*Porphyrula martinica*) at Gila Farms Pond, MAR, 1 Aug 1991; American Golden-Plover at Willcox, COS, 18 Sep 1992; Tennessee Warbler at the Empire Cienega, SCR, 6 May 1993; Orchard Oriole in Cave Creek Canyon, COS, 24 Apr 1994.

CONTRIBUTORS

D. Alexander, C. Babbitt, D. Bailey, J. Bartley (JBl), J. Bates, R. Bates, J. Bealer, C. D. Benesh, E. Bennett, T. Bishop, J. Bock, R. Bowers, R. Bradley, J. Braley, F.

Brandt, C. Brown, M. Brown, N. Brown, K. Brunson, J. Burns, W. Cady, S. Capawana, B. Carrell, C. Cathers, J. Chace, R. Chapman, D. Clark, M. Collie, J. Coons, T. Corman, N. Crook, D. Crumb, V. Dayhoff, B. Demaree, K. Diem, R. Ditch, J. L. Dunn, D. Edwards, F. Fekel, R. Ferguson, S. Finnegan, D. Fischer, L. Frederick, S. Ganley, B. Given, S. Goldwasser, S. Goodchild, C. Gordon, C. Green, R. Grohman, B. Grossi, P. Hammerton, J. Hand, T. & J. Heindel, G. Hentz, R. Hicks, J. Hirth, C. Hohenberger, D. Hook, E. Hough, B. Howe, R. Hoyer, C. Hunter, B. Jackson, D. Jasper, B. Johnson, R. Jones, C. Kangas, B. Kerr, C. Kolesar, H. Koons, T. Koronkiewicz, J. Krebs, J. Kreitzer, D. Krueper, C. LaRue, P. Lehman, W. Leitner, J. Levine, T. Linda, R. Long, B. Lyon, M. Mammoser, C. Marrantz, B. McAneny, L. McCloskey, A. McCready, H. McCrystal, V. Miller, G. S. Mills, S. Mlodinow, G. Monson, A. Moorhouse, N. Moore-Craig, D. Morrison, P. Moulton, L. Muelbach, G. Nation, D. Nelson, K. Newlon, P. Norton, J. Oldenettel, J. Owen, R. Palmer, J. Paris, D. Pearson, S. Peterson, D. Pierce, L. Piest, J. Pike, B. Pranter, M. Pretti, J. Price, B. Principe, R. Radd, G. H. Rosenberg, R. Ray, W. Russell, J. Saba, P. Salomon, C. Sandell, M. SanMiguel, L. Sansone, M. Sennett, C. Sherman, J. Simon, C. Smith, M. Sogge, J. Sommers, D. Stejskal, M. M. Stevenson, B. Sutton, D. Taylor, J. Taylor, R. Taylor, B. Thomen, I. Tolinson, C. Tomoff, M. Vandzura, J. Whetstone, B. Whitney, D. Wight, R. Witzeman, B. Wotten, B. Zimmer.

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RECOLONIZATION OF THE FLICKER AND OTHER NOTES FROM ISLA GUADALUPE, MEXICO

PAUL R. SWEET and GEORGE F. BARROWCLOUGH, Department of Ornithology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024

JOHN T. KLICKA, J. F. Bell Museum of Natural History, University of Minnesota, St. Paul, Minnesota 55108 (current address Barrick Museum, University of Nevada, Las Vegas, Nevada 89154)

LILIANA MONTAÑEZ-GODOY and PATRICIA ESCALANTE-PLIEGO, Instituto de Biología, Universidad Nacional Autónoma de México, Apartado Postal 70-153, 04510 Distrito Federal, México

ABSTRACT: During a visit to Isla Guadalupe from 31 May to 3 June 1996, we documented three species new to the island, the Barn Owl, Swainson's Thrush, and Hooded Oriole, and established first breeding records for the European Starling and Western Meadowlark. Red-shafted Flickers are now breeding on the island, representing a recent recolonization from the mainland following the extinction of the endemic population. We investigated the validity of *Colaptes auratus rufipileus* and concluded that it does not meet the standard for phylogenetic species but differs from *C. a. collaris* at the 75% level usually associated with subspecific rank. Damage to the cypress forest by goats continues, and all species dependent on these trees are threatened by loss of habitat.

Isla Guadalupe is a volcanic oceanic island lying 260 km west of the coast of Baja California (29° 00′ N, 118° 20′ W). It is some 37 km long with an area of 250 km^2 and reaches an elevation of 1298 m. The history and status of the avifauna have been reviewed by Howell and Cade (1954) and more recently by Jehl and Everett (1985). Subsequent observations have been reported by Dunlap (1988), Oberbauer *et* al. (1989), Mellink and Palacios (1990), Howell and Webb (1992), and Gallo and Figueroa (1996). Here we report on birds observed and collected on a visit to Isla Guadalupe between 31 May and 3 June 1996. Maps of the island, showing localities mentioned here, have been provided by Jehl and Everett (1985) and Moran (1996). Three of the species we recorded represent first records for the island; in addition, we confirmed the breeding of two recently colonizing species and noted the recolonization of a previously extirpated species whose taxonomic status we reexamined.

ITINERARY

We spent a few hours at the naval base (Melpómene Cove or Punta Sur) upon our arrival on the island and then traveled the dirt road from there to the airstrip (Campo Pista: 29° 01′ N, 118° 17′ W), where we spent one night and a morning observing and collecting. We then continued to the cypress grove (29° 07′ N, 118° 20′ W, 1165m), near the highest point on the island, where we spent two nights. One night was spent at the fishing village (Campo Tepeyác or Campo Oeste). We returned to the naval base by launch.

CONSERVATION

Unfortunately the decimation of the island's vegetation by feral goats is continuing; we saw large numbers of goats throughout the island. They appeared to be most numerous in the central and northern portions of the island, nearer the major source of fresh water. Moran (1996) reviewed the history of goat damage to the flora of the island and estimated that the youngest of the endemic Guadalupe Cypress (*Cupressus guadalupensis*) were well over 100 years old. Apparently, in excess of 20,000 goats were removed from the island in 1971, reportedly leaving only 239 animals at that time (Agraz García 1978). Moran (1996) estimated that the population had rebounded to at least 7000 in 1994. Low-intensity hunting by fishermen and marines has had little impact on the population in recent years. In addition, attempts at protecting the remaining cypress forest fragment with a wire fence have failed. The fence is breached in many places, and a gate is missing; large herds of goats were observed trooping through the cypresses at all hours, leaving virtually no vegetation of consequence within the understory of the grove (Figures 1 and 2). In addition, the bark of many of the trees showed evidence of damage by goats. Clearly only the complete removal of goats from the island or a secure fence with a full-time warden will guarantee long-term survival of the cypresses and the birds dependent on them. We also saw feral dogs and cats on the island, but only in small numbers.

ANNOTATED LIST

Laysan Albatross (*Phoebastria immutabilis*). First recorded breeding on Isla Guadalupe in 1986 (Dunlap 1988). Its status up to 1992 was reviewed by Gallo and Figueroa (1996). We briefly surveyed the rocky plateau above the naval base and observed six full-grown chicks and one adult bird. The young birds were close to fledging with down remaining only on the head and neck.

Brandt's Cormorant (*Phalacrocorax pencillatus*). A pair was seen flying past Islote Zapato at the south anchorage.

American Kestrel (*Falco sparverius*). Fairly common and observed throughout the island.

Western Gull (*Larus occidentalis*). A few were seen along the coast between Campo Tepeyác and Melpómene Cove.

Mourning Dove (*Zenaida macroura*). Common throughout the island. Many were observed coming to drink at the fresh water spring below the north end of the cypress grove.

Barn Owl (*Tyto alba*). A single flank feather (Colección Nacional de Aves 25550) found near the airstrip provides the first documentation of the occurrence of this species on the island, although we saw or heard none. There have been several anecdotal reports of large owls on the island, and previous authors assumed that these refer to the Great Horned Owl (*Bubo virginianus*).

During Edward Palmer's initial study of the avifauna of the island (Ridgway 1876), two unidentified species of owls were observed but not collected.

Accounts of *B. virginianus* on the island appear to originate with Palmer's assistant (Bryant 1887) who reported a "Horned Owl (*Bubo*)" and that "the Mexicans" reported a "large owl ("*Tecolote*")." It is possible this represents a misunderstanding on behalf of the assistant: *tecolote* in Mexican Spanish could refer to any small owl, *buho* (interpreted as *Bubo*?) to any large owl. Presumably the *tecolote* is the Burrowing Owl, and Bryant (1887) assumed that the large owl was a Great Horned. However, it now appears plausible that these early reports refer to the Barn Owl, a species that is known for its ability to colonize islands, including Isla Socorro some 500 km from the southern tip of Baja California. No Great Horned Owls were heard during our visit.

Burrowing Owl (*Athene cunicularia*). Fairly common; several pairs were seen between the south end and the cypress grove.

Anna's Hummingbird (*Calypte anna*). Common in the cypress grove.

Northern Flicker (*Colaptes auratus* [*cafer* group]). Fairly common in the cypress grove; we found several active nests and collected two birds. A male (CNAV 24795) had enlarged testes and a female (CNAV 24794) had yolking eggs. The endemic form, *C. a. rufipileus*, has not been collected since 1906 and has been considered extinct. We believe the birds we saw and collected were mainland Red-shafted Flickers and that Isla Guadalupe has been successfully recolonized by flickers following the extirpation of the endemic subspecies (see below).

Rock Wren (*Salpinctes obsoletus*). Abundant from the beaches up to the cypress forest.

Swainson's Thrush (*Catharus ustulatus*). We collected a male with moderately enlarged testes (CNAV 24746) in the cypress grove; no other individuals were seen or heard. This is the first record of this species on Isla Guadalupe. Presumably it represents a vagrant; Swainson's Thrush occurs throughout Baja California as a migrant (Howell and Webb 1995) and has been recorded and presumed to be migrating in the mountains of Baja California as late as early June (Wilbur 1987). Escalante-Pliego compared the specimen to series at CNAV and tentatively identified it as nominate *C. u. ustulatus*, common in migration on the nearby mainland.

Northern Mockingbird (*Mimus polyglottos*). We saw two together in an open area near the cypress grove but could not determine if they were a pair. Bryant (1887) observed two birds in 1886, and subsequently individuals were seen near the airstrip in January 1988 (Howell and Webb 1992) and November 1989 (Mellink and Palacios 1990).

European Starling (*Sturnus vulgaris*). This species is now common on Isla Guadalupe. We saw a flock of over 100 birds near the spring below the cypress grove. Previous authors noted a few starlings on the island but suspected that they might represent only winter visitors (Howell and Webb 1992). However, we confirmed nesting in tree cavities in the cypress grove and collected one juvenile (CNAV 24826).

Guadalupe Junco (*Junco insularis*). This distinctive, endemic taxon has been recognized as a species in recent treatments (Howell and Webb 1995). We found it common within the cypress grove but did not see it anywhere else on the island. At the time of our visit, fledglings in streaky juvenal plumage were abundant and some males were still singing. Although other

authors have found juncos down to sea level outside of the nesting season, we saw them only in the remnant stand of cypress.

Western Meadowlark (*Sturnella neglecta*). Jehl and Everett (1985) reported only a record from 1886, but Howell and Webb (1992) saw 35-40 near the airstrip in January 1988 and suggested that the species might breed. Mellink and Palacios (1990) also observed it in November 1989. We found this species to be common throughout the island, particularly in the extensive grasslands of the central plateau, with flocks of up to 50 birds. Males were singing from prominent perches. We collected two birds, a male with enlarged testes (CNAV 24798) and a female with a regressing brood patch (CNAV 24836). Evidently this species has successfully colonized the island.

Hooded Oriole (*Icterus cucullatus*). We saw and collected a single male, which had slightly enlarged testes, in a solitary eucalyptus tree at Campo Pista (CNAV 24756). This is the first island record and presumably a vagrant; however, we were unable to reach the palm grove on the north slope of the island (Moran 1996), which perhaps could harbor a small breeding population.

House Finch (*Carpodacus mexicanus*). Common from sea level to the cypress grove. Recently fledged young were abundant during our visit and males were singing.

SYSTEMATIC STATUS OF THE FLICKERS OF ISLA GUADALUPE

Ridgway (1876) originally described the subspecies of the Red-shafted Flicker from Isla Guadalupe, emphasizing the "bright tawny forehead"—hence the name *rufipileus*—as the diagnostic character. He suggested rump color, bill length, wing length, tail length, and the amount of black on the underside of the tail as additional characters. Bryant (1886) treated the flickers of Isla Guadalupe as a full species.

Here we reevaluate the taxonomic status and characteristics of the Guadalupe Flicker in order to determine the provenance of the flickers we observed on the island. A series of *C. a. rufipileus* is available in the ornithological collections of the American Museum of Natural History; these birds were collected in the months of May, July, and August. For comparative material of mainland flickers that might represent the source for a possible recolonizing population, we borrowed specimens from a number of museums (see Acknowledgments). To ensure that we were working with individuals from breeding populations, and not migrants, we used adult specimens of both sexes from late spring and summer from mainland breeding localities. Few specimens were available from any one locality for the breeding season; therefore, our mainland sample was composed of Red-shafted Flickers from the mountains of northern Baja California, the southern California ranges from San Diego north to the San Bernardinos, the coastal ranges north to Monterey, and a few birds from the Sierra Nevada. These samples represent *C. a. collaris*, a form with a range proximal to and a phenotype similar to the recent Guadalupe birds (a comparison of extremes of *C. a. collaris* and the paler *C. a. canescens*,

courtesy P. Unitt, indicates that the two recent island birds are not typical of the highly migratory *canescens*). In all, our final sample consisted of one recent male and one recent female flicker from Isla Guadalupe, which we treated as of unknown origin, 11 males and 13 females from Isla Guadalupe from the late 19th and early 20th centuries, representing *C. a. rufipileus*, and 13 male and 15 female specimens from Baja California and southern California, representing *C. a. collaris*.

Sweet and Barrowclough independently measured, for all specimens, culmen length (from base of skull), wing chord (bend of wing to longest primary), tail length (to tip of longest central rectrix), and width of the terminal black band on the ventral surface of one of the central rectrices; some measurements could not be taken because of molt or broken feathers or bill. In addition, we independently arranged the specimens into graded series of crown/forehead color, by sex, from most to least rufescent; we then assigned the value of one to the most reddish bird, the value two to the next bird in the series, etc. (R. W. Dickerman, pers. comm. suggested that foxing was not a significant problem in flickers). In this way, we obtained two estimates for each of four mensural characters and a color character for the Guadalupe, mainland, and two new flickers. We averaged the two values, reducing measurement sampling error.

We used the computer package SAS (Windows version 6.12: procedure univariate; SAS Inst. 1988) to produce box plots for the crown color estimates. Because the color scores we assigned the birds are on an arbitrary scale, which is undoubtedly nonlinear, we used a nonparametric, descriptive technique for analyzing those data. Box plots simply encode frequency information and require no assumptions about the underlying distribution: the heavy vertical lines indicate the range, the solid lower and upper edges of the box correspond to the 25th and 75th percentiles of the distribution, the dashed line is the 50th percentile (median), and the cross is the mean of the distribution (Figure 3). Crown color, the principal character originally used to diagnose the Guadalupe Flicker, clearly varies substantially between the mainland and the island for both sexes. The two new specimens, a male and a female, both have scores unequivocally placing them with the mainland series.

Ridgway (1876) also mentioned a pink wash on the rump as a character for the island race, but we were unable to find a consistent difference in rump color and did not investigate that trait further. In the four measurements, the island and mainland forms completely overlapped in culmen and tail length. In wing length and width of the black tail bar, the means of the two samples for males and females differed, though with substantial overlap in the distributions (box plots not shown here). However, neither measurement had as great a power for discrimination as the crown color. Because these four measurements showed varying patterns of correlation (Table 1), we used a principal-component (PC) analysis to determine whether there was a linear combination of measurements that, independent of crown color, yielded a segregation of the island birds. We adopted a PC rather than a discriminant-function analysis (DFA) because our sample sizes were small and PC analysis identifies the "natural" combinations of the measurements representing

Figure 1. View northwest from remaining cypress grove. Young trees do not exist and older trees (such as the one in foreground) have had pieces of bark stripped by goats.

Photo by Paul R. Sweet

Figure 2. View into remnants of cypress grove, showing lack of understory.

Photo by Paul R. Sweet

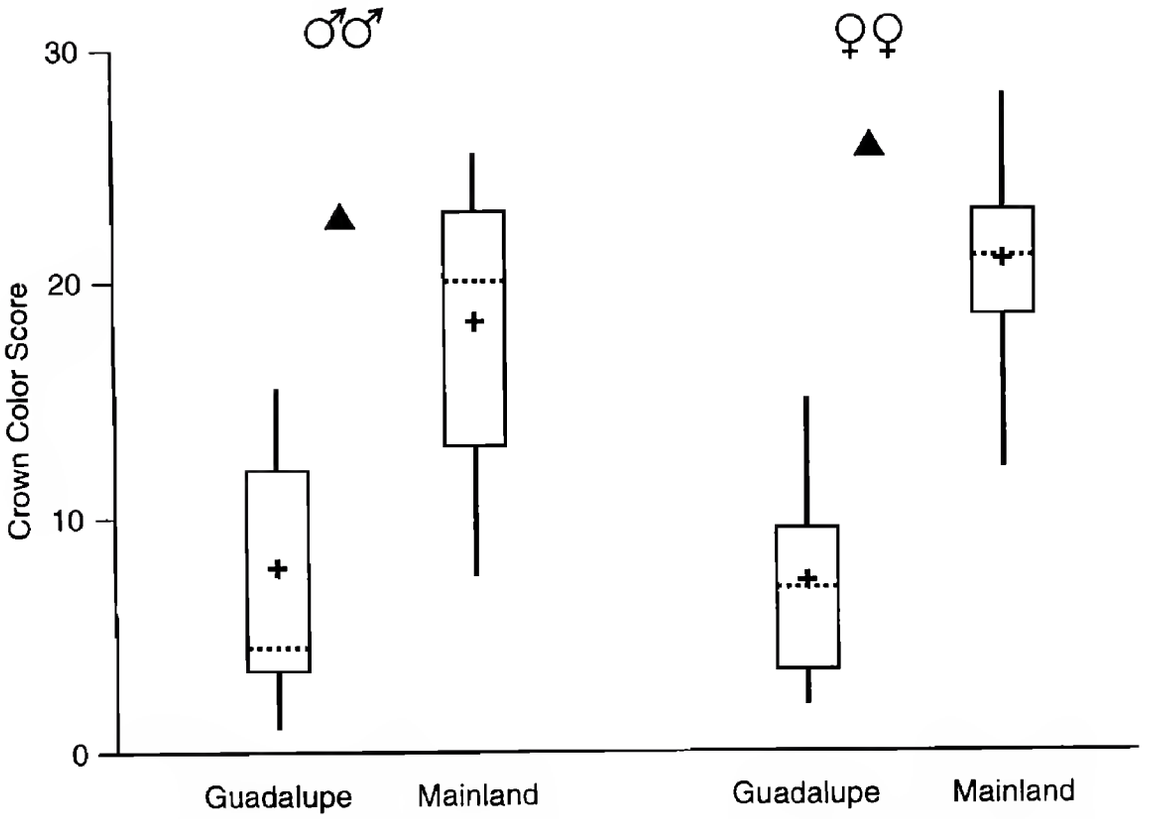

Figure 3. Box plots for crown color scores for male and female specimens of Red-shafted Flickers from Isla Guadalupe (historical sample), the southwestern mainland, and two recent Isla Guadalupe specimens, (triangles).

most of the variation in a set of data; in DFA, desired groupings are made on an *a priori* basis and high discrimination among groups that represents a very small fraction of the actual total variation is sometimes found. Using the matrix of character correlations, we found PC axes, separately for the two sexes, that summarized most of the variation in measurements with two vectors (SAS Inst. 1988: procedure princomp). For males, the first two PC axes explain 45% and 27% of the total variation, respectively; for females, the corresponding values are 41% and 38%. The character loadings on the first two PC axes are available from the authors. In Figure 4 we have plotted

Table 1 Matrix of Correlation Coefficients between Mensural Measurements of Isla Guadalupe and Mainland Red-shafted Flickers[a]

	Culmen	Wing	Tail	Tail Tip
Culmen	—	-0.076	-0.031	0.292
Wing	-0.182	—	0.091	-0.640
Tail	0.276	0.515	—	0.372
Tail Tip	0.409	-0.321	0.198	—

[a]Males above and females below diagonal.

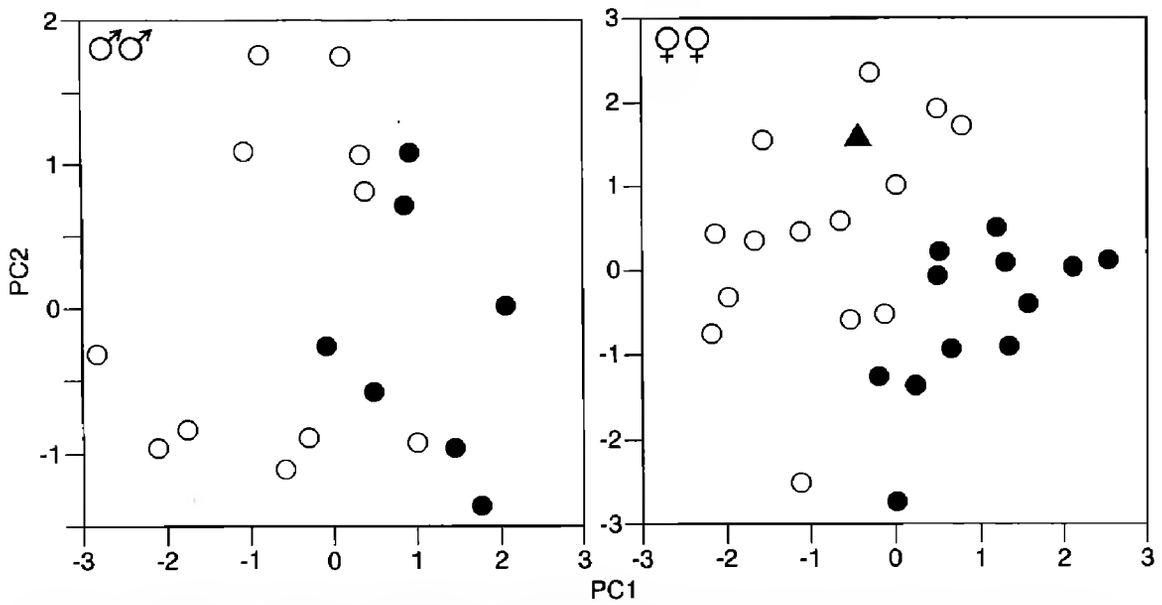

Figure 4. Scores of Isla Guadalupe (solid circles) and mainland (open circles) Red-shafted Flickers on first two PC axes based on measurements only. The recent female from Isla Guadalupe is indicated by a triangle; the recent male specimen was incomplete and so cannot be included.

the PC scores for the Isla Guadalupe, mainland, and recent flickers for which a full set of measurements were available. Unfortunately, some birds, including one of the recent specimens from Isla Guadalupe, had missing values and could not be included in the PC analysis.

For both sexes, the first PC axis yielded a good, but not perfect discrimination between the island and mainland specimens. In both cases the island birds have greater average PC1 scores than do the mainland specimens. The pattern of character loadings indicates that for both sexes the PC1 axis is largely a contrast of wing length vs. tail tip. For the males, sample location appears to be independent of the second PC axis; for females, island specimens have somewhat lower average scores on PC2 than do those from the mainland. The pattern of character loadings indicates that PC2 is at least in part a wing length plus tail length axis. The recent island female is clearly associated with the mainland specimens.

Our analysis of crown color plus four measurements indicates that the two recent flickers collected on Isla Guadalupe have characteristics placing them with mainland flickers rather than with the historical population. Greenway (1967) summarized the historical status of the Guadalupe Flicker; it was last collected in June 1906. None were recorded after that in spite of a number of expeditions and searches. However, Jehl and Everett (1985) reported that in late 1972 flickers were once again seen on the island; such observations have continued (e.g., Howell and Webb 1992), but the subspecific status of the recently observed birds was in doubt. The long historical gap in observations of flickers between 1906 and 1972, the continuing presence of flickers since then, and our character analysis, taken together, suggest that Isla Guadalupe was recolonized by mainland Red-shafted Flickers in the late 1960s or early 1970s and that the endemic subspecies is extinct.

Like most birds, the Guadalupe Flicker was described before the invention of statistical tests and quantitative studies of population variability. In part our detailed analysis of these flickers was based on an interest in ascertaining whether the subspecies *C. c. rufipileus* actually designates a distinctive endemic population (e.g., Barrowclough 1982). One modern, statistical standard for the recognition of subspecies is the "75% rule" (e.g., Mayr 1969). One interpretation of this rule is that subspecific recognition is warranted if 90% of one subspecies can be distinguished from 90% of the second (this is the 75% rule for symmetrical distributions). For crown color, the box plots indicate that females meet this standard, but males do not. For the PC analysis, based on measurements alone, the results are even less conclusive; no single PC axis can separate the island and mainland birds in accord with the 75% rule for either sex. For the females, a linear combination of PC1 and PC2 can do so, but the pattern of Figure 4 is such that it appears this would not hold up with an increased sample size. With the specimens currently available—that is, with few specimens from Isla Guadalupe in fresh (recently molted) plumage—the now extinct Guadalupe Flicker does not approach the 100% diagnosably different status required for recognition of a phylogenetic species (e.g., McKitrick and Zink 1988). However, females meet the 75% standard for subspecies. We therefore believe that subspecies status is (was?) warranted for this island form. It is clear that the flickers of Isla Guadalupe differed on average from those of the mainland; however, we did not find the degree of differentiation to be extensive. There may have been sufficient continuing gene flow to prevent complete isolation. An alternative possibility is that a series of fresh August or September specimens would have been largely diagnosable. Molecular methods may someday have the power to address such questions.

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NOTES

ORANGE BISHOPS BREEDING IN PHOENIX, ARIZONA

THOMAS A. GATZ, U. S. Fish and Wildlife Service, 2321 W. Royal Palm Road, Suite 103, Phoenix, Arizona 85021

In late summer of 1998 and 1999, I observed a small colony of approximately ten Orange Bishops (*Euplectes franciscanus*) in north Phoenix, Arizona. The colony was in a grassy tree-lined partially channelized desert wash in a highly urbanized area south of the intersection of First Drive and Greenway Parkway. A small amount of standing water was present through most of the year. In June of 2000, the 1998–1999 site was still occupied and I located a second group of six birds approximately 1.1 km east of the first location in a small cattail marsh with surface water in the same wash southwest of the intersection of Seventh Street and Greenway Parkway. The cattail marsh formed as a result of water ponded below a street culvert. The bishops at both locations were feeding on seeds of Johnson Grass (*Sorghum halepense*), a nonnative species from the Mediterranean region. Males, and occasionally females, often perched in nearby native and nonnative trees. I visited these specific locations and the surrounding area frequently from 1994 to 1997 but observed no bishops prior to 1998.

Evidence of breeding included alternate-plumaged males (Figure 1) displaying and chasing females from June through September, a male carrying a long blade of grass, apparently for nesting material, on 4 July, and a recently constructed but unoccupied nest in the cattail marsh on 6 August (Figure 2). The roundish nest, made of dried

Figure 1. Adult male Orange Bishop in alternate plumage, Phoenix, Arizona, July 2000.

Photo by T. Gatz

Figure 2. Nest of Orange Bishop, Phoenix, Arizona, August 2000.

Photo by T. Gatz

grass, was 10 cm tall by 7.5 cm wide with an opening near the top. It was woven around several stems of Johnson Grass, 1 m above the water surface. In September, I observed a female feeding a fledged young.

This species, a member of the mainly African weaver family, the Ploceidae, is native to sub-Saharan Africa and is now well established in southern California with flocks of 50 to 100 birds routinely noted in some flood-control basins near Los Angeles [Garrett, K. L. 1998. Field separation of bishops (*Euplectes*) from North American emberizids. W. Birds 29:231–232]. Both the California and Arizona birds are assumed to have originated from escaped cage birds. Small colonies of this species are now established in the West Indies and are also believed to have originated from captive birds (Raffaele, H., J. Wiley, O. Garrido, A. Keith, and J. Raffaele. 1998. A Guide to the Birds of the West Indies, p. 446. Princeton Univ. Press, Princeton, N.J.).

Although no additional cattail marsh/Johnson Grass habitat occurs in the area immediately surrounding these sightings, a considerable amount of similar habitat, into which this species could spread, exists in riparian areas, around artificial impoundments for flood control, and in agricultural sections of central and southern Arizona.

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BREEDING-SEASON HOME RANGES OF SPOTTED OWLS IN THE SAN BERNARDINO MOUNTAINS, CALIFORNIA

GUTHRIE S. ZIMMERMAN and WILLIAM S. LaHAYE, Department of Fisheries and Wildlife, University of Minnesota, 174 McNeal Hall, 1985 Buford Ave., St. Paul, Minnesota 55108

R. J. GUTIÉRREZ, Department of Wildlife, Humboldt State University, Arcata, California 95521 and Department of Fisheries and Wildlife, University of Minnesota, St. Paul, Minnesota 55108

Home ranges of the Northern Spotted Owl (*Strix occidentalis caurina*) in the Pacific Northwest (Forsman et al. 1984, Solis and Gutiérrez 1990, Carey et al. 1992, Zabel et al. 1995), of the Mexican Spotted Owl (*S. o. lucida*) in the southwestern U.S. (Ganey and Balda 1989, Zwank et al. 1994, Ganey et al. 1999), and of the California Spotted Owl (*S. o. occidentalis*) in the Sierra Nevada (Call et al. 1992, Zabel et al. 1992) have all been quantified. No home-range estimates exist, however, for isolated populations of the California Spotted Owl in the southern portion of its range (Gutiérrez and Pritchard 1992, Gutiérrez et al. 1995). Therefore, we report breeding-season home-range size for two pairs of radio-marked Spotted Owls in the San Bernardino Mountains, which support the largest population of the subspecies in southern California (LaHaye et al. 1997).

Our study area is approximately 140 km east of Los Angeles, California (34° 15′ N, 117° 55′ E). The San Bernardino Mountains are oriented east/west with elevations ranging from 800 to 3500 m and are surrounded by desert and chaparral vegetation (Barbour and Major 1988). The climate is Mediterranean, with most precipitation falling during the winter in the form of snow above 2000 m and rain at lower elevations. Precipitation, influenced by elevation and slope aspect, ranges from 25 to 100 cm (Minnich et al. 1995). Vegetation grades from Mojave desert scrub and coastal scrub at lower elevations to alpine at higher elevations (Barbour and Major 1988). Within this continuum, local aspect and topography form a complex mosaic of forest, chaparral, desert, and wetland vegetation. In this range, Spotted Owls occur between 800 and 2600 m and occupy forests composed of Canyon Live Oak (*Quercus chrysolepis*), Black Oak (*Q. kelloggii*), Big-cone Douglas Fir (*Pseudotsuga macrocarpa*), White Fir (*Abies concolor*), Incense Cedar (*Calocedrus decurrens*), Jeffrey Pine (*Pinus jeffreyi*), Ponderosa Pine (*P. ponderosa*), and Sugar Pine (*P. lambertiana*).

Using radio telemetry, we monitored two pairs of Spotted Owls from July 1987 to August 1988. We captured the owls with noose poles or mist nets. Each owl was fitted with a radio transmitter (Telonics Inc., Mesa, Arizona) by means of a backpack harness (Guetterman et al. 1991). The total mass of the transmitter package was approximately 18 g. We received transmitter signals through TR-2 receivers and four-element hand-held Yagi antennas (Telonics Inc.). Otis and White (1999) demonstrated that autocorrelation of telemetry locations does not bias estimates of home ranges when animals are considered the sampling unit. Nonetheless, we separated all owl locations in this study by at least 24 hours. We followed techniques outlined by Guetterman et al. (1991) and estimated nocturnal locations from triangulation of three to six compass bearings taken from fixed telemetry points. Triangulations resulting in polygons larger than 2 ha were removed from analyses.

We defined a breeding-season home range as the area used by owls during their nightly activities (Burt 1943) between March and August. We used the program CALHOME (Kie et al. 1996) to estimate home ranges with a minimum convex polygon (MCP) and the program KERNELHR (Seaman et al. 1998) to produce fixed-

and adaptive-kernel (Worton 1989) estimates. We used kernel estimators because they require no unrealistic assumptions about space use (Worton 1989) and perform better than other estimators in simulations (Worton 1995). The fixed-kernel estimator with least-squares cross validation outperformed the adaptive-kernel estimator in simulations (Seaman and Powell 1996, Seaman et al. 1999), so we focused our results and discussion on home ranges estimated with this procedure. The adaptive kernel (Ganey et al. 1999) and MCP have been used commonly as home-range estimators in studies of Spotted Owls (e.g., Forsman et al. 1984, Call et al. 1992, Zabel et al. 1995). Thus, given similar sample sizes, the adaptive kernel and MCP provided estimates comparable to those of other studies. We calculated the 95% fixed kernel, 95% adaptive kernel, 95% MCP, and 100% MCP for individual owls. We combined locations from individuals of each pair to estimate the pairs' home ranges (Table 1). We used the field techniques outlined by Franklin et al. (1996) to assess reproductive activity of radio-marked owls.

The number of locations per owl varied from 51 to 65 (Table 1). Fixed-kernel estimates of individual owls' home ranges varied from 223 to 654 ha. Considered individually or as a pair, the Pine Knot owls had a larger range than the Fawnskin owls. Fixed-kernel estimates for the pairs indicated that the Pine Knot pair's home range was almost twice as large as the Fawnskin pair's (Table 2). The Fawnskin pair nested during both years of the study, the Pine Knot pair during only the first year, but 60% of the latter's telemetry locations were obtained the second year when they did not nest. Furthermore, locations for the Pine Knot pair during the first year were concentrated near the center of the home range and nest; the second year the female used a larger area.

Kernel home ranges are estimates based on probability-density functions and are subject to sampling error (Seaman et al. 1999), which decreases as sample size increases. Seaman et al. (1999) reported that the bias and variance of kernel estimators reached an asymptote at ≥50 locations and recommended that home-range estimates be based on 50 or more locations. All home-range estimates in our analysis were based on >50 locations. However, our fixed- and adaptive-kernel estimates of home-range size for each pair may be slightly underestimated. By combining locations from members of a pair, we assumed that nocturnal locations of pairs are independent. If foraging locations for individuals of mated pairs are dependent, the sample size will be smaller than the sum of locations of members of the pair because the pair is acting as a single unit (Burnham and Anderson 1998:52).

Table 1 Home-range Estimates (ha) Based on Nocturnal Radiotelemetry Locations for Individual Spotted Owls during the Breeding Season in the San Bernardino Mountains, 1987–1988

		Estimation Method[a]			
Territory	Locations	100% MCP	95% MCP	95% FK	95% AK
Fawnskin					
Female	51	153	122	223	262
Male	65	325	229	430	568
Pine Knot					
Female	65	660	495	654	831
Male	63	648	377	448	619

[a]MCP, minimum convex polygon; FK, fixed kernel; AK, adaptive kernel.

Table 2 Home-range Estimates (ha) Based on Nocturnal Radiotelemetry Locations for Pairs of Spotted Owls during the Breeding Season in the San Bernardino Mountains, 1987–1988

		Estimation Method[a]			
Territory	Locations	100% MCP	95% MCP	95% FK	95% AK
Fawnskin	116	325	210	333	415
Pine Knot	128	816	632	598	810

[a]MCP, minimum convex polygon; FK, fixed kernel; AK, adaptive kernel.

However, Forsman et al. (1984) reported that paired Spotted Owls they studied foraged at the same locations only 4% to 10% of the time, indicating largely independent foraging behavior in this species. In contrast, if the pair's foraging locations in our study were not independent, we believe that the bias in our estimates of home-range size is small because we have >50 independent locations for each pair.

Pairs of Spotted Owls are more strongly associated with a central place (nest or roost area) during the breeding season than during the nonbreeding season (Forsman et al. 1984). Consequently, home ranges during the breeding season are smaller (e.g., Forsman et al. 1984, Zabel et al. 1992, Gutiérrez et al. 1995).

Our 100% MCP estimates of breeding-season home ranges for individual California Spotted Owls are larger than estimates reported for the Mexican Spotted Owl (range 278–361 ha; Zwank et al. 1994, Willey and van Riper 1995, respectively) but smaller than most estimates for the Northern Spotted Owl (range 413–817 ha; Solis and Gutiérrez 1990, Zabel et al. 1995, respectively). In general, our estimates are smaller than most previous estimates for California Spotted Owls. Reported home ranges for California Spotted Owls range from 289 ha in the southern Sierra Nevada (Zabel et al. 1992) to 2195 ha in the northern Sierra Nevada (Zabel et al. 1992). Zwank et al. (1994) reported home ranges about 30% smaller than ours for an isolated population of Mexican Spotted Owls in New Mexico. Our estimates of pairs' home ranges differ from those of other studies in a pattern similar to that described for individuals. Differences in home-range size of Spotted Owls among study areas may be due to variations in habitat (Zabel et al. 1992), prey base (Zabel et al. 1995), foraging behavior, or weather.

The variation in home-range size within our study is consistent with other studies of Spotted Owls (Forsman et al. 1984, Ganey and Balda 1989, Call et al. 1992, Zabel et al. 1995). Hypotheses for differences in size of home ranges include differences in habitat (Forsman et al. 1984, Carey et al. 1992), prey type and abundance (Zabel et al. 1995), prey-renewal rates (Carey et al.1992), and habitat fragmentation (Carey et al. 1992). Home-range size may also be related to nesting status, with nesting owls having smaller home ranges because they are strongly associated with the nest.

Densities of the Dusky-footed Woodrat (*Neotoma fuscipes*), the primary prey of Spotted Owls in our study area (Smith et al. 1999), can vary greatly (Williams et al. 1992). The habitat in both territories we studied is similar, and both pairs nested during the study. Therefore, we suspect that the differences in home-range size between the two pairs were due to differences in prey availability or random variation within the population. We could not investigate whether prey, habitat, nesting status, or the combination of these factors correlated with home-range size because our sample size is small. However, this study is the first to document home ranges of California Spotted Owls from isolated populations in southern California.

NOTES

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FIRST REPORT OF THE GRAY HERON IN THE UNITED STATES

KENNETH M. BURTON, P. O. Box 716, Inverness, California 94937
SEAN D. SMITH, Saint Paul Island Tours, 1500 West 33rd Avenue Suite 220, Anchorage, Alaska 99503

On 1 August 1999, at about 1400 ADT, Mike Greenfelder flushed a large *Ardea* heron from the shore of Weather Bureau Lake on St. Paul Island in the Pribilof archipelago, Alaska (57° 09′ N, 170° 14′ W). The bird disappeared into dense fog before it could be identified to species. Greenfelder and Smith searched fruitlessly the rest of the afternoon, and in the evening they were joined by Burton and several other birders. We finally saw the bird in flight near its original location. The heron alighted briefly at Rocky Lake, then continued flying west, calling repeatedly. Although the light was poor and our views were distant, we tentatively identified the bird as an adult Gray Heron, *Ardea cinerea*, in breeding plumage, on the basis of coloration and voice. We followed it by automobile to Southwest Point, where the road becomes essentially impassable and the heron disappeared behind bluffs, heading north as if to circumnavigate the island.

The following morning, we found the bird standing in a hunched posture on a rock at Webster Lake (11 km from Weather Bureau Lake and 20 km from Southwest Point). We observed the now stationary bird for almost an hour through spotting scopes from a distance of about 300 m and took detailed notes, on which the following description is based. This period of observation confirmed the previous evening's tentative identification. We were too far for photos and decided against closer approach until others had seen the bird and a video camera had been obtained. The heron was still in the same place when Burton saw it again several hours later, but it was wading actively when Smith returned with other observers. Before photos or videos could be obtained, the bird flushed inexplicably, and it was not seen again despite several days of intensive searching.

This observation has been accepted on the Alaska unsubstantiated list and represents the first report of a Gray Heron in the United States.

In general appearance the bird resembled a Great Blue Heron (*Ardea herodias*), a species with which all the observers are quite familiar, but had a less massive bill. The features that distinguished it from that species were its whitish, not rusty, thighs and complete lack of rufous on the shoulders. In flight, the upperparts showed stronger contrast between the black remiges and the gray back and wing coverts than is typical of a Great Blue Heron, and the underwings were a fairly uniform bluish gray with a pale leading edge. Its call, uttered frequently in flight, was a throaty "kraak," higher pitched than the croak of a Great Blue Heron.

The distal part of the bill was dull yellowish, becoming darker toward the base, especially on the culmen. The bird had a whitish crown, paler than the gray of the forehead and lores. Single black supraocular stripes extended posteriorly from the eyes, broadening and joining at the nape and forming nuchal plumes. White on the lower part of the face blended into gray on the sides of the neck; this was a paler gray than that of the mantle and secondary coverts. Several whitish plumes extended from the scapulars. At rest, the bird showed a black shoulder patch bordered on the sides with white, with no rufous anywhere on the wing.

Short black streaks extended in two lines down the whitish foreneck. The breast, belly, thighs, and undertail coverts appeared creamy white overall; the sides of the belly were black. There was a dusky wash, from which a few creamy plumes protruded, across the breast and a dusky band across the lower belly. Grayish

streaking extended along the flanks, and the undertail coverts showed sparse dingy streaking. The legs were dull yellowish green, paler than is typical of a Great Blue Heron.

Our sighting was preceded by a week of predominantly southwest and west-southwest winds averaging 15–21 knots daily. We found no other Asiatic vagrants on St. Paul associated with this weather system, but similar conditions produced a Chinese Pond-Heron (*Ardeola bacchus*) on 4 August 1996 (Hoyer and Smith 1997). The Pribilofs' only other heron records are of single Black-crowned Night-Herons (*Nycticorax nycticorax*) on 3 April 1979 and 6 August 1986. The early-August occurrence of three of the Pribilofs' four heron records is notable.

The Gray Heron breeds widely across Eurasia and Africa, withdrawing from most northern areas in winter (del Hoyo et al. 1992). In northeast Asia, the nominate race extends to Sakhalin Island and the Aldan River in the Russian Far East, roughly 3000 km west of St. Paul, while *A. c. jouyi* reaches Korea and Japan (Dement'ev and Gladkov 1951, Howard and Moore 1991, del Hoyo et al. 1992). *A. c. jouyi* tends to be paler than *A. c. cinerea* on the neck and upperwing coverts, with no buff or mauve tinge on the neck (Cramp and Simmons 1977, Hancock and Kushlan 1984). However, these differences are subtle, relative, and obscured by intergradation and clinal variation (Cramp and Simmons 1977, Hancock and Kushlan 1984), making subspecific identification of the St. Paul bird impossible.

Gray Herons disperse widely after the breeding season (Hancock and Kushlan 1984), which typically extends into the third week of July in northern Europe (Cramp and Simmons 1977) and early July in Japan (Brazil 1991). Migratory movement of most populations is to the southwest (Moreau 1972, Hancock and Kushlan 1984), though some individuals may move in other directions (Ali and Ripley 1968). There are many records of vagrants, and in North America the Gray Heron has occurred in the lesser Antilles and Bermuda (Hancock and Kushlan 1984, American Ornithologists' Union 1998), although the open sea is a major barrier to dispersal (Cramp and Simmons 1977). The Gray Heron has experienced exponential population growth in east Asia in recent decades (del Hoyo et al. 1992), increasing the likelihood of strays.

The closely related and very similar Great Blue Heron is resident in southeastern and south-coastal Alaska west to Prince William Sound, approximately 1400 km east-northeast of St. Paul (AOU 1998). It wanders north and west after the breeding season but so far has not been recorded west of Kodiak Island.

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CLOACAL INSPECTION OR PECKING IN ALLEN'S HUMMINGBIRD

JANET L. LEONARD, Joseph M. Long Marine Laboratory, 100 Shaffer Road, University of California, Santa Cruz, California 95060

Cloacal pecking, in which a male pecks at the cloaca of a female, causing her to void sperm, was first described in the Dunnock (*Prunella modularis*), a species with a very complex group-breeding system (Davies 1983). It has been interpreted as a mechanism whereby males ensure paternity of a female's offspring by eliminating the sperm of previous mates. Comparable behavior has been observed occasionally in other species of birds (N. Davies pers. comm.), but its taxonomic range and ecological context are not yet clear. On 14 April 2000 at approximately midday, I observed a somewhat similar behavior between two Allen's Hummingbirds (*Selasphorus sasin*) in a suburban backyard in Half Moon Bay, California. It was a bright sunny day, and the birds were observed from a window of the house from about 3 meters without binoculars. When I first noticed them, an adult male Allen's Hummingbird and what I took to be a female Allen's were interacting face to face and less than 30 cm apart about 3 to 4 meters above the ground. While I watched, the male flew to a position below the female and, facing her, and put the tip of his bill in the general area of her cloaca. The pair remained in this position while sinking slowly, in hovering flight, almost exactly vertically, until the male's tail was approximately 30 cm above the ground, at which point the male and female separated and flew into cover where I lost sight of them. The episode was prolonged, taking about 30 seconds, and appeared to require coordination between the two birds to allow the slow, sinking, vertical hovering flight. Allen's Hummingbird is a summer resident in central California, and the first adult male of the season that could be definitely identified as Allen's rather than the transient Rufous Hummingbird (*S. rufus*) was observed in this location on 19 March in 2000 and on 16 March in 1999. Both Allen's and Anna's (*Calypte anna*) Hummingbirds appear to establish breeding territories in or near the yard, although I have observed no nests.

There are several potential explanations for this behavior. The first would be a simple cloacal inspection by the male, which might serve to assess the reproductive condition and/or recent mating history of the female, serving a function analogous to the anogenital sniffing common in mammalian courtship and social behavior. The second would be to stimulate the female to void sperm from a previous mating, as in the Dunnock. No droplet of semen was observed but this might have been missed given the rapid movement of the male and female at the bottom of the descent. A third possibility, given the long tongue and characteristic feeding behavior of hummingbirds, is that the male might actually remove sperm from the reproductive tract of the female (Jeffrey R. Baylis pers. comm.). Physical removal of sperm by males was first demonstrated in damselflies (Waage 1979) and is known from other insects (Simmons and Siva-Jothy 1998). All of these explanations focus on the phenomenon of sperm competition, in which males continue to compete to fertilize a female's eggs even after mating (for birds see Birkhead 1998). The observations reported here suggest that novel mechanisms of sperm competition remain to be described in birds.

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Burrowing Owl Sketch © by Marni Fylling

BOOK REVIEWS

Birds of North America, by Kenn Kaufman. 2000. Houghton Mifflin, New York. 384 pages. Paperback, $20. ISBN 0-395-96464-4.

The year 2000 saw the publication of two completely new field guides to North American birds—the Sibley guide and the Kaufman guide. This simultaneity compels us to draw parallels—but are we comparing apples with apples? Before the details of the Kaufman guide are addressed, some background information should be appreciated. Kaufman is a well-known figure in North American birding circles. His accomplishments include editorship of the sadly short-lived but pioneering journal *Continental Birdlife* (1979–1981) and authorship of numerous publications including the Peterson series *Field Guide to Advanced Birding* (1990). Such associations with the cutting edge of bird identification may have led to certain expectations from his new field guide.

This guide, however, is aimed at entry-level and beginning birdwatchers, that is, anybody. This huge demographic is largely excluded (albeit inadvertently) by most other popular field guides. Excluded? This depends on how one defines a birdwatcher. Kaufman's intent is to enhance appreciation of birds in the general populace, many of whom we, as more advanced practitioners, might not even consider as birdwatchers. Conservation depends ultimately on political decisions, and the greater the public's awareness of birds, the greater the chance for their conservation. Ornithologists constitute a tiny minority that can help bring about conservation of endangered habitats or species. But if *everybody* appreciates birds, at some level, then the grassroots support for conservation could be monumental. A dream, perhaps, but a worthy one.

Departing from the seminal Peterson field guides, Kaufman chose to use photographs for illustrations. Making the leap from a bird one sees to a field-guide painting is one experienced birders take for granted, but I suspect most people relate more easily to photographs. Really good photographs are not always easy to find, so Kaufman edited photos using a computer and his extensive field experience.

The book is compact (it fits into a back pocket) and arranged in conventional field-guide format. Short introductory sections in user-friendly prose cover birding basics, bird topography, field marks (ten photos of House Finches convey variation more fully than in any other guide with which I am familiar), taxonomy, and geographic distribution. Then come the species accounts, with photos arranged opposite succinct text. Comparable poses were chosen for similar species, when possible, but photos cannot work as well as good paintings to facilitate direct comparisons. Most species are represented by at least two images that help convey differences in posture (useful for beginners) and plumage. Taxonomy and nomenclature, but not sequence, follow the American Ornithologists' Union (through the 2000 supplement to the 1998 checklist). First come ducks, then other swimming birds, aerial waterbirds, birds of prey, chickenlike birds, wading birds, shorebirds, medium-sized landbirds, and finally other landbirds (arranged in seven groupings). One can question why flycatchers or sparrows are not "typical songbirds," but the divisions may be helpful to a beginner. For example, "everybody" knows what a duck is, so that's a good place to start, and then comes the coot—"non-birders" at a local park I visit in my attempts to identify hybrid gulls often ask "what's this black duck?" Give them the National Geographic Society (NGS) guide and see them struggle to even find, let alone identify, an American Coot. The Kaufman guide should get them to this identification on page 2, in the pictorial table of contents.

The very first page has color-coded tabs that help locate a particular group. An important innovation is the pictorial table of contents at the front of the book, as one turns the *first* page. Photos of a selection of species from each group are presented right away, so that someone wanting to identify a bird can get (one hopes) to the right

group quickly, without wading through introductory text that might frustrate a "non-birder." The ability to put a name to a bird one sees is a powerful hook, and the pictorial table of contents is a good way to facilitate this step in incipient birders. Each of these groups (ducks, aerial waterbirds, etc.) is introduced in the text by a pictorial section that further narrows the choices and provides background information. Additional information is provided for problem groups: the summary of gulls on pages 68–69 is as helpful and concise as one could wish for a beginner, while the detailed range map (p. 273) for the Black-capped and Carolina chickadees is useful for these commonly seen garden birds.

On the basis of a few random comparisons, the color range maps seem on a par with the NGS for overall accuracy and further discriminate between common and scarce occurrence by different shades. The text for each species opens with a synopsis of abundance, habitats, and habits, followed by field marks, then voice. It seems user-friendly for the intended audience and could also benefit more experienced birders: the Short-tailed Shearwater is "much like Sooty Shearwater, not always identifiable;" or Cassin's Vireo is "Like a duller version of Blue-headed Vireo; best separated by range. Where they overlap some may not be identifiable."

Which species are covered? Although not stated in the introduction, it appears that all regularly breeding North American species are included, plus all regular migrants, commoner "vagrants," and even some very rare vagrants that could be found in gardens or at feeders (e.g., the Green Violet-ear and Fieldfare). Oddballs from Alaska islands and the like are not included.

What of the illustrations, the edited photos? In general these are well chosen, and pointers highlight field marks, but many minor problems pervade the photos, and in some cases their captions. This aspect of the book could have benefited from more thorough review. As examples, juvenile White-tailed Kites don't have ruby-red eyes, the wing-tips of the perched adult Glaucous-winged Gull look too pale, the wing-tips of the standing adult Western Gull are too short (primaries 8–10 appear to be lacking!), the right-hand illustration of the "Ashy Storm-Petrel" on page 99 is a dead ringer in shape for a Black Storm-Petrel, the wing-tips of the left perched Calliope Hummingbirds fall well short of a strongly graduated tail (rather than falling slightly beyond a more squared tail), the right wing of the center Ruby-crowned Kinglet on p. 287 appears deformed, the "immature" Black-throated Sparrow is actually a juvenile, and so on. While these facts could annoy or irritate more advanced birders, they may not detract from the overall goal of the book. The photos also are a potentially useful resource for more experienced birders, but the fact they've been "edited" cautions against their being used too literally.

Most birders you and I know may not need this new guide, but what about the kid next door, or the curious onlookers you attract at the local park? This book has potential for a huge audience, and I congratulate Kaufman for his pioneering spirit and broad-based goals. The back cover proclaims that this guide "cuts through the clutter to focus on the essentials." I agree, but the success of this guide will be measured by how it works for the intended audience. While I prefer the Sibley Guide and the NGS, I believe the Kaufman guide is more useful for beginning birders or "non birders," and I suspect we all can learn from this book and its approach to birding.

Steve N. G. Howell

The Sibley Guide to Birds, by David Allen Sibley. 2000. Alfred A. Knopf, New York. 544 pp. Paperback. $35.00. ISBN 0-679-45122-6.

"There is order in the universe, and birds are no exception." Welcome to the Sibley guide (p. 10) and the sixth-order tantric chakra, related to the act of seeing, both physically and intuitively. This long-awaited work provides an American answer to the increasingly detailed volumes covering other continents, particularly Europe. Whatever quibbling follows, let me emphasize that no student of birds is too green or jaded to benefit greatly from the art and observations in this guide.

Sibley treats approximately 744 native and vagrant species plus 66 introduced and domestic species. The third edition of the National Geographic Society's *Field Guide to the Birds of North America* (NG3) treats about 60 additional vagrants and species of far offshore waters, so most serious birders will want both guides. I would have preferred more complete coverage, particularly of species that pose identification pitfalls (e.g., the Red-tailed Tropicbird, which likely occurs regularly in North American waters), but the Sibley guide's omission of ultra-rare species can be viewed as a progressive step toward a less ego-driven world—one where birders more clearly recognize that our most profound contributions to field ornithology and conservation are made through such communitarian undertakings as breeding-bird atlases, Christmas Bird Counts, and purposeful bird-banding. Such projects require sound grounding in the local avifauna rather than esoteric knowledge of Siberian specialties.

Acknowledging an increasingly chaotic state of affairs around the species level, and that most subspecies cannot be identified reliably in the field, Sibley opted to portray intraspecific variability by a system of "natural ecological regions" in place of subspecific designations. Thus, Gambel's White-crowned Sparrow (*Zonotrichia leucophrys gambelii*) becomes the "west taiga" form, while the partially migratory Puget Sound (*Z. l. pugetensis*) and sedentary Nuttall's (*Z. l. nuttalli*) races constitute the "Pacific" group. Motivated readers are directed to admirably detailed subspecies accounts posted at www.sibleyart.com. This approach may be as valid as any, given the deep split between practitioners of the phylogenetic and biological species concepts, but I perceive no compelling reason why currently recognized subspecies names were not correlated to Sibley's alternative system in the guide—what is gained by banishing this basic information to a web page that many readers will never visit?

Fourteen pages of introductory material warrant a close read, as they outline Sibley's approach to the subject material and provide unusually insightful information on bird topography, hybrids, aberrant plumages, molt, and other topics central to birding and ornithology. Species accounts stretch vertically, and each is headed by at least two in-flight illustrations, with flight silhouettes for selected species. Each family or major group begins with a summary page or spread describing the group's characteristics and showing small images of each species, arranged by genera. Not only will newer birders find their match quicker, but I expect that those who start by learning the genera, rather than each species independently, will cultivate a deeper knowledge of birds and their identification. This is one subtle, but important, way in which the Sibley guide has the potential to advance American birding.

The benefits of the book's distinctive layout (e.g., visual appeal and ease of comparison between plates) are not without costs. Most importantly, the rigid columnar format limits the possibility of image sizes being modified to show greater detail where warranted, or to otherwise use space judiciously. Readers will find scattered inconsistencies of scale, such as those between the Least and American bitterns and the Bonaparte's and Black-headed gulls, and note that sexual dimorphism is lacking in the genus *Accipiter*. Groups that could have benefited from larger image sizes include the tropicbirds, boobies, several hawks and gulls, and the *Oporornis* and *Wilsonia* warblers.

Birders have long expected field guides to feature in-flight depictions of seabirds, ducks, hawks, and gulls, but I was somewhat skeptical about the value of extending this

convention to every species. As it turns out, these flight shots significantly improve Sibley's presentation by showing important wing and tail details and helping to convey each species' unique character. Considering the author's reputation for identifying birds by sounds as seemingly anonymous as a flight note, I was pleased to find the voice descriptions unusually detailed and helpful. The occasional eastern bias creeps through, however, such as the comparison of the Orange-crowned Warbler's call note to that of a Field Sparrow—western readers can substitute here the Black-chinned Sparrow (or a simple "tsit"). Special sections focused on topics such as the identification of swans, scaup, peeps, *Spizella* sparrows, and meadowlarks are stimulating and informative, often discussing plumages, structural features, and even behaviors that open both the eyes and the mind. Reminders that some birds may not be identifiable appear with welcome regularity.

Above all, Sibley is a formidable and attentive field ornithologist, and his distinctive artwork melds the birder's eye for proportion, posture, and feather patterns with the artist's gift for breathing depth and life into two dimensions. He employs annotated pointers to draw attention to key identifying features more quickly and effectively than text ever could. Particularly impressive plates include the shorebirds, hummingbirds (despite some tail-pattern miscues that could have benefited from a check of museum specimens), *Empidonax* flycatchers, chickadees through creepers, pipits and wagtails, tanagers, sparrows, and icterids. Larophiles will appreciate 26 nicely executed Herring Gull images, but Sibley's semi-impressionistic style fails to capture fine details characteristic of certain other medium-sized and large gulls, such as Thayer's, and stark the white backgrounds detract from all of the gull and tern plates. The warblers are generally excellent—exceptionally dull Pine Warblers were a piece of cake for me on a recent Maryland trip—although western Orange-crowned Warblers appear too coarsely streaked and lack their distinctive pale marginal coverts. Apparent printing irregularities in my copy include overly intense rufous tones (on the Brown Thrasher, for example) and washed-out greens on the vireos. When will publishers care enough to reproduce colors faithfully? All things considered, however, Sibley's artwork outshines that available elsewhere, and no other guide approaches the range of plumage variation depicted here.

Range maps constitute the book's only true disappointment. Among numerous errors evident in southern California and adjacent areas, the Yellow-rumped Warbler, Summer Tanager, and Green-tailed Towhee are shown breeding along the southern California coast, the coastal range of the Chestnut-backed Chickadee stops around San Francisco Bay (this species occurs south to Santa Barbara County), the west coast is mistakenly shown as a "main migration route" for the American Golden-Plover, Baja California Sur lacks its wintering Clay-colored Sparrows, and many seabirds strictly pelagic in this region are shown ranging along our immediate coast. Additionally, the use of green dots to illustrate broad patterns of rare occurrence is problematic, at least in California. For example, the Painted and American redstarts are depicted similarly in southern California although the latter species is about a hundred times more common than the former, and the exceptionally scarce Cape May Warbler is granted considerably more California dots than most regularly occurring eastern vagrants. For now, the maps in NG3 are far more readable and reliable—another good reason not to relegate "old faithful" to the shelf just yet.

An accomplished guide can facilitate the student's journey toward the rarified echelon of wisdom and consciousness represented by the seventh, or crown, chakra. Most birders alive today were assisted along their paths by Roger Tory Peterson's remarkable combination of observational, writing, and artistic talents, and it is gratifying to see David Sibley emerge from Peterson's long shadow to lead a new generation of seekers toward birding's next level.

Robert A. Hamilton

FEATURED PHOTO

FIELD IDENTIFICATION OF FEMALE ALLEN'S AND RUFOUS HUMMINGBIRDS

STEVE N. G. HOWELL, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, California 94970

Probably no other pair of North American bird species poses greater field identification problems than the Rufous (*Selasphorus rufus*) and Allen's (*S. sasin*) hummingbirds. Observations of anything other than rufous-backed adult males (at least outside of known breeding ranges and breeding seasons) are usually lumped as "Rufous/Allen's," since even a small percentage of adult male Rufous are fully green backed, matching the pattern of adult male Allen's (McKenzie and Robbins 1999). Females and immatures are generally considered unidentifiable to species in the field although, with excellent views and comparative experience, some immature males may be distinguishable by details of rectrix width and shape (Stiles 1972, Pyle 1997). While researching identification criteria for a photographic guide to North American hummingbirds, I found two features helpful in the separation of adult female Allen's and Rufous hummingbirds.

The most striking feature pertains to the race *sedentarius* of Allen's Hummingbird, which is endemic to southern California. This taxon is distinguished from nominate *sasin* by measurements, especially bill length, which averages longer in *sedentarius*, but no consistent plumage differences have been reported (Grinnell 1929, Stiles 1972, Mitchell 2000). Examination of adult female museum specimens revealed that *sedentarius* (n = 24; upper photo) has relatively dull and poorly contrasting cinnamon-rufous sides and flanks with moderate to extensive mottling of iridescent green spots. By contrast, nominate *sasin* (n = 60; lower photo) has brighter cinnamon-rufous sides and flanks that contrast more sharply with a white forecollar and white median stripe on the underparts. Only about 30% of nominate *sasin* (n = 60), as well as 30% of adult female Rufous Hummingbirds (n = 50), have one to a few iridescent green spots on the chest sides, rarely if ever approaching the extent of spotting on *sedentarius*; most have solidly cinnamon-rufous sides and flanks that lack iridescent green spotting, a pattern not shown by *sedentarius*.

Sedentarius is resident on most of the California Channel Islands, whence it spread in the 1960s and 1970s to the adjacent mainland coast (Wells and Baptista 1979). In recent years, its range has expanded inland through much of the coastal slope of Los Angeles County and parts of Orange County (Hamilton and Willick 1996, Gallagher 1997), and resident populations of presumed *sedentarius* also occur along the coast nearly to the edge of the breeding range of nominate *sasin* in Ventura County (K. L. Garrett pers. comm., D. E. Mitchell, pers. comm.). There is also some post-breeding movement of *sedentarius* upslope into nearby mountains (Stiles 1972), and the taxon has occurred casually south to San Diego County (Unitt 1984). Identification criteria proposed here may help document the nesting ranges of these two subspecies, and also the detection of wintering *Selasphorus* hummingbirds other than *sedentarius* in southern California. I encourage observers and banders in a position to examine known *sedentarius* (e.g., on the Channel Islands) to test the usefulness of flank color and pattern and to examine whether this feature is helpful for immatures (of which I did not see adequate samples); immatures of nominate *sasin* do not show extensive green mottling on their sides and resemble adult females in flank color.

A second feature worthy of critical examination in the separation of adult female Allen's and Rufous hummingbirds is uppertail-covert pattern and color. About 30% of specimens of both *sedentarius* and nominate *sasin* show relatively extensive rufous

edgings on their uppertail coverts (forming a distinctive rufous "rump patch"), in contrast to narrow or virtually absent rufous edgings on adult female Rufous (n = 50). Thus, on adult females, extensive rufous on the uppertail coverts suggests Allen's Hummingbird, a difference illustrated, although not mentioned specifically, by Sibley (2000). A smaller sample suggests the same trend in immature females, but because 10% of immature female Rufous (n = 20 specimens) have fairly distinct rufous fringes on their uppertail coverts, the presence of a rufous "rump patch" is not diagnostic of immature female Allen's. Also note that immature males of both Allen's and Rufous hummingbirds typically have extensively rufous uppertail coverts, so correctly determining the age and sex of any bird is a prerequisite to specific identification (see Pyle 1997).

I thank personnel at the California Academy of Sciences (the late Luis Baptista, Douglas J. Long), the Museum of Vertebrate Zoology, University of California, Berkeley (Carla Cicero, Ned Johnson), the American Museum of Natural History, New York (R. Terry Chesser, Jacqueline Weicker), the National Museum of Natural History (Smithsonian Institution), Washington D. C. (James Dean, Gary R. Graves), and the Western Foundation of Vertebrate Zoology (Jon Fisher) for access to specimens in their care. Kimball L. Garrett (Natural History Museum of Los Angeles County) and Peter Pyle helped with specimen examination. I am indebted to Larry Sansone for use of his photo of a female *sedentarius*, taken in Los Angeles County, California, March 1992, and to Ian C. Tait for his photo of a female *sasin* taken in Marin County, California, June 1971. Garrett and Don E. Mitchell contributed information on the range of *sedentarius*, and the manuscript benefited from review by Robert A. Hamilton, Mitchell, and Pyle. This is contribution number 945 of the Point Reyes Bird Observatory.

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Associate Editors: Daniel D. Gibson, Robert A. Hamilton, Ronald R. LeValley, Tim Manolis, Kathy Molina, Mark K. Sogge

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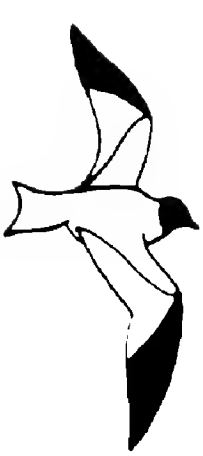

WESTERN BIRDS

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Cover photo by © Martin Meyers of Truckee, California: Le Conte's Sparrow (*Ammodramus leconteii*), Miller's Rest Stop, Nevada, October, 2000. If accepted, this will be the second record of Le Conte's Sparrow for the state of Nevada.

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 the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, 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 matter of style consult the Suggestions to *Contributors to Western Birds* (8 pages available at no cost from the editor) and the *Council of Biology Editors Style Manual* (available for $24 from the Council of Biology Editors, Inc., 9650 Rockville Pike, Bethesda, MD 20814).

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

WESTERN BIRDS

Volume 32, Number 2, 2001

RECENT BIRD RECORDS FROM THE GRAND CANYON REGION, 1974–2000

CHARLES T. LaRUE, 3525 W. Lois Lane, Flagstaff, Arizona 86001

LARA L. DICKSON, Grand Canyon National Park, 823 N. San Francisco St., Suite B, Flagstaff, Arizona 86001

NIKOLLE L. BROWN, 7779 N. Leonard, Clovis, California 93611

JOHN R. SPENCE, Glen Canyon National Recreation Area, P. O. Box 1507, Page, Arizona 86040

LAWRENCE E. STEVENS, P. O. Box 1315, Flagstaff, Arizona 86002

ABSTRACT: We report information on 100 species from the Grand Canyon region from 1974 to 2000; of these, 98 are from the Colorado River and 18 species are new to the Grand Canyon region. We compiled new seasonal information on 33 species and breeding information on 11 species. Changes are due, among other factors, to a change in habitats resulting from the construction and operation of Glen Canyon Dam. Flow regulation from the dam increased water clarity, and numbers of many waterbirds (primarily Anseriformes) subsequently increased. For example, the Common Goldeneye did not occur in Grand Canyon before the late 1980s, but since then it has become the most abundant wintering waterfowl. Stabilization of the river's flow has also allowed the growth and expansion of riparian vegetation. Birds we believe are responding to this increase in vegetation include Bell's Vireo, Sharp-shinned Hawk, and wintering *Empidonax* flycatchers and sparrows. Also, there has been an increase in coverage, e.g., bird-monitoring river trips in winter. Some species are increasing in number and/or expanding their ranges in Arizona, such as the Double-crested Cormorant, Cattle Egret, Ross's Goose, White-winged Dove, Anna's Hummingbird, Black Phoebe, Brown-crested Flycatcher, Crissal Thrasher, Summer Tanager, and Common Grackle. Last, improved field identification has helped in discerning closely related species.

This report discusses bird observations from the Grand Canyon region from 1974 through 2000. We report information on 100 species, of which 18 are new to the region. The Grand Canyon, located in northern Arizona, covers approximately 1000 km^2 and several life zones from lower Sonoran along the Colorado River (elevation 350 m) to boreal forests (2800 m; Figure 1). The physiographic Grand Canyon falls within the complex boundaries of six land-

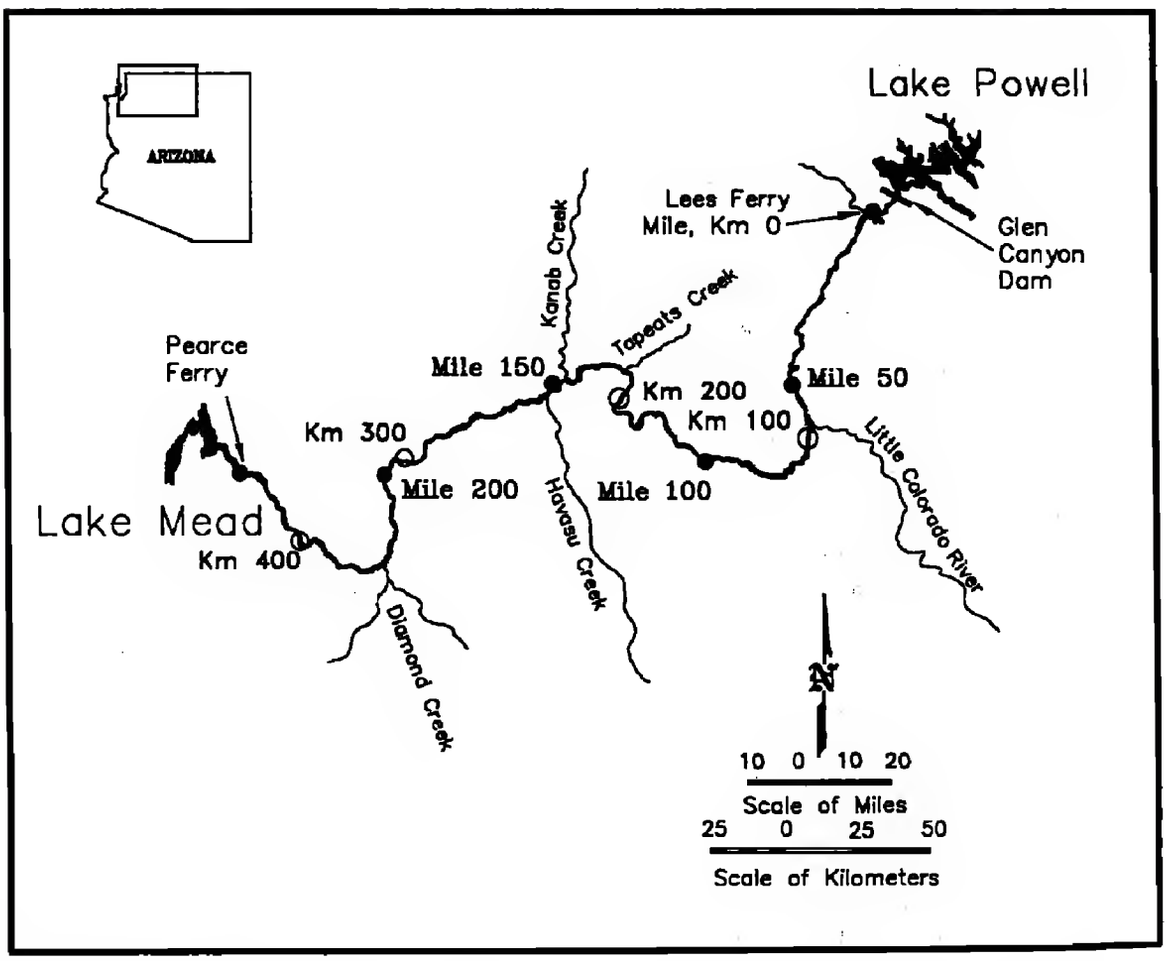

Figure 1. The Grand Canyon region, showing the Colorado River corridor and major tributaries.

management jurisdictions, including the National Park Service (Grand Canyon National Park, Lake Mead National Recreation Area, Glen Canyon National Recreation Area), the Bureau of Land Management, the U. S. Forest Service (Kaibab National Forest), the Navajo Nation, the Hualapai Nation, and the Havasupai Nation (Billingsley and Hampton 1999).

Bird diversity and distribution in the Grand Canyon region have been summarized by Bailey (1939) and Brown et al. (1984, 1987, 1993); Stevens et al. (1997) and Sogge et al. (1998) made additional studies of riparian and waterbirds along the Colorado River. The completion of Glen Canyon Dam in 1963 eliminated the nearly annual floods that scoured the banks of the Colorado River through the Grand Canyon and allowed the growth and expansion of native and nonnative riparian thickets (primarily tamarisk, *Tamarix ramosissima*) the length of the corridor (Turner and Karpiscak 1980, Johnson 1991). Flow regulation has increased the populations of waterbirds (primarily Anseriformes) along the Colorado River in lower Glen Canyon and the upper Grand Canyon, where density is a function of water clarity (Stevens et al. 1997, Glen Canyon N.R.A. files).

The majority of observations we report were recorded during investigations of ecological impacts of Glen Canyon Dam on the river and adjacent riparian zones. Most of our data were obtained during projects funded by the Bureau of Reclamation and administered by Glen Canyon Environmental

Studies and Grand Canyon Research and Monitoring Center. Several projects were administered by Glen Canyon National Recreation Area, including 12 bird-monitoring trips in the Grand Canyon from 1997 to 1999 during January, February, April, May, and June and a bird-monitoring project in Glen Canyon N.R.A. from 1992 to present. Sources of our other records include >200 research and commercial river trips from 1975 through 1999 by Stevens, projects on both the river and canyon rims by Grand Canyon National Park staff, and personal time and personal communications.

Trips on the Colorado River were conducted via motor and rowboats during all seasons. River trips were from river mile (RM) 0 at Lee's Ferry to RM 280 at Pearce Ferry (elevation 950 m to 350 m). We covered the Glen Canyon reach (RM 0 to RM –16 at Glen Canyon Dam) via motorboat. Locations on the Colorado River are given in river miles from Lee's Ferry (Stevens 1983) followed by L (left bank looking downstream) or R (right bank), where applicable. Records are given in a seasonal order; for example, observations of a winter resident start in the fall and go through the spring. Observers are noted in the text with their initials for each species, and their full names are given alphabetically in the acknowledgments.

Our reasons for reporting these observations include new species for the Grand Canyon region, new seasonal records, new breeding records, changes in status, including distribution and abundance, rarely encountered species, and range expansion. The published sources of status and distribution information from which we determined the significance of our records are Woodbury and Russell (1945), Phillips et al. (1964), Monson and Phillips (1981), Brown et al. (1984, 1987, 1993), Brown (1985), Stevens et al.(1997), and Sogge et al. (1998). For a broader regional perspective, we referred to the account by Rosenberg et al. (1991) of the lower Colorado River Valley (LCRV), from Davis Dam to Mexico (primarily the Arizona–California border) and to Monson and Phillips (1981) for the state of Arizona. For current information on the status of unusual species and records in Arizona, we referred to Rosenberg and Witzeman (1998, 1999).

We report 18 species new to the Grand Canyon region: the Least Bittern, Greater White-fronted Goose, Ross's Goose, Trumpeter Swan, Sanderling, Caspian Tern, White-winged Dove, Yellow-bellied Sapsucker, Eastern Phoebe, Scissor-tailed Flycatcher, Hutton's Vireo, Blue Jay, Northern Parula, Prairie Warbler, Prothonotary Warbler, Bobolink, Common Grackle, and Streak-backed Oriole. Our data bring the total number of waterbird species in the Grand Canyon region to 91, adding six species (and one corrected identification) to the list by Stevens et al. (1997).

SPECIES ACCOUNTS

COMMON LOON *Gavia immer*. Sogge et al. (1998) reported one previous record from the river corridor. Six of our seven records indicate that the Common Loon is a rare transient primarily in fall. We observed individuals at Lee's Ferry on 8 October 1992 (ACP), RM 51.5 on 19 October 1992 (LES), RM –3.6 on 2 November 1998 (JRS, CTL), RM –1.8L on 7 November 1996 (BKR, TMH), RM –12.0 on 12 November 1993 (ACP, BKR), and RM 1.4 on 12 February 1999 (PGF, RKR, LLD).

A very unusual summer occurrence was of one at RM 214 on 24 July 1998 (NLB, photo). The Common Loon is an uncommon fall and winter migrant at lakes throughout Arizona and is most frequent in the LCRV.

PACIFIC LOON *Gavia pacifica*. One was at Lee's Ferry 9–26 February 2000 (KSB, BRB, CTL). There is one other record from the Grand Canyon region, also from Lee's Ferry in winter. This species is rare but regular in winter on lakes in the LCRV and elsewhere in central and southern Arizona.

HORNED GREBE *Podiceps auritus*. We report the first records from the river corridor, seven from Glen Canyon: one at Lee's Ferry 27–31 October 1996 (CTL), one each at RM –13.5L and –2.5L on 7 November 1996 (BKR, TMH), one at Lee's Ferry on 21 December 1997 (JRS), two at Lee's Ferry on 1 January 1998 (JRS, BKR, CEG), one at RM –3.5 on 8 January 1997 (JRS, BKR, CTL), and two at RM –9.4 on 30 March 1995 (ACP). This species is a rare to uncommon migrant and winter visitor throughout Arizona.

AMERICAN WHITE PELICAN *Pelecanus erythrorhynchos*. One was at the base of Glen Canyon Dam on 30 January 1995 (ACP); this is the first winter record of the species from northern Arizona. Five were at RM 209.0 on 12 April 1999 (BHD, LLD, JAH). A flock of approximately 40 birds was at RM 8 on 8 May 1999 (reported to LES by TV). Nine were at RM 133 on 28 May 1999 (reported to LES by AP). A flock of 50 was at RM 120 in late August 1990 or 1991 (reported to LES by SH). Two river guides reported (to LES) a flock of 200 birds at RM 150 in mid-summer 1998. There are five previous records from the Grand Canyon region. The White Pelican is a rare but irregular transient throughout the year in Arizona.

BROWN PELICAN *Pelecanus occidentalis*. One was observed in Glen Canyon at RM –14.5 on 9 June 1992 (ACP), and another was at RM 170R on 4 August 2000 (NLB, photo). There is one other report from the Grand Canyon region. This species is a rare but irregular late summer and fall wanderer to lakes in the LCRV and elsewhere in Arizona.

DOUBLE-CRESTED CORMORANT *Phalacrocorax auritus*. Brown et al. (1984) reported this species as a common permanent resident in the upper portion of Lake Mead and an irregular transient along the river upstream from there. Beginning as early as 1985 this species began appearing in winter at the base of Glen Canyon Dam, and since 1992 the numbers have steadily increased to a high of 22 individuals in 1999 (JRS).

LEAST BITTERN *Ixobrychus exilis*. We report the first record of this species from the Grand Canyon region: one at Quartermaster Canyon, RM 260.1L, upper Lake Mead, on 22 January 1999 (CTL, JRS, photo NLB, BHD). This species is rare in winter in the upper LCRV. There are two other northern Arizona records.

GREAT BLUE HERON *Ardea herodias*. Incubating birds were seen on 10 nests at RM 275.0 on 7 April 2000 (CTL, LLD). Four pairs were on nests in tamarisks at the mouth of Burnt Springs Canyon (RM 259R) on 15 May 1990 (LES). The species nested in tamarisks at RM 0L (Lee's Ferry) in 1998 and 1999, successfully raising young both years (LES, JRS, NLB). Another nesting attempt (on a ledge 100 m above the river) at RM –13.3R in 1998 was unsuccessful (BKR, TMH). These are the first nesting attempts in the Grand Canyon region of this common wanderer along the Colorado River.

CATTLE EGRET *Bubulcus ibis*. Four records: one at Marble Canyon Lodge on 24 March 1999 (LLD, JAH), one at Glen Canyon Dam on 21 April 1994 (JDG), one at Lee's Ferry on 25 April 1995 (JDG), and three between RM –8.8 and –10.8 on 26 April 1995 (ACP). There were two previous records from the Grand Canyon region. This species has recently become more abundant as a migrant in northern Arizona (CTL unpubl. data).

GREATER WHITE-FRONTED GOOSE *Anser albifrons*. The first record of this species from the Grand Canyon region is of a single bird observed at RM 158 on 11 September 1997 (reported to LES by SH). The White-fronted Goose is a rare fall migrant in northern Arizona; there are seven records from the adjacent Navajo Nation (CTL unpubl. data).

ROSS'S GOOSE *Chen rossii*. One was observed at RM 2 on 8 March 1993 (reported to LES by KJB, CG), and another (or the same) was seen at RM −12.0 on 19 March 1993 (ACP, photo JRS). These are the first records of this species from the Grand Canyon region. Ross's Goose is a rare winter resident in the LCRV and has recently increased throughout Arizona as a migrant and winter resident.

TRUMPETER SWAN *Cygnus buccinator*. Two first-year birds that had been painted bright pink on one side were observed between RM 7 and 9.5 on 14 and 15 February 1997 (LES), observed and photographed 25–27 February 1997 between RM 4 and 20.5 by VM (reported to LES), and at RM 5 on 10 March 1997 (DH). Presumably the same two birds were seen near RM 6 on 12 January 1998 (JRS, NLB, KME, CTL), at RM 10.6 on 4 January 1999 (LES) and 8 January 1999 (DGS, NLB, CTL), and at RM 12 on 22 January 1999 (reported to LES by RGB). These marked individuals originated in Wyoming, through a cooperative effort to augment the population there (S. Patla pers. comm.). These are the first records of this species from the Grand Canyon region.

WOOD DUCK *Aix sponsa*. We accumulated nine records from the river corridor, seven from the Glen Canyon reach and Marble Canyon, two from RM 180–194. Five sightings were in spring (from 22 April to 8 June), four in fall or early winter (24 September to 30 December). To our knowledge, these are the first records of this species from the river corridor. This species is sparse in fall and winter throughout Arizona, a status reflected in these Grand Canyon region records.

EURASIAN WIGEON *Anas penelope*. An adult male was at RM −1.8L on 13 March 1998 (CEG, BKR). There was one previous report from the river corridor. There are more than 50 records of this rare migrant and winter visitor in Arizona.

MALLARD *Anas platyrhynchos*. The first breeding record of this species in the river corridor was in 1983 (Brown et al. 1987), and the population increased greatly after 1986 (Stevens et al. 1997). At present, Mallards breed commonly from Glen Canyon Dam to the Little Colorado River (RM 61) but apparently not farther downstream. Nests with up to 10 eggs have been found in dense stands of horsetail (*Equisetum* spp.) slightly above the typical high water mark from 15 April through 15 June (LES). The relatively long incubation period and the nests' proximity to the water's edge make this species highly susceptible to inundation as dam operations change.

A probable female Cinnamon Teal (*Anas cyanoptera*) with three young was observed at RM 47.8L on 8 June 1987 (LES, WB). Although this and the Blue-winged Teal (*A. discors*) are common migrants, neither has been recorded previously breeding on the Colorado River in the Grand Canyon region.

GREATER SCAUP *Aythya marila*. Since 1995 up to 30 individuals have been found wintering from Lee's Ferry upstream to RM −7.0 (Glen Canyon N.R.A. files). These are the first records from the river corridor in the Grand Canyon region. Monson and Phillips (1981) reported four records for Arizona based on specimens but noted that the species may be more common in the state. It has since been recognized as a rare but regular winter resident in the LCRV and elsewhere in Arizona (Brown 1985), a status reflected in the Grand Canyon region.

SURF SCOTER *Melanitta perspicillata*. There is one prior record from the Grand Canyon region. We report an additional four: a male at Lee's Ferry from 19

September 1991 to 26 April 1994 (ACP, JDG), a female at Glen Canyon Dam on 22 October 1993 (ACP), two birds at Lee's Ferry on 4 November 1995 (ACP), and one at Lee's Ferry on 26 April 1995 (ACP). This species is a rare but regular migrant and winter visitor throughout Arizona.

WHITE-WINGED SCOTER *Melanitta fusca*. We report five records from the Glen Canyon reach: one at Lee's Ferry from 21 November 1996 to 8 February 1997 (CTL, JRS), four at Lee's Ferry on 10 December 1990, with two there on 31 December 1990 (LES), one at Lee's Ferry on 25 January 1998 (CTL et al.), and one at RM –14.5 on 27 February 1995 (ACP). These observations represent the first records from the river corridor in the Grand Canyon region. This species is a rare migrant and winter visitor in Arizona.

LONG-TAILED DUCK *Clangula hyemalis*. We report eight records: one at Glen Canyon Dam on 30 November 1993 (ACP), one at Lee's Ferry on 10 December 1990 (NCK), an immature at Glen Canyon Dam from 2 January to 2 March 1999 (CTL, RKR, CEG, LLD, JAH), a male near Lee's Ferry from 16 January to 4 March 1992 (ACP, NCK), one on the Glen Canyon reach from 27 January to 9 April 1996 (JEH, JDG, JRS, ACP, BKR), one at RM –9.9 from 27 February to 19 March 1995 (ACP, MKS), one at Lee's Ferry on 19 March 1993 (ACP), and one at Glen Canyon Dam 27–28 March 2000 (CTL, BRB). These represent the first records from the river corridor and indicate that this species is a sparse winter resident in the Glen Canyon reach. This species is rare and irregular in winter in the upper LCRV.

BUFFLEHEAD *Bucephala albeola*. One was seen at Lee's Ferry on 23 June 1995 (JDG), a female was below Glen Canyon Dam on 24 June 1998, and a male was at RM –9.5 on 25 and 26 June 1998 (CTL, NLB). These are the first summer stragglers reported from the Grand Canyon region. A few have also been noted in summer in the LCRV.

COMMON GOLDENEYE *Bucephala clangula*. Brown et al. (1987) did not list this species as occurring in Grand Canyon. Since the late 1980s, however, it has become the most abundant wintering waterfowl along the Colorado River in the Grand Canyon, being observed commonly from Glen Canyon Dam to RM 61 from November through March (Stevens et al. 1997, Spence et al. 1998). The largest single-day count from the Glen Canyon reach was 2380 on 8 January 1998 (JRS, CTL, TMH). Records of nonbreeding birds remaining into summer include nine below Glen Canyon Dam on 3 June 1999 (CTL), single birds at RM –4.6 and RM –9.8 on 23 June 1995 (JDG), one male and two females in the Glen Canyon reach from 19 May to 19 August 1998 (CTL, NLB), and two below Glen Canyon Dam on 16 August 2000 (CTL). This species has increased in the LCRV since 1960.

BARROW'S GOLDENEYE *Bucephala islandica*. Since 1992, this species has been found annually in winter below Glen Canyon Dam (Spence et al. 1998) with up to 80 present in some years. The birds are generally present from late October to early March; however, two lingered until 15 June in 1999 (CTL, LLD). A female observed at RM 66.0 on 11 January 1999 (CTL, BHD) is the only record of this species below Lee's Ferry. Barrow's Goldeneye is a rare but irregular winter visitor below dams in the LCRV.

HOODED MERGANSER *Lophodytes cucullatus*. One to four males were seen at Lee's Ferry from 20 November 1990 to 11 February 1991, and two males were observed there on 7 January 1992 (LES, NCK). From 1992 through 1999, 24 records of 61 individuals were recorded from mid-November through April during waterfowl surveys in the Glen Canyon reach (Glen Canyon N.R.A. files). Brown et al. (1987) listed this species as casual in the region. To our knowledge these are the first records from the river corridor and indicate that this species is an uncommon migrant and winter resident in the Glen Canyon reach, as it is in the LCRV.

RED-BREASTED MERGANSER *Mergus serrator*. Brown et al. (1984, 1987) listed four records from the Grand Canyon region and described the species as casual in the region; however, our observations represent the first records from the Colorado River corridor. Four were seen at RM –6.2 on 13 February 1998 (CTL, CEG). Single males were seen at RM 64.0 on 5 April 1999 and RM 221 on 13 April 1999 (CTL, LLD, JAH, BHD). A mortally wounded female, probably struck by a Peregrine Falcon, was examined at RM 211L on 30 April 1994 (LES). The Red-breasted Merganser is a sparse migrant throughout Arizona and is occasionally a common migrant in LCRV.

OSPREY *Pandion haliaetus*. We report the first winter records from both the Grand Canyon region and northern Arizona. Individuals were observed at Lee's Ferry on 10 December 1990 (NCK) and in January 1991 (KJB), in Glen Canyon at RM –14.0 on 9 January 1998 (JDG) and on 18 January 1997 (JRS).

SHARP-SHINNED HAWK *Accipiter striatus*. We accumulated seventeen winter records from the river corridor in January and February of 1998 and 1999 (CTL, NLB, JRS, LLD, RKR, DGS). These and four other winter records (Brown et al. 1984, Sogge et al. 1998) indicate that this species is an uncommon winter resident of the river corridor, probably exploiting small birds wintering in the dense riparian vegetation that has proliferated since the building of the dam.

COMMON BLACK-HAWK *Buteogallus anthracinus*. We report three records: individuals were seen at RM 60.5 on 10 April 1998 (LES), RM 205.0 on 19 April 2000 (SEO, DS, DT), and Pumpkin Spring (RM 212) on 28 June 1997 (reported to LES by JC). These three stragglers and a few previous records from the Grand Canyon (B. T. Brown pers. comm.) represent the first records in northern Arizona aside from the extreme northwest corner (cf. Monson and Phillips 1981). Additionally, the Black Hawk is a casual transient and recent summer visitor in the LCRV and a summer resident of permanent streams, primarily in central Arizona.

RED-SHOULDERED HAWK *Buteo lineatus*. An immature, likely of the distinctive California race *B. l. elegans*, was seen at Quartermaster Canyon, RM 260.1L, upper Lake Mead, 26–27 February 1998 (CTL, RKR, NLB, CAL). This represents the second record from the Grand Canyon region. This species is a rare transient in Arizona that appears to be nearly annual in its occurrence.

ZONE-TAILED HAWK *Buteo albonotatus*. Listed as casual by Brown et al. (1984), this hawk is now confirmed as a breeding species. Six successful breeding attempts were recorded from 1995 to 1999 on the south rim (Grand Canyon N.P. files, reported to LLD by EFL).

VIRGINIA RAIL *Rallus limicola*. One was seen at RM –8.7L on 2 January 1999 (RKR, CTL), one was seen at RM 52R on 10 January 2000 (JRS), and one was heard at RM 246.0L on 21 January 1998 (CTL, JRS, BHD, NLB, KME). These are the first winter records from the Grand Canyon region, though the species is a common to abundant winter resident in the LCRV.

SORA *Porzana carolina*. One and two were heard calling at RM 246.0L and RM 265.0L, respectively, on 22 January 1998 (CTL, JRS, NLB). Nine and one were seen at RM 260.0L and RM 265.0L, respectively, on 27 February 1998 (CTL, RKR, CAL, NLB). One was observed at RM 259.5R on 4 April 2000 (CTL, LLD). There were two previous records from the Grand Canyon region. The Sora is a common winter resident and transient in the LCRV and a common transient throughout Arizona.

COMMON MOORHEN *Gallinula chloropus*. Three were at RM 260.0L on 22 January 1998 and 27 February 1998 (JRS, NLB, BHD, CTL), two were there on 13 May 1998 (NLB, CTL), one was at RM 255.5R on 3 April 2000 (CTL, LLD), and one was at Lee's Ferry on 22 July 1994 (JDG). There was one previous record from the Grand Canyon region. This species is a fairly common but local permanent resident in LCRV.

SOLITARY SANDPIPER *Tringa solitaria*. One was observed at RM –6.5 on 10 September 1992 (CTL). Although this is only the third record from the river corridor, the species is a fairly common migrant throughout Arizona.

SPOTTED SANDPIPER *Actitis macularia*. Brown et al. (1984) and Sogge et al. (1998) each reported one winter record from the river. We accumulated seven additional winter records from RM 1 to 73, indicating that this species winters in small numbers along the Colorado River. Additionally, three adults with one young were observed at RM –8.0 on 1 July 1998 (CTL, NLB), and one adult and one young were observed at RM 55.5 R in early July 1987 (LES). These represent the third and fourth breeding records from the river corridor.

SANDERLING *Calidris alba*. An immature bird was photographed by John Blaustein at RM 110R on 28 August 1974. This bird was initially identified as a Semipalmated Sandpiper (*Calidris pusilla*) and is the basis for that species' being ascribed to the Grand Canyon (B. T. Brown pers. comm., Brown et al. 1984, 1987, Stevens et al. 1997). A photograph of this individual in *The Hidden Canyon* (Blaustein 1999) is labeled as a Semipalmated Sandpiper, although it is identifiable as an immature Sanderling. Figure 2 is a more diagnostic photograph of the same bird. Sanderling is a sparse migrant through the region, and this photograph documents the only record from the Grand Canyon region.

CASPIAN TERN *Sterna caspia*. We report the first records from the Grand Canyon region. One was seen at RM 171.3 on 9 April 1999 (LLD, JAH, CTL, BHD), another at Pearce Ferry (RM 280) on 13 May 1998 (NLB, CTL). Although a rare to fairly common transient in the LCRV, the Caspian Tern is sparse in northern Arizona.

WHITE-WINGED DOVE *Zenaida asiatica*. We report the first records from the Grand Canyon region. Single birds were seen at Lee's Ferry on 27 April 1982 (GMS),

Figure 2. Sanderling at river mile 110 on 28 August 1974.

Photo by John Blaustein

8 May 1999 (CEG), and 20 May 1992 (JRS). This species is a rare transient in northern Arizona, where records have recently increased (CTL unpubl. data).

INCA DOVE *Columbina inca*. One was at RM 98.0R on 15 October 1993 (JB, CG), two were at Phantom Ranch (RM 87.8R) on 17 October 1998 (NLB), one was at Lonely Dell, near Lee's Ferry, on 24 October 1982 (ARL, CTL), and three were at Lee's Ferry on 2 December 1995 (JDG). There are two previous records from the Grand Canyon region. This species is an occasional transient in northern Arizona.

COMMON GROUND-DOVE *Columbina passerina*. One was observed at Lee's Ferry on 14 October 1991 (SRG). It represents the second record of this species from the Grand Canyon region and northern Arizona.

YELLOW-BILLED CUCKOO *Coccyzus americanus*. One was at RM –14.2 on 6 June 1995, and another (or the same) was at Lee's Ferry on 21 June 1995 (JDG). Brown et al. (1984) reported only one record from the Grand Canyon region since 1950. This species has declined sharply in the western U.S. (Hughes 1999).

GROOVE-BILLED ANI *Crotophaga sulcirostris*. One was at Cardenas Marsh, RM 71.0L, from 10 to 13 October 1993 (photo CG, Figure 3; JB). Another was photographed at the mouth of Salt Trail Canyon in the Little Colorado River gorge 6 miles above the confluence on 21 October 1992 (reported to CTL by PFR). A third was at RM 80.5R on 23 October 1992 (LES). There was one prior record from the Grand Canyon region. This is a casual transient primarily in summer and fall in central and southern Arizona and elsewhere in the Southwest (Mlodinow and Karlson 1999).

FLAMMULATED OWL *Otus flammeolus*. This species is a common summer resident of pine forest on the canyon rims, occurring as late as 25 October (on the South Bass Trail at the top of the Redwall Limestone in 1999, LES). A migrant was mist-netted

Figure 3. Groove-billed Ani at Cardenas Marsh, river mile 71, on 10 October 1993.

Photo by Chris Geanious

at RM 72R in dense riparian vegetation of Goodding willow (*Salix gooddingii*) and tamarisk on 5 May 1975 (LES). This species is occasionally found at lowland sites throughout Arizona, including two prior records from the bottom of Grand Canyon.

LONG-EARED OWL *Asio otus*. An adult with three fledglings and the nest site (on the ground in dense tamarisk) were found at Cardenas Marsh (RM 71.0L) on 6 June 1998 (NLB, TJT, CTL). Although this species was reported calling throughout the night at Cardenas Marsh from 1 to 3 May 1975 (SWC) and sporadically in subsequent years (LES), the 1998 record represents one of the few breeding records from Grand Canyon and the first verified from the Colorado River corridor. The Long-eared Owl breeds sparsely throughout Arizona.

NORTHERN SAW-WHET OWL *Aegolius acadicus*. One was observed at Kwagunt Marsh at RM 55.5R on 20 February 1996 (MJK, JB). Although irregularly present (occasionally in large numbers) on the canyon rims, and casually at lowland sites in the LCRV, this is the first report from the river corridor.

COMMON POORWILL *Phalaenoptilus nuttallii*. One was seen RM 246.0R, upper Lake Mead, on 22 February 1999 (LLD, RKR, CTL). This is the first winter record from the Grand Canyon region; however, whether this bird overwintered (perhaps hibernating) or was an early migrant is unknown. The presence of an overwintering population downstream in the LCRV has yet to be demonstrated.

WHIP-POOR-WILL *Caprimulgus vociferus*. Two birds were heard at Swamp Point on the north rim on 27 June 1999 (reported to LLD by JPD, JVJ, NEP). This is the third record from the Grand Canyon region; the two previous records were from the same location (Brown et al. 1984). This is the northernmost locality for this species in Arizona.

ANNA'S HUMMINGBIRD *Calypte anna*. Single males were seen at RM 196.0R and 198.0R on 16 January 1999, RM 200.5R on 17 January 1999, and RM 207.8L on 12 April 1999 (CTL). These are the first records from the Colorado River corridor and are likely associated with recent population increases and expansion in the LCRV, elsewhere in Arizona (Monson and Phillips 1981, Rosenberg et al. 1991), and in several other western states (DeSante and George 1994).

COSTA'S HUMMINGBIRD *Calypte costae*. Brown et al. (1984) and Sogge et al. (1998) reported this species along the river corridor primarily from RM 140 downstream. A remarkable influx occurred in April and May of 1999. We recorded 60 males throughout the corridor, including 16 from RM 0 to 65 (LLD, JAH, CTL, NLB). Single males were also seen as far upstream as RM –8.4R on 26 April 1999 and RM –10.0L on 27 April 1999 (LLD, CTL). This influx may be related to the severe drought that prevailed in the desert Southwest during the winter. An influx of Costa's Hummingbirds occurred in 1984 (Brown et a1.1987), which was also an exceptionally dry winter in the Southwest. One was observed at RM –6.0 on 10 April 1984 (BTB, KDG).

YELLOW-BELLIED SAPSUCKER *Sphyrapicus varius*. A first-winter individual was at Lee's Ferry from 16 to 30 January 1994 (CTL), and an adult male was at RM 1.0R on 12 February 1999 (RKR, CTL, LLD). These are the first reports of this species from the Grand Canyon region. The Yellow-bellied Sapsucker is a rare winter visitor in the southwestern half of Arizona, including the LCRV.

WILLOW FLYCATCHER *Empidonax traillii*. The decline and virtual disappearance of the breeding population of this species along the river corridor has been documented by Sogge et al. (1997) and Brown (1988). A territorial male was observed at RM –7.0L from 27 May to 15 June 1999 (LLD, CTL, JAH); it is the first to be noted from the Glen Canyon reach (M. Sogge pers. comm.).

HAMMOND'S FLYCATCHER *Empidonax hammondii*. One seen at RM 193.8R on 23 February 1998 (CTL, RKR) represents the first winter record from the Grand Canyon region and northern Arizona. The species is a rare and irregular winter resident in the LCRV.

GRAY FLYCATCHER *Empidonax wrightii*. The first winter record from the Grand Canyon region is of one at RM 207.5L on 21 February 1999 (CTL, RKR). The Gray Flycatcher is a locally uncommon winter resident in the LCRV.

DUSKY FLYCATCHER *Empidonax oberholseri*. One was seen and heard at RM 49.1R on 18 February 1998 (RKR, CTL, NLB, CAL). This represents the first winter record of the Dusky Flycatcher from the Grand Canyon region. The species is a rare and irregular winter resident in the LCRV.

BLACK PHOEBE *Sayornis nigricans*. We report the first winter and breeding records from the Glen Canyon reach. At RM –12.0L, one bird was seen on 2 January 1999 (RKR, CTL) and two were seen on 3 and 30 January 2000 (RKR, LLD, JDG). Another bird was at RM –11.5R on 2 February 1999 (CTL, LLD). A bird was seen at a newly constructed nest at RM –12.0R on 20 April 1999; this nest contained two eggs on 16 June 1999, and a second nest found the same day at RM –13.4L contained four eggs (CTL, JAH). The nest at RM –12.0R contained four eggs on 27 April 2000 (CTL). A family group was seen at the base of Glen Canyon Dam on 7 July 1997 (CTL, DGS, BKR). This species has expanded its range in Arizona, particularly in the LCRV, and our records suggest this expansion includes the Grand Canyon region.

EASTERN PHOEBE *Sayornis phoebe*. We report the first records of this species from the Grand Canyon region. Individuals were observed at RM 1.0R and 1.8R on 1 April 1999 (CTL, JAH, KGM, BHD, MC, LLD) and at RM 155.2 on 8 April 1999 (CTL, JAH, LLD, BHD). The Eastern Phoebe is an uncommon migrant/winter resident in much of Arizona, but its status in northern Arizona is unclear.

VERMILION FLYCATCHER *Pyrocephalus rubinus*. A male was at Lonely Dell, Lee's Ferry, from 25 May to 4 June 1997 (LSB, CEG). This is the sixth record from the river corridor. Although a common summer resident in southern Arizona, this species is a sparse transient in northern Arizona.

BROWN-CRESTED FLYCATCHER *Myiarchus tyrannulus*. Brown et al. (1984, 1987) speculated on this species' occurrence in Grand Canyon. Sogge et al. (1998) confirmed its restricted range in the immediate area of RM 198, and LES observed one to two pairs in the cottonwoods at Supai Campground in Havasu Canyon periodically during the 1980s and 1990s. From 1997 to 1999 we recorded 12 observations (a maximum of 18 individuals) from RM 194 to 204 (CTL, LLD, NLB, JAH, TJT). Remarkably, one was observed at RM 5.2R on 30 May 1999 (reported to LLD by TJT, LA, KB). Our records suggest this species is continuing its expansion into the Grand Canyon region, as noted in the LCRV (Rosenberg et al. 1991) and elsewhere in the Southwest (Johnson 1994).

EASTERN KINGBIRD *Tyrannus tyrannus*. One was observed at Lee's Ferry on 14 July 1994 (JDG). This is the fourth record from the river corridor of this rare annual migrant in Arizona.

SCISSOR-TAILED FLYCATCHER *Tyrannus forficatus*. We report the first record of this species from the Grand Canyon region: one at RM 74R on 14 June 1996 (reported to LES by SH, JC). A different (or the same) bird was reported at Thunder River ten days later (reported to LES by TF). This species is a recurring summer visitor (over 45 records) in Arizona.

NORTHERN SHRIKE *Lanius excubitor*. There was one previous record from the river corridor. We report four additional records: an adult at RM 5.8R on 17 December 1999 (CTL, CAB), and at Lee's Ferry an adult on 1 January 1998 (JRS),

an immature on 15 January 1997 (CTL), and an adult found dead on 1 February 2000 (CAB; specimen to Univ. of Ariz.). This species is a regular and uncommon winter resident in northern Arizona.

BELL'S VIREO *Vireo bellii*. Both Brown et al. (1984) and Sogge et al. (1998) reported this species as a breeding resident as far upstream as RM 50, with occasional vagrants as far as Lee's Ferry. We report three records above Lee's Ferry: two at RM –8.8L on 2 June 1993 (JRS), two at RM –8.3 on 6 June 1995 (JDG), and one at RM –2.3L on 7 July 1997 (CTL, NLB). The presence of two birds each in June of 1993 and 1995 in Glen Canyon may indicate breeding. Our records suggest that the range expansion in the Grand Canyon region documented by Brown et al. (1983) is continuing.

CASSIN'S VIREO *Vireo cassinii*. One was seen at RM 193.8R on 10 April 1999 (CTL, LLD, JAH) and at RM 198.0R on 11 April 1999 (CTL). These records are nearly a month earlier than the known spring passage in northern Arizona (Phillips et al. 1964) and may represent individuals that wintered locally. This species is known to winter in the LCRV and is a common migrant throughout Arizona.

HUTTON'S VIREO *Vireo huttoni*. We report the first record of this species from the Grand Canyon region and the northernmost record from Arizona. One was heard singing and later observed at RM 204.1R on 21 February 1999 (CTL, LLD, RKR). Hutton's Vireo is a common summer and uncommon winter resident in central and southeastern Arizona and a casual transient and winter visitor to the LCRV.

RED-EYED VIREO *Vireo olivaceus*. One was observed at Lonely Dell, Lee's Ferry, on 23 September 1998 (CTL, NLB). There were six previous records from the Grand Canyon region. This species is a sparse transient throughout Arizona, but reports have declined in recent years.

BLUE JAY *Cyanocitta cristata*. One was observed at RM 175.8 on 7 May 1998 (CTL, PW, photo NLB). This represents the first record of this species from the Grand Canyon region and the sixth report from Arizona (Rosenberg and Witzeman 1999).

TREE SWALLOW *Tachycineta bicolor*. One was seen at RM 204.0 on 24 February 1998, and two were seen at RM 223.0 on 25 February 1998 (CTL, RKR, CAL). These represent the earliest spring records from the Grand Canyon region and were probably early spring arrivals.

NORTHERN ROUGH-WINGED SWALLOW *Stelgidopteryx serripennis*. One was at RM 208.7 on 21 February 1999 (AMD, CTL, LLD), and six were between RM 260.2 and Pearce Ferry on 26 and 27 February 1998 (CAL, RKR, NLB). These represent the earliest records from the Grand Canyon region and were probably early spring migrants. Additionally, one was seen at Lee's Ferry on 16 January 2000 (CAB) during a period of unusually mild weather. Breeding by this species on upper Lake Mead was recorded by Brown et al. (1993) and R. McKernan (pers. comm.). We report nests farther upstream than has previously been noted. At RM 196.0, a nest was observed 10 May 1999 (NLB, BHD), and adults with fledglings were observed on 10 June 1998 (NLB, PW).

CACTUS WREN *Campylorhynchus brunneicapillus*. This species is a rare to uncommon permanent resident in the upper Lake Mead area (Brown et al. 1984) and the middle reaches of Peach Springs Wash (LES). A nest containing three eggs was found at RM 207.5L on 12 April 1999 (CTL). To our knowledge, this is the farthest upstream Cactus Wren breeding has been reported.

HOUSE WREN *Troglodytes aedon*. We report the first seven known winter records from the Grand Canyon region: one each at RM 203.0L, 204.3R, and 209.0L on 17 January 1999 (CTL, NLB, RKR), Spencer Canyon, RM 246.0L, on

18 January 1999 and 26 February 1998 (CTL, NLB, RKR), and RM 209.0L on 20 January 1998 (JRS, CTL) and 21 February 1999 (LLD, RKR). This species is a fairly common winter resident in the LCRV but is sparse in winter in northern Arizona.

WINTER WREN *Troglodytes troglodytes*. Both Brown et al. (1984) and Sogge et al. (1998) considered this species to be a rare transient and winter visitor in riparian vegetation of the Colorado River and its lower tributaries. Our series of records indicates that it may be more common. We recorded 21 observations of 26 individuals from the length of the river corridor in 1998 and 1999. These records extend the known period of occurrence in the Grand Canyon region from 16 October 1999 (at Indian Gardens; CTL) to 1 April 1999 (at RM 5.8R; JAH). The Winter Wren is a rare winter resident throughout riparian areas in central and southern Arizona.

BLUE-GRAY GNATCATCHER *Polioptila caerulea*. There was one previous winter record from the river corridor, and we add two more. Three were at Lee's Ferry on 5 December 1995 (JDG), three at RM –11.0R on 30 January 2000 (JDG). This species is common in southern Arizona in winter but sparse in the northern portions.

HERMIT THRUSH *Catharus guttatus*. There were three previous winter records (Brown et al. 1984, Sogge et al. 1998). From 1998 to 2000, we accumulated 12 winter records extending from RM –7.0 to 265.0, with the majority below RM 200. These records establish that this species is an uncommon winter resident in riparian vegetation along the river corridor, primarily in the lower western portions of the Grand Canyon. The Hermit Thrush is a common winter resident in riparian areas in central and southern Arizona and the LCRV.

NORTHERN MOCKINGBIRD *Mimus polyglottos*. At "Dox Seep" at RM 70L on 1 June 1995, an adult Blue-gray Gnatcatcher was observed landing on the head of a fledgling Northern Mockingbird and unsuccessfully attempting to place a geometrid moth larva in the panting mockingbird's bright yellow mouth (LES). This was the first evidence of nesting mockingbirds known to us in the river corridor in the Grand Canyon, although singing males are heard here sporadically.

SAGE THRASHER *Oreoscoptes montanus*. One was observed at RM 196.0R on 20 February 1999 (CTL, LLD). This is the third record from the Colorado River in the Grand Canyon region and likely represents an early spring migrant. This species is a migrant and sparse summer resident on adjacent arid plateaus.

CRISSAL THRASHER *Toxostoma crissale*. The status and distribution of this species in northern Arizona are poorly known (Phillips et al. 1964, Brown et al. 1984), but recent field work is clarifying its distribution in the region. Brown et al. (1984) speculated that it is a locally rare resident in the western Grand Canyon and noted only two records from the Colorado River. Sogge et al. (1998) reported four additional records from the Colorado River from RM 173.8 to 204.5R during winter and spring surveys. We add five records: one each at RM 246.0R on 22 January (CTL, JRS) and 26 February 1998 (RKR, CAL), seven at RM 265.0L on 27 February 1998 (CTL, RKR, CAL), and one at RM 45.5R on 2 April 1998 (NLB, CTL). Last, one remained at Lonely Dell, Lee's Ferry, from 30 November 1999 to 9 February 2000 (CAB, CTL). The Arizona breeding-bird atlas project documented breeding across north-central and northwestern Arizona from the Echo Cliffs west (T. Corman pers. comm.), and there are several winter records from the western Navajo Nation (CTL unpubl. data). It may be concluded that this species is a sparse permanent resident throughout much of northwestern Arizona. In the Grand Canyon region, it is found primarily on plateaus in open sage desert and juniper woodlands, and along the Colorado River from RM 175 downstream to Grand Wash Cliffs (RM 280).

EUROPEAN STARLING *Sturnus vulgaris*. Although nonnative starlings are widespread throughout the United States, their distribution and ecological role in

Grand Canyon are poorly known. Although single birds are occasionally seen during summer, a flock of 50 birds was seen for a full day at Granite Park (RM 209L) on 13 November 1993 (LES). This record corresponds to a marked period of migratory passage in northeastern Arizona (CTL unpubl. data).

BOHEMIAN WAXWING *Bombycilla garrulus*. One was observed at Lonely Dell, Lee's Ferry, on 20 May 1992 (JRS). This represents the third record from the Grand Canyon region and is perhaps the latest in spring that this species has been reported from Arizona (cf. Phillips et al. 1964). The Bohemian Waxwing is a sparse and erratic winter visitor to northern Arizona.

ORANGE-CROWNED WARBLER *Vermivora celata*. There were no winter records prior to our observations. From 1998 to 2000, we accumulated 23 winter records from RM –10 to 265. Although these records extend the length of the river corridor, the majority are from the lower western end. These records establish that this species is an uncommon winter resident in riparian vegetation along the Colorado River in the Grand Canyon region, perhaps becoming so only since completion of Glen Canyon Dam. Furthermore, it is a common winter resident along the LCRV.

NORTHERN PARULA *Parula americana*. We report the first record of this species from the Grand Canyon region. An immature male was at Lee's Ferry from 19 November to 29 December 1999 (CTL, CEG). The Parula is a rare but regular migrant and winter resident in the LCRV and throughout Arizona, with reports increasing in recent years.

PRAIRIE WARBLER *Dendroica discolor*. We report the first record of this species from the Grand Canyon region. An adult male was seen at Spencer Canyon, RM 246.0L, on 22 January and 26 February 1998 (JRS, CTL, KME, CAL, RKR). This species is casual in Arizona.

AMERICAN REDSTART *Setophaga ruticilla*. We report three records: a male at RM 131.6L on 13 May 2000 (LLD, BTM, LKM), one at Lonely Dell, Lee's Ferry, on 3 June 1986 (CTL), and one at RM 11.3R on 13 October 2000 (JDG). There were four previous records, two from the river corridor, one in spring, one in fall, and two fall records from the rim. This is a sparse but regular transient throughout Arizona.

PROTHONOTARY WARBLER *Protonotaria citrea*. We report the first record of this species from the Grand Canyon region. One was observed at RM –14.3R on 26 May 1994 (JDG). This species is a sparse transient throughout Arizona.

COMMON YELLOWTHROAT *Geothlypis trichas*. We report the first winter record of this species from the Grand Canyon region. An adult male was at RM 50.0L on 10 January and 14 February 1999 (CTL, RKR, PGF). The species is a fairly common winter resident in the LCRV.

PAINTED REDSTART *Myioborus pictus*. Brown et al. (1984) reported three previous records from the Grand Canyon region. We report one at RM 31.5R on 4 April 1999 (reported to CTL by CBN, BJB, TD). These are the only reports of this species from northern Arizona. Our record corresponds to the unusual occurrence of this species at nearly 20 lowland sites in Arizona in the spring of 1999 (Rosenberg and Benesh 1999).

SUMMER TANAGER *Piranga rubra*. This species has recently colonized and become a rare summer resident in lowland riparian areas in the Grand Canyon (Brown et al. 1984). Sogge et al. (1998) reported singing males as far upstream as RM 46.7 but no evidence of nesting. We accumulated four sightings that seem to indicate that this expansion is continuing upstream into the Glen Canyon reach: a subadult male at RM –13.4L on 22 May 1998 (CTL), a subadult male at RM –3.0R on 25 May 1999 (CTL, LLD), one at RM –6.1R on 21 June 1995 (JDG), and an adult male at RM –8.6R on 21 July 1993 (JRS). Although this species has recently

increased in the Grand Canyon region, it has decreased dramatically in the LCRV.

CHIPPING SPARROW *Spizella passerina*. We report four winter records: two at RM 209.0L on 21 January 1998 (JRS, CTL), two on 25 February 1998 (NLB, RKR), and one there on 18 January 1999 (CTL, NLB), and two at RM 196.0R on 23 February 1998 (RKR, CTL). There were two previous winter records from the river corridor. The species is rare in northern Arizona in winter.

CLAY-COLORED SPARROW *Spizella pallida*. We report the first record of this species from the Grand Canyon region. One was observed at RM 1.0R (Paria Beach) on 2 May 1995 (JDG).

BREWER'S SPARROW *Spizella breweri*. We report the first winter records of this species from the Grand Canyon region. One was at RM 5.2R on 12 January 1998 (CTL, NLB), 25 were at RM –3.0R on 13 February 1998 (CTL, CEG), and two were at RM 56.1R on 19 February 1998 (RKR, CAL, NLB). This species is generally sparse in winter in northern Arizona, and our records may be a result of favorable weather and/or food conditions.

BLACK-THROATED SPARROW *Amphispiza bilineata*. This species is known as a common summer resident in desert habitats throughout northern Arizona with rather abrupt arrival and departure from the region in mid-March and early September (Phillips et al. 1964). Although it is not known as a winter resident in this area (Brown et al. 1984, Sogge et al. 1998), we accumulated 11 records of more than 20 individuals from desert scrub adjacent to the Colorado River from October through February. From these records, it is apparent that this species winters in small numbers in the lowlands along the Colorado River in the Grand Canyon region.

GRASSHOPPER SPARROW *Ammodramus savannarum*. One was seen at RM 1.0R on 27 and 31 October 1996 (CTL). This observation is the first report from the river corridor and the third from the Grand Canyon region. This species is a sparse migrant in northern Arizona (CTL unpubl. data) and more common elsewhere in the state.

FOX SPARROW *Passerella iliaca*. "Slate-colored" individuals were observed at Lee's Ferry on 27 October 1996 (CTL), RM –7.0L on 3 February 2000 (CTL, JRS), RM –8.8L on 18 March 1996 (JRS), and Spring Canyon (RM 204.4R) on 11 April 1999 (CTL, JAH). There were two previous records from the river corridor. This species is a rare transient and winter resident throughout Arizona.

LINCOLN'S SPARROW *Melospiza lincolnii*. Both Brown et al. (1987) and Sogge et al. (1998) speculated that this species may winter in the Grand Canyon region. During winter survey trips along the Colorado River in January and February, we recorded 60 in 1998 and 16 in 1999 (CTL, JRS, NLB, RKR, LLD). These records indicate that this species winters in the riparian vegetation along the Colorado River in the Grand Canyon region with high year-to-year variability. It is common in winter in southern Arizona.

SWAMP SPARROW *Melospiza georgiana*. The two previous records were of one in October (Brown et al. 1984) and one in April (Sogge et al. 1998). We report six records, the first winter records from the Grand Canyon region. Individuals were observed at RM –8.7L on 4 February 2000 (CTL), RM 1.6R on 17 February 1998 (CTL, RKR) and 30 November 1999–23 February 2000 (CTL), Phantom Ranch (RM 87.8R) on 20 February 1998 (RKR), RM 204.3R on 24 February 1998 (RKR), and RM 209.0R on 25 February 1998 (RKR, NLB). This species is a rare winter resident in northern Arizona.

WHITE-THROATED SPARROW *Zonotrichia albicollis*. We report seven records. Individuals were observed at RM –14.3R on 29 October 1998 (CTL), at Lee's Ferry

from 5 December 1994 to 7 March 1995 (JDG) and on 5 December 1995 (JDG, CTL), at RM 87.8R on 15 January 1998 (JRS), and at RM –0.5L on 27 March 2000 (CTL). There were four previous records from the Grand Canyon region, two from the Colorado River corridor. The White-throated Sparrow is an uncommon winter resident throughout Arizona but is considered rare in the LCRV.

GOLDEN-CROWNED SPARROW *Zonotrichia atricapilla*. Individuals were observed at RM –8.8R on 8 January 1998 (CTL, JRS), upper Deer Creek on 13 January 1999 (CTL), RM 136.3R on 2 April 1997 (CTL, JRS, AF), and RM 53.0R on 5 April 1999 (CTL, JAH). There were four previous records from the Grand Canyon region. This species is an uncommon winter visitor throughout Arizona, although less numerous in the northern portions.

BOBOLINK *Dolichonyx oryzivorus*. The first record of this species from the Grand Canyon region is of one at Lonely Dell, Lee's Ferry, on 15 September 1994 (JDG). The Bobolink is a sparse, primarily fall, migrant throughout Arizona.

COMMON GRACKLE *Quiscalus quiscula*. We report the first records of this species from the Grand Canyon region. One was observed with a female Great-tailed Grackle (*Q. mexicanus*) at RM 198.0R on 9 and 10 June 1997 (CTL, NLB, MDY), another was in the Lee's Ferry area from 28 May to 31 July 1997 (CTL, CEG, DGS), with two present there on 29 and 31 July 1997 (CTL, CEG, DGS), and another was at RM 217.8 on 16 November 1993 (LES). This species is a recent sparse transient to Arizona (LaRue and Ellis 1992).

STREAK-BACKED ORIOLE *Icterus pustulatus*. One was seen and heard at Spencer Canyon, RM 246.0L, upper Lake Mead, on 22 January 1998 (JRS, CTL, NLB, KME). This represents the first record of this Mexican oriole from the Grand Canyon region. This species is known for its rare breeding (Corman and Monson 1995) and rare but regular winter northward dispersal from Mexico into southern Arizona (Monson and Phillips 1981, Rosenberg and Witzeman 1999). This is the northernmost occurrence in Arizona.

RED CROSSBILL *Loxia curvirostra*. One was seen at RM 51.5L on 13 January 1998 (CTL, JRS). There were no previous records from the river corridor. This species is a rare irregular transient at lowland sites throughout Arizona.

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OCCURRENCE PATTERNS OF PEREGRINE FALCONS ON SOUTHEAST FARALLON ISLAND, CALIFORNIA, BY SUBSPECIES, AGE, AND SEX

SASHA EARNHEART-GOLD and PETER PYLE, Point Reyes Bird Observatory, 4990 Shoreline Hwy., Stinson Beach, California 94970

ABSTRACT: We summarize observations of 201 Peregrine Falcons (*Falco peregrinus*) at Southeast Farallon Island during the fall and winter from 1990 to 1999 by age, sex, and subspecies. The northwestern subspecies *F. p. pealei* and the continental subspecies *F. p. anatum* occurred with roughly equal frequency. We recorded 10 individuals of the arctic subspecies *F. p. tundrius*. During fall, adults occurred significantly earlier than immatures. Males tended to occur earlier than females; *anatum* tended to occur earlier than *pealei*. Four to six birds per year (of both *anatum* and *pealei*) remained through the winter. Under the assumption that wintering individuals returned each year to the maximum extent possible allowed by the observed variation by age, sex, and subspecies, their survival rate was 0.78.

Although the Peregrine Falcon (*Falco peregrinus*) was recently removed from the federal endangered-species list (*Federal Register* 64 FR 46541 46558), there is still much interest in this species (e.g., Ratcliffe 1980, Cade et al. 1988). On Southeast Farallon Island, 42 km off San Francisco, California, numbers of Peregrines increased significantly during fall migration from 1974 to 1993 (Pyle and DeSante 1994); the negative (but nonsignificant) curvilinear relationship found in that analysis suggested that the increase was leveling off by the early 1990s. This species has also become a regular winter resident at Southeast Farallon (Pyle and Henderson 1991).

Currently, there are about 19 recognized subspecies of the Peregrine Falcon in the world (White and Boyce 1988). The AOU (1957) listed two subspecies in California, *P. f. anatum*, which breeds and winters throughout the state, and *P. f. pealei*, which is reported to winter "rarely to California." Grinnell and Miller (1944) listed three specimens of *pealei* from California, as far south as San Diego County (Swarth 1933), but Beebe (1960) seemed to question most reports of this subspecies south of Washington, and Hunt et al. (1975) believed few if any Peregrines migrate down the Pacific coast. Anderson et al. (1988) listed two records of *pealei* banded as nestlings in British Columbia and recovered in San Diego and Santa Cruz; they suggested on the basis of sight reports that it is a regular visitor to Southeast Farallon and elsewhere in California.

A third subspecies, *P. f. tundrius*, breeding in arctic North America, was described by White (1968). He suggested that it is a rare or uncommon migrant along the west coast of North America and listed one specimen (of 213 *tundrius* examined) from California (March, Del Ray, Fresno County) and four specimens from Baja California (March and April). Anderson et al. (1988) listed a second California specimen of a banded *tundrius* recovered on San Miguel Island, and Hamilton and Willick (1996) listed two records of banded birds from Orange County. Otherwise, little has been published about the occurrence of *pealei* and *tundrius* in California.

During the past ten years Point Reyes Bird Observatory biologists have made an effort to identify Peregrines on Southeast Farallon Island by

subspecies, age, and sex. Here we summarize our findings from 1990 to 1999 for both fall and winter, when a majority of migrant and resident individuals were recorded. Arrivals from spring and summer are excluded because sample sizes are much smaller (Pyle and Henderson 1991) and critical subspecies, age, and sex determinations were not recorded.

METHODS

The standardized daily census for migrant and wintering birds on Southeast Farallon, uninterrupted since 1968, has been described by DeSante and Ainley (1980) and Pyle and Henderson (1991). Birds censused each day during the fall/winter period (15 July–1 March) were identified as arrivals if banding data and/or plumage observation, coupled with data from previous days, suggested that they had arrived at the island that day. Between 1990 and 1999 the size, shape, and plumage of most arriving and winter resident Peregrine Falcons were examined critically for subspecies, age, and sex. We defined as winter residents those remaining for at least 21 days between 15 December and 1 March.

All subspecific, age, and sex determinations of Peregrines were made either by Pyle (78.6% of 126 identifications) or long-term interns (including Earnheart-Gold) that had been trained for this by Pyle. Plumage criteria used in these determinations included those presented by Brooks (1926), Beebe (1960), Brown and Amadon (1968), White (1968), and White and Boyce (1988), supplemented by examination of specimens at the California Academy of Sciences (CAS), San Francisco, and Museum of Vertebrate Zoology (MVZ), Berkeley. Determinations were usually made in the order age, subspecies, sex. During most (91.2%) determinations there were one to five other Peregrines at Southeast Farallon on the same day, often interacting with each other, allowing direct comparisons of size and plumage. Peregrines for which determinations were not made were not observed adequately or were difficult to categorize by known criteria. There is much variation within each subspecies, leading to overlap in size and/or plumage, especially between *anatum* and each of the other two subspecies. Because of this intrasubspecific variation we identified only typical examples and left many birds unidentified to subspecies. The following criteria were used to identify subspecies:

F. p. anatum: Medium sized; stocky build. Adults with medium-dark gray upperparts, contrastingly black hood extending to the bill, and buffy- or rosy-tinged underparts with medium-heavy spotting. Immatures medium brownish, sometimes tinged rufous, with little or no buffy in the crown, a medium-thick malar stripe, and a thin buffy terminal band on the tail.

F. p. pealei: Large; medium-stocky build. Adults with medium-dark grayish upperparts blending to a slightly darker crown and hood, often interrupted by a white band at the base of the bill, and whitish underparts with heavy barring throughout the breast and belly. Immatures dark gray to blackish without buffy in the crown, a thick malar stripe, and a thin or no buffy terminal band on the tail.

F. p. tundrius: Medium-small; slender and long-winged in build. Adults with medium-pale grayish to bluish upperparts contrasting somewhat with a blackish crown and hood, interrupted by a white band at the base of the bill, and white

underparts with light barring on the belly but little or no barring on the upper breast. Immatures brownish with extensive buffy in the crown and nape, a reduced malar stripe, and an extensive buffy terminal band on the tail.

We used simple and multiple linear regression and analysis of variance (ANOVA) to help describe the occurrence patterns and look for significant variation in these patterns among subspecies, ages, and sexes.

RESULTS

We counted 201 Peregrine Falcons during fall and winter, 1990–1999 (Table 1); 126 birds identified to subspecies included 56 of *anatum*, 57 of *pealei*, and 10 of *tundrius*. Of 87 birds that were sexed, 47 were females and 40 were males, and of 121 birds that were aged, 50 were adults and 71 were immatures. There was no significant linear trend in number of arrivals during the 10-year period taken as a whole (Figure 1; linear regression; $t = 0.363$, $P = 0.719$). Evidently, however, fewer Peregrines arrived immediately after El Niño years (1992 and 1997–1998), followed by gradual increases in arrivals until the next El Niño (Figure 1). For example, the positive linear trend in arrivals between 1993 and 1998 was significant ($t = 7.86$, $P = 0.001$). The 10-year trend for identified *anatum* was slightly and nonsignificantly positive ($t = 0.147$, $P = 0.887$), and that for identified *pealei* was positive and nearly significant ($t = 2.193$, $P = 0.060$). It should be noted that biases related to the 75 Peregrines (37.3%) not identified to subspecies could affect these analyses.

All ten individuals of *tundrius* noted during the study period were observed and identified by Pyle. They were recorded in only five of the ten

Table 1 Arrival Dates of Peregrine Falcons on Southeast Farallon Island during Fall and Winter (15 July–1 March), 1990–1999

Subspecies/Age/Sex	*n*	Mean	Minimum	Maximum
Total	201	14 Oct	22 Jul	31 Dec
F. p. anatum	56	14 Oct	6 Aug	1 Dec
Male	18	30 Sep	6 Aug	23 Nov
Female	18	22 Oct	13 Aug	27 Nov
Adult	26	3 Oct	6 Aug	1 Dec
Immature	28	24 Oct	13 Aug	27 Nov
F. p. pealei	57	20 Oct	26 Aug	3 Dec
Male	18	24 Oct	7 Sep	24 Nov
Female	26	20 Oct	26 Aug	3 Dec
Adult	22	13 Oct	13 Sep	13 Nov
Immature	34	26 Oct	7 Sep	3 Dec
F. p. tundrius	10	19 Oct	2 Oct	17 Nov
Male	3	11 Oct	7 Oct	14 Oct
Female	3	14 Oct	7 Oct	22 Oct
Adult	2	11 Oct	7 Oct	14 Oct
Immature	8	21 Oct	2 Oct	17 Nov

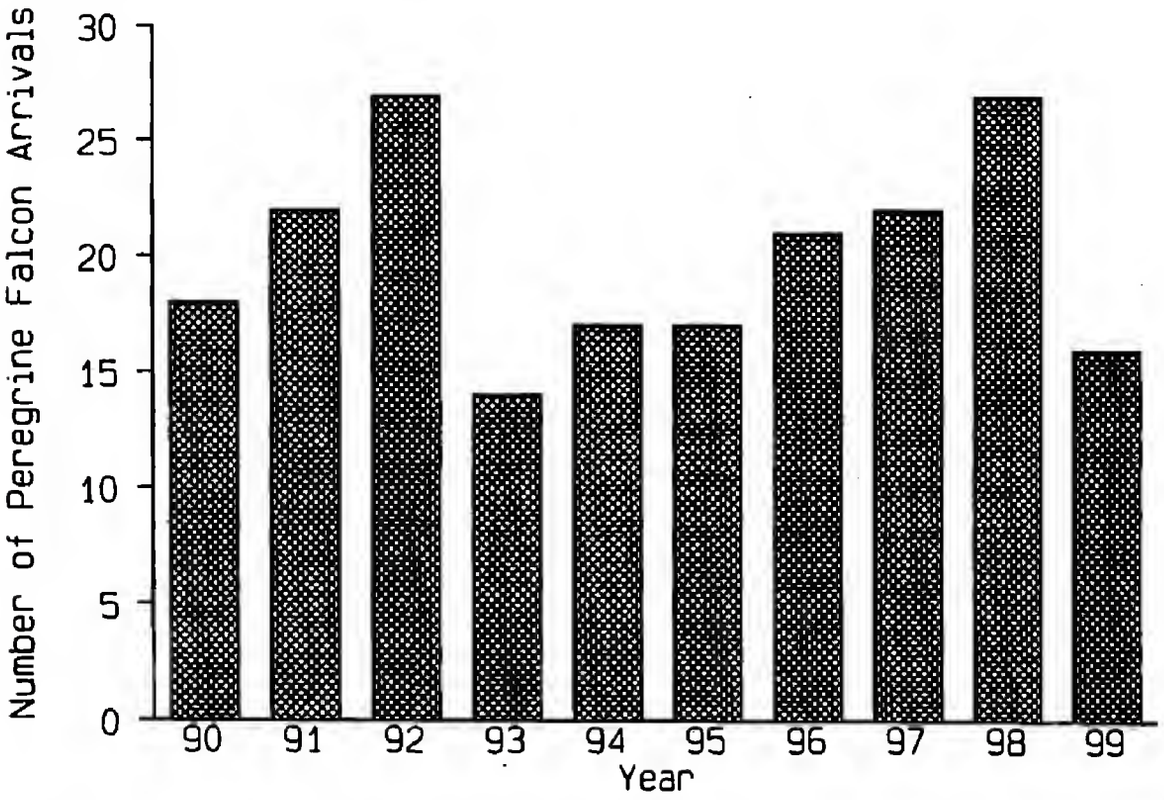

Figure 1. Numbers of Peregrine Falcon arriving (see text) on Southeast Farallon Island, by year, 1990–1999.

years, 1992 (two birds), 1993 (one), 1994 (one), 1995 (two), and 1997 (four), despite a similar amount of observation effort each year. Both adults (see Table 1) were males, recorded on single days in 1997. Seven of the ten birds were recorded between 7 and 22 October. There are also at least six records of this subspecies (all immatures) observed and described or photographed (e.g., Figure 2) by Pyle or other biologists between 26 September and 6 November, 1981–1988. All birds identified as *tundrius* fit the description above, and most were seen in direct comparison with other Peregrines.

Examination of mean arrival dates (Table 1) reveals several patterns according to subspecies, age, and sex. In all three subspecies identified males apparently tended to arrive before females, but this pattern was not signifcant for the species as a whole ($F_{(1,99)} = 1.50$, $P = 0.299$; $F_{(3,83)} = 1.62$, $P = 0.207$, adjusting for subspecies) or for *pealei* ($F_{(1,42)} = 0.38$, $P = 0.543$). It was almost significant for *anatum* ($F_{(1,34)} = 3.98$, $P = 0.054$). In all three subspecies identified adults arrived before immatures, and this pattern was significant for the species as a whole ($F_{(1,154)} = 11.32$, $P = 0.001$; $F_{(3,118)} = 15.14$, $P < 0.001$, adjusting for subspecies), for *anatum* ($F_{(1,52)} = 6.87$, $P = 0.012$), and for *pealei* ($F_{(1,54)} = 7.32$, $P = 0.009$). The mean arrival date of *anatum* was not significantly earlier than that of *pealei* ($F_{(1,111)} = 1.29$, $P = 0.259$) when all age/sex groups were combined. When the ages and sexes were separated, this comparison was significant for males ($F_{(1,34)} = 6.53$, $P = 0.015$) but not for females, immatures, or adults ($F < 1.72$, $P > 0.197$). As in analyses of subspecies, it should be noted that biases among birds not identified to age ($n = 80$; 39.8% of the sample) or sex ($n = 114$; 56.7% of

Figure 2. Immature Peregrine Falcon of the tundra subspecies *F. p. tundrius*, Southeast Farallon Island, 6 November 1987.

Photo by Scot Anderson

the sample) might affect these results. The sample of *tundrius* was too small for these analyses to be meaningful.

The winter resident population consisted of four to six individuals, up to three of *anatum* and three of *pealei* of various ages and sexes (Table 2). Under the (perhaps tenuous) assumption that winter residents return in consecutive years, the table implies a minimum of 13 wintering individuals

Table 2 Winter Resident Peregrine Falcons on Southeast Farallon Island, 1990–1999

Year	Summary by subspecies/age/sex
1990–91	Four adults; subspecies unknown
1991–92	*anatum*: 2 adults, 1 immature; *pealei*: 2 adults
1992–93	*anatum*: 2 adults; *pealei*: 1 adult ♂, 1 adult ♀
1993–94	*anatum*: 1 adult ♂, 1 adult ♀; *pealei*: 1 adult ♂, 1 adult ♀
1994–95	*anatum*: 1 adult ♂, 1 immature ♂; *pealei*: 1 adult ♂, 2 immature ♀
1995–96	*anatum*: 1 adult ♂, 1 adult ♀, 1 immature ♀; *pealei*: 1 adult ♂, 1 adult ♀, 1 immature ♀
1996–97	*anatum*: 1 adult ♂, 1 adult ♀; *pealei*: 1 adult ♀, 1 immature
1997–98	*anatum*: 1 adult ♂, 1 adult ♀; *pealei*: 1 adult ♂, 1 adult ♀
1998–99	*anatum*: 1 adult ♂, 1 immature ♂, 1 immature ♀; *pealei*: 1 adult ♂, 1 immature
1999–00	*anatum*: 1 adult ♂, 1 adult ♀; *pealei*: 1 adult ♀, 1 immature ♂, 1 immature ♀

over the 10-year period, five of *anatum* (two males and three females) and eight of *pealei* (three males and five females). If returning winter resident adults of the same sex represented the same individuals, six adults (two of *anatum* and four of *pealei*) disappeared and 21 adults returned for an annual adult survival rate of 0.78 (0.86 for *anatum* and 0.69 for *pealei*) over the 10-year period.

DISCUSSION

Our finding no linear trend in Peregrine numbers between 1990 and 1999 suggests that populations have stabilized since recovery from their pesticide-related reductions from the 1950s to the 1970s and that our proportions may represent historical distributions in population size and range. It is also possible, however, that distributions have shifted since the population bottlenecks of the 1950s–1970s, especially if seabird populations or other prey resources have changed. Our data further suggest that mortality of Peregrines is higher and/or fall and winter populations shift during El Niño periods (e.g., 1992 and 1997–1998), perhaps in response to reduced abundance of seabird prey off central California during these events (Ainley and Boekelheide 1990).

The regularity of *pealei* in California (similar in abundance to *anatum* at Southeast Farallon) has not been previously appreciated in the literature (e.g., AOU 1957, Beebe 1960, Hunt et al. 1975), although suspected by Anderson et al. (1988) and confirmed by museum specimen examination (C. White pers. comm.) and unpublished data collected by the Santa Cruz Predatory Bird Research Group (B. Walton pers. comm.). It is possible that the abundant alcid populations at Southeast Farallon (Ainley and Boekelheide 1990) provide a food resource for *pealei*, an alcid specialist where it breeds (Beebe 1960). Because the colony at Southeast Farallon represents the southernmost point of such alcid abundance (Carter et al. 1992), the island may represent the southern limit of the regular winter range of *pealei*. Individuals of *pealei*, though, winter or wander as far south as San Diego and even Baja California but are greatly outnumbered by *anatum* south of Southeast Farallon (B. Walton pers. comm.).

Our data suggest that *tundrius* is an uncommon but regular transient down the California coast from late September through mid November, as proposed by White (1968) and Anderson et al. (1988) and confirmed with unpublished data from the Santa Cruz Predatory Bird Research Group (B. Walton pers. comm.). It is possible that these birds winter in Baja California (White 1968), although residents of *anatum* of that region, particularly immatures, may resemble *tundrius* in size and plumage more closely than those of California-breeding populations (C. White, M. A. Patten, pers. comm.; Pyle, specimen examination at CAS and MVZ). We suggest that the identification of the four specimens of *tundrius* from Baja California listed by White (1968) be reconfirmed.

Our data on arrival patterns of *anatum* and *pealei* by age and sex are consistent with patterns widely known in birds: smaller males depart nesting grounds for winter areas slightly before larger females, and adults migrate and arrive on winter grounds well before immatures. The more local and

southern *anatum* arriving before the more northern *pealei*, especially among males, is also to be expected (Anderson et al. 1988).

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NOTES

LOW-ELEVATION NESTING BY CALLIOPE HUMMINGBIRDS IN THE WESTERN SIERRA NEVADA FOOTHILLS

BRIAN D. C. WILLIAMS, 8200 Turner Dr., Granite Bay, California 95746

The Calliope Hummingbird breeds uncommonly to fairly commonly in the Sierra Nevada and other high mountain ranges in California. In the Sierra it typically nests above 4000 feet elevation (Grinnell and Miller 1944, Gaines 1992, pers. obs.), usually near moist meadows or other relatively level and wet sites with a mixture of deciduous and coniferous trees, shrubs, and flowering plants (Grinnell and Miller 1944, Verner et al. 1980, Gaines 1992, pers. obs.). Although it can be locally fairly common as a migrant in the more arid lowlands during spring migration (pers. obs.), it generally avoids dense forests, dry ridges, or other relatively exposed and hot sites for breeding. Consequently, I was quite surprised to find a Calliope Hummingbird raising young in relatively arid Blue Oak (*Quercus douglasii*) woodland well below 1000 feet elevation.

On 6 June 1993, I found a female Calliope Hummingbird feeding a dependent fledgling in a California Buckeye (*Aesculus californica*) near Granite Bay in Folsom Lake State Park, Placer County, elevation 420 feet, at the western edge of the Sierra Nevada foothills. Both birds were clearly smaller than Anna's Hummingbird (*Calypte anna*), a common resident in the area, and they were also smaller but chunkier than the slender-necked Black-chinned Hummingbird (*Archilochus alexandri*), also fairly common there. Both Calliopes had buffy flanks with faint buffy breast bands (see Kaufmann 1990). They both had a pattern of symmetrical columns of dark throat spots, not concentrated in the center of the throat and lacking apparent iridescence. The female Calliope's primaries extended just slightly beyond her short tail, and the four central retrices lacked white tips. I distinguished the juvenile mostly by behavior as it made only short uncoordinated flights of no more than a few feet and often had difficulty perching, though its plumage also seemed buffier plumage than the adult female's (Baltosser 1994). The juvenile usually remained stationary in the buckeye until the female returned to feed it, inserting her bill into its gape. To make sure of the identification and to document this rare event, I called Bill Grenfell, a local wildlife photographer, who took a few photographs on the afternoon of 6 June (Figure 1). The birds were quite approachable, and we were able to stand closer than 12 feet without flushing either of them. They also appeared to ignore other birds in the area, except for a Black-chinned Hummingbird (unknown sex) that was chased from the area by the female Calliope on my single return visit about 10:00 on 7 June. On that visit I returned to the same tree and immediately found the juvenile still perched there; presumably the nest was nearby. The female was still making repeated foraging trips and returned regularly to feed the juvenile.

The Calliope Hummingbird is a regular spring migrant at Folsom Lake State Park, and two to five adult males can usually be found daily in the Granite Bay–Beek's Bight area from mid-April to early May. They concentrate in an area of mixed oak woodland and patchy Chamise (*Adenostoma fasciculatum*) chaparral where sticky monkey-flowers (*Mimulus aurantiacus*) and buckeyes are numerous and Indian paintbrush (*Castilleja* sp.), yerba santa (*Eriodictyon californicum*), and other flowering plants are scattered about in the chaparral. This female and her fledgling, however, were about 0.5 mile southwest of that area within a woodland dominated by the Blue Oak and situated on a gentle north-facing slope with a sparse understory of Poison Oak

Figure 1. Female Calliope Hummingbird feeding fledgling in California Buckeye, Folsom Lake State Park, 6 June 1993.

Photo by Bill Grenfell

(*Toxicodendron diversilobum*) and flowering California buckeye. The woodland's canopy closure is approximately 80% (visually estimated), though the Blue Oak canopy is generally high, not very dense, and admits plenty of filtered light for a ground cover of mostly nonnative grasses and forbs. Otherwise there are no nearby concentrations of typical hummingbird-pollinated plants within at least 100 m. The site is also at the edge of an almost level drainage that stays moist relatively late into the spring and probably still contained some open water at the time of nest initiation. The north aspect, high canopy cover, relatively mesic conditions, and position at the bottom of a local basin (into which cooler air collects) likely give this spot one of the coolest microclimates within roughly a half-mile radius. The Calliope Hummingbird generally prefers cool microhabitats (Calder and Calder 1994). Gaines (1992), however, reported the species using arid ridges in Yosemite, and in 1978 Ted Beedy (pers. comm.) found two nests in junipers on a dry slope about 2 miles south of Highway 20 and >100 m from Yosemite Creek (>6000 feet elevation).

Surprisingly, I later learned of a previous breeding attempt by a Calliope Hummingbird about 0.5 mile from the site described above. On 20 April 1985 Tim Fitzer, Jack Wilburn, and Dan Brown saw a female Calliope fly from a nest. Excited by their discovery, Wilburn and Brown returned two days later to photograph the nesting Calliope (Figure 2). On a later visit Wilburn did not see the female and assumed the nest was abandoned. It is not known whether the bird laid any eggs or fledged young. The date of probable nest initiation in 1985 was very near that in 1993. If the juvenile fledged on 6 June 1993 (the last possible date) and incubation (15-16 days) and fledging (18-21 days) took 33-37 days (Calder and Calder 1994), the last possible dates for egg laying were 1–5 May.

The only other probable or possible extralimital nesting records I was able to locate

Figure 2. Calliope Hummingbird on nest at Beek's Bight, Folsom Lake State Park, 22 April 1985.

Photo by Dan Brown

were by San Miguel (1985) and in the editors' files for the Middle Pacific Coast region of *American Birds* and its various successors (1955-1991; 1997-1998). I subsequently confirmed all of these records with the observers. Bob Yutzy found one at Lake Shasta, Shasta Co., on 21 June 1980. Richard A. Erickson found a pair copulating at 2000 feet elevation 1 mile north of Hyampom, Trinity Co., 16 June 1983 (LeValley and Evens 1983, Harris 1991). Jeri M. Langham found a male along French Hill Road about 1000 feet elevation near Shingle Springs, El Dorado Co., 8 June 1985. David G. Yee found a female apparently on territory at 2000 feet elevaton near Mokelumne Hill, Calaveras Co., 1 June 1985. Yutzy reported a pair visiting a feeder at 1300 feet elevation west of Redding in mid-July 1985, and a female at a feeder in Redding 11 June 1987; he also saw a female on a nest at about 2000 feet elevation along Gilman Road northeast of Lake Shasta on 31 May 1997 and has seen the species a few other times in late May sightings at his feeders near Shasta (>1000 feet) west of Redding (pers. comm.). Even though the various observers considered these records either out of range or at the margins of the species' range, all of these localities are in or near coniferous forest (Ponderosa Pine, *Pinus ponderosa*, or Douglas Fir, *Pseudotsuga menziesii*; the Gilman Road nest was in a Douglas Fir), nesting habitat more typical Blue Oak woodland.

Records accumulated over the years suggest the American River may serve as a migratory corridor, hummingbirds roughly following the progression of blooming flowers to more typical nest sites at higher elevations (mostly above 5000 feet in this part of the Sierra). This phenomenon was hypothesized by San Miguel (1985) for the Kaweah River of the southern Sierra and may be a common strategy of migrating hummingbirds. Possibly the nestings at Folsom Lake were responses to locally favorable food supplies (e.g., Sealy 1979) and/or suitable microclimate and nesting sites (e.g., Walley 1977, Roberson 1993), but the role of premature reproductive

development (in this and other extralimital nesting species) is unknown. Either way, I urge other observers to watch for signs of nesting Calliope Hummingbirds at other favorable sites outside of the recognized breeding range, especially in the Sierra Nevada foothills where other montane birds may nest locally well outside of their known range. Such nesting also raises the possibility of multiple broods (see also the hint by Calder and Calder 1994), as it seems possible for a Calliope Hummingbird nesting at a low elevation early to nest at a higher elevation later in the year, in June and July as is typical for the species (Orr and Moffitt 1971).

Thanks to Bill Grenfell for quickly responding to my plea for photos, to David Yee, Don Roberson, and Steve Glover for providing copies of the editors' files for *American Birds* and its successors, and to the many observers who, by recording and submitting their sightings, make distributional studies possible. Thanks also to Tim Manolis, Steve Speich, Tim Fitzer, and Jack Wilburn for information on previous local records, and to Dan Brown for contributing a photo of the nest. Tim Manolis and Ted Beedy provided very helpful suggestions on an earlier draft.

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RAPID SECOND NESTING BY ANNA'S HUMMINGBIRD NEAR ITS NORTHERN BREEDING LIMITS

ANN SCARFE, 4090 Gordon Head Road, Victoria, British Columbia V8N 3Y1
J. CAM FINLAY, 270 Trevlac Pl., Victoria, British Columbia V9E 2C4

Anna's Hummingbirds (*Calypte anna*) were first reported in Victoria, British Columbia, in December 1944 and again each winter until 13 January 1947. Sightings continued through the 1950s (Taylor and Harper 1987), increased in numbers each year, and by 1970 the first individual was noted on the Victoria Christmas bird count. Numbers increased on subsequent counts, with 177 noted in 1998 (D. Pearce pers. comm.). With these data and our banding records over the past two years, we estimate a minimum of 300 Anna's Hummingbirds spend the winter and spring on the southeastern tip of Vancouver Island (greater Victoria). Given these numbers, we suspect this species might exhibit nesting overlap here as it does in Arizona and California (Russell 1996, Maender et al. 1996).

The first documented nest of Anna's Hummingbird in Canada was found near Duncan, 50 km north of Victoria, in July 1958. In Victoria a nest was first seen 30 years later on 29 February 1988 (Campbell et al. 1990). Since then, nests have been found in increasing numbers each spring.

Our study was conducted in Scarfe's private garden approximately 1.5 km northeast of the University of Victoria, near the south end of Vancouver Island, from February to mid April in both 1998 and 1999. The female discussed here that laid two clutches was caught by means of a feeder within a wire cage trap. We banded her and colored the top of her head orange with Liquitex Value Series Basics acrylic color, a water-based paint that lasts about five months. Nest observations were made with the aid of a mirror on a long handle, with 7, 8, and 9× binoculars and a 27× spotting scope. We obtained temperature data from the weather station on the campus of the University of Victoria.

By the end of February 1998, Scarfe had located four active Anna's Hummingbird nests in the greater Victoria region. When first spotted on 19 February, one of these (nest 1) was being built by a female 3.3 m above ground in Scarfe's yard. The nest sat on a bare Douglas fir (*Pseudotsuga menziesii*) branch, 4 cm in diameter, with dense needle coverage above it and on its north and south sides. The north-facing wall of Scarfe's residence was 2 m away, providing shelter from winds from the southeast. This nest contained two eggs when was first checked for eggs on 21 February. By 3 March, nestlings were being fed, the first of which fledged on 20 March, the second on 23 March. The adult female was never trapped or color marked.

On 22 March, only 33 m to the southwest of nest 1, Scarfe discovered a second female building a nest on the topmost, unsheltered branch of an apple tree (*Malus* sp.), 4.75 m above ground. This female was trapped, banded, and color marked on 23 March. That day we watched the unmarked female feeding one newly fledged juvenile. Also on 23 March, the marked female was seen feeding two newly fledged young (estimated 1–3 days out of the nest) in dense shrubbery about 8 m from the new nest tree. On 25 March we noted this female sitting on her nest at 10:00 when she left to feed the nearby fledglings about 7 m away. At 10:30 that day, we noted two eggs in the new nest.

On 30 March, the marked female was incubating eggs and feeding her two fledglings, which were now more than 25 m away from nest 2 but still calling for food. By 3 April only one fledgling, being fed by the female, could be located. The next day it too disappeared.

The marked female's eggs hatched on, or just before, 14 April. We noted the female feeding nestlings and a small bill poking above the nest's rim on that day. The two nestlings were present on 23 April, but the nest was empty on 27 April. The nest remained intact. The marked female remained around for several days and then disappeared. Over the summer both nests were gone. Feeders were available all summer but were seldom used.

All four nests of Anna's Hummingbirds that Scarfe found in 1998 had incubating females by the end of February. Another nest 2.5 km southeast of Scarfe's residence fledged two young on 28 and 29 March 1998.

The marked female was trapped again on 18 September 1998 and remarked. On 12 February 1999 this marked female was seen building a nest in the exact spot where the unmarked female built the previous year. An egg was present on 19 February, almost a year from when the unmarked female began laying in 1998. A second egg appeared the next day. Both had hatched by the morning of 7 March, but the nestlings died that day.

The southeast side of Vancouver Island has a Mediterranean-type climate with cold, wet winters. January temperatures sometimes fall below 5° C at night, but by mid February, overnight low temperatures seldom go below freezing and, if so, to only −1° or −2° C.

In both 1998 and 1999 eggs were laid on or just before 19 February. Since the mean temperature for February was 5.5° C in 1998 but only 3.6° C in 1999, it would seem that similarities in time of nest construction and egg laying in the two years were not entirely temperature dependent. We suggest that the early breeding has been aided by the increased numbers of hummingbird feeders being left filled all year, a result of public knowledge of the presence of this species.

Because Anna's Hummingbirds do raise two broods in California and Arizona (Russell 1996) and have been confirmed breeders on southern Vancouver Island for at least 40 years it was not surprising to find two broods being raised in Victoria.

In 1999, the marked female selected the exact site used in 1998 by the unmarked female the previous year. Because this was a more sheltered site than the marked female had used the previous year, perhaps it was selected to avoid the effects of cold stress. Calder (1974) found that an Anna's Hummingbird selected a sheltered nest site located so that the temperature within the nest was slightly warmer than the surrounding ambient air.

Overlap of two broods (a female feeding late nestlings and incubating a second clutch simultaneously) was observed in the Broad-tailed Hummingbird (*Selasphorus platycercus*) by Bailey (1974).

The use of the same spot two years in a row by an Anna's Hummingbird is relatively uncommon but does occur. One of the earliest citations is by Bendire (1895). W. M. Tyler (in Bent 1940) noted that several other species of hummingbirds, including the Ruby-throated (*Archilochus colubris*), Costa's (*C. costae*), Rufous (*S. rufus*), and Allen's (*S. sasin*), have renested on the same site in two or more consecutive years. Tim Manolis (pers. comm.) has observed Black-chinned Hummingbirds (*A. alexandri*) reusing the same site in California.

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NESTING OF BRANDT'S CORMORANTS IN THE NORTHERN GULF OF CALIFORNIA

JUAN CERVANTES-SANCHEZ, C/ Nueva Zelanda 69 6A, 28035 Madrid, Spain

ERIC MELLINK, Centro de Investigación Científica y Educación Superior de Ensenada, Apdo. Postal 2732, 22860 Ensenada, Baja California, Mexico (U.S. mailing address: P.O. Box 434844, San Diego, California 92143-4844)

In Mexico, Brandt's Cormorant (*Phalacrocorax penicillatus*) breeds mostly on islands and offshore rocks along the Pacific coast of the peninsula of Baja California (Everett and Anderson 1991, Grinnell 1928, Wilbur 1987). The southernmost known colony on the Pacific coast is at the north end of Isla Margarita (approximately 24° 30′ N, 112° W; Guzman in Everett and Anderson 1991). Colonies in the Pacific can contain thousands of individuals.

In the Gulf of California documented Brandt's Cormorant breeding has been restricted to the Midriff Islands. In this region it nests or has nested on Roca Vela, on islands in Bahía de los Angeles, including Calavera, Smith, and Flecha, on Roca Partida (near Isla Partida Norte), Isla Partida (or Cardonosa), Isla Salsipuedes, Isla San Esteban, and Isla San Pedro Mártir (Ainley et al. 1981, Banks 1963, Everett and Anderson 1991, Osorio-Tafall and del Toro-Avilés 1945, Tershy and Breese 1997, van Rossem and Hachisuka 1937, E. Palacios pers. comm.). In addition, van Rossem (1945) suspected some offshore rocks near Guaymas as a breeding locality for this species. Brandt's Cormorant breeding colonies in the Gulf of California are small, rarely exceeding 250 pairs, and the total population in this area has been estimated at 500 to 1000 pairs (Everett and Anderson 1991). It is possible, however, that some colonies have been overlooked, through confusion of this species with the Double-crested Cormorant (*P. auritus*) (Russell and Monson 1998, Wilbur 1987).

Here we report a breeding colony of Brandt's Cormorant on Isla San Jorge in the northern Gulf of California. Mailliard (1923) and Mellink and Palacios (1993) previously reported on the breeding birds of this island, and neither recorded nesting Brandt's Cormorants. Isla San Jorge (31° 01′ N, 113° 15′ W) comprises a series of small bare rocky islets located in the northeastern Gulf of California.

On 9 November 1999 we found a small breeding colony of Brandt's Cormorant on the northeastern side of the southernmost islet (Figure 1). The colony, located on a 30° slope, about 10 meters above mean sea level, was surrounded by a small congregation of California Sea Lions (*Zalophus californianus*) and some nesting Brown Boobies (*Sula leucogaster*). Double-crested Cormorants were nesting on the upper ridges of the islet. We counted about 40 Brandt's Cormorants, including breeding adults and first-year birds, and 24 nests, 19 of which contained one to four eggs. On 31 January 2000 we recorded 31 adults and 13 juveniles. Five adults were still attending nests. A small chick, yet to fledge, was visible in one of these. On 9 January 2001 there were 39 adults and 26 young in the colony. Eight of the adults were attending nests.

Our field work was supported by a grant from Conacyt (Mexico) to Mellink. We thank the Sociedad Cooperativa Ejidal Bahía de San Jorge for logistical support, Mario Machado and Carmelo Gil for transportation to the island, and Eduardo Palacios and Kimball Garrett for editorial assistance.

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Figure 1. Brandt's Cormorant colony at Isla San Jorge, showing chicks three quarters grown and one incubating adult. Also visible are Blue-footed and Brown Boobies and California Sea Lions.

Photo by Eric Mellink

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A POTENTIAL THREAT TO BALD EAGLES IN BAJA CALIFORNIA SUR, MEXICO

GUSTAVO ARNAUD, EDGAR AMADOR, AND MARCOS ACEVEDO, Centro de Investigaciones Biológicas del Noroeste, S.C., Apdo. Postal 128, La Paz, Baja California Sur, México 23000

The Southern Bald Eagle (*Haliaeetus leucocephalus leucocephalus*) is a resident species in the state of Baja California Sur (Grinnell 1928), occurring in mainly coastal habitats. Nesting is now known only from Bahia Magdalena–Almejas on the west coast (Henny et al. 1993, Amador-Silva and Guzmán-Poo 1994, Rodríguez-Estrella et al. 1995) where no more than three pairs are found annually. The physiography of Baja California Sur is composed of extensive plains and hills, the principal mountain ranges are the sierras la Giganta and la Laguna, and predominant vegetation is desert scrub, which covers 92% of the state area (INEGI 1995). Freshwater habitats are scarce and largely temporary across the state.

During bimonthly visits to the Sierra de la Giganta that commenced in June 1995 and continue to date, we have observed Bald Eagles on two occasions: On 13 April 1996 we observed two adults, and on 27 March 1997 a single adult, soaring over a canyon located at 24° 50' N and 111° 00' W (80 km west of Bahía Magdalena), at 250 meters above sea level. This canyon includes a series of permanent fresh-water ponds (locally known as "pozas") ranging in size from 35 to 100 m long and from 1 to 3 m deep. Unlike most other oases in Baja California Sur, these ponds contain abundant fish of at least two introduced species (*Oreochromis urolepis hornorum* and *Tilapia* spp.).

We have observed Ospreys (*Pandion haliaetus*) fishing in these ponds on several occasions and it seems likely that Bald Eagles may also utilize this resource, at least occasionally. Local informants report that fisherman occasionally shoot Ospreys, arguing that these birds take the fish they use for food. The hunting of Osprey is illegal, suggesting that fish-eating Bald Eagles could also be targeted, a potentially serious threat to the relatively small and vulnerable population nesting at Bahía Magdalena. Education of the fishermen in this area regarding the rarity of Bald Eagles in Baja California could be effective in helping to ensure the future of the peninsula's last remaining nesting population of this endangered raptor.

We thank Eduardo Palacios and Leopoldo Moreno for their critical review. Charles Henny and Peter Bloom also reviewed and improved this note.

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BOOK REVIEW

The California Condor: A Saga of Natural History and Conservation, by Noel Snyder and Helen Snyder. 2000. Academic Press, San Diego. 410 pp., 118 color and 21 black-and-white photos, 22 tables, 8 graphs, 4 maps. Hardback, $29.95. ISBN 0-12-654005-5.

This nearly folio-sized book of 4¼ pounds is aptly subtitled, given the history of the major study and conservation programs directed toward this species since the 1940s. A prologue tells of the authors' first experience with California Condors and expresses the book's goal, "to give the reader an appreciation of both the basic biology of the condor and the dynamics of condor conservation from a viewpoint mainly inside the conservation and research program." The book is then organized into six "parts," the first of which is "historical and background matters." chapter 1, on "perspectives," summarizes the species' natural history and compares it with that of the Andean Condor and several Old World vultures. Chapter 2 provides an excellent account of the ceremonial and other uses made of California and Andean Condors by native peoples within their ranges.

Part I concludes with the 39-page chapter 3, "Condor Research and Conservation in the Early–Mid 20th Century." Much of this is derived directly from the same authors' 1989 account "Biology and Conservation of the California Condor (Current Biology 6:175–267). Some of the text is identical, but other parts are rewritten and updated where appropriate. As in their earlier account, the Snyders divided studies preceding theirs into segments that they now call "eras," each named for one or two of the chief investigators or proponents: Finley (early 1900s), Robinson–Easton (1930s), Koford (the first detailed field study, 1939–46), Miller–McMillan (late 1950s into 1970s), [Fred] Sibley (1966–1969), and Wilbur (1970s). Throughout this chapter, the Snyders trace the developing knowledge of the condor's behavior and ecology, along with changes in ideas as to its apparent decline. Each era is also credited with a special advance in knowledge or a particular emphasis that had a subsequent effect on the effort to conserve the species. Interaction of the sometimes conflicting ideas is discussed freely whenever it seems appropriate, and the authors give their own evaluation of the major advances and diversions. Thus the stage is set for Part II.

This is titled "Struggles to Launch a New Program," and its three chapters are "Battles in the Political Arena," "Africa and Peru," and "Development and Testing of Research Techniques." Noel Snyder, of the U.S. Fish and Wildlife Service, and John Ogden, of the National Audubon Society, were named as joint managers of an expanded condor-conservation program beginning in early 1980. Noel's wife Helen was also involved as an Audubon employee in much of the work of the research center, established in Ventura. Although they left those positions in 1986, and the recovery [advisory] team was subsequently discontinued by the Fish and Wildlife Service, it seems to me the Snyders are the best choice to tell the story of the often controversial efforts to conserve this endangered species, and this book is it!

Chapter 4 details the campaign to establish and expand refuges and wilderness areas for the condor's nesting. The Snyders believed from the outset that the very mobile condors should be studied first by radio-telemetry to discern the foraging range of individuals, and to aid in learning just what factors were involved in their population decline. They describe the controversies they encountered, including a tense meeting at the home of one of the chief proponents of the "hands-off" approach, and a "gag order" from their superiors in the Fish and Wildlife Service that prohibited them from contacting high-level California Department of Fish and Game officials directly. When freer communications were allowed in 1982, a more reasoned plan emerged. A permit issued in 1980 by the California Department of Fish and Game allowed the center to capture and radio-tag 10 birds, with the stipulation that one female be

retained as a mate for the then lone California Condor in captivity—the first admission by "hands-off" proponents that any efforts should be made toward building a captive population. But after the second chick handled died from stress, the California Department of Fish and Game permit was revoked, and only after two years was a new one issued.

Without a permit to handle any California Condors, Snyder and Ogden went to Peru to observe, and sometimes participate in, research on the Andean Condor, thus learning much about capturing, radio-tagging, and behavior of condors. They also visited European research teams in South Africa, Zimbabwe, and Namibia working with the Cape Griffon and the Lappet-faced Vulture, the latter species showing breeding characteristics similar to the two condors'. Chapter 5, describing these trips, includes some interesting accounts of encounters with local peoples and even a narrow escape from being targets of a victorious but not yet disbanded army unit!

Chapter 6 details the development of techniques for capturing condors (they selected cannon-netting), handling, blood-sampling, and sexing the birds, and radios for tracking of the birds so marked. The excitement attendant on establishing methods that would provide the data needed on the movement and lives of the marked birds comes through very nicely in this chapter.

Part III is titled "Research Results of the New Program." Its six chapters take up more than 100 pages, organized under censusing, movements and food, nest sites, breeding behavior, breeding effort and success, and mortality. Only a few highlights can be mentioned from this meaty basis for the rescue program that was finally adopted. The use of frequent photos of flying condors proved by far the most reliable tool for counting the number of birds still alive. California Condors obtained little food near their nest areas but traveled great distances to ranch lands around the southern San Joaquin Valley. When nesting, the adults used parts of that foraging range closer to their nest sites, but some young birds roved over the entire range. Characteristics of nest sites of different pairs varied, but most were difficult of access by humans or ground-based predators. Ravens, however, were watchful of many sites and quick to enter for a meal if the egg was left unguarded. Most pairs that lost an egg or young chick readily initiated another breeding effort the same year, but almost always at a different site and often miles away. This was not possible to detect without telemetry. Courtship postures are described, and one photo from the wild and one of a captive pair are included.

Tables provide data pertinent to courtship, copulation, incubation shifts, percentage of daylight hours adults were at or near nest sites, number of feedings of young by male and female parents, pairs breeding in the 1980s and the success of each, and dates when individual photo-documented birds were last seen. These are reported pair by pair or by individual, by means of identification codes of which only two are explained in the book (pp. 213–214). The other codes also probably have a geographic indication and were no doubt left unpublished to minimize potential disturbance when birds were still free-flying and nesting in those areas. Those familiar with California geography can guess at several others, so the continued secrecy may be of questionable value. More disconcerting, however, is the lack of any list of tables in the front of the book. Diligent readers should prepare such a list for themselves as not all of the text references to them are within two or three pages of the table.

Chapter 12 discusses the known and potential causes of death of condors—from shooting, collisions with wires and wind turbines, possible effects of eating poisoned ground squirrels or coyotes, to cyanide guns set for coyote control. Strong evidence is presented that the predominant factor killing wild condors, at least in recent years, has been lead poisoning from bullet fragments ingested with food. The case histories of three radio-marked birds and one other found dead by a ranch foreman build the case like an intriguing detective story. This culminates in a step-by-step description of a January 1984 lab demonstration to skeptical state and federal officials that the last

bird had, indeed, died from the cyanide–tracerite powder from a coyote-poisoning device. Only then was any restriction placed on the widespread use of such devices in the condors' foraging range.

In part IV, Conservation in the 1980s, chapter 13 surveys several efforts made to improve suboptimal nest sites by altering the slope of the cavity, building an external "porch" where the nearly fledged young could exercise their wings without falling off, by reducing the number of ravens in the area, etc. Of three ways to reduce the likelihood of condor deaths from lead poisoning, neither the conversion of the foraging range into a no-hunting zone nor prohibiting use of lead ammunition by hunters was ever tried, because of bureaucratic hurdles and lack of time. The third method, providing clean lead- and poison-free carcasses for the wild condors to eat, was tried on the Hudson Ranch in southwestern Kern County. But the condors shifted locations when deer-hunting season began in other parts of their range and so continued to eat meat with lead embedded. There is also a list of 30 steps taken from 1937 to 1992, mostly by the federal government, that set aside or improved protection of areas to benefit the California Condor.

Chapter 14, "Formation of a Captive Flock," documents the controversies and slow stages in 1982–84 of this effort, the success in replacement clutching when removal of first-laid eggs of wild pairs was finally allowed and then hatched in incubators, and the questions as to the fraction of the population to which such efforts could be applied. Only after the winter of 1984–85 saw the disappearance of one or both members of all but one of the breeding pairs was the emphasis shifted to rapid development of a captive breeding flock, by taking the nine remaining birds into captivity. Another interplay of opposing views is described without rancor for those who didn't agree with that goal and insisted that at least a few birds be left in the wild. Foremost among these proponents was the National Audubon Society, which sued to prevent the last captures. Most of chapter 15 is devoted to this topic, after precursor events described in chapter 14. This part ends with a summary of the "alternative plan" dependent on captive breeding to preserve the species "near term" but with eventual releases into the wild after safe numbers and genetic variety were in the population and after release techniques had been tested on Andean Condors temporarily released in the area.

In part V, "Restoration," chapter 16 describes the facilities built to house captives and the methods developed to promote pairing and at the same time preserve or even heighten the genetic diversity of this small population. Table 16 (p. 320) shows for each facility the number of mated pairs, eggs laid, and young fledged each year from 1988 through 1998. The overall total, obtained only by adding yearly totals, was 141 fledglings—very impressive from a start of only 9 adults and 18 immatures in 1987! Elsewhere in the chapter results are tabulated by each parent bird, and various comparisons are made of reproductive output with the few pairs followed in the wild (mostly in the early 1980s). Incubation periods averaged 57.2 days, slightly shorter than that of Andean Condors. This chapter also contains a host of other natural history information that would have been extremely difficult to obtain from wild birds even though critical to the planning for their survival.

Techniques and results (through 1998) of "Releases to the Wild" (chapter 17) are described, with several appropriate photos. Results for each of 61 birds released in California and 28 in northern Arizona are summarized in table 22. The gist of the findings is that young raised by captive parents are much better at surviving when free to fly than those that are fed early in life only by "puppets" (gloves of very realistic condor head shapes) operated by hidden keepers. Those that undergo "aversive conditioning" to rectangular human-built structures fare somewhat better than those that don't. Various release locations already tried, and several others with potential, are described. So also is the question of food subsidy and the conditions that might make it work by reducing the likelihood of the birds foraging widely and eating

carcasses containing lead fragments. The authors give their own recommendations for releases and general captive propagation in this chapter, and those interested in the ultimate survival of the species should read them carefully.

Part VI, "A General Evaluation," includes in chapter 18 the authors' philosophy of how efforts to conserve endangered species in general should be organized, with interplay of private and government units, intensive research and captive breeding if needed, but overall allowing for diversity of input and implementation guided by well-constructed recovery teams. These are distinguished from those that rely just on "recovery plans," many of which have been written with inadequate supporting knowledge and are too detailed to allow for the constant alteration necessary as new facts emerge. The Snyders warn of the danger of goal substitution—of the preservation of recovery programs being substituted for the recovery of the species itself. The chapter ends with nine recommendations specific to the recovery of the California Condor. The authors say, "[we] remain optimistic that unmanaged and viable wild condor populations can be reestablished, but we are deeply concerned about the recent rate of progress toward that goal."

Maybe those who want to know just about the California Condor's natural history, without wading through this history of the research and conservation efforts directed toward its survival, will tire of all the accounts of controversies. However, for those interested in complex species-conservation problems and the associated negotiations and politics, this is a really valuable story. Many additions to the natural history saga are to be found only embedded in the conservation saga that forms the bulk of the book. Most technical aspects of the book's production are also of high quality: heavy glossy paper, attractive layout, superb photos (drawings in two cases where more pertinent), a generous set of acknowledgments (and a special list of credits in front for all the photos), a bibliography of 382 cited references, and a thorough index. I noted only about three typographical errors. In short, anyone interested in the California Condor or in the conservation of endangered species in general should study this book.

Howard L. Cogswell

FEATURED PHOTO

RANGE EXPANSION OF THE GREAT-TAILED GRACKLE IN WESTERN NORTH AMERICA

WALTER WEHTJE, Geography Program, Department of Earth Sciences, University of California, Riverside 92521

The spread of the Great-tailed Grackle (*Quiscalus mexicanus*) is one of the most impressive range expansions to occur in North America during the 20th century. The U.S. breeding range was limited to southernmost Texas in 1900 (Ridgway 1902), but a century later Great-tailed Grackles breed in 19 states, from Arkansas in the East north to Minnesota and west to California and Oregon (Dinsmore and Dinsmore 1993, Scheuering and Ivey 1995, Price 1997, Granlund 1999), with sightings in Washington, British Columbia, Montana, North Dakota, Wisconsin, and Ontario (Dinsmore and Dinsmore 1993, Granlund 1999).

The northward spread of Great-tailed Grackles in North America has occurred on three fronts: Birds from south Texas, of the subspecies *Q. m. prosopidicola*, moved north and east and are currently found east of a north–south line through western Texas and eastern Colorado. A separate population from Chihuahua invaded New Mexico in 1913, with breeding confirmed in eastern Arizona in 1937 and Colorado in 1973 (Bailey 1928, Phillips et al. 1964, Stepney 1975). Phillips (1950) described this population as a new subspecies, *Q. m. monsoni*, with a range that encompassed north-central Mexico, western Texas, southern and central New Mexico, and eastern Arizona. By 2000, *monsoni* was present in New Mexico, southeastern Nevada, Arizona, and California. The third subspecies, *Q. m. nelsoni*, originated in coastal Sonora, Mexico, and adjacent areas (Friedmann et al. 1957), arriving in southern Arizona by the late 1930s (Phillips et al. 1964). After moving into Arizona, *nelsoni* expanded west and was first noted in California in 1964 (McCaskie et al. 1966); it is now found in Arizona, California, and southwestern Nevada. The subspecific affinities of Great-tailed Grackles breeding in Oregon, Idaho, Utah, and central Nevada have not been established (Dinsmore and Dinsmore 1993, Scheuering and Ivey 1995).

Great-tailed Grackle subspecies differ in both size and color. Adult males of *Q. m. monsoni* are nearly 20% heavier than adult males of *Q. m. nelsoni*, with average (flattened) wing lengths of 191 mm vs. 167 mm (14% longer) and tail lengths of 210 mm vs. 165 mm (27% longer; W. Wehtje unpublished data; *monsoni* $n = 7$, *nelsoni* $n = 8$). Adult females of *monsoni* are at least 10% heavier than females of *nelsoni*, with average (flattened) wing lengths of 150 mm vs. 136 mm (10% longer) and tail lengths of 150 mm vs. 126 mm (19% longer; W. Wehtje unpublished data; *monsoni* $n = 23$, *nelsoni* $n = 6$). In addition to the size differences, females of the two subspecies differ in plumage color: *nelsoni* shows pale grayish buffy underparts, *monsoni* darker brownish gray underparts (Phillips 1950, Rea 1969).

Clockwise from upper left, birds shown in the featured photo on the back cover are an immature female *nelsoni* (26 January 2000, Oxnard, California), adult male *nelsoni* (10 December 1999, Tucson, Arizona), immature female *monsoni* (12 December 1999, Arlington, Arizona), adult male *monsoni* (2 June 2000, Bill Williams National Wildlife Refuge [NWR], Arizona), adult female *monsoni* (10 December 1999, Tucson), adult female *monsoni* (5 June 2000, Peña Blanca Lake, Arizona), adult female *monsoni* (2 June 2000, Bill Williams NWR), and immature female *nelsoni* (15 May 1994, Salton Sea NWR, California). It bears noting that recent specimens of adult female *nelsoni* in fresh plumage are, apparently, lacking from collections.

In an ideal world, identifying Great-tailed Grackles to subspecies in the western US

would be simple: large males and dark females would be of the subspecies *monsoni*, and small males and pale females would be of the subspecies *nelsoni*. In reality, this approach is complicated by plumage differences between adult and immature birds, and the degree to which female Great-tailed Grackles fade during the spring. The presence of intergrades complicates the picture further.

In common with several other icterids, Great-tailed Grackles have distinct first-year and adult plumages (Pyle 1997). Immature birds have duller plumages, shorter wings, and shorter tails than adults. Juvenile males molt into their first basic plumage, a dull black, by late summer. Not until their second fall do they molt into the long-tailed and glossy plumage of the adult males; therefore, meaningful comparisons between males can be made only with birds of the same age. The featured photo illustrates the size difference between adult males (*monsoni* flat wing 184 mm, tail 201 mm; *nelsoni* flat wing 174 mm, tail 174 mm).

Determining the subspecies of female Great-tailed Grackles is more difficult. While size differences are useful, plumage characteristics are of greater importance. Determining a bird's age is essential to assigning it to either *nelsoni* or *monsoni*. Adult females have cream-colored irises, while immatures have khaki-colored irises with dark flecking until at least June of their second year. Immature females are smaller and duller than adults, and their feathers tend to wear and fade more rapidly and extensively than those of adults. The difference between adults and immatures becomes most pronounced in late spring, when immatures can have pale gray underparts with no hint of brown in them. By late summer both adults and immatures have faded underparts and should not be identified to subspecies.

The two females on the upper row of the photograph are newly molted immatures. The left-hand bird is an unusually gray *nelsoni* (flat wing 134 mm, tail 122 mm), and the right-hand bird is a more or less typical *monsoni* (flat wing 139 mm, tail 127 mm). The size difference between adult females would normally be greater than this, but even a more typical *nelsoni* would be obviously paler than the rich brown characteristic of immature female *monsoni*.

The bird in the lower right-hand corner of the featured photo is a fresh adult female *monsoni* showing underparts that are a deeper brown than ever shown by female *nelsoni*. The two middle birds demonstrate the range of fading shown by adult female *monsoni* by early June (these birds were collected within three days of each other). While each of these birds has faded significantly, neither is as worn as the immature *nelsoni* on the far left, which was collected at the Salton Sea in mid-May. Birds in this extreme environment tend to have completely pale underparts by late spring.

In most of central California and Nevada, the plumage of grackles is often visibly faded by March and April, when these migratory populations arrive from southern Arizona and southern California. Since these grackles head back south in late summer before undergoing prebasic molt, they are difficult to observe in fresh plumage on the breeding grounds and therefore difficult to identify with certainty. Judicious collecting early in the nesting season should shed light on the interaction between the two subspecies as they continue to spread across western North America.

Another confounding factor in distinguishing between the two western subspecies is the presence of intergrades between them. Interbreeding between *monsoni* and *nelsoni* was observed in Arizona in the mid 1960s (Rea 1969) and has continued to the present. In California, male Great-tailed Grackles tend to be intermediate in size between the two subspecies, while females are as dark as *monsoni* but closer in size to *nelsoni*. The degree of interbreeding in other states is not known.

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of Arizona Vertebrate Museum, University of California Santa Barbara Vertebrate Museum, and the Western Foundation of Vertebrate Zoology. I also thank the agencies and individuals who gave me permission to collect grackles. A Frank M. Chapman Memorial Grant from the American Museum of Natural History funded portions of this research. Finally, I thank Robb Hamilton for suggesting I write this article and Amadeo Rea for reviewing and improving the manuscript.

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HELP SUPPORT THE WFO PUBLICATION FUND

Western Field Ornithologists recently established a Publication Fund, which will be used specifically to increase the size of issues of Western Birds, include more color photographs, and initiate a new monograph series. We have already received financial support from the WFO Board, and we are pursuing sponsorship agreements with major optical companies. Via this announcement, we also are soliciting the financial support of our members and readers. Please send donations, payable to Western Field Ornithologists and earmarked "Publication Fund," to Dori Myers, WFO Treasurer, 6011 Saddletree Lane, Yorba Linda, CA 92886. Thanks very much for your support!

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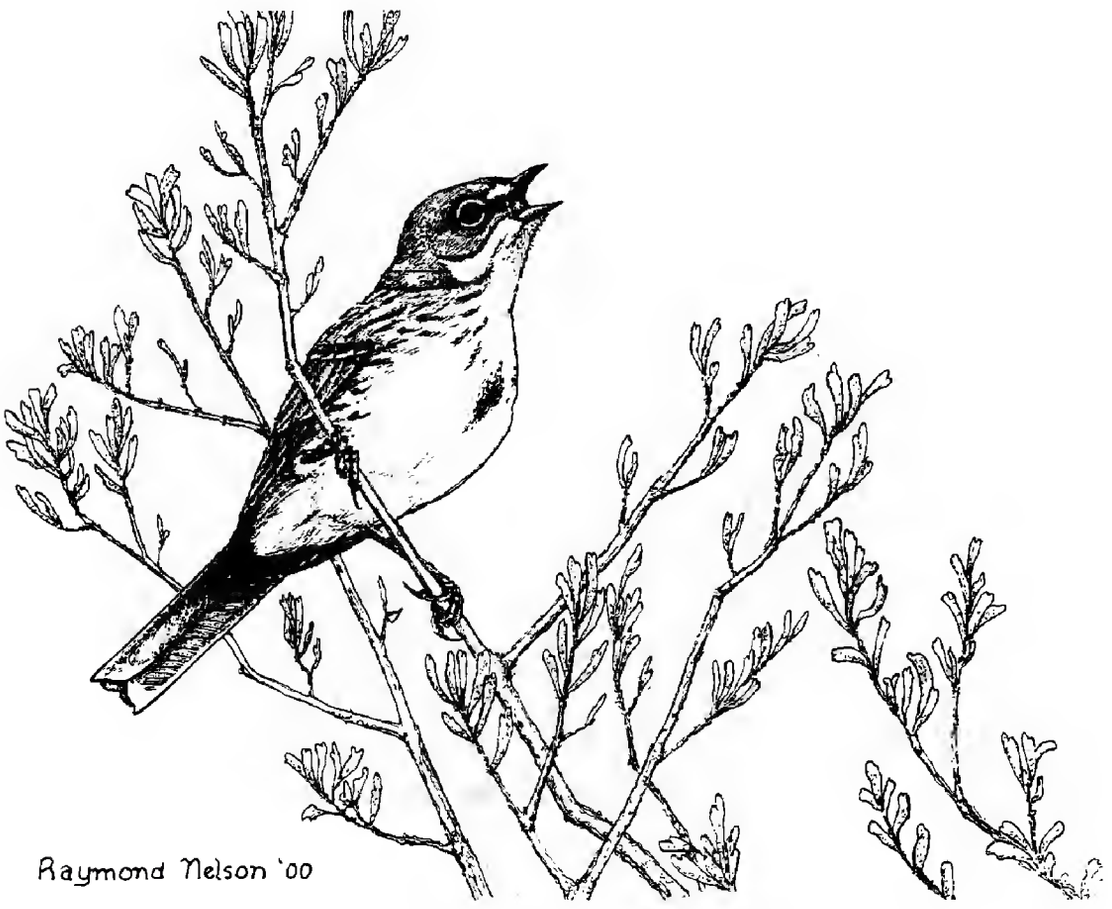

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WESTERN BIRDS

Quarterly Journal of Western Field Ornithologists

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WESTERN BIRDS

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Cover photo by © Jim Burns/NATURAL IMPACTS of Scottsdale, Arizona: Rufous-capped Warbler (*Basileuterus rufifrons*), French Joe Canyon, Arizona, August, 2000.

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 the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, 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 matter of style consult the Suggestions to *Contributors to Western Birds* (8 pages available at no cost from the editor) and the *Council of Biology Editors Style Manual* (available for $24 from the Council of Biology Editors, Inc., 9650 Rockville Pike, Bethesda, MD 20814).

Reprints can be ordered at author's expense from the Editor when proof is returned or earlier.

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WESTERN BIRDS

Volume 32, Number 3, 2001

DISTRIBUTION AND ABUNDANCE OF WINTER SHOREBIRDS ON TOMALES BAY, CALIFORNIA: IMPLICATIONS FOR CONSERVATION

JOHN P. KELLY, Cypress Grove Research Center, Audubon Canyon Ranch, Marshall, California 94940

ABSTRACT: I analyzed the distribution and abundance of wintering shorebirds (Scolopacidae, Charadriidae, and Recurvirostridae) in Tomales Bay, California, on the basis of 57 baywide counts conducted over 10 years, from 1989–90 to 1998–99. Tomales Bay supports up to 20,689 shorebirds in early winter, thus qualifying as a wetland of "regional" importance in the Western Hemisphere Shorebird Reserve Network. Minimum overall shorebird abundance fell as low as 1291 in late winter. Tomales Bay supported approximately a third of the wintering shorebirds in the Point Reyes/Bodega area in early winter. Observations of tidally structured flock movements of several species suggested that the northern and southern ends of Tomales Bay are occupied by different wintering groups. In association with cumulative seasonal rainfall, most species declined in abundance significantly in midwinter. The Sanderling and Marbled Godwit increased with cumulative rainfall in the north and south bay, respectively, suggesting weather-related influxes from outer coastal beaches. After accounting for the effects of cumulative seasonal rainfall and a 10-year trend in annual rainfall, I detected no trends in species' abundances. Foraging and roosting shorebirds at the northern end of the bay were vulnerable to direct disturbance from concentrated recreational use. Long water-residence times in southern Tomales Bay suggest that shorebirds there may be particularly vulnerable to toxic spills or anthropogenic eutrophication. The closeness of San Francisco Bay implies a high potential for invasion of nonnative organisms established there, which could alter the availability of benthic prey to shorebirds in Tomales Bay. Shorebird feeding habitat at the deltas of Walker and Lagunitas creeks may be adversely affected by heavy rainfall leading to the deposition of sediment. Daily influxes of roosting gulls from a local landfill were associated with reduced shorebird use of tide flats. Shorebirds' use of open tide flats developed for mariculture is reduced, although floating oyster bags provide roosting areas during high tides. Breaching levees that isolate historic wetlands may increase shorebird use in some areas. The likelihood of regular or episodic intraseasonal movements among Point Reyes/Bodega area wetlands suggests Tomales Bay and other nearby wetlands are worthy of broad protection.

Tomales Bay is one of California's largest and least disturbed estuaries. It has been recognized as a wetland of "regional importance" on the basis of its supporting up to 20,000 shorebirds, a criterion for inclusion in the Western Hemisphere Shorebird Reserve Network (WHSRN; Harrington and Perry 1995, Page and Shuford 2000). An analysis of shorebird abundance and distribution on the Pacific coast of the United States identified Tomales Bay as a key wetland for shorebird conservation because it supports in at least one season at least 1% of the total population of 8 of 13 shorebird species that concentrate in estuaries and brackish wetlands (Page et al. 1999). In spite of this recognition, little has been published on the spatial or temporal variations in shorebird abundance on Tomales Bay, or the birds' vulnerability to environmental threats. Kelly and Tappen (1998) reported previously on the value of Tomales Bay to other winter waterbirds.

Shuford et al. (1989) analyzed the results of up to 10 consecutive years of shorebird counts in the adjacent Point Reyes area between 1965 and 1982 but provided little information on shorebird use of Tomales Bay. As part of a statewide survey, Jurek (1974) reported on five years of monthly shorebird counts at the Walker Creek delta, in the northern part of the Tomales Bay, but did not survey abundances baywide. Over recent decades, Tomales Bay has been suggested for protection as habitat for shorebirds (Smail 1972, National Oceanic and Atmospheric Administration 1987, Neubacher et al. 1995, Page and Shuford 2000). However, with one exception dealing with the effects of aquaculture on shorebirds (Kelly et al. 1996), evaluations of conservation issues in Tomales Bay have not directly addressed patterns of shorebird use.

In this paper, I (1) present results from 10 years of baywide winter shorebird censuses on Tomales Bay; (2) compare these results with other studies to provide a historical and geographical perspective on the importance of Tomales Bay to shorebirds; (3) evaluate species' distributions within the bay with regard to the importance of particular areas used by shorebirds; (4) examine processes that influenced abundance trends over the 10 years of study, and (5) identify needs for conservation of wintering shorebirds on Tomales Bay. I address these objectives with regard to all Scolopacidae, Charadriidae, and Recurvirostridae associated with Tomales Bay and immediately adjacent seasonal wetlands (Figure 1).

STUDY AREA

Tomales Bay floods the lower 20 km of the fault-rift Olema Valley on the central California coast, about 45 km northwest of San Francisco (Figure 1; Galloway 1977). Approximately 18% of the bay's 28.5-km^2 area is intertidal, providing primarily sand or mud flats suitable for foraging shorebirds and cobblestone beaches along the east shore. In general, sediments grade from primarily fine to coarse sand in the northern reaches of the bay to muddier substrates in southern portions of the bay (Daetwyler 1966).

Two primary points of freshwater inflow, Lagunitas Creek at the south end of the bay and Walker Creek near the north end of the bay, are associated with large tidal deltas suitable for foraging shorebirds (Figure 1). Numerous smaller delta marshes and tidal flats occur where small perennial

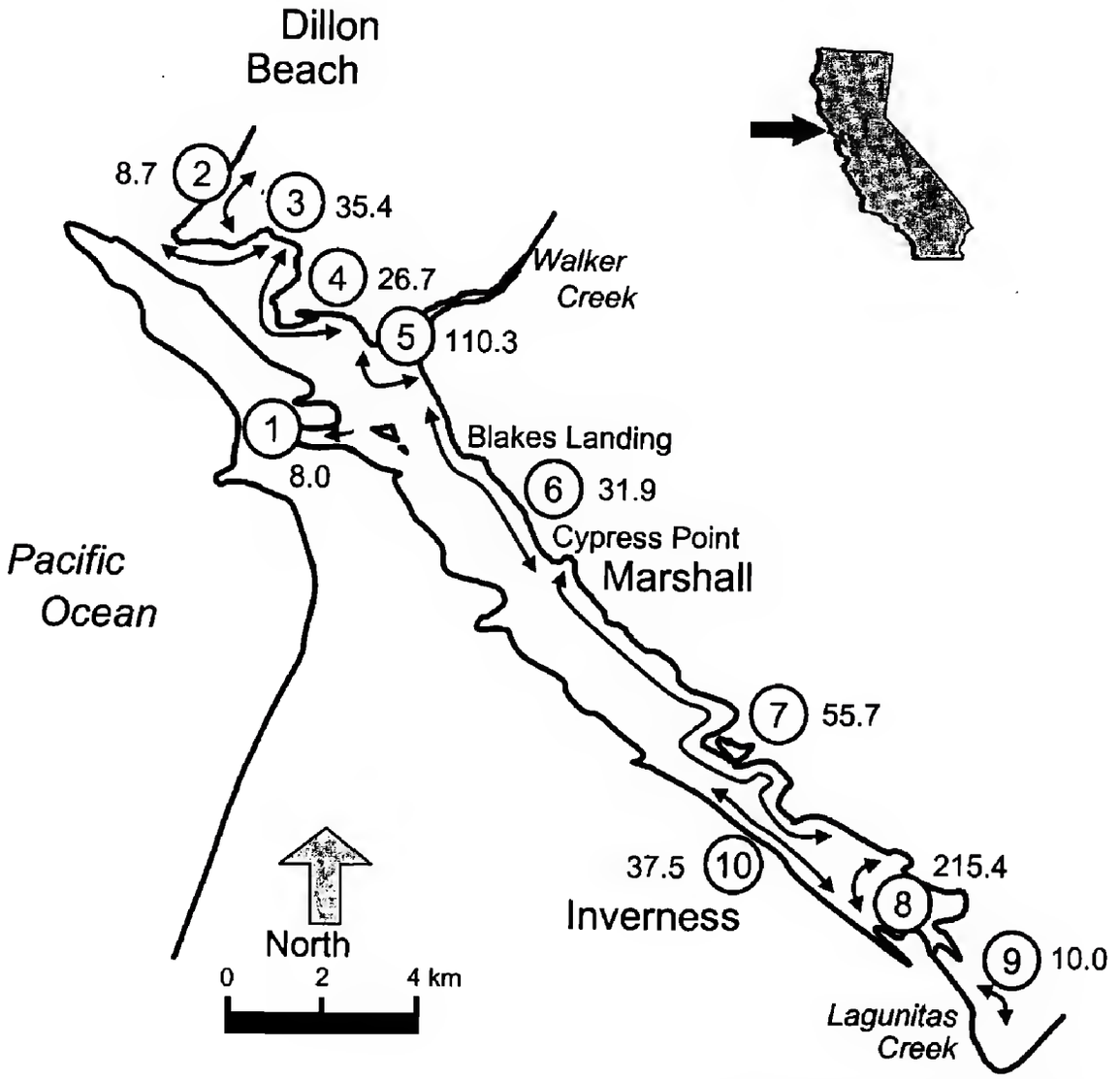

Figure 1. Shorebird count areas on Tomales Bay, California. 1, White Gulch; 2, Lawson's Meadow; 3, Sand Point; 4, Tom's Point; 5, Walker Creek delta; 6, North Marshall; 7, South Marshall; 8, Lagunitas Creek delta; 9, Giacomini Pasture; 10, Inverness shoreline. Arrows indicate length of shoreline in each count area; labels indicate extent (ha) of exposed tidal flat at MLLW.

and ephemeral streams enter the bay. Adjacent seasonal wetlands suitable for shorebirds are normally limited to about 15 ha of a 200-ha diked pasture at the south end of the bay and approximately 20 ha of wet meadow surrounded by sand dunes at the north end of the bay. Additional seasonal wetlands, used by shorebirds during periods of heavy flooding, occur in agricultural areas northeast of the bay.

Most (95%) of the annual rain falls when wintering shorebirds are present, from October through April, with 55% falling from December through February (Audubon Canyon Ranch, unpublished data). Constraints on tidal exchange with the ocean, imposed by the linear shape of the bay, interact with winter runoff to create contrasting habitats at the two ends of the bay. In the southern half of the bay, variably high levels of freshwater inflow during winter, low flows in summer, and long water-residence times result in highly variable salinities (Hollibaugh et al. 1988). Salinities range from nearly

fresh after heavy winter runoff to slightly hypersaline in late fall (Smith and Hollibaugh 1997). In northern Tomales Bay, regular tidal mixing maintains salinities that consistently reflect those of nearshore waters along the outer coast. The difference between mean high and mean low tides is about 1.1 m, with an average annual maximum tide swing of about 2.5 m (U. S. National Oceanic and Atmospheric Administration harmonics and correction tables; Tides and Currents, Nautical Software, Inc.).

METHODS

I divided Tomales Bay into 10 subareas within which all shorebirds could be counted in 60 to 90 minutes (Figure 1). These areas include almost all of the intertidal flats in the bay, with the exception of a few small areas at creek mouths along the west shore. Teams of qualified observers counted all shorebirds by species in all subareas simultaneously.

Observers counted during rising tides, at tide levels between 0.76 and 1.22 m above mean lower low water (MLLW) at Blake's Landing (Figure 1). Count-area protocols were coordinated so that adjacent areas were surveyed simultaneously. Abundances generally represented counts of foraging individuals, with estimates of large mobile flocks made only rarely. During three workshops held to examine and reduce observer bias in estimating flock size, biases were inconsistent and without a clear central tendency. Therefore observer bias was assumed not to affect overall estimates of abundance. The time and direction of all flock movements, departures, and arrivals during count periods were recorded and examined later to minimize chances of birds being double counted. Counts were conducted only on days with weather suitable for using telescopes to identify shorebirds.

Each year from 1989–90 to 1998–99, we completed approximately three counts in each of two intraseasonal periods (n = 57): early winter (mean 2.8, range 1–4; 1 November–19 December) and late winter (mean 2.9, range 2–3; 15 January–4 March). I summarized results within intraseasonal groups to compare early- and late-winter population levels. Most individual shorebirds were identified to species. Occasionally, individuals were not identified to species and were recorded in pooled species groups such Least/Western sandpiper. Individuals recorded in pooled species groups were allocated to single species groups in direct proportion to the number of identified birds of each species in each count area on each day (Page et al. 1999). Such adjustments were made, however, only if the number of identified individuals exceeded the number of undifferentiated individuals and was >50 for groups of two species or >100 for groups of three species.

Observations of shorebird flocks revealed restricted movements in the middle section of the bay. Of 19 flocks of several shorebird species observed departing as the tide inundated the feeding area at Walker Creek delta, 100% were oriented to the northwest and only one flock flew by from farther south. In southern Tomales Bay, 56 flocks of several species were observed departing north from feeding areas during rising tides, but only one flock (2%) was seen flying north past Cypress Point in Marshall (Figure 1). These observations suggest that several species winter in discrete groups. In addition, a reciprocal translocation of color-banded Dunlins, the most

abundant species in the bay, revealed that wintering populations at the two ends of the bay were separate (Kelly 2000). Therefore, I analyzed the results separately for subregions of Tomales Bay north (areas 1–6) and south (areas 7–10) of Cypress Point, Marshall, in addition to analyzing them for the bay as a whole (Figure 1).

I transformed abundance data into densities, based on the extent of exposed mudflat in each count area, estimated at MLLW with a planimeter on a bathymetric chart (Figure 1; U. S. National Oceanic and Atmospheric Administration Chart 18643, 16th ed., Dec 1995). Estimates of shorebird preferences based on densities among different habitat types may be sensitive to different measures of availability (Warnock and Takekawa 1995), particularly if birds concentrate along the edge of the rising tide (Recher 1966, Burger et al. 1977) and the linear extent of the tide line is not closely correlated with areal extent of the habitat. However, suitable shorebird habitat on Tomales Bay is limited primarily to tidal flats, and each count area represented a similar proportion of the area available for foraging along the tide line at any particular tide level. Consequently, densities based on different widths of tidal exposure did not significantly alter estimates of relative shorebird use by count area.

To examine the effects of count-area location, intraseasonal period, and year on patterns of shorebird use, I used mixed-model analysis of covariance of shorebird densities, controlling for days since the beginning of each intraseasonal (early or late winter) period and treating year as a random effect. Shorebird densities were log-transformed to improve normality and stabilize the variance of residuals. Significant count-area effects were followed by multiple pairwise comparisons within the northern and southern subregions of the bay. I inspected bivariate scatterplots of shorebird abundance on cumulative seasonal rainfall, using Cleveland's robust locally weighted regression algorithm (LOWESS; Cleveland 1979, Chambers et al. 1983), to look for nonlinear thresholds and trends. I selected this method because it uses locally weighted least squares and a robust fitting procedure to define smoothed points that are relatively insensitive to outlying values, and it allows a flexible degree of smoothing by adjusting the proportion of data scanned (f) for each fitted value. To improve the normality of abundances used in the analysis, I based trends for the Semipalmated Plover, Black Turnstone, and Least Sandpiper on the natural logarithms (ln) of the counts; distributions of other species' abundances were approximately normal without this transformation. Annual and cumulative seasonal rainfall were derived from daily rainfall measured at Cypress Point (Figure 1; Audubon Canyon Ranch, unpubl. data). I estimated annual trends in species abundance within subregions as partial regression coefficients on year, independent of the linear effect of cumulative seasonal rainfall. I compared these results with correlated trends in annual rainfall.

RESULTS

Tomales Bay supported as many as 20,689 shorebirds in early winter, with minimum numbers falling as low as 1291 in late winter. The most abundant winter shorebird in Tomales Bay was the Dunlin, accounting for

Table 1 Mean, Minimum, and Maximum Abundances of Wintering Shorebirds on Tomales Bay, 1989–90 to 1998–99[a]

Species	North bay				South bay				Baywide					
	Early winter		Late winter		Early winter		Late winter		Early winter			Late winter		
	Mean	(SE[b])	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)	Range	Mean	(SE)	Range
Black-bellied Plover *Pluvialis squatarola*	139	(11.8)	68	(7.4)***	55	(6.0)	39	(6.1)	194	(13.8)	39–327	107	(11.9)	1–258***
American Golden-Plover *Pluvialis dominica*	+	(0.1)	0	(0.0)	0	(0.0)	0	(0.0)	+	(0.1)	0–2	0	(0.0)	0–0
Pacific Golden-Plover *Pluvialis fulva*	4	(0.7)	3	(0.6)	0	(0.0)	0	(0.0)	4	(0.7)	0–12	3	(0.6)	0–11
Snowy Plover *Charadrius alexandrinus*	13	(2.9)	4	(1.9)*	0	(0.0)	0	(0.0)	13	(2.9)	0–53	4	(1.9)	0–42**
Semipalmated Plover *Charadrius semipalmatus*	14	(3.0)	3	(0.9)**	17	(4.5)	10	(3.4)	31	(5.8)	0–123	13	(3.6)	0–89**
Killdeer *Charadrius vociferus*	14	(2.9)	7	(1.3)*	8	(2.1)	2	(0.5)**	23	(4.6)	2–111	9	(1.7)	0–38**
American Avocet *Recurvirostra americana*	+	(0.1)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0–0	+	(0.03)	0–1
Greater Yellowlegs *Tringa melanoleuca*	2	(0.4)	1	(0.2)*	14	(1.6)	5	(1.1)***	16	(1.8)	3–38	6	(1.2)	0–22***
Willet *Catoptrophorus semipalmatus*	283	(25.4)	235	(18.5)	127	(20.8)	175	(18.0)	410	(26.6)	94–767	410	(24.9)	82–671
Spotted Sandpiper *Actitis macularia*	2	(0.4)	2	(0.3)	+	(0.2)	1	(0.2)	3	(0.4)	0–8	2	(0.3)	0–7*
Whimbrel *Numenius phaeopus*	1	(0.3)	1	(0.2)	+	(0.3)	0	(0.0)	1	(0.5)	0–15	1	(0.2)	0–3
Long-billed Curlew *Numenius americanus*	+	(0.1)	+	(0.1)	+	(0.1)	+	(0.2)	+	(0.1)	0–3	+	(0.1)	0–3

Marbled Godwit														
Limosa fedoa	799	(78.0)	916	(90.2)	85	(14.1)	152	(19.0)***	885	(80.4)	100–1564	1067	(96.8)	73–2233
Ruddy Turnstone														
Arenaria interpres	3	(0.8)	3	(1.2)	2	(1.7)	+	(0.1)	4	(2.0)	0–54	3	(1.2)	0–26
Black Turnstone														
Arenaria melanocephala	39	(5.5)	23	(5.1)	18	(4.9)	12	(3.4)	57	(6.6)	1–124	35	(6.0)	0–126*
Surfbird														
Aphriza virgata	1	(0.1)	+	(0.05)	0	(0.0)	+	(0.03)	+	(0.1)	0–3	+	(0.1)	0–1
Red Knot														
Calidris canutus	2	(1.0)	2	(0.9)	0	(0.0)	0	(0.0)	2	(1.0)	0–19	2	(0.9)	0–18
Sanderling														
Calidris alba	393	(30.1)	559	(56.3)*	69	(12.6)	112	(18.5)	462	(31.3)	170–829	671	(62.2)	116–1479**
Western Sandpiper														
Calidris mauri	1019	(159.4)	811	(105.5)	564	(93.1)	404	(131.5)	1583	(192.1)	198–3962	1216	(170.9)	222–3553
Least Sandpiper														
Calidris minutilla	642	(78.6)	279	(59.0)***	564	(93.1)	199	(58.6)**	1290	(164.3)	181–3811	477	(103.8)	0–1822***
Dunlin														
Calidris alpina	3370	(342.9)	1102	(199.9)***	2930	(411.2)	633	(157.7)***	6200	(684.4)	1013–12,762	1735	(334.3)	5–6951***
Dowitchers														
Limnodromus spp.	29	(6.2)	15	(7.6)	55	(12.0)	17	(6.6)**	84	(13.1)	0–315	32	(10.9)	0–254**
Common Snipe														
Gallinago gallinago	8	(2.2)	4	(2.0)	+	(0.1)	1	(0.6)	8	(2.1)	0–38	5	(2.0)	0–57
Red-necked Phalarope														
Phalaropus lobatus	+	(0.1)	0	(0.0)	0	(0.0)	0	(0.0)	+	(0.1)	0–4	0	(0.0)	0–0
Red Phalarope														
Phalaropus fulicaria	0	(0.0)	+	(0.1)	0	(0.0)	0	(0.0)	0	(0.0)	0–0	+	(0.1)	0–3
Total	6709	(450.8)	4062	(343.2)***	5047	(570.4)	1877	(332.0)***	11,756	(917.0)	4827–20,689	5939	(604.2)	1291–13,787***

[a]Based on 29 counts in early winter and 28 counts in late winter. Asterisks specify significant differences between early and late winter: *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$. +, Mean abundance <0.5. See Figure 1 for count areas included in north and south bay subregions.

[b]SE, standard error.

over half (53%) of all shorebirds in early winter and nearly a third (29%) in late winter. The second most abundant species was the Western Sandpiper, representing 13% in early winter and 20% in late winter (Table 1). The total number of shorebirds declined significantly from early to late winter in northern ($t = 4.67$, df = 56, $P < 0.001$) and southern ($t = 4.80$, df = 54, $P < 0.001$) Tomales Bay, as did several individual species (Table 1). In contrast to this pattern, the Marbled Godwit increased significantly during winter in southern Tomales Bay, and the Sanderling increased significantly in the northern bay and baywide (Table 1).

Maximum annual abundance varied by a factor of 8.9 in the Dunlin, 8.0 in the Marbled Godwit, 6.7 in the Killdeer, 6.2 in the Greater Yellowlegs, 4.4 in the Sanderling, 4.2 in the Western Sandpiper, 3.5 in the Spotted Sandpiper, 3.4 in the Willet, 3.2 in the Black Turnstone, 2.3 in the Black-bellied Plover, and 4.1 in all species combined. Maximum annual abundance varied substantially more in some species, by a factor of 17.8 in the dowitchers, 16.7 in the Semipalmated Plover, 15.5 in the Least Sandpiper, and 12.0 in the Pacific Golden-Plover, reflecting proportional changes in smaller populations and/or difficulties in detecting inconspicuous birds. Densities in most species varied significantly from year to year (Table 2).

Winter shorebird densities differed significantly from count area to count area within both subregions of Tomales Bay (Table 2). Most species showed significant annual and intraseasonal shifts in distribution of densities among count areas, indicated by significant interaction terms in analyses of covariance (Table 2). Although average midwinter declines in count-area density, weighted equally for large and small areas, were significant only for the Dunlin and dowitchers (Table 2), several species decreased significantly in overall abundance on the basis of north bay, south bay, and baywide totals (Table 1).

Northern Tomales Bay supported more shorebirds, overall, than southern Tomales Bay in early winter ($t=2.92$, df=55, $P<0.05$) and late winter ($t = 4.57$, df = 55, $P < 0.001$). The Walker Creek (area 5) and Lagunitas Creek (area 8) deltas not only supported the greatest concentrations of shorebirds but also the highest densities for more shorebird species than other areas in Tomales Bay (Table 2, Figure 2). The northeast shoreline from Sand Point (area 3) to Vincent's Landing south of Tom's Point (area 4) also supported relatively high abundances of several species (Table 2, Figure 2). Shorebird use of seasonal wetlands at Lawson's Meadow (area 2) and Giacomini Pasture (area 9) was highly variable; consequently, mean shorebird densities in these areas could not be distinguished clearly from those in other areas (Table 2). Greater Yellowlegs concentrated primarily in the extreme south end of Tomales Bay, while Sanderlings and Marbled Godwits concentrated primarily at the north end of the bay (Figure 2). The Pacific Golden-Plover, Snowy Plover, and Red Knot occurred exclusively in northern Tomales Bay.

Cumulative seasonal rainfall was associated with significant decreases in the use of Tomales Bay by most shorebird species but significant increases by the Marbled Godwit and Sanderling (Figure 3). Bivariate plots suggested that 25–30 cm of rain must fall in a season to trigger the declines of the Western Sandpiper, Least Sandpiper, and dowitchers (Figure 3). Alternatively, rainfall correlations might be the result of intraseasonal changes in abundance

Table 2 Effects of Count Area (A), Intraseasonal Period (S), and Year (Y, Random Effect) on Densities of Wintering Shorebirds in Tomales Bay[a]

	North bay count areas							South bay count areas					
Species	ANCOVA[b] (n = 330)		1	2	3	4	5	6	ANCOVA[b] (n = 202)		7	8	9	10
Black-bellied Plover	A**, Y, AY**, ASY**		D	C	**A**	BC	BD	BCD	A**, Y**, AY**		**A**	**A**	**AB**	B
Semipalmated Plover	A**, Y**, AS*, AY*, ASY**	(E)	B	B	**A**	B	B	B	Y**, AY**, ASY**					
		(L)	**A**	**A**	**A**	**A**	**A**	**A**						
Killdeer	A**, Y**, AY**, SY**, ASY**		B	**A**	B	B	B	B	A*, Y**, AY**, SY**, ASY**		**A**	B	**AB**	B
Willet	A**, Y**, AS*, ASY	(E)	**AB**	**B**	**A**	**A**	**AB**	B	Y**, AS, AY**, ASY**	(E)	**A**	**A**	**A**	**A**
		(L)	**A**	**A**	**A**	**A**	**A**	B		(L)	B	**A**	**AB**	**AB**
Marbled Godwit	A**, Y**, AY**, SY		BC	**ABC**	**A**	**A**	**AB**	C	Y**, AS**, AY*	(E)	**A**	**A**	**A**	**A**
										(L)	B	**A**	B	**AB**
Black Turnstone	A**, AY*, ASY*		B	B	**A**	B	**A**	B	A**		**A**	**AB**	C	B
Sanderling	A**, AS**, AY**	(E)	C	C	**AB**	**A**	BC	C	ASY**					
		(L)	**AB**	C	**A**	**ABC**	**ABC**	C						
Western Sandpiper	A**, AY**, ASY*		B	**AB**	B	**A**	**A**	B	A**, Y, AY*, SY, ASY**		B	**A**	**ABC**	C
Least Sandpiper	A**, Y**, AS**, AY*, SY*	(E)	**A**	**AB**	B	**A**	**A**	B	A**, Y**, AS**	(E)	**A**	**A**	B	B
		(L)	**A**	**AB**	B	B	B	B		(L)	A	**AB**	**AB**	B
Dunlin	A**, S, Y**, AS**, AY**	(E)	C	**ABC**	B	B	**A**	C	A**, Y**, AS*, AY**, SY**, Y**	(E)	B	**A**	**ABC**	C
		(L)	BC	**ABC**	**A**	B	**A**	C		(L)	B	**A**	**AB**	B
Dowitcher species	A**, Y**, S, AY**, SY**, ASY**		BC	**ABC**	**AB**	B	**A**	B	Y*, AY**, SY**, ASY**					
All Shorebirds	A**, Y*, AY**, AS, ASY**		B	**ABC**	**AB**	**AB**	**A**	C	A**, Y**, AY**, ASY*		B	**A**	**ABC**	C

[a]Significant fixed effects of count area are followed by multiple pairwise comparisons, computed separately for early (E) and late winter (L) when AS interaction is significant; areas with the same letter within north bay or south bay subregions are not significantly different (Bonferroni experimentwise error $P > 0.05$) and are ranked: A > B > C > D. Area preferences, suggested by means not significantly different from highest means, are in boldface. See Figure 1 for count area locations.

[b]Mixed-model analysis of covariance; covariate is days since beginning of early winter (November–December) or late winter (January–February) period; each effect listed by letter code has significant F ratio ($P < 0.05$); *$P < 0.01$, **$P < 0.001$.

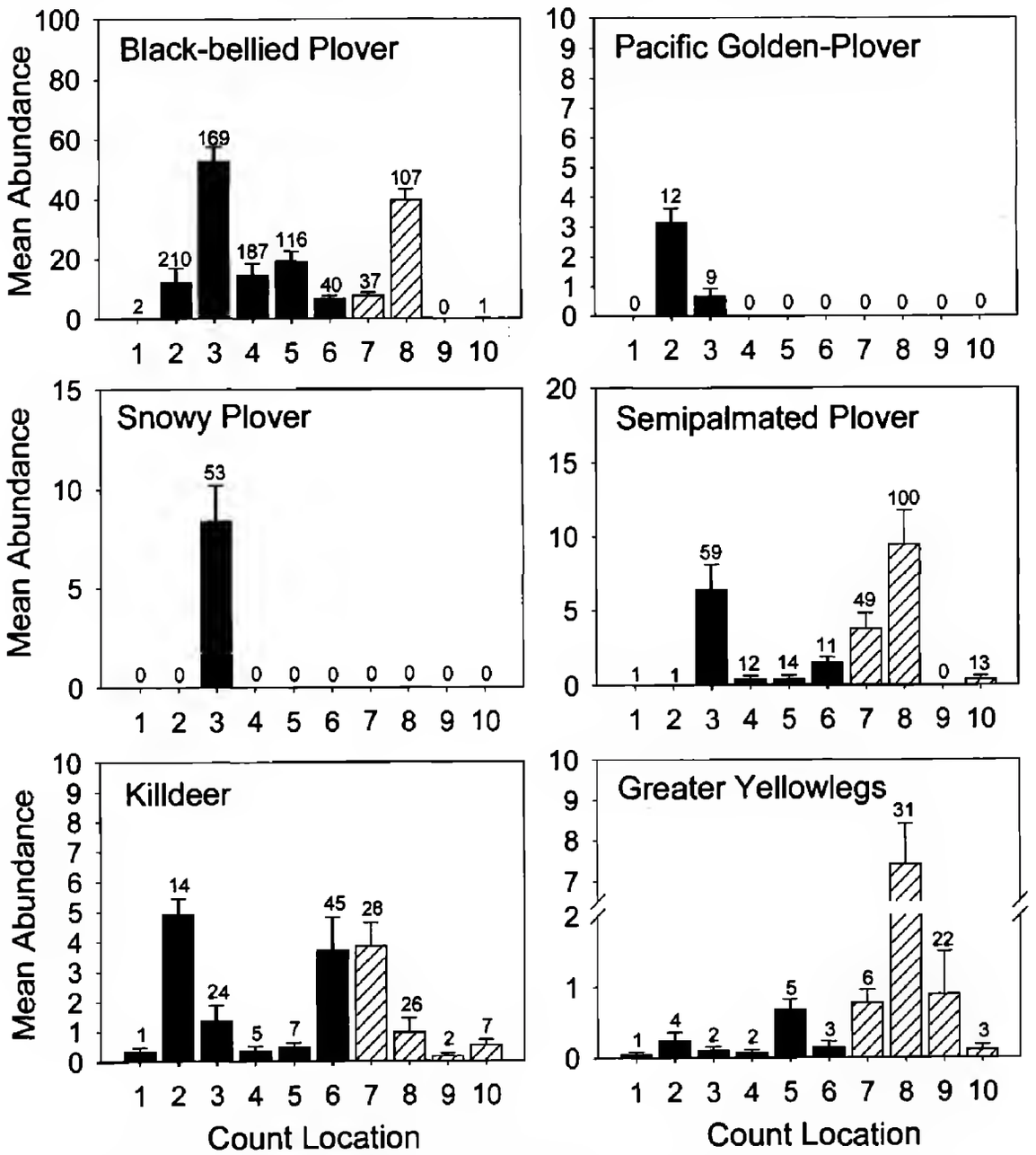

Figure 2. Mean winter abundance of shorebirds, by count area, in northern (solid bars) and southern (striped bars) Tomales Bay, California, 1989–90 to 1998–99. Error bars indicate standard errors; numbers above bars indicate maximum abundance observed during the study period.

unrelated to rainfall. When count date and year were included as covariates, residual (uncorrelated) effects of cumulative seasonal rainfall in the north bay were significant for the Black-bellied Plover ($b = -1.31$, $P < 0.05$), Willet ($b = 2.56$, $P < 0.05$), Dunlin ($b = -27.30$, $P < 0.05$), and (ln) Least Sandpiper ($b = -0.06$, $P < 0.001$); residual effects in the south bay were significant for the (ln) Least Sandpiper ($b = -0.06$, $P < 0.05$). Conversely, intraseasonal trends independent of cumulative seasonal rainfall and year were significant for the Willet (north bay: $b = -1.74$, $P < 0.01$; south bay: $b = 1.01$, $P < 0.05$), Dunlin (north bay: $b = -17.96$, $P < 0.01$; south bay: $b = -22.25$; $P < 0.01$), and (ln) Black Turnstone (south bay: $b = -0.03$; $P = 0.01$).

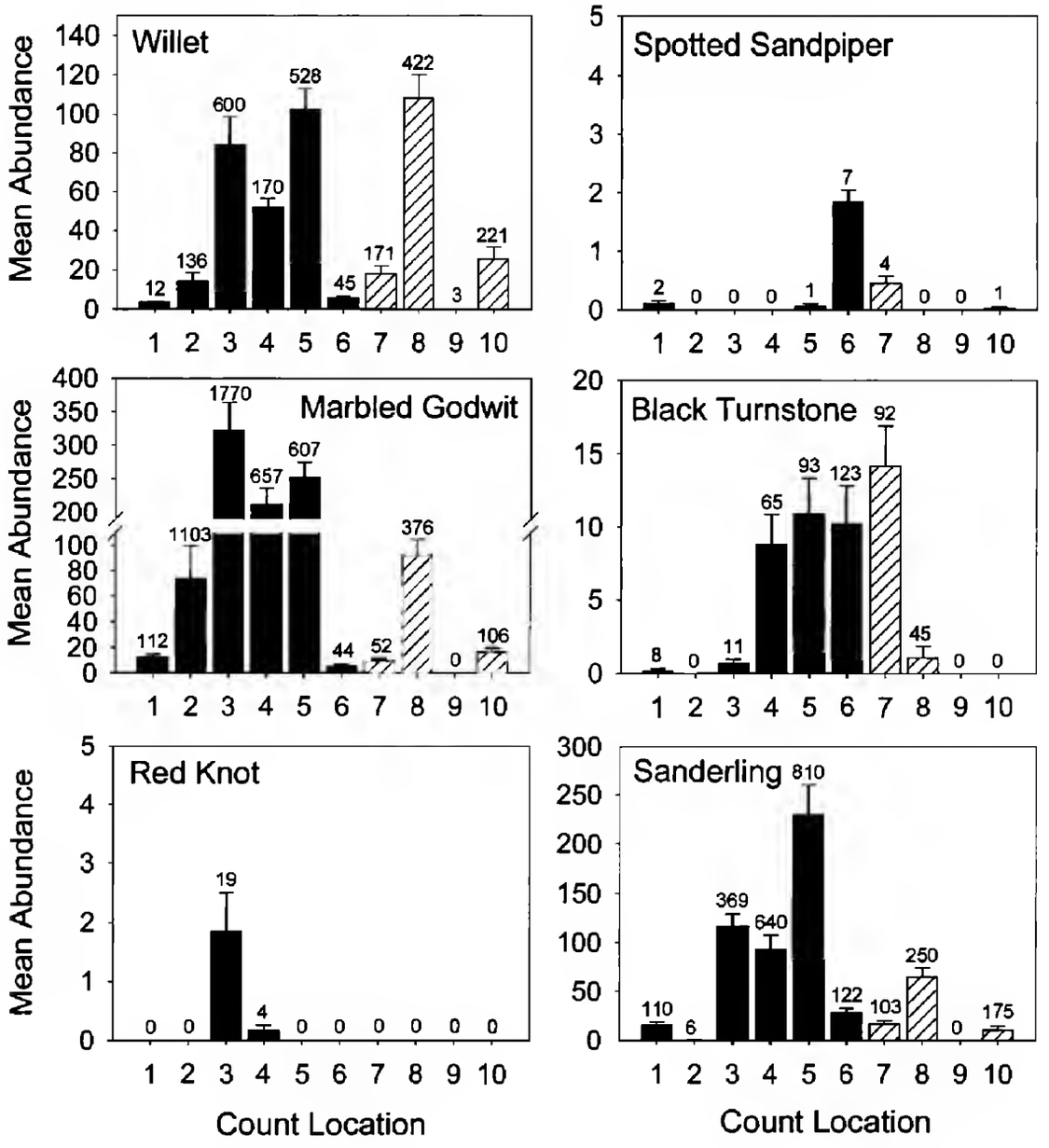

Figure 2 (*continued*).

After the linear effects of cumulative seasonal rainfall and date are accounted for, residual annual trends were not significant ($P > 0.05$), except in five cases. In the south bay, significant linear trends independent of cumulative seasonal rainfall and date suggested 10-year declines in the Black-bellied Plover ($b = -5.62$; $P < 0.001$), (ln) Semipalmated Plover ($b = -0.32$; $P<0.05$), (ln) Least Sandpiper ($b = -0.32$; $P<0.05$), and Dunlin ($b = -223.21$; $P < 0.001$), and increases in the Willet ($b = 14.43$, $P < 0.01$) and Marbled Godwit ($b = 10.68$, $P < 0.05$). In northern Tomales Bay, significant 10-year declines independent of cumulative rainfall and date were evident in the Willet ($b = -13.10$, $P < 0.05$) and Dunlin ($b = -330.26$, $P < 0.01$). Although these changes in shorebird use were independent of cumulative seasonal rainfall, they might have reflected escalating effects of successive increases in annual rainfall ($b = 5.3$ cm/year, $P < 0.05$; Figure 4). The 10-year duration of this study was too short to distinguish between the influence of annual rainfall trend and possible underlying (correlated) population

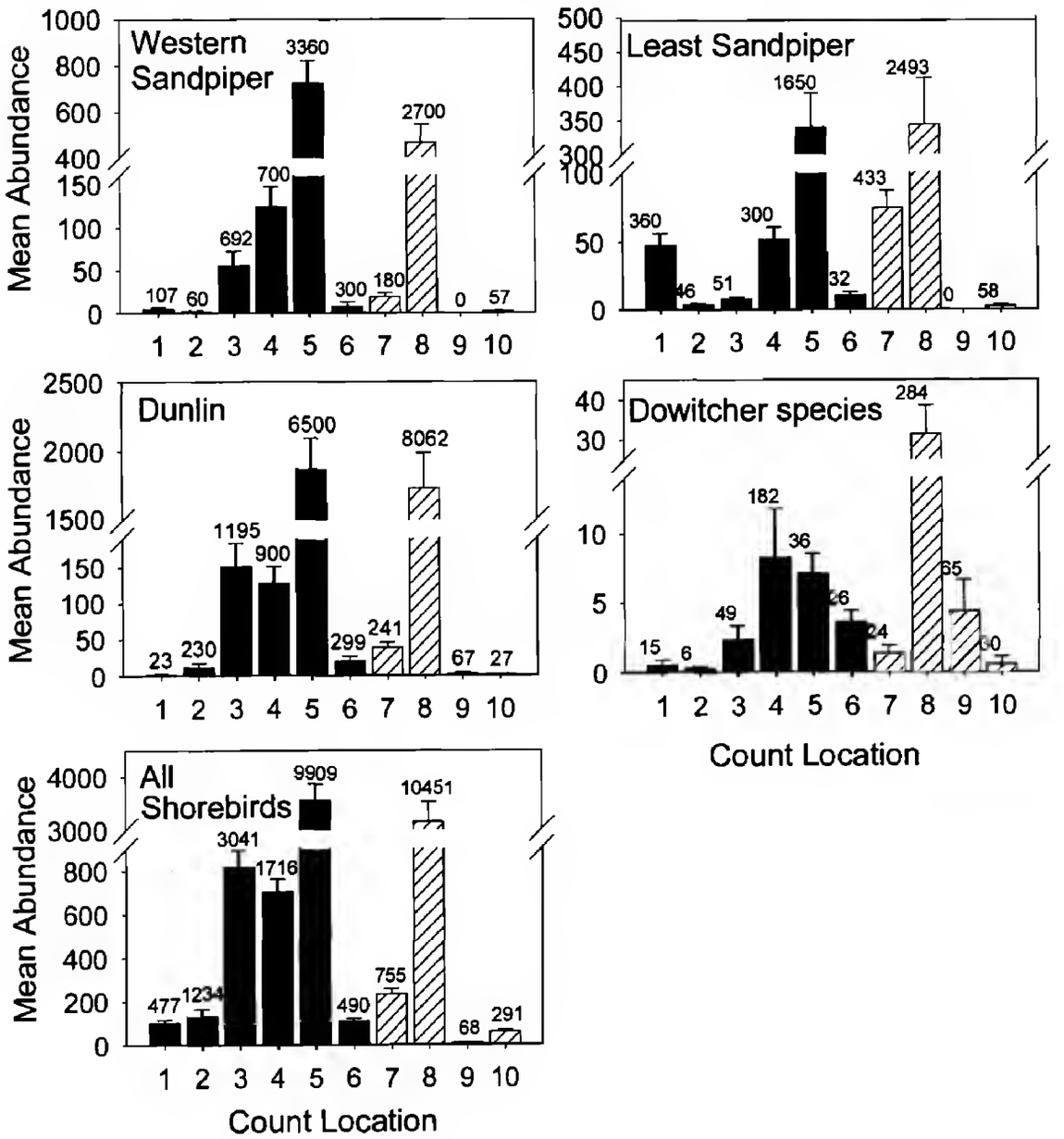

Figure 2 (*continued*).

trends. Annual trends in maximum (fall) abundance were nonsignificant for all species ($n = 10$, $P > 0.05$), after differences associated with cumulative rainfall through November and in the previous year were accounted for.

DISCUSSION

Winter Abundance and Distribution

My results confirm Tomales Bay as a wetland of "regional" importance on the basis of its supporting more than 20,000 shorebirds, a criterion for inclusion in the WHSRN (Harrington and Perry 1995, Page and Shuford 2000). Relative abundances of wintering shorebird species were similar to those reported for other Point Reyes area wetlands (Page et al. 1983, Page et al. 1992). Concurrent counts conducted in 1989–90 in other nearby wetlands indicated that Tomales Bay supported approximately a third of the

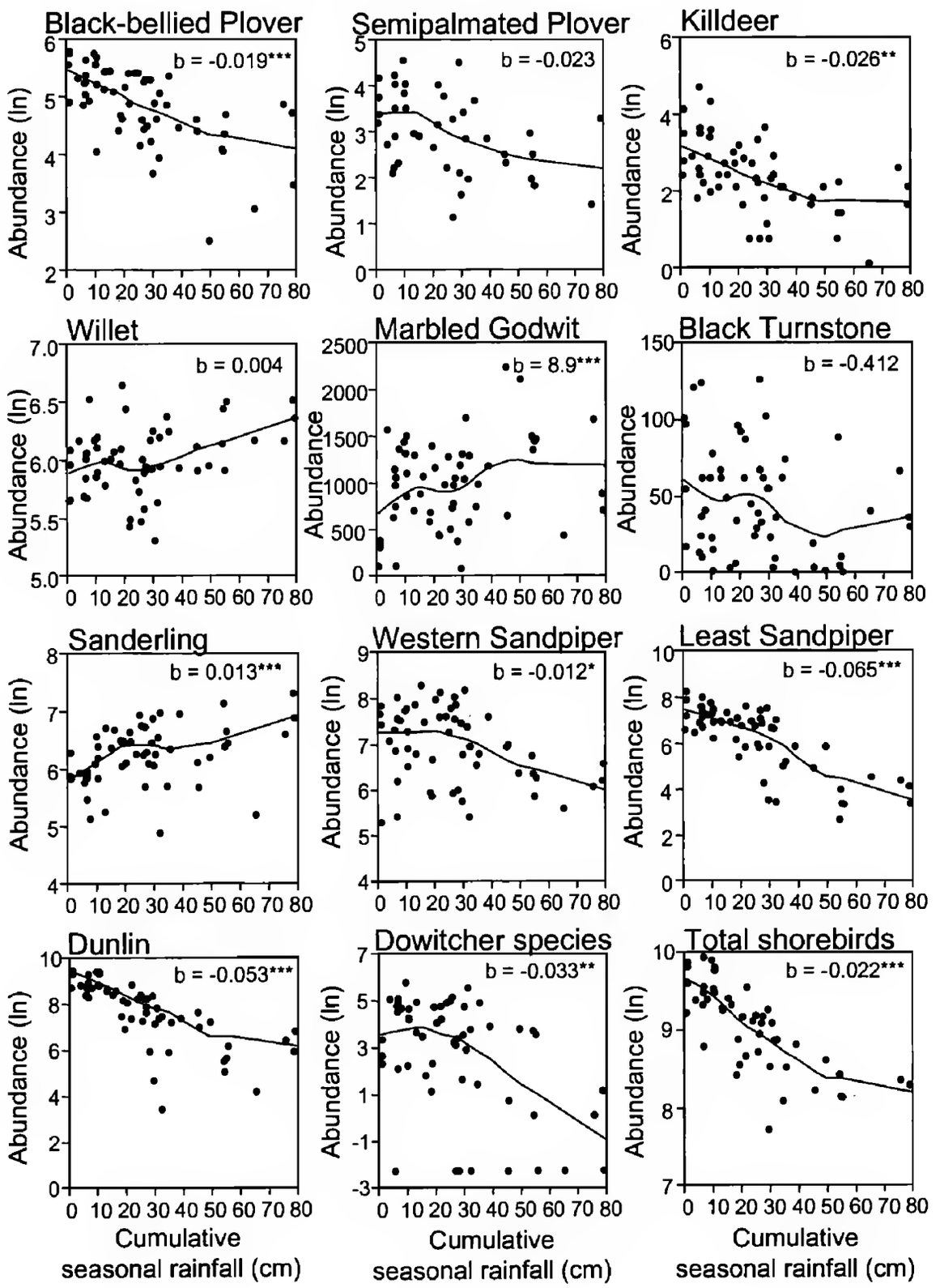

Figure 3. Bivariate plots of baywide shorebird abundance (ln) on cumulative seasonal rainfall in Tomales Bay. Lines represent LOWESS trends, with smoothing parameter $f = 0.6$. Slope of linear regression (b) is indicated in each plot: $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$. Between northern and southern Tomales Bay linear slopes did not differ significantly ($P < 0.05$). Abundances of the Marbled Godwit and Black Turnstone are not ln-transformed.

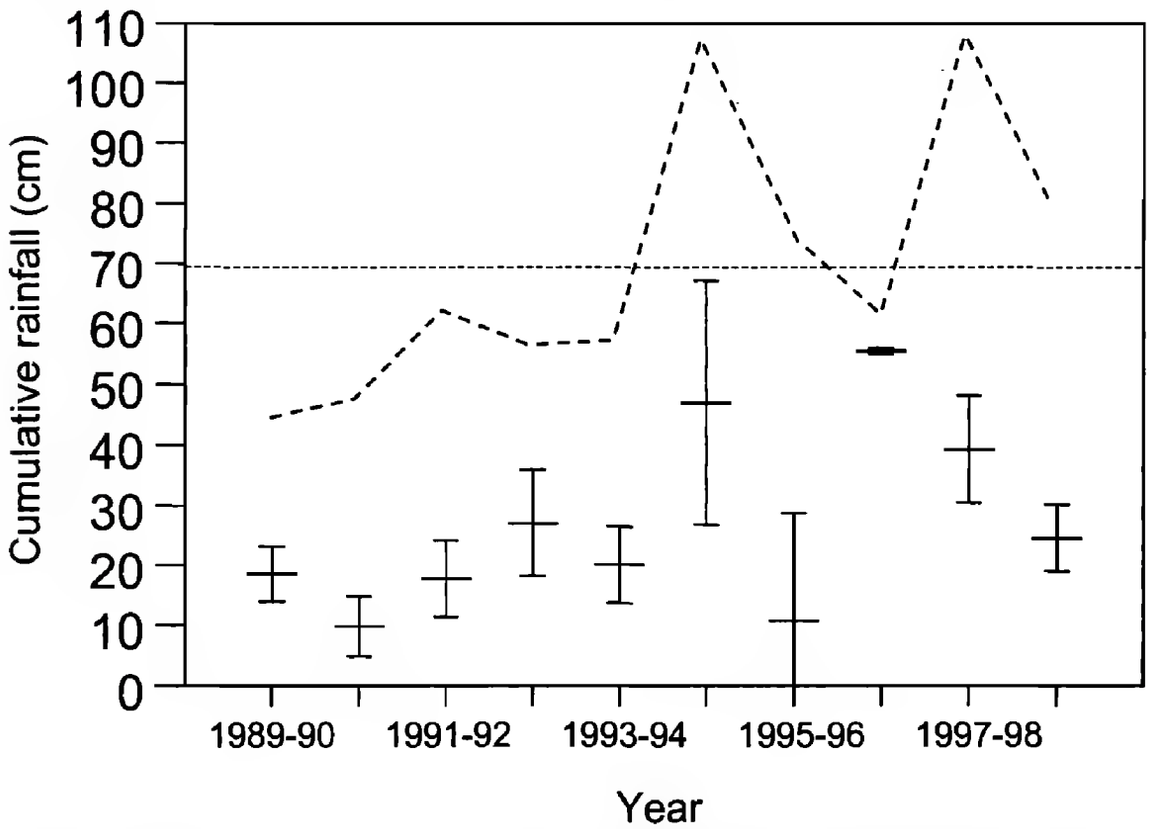

Figure 4. Means and standard errors of cumulative seasonal rainfall measured on shorebird count days on Tomales Bay, from 1989–90 to 1998–99. Dashed line indicates total annual rainfall (July–June) across years. Horizontal dashed line indicates long-term average annual rainfall.

wintering shorebirds in the greater Point Reyes area, which includes Bolinas Lagoon, Drake's and Limantour esteros, Estero Americano, and Bodega Harbor (this study and unpublished data from P. Connors and G. Page).

The only other baywide counts of shorebirds in Tomales Bay are aerial surveys conducted from August 1968 to April 1970 (Smail 1972). Unknown differences in detectability, however, preclude comparisons with these aerial counts, which detected far fewer shorebirds than my study. The aerial counts did indicate that Tomales Bay supported more shorebirds than other Point Reyes area wetlands, including Drake's and Limantour esteros and Bolinas Lagoon (Smail 1972). Jurek (1974) conducted counts at the Walker Creek delta from 1969–70 to 1973–74 (area 5, Figure 1) and reported abundances that do not differ significantly from those I report; however, population trends could be obscured by substantial variability in shorebird use from year to year and count area to count area (Table 2).

Among several species, shorebirds wintering at the northern and southern ends of Tomales Bay appear to represent different groups (this study, Kelly 2000). The apparent separation of shorebirds into local wintering groups in the northern and southern portions of Tomales Bay is consistent with the spatial scale of winter site fidelity demonstrated by other studies along the California coast (Kelly and Cogswell 1979, Warnock and Takekawa 1996).

Although the composition of shorebird species in the northern and southern portions of the bay was similar, habitat conditions differed substan-

tially. Habitat differences resulted from spatial and temporal hydrographic gradients in the estuary that affect salinity (lower and more variable in the south), sediment size (finer in the south), turbidity (greater and more variable in the south), and flood disturbance (more frequent and intense in the south; Daetwyler 1966, Hollibaugh et al. 1988). Such differences are likely to influence the composition, abundance, or availability of invertebrate prey (Johnson 1971, Wolff 1969, 1983) and, consequently, may be associated with spatial or temporal patterns of shorebird use. For example, Marbled Godwits concentrated in northern Tomales Bay, where substrates are composed predominantly of well-sorted medium and fine sand, but not in the southern portion of the bay, where substrates are composed of finer particles (Daetwyler 1966). Within the Point Reyes/Bodega area, godwits also concentrate in nearby Bodega Harbor (Page et al. 1983), where sediments are similar to substrates in northern but not southern Tomales Bay (Standing et al. 1975).

Midwinter influxes of the Sanderling and Marbled Godwit were significantly associated with cumulative seasonal rainfall. These species occur commonly on nearby beaches along the outer coast and are known to switch habitats with the tides (Shuford et al. 1989, Connors et al. 1981, Colwell and Sundeen 2000). My study suggested an intraseasonal influx of these species into estuarine tide flats, correlated with cumulative rainfall and independent of tides. Connors et al. (1981) linked tide-associated movements between habitats with enhanced foraging profitability and found that variation in the timing of these movements varies seasonally to enhance profitability. Thus midwinter influxes of Sanderlings and Marbled Godwits into Tomales Bay might reflect an intraseasonal increase in the profitability of foraging in tide flats over foraging on beaches. Alternatively, movements into Tomales Bay may result from a thermal advantage of refuge from harsher weather along the outer coast.

The significant midwinter declines in several species using Tomales Bay suggest local or regional movements to alternative wintering areas. At Humboldt Bay Colwell (1994) also reported midwinter declines in several shorebirds. Nonmigratory movements of wintering shorebirds, ranging from use of local alternative habitats to interestuarine movements to large-scale flights from the coast inland, have been documented at several California estuaries, but in different areas intraseasonal patterns are not necessarily similar (Page et al. 1979, Ruiz et al 1989, Shuford et al. 1989, Warnock et al. 1995).

Four of six principal wetlands in the Point Reyes/Bodega area are considered, independently, to have potential regional importance by the WHSRN (Harrington and Perry 1995, Page et al. 1999). These are Bolinas Lagoon (Page et al. 1979), Drake's and Limantour esteros (Page et al. 1983, Shuford et al. 1989), Tomales Bay (this study), and Bodega Harbor (Page et al. 1983, Ruiz 1987). The closeness of these areas, along with other locally important wetlands, within approximately 60 km of coast line indicates substantial importance of this area to wintering and migrating shorebirds. Movements of wintering shorebirds among wetlands in the Point Reyes/Bodega area have been suggested by my results and by those of others (Page et al. 1979, Myers et al. 1980, Shuford et al. 1989, Ruiz et al.

1989). Although strong site fidelity often distinguishes wintering groups of coastal shorebirds (Warnock and Takekawa 1996, Kelly 2000), the ability to respond with intraseasonal or episodic movements among wetlands may be crucial to maximizing winter survival in the face of unpredictable changes in foraging conditions (Connors et al. 1981, Myers 1980, Ruiz et al. 1989, Colwell 1993, Warnock et al. 1995). Thus, regional complexes of wetlands such as those in the Point Reyes/Bodega area may need broad protection and cooperation by the numerous agencies responsible for their management (Laubhan and Fredrickson 1993).

Page et al. (1992) reported on the use of Tomales Bay by migrating shorebirds in the context of other sites in the Pacific Flyway. Further information on shorebird use during spring and fall is needed for the importance of Tomales Bay to migrating shorebirds to be understood fully. The spatial scale and flexibility of stopover-site selection by migrating shorebirds within systems of coastal wetlands is poorly understood but might involve short-flight hopping (Iverson et al. 1996) or local movements related to changing habitat conditions, as found at inland wetlands (Skagen and Knopf 1993, 1994). If so, Point Reyes/Bodega area wetlands may provide extended stopover support for migrating shorebirds.

Conservation Implications

Shorebirds tend to concentrate where the density (Goss-Custard et al. 1977, Bryant 1979) or availability (Recher 1966, Goss-Custard 1984) of invertebrate prey is greatest. Midwinter declines in several shorebird species observed in this study may be associated with the adverse effects of heavy freshwater runoff and associated sediment deposition on prey (Wolff 1983, Holland 1985, Anima et al. 1988, Nordby and Zedler 1991). Because of water-residence times as long as four months, prey in southern Tomales Bay may be particularly vulnerable to the effects of toxic spills or anthropogenic eutrophication (Smith and Hollibaugh 1989, 1997). Midwinter changes in shorebird use of key feeding areas at Lagunitas and Walker creeks are consistent with a hypothesis that deposition of sandy sediment during heavy runoff reduces the suitability of some areas to foraging shorebirds. Core samples collected in these areas 4–7 weeks after a major flood in 1982 revealed a surface layer of sandy material that was several centimeters thick and virtually devoid of invertebrates (Anima et al. 1988). Gerstenberg (1979) reported reduced shorebird use in Humboldt Bay after siltation of tide flats during heavy rains. Quammen (1982) found reduced feeding success and abandonment of preferred feeding areas by Dunlins, Western Sandpipers, and dowitchers when tidal feeding areas were treated with a thin layer of sand. Periods of increased sedimentation in Tomales Bay have been associated with logging and intensive farming in the watershed (Rooney and Smith 1999) and could also result from development, overgrazing, or other disturbance of upland soils (Storm 1972).

Daily, tidal, or intraseasonal movements of shorebirds to alternative sites in seasonal wetlands and upland fields have been reported in several areas along the central and northern coast of California (Gerstenberg 1979, Ruiz et al. 1989, Ramer et al. 1991, Colwell 1993). Near Tomales Bay, however, alternative foraging areas are relatively limited, and use of alternative

habitats was generally limited to seasonal wetlands at Lawson's Meadow and Giacomini Pasture (Figure 1). Breaching levees that isolate the Giacomini Pasture would restore approximately 150 ha of tidal marsh and at least 36 ha of tidal flats (elevation less than 1.2 m above MLLW) for shorebirds at the southern end of the bay (Philip Williams and Associates et al. 1993). The protection of routinely used seasonal wetlands at Lawson's Meadow adjacent to the north end of the bay may be especially important. During heavy rainfall and flooding, some shorebirds flew to seasonal wetlands 5–15 km northeast of the bay (pers. obs.).

Direct disturbance by people or dogs can have detrimental effects on the continuing use of foraging (Burger 1986, Burger and Gochfield 1991) and roosting (Burger 1981, Kirby et al. 1993) areas by wintering shorebirds. In Tomales Bay, aggregations of roosting and feeding shorebirds along the shoreline below sand dunes at Brazil Beach, and on offshore tide flats north of Tom's Point (areas 3 and 4, Figure 1), were frequently disturbed by people from an adjacent 1000-site campground (Shannon and Associates 1998), who come for clamming or other activities (pers. obs.; Page and Shuford 2000). Dune beaches near the mouth of Tomales Bay may provide critical winter habitat for the threatened Western Snowy Plover (*Charadrius alexandrinus nivosus*; U.S. Fish and Wildlife Service 1995). Direct disturbance of roosting and feeding Snowy Plovers by recreational users in this area was evident during winter; during spring and summer such disturbance may prevent nesting by this species in otherwise suitable habitat (Page and Shuford 2000).

Gulls may interfere with shorebird foraging (Thompson and Lendrem 1985, Warnock 1989, Amat and Aguilera 1990). During winter low tides at the Walker Creek delta (area 5, Figure 1), large concentrations of gulls were inversely correlated with shorebird use of exposed tidal flats, suggesting that gulls displaced shorebirds from otherwise suitable foraging habitat (Kelly et al. 1996). The gulls arrived daily from a garbage dump approximately 20 km to the northeast. Possible indirect adverse effects of local landfills on shorebird use of estuaries should be investigated further, and the use of such landfills by wintering gulls could be reduced.

Currently, leases for commercial oyster culture occupy 208 ha of Tomales Bay, but the limit placed on mariculture leases by the Marin County local coastal plan is 365 ha. (Tom Moore, Calif. Dept. Fish and Game, pers. comm.). Shorebirds' use of open tide flats decreases when these are developed for mariculture (Kelly et al. 1996). The two most abundant shorebirds in Tomales Bay, the Dunlin and Western Sandpiper, avoided areas devoted to mariculture significantly, although Willets were attracted to oyster plots. Expansion of mariculture, or its redistribution to be concentrated more heavily on particular tidal strata, could further reduce foraging opportunities and possibly abundances of wintering shorebirds. The occasional use by roosting Dunlin and Western Sandpipers of floating oyster culture bags in subtidal areas during high tides (pers. obs.) suggests possible benefits to shorebirds.

The invasive nonindigenous European green crab (*Carcinus maenas*) has become established in Tomales Bay and can alter the abundances of benthic invertebrate prey dramatically, although the consequences for shorebirds

are unknown (Grosholz and Ruiz 1995, Grosholz et al. 2000). The closeness of San Francisco Bay implies a high potential for invasion by nonindigenous cordgrass (*Spartina alterniflora*), which is established there and known to affect shorebirds adversely (Goss-Custard and Moser 1988, Daehler and Strong 1996). These concerns, along with those related to watershed effects, limited availability of alternative habitats, and human disturbance associated with recreation, mariculture, and garbage dumps, indicate broad management needs for protecting shorebird foraging areas in Tomales Bay.

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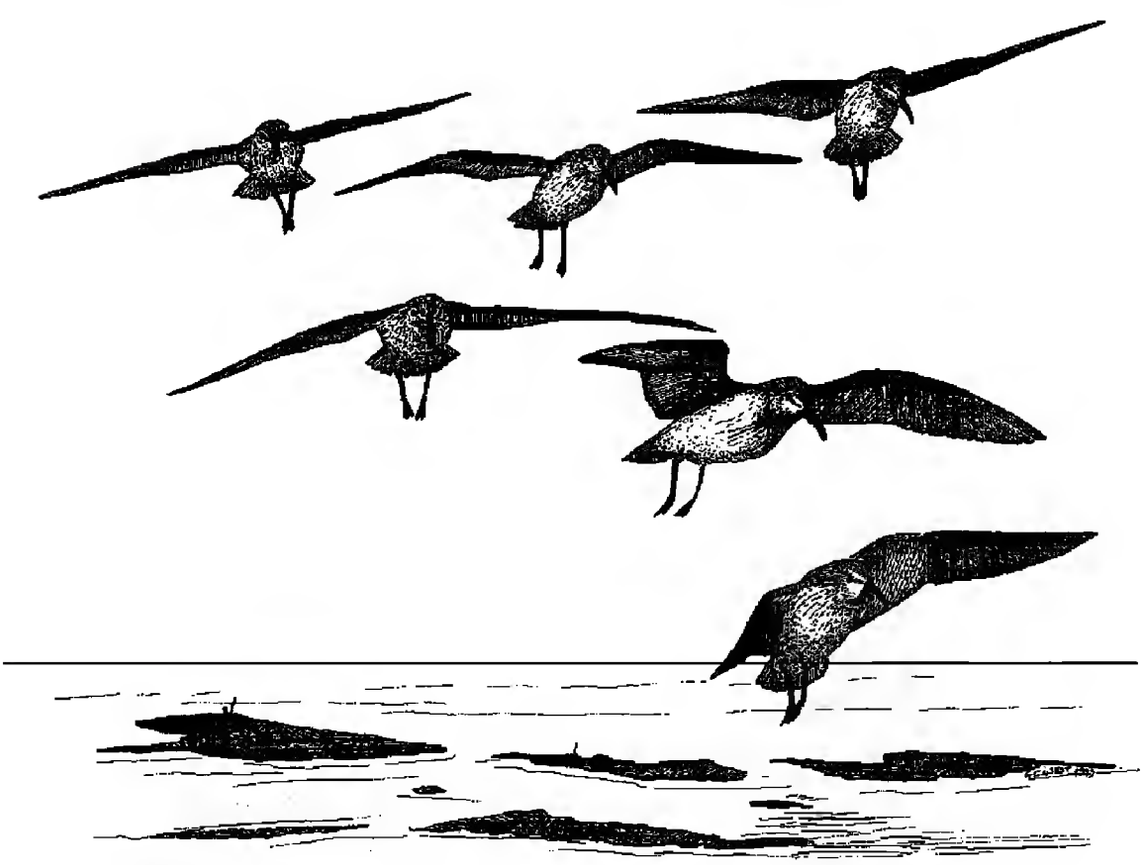

Western Sandpipers

Sketch by George C. West

A TARGETED MIST NET CAPTURE TECHNIQUE FOR THE WILLOW FLYCATCHER

MARK K. SOGGE, JENNIFER C. OWEN, EBEN H. PAXTON, SUZANNE M. LANGRIDGE, and THOMAS J. KORONKIEWICZ, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station, P. O. Box 5614, Flagstaff, Arizona 86011 (current address of Owen Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, Mississippi 39406-5018; current address of Langridge Department of Environmental Studies, University of California, Santa Cruz, California 95064)

ABSTRACT: We developed a targeted mist-netting technique designed to capture Willow Flycatchers (*Empidonax traillii*) at their breeding sites. The technique uses a variety of conspecific vocalizations to lure territorial flycatchers into mist nets. Songs and calls are broadcast from a portable CD player with speakers placed on both sides of the net. By playing vocalizations commonly heard during territorial interactions, and switching the sound output from one speaker to the other, flycatchers are readily drawn into the nets. This capture technique is highly effective, captures birds of both sexes, and worked at sites throughout the Willow Flycatcher's breeding range and on its Central American wintering grounds.

Mist netting is an important tool in many avian research projects. Passive netting by deploying and periodically checking nets works well for many studies, especially those set where vegetation is relatively short (approximately net height), the target species are active at the heights sampled by the net, and/or when multiple bird species are sought. Because these conditions do not apply to all areas or studies, targeted trapping methods have been developed for many species (e.g., see McClure 1984). By exploiting behavioral characteristics of a particular species, targeted techniques can be especially effective, even under difficult netting conditions.

Breeding Willow Flycatchers (*Empidonax traillii*) can be captured readily via passive mist netting, especially in relatively short, linear habitats or where nets can be placed near active nests (Sedgwick and Klus 1997). In 1996, we initiated a large-scale Willow Flycatcher research program that required the capture of hundreds of adult flycatchers over much of the species' range. Furthermore, we needed to capture both male and female flycatchers to study sex-based survivorship and movements. This was especially challenging in habitats where thick vegetation in the lower strata and tightly interwoven upper-canopy vegetation often limit the number and location of net lanes. The Southwestern Willow Flycatcher (*E. t. extimus*), our primary target bird, is a federally listed endangered species, so the technique also had to minimize damage to habitat and pose little risk of capture-related injury.

The Willow Flycatcher is an aggressively territorial species (Sedgwick 2000, Sogge 2000), singing and approaching in response to playback of conspecific songs (*fitz-bews*) and calls. This behavior underlies current survey protocols (Sogge et al. 1997) and suggests it can be taken advantage of during banding efforts (McClure 1984: 222). However, our preliminary efforts (1994 and 1995) to capture flycatchers by broadcasting *fitz-bews* from a tape player placed under a mist net met with only limited success. Here, we describe a more effective capture technique that includes a variety

of flycatcher songs and calls broadcast from a CD player through speakers set on both sides of a mist net.

METHODS

Study Area

We concentrated our banding effort in central Arizona at two main study areas, the Salt River and Tonto Creek inflows to Roosevelt Lake (Gila County) and the lower San Pedro River and its confluence with the Gila River (Pinal County). At both areas, vegetation ranges from 8 to 15 m tall and is composed of dense stands of saltcedar (*Tamarix ramosissima*) and broadleaf riparian woodland, primarily of Goodding willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*).

Mist Nets

Because of dense vegetation, we typically used short (length 2.6 and 6 m, height 2.6 m, mesh 38 mm) mist nets suspended between aluminum poles (diameter 1.6 cm, height 122 cm). The height at which we placed the nets (3–4 m at top of net) depended on the height and density of the understory and mid-canopy vegetation. In general, we stayed at least 10 m from active nests. To provide flight lanes for the flycatchers, we tried to place nets so vegetation did not encroach within 2 to 3 m above and on the sides of the net; nets closely surrounded by vegetation worked less well.

Vocalizations

Flycatchers use a variety of vocalizations during their natural interactions and in response to broadcast recorded vocalizations (vocalizations below follow terminology in Sedgwick 2000). Highly agitated and aggressive flycatchers sing at increased rates and use emphatic *fitz-bews*, *creets*, *whits*, *writ-tus* (*wee-oos* of Stein 1963), and *trills* (*churr* of Stein 1963). In some intense confrontations (e.g., physical chase and aggression), flycatchers combine these into patterns sounding roughly like a high-pitched squeaker toy. To obtain vocalizations for our broadcasts, we tape-recorded an array of Willow Flycatcher vocalizations and from these selected a series that included *fitz-bews*, *creets*, and *whits* of varying rate and pitch, *writ-tus*, and *trills*. One recording included an array of calls made during an aggressive encounter between a flycatcher and a Brown-headed Cowbird (*Molothrus ater*). We transferred the recorded vocalizations from cassette tape to audio CD by using a PC-based CD-ROM writer. The final CD contained 12 tracks, each track with a 10– to 60-second series of one or more vocalizations.

Broadcast Equipment

To broadcast vocalizations, we used a portable CD player and two speakers. One speaker was placed on each side of the mist net, 2 to 5 m from the net perpendicularly. Where possible, speakers were set in dense vegetation or on branches 1 to 2 m above ground. We used commercially available monaural amplified speakers and adjusted playback volume with

the CD player's controls. The speakers and CD player were connected via monaural audio cables 8–15 m (25–50 ft) long with ⅛-inch male mono or stereo jacks on both ends. We switched sound output between the two speakers during a capture attempt by using a handmade toggle switch or simply plugging and unplugging the appropriate speaker wire into the CD's headphone jack.

The Capture Process

The net/speaker combination was placed in a suitable open area near a song perch or nest. Banders sat quietly 5 to 15 m away from the net (in dense vegetation whenever possible), where they could clearly see the entire net and surrounding area. Once the vocalizations were broadcast, flycatchers generally paid little attention to the bander, even when he or she was clearly visible. The capture process typically began with the bander broadcasting *fitz-bews* and/or *whits* to bring a flycatcher closer to the net, then trying different tracks to find which vocalizations elicited the strongest response from that particular flycatcher. This usually stimulated the flycatcher to become more aggressive and move toward the speakers, flying close to whichever speaker was broadcasting. By then switching immediately to the speaker on the opposite side of the net, the flycatcher could be drawn into the net as it flew across to pursue the "moving" vocalization. The bander, able to watch the entire area around the net, could readily manipulate the speaker output as the flycatcher moved near the net and could approach and remove the bird immediately after it hit the net.

RESULTS

The targeted mist-netting technique was very effective in capturing territorial adult Willow Flycatchers. From 1996 through 2000, we captured 492 adult flycatchers at our primary study sites in Arizona (Luff et al. 2000), 99 elsewhere in Arizona, and 364 in other states ranging from the Pacific Northwest to the northeastern and southeastern United States. There were no capture-related injuries or mortalities among these 955 flycatchers. At our primary study sites, we captured and banded an average of 60 to 75% of the adult population at each site. Males generally responded more strongly than females and were therefore captured more often. Outside of Arizona, where the sex of the captured flycatcher was not important to our objectives, we captured many more males (262; 72%) than females (102; 28%). At our primary study sites in Arizona, where we focused on catching both sexes, the proportion of captured males (280; 57%) to captured females (212; 43%) was much closer.

Targeted netting also worked during the nonbreeding season. Lynn and Whitfield (2000) reported target-netting 59 wintering flycatchers in El Salvador and Panama. In Costa Rica, we captured and banded 82 wintering flycatchers—over 90% of the local wintering population at two study sites (Koronkiewicz and Sogge 2000); the ratio of males to females was approximately equal (USGS unpubl. data). As on the breeding grounds, there were no capture-related injuries or mortality.

DISCUSSION

This targeted capture technique works well because it takes advantage of the Willow Flycatcher's strongly territorial nature and aggressive response to conspecific vocalizations. Three factors were important in developing our particular capture protocol: incorporating a variety of flycatcher vocalizations, using a CD player, and using multiple speakers to manipulate the flycatcher into the net. A variety of recorded vocalizations was useful because individual flycatchers responded best to different vocalizations. One series of vocalizations, recorded when a flycatcher chased a cowbird from its territory, was particularly effective in eliciting aggressive response and chasing behavior, especially once a flycatcher was near the net. Other types of calls recorded during territorial squabbles between flycatchers also produced this effect, though not as strongly. A few flycatchers did not respond strongly to any vocalizations and simply sang or called from above the nets or elsewhere within their territory. Although we initially used portable tape players when netting, we soon switched to CD players because a CD could hold multiple tracks and allowed rapid, silent, and relatively motion-free switching from one vocalization to another. Furthermore, CD broadcast had better clarity and durability than did that of tape players. Use of two speakers dramatically improved capture success over use of one. By alternately switching the sound output from one side of the net to the other, we more naturally mimicked a conspecific territorial intrusion and were better able to manipulate the responding flycatcher into the net. Flycatchers focusing intently on and pursuing the source of the vocalizations flew close to and/or perched near the broadcasting speaker. Placing the speaker high (over 2 m) often led to flycatchers flying back and forth over the top of the net, so the positioning of speakers relative to the net was very important. Furthermore, long speaker wires (>10 m) are important because they allow the bander to move away from the net, limiting disturbance.

Frequently, both birds of a pair reacted to the broadcast vocalizations, and we sometimes caught the second bird after its mate was captured. When females were targeted, nets placed 10–20 m from the nest were more effective than those placed farther away within the territory. Females often responded aggressively and sometimes sang during the capture process, so aggression and song do not always indicate the sex of the responding bird. The combination of CD vocalizations and aggressive response by territory holders sometimes stimulated neighboring males to intrude into the territory and be caught.

A particularly important aspect of this technique is its low impact on the flycatchers. Based on voluntary reporting, the overall injury and mortality rates of passerines during mist-netting/banding projects are 0.2% and 0.4%, respectively (Canadian Bird Banding Office, unpubl. data). Even such relatively low rates could be problematic in work with an endangered species. Our targeted mist-netting technique, coupled with highly experienced staff, has allowed us to avoid any capture-related injuries or mortality among the >1000 flycatchers captured on the breeding and wintering grounds. Because a bird's degree of entanglement in a net (and thus difficulty of removal) is directly proportional to its time in the net (McClure 1984), the

bander's being present when the bird is captured and removing it immediately helps minimize stress and avoid injuries. The technique also minimizes our time within a flycatcher's territory; birds not previously targeted for capture were usually caught within 10 minutes (broadcast time).

We believe this technique can be readily adapted to other species as well. Using only songs and calls from commercially available tapes and CDs, we have used this technique to capture Alder (*E. alnorum*), Cordilleran (*E. occidentalis*), and Dusky (*E. oberholseri*) Flycatchers. Johnson et al. (1981) identified at least 51 bird species that are responsive to playback recordings and might therefore respond well to targeted capture. Persons attempting to use this technique on other species can start with basic songs and calls from their target species, then augment with additional vocalizations where possible.

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Willow Flycatcher

Sketch by John Schmitt

NOTES

FURTHER EVIDENCE FOR A POPULATION DECLINE IN THE WESTERN WARBLING VIREO

THOMAS GARDALI, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, California 94970

ALVARO JARAMILLO, San Francisco Bay Bird Observatory, P. O. Box 247, Alviso, California 95002

Recently, Gardali et al. (2000) reported that mist-net capture rates of breeding and migrating western Warbling Vireos (*Vireo gilvus swainsonii*) had declined in Marin County, California, from 1979 to 1997. Evidence of a population decline from a single site, though, may be misleading and simply represent site-specific changes in abundance. Here we report a trend in Warbling Vireo abundance from 12 years (1987–1998) of mist-net data at another site in California, the Coyote Creek Field Station of the San Francisco Bay Bird Observatory.

The Coyote Creek Field Station is situated at the extreme south end of San Francisco Bay, north of San Jose, Santa Clara County (37° 20′ N, 122° 10′ W). The site is 80 km southeast of the Marin County site reported on by Gardali et al. (2000). The habitat at the Coyote Creek Field Station is a mix of valley riparian forest and an open weedy field. The latter is within a non-concrete flood-control channel that flows periodically during wet winters. This overflow channel is mowed every several years to prevent woody vegetation from colonizing. The forest habitat includes an old stand immediately adjacent to Coyote Creek as well as two riparian restoration sites, one planted in 1986, the other in 1994. The forested habitats are dominated by Fremont cottonwood (*Populus fremontii*), willows (*Salix* spp.), boxelder (*Acer negundo*), western sycamore (*Platanus racemosa*), and coyote brush (*Baccharis pilularis*). For a more detailed description of the study area see Otahal (1995).

Warbling Vireos were sampled through standardized-effort mist-netting. A total of 48 nets at fixed locations (36 prior to 1995) were operated once weekly throughout the year. Nets were opened 45 minutes before sunrise and kept open for 5 hours during each day of operation. A variable number of additional nets were also operated as part of other research projects over the years, particularly during migration. However, netting effort remained relatively constant between 1987 and 1998, except for periods of greater effort in spring 1996 and fall 1998. Captured Warbling Vireos were banded with standard U.S. Fish and Wildlife Service bands, measured, and released immediately. Aging of birds in the hand was achieved by noting the extent of skull pneumatization in the fall (Pyle 1997).

Warbling Vireos do not breed at Coyote Creek, so our analyses were limited to examining trends for both migratory periods separately, fall (August–October) and spring (April–May). Our sample consisted of 335 individuals (202 in fall and 133 in spring). Using the program STATA (Stata Corp. 1997), we examined trends by linear regression. We used the number of individual birds captured per 1000 net-hours to standardize capture rate by netting effort. Capture totals were log-transformed in order to improve the normality of the model residuals (Zar 1996). We examined whether trends were nonlinear by testing for a significant quadratic coefficient for year in the presence of a linear term and found no trends to be nonlinear. Significance was assumed at a level of $P < 0.05$.

Table 1 Fall Netting Effort and Captures of Warbling Vireos at Coyote Creek Field Station, 1987–1998

Year	Net hours	Vireos captured	Vireos per 1000 net hours
1987	2467.50	17	6.89
1988	2948.00	24	8.14
1989	2825.99	56	19.82
1990	3494.75	19	5.44
1991	2525.00	6	2.38
1992	2757.50	26	9.43
1993	2806.75	13	4.63
1994	2574.00	14	5.44
1995	2535.00	9	3.55
1996	2292.50	13	5.67
1997	3124.50	8	2.56
1998	4655.62	6	1.29

The captures of fall migrants declined significantly over the course of our study ($\beta = -0.13$, SE = 0.046, $P = 0.02$; Table 1; Figure 1); the average annual change was −12.2% per year. Fall captures were primarily of birds that hatched that year (86.8%). Capture rates of Warbling Vireos migrating through Coyote Creek in spring showed a negative but nonsignificant trend ($\beta = -7.98$, SE = 0.0003, $P = 0.79$).

Over the course of this study there has been an increase in riparian habitat at the Coyote Creek Field Station due to restoration efforts. Capture rates of several species that occur at Coyote Creek only as migrants have increased over the study period (e.g., the Willow Flycatcher, *Empidonax traillii*), perhaps in response to restoration efforts (San Francisco Bay Bird Observatory unpubl. data), while the Warbling Vireo has declined. However, whether capture rates during migration are responsive to habitat restoration remains unknown. Our spring capture data suggest a stable pattern for adult migrants, though our sample size may not have been great enough to detect a trend. In fall, however, we did detect a decline in abundance of Warbling Vireos, of which the majority were first-year birds. Hence, the decline in fall captures probably represents a decline in breeding productivity, as also reported by Gardali et al. (2000).

Like this study and that of Gardali et al. (2000), the Breeding Bird Survey (BBS) has detected a decline in Warbling Vireo abundance in California (Sauer et al. 1999). We recorded a rate of decline, expressed as the slope of log-transformed data, similar to that of Gardali et al. (2000; $\beta = -0.13$ and $\beta = -0.10$, respectively). The BBS data showed a decline of 0.9% per year ($P = 0.06$) from 1966 to 1998 compared to our −12.2%. When the analysis of BBS data was limited to 1980–1998 it showed a more severe annual decline of 2.3% per year ($P = 0.01$; Sauer et al. 1999). Total fall captures at Southeast Farallon Island demonstrated no trend from 1968 to 1992 (Pyle et al. 1994). The Farallon captures were of both adults and young birds, in contrast with mostly young birds at Coyote Creek. The Farallon study did report a significant negative trend in the ratio of young to adult birds, supporting our contention that there has been a decline in the Warbling Vireo's breeding productivity.

The mechanisms responsible for a decline in Warbling Vireo abundance in California are not known. The decline in abundance of this species at Coyote Creek in autumn, where first-year birds constitute a preponderance of Warbling Vireos captured, suggests that fewer young have been produced annually; the extent of the

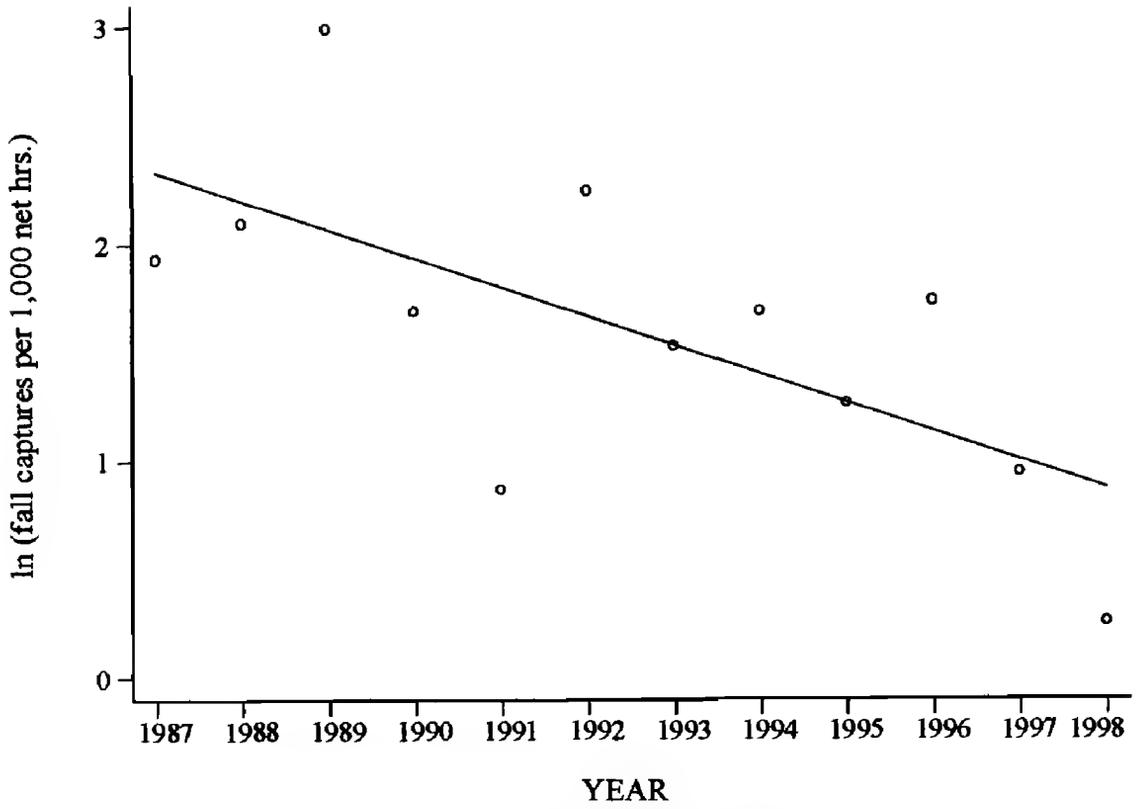

Figure 1. Trend in fall captures of Warbling Vireos, 1987–1998, at Coyote Creek Field Station. Each circle represents datum for one year; line is least-square line of best fit ($P = 0.02$, $r^2 = 0.39$).

breeding range sampled by our mist-nets is not known. Gardali et al. (2000) presented indirect evidence that linked poor reproductive success to population declines. Recent work in interior British Columbia suggests that local populations of western Warbling Vireos have the potential to be extirpated by high levels of parasitism by the Brown-headed Cowbird (*Molothrus ater*) but that even at low levels of parasitism vireo nesting success is low (Ward and Smith 2000). More studies are needed to examine the specific factors limiting the reproductive success of Warbling Vireos.

Our results, together with the BBS (Sauer et al. 1999) and Gardali et al. (2000), provide strong evidence that western Warbling Vireo populations are in a decline.

None of these data would be available had it not been for the dedication of the Coyote Creek Field Station's volunteer banders. Thank you for the commitment and the fine data. Part of this work was funded by the Santa Clara Valley Water District's Coyote Creek Flood Control Project, Wildlife Monitoring Program. This manuscript was improved by the thoughtful reviews of Kimball Garrett, Tim Manolis, and Kathy Molina. Steve N. G. Howell provided valuable editorial comments. This is contribution 769 of the Point Reyes Bird Observatory and 120 of the San Francisco Bay Bird Observatory.

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BRANDT'S CORMORANT SINKS AT SEA

TERENCE R. WAHL, 3041 Eldridge, Bellingham, Washington 98225

Cormorants' limited degree of plumage waterproofing, the spread-winged posture attributed to the need to dry their feathers, their need to rest and roost out of the water, and their nearshore foraging distribution have been commented upon by many (e.g., Schneider and Hunt 1984, Boekelheide et al. 1990, Siegel-Causey and Litvinenko 1993). I am unaware of descriptions of consequences for cormorants should they be unable leave the water before saturation.

Counts of seabirds made on >330 one-day trips off Grays Harbor, Washington, between 1971 and 2000 (see Wahl and Tweit 2000) included a total of 26,340 Double-crested (*Phalacrocorax auritus*), Brandt's (*P. penicillatus*), Pelagic (*P. pelagicus*), and unidentified cormorants. Their nearshore distribution was obvious: 74% of the birds were in Grays Harbor and channel, 22% were between there and a depth of 20 m, and about 4% were in water 20–50 m deep, most of them just outside the 20-m contour. Thus essentially all birds were within 20 km of shore—only 97 were seen from there to the edge of the continental shelf.

In addition to these one-day trips I spent several weeks aboard the R./V. *Thomas G. Thompson*, of the University of Washington Department of Oceanography, on research cruises from near shore to 126° 30′ W, about 160 km offshore. On 18 September 1976, during one such cruise, I first noted a Brandt's Cormorant perched on the bow at 47° 07′ N, 124° 54′ W, about 138 km offshore. Over the next 5 days the bird (presumably the same individual) roosted aboard the ship and foraged nearby. The ship was under way much of the time and, even when it was stopped on station, people seldom visited the bow but remained on the afterdeck. The ship traveled east and west on a sampling track to 125° 01′ W offshore and closest to land at 124° 41′ W, about 35 km offshore.

On 23 September at 0615 the ship stopped on station at 47° 07′ N, 124° 45′ W, when the sea was nearly flat. Shortly thereafter scientists and crew had scattered all over the ship. At 0830 I observed the cormorant in the water, about 50 m away. I do not know how long the bird had been in the water, but the ship had been collecting phytoplankton samples on a box pattern with stops about 0.7 to 2.2 km apart, and the bird could have been foraging for 2 to 3 hours with the slow-moving ship easily within sight. It was apparent that the bird was slowly settling lower in the water. When it was low in the water, with only its head and neck erect and exposed, two gulls (*Larus occidentalis* or *L. glaucescens*) approached and pecked at it briefly, eliciting little response from the cormorant. Just before the ship moved off station at 0850 I noted only the bird's head above the surface. My attention was diverted for a few seconds, and when I looked again the bird had sunk. I saw no evidence of a struggle resulting from underwater attack. It had appeared healthy the day before and flew normally. I concluded that the bird was either scared off the ship or, on return from foraging, had been intimidated by people, would not return to the ship, and became waterlogged and drowned.

I thank D. Fix for useful review comments.

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FIRST RECORD OF THE EUROPEAN GOLDEN-PLOVER (*PLUVIALIS APRICARIA*) FROM THE PACIFIC

ANDREW W. PISTON, P. O. Box 6553, Ketchikan, Alaska 99901
STEVEN C. HEINL, P. O. Box 23101, Ketchikan, Alaska 99901

The European Golden-Plover (*Pluvialis apricaria*) breeds from Iceland and the British Isles east to the base of the Taimyr Peninsula, Russia, at about 102° 30′ E (Vaurie 1965). Virtually the entire population migrates to or through Europe to winter in the British Isles, western Europe, and throughout the Mediterranean Basin; small numbers winter east to the southern Caspian Sea and casually to eastern India, and small numbers winter on the Atlantic coast of Africa, casually south to Gambia (Vaurie 1965, Cramp 1983). At the western periphery of this range, the European Golden-Plover is a regular vagrant to Greenland, where it is also a local breeder in the northeast (Boertmann 1994). It is a casual visitant to Newfoundland (including Labrador) and Saint Pierre et Miquelon, with nearly all records in April and May (Tuck 1968, Mactavish 1988, ABA 1996). There are reports from New Brunswick (Am. Birds [AB] 42: 408, 1988), Nova Scotia (AB 43:56, 1989; AB 44:390 1990; Natl. Audubon Soc. Field Notes [NASFN] 49:222, 1995), and Quebec (AB 42:1271, 1988).

On 14 January 2001 we collected a European Golden-Plover near the Ketchikan airport, Gravina Island, Alexander Archipelago, southeast Alaska (55° 17′ N, 131° 46′ W). In a search of the literature, and contacts with shorebird specialists in Asia and the Pacific, we found no evidence of the prior occurrence of this species in the Pacific basin.

Piston discovered the bird on 13 January 2001 and watched it for approximately one hour as it fed on a rocky gravel-covered beach with a flock of 35 Black Turnstones (*Arenaria melanocephala*), three Rock Sandpipers (*Calidris ptilocnemis*), and two Surfbirds (*Aphriza virgata*). Knowing that the occurrence of a golden-plover in Alaska in the winter was unprecedented, he took photographs and notes in the field. Later that same day we looked over references and discussed the bird's field marks. The bird was brightly colored, with gold speckles over the entire back and a golden wash on the head and breast. The bird also showed a faint white wing bar when it flew, a field mark of the European Golden-Plover. Other critical field marks were not noted, and we did not make much of the wing stripe at the time. We discussed the identification of the European Golden-Plover, but, quite naturally, did not seriously consider that species a possibility. Instead we focused our discussion on the field identification of the American (*P. dominica*) and Pacific (*P. fulva*) golden-plovers.

We determined to relocate the bird the next day and collect a voucher specimen of what we figured to be a Pacific Golden-Plover. We based this assumption simply on the fact that the bird was brightly colored, and also because that species would be the most likely golden-plover to occur in Alaska in the winter. The Pacific Golden-Plover winters locally in very small numbers in California (Garrett and Dunn 1981, Harris 1996), and it has been found casually in winter from Oregon (Gilligan et al. 1994, Contreras 1998) to the coast of southwestern British Columbia (Campbell et al. 1990). More recently, the Pacific Golden-Plover has been reported in winter at the Queen Charlotte Islands, British Columbia, only 150 km southwest of Ketchikan. One at Massett 15 December 1991–February 1992 was reported as the first winter record for the Queen Charlotte Islands (AB 46: 304, 1992); two golden-plovers at Sandspit, 27 December 1997, were considered "about" the fourth winter record for the Queen Charlotte Islands (NASFN 52:245, 1998). Although the American Golden-Plover has been collected in mid-winter in the southeastern United States (Paulson and Lee

1992), there are no substantiated midwinter records on the west coast of North America. No golden-plovers had previously been reported in Alaska in the winter.

On 14 January 2001 we relocated the bird with the same flock of shorebirds and again noted that it was relatively brightly colored. When it flew a short distance we saw that the bird indeed had a distinct narrow white wingstripe across the base of the flight feathers. At one point the bird flapped its wings and we were both stunned to see that it clearly had white axillaries and underwing coverts. We then noted that the bird appeared rather dumpy, with proportionately short legs, a chunky body and a neckless look, subtly different from the slimmer bodied, longer legged, and longer necked appearance that we are used to seeing in the Pacific Golden-Plover. We also noted that the bird had a shortish, slightly conical, deep-based, fine-tipped bill, and a uniform face pattern that lacked a strong supercilium (the supercilium looked to be the same dull yellowish color as the auriculars). All of these field marks led us to believe that the bird was probably a European Golden-Plover. (Excellent treatments of the field identification of the golden-plovers can be found in Hayman et al. 1986, Jonsson 1992, Beaman and Madge 1998, and Svensson et al. 1999.) We saw the bird fly again three or four times, but the underwings did not look especially white; either the light was not good or we did not have the right angle. Each time it flew we noted the narrow white stripe on the upperwing, which could be seen clearly from at least 100 meters. We agreed that we had never seen a Pacific or an American golden-plover with such a distinct wing stripe. We collected the bird and were again stunned to see that the bird had white axillaries and underwing coverts.

We forwarded the specimen to the University of Alaska Museum (UAM), Fairbanks, where our identification was corroborated by Daniel D. Gibson. Gibson prepared the specimen as a study skin and preserved partial skeleton, frozen tissues, stomach contents, and guts (lower digestive tract for disease screening). The specimen (UAM 12100) is a first-winter male, with mass 199.5 g (heavy fat), wing chord 181 mm, tail length 71.0 mm, bill length (from distal end of naris) 14.3 mm, bill depth 5.2 mm (at distal end of naris), bill width 4.9 mm (at distal end of naris), and tarsus length 45.0 mm (D. D. Gibson in litt.). The bird's stomach contained six species of gastropod mollusks up to 3 mm in length—four snails (*Lacuna vinita, Margarites helicinus, Lirularia succincta, Littorina scutulata*) and two limpets (*Lottia* sp. and *Tectura* sp.)—plus at least one crustacean fragment (Tanaidacea; Nora R. Foster, UAM, in litt.).

We thank Daniel D. Gibson for providing the specimen data and references, and for helpful comments that improved the quality of this note. We also thank Kimball L. Garrett and Robert E. Gill for their reviews.

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BOOK REVIEWS

United States Shorebird Conservation Plan, by S. Brown, C. Hickey, B. Harrington, and R. Gill (eds.). Second edition. May 2001. Manomet Center for Conservation Sciences, Manomet, Massachusetts. Available on request from U.S. Fish and Wildlife Service, Division of Migratory Bird Management, 4401 North Fairfax Drive, Room 634, Arlington, VA 22203, or through the World Wide Web (with accompanying technical documents and regional plans) at http://www.manomet.org/USSCP/files.htm.

Shorebirds may not be as commercially valuable as waterfowl, or as widely appreciated by the general public as songbirds, yet they have long held a special fascination for birders and ornithologists. The spectacular migrations undertaken by some species, and the wild regions they often inhabit, stir both the soul and the mind. Until recently, however, most shorebirds have tended to slip through the cracks in conservation consciousness. Yet their highly migratory habits, their need to concentrate at a few food-rich sites, and their use of habitats prone to human disturbance and development combine to make shorebirds vulnerable at many levels.

The need to conserve these remarkable birds has taken on a new dimension with the publication of the U.S. Shorebird Conservation Plan (hereafter the plan). The plan is a partnership of state and federal agencies, nongovernmental organizations, academic institutions, and individuals committed to restoring and maintaining shorebird populations in the U.S. and across the Western Hemisphere. The plan summarizes technical reports and recommendations produced by working groups that developed the plan and offers a wealth of information concerning what is needed for practical shorebird conservation in the United States.

The plan has been designed to complement, and be integrated with, the continent-wide conservation initiatives of the North American Waterfowl Management Plan, Partners in Flight, and the North American Colonial Waterbird Conservation Plan, all of which share much common ground. International coordination is also underway with the Canadian Shorebird Conservation Plan, which shares responsibility for many of the same species. The need for information to be updated constantly and for goals to be reassessed means that the plan will be revised every five years over the next 15 years, thereafter as necessary.

Seven parts constitute the plan: an introduction to shorebirds' general biology and conservation needs, a vision for shorebird conservation, population sizes and conservation status, national conservation strategies, regional goals and strategies, how the plan should be implemented, and a listing of associated technical reports (which should be consulted for greater detail and references). Five appendices give population estimates for shorebirds breeding in North America, map the 12 planning regions in the U.S., rank the relative importance of each species in each region, classify the level of risk for each species, and list species recorded rarely in North America and not treated by the plan. The five planning regions most relevant to the western U.S. are Alaska, Hawaii/Pacific Islands, Northern Pacific, Southern Pacific, and Intermountain West. Each is based on bird-conservation regions identified by the North American Bird Conservation Initiative.

The plan has three major goals at different scales: at a regional scale, to identify, protect, and manage important shorebird habitats; at the national level, to stabilize population levels of species suspected to be in decline, while keeping common species common; and at the hemispheric scale, to restore and maintain populations of all shorebird species in the Western Hemisphere through cooperative international efforts.

The plan recognizes that effective shorebird conservation strategies should be based on sound science and that baseline population estimates of all species are a prerequisite to this. Estimates presented in the plan address geographically disjunct

populations (e.g., Pacific coast and interior Snowy Plovers) as well as formally recognized subspecies separately and, while crude in most cases, are a starting point for broad policy goals. The plan also sets population targets and estimates a level of risk (from "highly imperiled" to "not at risk") for each population from variables such as population trend, relative abundance, and specific threats on the breeding and nonbreeding grounds.

How the worthy aims of the plan should be accomplished is discussed in parts 4 through 6. Part 4 advocates that the conservation strategies of greatest priority at the national level should be population and habitat monitoring (at an estimated cost of $1.5 million per year), the establishment of a national shorebird-research program to address shorebird biology (with annual funding of $2 million for national and $1.75 million for regional research priorities), and concerted public education and outreach programs (no cost estimate). Part 5 summarizes regional goals and strategies, e.g., protecting important stopover sites along the Pacific coast. For the southern Pacific region, "regional priorities must include increasing populations of breeding species such as Snowy Plover, Killdeer,... Black-necked Stilt, and American Avocet." Although many birders and field ornithologists may question this statement for three of these species, can we prove otherwise? If nothing else, this should force us to recognize the need for reliable baseline data and make us question how much we take for granted. Part 6 proposes a model for the plan's implementation, to be coordinated by the U.S. Shorebird Plan Council. Membership of the council is open to any organization, and current members include the American Bird Conservancy, Canadian Wildlife Service, Ducks Unlimited, the Nature Conservancy, and several branches of the U.S. government.

A phenomenal amount of work went into coordinating and publishing this ambitious plan, which appears to have included all interested parties. Two observations might be addressed in future editions. I appreciate that agendas as broad as nationwide shorebird conservation are difficult to communicate succinctly. With judicial editing and reorganization, however, the plan's length could be cut significantly—with no loss of content. In this edition, anyone wishing to identify a focused strategy of action is likely to be lost in a maze of circumlocution. Second, I found no mention of the plan's intended audience, although I assume there is one. Identifying an audience could help focus the plan's content. The general public, unless fluent in jargon (e.g., "to enhance funding capabilities and delivery of habitat protection and restoration activities governed by provisions of...") will likely "tune out" quickly. Those with a more scientific background also may be troubled by the nebulous content and lack of direct citations—but note that these are included in the technical documents accompanying the electronic version. Even if jargon-literate land managers and politicians are the intended audience, frequent repetition in the plan is inefficient of the reader's time.

The plan represents an overview of shorebird conservation issues, which now need to be addressed. The technical committees and regional working groups formed during the plan's conception are working actively toward its fulfillment, and the best way for interested parties to become involved is to consult their regional plan and make contacts from there. Shorebirds need all the help they can get, and I am very glad that a growing constituency is dedicated to conserving what have long been among my favorite birds.

Steve N. G. Howell

The Riparian Bird Conservation Plan, by California Partners in Flight and the Riparian Habitat Joint Venture, version 1.0. 2000. 88 pp. Available free (in pdf format) from the Point Reyes Bird Observatory (PRBO) website: http://www.prbo.org/CPIF/Consplan.html.

Habitat loss may be the leading cause of population declines and range reductions among landbirds in western North America. To reverse this trend and maintain existing populations, remnant high-quality habitats must be protected and degraded habitats restored. Although efforts to protect and enhance riparian habitats are underway, land managers designing restoration programs face a high degree of uncertainty in deciding which management actions will be most effective. To reduce this uncertainty, the full range of knowledge and skills from the natural and social sciences should be brought to bear on the problem. In addition, dissemination of information among scientists, managers, and stakeholders should be rapid, reciprocal, and continuous (Mangel et al. 1996).

Recognizing these challenges, California Partners in Flight (see Bonney et al. 2000 for a discussion of the Partners-in-Flight approach) teamed up in 1994 with a diverse coalition of federal, state, and nonprofit organizations and landowners to form the Riparian Habitat Joint Venture (RHJV). The RHJV was modeled after the highly successful joint ventures of the North American Waterfowl Management Plan, and to date 19 organizations throughout California have joined this initiative to protect biodiversity. Broadly stated, the RHJV's goal is to conserve, increase, and improve riparian habitats to protect and enhance California's native bird populations.

As a major step toward achieving this goal, the RHJV, with PRBO as the leading organization, produced the first edition of the Riparian Bird Conservation Plan (hereafter "the plan") in August 2000. The plan's goal is to provide scientific information and technical guidance to help private landowners, land managers, agencies, and conservation organizations select, design, and implement the conservation and land-management projects of highest priority. More specifically, the plan synthesizes current scientific knowledge of the requirements of birds in riparian habitats and recommends strategies for habitat protection, restoration, management, monitoring, and policy. The plan's guidelines are flexible, so that land-management practices designed to benefit wildlife do not conflict with resource-dependent economies.

Although the plan has a California focus, many of its recommendations are relevant to other western states. In part this is because the plan presents separate conservation objectives for eight of California's ten bioregions. To capture the conservation needs of these regional avifaunas, fourteen focal species were selected. It is hoped that the restoration strategies necessary to support these species represent a multispecies umbrella that will protect the riparian bird community at large (Lambeck 1997). The plan contains historical and current data on the distribution of these focal species from more than 350 sites throughout the state and provides population targets for each species in these eight bioregions. In documents separate from the plan (links on the PRBO website), each focal species is profiled in detail. These profiles present valuable information on life history and distribution but differ from other species accounts (e.g., *The Birds of North America* series) in that they focus on species-specific conservation priorities.

The plan has tremendous potential to advance avian conservation efforts and, given the resources now being devoted to riparian restoration, its release could not be more timely. Although a landmark effort in its current form, there are aspects of the plan that could be improved. For example, it would help if there were greater acknowledgment of the degree to which particular conclusions or recommendations are based upon speculation versus empirical evidence. Recommendations that are based on best guesses and/or anecdotal observations could then be tested with rigorous scientific methods. In this manner the document has the potential to function as an important hypothesis-generating tool supporting adaptive management. In

adaptive management, science is used to evaluate current management practices, design tractable management experiments, monitor their effectiveness, and recommend midstream adjustments (Walters 1986). Although the plan does provide some research and monitoring recommendations, this section of the plan should be expanded. In its present form this section informs land managers of the need to integrate scientific investigation and management actions but offers less to the research ecologist interested in learning which uncertainties need focused investigation.

Ultimately the Riparian Bird Conservation Plan takes a heroic step forward in tightening the link between science and on-the-ground management, integration sorely needed if we are to meet today's conservation challenges. The plan is a valuable resource that should be consulted by all those interested in managing riparian resources. Additional habitat-based bird-conservation plans (e.g., for oak woodlands) are being developed by California Partners in Flight, with drafts available at the PRBO website.

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Gregory H. Golet

FEATURED PHOTO

PARAPATRY IN WOODHOUSE'S AND CALIFORNIA SCRUB-JAYS REVISITED

JON L. DUNN, RR2, Box 52R, Bishop, California 93514

KIMBALL L. GARRETT, Section of Vertebrates, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007

Geographical variation in the scrub-jays (the *Aphelocoma coerulescens* species group) has intrigued and confounded ornithologists both before and since Pitelka's (1951) extensive review. In part on the basis of the work of Peterson (1990, 1992), the American Ornithologists' Union (1995) elevated the widespread continental scrub-jays (*A. californica*, the "Western Scrub-Jay") and the endemic jay of Santa Cruz Island (*A. insularis*, the "Island Scrub-Jay") to full species rank, restricting the name *Aphelocoma coerulescens* to the isolated Florida Scrub-Jay. Components of the Western Scrub-Jay have at times been given full species rank, in the form of a division between birds of the Pacific coast (the *A.* [*c.*] *californica* group of subspecies, hereafter "California Scrub-Jay") and birds of interior western North America (the *A.* [*c.*] *woodhouseii* group, "Woodhouse's Scrub-Jay"); an additional group of subspecies (the "Sumichrast's Scrub-Jay," *A.* [*c.*] *sumichrasti*) occurs on the southern Mexican plateau. Woodhouse's and California Scrub-Jays were treated as separate species most recently by Swarth (1918).

Minor variation in plumage and measurements, differing identifications of type specimens, and vague type localities for old names have sparked taxonomic disagreements and, indeed, markedly conflicting nomenclature (e.g., Phillips 1986). Pitelka's landmark study (1951) did establish limited intergradation between the two groups in a zone of parapatry around the Pine Nut Mountains of Douglas Co., Nevada, with intergrades encountered north to the Virginia Mountains and south to the California border area of northernmost Mono Co. Pitelka also documented intergradation in the Owens Valley region, Inyo Co., California.

Larry Sansone took the photos on the back cover west of Wellington, Nevada, in the southernmost Pine Nut Mountains. The upper photo (taken 7 December 1996) shows a bird apparently typical of Woodhouse's Scrub Jay in the western Great Basin, *A. c. nevadae* according to Pitelka's (1951) nomenclature. The brighter bird in the lower photo (15 December 1996) shows characters of Pacific Coast birds (the nearest subspecies of the California Scrub-Jay being *A. c. superciliosa* of the 5th edition of the A.O.U. Check-List) but could represent an intergrade.

Woodhouse's Scrub-Jays of the western Great Basin are readily told from California Scrub-Jays by several plumage and structural characters. The head, rump, and tail of *nevadae* are pale blue washed with gray, recalling a Pinyon Jay, and the underparts are gray with a blue wash on the undertail coverts; as a result, *nevadae* shows only a weak contrast between the bluish head and gray-brown back and between the dull bluish collar and the blended gray underparts. California Scrub-Jays are deeper blue dorsally, with strong contrast between the blue head and gray-brown back; they are mainly whitish below with a deep blue collar that is interrupted medially, and the undertail coverts only occasionally show a pale blue wash. California Scrub-Jays also show a blacker auricular patch with a more contrasting white supercilium (again, these areas appear more blended in *nevadae*). Structurally, the bill of *nevadae* has a distinctly thinner base and less decurved culmen than the stouter bill of coastal birds; *nevadae* has relatively longer wings than California Scrub-Jays. We caution here that more easterly Woodhouse's Scrub-Jays of the subspecies *woodhouseii* and *texana* are somewhat brighter blue above than *nevadae*, though the other distinctions from

the California group still hold; southward through Mexico, culminating in the Sumichrast's Scrub-Jays, the plumage becomes even more "California-like."

We have found Woodhouse's Scrub-Jays to be consistently much shyer than California birds; more easterly Woodhouse's may tame down in a few picnic areas (e.g., in the Davis Mtns. of Texas), but typically *nevadae* is quite skittish. Vocally, at least within the core range of *nevadae*, the common upslurred "jrr-eee?" call is relatively high pitched and almost two parted, so that the first syllable is level and the second rises abruptly. California Scrub-Jays have a somewhat lower, harsher and monosyllabic "shhrreee?" call. The rapid "shreek shreek shreek..." series of Woodhouse's is, to our ears, higher pitched and squeakier.

Woodhouse's Scrub-Jays wander erratically away from their breeding range in fall and winter, with notable movements occurring every several years (most recently during the fall and winter of 2000–2001). In invasion years they may move as far as the southern Mojave Desert, the Imperial Valley, and the lowlands of southeastern Arizona. Exceptionally birds may wander west over the crest of the Sierra Nevada, e.g., in Yosemite National Park at Tuolumne Meadows (Gaines 1988) and McGurk Meadow, where Dunn observed one on 15 September 1996. There may be even more movement into the Pacific coast region, but vagrants there would be more difficult to detect than in areas where any scrub-jay is unusual. Eastward movements of California Scrub-Jays are far more limited, but birds of this group have occurred, for example, on the northern Mojave Desert at Galileo Hill, Kern Co., California (M. T. Heindel in litt.), and R. Higson collected one of the subspecies *obscura* in El Centro, Imperial Co., California 10 August 1989 (SDNHM 45999).

The California and Woodhouse's groups of scrub-jays were lumped (American Ornithologists' Union 1931) in an era when the polytypic species concept first gained wide acceptance. Given the recognition of species status for the isolated Island and Florida scrub-jays, similar status for the Woodhouse's and California groups is perhaps not unwarranted. Indeed, Woodhouse's and California Scrub-Jays seem to us more distinct from one another than do the Island and California Scrub-Jays. Such a revision, however, requires further elucidation of the status of the *sumichrasti* group in south-central Mexico. Additional field studies of the behavior, vocalizations, ecology, and breeding biology of scrub-jays in the region of parapatry in western Nevada will also be enlightening.

We thank Larry Sansone for obtaining these instructive photos, and Ed Harper for sharing some of his photos of Woodhouse's Scrub-jays from Idaho. Philip Unitt made a number of very helpful editorial suggestions.

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WESTERN BIRDS

Quarterly Journal of Western Field Ornithologists

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Book Reviews: Steve N.G. Howell, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970

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Cover photo by © Brian E. Small of Los Angeles, California: Sharp-tailed Sandpiper *(Calidris acuminata)*, Bolsa Chica Ecological Preserve, California, March, 2000.

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WESTERN BIRDS

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BREEDING STATUS OF THE BLACK TERN IN CALIFORNIA

W. DAVID SHUFORD, JOAN M. HUMPHREY, and NADAV NUR, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, California 94970

The Black Tern is the familiar spirit of all fresh-water swamps in California north of the Tehachipe—Dawson (1923)

ABSTRACT: We surveyed breeding Black Terns throughout California in 1997 and 1998, following winters of very high runoff. We estimated the state's nesting population at about 4150 pairs (±30%), of which 47% were in northeastern California and 53% in the Central Valley. The 1940 pairs in northeastern California were at 60 sites; 59% were at 10 sites and 70% were in Modoc County. State and federal wildlife refuges supported <4% of the regional population; the rest were mostly on U.S. Forest Service and private lands. Low emergents, primarily spikerush (*Eleocharis* spp.) and *Juncus* spp., dominated most nesting marshes in northeastern California. Percent cover of emergents (vs. open water) was >80% at 68% of breeding sites. About 90% of the Central Valley breeding population was in Sacramento Valley rice fields. The rest were in the San Joaquin Valley, primarily in flooded agricultural fields with residual crops or weeds and secondarily in rice fields. State, federal, or private refuges or reserves held <1% of Central Valley terns.

Currently the Black Tern is extirpated locally at Lake Tahoe and in the Sacramento–San Joaquin River Delta. In the San Joaquin Valley, formerly a center of abundance, terns typically now breed mainly in two small areas of rice fields in the San Joaquin Basin. The Black Tern is quasi-extirpated in the Tulare Basin, where it nests irregularly and locally in ephemeral habitats, mainly in extremely wet years. The 160,000 to 200,000 ha of rice currently planted annually in the Sacramento Valley may far exceed the average amount of natural shallow-water habitat available there before agriculture.

We recommend a statewide survey of the California breeding population about once every 10 years, during typical climatic and habitat conditions, and monitoring for population trends annually. Conservation should focus on restoring, enhancing, and providing long-term protection for suitable wetlands and on maintaining isolation of colonies from humans and ground predators. Given the scarcity of water in the Central Valley in most summers, efforts to enhance tern habitat may be most fruitful in years of exceptional runoff. Research is needed on nesting and foraging ecology, habitat suitability, demography, limiting factors, population response to changing water conditions, and the value of rice fields versus wetlands as breeding habitat.

Although the New World subspecies of the Black Tern (*Chlidonias niger surinamensis*) breeds widely across southern Canada and the northern United States, concern has been expressed because the population declined across the contintent (Dunn and Agro 1995, Peterjohn and Sauer 1997, Shuford 1999) during a period of rapid wetland loss (Dahl et al. 1997). Breeding Bird Survey data imply that the Black Tern declined across the range surveyed, though not significantly, at an average rate of –1.6% (95% confidence interval –4.4–1.1) annually (–41.3% overall) from 1966 to 1999 (Sauer et al. 2000). Although extirpated from only two states, the Black Tern has declined in at least 14 of the 34 states, provinces, and territories where it currently breeds (Shuford 1999). Consequently, the Black Tern is listed as threatened or endangered in six states and variously designated of conservation concern in 18 other states or provinces. For the United States overall, the Black Tern is listed as a "migratory nongame bird of management concern" (USFWS 1995), whereas in Canada it has no official status despite recommendations for listing as "threatened" by Gerson (1988) and "vulnerable" by Alvo and Dunn (1996). Knowledge of the Black Tern's status is poor in the western United States, including California, where anecdotal information led to its listing as a species of special concern (CDFG 1992).

To fill gaps in knowledge of breeding Black Terns in California, Point Reyes Bird Observatory surveyed populations statewide in 1997 and 1998 as the focus of a project to assess the status of seven species of "inland-breeding seabirds" (Shuford 1998, Shuford et al. 1999). Here we report current statewide population estimates, breeding distribution, breeding phenology, and habitat associations of the Black Tern and compare them with the historical record. We also make recommendations for conservation, management, and long-term monitoring of the Black Tern in California.

STUDY AREA AND METHODS

Prior to field work, we searched the published and unpublished literature and contacted various field biologists to identify historic and potential breeding habitats of the Black Tern in California. We cite data from *Audubon Field Notes* (AFN) and *American Birds* (AB) by volume and page number and unpublished data from notebooks of the editors of the Middle Pacific Coast region of *North American Birds* as MPCR files.

In the field, we contacted additional biologists for further information on potential breeding habitat. We later obtained egg-set data on Black Terns from the California Academy of Sciences (CAS), Los Angeles County Museum of Natural History (LACM), Moore Laboratory of Zoology (MLZ), Museum of Vertebrate Zoology (MVZ), San Bernardino County Museum (SBCM), San Diego Natural History Museum (SDNHM), Santa Barbara Museum of Natural History (SBMNH), and Western Foundation of Vertebrate Zoology (WFVZ).

We varied field survey methods by region, to match local logistical constraints, and timed surveys to follow the passage of most migrants and begin with the initiation of nesting.

Northeastern California

The study area here included valleys of the Cascade Range, Klamath Mountains, and Sierra Nevada, the Modoc Plateau, and the Great Basin desert, that is, eastern Siskiyou, northeastern Trinity, eastern Shasta, Modoc, Lassen, Plumas, Sierra, and El Dorado counties. Potential Black Tern habitat in marshes, lakes, and reservoirs is scattered widely, primarily from 4000 to 6000 feet (1220–1830 m) elevation in intermountain valleys or in depressions in the Modoc Plateau. Precipitation, falling mostly from October through April as rain and snow, in the climate year (1 July–30 June) 1996–97 was 114.3 cm in the Sacramento Drainage Division and 79.8 cm in the Northeast Interior Basins Division (results from weather stations throughout the region averaged). Combined, these divisions encompass most of the study area. As these figures represent 119% and 147%, respectively, of the long-term (n = 104) averages for these areas (Western Regional Climate Center; http://www.wrcc.dri.edu/divisional.html), wetlands in the study area were well supplied with water in summer 1997.

From 18 May to 19 July 1997, Shuford and colleagues surveyed most potential breeding habitat in northeastern California for Black Terns; all sites surveyed were listed by Shuford (1998). In addition, K. Laves and Shuford surveyed the south shore of Lake Tahoe, El Dorado County, on 14 June 1998, and M. McVey surveyed most potential breeding wetlands in the Shasta Valley, Siskiyou County, in spring and summer 1998 and 1999. Shuford and colleagues also opportunistically resurveyed various sites in the summers of 1998 to 2001, as indicated in the text or Table 1. We conducted surveys mostly on foot and occasionally by kayak or canoe. We were unable to survey only a few areas with high potential for nesting terns. We did not survey Picnic Grove and Lakeshore reservoirs in the Devil's Garden Ranger District of Modoc National Forest because of logistical difficulties, and we were denied access to a few private holdings, the largest being Steele Swamp, Modoc County, and Dixie Valley, Lassen County.

Early in the season it was possible at many sites to count both adult Black Terns using the wetland and all or most of their nests. We soon realized we would be unable to count all nests at all sites because of the time needed and our inability to count nests accurately once chicks began to leave their nests shortly after hatching. Thus, depending on circumstances, we obtained three types of counts and used three corresponding methods to estimate numbers of pairs of terns, presented here in order of their apparent reliability and annotated with respect to biases. When data are available to make more than one estimate, we present only the method of apparent highest reliability.

(1) Total nests: obtained by systematically walking all of a marsh and locating all or most nests by visually scanning areas where terns were agitated, flushing adults from nests, or following terns back to nests. At sites where a thorough search was impractical, we made partial nest counts, which served only to document breeding. We estimated the number of breeding pairs as the total number of nests at the time of the survey. This method may underestimate the total because of the difficulty of finding all

Table 1 Numbers of Adult Black Terns, Nests, and Estimated Pairs from Surveys of Wetlands in Northeastern California in 1997

Site	Survey date	Number of adults[a]		Number of nests[b]		Estimated pairs[c]
		Disturbed	Undisturbed	Total	Partial	
Siskiyou County						
Butte Valley WA	14 July	22	—	—	2	11[2]
Butte Valley National Grasslands	14 July	0	2	—	1	2[3]
Grass Lake[d]	12 July	—	28	—	2+	22[3]
Orr Lake	30 May	—	8	—	—	6[3]
	24, 26 June	—	6	—	—	—
Dry Lake (T44N, R1W, sect. 30, 31)	12 July	—	4	—	2	3[3]
Lower Klamath NWR[e]						
Unit 4E	18 June	~73	65	—	3	37[2]
Unit 4D	18 June	—	18	12+	—	12[1]
Barnum Flat Reservoir	1 July	—	68	—	2+	54[3]
Subtotal						147
Modoc County[f]						
Dry Lake (T44N, R6E, sect. 4, 5)	20 June	—	12	—	—	9[3]
Fourmile Valley	27 May	38	27	27	—	27[1]
Wild Horse Valley	28 May	6	8	3	—	3[1]
Buchanan Flat	26–27 May	36	29	21	—	21[1]
Weed Valley	3 June	—	203	—	6	160[3]
Baseball Reservoir	26 May	47	47	42	—	42[1]
Dry Valley Reservoir	25 May	58	—	30	—	30[1]
Hager Basin (North)	24 May	22	13	14	—	14[1]
Hager Basin (South)	24 May	51	21	18	—	18[1]
Telephone Flat Reservoir	31 May	23	—	7	—	7[1]
South Mountain Reservoir	31 May–1 June	6	—	2	—	2[1]
Pease Flat[g]	21 May	—	1	0	—	—
	17 July	—	~60	—	—	47[3]
	18 July	—	19	2+	—	—
Mud Lake (T46N, R12E, sect. 16)	22 May	26	8–10	16	—	16[1]
Crowder Mt. Reservoir	1 June	—	41+	40	—	40[1]
Whitney Reservoir	20 June	10	—	—	—	5[2]
Hackamore Reservoir	20 June	20	—	—	4	10[2]
Spaulding Reservoir	21 June	40	—	—	10	20[2]
Beeler Reservoir	22 June	26	—	—	10	13[2]
Pinky's Pond	22 June	14	—	—	3	7[2]
Widow Valley	22 June	—	82	—	1	64[3]
Bucher Swamp	22 June	—	122	—	5	96[3]
Six Shooter Tank	23 June	18	12	—	1	9[2]

(continued)

Table 1 *(continued)*

Site	Survey date	Number of adults[a]		Number of nests[b]		Estimated pairs[c]
		Disturbed	Undisturbed	Total	Partial	
Deadhorse Flat Reservoir	23 June	—	45	—	1	35[3]
Surveyors Valley	23 June	—	35	—	1	28[3]
Boles Meadow	7 June	—	211	—	15	166[3]
Fletcher Creek Reservoir	16–17 June	—	48	31	—	31[1]
Jack's Swamp	5 June	—	64	26	—	26[1]
Dead Horse Reservoir	29 May	—	7+	11	—	11[1]
Jesse Valley	26 June	—	13	—	4	10[3]
Whitehorse Flat Reservoir	1 July	—	37	—	4+	29[3]
Egg Lake	30 June–1 July	—	343	—	1+	270[3]
Taylor Cr. wetlands	30 June	—	128	—	2	101[3]
Subtotal						1367
Lassen County						
Muck Valley	2 July	—	53	—	5	42[3]
Hoover Flat Reservoir	3 July	—	7	—	—	6[3]
Moll Reservoir	27 June	34	20	—	3+	17[2]
	16 July	13	—	—	—	—
Okendine's Spring	27 June	9	5	—	—	5[2]
	16 July	—	0	—	—	—
Ash Valley (main)	27 June	—	66	—	—	52[3]
Ash Valley (SE)	19 July	—	9	—	—	7[3]
Red Rock Lakes complex	26–27 June	—	72	—	2+	57[3]
Boot Lake	25–26 June	—	15	—	8	12[3]
Poison Lake[h]	5 July	76	43	—	2	38[2]
Dry Lake (Grass Valley)	10 June	—	6	—	—	5[3]
	5 July	—	0	—	—	—
Straylor Lake	26 May	—	11	—	—	9[3]
	11 July	—	1	—	—	—
Long Lake (T34N, R8E, sect. 22)	26 May	—	6	—	—	5[3]
	11 July	—	0	—	—	—
Ashurst Lake	26 May	—	7	—	—	?
	13 June	—	2	—	—	2[3]
	10 July	—	2	—	—	—
Gordon Lake	9 June	—	12	—	—	9[3]
	10 July	—	10	—	—	—
Pine Creek wetlands (T32N, R9E, sect. 28)	10 June	—	9	—	—	7[3]
	10 July	—	5	—	—	—
McCoy waterpit	9 June	—	12	—	—	9[3]
	10 July	—	0	—	—	—

(continued)

Table 1 (*continued*)

Site	Survey date	Number of adults[a]		Number of nests[b]		Estimated pairs[c]
		Disturbed	Undisturbed	Total	Partial	
Eagle Lake[i]	8–9 July	—	142	—	3+	112[3]
Willow Creek WA	10 June	—	13	—	—	10[3]
Horse Lake	8 July	15	15	—	1+	8[2]
Mountain Meadow Reservoir	7 July	22	20	—	—	11[2]
Honey Lake N (private)	15 June	5	5	—	1	3[2]
Subtotal						426
Total						1940

[a]Numbers of adults from either disturbed or undisturbed counts (see Methods).

[b]Numbers of nests from either total or partial counts (see Methods).

[c]Numbers of pairs estimated by three methods, listed here in order of apparent reliability, on the basis of [1]numbers of total nests, [2]counts of total disturbed adults, and [3]counts of total undisturbed adults (see Methods). When data enable more than one type of estimate, the estimate presented is from the method of highest apparent reliability.

[d]A count of 13 undisturbed adults at Grass Lake on 24 June 1999 yields an estimate of 10 breeding pairs that year; no terns were seen there on 28 May during the drought year of 2001.

[e]Counts of undisturbed adults of 54 in Unit 6B, 220± in Unit 6C, 10 in Unit 10A, and 146 in Unit 12C on 21 June 2001 yield estimates of 42, 173, 8, and 115 breeding pairs in those units, respectively, that year.

[f]A count of 57 undisturbed adults on 21 June 1999 yields an estimate of 45 breeding pairs at Lost Valley, which was mostly dry and devoid of waterbirds on 22 June 1997.

[g]A count of 23 undisturbed adults at Pease Flat on 20 June 1999 yields an estimate of 18 breeding pairs that year.

[h]Five adults at Poison Lake on 23 June 1999 showed no signs of site attachment or other evidence of breeding.

[i]A count of 160 undisturbed adults at Eagle Lake on 23 June 1999 yields an estimate of 126 breeding pairs that year.

nests, particularly in large marshes, and, because of asynchronous egg laying among colonies or subcolonies, some birds may not have initiated or completed laying at the time of surveys.

(2) Total disturbed adults: taken from within the colony when the observer (or a predator) disturbed birds, and all or most terns, including adults attending nests, joined a mobbing flock around the intruder. We estimated the number of pairs as the best count of total disturbed adults rounded to the nearest even number and divided by two. This method does not account for adults foraging far from the colony, hence not attracted to mobbing flocks, adults not joining the mobbing flock, or failed breeders having left the colony. We did not use this method at large wetlands, where we were unable to obtain accurate counts because of many adults swirling rapidly around the observer and terns continuously joining or leaving the mobbing flock as they

flushed from, or returned to, nests as the intruder approached or left their "zone of concern."

(3) Total visible undisturbed adults: taken from the edge of the wetland or from a vantage point within where the observer did not attract mobbing adults. We estimated the number of breeding pairs as the best count divided by 1.27 (standard error 0.16), the mean ratio of undisturbed adults counted to nests at the 10 sites where we collected both types of data (317 total adults, 247 total nests) during the incubation period. The method's primary biases, adjusted by a correction factor, are that it underestimates total adults or pairs because of the difficulty of seeing many incubating and roosting terns obscured by vegetation or other visual obstructions and does not account for adults foraging away from the colony. Also, the number of visible adults may increase as nests hatch and adults spend more time foraging, or, conversely, may decrease as nests fail and adults disperse.

To characterize habitat at each breeding site, observers recorded the dominant species of emergent vegetation and visually estimated the percent cover of both emergent vegetation and open water. We estimated these variables for the entire wetland, except at managed refuges where we estimated them for just the diked wetland units in which terns were breeding rather than for the entire complex of units.

Central Valley

The Central Valley, surrounded by mountains except at its western outlet into the San Francisco Bay estuary, averages about 644 km long and 64 km wide. It is divided into the Sacramento Valley, draining south, the San Joaquin Valley, draining north, and the Sacramento–San Joaquin River Delta where these rivers converge. The Sacramento Valley is further divided into the Colusa, Butte, Sutter, American, and Yolo drainage basins, the San Joaquin Valley into the San Joaquin Basin and the (usually closed) Tulare Basin.

Over 90% of the Central Valley's presettlement wetlands have been lost (Frayer et al. 1989, Kempka et al. 1991), and the dominant land use is agriculture. Hence, breeding habitat for waterbirds typically is scarce. Precipitation, falling mainly from October through April (as rain, or snow in adjacent mountains), is highly variable. Despite a massive reservoir storage and drainage system and high summer temperatures, in the wettest years extensive shallow water can persist through the breeding season. Precipitation in the climate year 1997–98, during El Niño, was 153.7 cm in the Sacramento Drainage Division and 86.9 cm in the San Joaquin Drainage Division, representing 161% and 169%, respectively, of the long-term (n = 104) averages for these regions (Western Regional Climate Center; http://www.wrcc.dri.edu/divisional.html). Hence the breeding season of 1998 provided some of the best conditions for nesting waterbirds in the Central Valley since the 1950s. Shallow-water breeding habitat increased primarily in the Tulare Basin, where large areas of agricultural land were flooded, intentionally or unintentionally, and secondarily near Los Banos, Merced County, on refuges and in flood-control bypasses.

Large areas of cultivated rice fields in the Sacramento Valley, and smaller areas in the delta and San Joaquin Basin, typically provide potential nesting

habitat for the Black Tern. In 1998, the intense and extended rainy season delayed rice planting in the Sacramento Valley by about three weeks, and only about 75% of the crop had been planted at the time of our surveys (60% by 31 May, 90% by 7 June; 9 June 1998 "Weekly Weather and Crop Bulletin," Natl. Agric. Statistics Serv., Agric. Statistics Board, U.S. Dept. Agric.). Other habitats in the Central Valley sometimes suitable for breeding terns include managed wetlands on refuges and duck clubs (limited summer water) and floodwater storage or recharge facilities (e.g., South Wilbur Flood Area, Kern Fan Element Water Bank). The average May to July temperatures of 62.5° F (16.9° C) and 66.5° F (19.2° C) for the Sacramento and San Joaquin drainage divisions, respectively, were the second lowest and lowest on record (Western Regional Climate Center, http://www.wrcc.dri.edu/divisional.html; $n = 105$). These were ideal conditions for both surveying in this typically very hot climate and delaying desiccation of the tern's breeding habitats.

Because of the 187,000 ha of rice planted in the Sacramento Valley in 1998, and limited access to private lands, we were unable to survey all potential breeding habitat. Instead, from 29 May to 10 June (also 18 June), seven observers conducted roadside transect surveys along most lightly traveled roads in the Sacramento Valley rice country (Glenn and Butte counties south to Yolo County) to estimate densities of Black Terns breeding there. Single observers covered routes by driving roads at 24 to 32 km/hr and counting terns seen within the primary census zone of 0.1 mile (160 m) on each side of the road. We surveyed without the aid of binoculars, except when needed to confirm identifications or estimate numbers accurately. We surveyed from 0600 to 1000 hours, later if temperatures were under 29° C; as temperatures often were below normal, this meant sometimes all day. We halted during strong winds (>24 km/hr) or persistent rain.

Observers recorded weather conditions, start and stop times, route covered, miles driven, distance surveyed (each side of the road tallied separately), number and age of terns, location(s) and habitat type where terns were observed, and any breeding evidence, including details of nest locations. Observers also recorded any terns seen beyond the primary census zone or off survey routes, but we did not use these data to calculate densities of breeding terns in rice fields. Observers recorded all observations of terns on maps in the field for later use in mapping patterns of breeding distribution. Observers were asked to try to confirm nesting by returning to make observations after finishing a survey or on a subsequent visit. We considered confirmed nesting all observations of nests with eggs, adults sitting in incubation posture on an apparent nest, adults feeding non-flying young, adults repeatedly carrying food to the same spot (presumably to an unseen chick), or nonflying or very weakly flying young. Because of delayed planting, at the time of our surveys little growing rice had emerged above water (15% emerged on 31 May, 35% on 7 June; 9 June 1998 "Weekly Weather and Crop Bulletin," Natl. Agric. Statistics Serv., Agric. Statistics Board, U.S. Dept. Agric.), and hence most terns sitting on nests were still visible.

We calculated densities of Black Terns in rice fields by first multiplying the distance surveyed on each route by 160 m, the width of the primary census zone, then converting this to hectares of habitat surveyed. We next deter-

mined the mean density of terns per 100 hectares for each county (or grouping of counties) by calculating the mean density for all of the county's routes weighted by distance surveyed. We estimated the total number of breeding terns in each county by multiplying tern density per county times the number of hectares of planted rice per county (M. Leighton, Calif. Agric. Statistics Serv. in litt.; National Agric. Statistics Serv., http://www.nass.usda.gov:100/ipedb/), adjusted by a correction factor of 0.75, the estimated proportion of rice planted at the time of our surveys. Field observations did not suggest any evidence of avoidance of, or attraction to, roads by nesting terns, which might have biased our estimates.

By contrast, in the delta, San Joaquin Valley, and in habitats in the Sacramento Valley other than rice fields, we surveyed from the ground or by boat all known potential breeding habitat for Black Terns. See Shuford et al. (1999) for a list of sites surveyed. In 1998, we surveyed the entire 807, 1817, 2220, and 1211 ha of planted rice in Stanislaus, San Joaquin, Merced, and Fresno counties, respectively, rather than sampling them as in the Sacramento Valley. We counted mainly visible undisturbed adults and, rarely, total nests via thorough nest searches. We did not count total disturbed adults or total nests at most sites because of the potential to damage crops by doing so. Partial nest counts at many sites served only to document breeding. Hence, depending on available data, we estimated numbers of pairs of Black Terns by either the "total nests" or "undisturbed adults" methods described above for northeastern California. In the latter case, the correction factor used for the Central Valley was that derived in northeastern California in 1997.

RESULTS

Population Size and Distribution

We estimated about 4153 pairs of Black Terns nested in the state in 1997 and 1998, 46.7% in northeastern California and 53.3% in the Central Valley.

Northeastern California. An estimated 1940 pairs nested at 60 widely scattered sites in this region (Table 1, Figure 1). About 70.5%, 22.0%, and 7.6% of that population was located in Modoc, Lassen, and Siskiyou counties, respectively. The 10 sites with >50 pairs of terns, which combined held 58.7% of the regional population, were Barnum Flat Reservoir, Siskiyou County; Weed Valley, Widow Valley, Bucher Swamp, Boles Meadow, Egg Lake, and Taylor Creek wetlands, Modoc County; and Ash Valley (main), Red Rock Lakes complex, and Eagle Lake, Lassen County.

Central Valley. Of the estimated 2213 pairs of Black Terns that bred in the Central Valley in 1998, 89.8% were in the Sacramento Valley and 10.2% in the San Joaquin Valley (Tables 2 and 3, Figures 2 and 3). From roadside surveys, we estimated that about 2523 ± 754 (1769–3277) adult terns, or about 1987 (1393-2581) pairs, bred in Sacramento Valley rice fields (Table 2). Although the birds were spread widely, the largest numbers were in the northern Colusa Basin (Table 2, Figure 2). In the San Joaquin Valley, about 75 pairs bred at five sites in the San Joaquin Basin and 151 pairs bred at six sites in the Tulare Basin (Table 3).

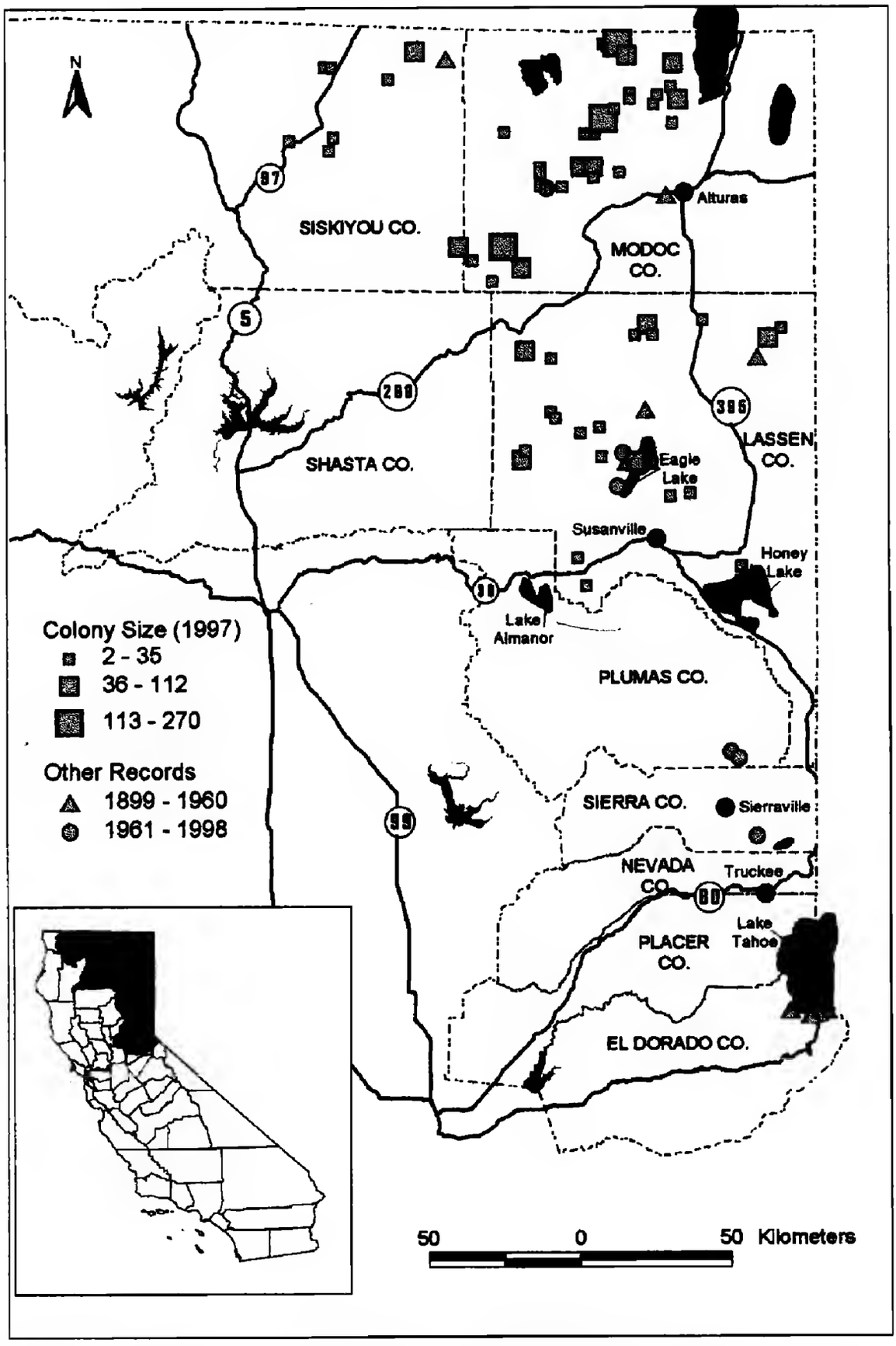

Figure 1. Distribution and size (number of pairs) of Black Tern colonies in northeastern California in 1997 (see Table 1), plotted with historical (1899–1960) and other recent (1961–1998) records of confirmed breeding (see Appendices 1 and 2).

Table 2 Estimated Numbers of Black Terns Breeding in the Sacramento Valley from Roadside Surveys of Rice Fields, 29 May–10 June 1998

County	Hectares planted rice[a]	Survey routes (*n*)	Distance surveyed (km)[b]	Terns per 100 ha (± SE)[c]	Terns estimated (± SE)[d]
Colusa	36,637	38	370.2	2.67 ± 0.67	978 ± 245
Sutter–Yolo–Sacramento[e]	36,485[f]	26	284.5	0.70 ± 0.23	255 ± 84
Butte	26,645	10	234.5	0.85 ± 0.31	226 ± 82
Glenn	25,131	44	352.8	3.68 ± 1.56	925 ± 392
Yuba	11,294	16	122.1	1.22 ± 0.44	138 ± 50
Placer	4239	4	47.0	0.00 ± 0.00	0
Tehama[g]	363	0	0	—	0
Totals	140,794	138	1411.11	1.80 ± 0.54[h]	2523 ± 754

[a]Planted rice acreage adjusted to account for estimate that only 75% of the total for the year had been planted at the time of our surveys (see Methods).

[b]Each side of road tallied separately.

[c]Density estimates for each county are means of survey routes, weighted by distance surveyed. SE, standard error.

[d]Tern numbers estimated by multiplying densities on roadside surveys times acreage of available rice fields. Standard errors represent variation in densities of terns on survey routes but do not account for possible error in the estimate of the amount of planted rice at the time of tern surveys.

[e]Data for these counties pooled because of small sample sizes for Yolo and Sacramento counties. Number of survey routes and distance surveyed, respectively, per county: Sutter, 15, 204.0; Yolo, 10, 69.4; Sacramento, 1, 11.1.

[f]Numbers of hectares planted rice per county at time of survey: Sutter, 27,553; Yolo, 6177; Sacramento, 2755.

[g]Although we surveyed no routes in Tehama Co. in 1998, coverage since the 1970s there has shown no evidence of terns there in the breeding season (S. Laymon in litt.). If terns breed there now the number would be small: 7 or 13 if densities were the same as for the entire Sacramento Valley or for Glenn County, respectively.

[h]Mean of county density estimates, weighted by hectares of rice.

Nesting Phenology

In northeastern California in 1997, we observed the first nests with eggs at Mud Lake, Modoc County, on 22 May and the first hatched young at Fletcher Creek Reservoir on 17 June. On the basis of the species' 19–21 day incubation period (Dunn and Agro 1995), eggs at Mud Lake likely hatched by at least 12 June. Collection dates of egg sets for the region extend from 23 May to 30 June and reach a peak in early June (Figure 4). Observations in the Central Valley in 1998 were inadequate for assessing breeding phenology; dates of egg sets collected there extend from 3 May to 5 July and reach a peak from late May to early June (Figure 4).

Habitat Associations

Northeastern California. Of 60 breeding sites in northeastern California, 52 (86.7%) were marshes dominated by low (<1 m) emergents, six

Table 3 Numbers of Adult Black Terns, Nests, and Estimated Pairs in the San Joaquin Valley in 1998

Site	Survey date	Number of Adults[a]	Number of nests[b]		Estimated Pairs[c]
			Total	Partial	
Merced County					
Rice fields SW of Merced					
	22 June	30	—	—	24[2]
	3 July	25	—	2	—
Raccoon Marsh, West Bear Creek Unit, San Luis NWR					
	22 June	4	2	—	2[1]
Cinnamon Slough, Merced NWR					
	23 June	4	2	—	2[1]
Fresno County					
Rice fields S of Dos Palos, Merced Co.					
	22–23 June	58	—	5	46[2]
James Bypass S of James Rd.					
	1 July	2	1	—	1[1]
Kings County					
S of Hacienda Ranch Flood Basin (T24S, R21E, sect. 31, 32)					
	19 June	69	—	7	54[2]
S of Hacienda Ranch Flood Basin (T24S, R21E, sect. 28, 33)					
	19 June	28+	—	3	22[2]
	13 July	—	—	3–4	—
Tulare County					
Vicinity jct. Hwy. 43 and Virginia Ave.					
	25 June	35+	—	2	28[2]
2 mi W of Rd. 40 about 3 mi S of Alpaugh					
	23 June	21	—	1	16[2]
Just W of Rd. 40 about 4 mi S of Alpaugh					
	22 June	32	—	3	25[2]
Kern County					
Kern Fan Element Water Bank (pond W-2), W of I-5					
	20 June	7	—	1	6[2]
Total					226

[a]Numbers of adults from counts of undisturbed birds (see Methods).

[b]Numbers of nests from either total or partial nest counts (see Methods).

[c]Numbers of pairs estimated by two methods, listed here in order of apparent reliability, on the basis of [1]counts of total nests or [2]counts of total undisturbed adults (see Methods). When data enable more than one type of estimate, the estimate presented is from the method of highest apparent reliability.

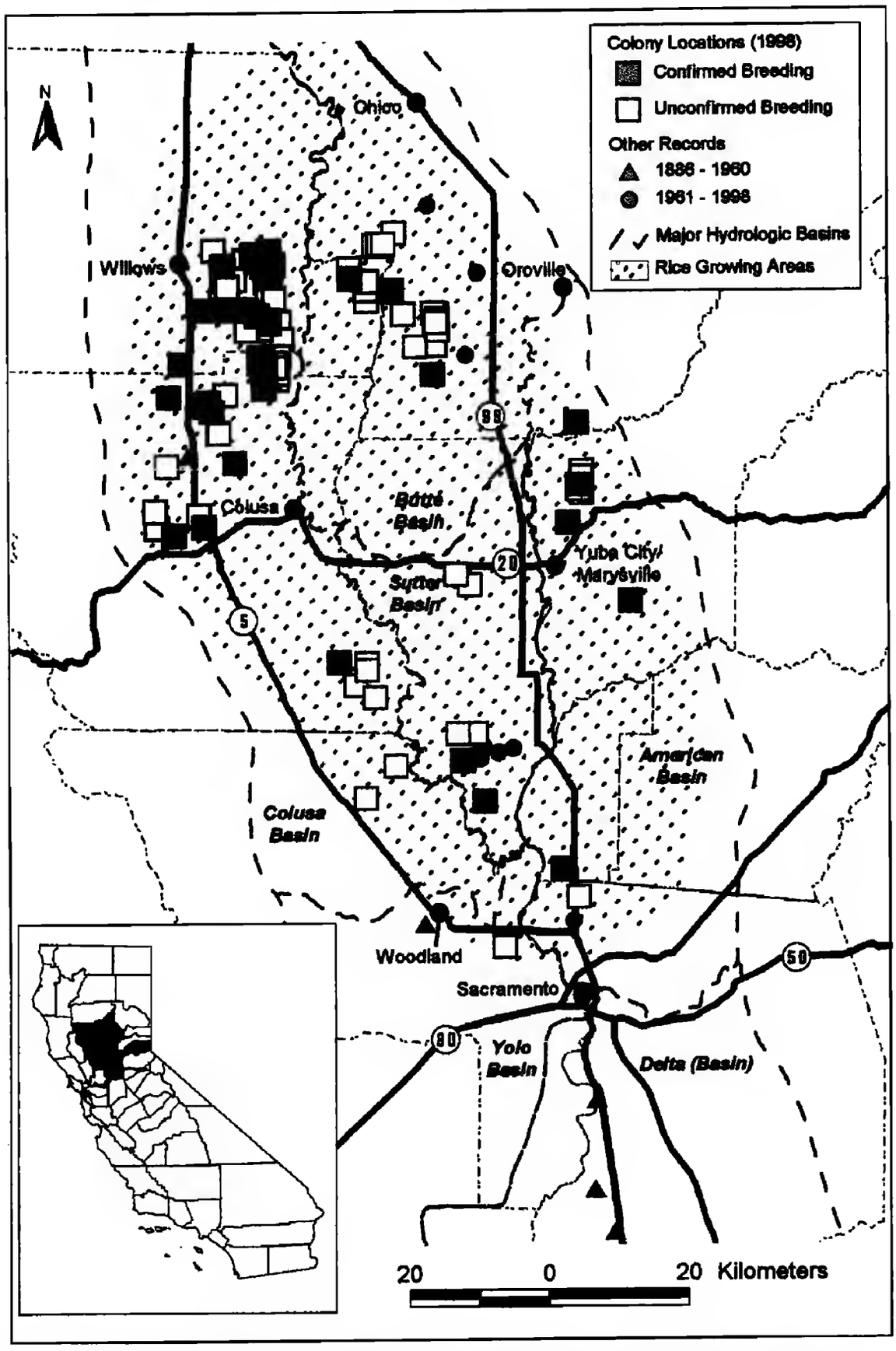

Figure 2. Distribution of breeding Black Terns in California's Sacramento Valley and Delta in 1998 (see Table 2), plotted with historical (1886–1960) and other recent (1961–1999) records of confirmed breeding (see Appendices 1 and 2). Stippling denotes areas where rice currently is grown.

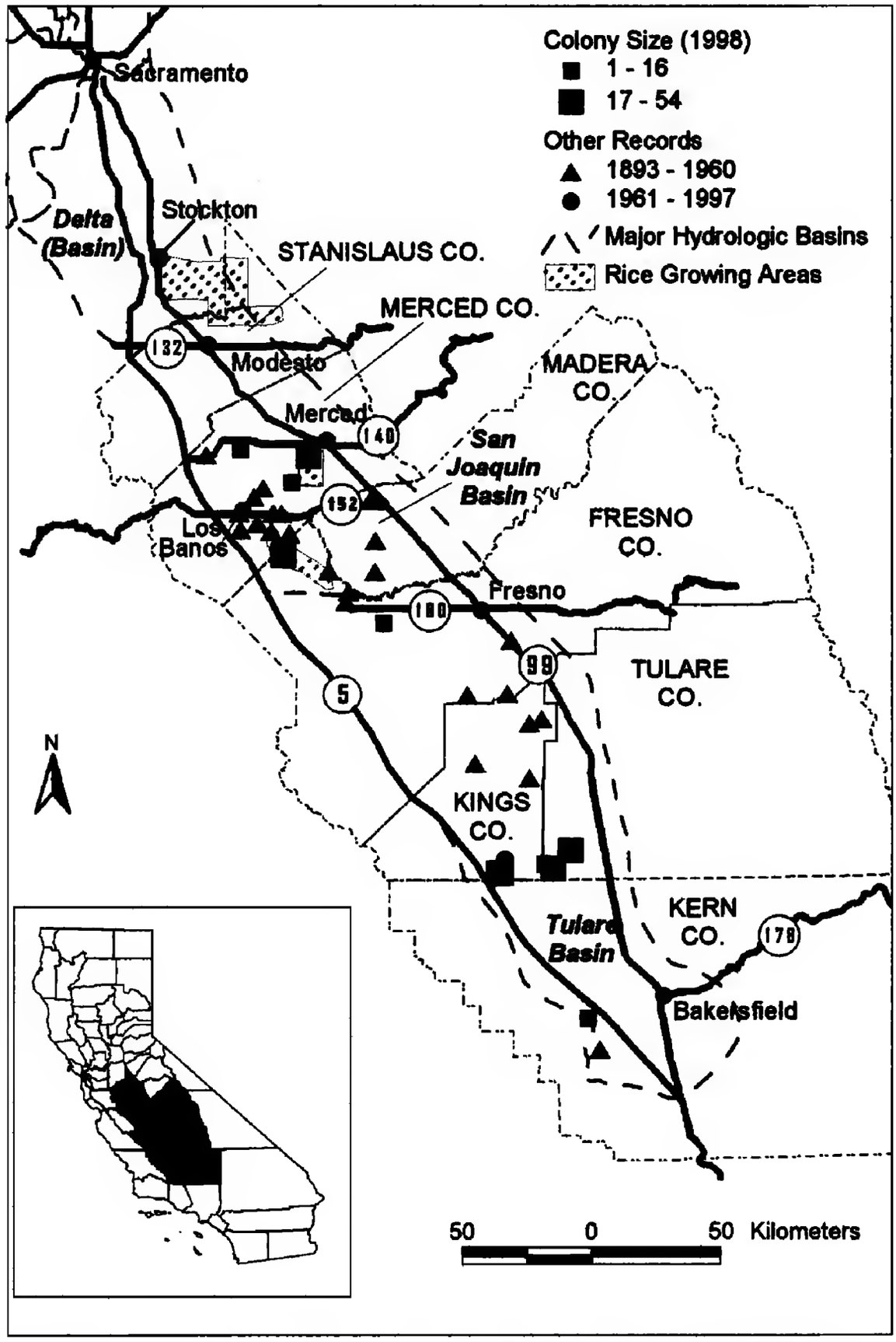

Figure 3. Distribution and size (number of pairs) of Black Tern colonies in California's San Joaquin Valley in 1998 (see Table 3) plotted with historical (1893–1960) and other recent (1961–1997) records of confirmed breeding (see Appendices 1 and 2). Stippling denotes areas where rice currently is grown.

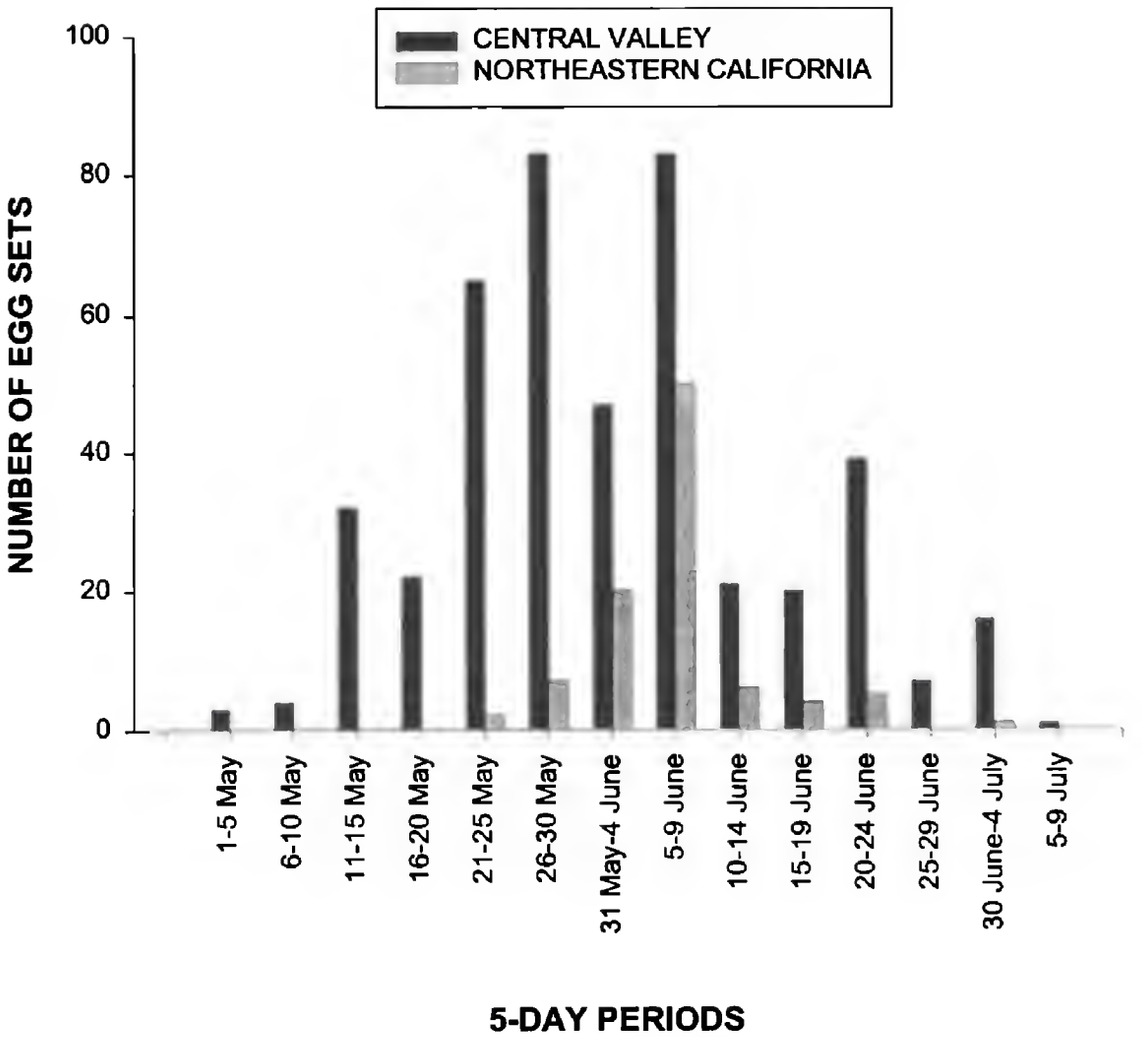

Figure 4. Temporal distribution of egg-set records of the Black Tern in California, 1886–1960. Data from major California museums (see Methods, Appendix 1).

(10%) by a mixture of tall (>1 m) and low emergents. At Lower Klamath National Wildlife Refuge (NWR), Black Terns nested in shallowly flooded basins dominated by residual barley stubble and algal mats and lacking much live emergent vegetation. At Boot Lake, Lassen County, in the Warner Mountains at 6560 feet (2000 m), the highest colony, breeding habitat was dominated by the floating yellow pond-lily (*Nuphar luteum* ssp. *polysepalum*). Of 58 sites with emergent vegetation, 50 (86.2%) were dominated or co-dominated by low emergent spikerush (*Eleocharis* spp.) or *Juncus* spp., seven by a mixture of tall emergents such as tules (*Scirpus* spp.) or cattails (*Typha* spp.) and low emergents, and one by a low emergent composite (*Arnica* sp.).

Percent cover of emergents was >80% at 41 sites (68.3%), between 60% and 80% at nine sites (15%), between 40% and 60% at three sites (5%), between 20% and 40% at no sites, and between 0% and 20% at seven sites (11.7%). All sites with <20% emergent cover, except Lower Klamath NWR, were lakes or reservoirs with mostly open water fringed by marsh vegetation. If we had limited estimates of vegetative cover to actual breeding sites, rather

than the entire wetland, the proportion of total sites with >80% cover would have been higher.

Central Valley. Of the valleywide total, about 2057 pairs (93.0%) bred in cultivated rice fields, 151 (6.8%) in agricultural fields with residual crops and weeds and shallow water remaining from winter floods, and 5 (0.2%) in emergent wetlands of low stature. Of the four pairs that bred in protected areas, two each were at Merced and San Luis NWRs in the San Joaquin Basin. All breeding evidence in the Sacramento Valley was from rice fields, though one colony in Glenn County was in sedges in the corner of a field rather than in the rice itself (Shuford pers. obs.). Of the 226 pairs in the San Joaquin Valley, 66.8% were in flooded agricultural fields with residual crops or weeds, 31.0% in rice fields, and 2.2% in emergent wetlands of low stature.

DISCUSSION

Accuracy of 1997–1998 Surveys

Although unable to estimate the precision of all methods used to survey terns in 1997–1998, we suspect our overall population estimate for the state was within 30% of the actual number. The 95% confidence interval was ±60% for surveys in rice fields of the Sacramento Valley (Table 2) versus ±25% for the "undisturbed adults" method used in northeastern California and the San Joaquin Valley (Tables 1 and 3). The precision estimate for the latter method, though, is applicable only for the incubation period, when it was derived, even though this method was used for data collected throughout the breeding season. Although the "total nests" and "disturbed adults" methods, also used widely in northeastern California and the San Joaquin Valley (Tables 1 and 3), lack estimates of precision both underestimated numbers of nesting pairs (see Methods). Another source of underestimation was our inability to cover some potential tern nesting habitat in northeastern California. Hence our overall estimate is more likely an under- than an overestimate of the statewide nesting population during the survey period.

To have conducted the statewide survey in one rather than two years would have been desirable also. We suspect, though, that numbers from the 1997–98 survey were representative of those statewide in 1998, when we surveyed the entire Central Valley and water conditions in northeastern California were similar to those in 1997.

Historical Patterns of Distribution and Abundance

Past data on the distribution and abundance of breeding Black Terns in California are mostly anecdotal (Grinnell and Miller 1944, Cogswell 1977, Shuford 1999). Breeding populations were restricted to two distinct areas: (1) the Modoc Plateau and mountain valleys of northeastern California and (2) the lowlands of the Central Valley. Today the outlines of the breeding range remain much the same (Figures 1–3). In northeastern California, however, the species is extirpated at Lake Tahoe. In the Central Valley it is extirpated in the delta, and in much of the San Joaquin Valley it is either extirpated or breeds irregularly, only in exceptionally wet years. Grinnell and

Miller (1944) considered the Black Tern a "locally common" breeder in California. Evaluating subsequent population trends is very difficult given the anecdotal nature of early accounts and the lack of recent Breeding Bird Survey data for California sufficient for trend analysis (Peterjohn and Sauer 1997, Sauer et al. 2000).

Northeastern California. Historic locations of confirmed breeding for this region include Tule Lake and Alturas Meadow, Modoc County; Grasshopper Meadows/Lake and Eagle Lake, Lassen County; and Lake Tahoe, El Dorado County (Grinnell and Miller 1944; Appendix 1). Assessing population trends is problematic given the few known historic breeding areas, the large number of recent breeding sites (Table 1), few of which have a long record of occupancy, and the species' propensity to shift from site to site with fluctuating environmental conditions. Extensive wetland loss, particularly in the Klamath Basin, may have been partially offset on the Modoc Plateau by the creation of shallow reservoirs for livestock grazing and recent enhancement for waterfowl (T. Ratcliff, G. Studinski pers. comm.).

Black Terns have bred at Eagle Lake since at least 1918 (Appendix 1). Using a combination of nest counts in habitat visited, the behavior and number of terns in suitable habitat not well surveyed for nests, and the extent of suitable habitat not visited, Gould (1974, in litt.) estimated 300 breeding adults at Eagle Lake in 1970 and 150 in 1971. From nest counts, Lederer (1976) estimated 46 breeding adults in 1974; Shaw (1998) estimated 78 in 1996 and 64 in 1997. Our independent estimate in 1997, based on counts of undisturbed adults, was 224 breeding adults (112 pairs; Table 1). A count of 160 undisturbed adults on 23 June 1999 yielded an estimate of 252 breeding adults (126 pairs; Table 1, footnote). Together these numbers may reflect year-to-year variation in nesting population size, perhaps mirroring changing patterns of emergent vegetation in response to lake levels (G. Gould pers. comm.) rather than a population decline followed by recovery, or, in part, the variation in survey techniques among observers.

Black Terns formerly reached their southeastern breeding limit in the region at Lake Tahoe, where they nested mainly at Rowlands Marsh near the mouth of the Upper Truckee River, El Dorado County (Orr and Moffitt 1971). That colony once held over 100 pairs, and, prior to 1920, colonies of four or five pairs bred near the mouth of Emerald Bay, at Meeks Bay, and near Tahoe Vista; "a few pairs" also formerly nested annually west of Tallac (Orr and Moffitt 1971; Appendix 1). Habitat loss and degradation from development and lowering of water levels eliminated breeding Black Terns at Lake Tahoe (Orr and Moffitt 1971, Cogswell 1977, K. Laves pers. comm., Shuford pers. obs. in 1998). Today the species reaches its southern limit in the Sierra Nevada at Sierra Valley, Plumas and Sierra counties, and at Kyburz Flat, Sierra County, where breeding is irregular, particularly at Kyburz (Appendix 2).

Black Terns have been reported breeding in the extensive marshes of Sierra Valley since at least the early 1970s (Appendix 2), primarily by birders looking off Marble Hot Springs Road (Dyson Lane), Plumas County. Numbers there fluctuate annually (up to 50 on 27 May 1989, J. McCormick in litt.), and terns are absent in some drought years, such as 2001 (Shuford

pers. obs., 12–16 June) The species also occurs in the Sierra County portion of the marsh (e.g., up to nine adults ~4 miles north of Sierraville 15–20 June 1999; J. McCormick, Shuford pers. obs.), but this area gets little coverage.

Small's (1994) report of "the largest regular [breeding] concentration (1000+) in northern California" in the Klamath Basin is unsubstantiated. Although Zeiner et al. (1990) mapped the summer range as including the Shasta Valley, Siskiyou County, and Small (1994) cited Cedar Lakes, Shasta Valley, as a recent breeding area, we know of no documented breeding records for that valley (Appendices 1 and 2, R. Ekstrom in litt.). M. McVey (in litt.) did not find evidence of Black Terns breeding at any of numerous wetlands in the Shasta Valley he surveyed in 1998 and 1999.

Central Valley. Grinnell and Miller (1944) reported Black Terns nesting in the Central Valley along the Sacramento and San Joaquin rivers (latter near Merced) and at Los Banos, Merced County, Laton and Firebaugh, Fresno County, and Buena Vista Lake, Kern County. They also noted the species had colonized rice fields. Egg-set data provide a minimum of two nesting records for the Sacramento Valley, 39 for the delta (none reported by Grinnell and Miller), and 399 for the San Joaquin Valley (Appendix 1). Although terns were widely scattered in the latter valley, many egg sets were collected from the Los Banos area of the San Joaquin Basin, perhaps reflecting local abundance, ease of observer access, or collector bias. In the early 20th century the San Joaquin Valley was of great importance to breeding Black Terns; Ray (1906), Chapman (1908), Tyler (1913), and van Rossem (1933) described the species as very numerous there. Among the few early quantitative estimates were over 100 nests near Los Banos and South Dos Palos from 19 to 22 May 1919 (J. G. Tyler et al., Appendix 2), "many hundreds in sight in all directions" in overflow lands of the San Joaquin River near Los Banos on 29 May 1941 (W. B. Minturn field notes), and a colony of "about 200 pairs" at Buena Vista Lake on 21 June 1921 (A. J. van Rossem egg data slip, WFVZ 2470). Sacramento Valley and delta records being so few may in part reflect limited egg collecting there.

From the cessation of most egg collecting in the mid-1940s until our 1997–1998 surveys, the limited information on the Black Tern's status in the Central Valley was primarily anecdotal. Although Grinnell and Miller (1944) noted the at least partial shift in breeding from reclaimed marshes to cultivated rice, it is unclear how widespread or numerous terns were in rice fields, which in 1943 totaled 96,000 ha in California (National Agric. Statistics Serv.; http://www.nass.usda.gov:100/ipedb/). The estimate of 1000+ migrant Black Terns at the Woodland Sugar Ponds, Yolo County, 8–21 May 1955, though notable at the time (AFN 9:355), far exceeds any such recent estimate for the Sacramento Valley. Black Terns bred at Sacramento NWR in 1958 (Appendix 2), when rice was regularly grown on the refuge, but no terns are known to have bred on any federal refuge in the Sacramento Valley since at least the early 1980s (J. Silveira pers. comm.). Greenberg (1972) reported up to 48 Black Terns in mid-June on two 6-mile (9.6-km) road transects in Sutter and Sacramento counties from 1969 to 1971, but data are too few for trend analysis. Cogswell (1977) concluded that Black Tern numbers declined in the Central Valley with loss of marshes,

increased with expansion of rice growing, and declined again "recently," perhaps from pesticide accumulation. The anecdotal nature of his and others' claims of declines (AFN 24:638, AB 32:1205, AB 39:98) or upswings (AB 31:1185) in tern numbers in the Sacramento Valley in the 1970s and 1980s make them hard to evaluate. Lee (1984) found six colonies (one in Sacramento Co., five in Sutter Co.) while studying Black Tern nesting biology in rice fields in 1976 and 1977 but made no population estimates for the area.

Numbers of Black Terns recorded during surveys of pheasant broods in Butte County in late June and early July, 1976–1992 (J. Snowden in litt.), did not show any significant temporal trend but appeared to track the county's rice acreage (Figure 5). Similarly, the only Breeding Bird Survey route in California (no. 148) with moderate numbers of Black Terns (median 9, range 0–54), in Glenn and Colusa counties in the Sacramento Valley, showed substantial variability in numbers and no clear trend from 1971 to 1999 (USGS Patuxent Wildlife Research Center 2000; http://www.mp2-pwrc.usgs.gov/bbs/retrieval/).

W. B. Minturn (field notes) was still observing up to 500+ at various sites in the San Joaquin Valley in May through at least 1950. In the Tulare Basin, Black Terns probably bred regularly at Tulare and Buena Vista lakes until the 1940s and 1950s (Appendix 1), when dams constructed on the rivers feeding them cut off most runoff. Since then breeding in that basin has been irregular,

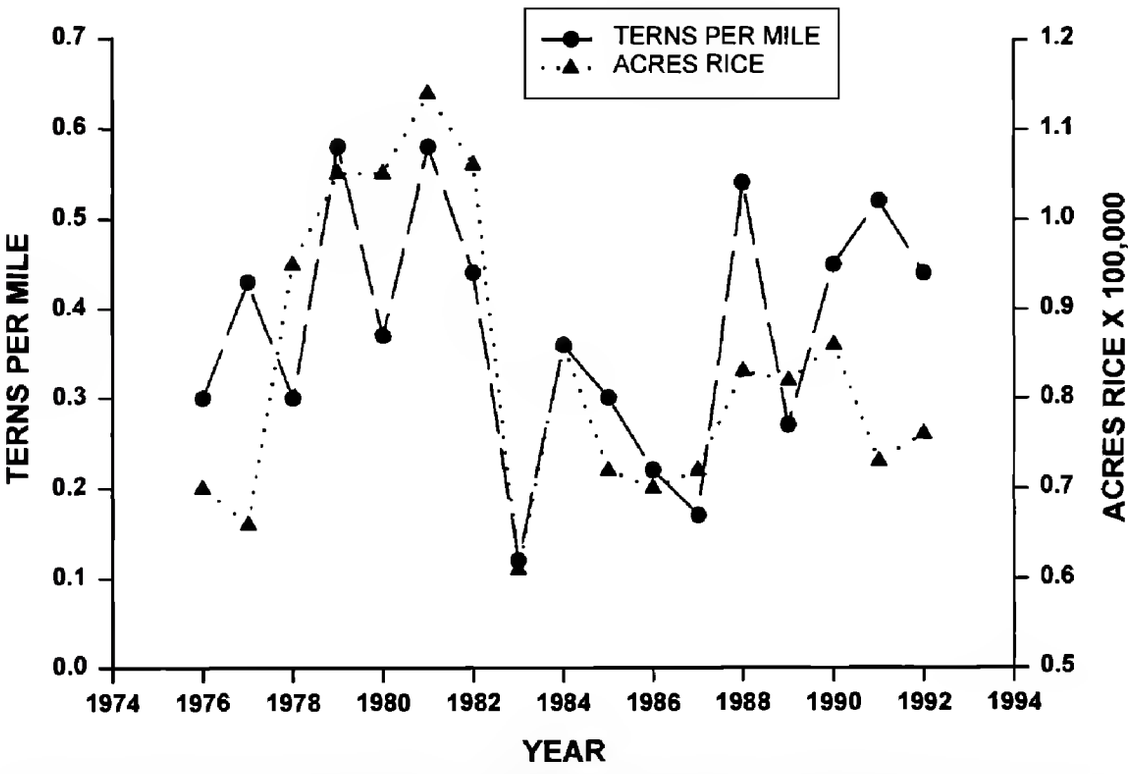

Figure 5. Numbers of Black Terns on California Department of Fish and Game survey routes for pheasant broods in Butte County, 1976 to 1992 (see Methods), relative to yearly totals of rice acreage for that county (National Agricultural Statistics Service 1999; http://www.nass.usda.gov:100/ipedb/).

mainly in extremely wet years. On 22 July 1983, following an El Niño winter, R. Hansen (MPCR files) found "many" nests and up to 70 Black Terns, mostly fledged young, at the Hacienda Ranch Flood Bàsin and South Wilbur Flood Area, Kings County. Also in the early 1980s, Black Terns nested in thick ditch-grass (*Ruppia maritima*) at J & W Farms agricultural evaporation ponds, 18 km southwest of Corcoran, Kings County (G. Gerstenberg pers. comm.). These ponds are no longer active, though, and other evaporation ponds in the basin currently do not support much emergent growth or any breeding Black Terns (R. Hansen, J. Seay pers. comm.).

Similar local extirpations have also occurred in the San Joaquin Basin. In the early to mid-1950s, Black Terns nested where a slough flooded areas of spiny saltbush (*Atriplex spinifera*) interspersed with vernal-pool–like habitat at Volta Wildlife Area (WA) near Los Banos (R. Wilbur pers. comm.). Black Terns appear to have been still widespread around Los Banos at that time, as R. D. Ross (MPCR files) estimated 200–250 terns on a drive across Highway 152 on 15 June 1956. Subsequently, P. J. Metropulos (in litt.) found the species "common" in the Los Banos area on 20 June 1970, V. Remsen and P. Myers (AB 27:914) counted 43 south of Los Banos on 16 June 1973, and R. J. Bacon (MPCR files) sighted two or three nesting pairs at Merced NWR in summer 1983. Black Terns apparently were nesting in the Traction Ranch section of Mendota WA, Fresno County, when ponds were first developed there about 1990 (S. Bruggemann pers. comm.). Today terns do not nest regularly at any of the state or federal refuges in the San Joaquin Valley (J. Allen, S. Bruggemann, R. Wilbur, D. Woolington pers. comm.). They likely breed regularly, though, in the limited rice acreage near Merced and South Dos Palos, though this remains to be documented. The current tenuous status of breeding Black Terns in the San Joaquin Valley documents a major population decline there over the last 100 years and an apparent shift of abundance to the Sacramento Valley. It is possible, though, that the Sacramento Valley has always been an important, though poorly documented, breeding area.

Extralimital breeding. Apparent nesting at Merritt Lake, near Castroville, Monterey County (Silliman 1915), likely represents an extralimital attempt, as the species has not bred elsewhere along the coast of California.

Historical Habitat Shifts

In the past, Black Terns nested in the Central Valley in ephemeral early successional wetlands created by natural overflow of rivers and lakes (Mailliard 1904, Tyler 1913, van Rossem 1933) or by flood irrigation of pasturelands (Chapman 1908). It is hard to estimate the extent of tern breeding habitat, particularly ephemeral overflow lands, available prior to the massive alteration of the Central Valley's natural hydrology. Hall (1880) estimated 324,000 ha of the Sacramento Valley were subject to inundation from annual overflow and an additional 117,000 ha by "occasional temporary overflow." In the San Joaquin Valley, he estimated 253,000 ha of swamp land were subject to periodic inundation. In the Tulare Basin alone the fluctuating margins of Tulare Lake could engulf many thousands of additional hectares after a series of wet winters.

Although it is unclear how much ephemeral habitat remained through the terns' breeding season, the vast flood plains and natural flood basins delayed transmission of flood flows, reduced peak flows and velocities, and increased summer river flows, as the floodwaters slowly drained back into the rivers, sometimes through July, or evaporated (Bay Institute 1998). The buffering effect of the flood basins shifted high upstream flows of January to May to a period of high river outflow from March to June. Rainfall-induced floods (December–March) predominated in the Sacramento Valley, whereas prolonged snowmelt floods (April–June) were the norm in the San Joaquin Valley, particularly in the Tulare Basin (Bay Institute 1998). Hence, the latter region likely had the most ephemeral habitat for breeding terns.

Today's water-management infrastructure keeps rivers within their banks, except during extreme floods, after which water usually rapidly drains or is pumped back into river and bypass channels, leaving few areas of shallow water where Black Terns could breed. The exception is the closed Tulare Basin where in extreme winters flood waters are diverted into shallow storage basins or run unchecked into fields. Flood frequency has decreased such that floods in the Sacramento Valley that formerly occurred about every 2 years now occur once every 7 to 13 years, 10-year floods every 100 years (Bay Institute 1998). Valleywide, the volumes of large floods remain largely unchanged, but only in years of a very heavy snowpack in the Sierra Nevada do flood flows in the San Joaquin Valley approach historic levels.

The great loss of wetlands was mitigated in the Sacramento Valley by the expansion of rice to the current annual level of 160,000 to 200,000 ha (Figure 6), which may far exceed the average extent of shallow-water habitat available there previously in summer. By contrast, wetlands lost in the San Joaquin Valley have been replaced to only a tiny degree by rice, which has declined there since the mid-1950s (Figure 6). Terns formerly bred in rice fields as far south as Kern County (Appendix 1) but no longer do so.

Migratory Stopovers

From 1949 to 1977, estimated peak counts of Black Terns at Tule Lake NWR, Siskiyou and Modoc counties, from July to early September ranged from 2000 to 19,000 (n = 17 years, median 5000, Klamath Basin NWR files), documenting it as an important postbreeding or migratory stopover for the species. Estimates of tern numbers at Tule Lake, 15 July–4 August 1997, ranged from 1000 to 6000 (J. Beckstrand, R. Ryno, R. Ekstrom in Shuford 1998). In five years from 1958 to 1972, peak counts at Lower Klamath NWR in August exceeded 1000 (maximum 9000, Klamath Basin NWR files); large numbers have not been reported there in recent years. The only other key stopover site known in the state is the Salton Sea, Riverside and Imperial counties, outside the breeding range. Up to 15,000 have been estimated there in early August (Patten et al. in press), but the only census, 13–16 August 1999, tallied 4011 individuals (Shuford et al. in press). Small (1994) implied that numbers at the Salton Sea have declined since 1987, but M. A. Patten (in litt.) has no evidence of this. Numbers of migrants on the southern California coast have declined greatly since the early 20th century (Garrett and Dunn 1981).

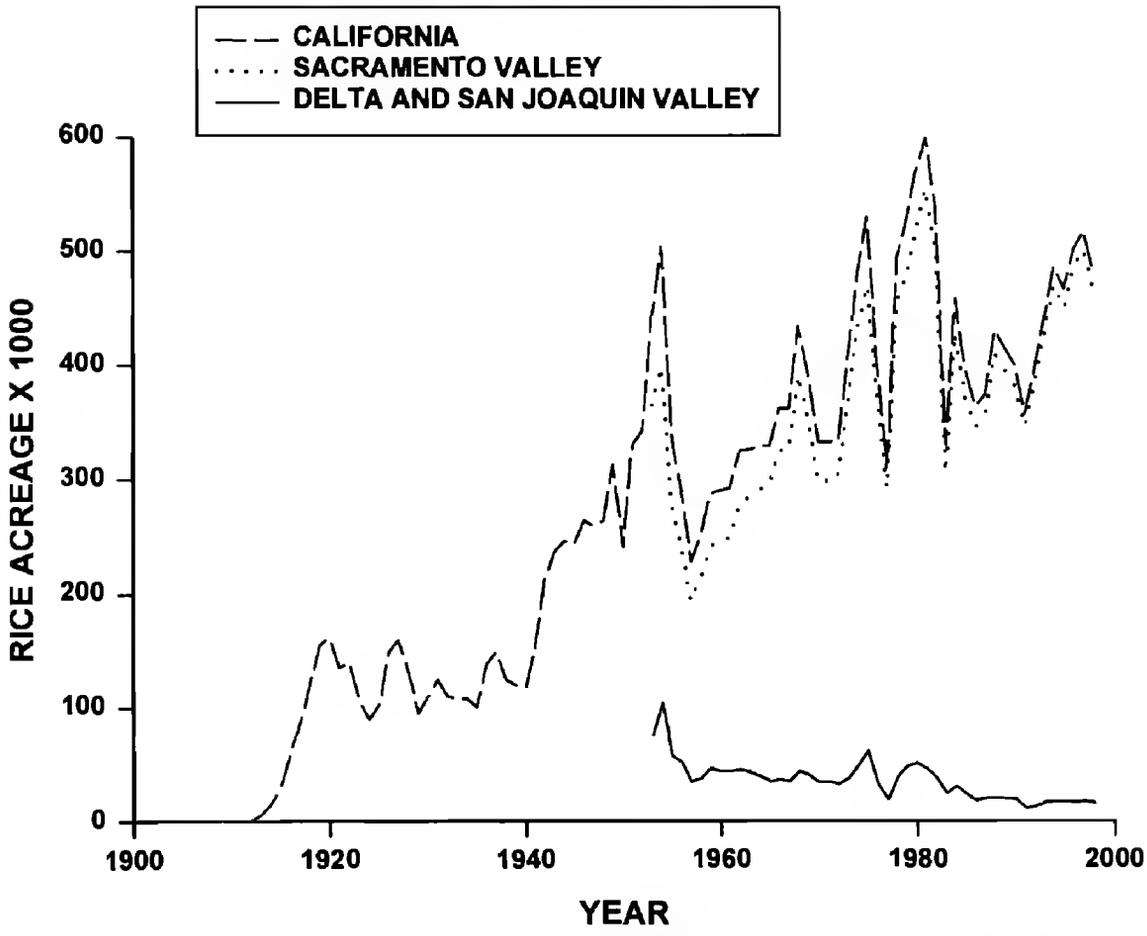

Figure 6. Historic changes in acreage of planted rice in California, 1912 to 1998, and in the Sacramento Valley and Delta and San Joaquin Valley, 1953 to 1998. Data from National Agricultural Statistics Service (1999; http://www.nass.usda.gov:100/ipedb/); county and district breakdowns available only since 1953.

Current Threats

Central Valley. Agricultural practices that rapidly draw down water levels in rice fields have exposed tern nests to rat predation only to destroy renesting attempts later when fields were reflooded above original levels (Lee 1984). In 1998, Shuford saw terns sitting on nests in muddy fields from which the water had been temporarily drained, and later some of these nests were abandoned. The rapid increase in rice cultivation coincided with the post-World War II boom in chemical use in agriculture. Three egg yolks collected from a Black Tern colony in rice fields in the Sacramento Valley in 1969 had 8.0, 9.1, and 11.8 ppm DDE (Greenberg 1972), but there is no evidence of deleterious effects of pesticides or other agricultural chemicals on terns breeding in rice fields. Dunn and Agro (1995) and Weseloh et al. (1997) reviewed the literature on contaminants in Black Tern eggs but found no evidence of reproductive effects. They concluded that direct chemical toxicity is generally not a problem with these terns, but pesticides may reduce favored insect foods. Loss of insect diversity or biomass could lead to chick starvation.

Conservation Priorities

Black Tern conservation should focus on protecting and enhancing high-quality nesting habitat. Because of the variable and generally arid climate in much of the California breeding range, the value of management efforts in years of short versus abundant water supply should be assessed carefully. Water levels should be regulated to protect important nesting and foraging habitats from ground predators and human disturbance, and management for terns should be coordinated with activities to conserve other species groups via other multi-partner conservation efforts (e.g., Central Valley Habitat Joint Venture, U.S. Shorebird Conservation Plan). Protection of key migratory stopovers, such as Tule Lake and the Salton Sea, is also vital.

Northeastern California. Because few Black Terns currently nest on refuges, it would be valuable to see if spikerush-dominated marshes, the species' main breeding habitat in the region, could be established or expanded in these areas.

Central Valley. Because summer water typically is scarce in the Central Valley, and because seabirds' productivity often runs in cycles of boom and bust, efforts to enhance tern habitat may be most fruitful in years of exceptional runoff. Recent evidence of extensive, irregular nesting in flooded fields with residual vegetation or crop stubble in the Tulare Basin indicates the species would benefit from more of this habitat. Perhaps fields with marginal crop yields could be retired from production and put in a conservation bank to be flooded when excess water is available. Such flooding should be weighed against possible waterbird mortality from botulism outbreaks, which might be reduced by rotating the fields to be flooded and choosing areas with no prior evidence of disease. Scant breeding on newly restored wetlands on refuges near Los Banos perhaps could be increased in the future, particularly in years of high runoff. In such years, infrastructure improvements likely could spread water over larger areas within or adjacent to bypasses, such as the Eastside Bypass near Los Banos and the James Bypass/Fresno Slough south of Mendota WA. Study also is needed of whether suitable habitat on refuges adjoining bypasses could be increased during years of high flow by drawing upstream water, circulating it through refuge ponds, and draining it back into the bypass downstream. Maintaining a slow, steady flow likely would reduce the chances of botulism.

Monitoring and Research Needs

Shuford (1999) summarized monitoring and research needs for the Black Tern across North America. Efforts should be made to coordinate California surveys and research with those in other states and provinces to establish a broad perspective on population trends and ecology. Research is particularly needed on the foraging and nesting ecology of Black Terns in California. Studies of habitat suitability at both the local and landscape level are needed to guide wetland protection and acquisition efforts (Naugle et al. 2000). Banding studies are needed to reveal how terns shift with changing water conditions, as are demographic studies to identify which breeding habitats are sources or sinks for the overall population. Researchers should focus on variation in aspects of reproduction most likely to influence population

trends and on understanding factors limiting nest success (Servello 2000), using methods that minimize disturbance to nesting terns (Shealer and Haverland 2000).

We recommend a statewide survey approximately every 10 years, during typical climatic and habitat conditions, to document potential range shifts and calibrate long-term monitoring data. We recommend annual monitoring by trained observers using sampling protocols incorporating precision estimates; methods should be suitable for local conditions and responsive to the shifting of breeding locations.

Northeastern California. Monitoring should be conducted in mid-June by counting undisturbed adults from points where observers do not attract mobbing terns. Surveys should be based on a random or stratified sampling of a subset of potential breeding sites, accounting for the difficulty of reaching some.

Central Valley. Monitoring should be conducted via standardized roadside transects in rice fields in the Sacramento Valley. Concern about the potential effects of agricultural pesticides and cultivation practices on Black Terns (Lee 1984) begs for expansion of research on these topics. Studies are needed to assess whether the value of rice fields to Black Terns equals that of ephemeral overflow lands or natural marshes.

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Appendix 1. Numbers of egg sets of the Black Tern in California, 1886–1960, from major California museums.

Northeastern California

Modoc County: Alturas Meadow, 9 June 1918 (2); 3.7 mi W of Alturas, 9 June 1918 (4).

Lassen County: Grasshopper Meadows/Lake, 2–22 June 1918 (20); Spaulding's, Eagle Lake, 3 June 1918 (7); Eagle Lake, 3–6 June 1918 (5), 22 June 1928 (1); nr. Truxell's, east shore of Eagle Lake, 23 May 1923 (1); Upper Ragar Meadow, 1 June 1935 (1).

El Dorado County: nr. Bijou, Lake Tahoe, 19 June 1899 (1), 9 June 1911 (5), 10 June 1912 (2), 6 June 1918 (9); Lake Tahoe, 6 June 1910 (1); Rowland's Marsh (i.e., Al-Tahoe), Lake Tahoe, 22 June 1902 (1), 10 June 1909 (3), 23 May–15 June 1910 (7), 30 May–9 June 1914 (18), 30 June 1918 (1), 5 June 1919 (1), 30 May 1920 (1), 14 June 1928 (1), 21 June 1930 (1), 15 June 1939 (2); nr. Tallac, Lake Tahoe, 22 June 1911 (1).

Central Valley: Sacramento Valley

Colusa County: Maxwell, 23 June 1939 (1).
Yolo County: Woodland, 11 May 1886 (1).

Central Valley: Sacramento–San Joaquin River Delta

Sacramento County: 0.5 mi S of Freeport, 15 June 1899 (2); Bear Lake, 27 May 1923 (5); vic. Sacramento (?county, ?delta), 7 June 1902 (1), 13 May 1906 (2); Stone Lake, 15–29 May 1921 (23), 4 June 1922 (1), 13–30 May 1923 (4).

San Joaquin County: White Ranch, 9 mi N of Stockton, 3 June 1921 (1); Kettleman Swamp, 9.5 mi NW of Stockton, 1 June 1947 (3).

Central Valley: San Joaquin Valley

Madera County: Chowchilla (egg record says "Merced Co."), 23 June 1900 (5); 15 mi W of Madera, 30 June 1923 (1); "Madera Co.," nr. Firebaugh, Fresno Co., 16–17 May 1927 (8); "Madera Co.," 10 mi E of Firebaugh, Fresno Co., 26 May 1927 (4); 10 mi from Firebaugh (?county), 5 June 1927 (1); "Madera Co.," 28 May 1928 (1), 9 June 1930 (3).

Merced County: nr. Brito, 21 May 1919 (1); Dos Palos, 17–22 May 1912 (5), 8 June 1927 (1); Gadwall, 16 May 1914 (1), 1–2 July 1917 (6), 12 May–4 June 1918 (14); Gustine, 14 May 1931 (1), 5 June 1932 (1), 12 June 1934 (1), 7 June 1937 (5);

Los Banos, 17 May 1898 (1), 8 June 1901 (1), 5 June 1905 (3), 2 June 1908 (2), 26 May 1910 (3), 2 July 1913 (1), 7 June 1914 (2), 29 May–25 June 1916 (12), 3–4 June 1918 (4), 26 June 1919 (1), 30 May 1920 (1), 28 May 1921 (1), 3–4 June 1922 (3), 1–18 June 1923 (15), 21 May–21 June 1925 (9), 23 May–20 June 1926 (8), 3 June 1928 (1), 30 May–1 July 1930 (23), 14 June 1931 (1), 13 May–5 June 1932 (10), 12 May–12 June 1934 (4), 11–13 May 1935 (5), 25 May 1936 (4), 14 May–1 June 1937 (11), 4 June 1938 (1), 10 May–7 June 1939 (8), 19 May 1940 (4), 9 June 1941 (1), 9 June 1942 (2); 4–6 mi S of Los Banos, 21–23 May 1919 (2), 30 May 1920 (1), 12–21 June 1931 (5); 8–10 mi E of Los Banos, 7 May 1927 (1), 13 May–1 June 1935 (5); 5–10 mi NE of Los Banos, 9 May 1936 (1), 14 May 1937 (3), 31 May 1939 (1); "Merced Co.," 20 May 1899 (1), 25 May–1 July 1908 (16), 26 May 1909 (9), 15–28 May 1926 (2), 28 May 1928 (1), 9 June 1930 (2), 25 June 1931 (1), 12–19 May 1935 (4), 3 May–9 June 1936 (20), 10 May 1939 (1), 5 June 1946 (1), 22–23 June 1948 (4), 22–23 May 1949 (6); San Joaquin R. at Los Banos Crossing, 15 May 1897 (2).

Fresno County: Columbia Ranch, 24–25 June 1919 (4), 8–9 June 1920 (8), 22–23 June 1921 (5); Firebaugh, 28 May 1916 (2); "Fresno Co.," nr. South Dos Palos, Merced Co., 20 May 1919 (3); nr. Laton, 21 June 1919 (2), 3 June 1922 (1); McNeil's Ranch SW of Fresno, 7 June 1920 (1); Mendota, 26 May 1915 (1), 7–21 June 1930 (5); Riverdale, 25 May 1917 (1), 24 May 1919 (1).

Kings County: 12 mi from Corcoran (egg record says "Kern Co."), 24 May 1940 (1); Gernsey Slough, 3 June 1946 (2); 3 mi E of Hanford, 24 May 1922 (1); nr. Stratford, 23–24 May 1936 (10); border of Tulare Lake, 4 mi W of Waukena, Tulare Co., 6 June 1893 (3); Tulare Lake, 8 June 1941 (11); Tulare Lake (Kings Co.), 24 May–8 June 1941 (18); 14 mi NW of Tulare, 6 June 1893 (1).

Kern County: Buena Vista Lake, 10 June 1907 (1), 19–20 June 1914 (2), 18 June 1916 (1), 19–21 June 1921 (3), 11 June–5 July 1922 (8), 4 July 1937 (1), 5 June 1938 (4), 6 June 1948 (1), 20 June 1954 (2), 24 June 1956 (1); rice field between Wheeler Ridge and Buena Vista Lake, 12 June 1960 (2); Kern River, 5 June 1938 (2).

Appendix 2. Sight records of confirmed breeding of Black Terns in California, 1899 to 1999, other than those listed or summarized in the text.

Northeastern California

Siskiyou County: Lower Klamath NWR, Unit 13A, mid-July 1995 (22 nests, Klamath Basin NWRs files).

Siskiyou/Modoc County: Tule Lake, early July 1899 ("nests," Bailey 1902).

Modoc County: Beeler Reservoir, 19 June 1976 (nest, B. E. Deuel).

Lassen County: Eagle Lake, 22 June 1921 (15–20 nests, Grinnell et al. 1930), summer 1974 (23 nests, Lederer 1976); Delta Bay, Eagle Lake, late May–mid July 1971 (1 nest, Gould 1974); North Basin, Eagle Lake, late May–late June 1996 (29 nests, Shaw 1998), early June–mid July 1997 (21 nests, Shaw 1998); southwest shore, Eagle Lake, late May–mid July 1971 (6 nests, Gould 1974); nr. Spaulding's, Eagle Lake, 9 June 1925 ("many nests," Grinnell et al. 1930), late May–mid July 1970 (30 nests, Gould 1974), late May–mid July 1971 (33 nests, Gould 1974), early June–mid July 1997 (11 nests, Shaw 1998); eastside bays (Troxel and Duck Island bays), Eagle Lake, late May-mid July 1971 (11 nests, Gould 1974), late May–late June 1996 (10 nests, Shaw 1998).

Plumas County: Sierra Valley, 23 July 1973 (nest, G. Zamzow), 14 June 1989 (nest, D. Shuford et al.), 13 June 1998 (nest, D. Shuford, J. McCormick).

Sierra County: Kyburz Flat, 28 June 1973 (nest, G. Zamzow), 19 July 1973 (nest, G. Zamzow).

El Dorado County: Emerald Bay, Lake Tahoe, 10 August 1918 ("parents feeding

young," J. W. Mailliard in Orr and Moffitt 1971); Rowland's Marsh (i.e., Al-Tahoe), Lake Tahoe, 1 June 1909 ("scores of nests," Ray 1913).

Central Valley: Sacramento Valley

Butte County: W of Biggs, 6 July 1987 (2 nests, J. Snowden in litt.); 3 mi S of Durham, 1 June 1985 (2 nests, J. Hornstein); 2 mi NE of Richvale, 3 July 1984 (7 nests, J. Snowden in litt.).

Glenn County: Sacramento NWR, 9 June 1958 (2 chicks banded; refuge files).

Colusa County: S side of White Rd. 0.7 mi W of Browning Rd., 26 June 1999 (2+ nests, B. Williams in litt.).

Sutter County: S of Kirkville Rd. adjacent to Sutter Bypass, June–July 1976 (3 nests, Lee 1984); jct. Hwy. 113 and Varney Rd., June–July 1976 (10 nests, Lee 1984); E of Armour Rd. between Kirkville and Varney roads, May–July 1977 (2 nests, Lee 1984); jct. Hwy. 113 and Kirkville Rd., June–July 1977 (8 nests, Lee 1984); N of Kirkville Rd. adjacent to Sutter Bypass, June–July 1977 (11 nests, Lee 1984); N of Robbins, June 1969 ("colony of 12 terns [with] nests," Greenberg 1972).

Sacramento County: jct. Hwy. 99 and Elkhorn Blvd., 24 May–22 June 1976 (13 nests, Lee 1984).

Central Valley: San Joaquin Valley

Merced County: nr. Los Banos, 16 June 1903 (young of year just beginning to fly, Chapman 1908), prior to 1923 (photo of chicks, Dawson 1923); San Joaquin River nr. Merced, prior to 1904 ("number of nests recorded," Mailliard 1904).

Merced/Fresno County: vic. Los Banos and South Dos Palos, 19–22 May 1919 (>100 nests examined, J. G. Tyler et al.).

Fresno County: nr. Laton, 31 May 1910 ("set of 3 eggs," C. Lamb in Tyler 1913), 27 May 1917 (colony of about 30 pairs, 8 egg sets, N. K. Carpenter, A. M. Ingersoll *fide* J. G. Tyler); Firebaugh, 30 May 1912 (several birds "sitting on nests," Tyler 1913); Riverdale, 25 May 1917 (colony of 20–25 pairs, 13 egg sets, J. G. Tyler, N. Carpenter); pond S of Fowler, 30 May 1918 (nest, J. G. Tyler); Mendota, 30 May 1928 (3 nests, W. B. Minturn, J. G. Tyler); White's Bridge Rd., Mendota, 17 May 1930 (nest, W. B. Minturn), 7 June 1930 (about 20 nests, W. B. Minturn, J. G. Tyler), 1 May 1937 (7 nests being built, W. B. Minturn), 22 May 1937 (8 nests, W. B. Minturn, C. Chandler), 14 May 1941 (partly completed nest, W. B. Minturn), 7 June 1941 (nest, W. B. Minturn).

Fresno/Madera County: Mendota Dam (i.e., Mendota Pool), 3 June 1933 (8 nests, W. B. Minturn, J. G. Tyler), 23–24 June 1933 (7 nests, W. B. Minturn, J. G. Tyler).

Madera County: 12 mi W of Madera, 9 June 1934 (2 nests, J. G. Tyler).

Kings County: Hacienda Ranch Flood Basin and South Wilbur Flood Area, 22 July 1983 ("many nests", one photographed, R. Hansen); East Hacienda Ranch Flood Basin, 29 June 1997 (5 nests, R. Hansen in litt.)

IDAHO BLACK SWIFTS: NESTING HABITAT AND A SPATIAL ANALYSIS OF RECORDS

R. KASTEN DUMROESE, USDA Forest Service, SRS, 1221 South Main Street, Moscow, Idaho 83843

MARK R. MOUSSEAUX, USDI Bureau of Land Management, Medford District Office, 3040 Biddle Road, Medford, Oregon 97504

SHIRLEY HORNING STURTS, East 4615 Fernan Lake Road, Coeur d'Alene, Idaho 83814

DANIEL A. STEPHENS, Department of Biology, Wenatchee Valley College, 1300 Fifth Street, Wenatchee, Washington, 98801

PAUL A. HOLICK, 1037 Showalter Road, Moscow, Idaho, 83843

ABSTRACT: The Black Swift (*Cypseloides niger*) was first confirmed breeding in Idaho in 1997 and 1998 when four and five pairs, respectively, nested near Shadow and Fern falls along the North Fork Coeur d'Alene River, Shoshone County. Nest sites were on cliffs composed of argillite within the large Precambrian Belt Supergroup geologic formation and associated with a narrow riparian strip of western redcedar and devil's club. The microcommunity along cliff faces consisted of a variety of mosses, liverworts, and ferns. We analyzed all Black Swift sight records for Idaho, finding that 78% were from the breeding season and most breeding-season records (96%) were associated with the Precambrian Belt Supergroup.

The Black Swift (*Cypseloides niger*) breeds locally in the mountains and along the coasts of western North America from southeast Alaska south to Mexico and east to central Colorado (AOU 1983). Nests are associated with coastal cliffs (Vrooman 1901), waterfalls (Smith 1928), and caves (Davis 1964). Although the Black Swift breeds in adjacent areas in the northern Rocky Mountains (Kondla 1973, Holroyd and Holroyd 1987, Hunter and Baldwin 1972), details of its status in Idaho are lacking. Larrison et al. (1967) considered the Black Swift a rare migrant and possible breeder, while Burleigh (1972) failed to mention the species. Since 1985, however, reports of summering Black Swifts have increased, and discovery of four nests in 1997 (Svingen and Trochlell 1998) along the North Fork Coeur d'Alene River, Shoshone Co., provided the first confirmation of breeding in Idaho (Stephens and Sturts 1998).

Here we describe the known nesting habitat of Idaho Black Swifts, explore the relationship of a prominent geologic formation to sight records, and suggest other potential suitable areas in Idaho for breeding swifts.

STUDY AREA AND METHODS

Black Swifts nested at two waterfalls, Shadow and Fern, on Falls Branch of Yellow Dog Creek in the North Fork Coeur d'Alene River watershed, Idaho Panhandle National Forest (47° 45′ 13″ N, 116° 06′ 19″ W). The region, characterized by steeply dissected mountains between 600 and 2570 m elevation, lies over the Precambrian Belt Supergroup, a large formation of sedimentary rock (Hobbs et al. 1965). Annual precipitation ranges from 648 to 1415 mm, with 70% falling as snow (R. Kasun pers.

comm.). The temperature at nearby Kellogg, Idaho, averages about 8° C, and the climate receives maritime influence. Winters are relatively mild and summers are dry (see ecoregion M333Ba, Nesser et al. 1997).

We visited the nesting site on 8, 23, and 24 August 1998 and characterized the waterfalls and associated macro- and micro-habitats. We compiled all known Idaho Black Swift sight records from 1929 through 2001 from several sources: Stephens and Sturts (1998); *Audubon Field Notes*, *American Birds*, and their successors; U.S. Fish and Wildlife Service (USFWS) Breeding Bird Surveys; unpublished records of M. T. Jollie (Univ. of Idaho); the database of Thomas Rogers, long-time regional editor for *Audubon Field Notes* and *American Birds*; and individual birders. Using Black Swift breeding phenology (Hunter and Baldwin 1962; Marín 1997, 1999) and our observations, we classified as summer (breeding) sight records from 7 June through 31 August; all others were migration records. Finally, we mapped records in the context of a USFWS latilong grid over the distribution of the geology found at the nesting site.

RESULTS

Nest-Site Habitat

Shadow and Fern falls face east and lie in the bottom of a steeply sloped (45°) valley. Elevation of the precipices of Shadow and Fern falls is 998 and 980 m, respectively, with Shadow Falls about 100 m upstream of Fern Falls. Although the creek flows through a narrow riparian macro-community dominated by western redcedar (*Thuja plicata*) and devil's club (*Oplopanax horridum*) (Cooper et al. 1991), this community is in a mostly later seral state dominated by western hemlock (*Tsuga heterophylla*) and lady fern (*Athyrium felix-femina*). It contains the following key plants: twisted stalk (*Stetopus stretopoides*), northern wood fern (*Dryopteris expansa*), Anderson's swordfern (*Polystichum andersonii*), Dewey's sedge (*Carex deweyana*), fool's huckleberry (*Menziesia ferruginea*), and smooth willowweed (*Epilobium glaberrimum*). Upslope of the narrow, later successional riparian zone the plant community quickly grades to a moist western hemlock/oak fern (*Gymnocarpium dryopteris*) community and then to a drier and younger western hemlock/queencup beadlily (*Clintonia uniflora*) community (Cooper et al. 1991) with few or no species associated with moist riparian areas. We observed a few old stumps, likely of the western white pine (*Pinus monticola*), indicating some historic logging and associated burning of the residual logging debris that was scattered across the site (probably before 1940s), but there has been no recent logging nearby.

Rock outcrops at both falls are green or bluish-gray thinly layered (0.2 to 10 cm) argillite, with occasional thicker layers (10 to 15 cm) of impure quartzite. Argillite layers generally contain abundant mud cracks and erode more readily than do the quartzites. Thicker, more resistant quartzites generally form tops of precipices over which water descends, with less resistant, thinly layered argillite [which dips back (8° to 12°) into the face of the cliff] forming undercut faces of cliffs. Rocks on undercut faces are moderately fractured, slumping forward in places until they are almost horizontal. On the basis of correlations with previously mapped areas, rock

outcrops most likely represent the upper Wallace Formation within the Precambrian Belt Supergroup (Hobbs et al. 1965).

Shadow Falls is about 8 m tall, and the curtain (free falling water no longer in contact with the cliff) is 5 m high, with the back of the falls cut at about a 45° angle and approximately 2 m deep at the base. The main fall is 4 m wide, with a more fragmented curtain to 5 m, and the total width of dripping water is 8 m. Fern Falls is approximately 5 m tall; its curtain is 3 m high with a backcut similar to Shadow Falls', and the drip zone is about 12 m wide.

We found four nests, each with one nestling, at Shadow Falls in 1998 (Figure 1). The lowest nest was near the southern edge of the curtain, behind falling water, and about 3.5 m above the bottom of the falls. The second nest was about 1 m directly above the first nest, behind the curtain, and about 0.3 m below where the curtain began. A third nestling was 0.75 m due north of the second nest along a nearly horizontal ledge. The fourth nest was not behind falling water but about 1.5 m due south of the second nest and underneath an overhang 5 m deep that extended about 8 m to the southeast. The single nest and nestling at Fern Falls was only 2 m above the bottom of the falls near the northern edge of the main curtain (Figure 2).

The dominant micro-community on the wet cliff faces included broom moss (*Dicranium scoparium*), eurhynchium moss (*Eurhynchium praelongum*), stair step moss (*Hylocomium splendens*), leucolepis moss (*Leucolepis menziesii*), platydictya moss (*Platydictya jungermannioides*), big redstem moss (*Pleurozium schreiberii*), bentleaf moss (*Rhytidiadelpus squarrosus*), snake liverwort (*Conocephalum conicum*), lung liverwort (*Marchantia polymorpha*), yellow-ladle liverwort (*Scapania bolanderi*), lady fern, fragile fern (*Cystopteris fragilis*), western polypody (*Polypodium hesperium*), and oak fern. Nests appeared to be made exclusively from some or all of these bryophytes.

Currently the site is indirectly protected under the USDA Forest Service's conservation protocols that require maintaining the riparian community for 50 m on either side of the creek. The falls are a popular tourist spot, with a well-maintained trail leading to Shadow Falls. Despite heavy visitation, most persons we talked with were unaware of nests. Black Swifts have high fidelity to nest sites (Collins and Foerster 1995, Marín 1997), and our observation that nearby human activity had no impact on breeding concurs with Foerster and Collins (1990), although Hirshman (1998) found that nestlings closer to human activity fledged later than those in less disturbed areas.

Knorr (1961) listed five characteristics of Black Swift nest sites: (1) presence of moving water; (2) high relief so swifts leaving nests are automatically at potential foraging altitude above surrounding terrain; (3) inaccessibility to terrestrial predators; (4) sunlight not reaching occupied nests; and (5) unobstructed flyways immediately in front of nests. After additional work, Knorr (1994) concluded that high relief is not a requirement, although the characteristic is almost invariably present, and added a sixth criterion, the presence of niches in rocks for nest sites.

Flowing water, inaccessible nests, and unobstructed flyways were present at both Shadow and Fern falls. Nests at Shadow Falls never received direct sunlight, but the nest at Fern Falls received about 20 minutes of direct sunlight around 08:30 the last days of August (J. Acton pers. comm.). Smith

Figure 1. Three Black Swift nestlings behind Shadow Falls, Shoshone Co., Idaho.

Photo by Dave Holick

Figure 2. A Black Swift nestling at Fern Falls, Shoshone Co., Idaho.

Photo by Dave Holick

(1928) reported sunlight to shine directly on a California nest site for an hour in early morning. Because of their location in the bottom of a narrow, steep valley, neither Shadow nor Fern falls offers immediate high-altitude foraging for adults. Like some Black Swifts in southern California (Foerster and Collins 1990), birds at Shadow Falls also flew through a maze of tree branches when exiting the nesting site (Figure 3; D. Johnson pers. comm.). The area immediately in front of the nests, however, was unobstructed as defined by Knorr (1961). Farther upstream of Shadow and Fern falls at 1054 m elevation, we found three additional falls, heights 2, 3.5, and 6 m, that were characterized by the thicker, more resistant quartzites and lacked layering and nests. Marín (1997) concluded cypseloidine swifts breed by water to ameliorate daily temperature changes around the nest and that Knorr's (1961) other criteria were secondary consequences of nesting near waterfalls. Our observations imply that high relief and lack of direct sunlight striking an occupied nest are less important ecological characteristics for successful Black Swift breeding than the presence of moving water, protection from terrestrial predators, available niches for nest construction, and unobstructed flyways.

Statewide Distribution

As annotated in the appendix, Idaho's 82 sight records of the Black Swift are from 34 general locations, shown in Figure 4 against the range of sedimentary rocks of the Precambrian Belt Supergroup. The 1929 sighting in latilong 5 probably formed the basis for the species being listed by Larrison et al. (1967:128) and Larrison (1981:171). Except for that sighting

Figure 3. View directly downstream from Shadow Falls. An adult Black Swift was observed flying through this forest when leaving the nest,

Photo by Dave Holick

and one in 1973 (latilong 1), all records have been since 1985. Most records (64, 78%) are from the breeding season. Most breeding-season records (96%) are from Idaho's panhandle (latilongs 1 through 5) and associated with the Precambrian Belt Supergroup (Figure 4).

The three observations from latilongs 7, 8, 11, and 13 (15 July, 24 June, 12 June, and 8 July, respectively) probably represent widely dispersed

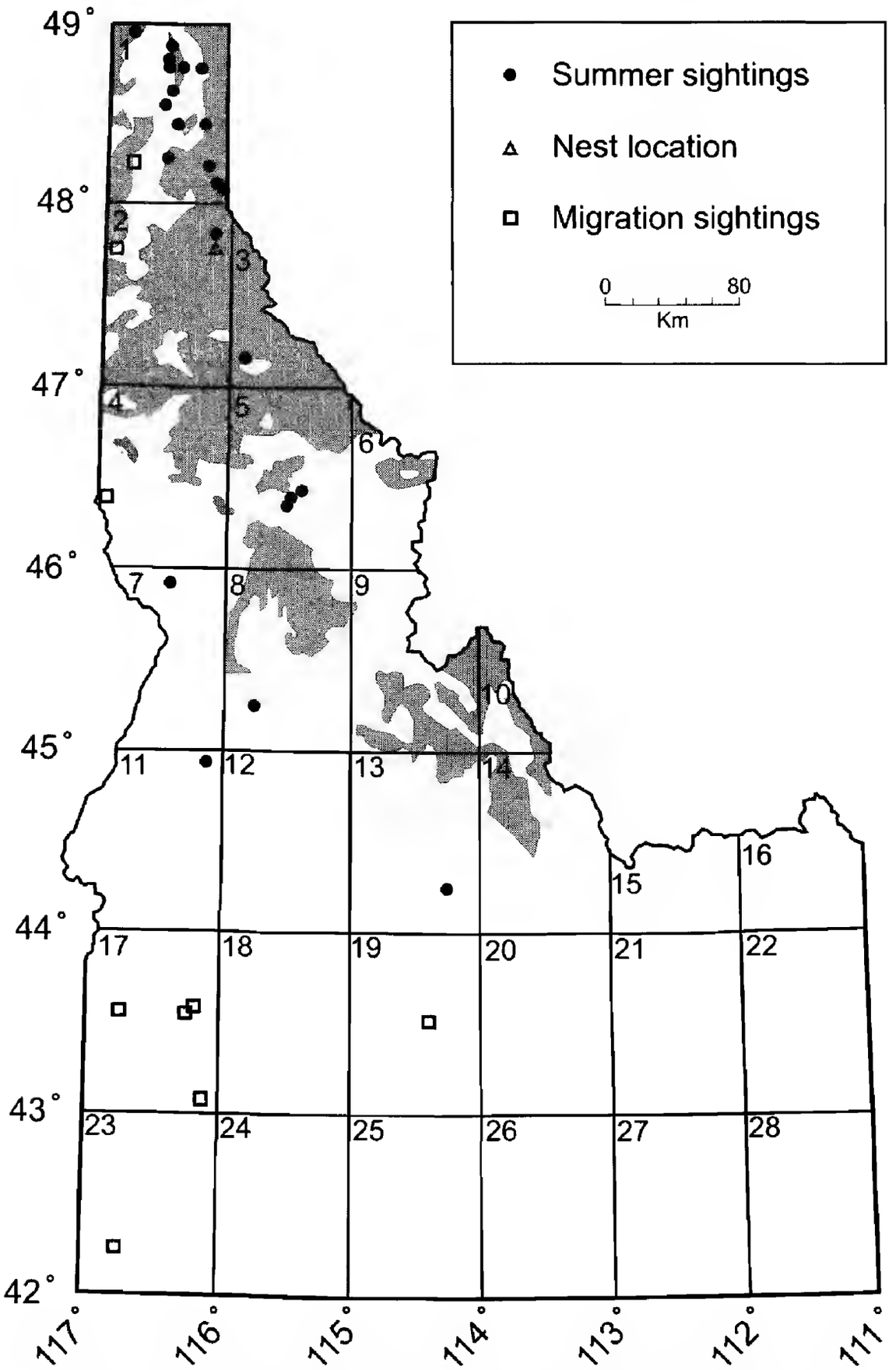

Figure 4. Latilongs, Black Swift sighting locations, and distribution of Precambrian Belt Supergroup sedimentary rocks (shaded areas) in Idaho. If the species has been sighted in both summer and migration at the same location, only a summer sighting is indicated. Adapted from our appendix, Stephens and Sturts (1998), and Idaho Geologic Survey (1978).

foraging adults. Although the Belt Supergroup is a large formation, south of the Lochsa River (generally latilongs 7+) the more highly metamorphosed Precambrian Belt rocks loose some of their layering as they change into schist, probably reducing the availability of nesting ledges like those at Shadow and Fern falls. Spring records from latilongs 17, 19, and 23 are too early for breeding, and fall records in latilong 17 are probably of migrating birds since adults and fledglings apparently begin migration immediately (Marín 1997).

Our observations of nest-site habitat at Shadow and Fern falls and the prevalence of summer sight records in latilongs 1 to 5 suggest that any northern Idaho waterfall on sedimentary rock may meet the requirements of nesting Black Swifts and should be investigated. Additional field work should enhance our knowledge of the distribution of Black Swifts in Idaho.

ACKNOWLEDGMENTS

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APPENDIX—Idaho Black Swift Sightings

See Figure 1 for latilongs. Abbreviations: American Birds (AB), National Audubon Society Field Notes (FN), North American Birds (NAB), National Wildlife Refuge (NWR), breeding bird survey (BBS).

Latilong 1—**Boundary Co.** Smith Creek drainage (T64N R3W Sec. 4): 1 on 6 Jun 1998. Kootenai NWR: 1 on 20 Jun 1985, 20 during summer 1985 (AB 39:940, 1985), 1 on 16 May 1986, 12 on 20 Jul 1986, 1 on 1 Jun 1988, 20 on 13 Jun 1998, 5 on 24 Jun 2001. Along Farnham Creek (T64N R1W Sec. 33 & 34): 1 seen often during Jun 1998. Westside Road near Copeland Bridge: 1 with 200 Vaux's Swifts 29 Aug 1997. Myrtle Creek Road (T62N R1W): 4 on 15 Jul 1998. Naples BBS (IDA-001) following Westside Road between Myrtle and Trout creeks: 3 on 11 Jun 1973, 7 on 12 Jun 1988, 6 on 11 Jun 1989, 1 on 23 Jun 1990, 2 on 30 Jun

1994, 7 on 15 Jun 1997. Pack River Road at Upper Pack River Bridge: 2 with 4 Vaux's Swifts on 7 Aug 1993. Bonner's Ferry: 1 on 19 Jun 1989. McArthur Wildlife Management Area: 1+ on 27 Jul 2000. **Bonner Co.** Upper Grouse Creek Road: 4 to 6 above 1220 m elevation during Jun and Jul from 1988 through 1994. Clark Fork River between Clark Fork and the Cabinet Gorge Dam on the Montana border: 25+ on 6 and 24 Jun 1985 (AB 39:940, 1985), 2 on 10 Aug 1985, 1 on 13 Aug 1985 (Idaho Rare Bird Committee 3-88), 2 on 23 Jul 1986 (AB 40:1231, 1986), 4 to 6 each summer from 1988 through 1996. North of Clark Fork along Lightning Creek (T56N R2E Sec. 13): 11 with Vaux's Swifts on 16 Jun 1989 (AB 43:1344, 1989), "many" on 13 Jun 1991. Schweitzer ski area, Sandpoint: 2 soaring on 18 Jul 1997. Along the Priest River north of Priest River: 6 Jun 2001.

Latilong 2—**Kootenai Co.** North shore Lake Coeur d'Alene in Coeur d'Alene: 1 dead female on 28 May 1998 (Idaho Museum of Natural History 2643). **Shoshone Co.** North Fork Coeur d'Alene River near Cinnamon Creek (T52N R3E): 2 on 31 May 1989, 1 with Vaux's Swift on 1 Jun 1997 (FN 51:1025, 1997), 1 on 30 Aug 1997. North Fork Coeur d'Alene River, Shadow and Fern falls (T51N R3E Sec. 20): 5 including 3 and 1 nestlings, respectively, on 28 and 30 Aug 1997 (FN 52:95, 1998), Fern Falls nestling photographed clinging vertically to its nest was erroneously published horizontally (FN 52:143, 1998), 1 adult on a Shadow Falls nest on 8 Jun 1998, 1 adult on 22 and 23 Jun 1998, 5 nestlings (4 at Shadow Falls and 1 at Fern Falls) 26 Aug 1998 (NAB 53:80, 1999), 4 nestlings (3 at Shadow Falls and 1 at Fern Falls) on 27 Aug 1999; 3 nestlings at Shadow Falls on 9 Aug 2000; 4 nestlings (3 at Shadow Falls and 1 at Fern Falls) on 24 Aug 2001.

Latilong 3—**Shoshone Co.** Middle Sister Lookout: 1 flew by at 2040 m on 4 Aug 2000.

Latilong 4—**Nez Perce Co.** Lewiston Orchards: 5 or 6 on 27 May 1980.

Latilong 5—**Idaho Co.** Lochsa River, Wilderness Gateway Campground: 1 on 14 Jul 1984, 3 on 12 Jun 1987, 5 on 17 Jun 1989 (Boulder Creek, T35N R9E Sec. 34; AB 43:1344, 1989), 5 on 20 Aug 1990, 1 on 5 and 6 Jun 1993, 3 on 27 Jul 1997 (FN 51:1025, 1997). Selway River 64 km west of Lolo Pass: 1 with 8+ Vaux's Swifts on 30 Jul 1993. Confluence of Lochsa and Selway rivers: mouth of Pete King Creek: 1 foraging low with Vaux's Swifts during stormy weather on 17 Jun 1929; Johnson Bar: 1 with 10 Vaux's Swifts on 28 Jul 1993.

Latilong 7—**Idaho Co.** Joseph Plain along Billy Creek Road (about T29N & T30N R1W): 1 on 15 Jul 1989 (AB 43:1344, 1989).

Latilong 8—**Idaho Co.** Warren, Burgdorf BBS (IDA-208): 4 on 24 Jun 1989.

Latilong 10—Although Stephen and Sturts (1998) indicated a migration record, no data confirm it, and this is most likely a typographical error.

Latilong 11—**Valley Co.** Bear Basin, McCall: 2 on 12 Jun 2000 (NAB 54:402, 2000).

Latilong 13—**Custer Co.** Spar Canyon, 25 km south of Challis: 1 with a few White-throated Swifts flying around a 120-m east-oriented cliff on a south-facing slope at 1850 m elevation 8 Jul 1984.

Latilong 17—**Canyon Co.** Deer Flat NWR: 1 flew under low clouds and over the New York Canal at Lake Lowell on 5 Sep 1992 (AB 47:122, 1993). **Ada Co.** Lucky Peak Bird Observatory (T3N R3E Sec. 11): 30 to 35 on 25 Sep 1997 (FN 52:95, 1998); 3 on 10 Sep 2001. Boise: 3 on 4 Jun 1999 (NAB 53:412, 1999); 2 on 5 Sep 2000 (NAB 55:76, 2001). **Owyhee Co.** Near C.J. Strike Dam: 1 on 13 Oct 2000 (erroneously published as Elmore Co. in NAB 55:76, 2001).

Latilong 19—**Blaine Co.** Hailey: 1 about 8 m above the ground in a mixed flock of swallows at dusk on 2 May 1998 (erroneously published as 24 May in FN 52:361, 1998).

Latilong 23—**Owyhee Co.** Owyhee River: 2 on 1 Jun 1984.

NOTES

DETECTIONS OF CALIFORNIA BLACK RAILS IN THE COLORADO RIVER DELTA, MEXICO

OSVEL HINOJOSA-HUERTA and WILLIAM W. SHAW, 104 Biological Sciences East, School of Renewable Natural Resources, University of Arizona, Tucson, Arizona 85721

STEPHEN DeSTEFANO, U. S. Geological Survey, Massachusetts Cooperative Fish and Wildlife Research Unit, Holdsworth Natural Resource Center, University of Massachusetts, Amherst, Massachusetts 01003

Populations of California Black Rails (*Laterallus jamaicensis coturniculus*) have been drastically reduced in western North America over the last several decades (Repking and Ohmart 1977, Evens et al. 1991). The California Black Rail is listed as threatened by the California Department of Fish and Game and is considered a "species of concern" by the U.S. Fish and Wildlife Service (www.dfg.ca.gov/endangered/birds.html). In Mexico, the California Black Rail is listed as endangered (Diario Oficial de la Federación 2000). Current management of the lower Colorado River, including the difficulty maintaining shallow and stable water levels at potentially suitable wetlands, is the critical factor limiting the distribution of Black Rails inland (Eddleman et al. 1994). Black Rails were first detected in the Colorado River delta in 1998, at the Ciénega de Santa Clara (Piest and Campoy 1999), despite rail surveys having been conducted there in the 1980s and early 1990s (Abarca et al. 1993, Eddleman et al. 1994). Evens et al. (1991) speculated that Black Rails were absent from these wetlands because of massive habitat degradation. The purpose of our study was to assess the presence or absence of Black Rails in the remnant wetlands of the Colorado River delta, Baja California and Sonora, Mexico.

Our surveys were focused in the Ciénega de Santa Clara, at about 5800 ha the largest marsh in the delta. This wetland lies within the Upper Gulf of California and Colorado River Delta Biosphere Reserve. Other surveyed areas were Hardy River, El Mayor River, Pescaderos River, Riito Drain, Cucapá Complex, El Indio Lagoon, El Doctor wetlands, and Eastern Drains (Figure 1). The surveyed wetlands included emergent marshes fed by agricultural runoff and natural springs. Vegetation was dominated mostly by cattail (*Typha domingensis*), with common reed (*Phragmites australis*), bulrush (*Scirpus* spp.), saltcedar (*Tamarix ramosissima*), and salt grasses (*Distichlis* spp.) present also. Glenn et al. (2001) described each wetland.

We conducted call-response surveys from March to June 2000 during Yuma Clapper Rail (*Rallus longirostris yumanensis*) surveys (Hinojosa-Huerta et al. 2001). After completing the Yuma Clapper Rail survey protocol, we played taped vocalizations of California Black Rails for 2 minutes, followed by a silent period of 2 minutes in which we recorded all responding individuals. The tape included two types of calls (starting with *kickee-doo*, followed by grunt vocalization) arranged in a 1-minute loop. Surveys started at sunrise and continued no later than 1030. Survey stations were circular plots (30-m radius) located at least 200 m apart and grouped into routes. We visited each station once during the early breeding season (11–17 March) and again during late breeding season (18–22 May). We selected the location of the routes in the Ciénega de Santa Clara randomly (16 routes, 173 stations, covering about 9% of the total area of the ciénega). Other wetlands considered potential habitat were much smaller, and we placed routes in them nonrandomly to maximize coverage of these areas (8 routes, 55 stations).

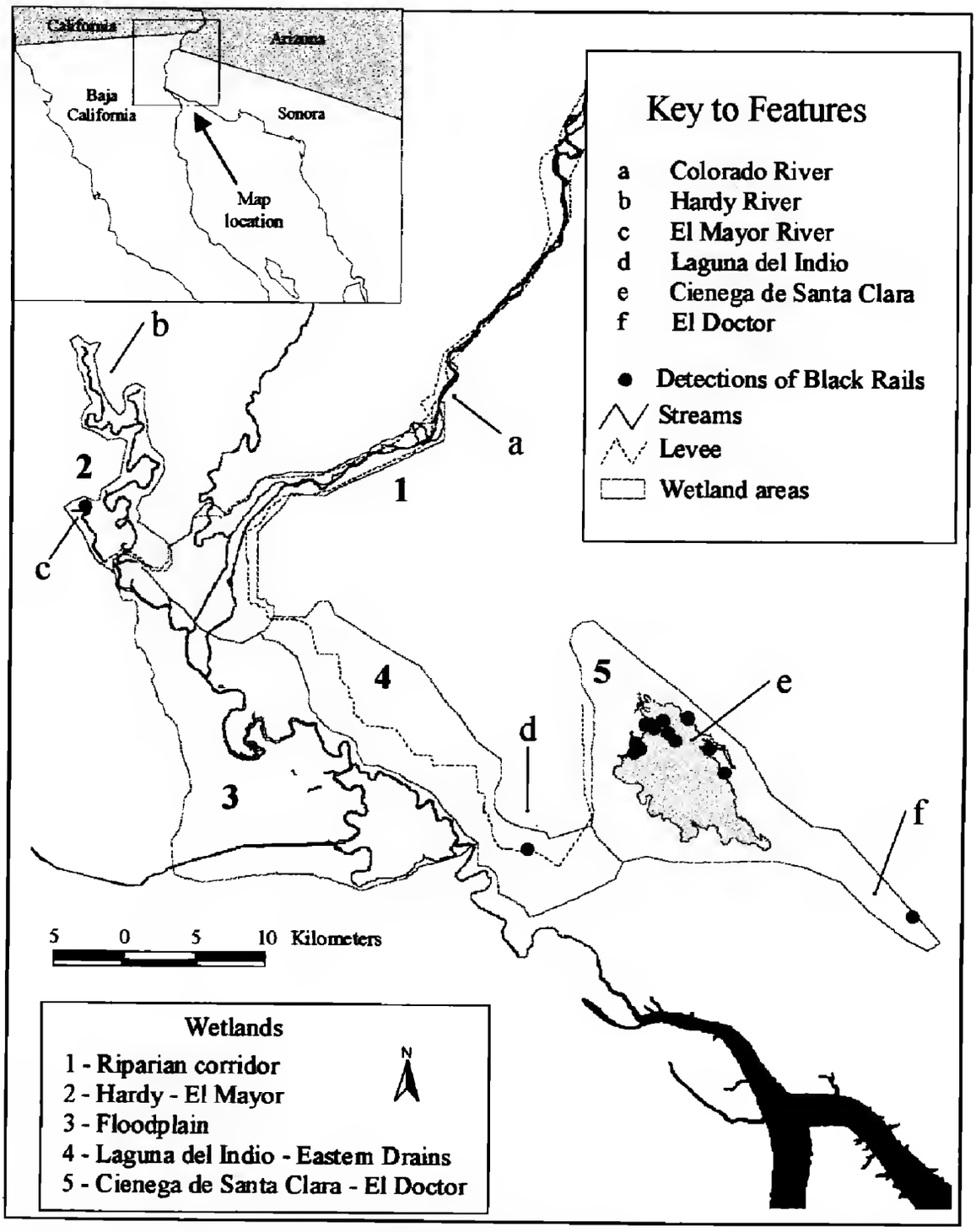

Figure 1. Wetland areas where California Black Rails were detected in the Colorado River delta, Baja California and Sonora, Mexico.

We detected a total of 19 Black Rails at 18 survey stations (3.94 % of the surveyed stations) during the two survey periods (Figure 2). Most were located in the Ciénega de Santa Clara, where we detected 10 Black Rails at nine stations (5.20% of the surveyed stations) during early breeding season and six at six stations (3.46% of the surveyed stations) during late breeding season. All of the detections in the late breeding season were >500 m away from any detection in the early breeding season (Figure 2). Cattail was the dominant vegetation (>50% of vegetation cover) at all stations where Black Rails were detected in the ciénega. Bulrush was an important vegetation feature

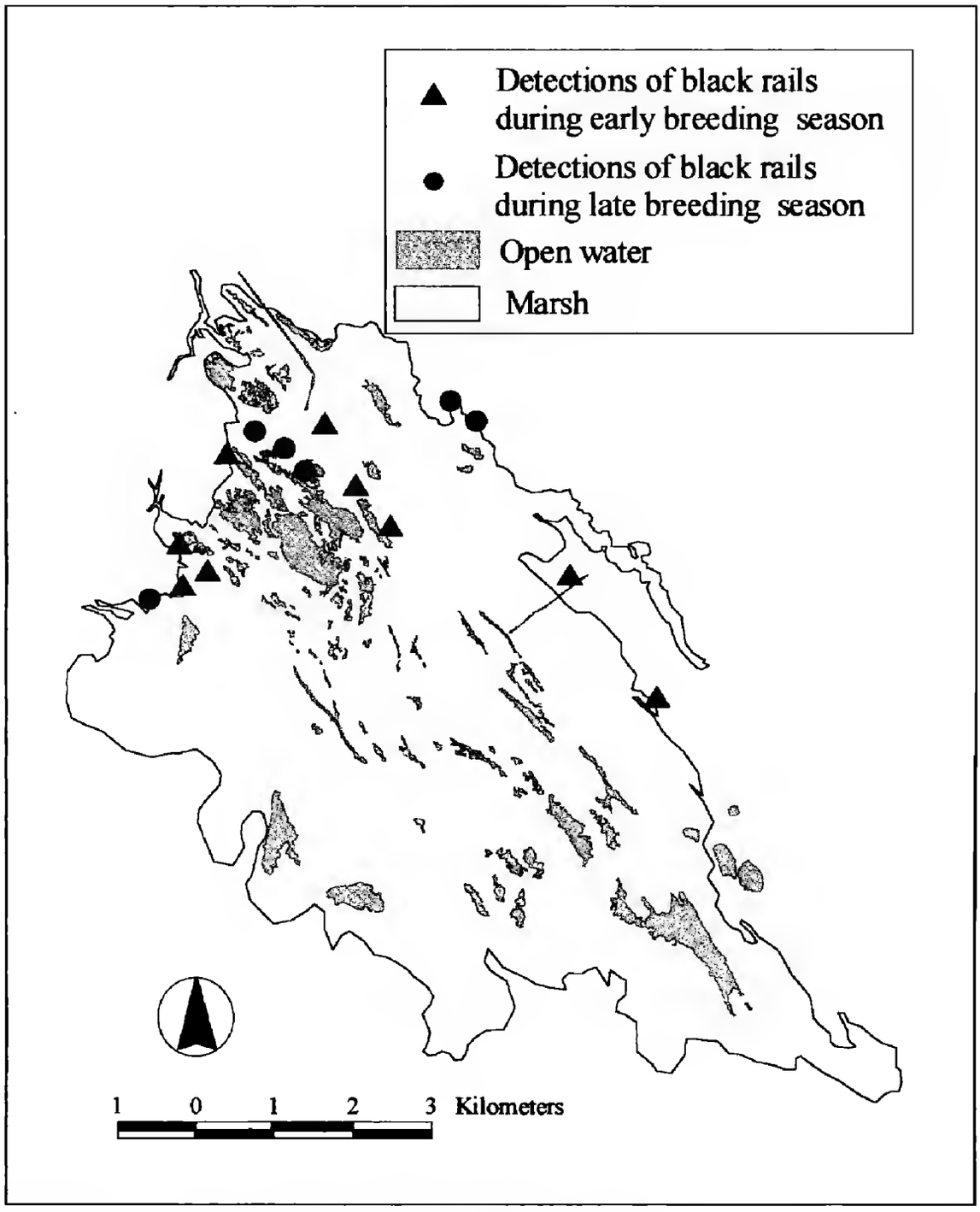

Figure 2. Survey stations where California Black Rails were detected in the Ciénega de Santa Clara, Sonora, Mexico during 2000.

(>15% of the vegetation coverage) at five of these stations, saltcedar only at two.

We detected three Black Rails at other wetlands in the delta during March (early breeding season) (present at 5.45% of the surveyed stations). One individual was along El Mayor River in a shallow (12–30 cm) agricultural drain dominated by cattail. A second Black Rail was at El Doctor wetlands in Sonora, which are maintained by natural springs. This area has constant shallow water throughout the year, and its vegetation is dominated by bulrush. The third individual was at El Indio Lagoon, Baja California, a recently restored wetland supported by agricultural drainage water, dominated by saltcedar but with substantial cattail. We detected no Black Rails at

Hardy River, Pescaderos River, Riito Drain, Cucapá Complex, or Eastern Drains. This absence may be related to the dominance of saltcedar and the lack of a constant source of water at these wetlands (Hinojosa-Huerta 2000).

California Black Rails were scarce and located at only a few sites in the Colorado River delta during our surveys in 2000. However, these detections document California Black Rails occurring in these wetlands during the breeding season. These sites should be monitored for changes in the population, with a survey design specific for the subspecies, to avoid potential disruption caused by other procedures (e.g., eliciting taped calls of Yuma Clapper Rails). An optimum protocol to survey California Black Rails should follow recommendations by Spear et al. (1999), although further research is needed. The sequence of calls in the survey tape should be reassessed, as the *kickee-doo* call may interfere with the grunt vocalization (M. Legare pers. comm.).

The subspecies should be included in management plans for the biosphere reserve, with specific practices to enhance or restore Black Rail habitat. Our results indicate that there is potential in agricultural drainage water and remnant wetlands in the delta for the conservation of the subspecies. This information should be considered in the development of conservation and recovery plans for inland populations.

This research was funded by the U.S. Fish and Wildlife Service, Region 2, (agreement number 1448-20181-98-G942), through the Arizona Cooperative Fish and Wildlife Research Unit. We thank Lin Piest, José Campoy, and Martha Román for their continuous help throughout the project. Jules Evens, Robert A. Hamilton, Michael Legare, and Philip Unitt made helpful comments on an earlier draft.

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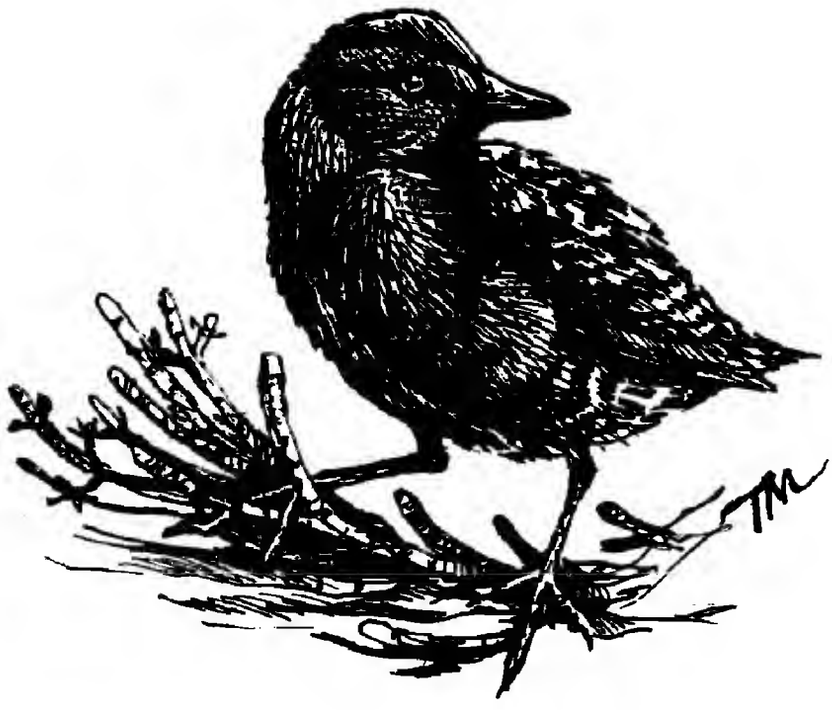

Black Rail *Sketch by Tim Manolis*

BOOK REVIEWS

Birds of North America, Western Region, by Fred J. Alsop, III. Smithsonian Handbooks, DK Publishing, New York. Paperback, $24.95. ISBN 0-7894-7157-4.

"Until now, no tool for identifying birds has also provided access to information on behavior, nesting, flight patterns, and similar birds in a compact and user-friendly format." So proclaims the introduction to *Birds of North America, Western Region* (hereafter BNAW), and that this book is written for novices and for experienced birders. How does it uphold these claims?

The subject matter of BNAW is birds recorded west of the 100th meridian, north of Mexico. A brief introduction explains how to use the book (e.g., the numerous icons), including sections on watching birds and conservation. The introduction is not free of miscues: the "Ruby-throated Hummingbird" photo (p. 13) is of a Plain-capped Starthroat, and in the abundance and distribution terms (pp. 24–25) the European Starling is "abundant," while the Cattle Egret is "exotic," and the Antillean Nighthawk (unknown in the West) is "rare." Single-page accounts follow for 696 species, in the latest AOU sequence. Each has one or two color photos (or paintings), a small color map, and various other information conveyed by text (song, behavior, breeding, nesting, population) or icons (flight pattern, nest identification, habitat). A small box covers similar species. The book concludes with a list of 80 "accidental" species, a glossary, and an index.

I have yet to see an identification guide that works well for all levels. In regard to BNAW, I doubt a beginner wants to wade through many pages of species he will never see in an attempt to identify a bird in his yard. Advanced birders will be frustrated (or amused) by the concept and execution: e.g., criteria for which species are addressed in accounts appear purely whimsical: included are the Streaked (but not Manx) Shearwater, Red-tailed (but not Red-billed) Tropicbird, Great Knot (but not Ruff!), and so on. Illustrations are the crux of any identification guide, yet one full-color photo of a Red-throated Loon or Sanderling in breeding plumage is unlikely to help beginners identify these species during most of the year. Photos generally have been trimmed to the bird's outline, but some retain an unappealing and distracting color outline (e.g., the Great Egret and Baird's Sandpiper), and many are of birds in poses unhelpful for identification. The paintings appear to have come from "professional" design people unfamiliar with avian anatomy or live birds. I didn't search for misidentified photos but the female "Rufous" Hummingbird is a Lucifer, and the White Wagtail is not of the Alaskan subspecies *ocularis*.

The text is of little substantive value for field identification. For other topics (such as behavior and nesting) it contains much that is accurate, but little reflects first-hand experience. An eastern bias is pervasive, and the editing is poor. Equally good or better life-history summaries can be found in *The Birder's Handbook* by Paul Ehrlich et al. (Simon and Schuster, 1988, whence much information in BNAW appears to have been copied directly) or Kenn Kaufman's *Lives of North American Birds* (Houghton Mifflin, 1986). For field-identification use the Sibley, National Geographic Society, or Kaufman guides, which are all excellent, well-conceived, and together cater to the full spectrum of birders. You'd be unlikely to take BNAW afield (it's heavy, at 8.5″ × 5.5″ × 1.75″), so having two or more useful books at home would be better than having this one.

BNAW appears to be a well-intentioned but poorly executed attempt to combine life-history information with identification. Usually I donate review copies to a library, but in this case I'll recycle my copy when this review is finished.

Steve N. G. Howell

Isles of Refuge, by Mark J. Rauzon. 2001. University of Hawaii Press, Honolulu. 206 pp., 97 color and 46 black-and-white photos, 21 illustrations, 11 maps. Paperback, $29.95. ISBN 0-8248-2330-3.

You are on a May pelagic trip off Bodega Bay. You reach the continental shelf, and suddenly the chummed-in fray is joined by one, two, 25, 50, perhaps even 500 incoming bombers: majestic, graceful Black-footed Albatrosses splay their feet and eagerly scatter the screeching gulls in search of a morsel of popcorn or suet. Some of them have bleached heads, some are in fresh plumage, some have begun their molt, others have tattered wings. A few wear metal or color bands around one or both legs. You wonder whence they have traveled that day or that week. As was discovered recently through satellite transmitters, the answer is quite astounding: the bleach-headed birds are tending chicks over 5000 km away in the northwestern Hawaiian Islands. They have ridden the winds on a quick grocery run to the California coast. You wonder what kind of place can produce such marvels of the sea.

Aptly named, *Isles of Refuge* takes you on a sun-drenched cruise through the atolls and pinnacles of the Black-footed Albatross and many other tropical seabirds. Although making up less than 0.1% of Hawaii's land area, the northwestern Hawaiian Islands span a distance of more than 1600 km, over twice that of the populated or "main" Hawaiian Islands. As the Pacific plate moves over Hawaii's volcanic hotspot, lands are created, eroded, submerged, maintained by surface-reaching coral, and finally extinguished as they reach "Darwin's Line" at 29° N. The northwestern islands consist of five remnant rocky volcano tops (e.g., Nihoa, Laysan, and Gardner Pinnacles) and six coral atolls (e.g., French Frigate Shoals, Midway, and Kure), the latter graced with shifting snow-white sands, sparse native vegetation, and impossibly blue lagoons. These remote islands have a rich and storied human history, culminating in their protection as national fish and wildlife refuges and Hawaii state refuges. But it is the stunning images and insights into the spectacular natural history of *Isles of Refuge* that will be of interest to the readers of *Western Birds*.

The book is divided into 22 chapters. Those on each of the island groups are interspersed with others covering the biology of keystone species (such as the "goonies," Monk Seal, and Green Sea Turtle), vertebrate and subtidal ecology, conservation concerns and initiatives, personal stories, and human campaigns. The last range the spectrum from a voyage of the native Hawaiian canoe *Hokule'a* to Nihoa in search of sacred Polynesian sites to the battle of Midway. Being a writer, photographer, and ornithologist, Rauzon shares with the reader a unique understanding and perspective of this important biological reserve. You learn how it is to be a biologist "stranded" for months at a time with little but the wind, waves, and seabirds to keep you company: "It was OK when the goonies talked to you, but when you understood what they said, it was time to leave." You gain an appreciation for the spiritual ways and poetic views of the *kamaaina*, or peoples of Hawaii. You contrast this with the bungling, shipwrecking, murderous, warring, and ecologically apocalyptic exploitations of the *haoles* and other foreign visitors of the nineteenth and early twentieth centuries. Most important, you see hope in recent efforts to study the resident species, eradicate alien flora and fauna, and restore the islands to their native constituents.

Beautifully written, entertaining, and with few miscues (fans of Pink Floyd will cringe at the reference to "Dark Side of the *Sun*"), I fully recommend *Isles of Refuge* to those with an interest in the seabirds and ecology of the tropical Pacific.

Peter Pyle

Bird Songs of Southeastern Arizona and Sonora, Mexico by Geoffrey A. Keller. 2001. Library of Natural Sounds, Cornell Laboratory of Ornithology. Set of 2 compact disks; $24.95. ISBN 0-938027-58-1.

This fine set of recordings appears to be part of a series from Cornell that, to date, has covered Alaska (1999), the Rocky Mountain states and provinces (1999; reviewed in *W. Birds* 31:64), and the lower Rio Grande valley and southwestern Texas (2000). The compilation reviewed here contains vocalizations from 151 "Arizona species" (those with "at least one confirmed breeding record in the state"—although, apparently, a nest with two eggs of the Rufous-capped Warbler [Rosenberg and Witzeman 1999. *W. Birds* 30:94–120] does not qualify) and a further 51 "Sonora species," including some that stray rarely to southeastern Arizona (e.g., the Plain-capped Starthroat and Yellow Grosbeak). As with other works in this series, the selection of species is somewhat eclectic with no stated reason for inclusion or omission. For example, included are the Sharp-shinned Hawk but not the Red-tailed, the Eastern Meadowlark but not the Western. Nonetheless, apparently all of the "southeastern Arizona specialties" are included, which may be the main focus for most potential buyers. Species are arranged in AOU (1998 checklist) sequence, but the 42nd checklist supplement (2000) was not followed, e.g., the Arizona Woodpecker (*P. arizonae*) remains as Strickland's Woodpecker (*P. stricklandi*). An accompanying booklet provides context for most vocalizations and also gives the location of each recording (at the state level only, see below). The booklet includes many written transcriptions and often articulates helpful pointers for distinguishing vocalizations of similar-sounding species. Regional or subspecific variation in song is mentioned for some taxa, e.g., the Southwestern Willow Flycatcher (*E. t. extimus*) and Eastern Meadowlark (*S. m. lilianae*), but not for others, e.g., the Northern Pygmy-Owl or White-breasted Nuthatch.

The recordings are, almost without exception, of superb quality which, ironically, makes some sound "unnatural," because ambient noise we usually hear in the field is lacking. Among many possibilities, one can make useful comparisons of the songs of the Bendire's, Curve-billed, Crissal, and Le Conte's thrashers, or of the calls of the Ladder-backed, Hairy, and Arizona/Strickland's woodpeckers. The three southwestern *Myiarchus* flycatchers are included, as is the Nutting's Flycatcher from Sonora, and other notable species included are the White-throated and Pine flycatchers and Black-capped Gnatcatcher. Other species are sometimes audible in the background but, although not identified, are unlikely to be confused with the featured species.

The following observations are intended as constructive comments to be considered for future editions and other works in this series and, I acknowledge, are for the most part niggling relative to the overall scope and quality of this undertaking. My main complaint is that the date and location are not provided for each cut, although, according to the booklet's introductory material, such information can be requested. Nonetheless, in an age when appreciation of geographic variation with respect to subspecies (or even local dialects) is growing, the addition of date and location data should be mandatory and, with forethought, would not take up much space in the booklet. Instead, locations are given only at the state or province level, and without date. More than one subspecies can breed in a state, however, and subspecies not breeding in a region can sing during migration. Related to this, 25% of the "Arizona" species were recorded outside that state, as were many additional cuts for other species. Consequently the title is somewhat misleading and might more accurately read "Songs and calls of birds that occur in southeastern Arizona...." Surely there are recordings from Arizona of the Common Raven or Brown Creeper? The flight call of the male Brown-headed Cowbird is renowned for its geographic variation (the cut included is from Oregon), and the vocalizations of Berylline Hummingbird (from Chiapas, southern Mexico) pertain to a very different subspecies and are unlikely to be of much help in Arizona.

I recognize that the vocal repertoires of very few species are completely known, let alone represented by recordings. In particular, this might pertain to the Mexican species on these CDs—and can highlight where field work needs to be directed—but for other species I would hope that fuller ranges of sounds could be found, and of the relevant subspecies. For example, no drum is included for the Ladder-backed Woodpecker, and the *peek* call of the Hairy Woodpecker is from an Oregon subspecies. Some calls I hear commonly from several species are not included in the cuts, e.g., the *chup* call of a Hermit Thrush or the Berylline Hummingbird's diagnostic buzz call. Several vocalizations sound as if birds were agitated (perhaps by playback or near the nest?), e.g., the unusually persistent (and "atypical") Flame-colored Tanager calls. If birds were responding to playback this could be noted; the resulting vocalizations are still "natural" but may not be those heard under most field conditions.

The distinction between a "song" and a "call" is, of course, rather anthropomorphic and often somewhat subjective, but the Gray-collared Becard's so-called "song" sounds like an infrequently heard "agitation call," while the second cut is an attenuated version of this species' typical "territorial song." Users should also be aware that the booklet's text sometimes compares non-analogous vocalizations. This could lead to mistaken beliefs that some species' calls are quite different, e.g., the calls provided for Northern Cardinal (from Florida) and Pyrrhuloxia. Alternatively, the Eared Trogon's voice is reportedly "very different from that of the Elegant Trogon." True enough, but the relevant cuts compare Elegant Trogon "songs" with non-analogous "calls" of the Eared.

My final observation, having been involved in some of the in-progress review work, is that the completed CDs and booklet appear not to have been subjected to final review—an important step not to overlook. Thus, although I am credited with reviewing the Mexican species for authenticity I was surprised to see the inclusion of the Maroon-fronted Parrot (endemic to northeast Mexico!) under the Thick-billed Parrot (the Nuevo Leon cut). Also note the "Common Black Hawk" from "Costa Rica: Puntarenas," which, on geographic grounds, seems more likely to have been a Mangrove Black Hawk (split by the AOU if not by Middle American authorities, e.g., see Stiles and Skutch, 1989, *A Guide to the Birds of Costa Rica*). The booklet also could have benefited from a copy-editing check for grammar, but, all in all, my comments and complaints are minor set against the fine resource that Geoff Keller and Cornell have produced. Anyone interested in the songs and calls of North American and Mexican birds should own these CDs and, if possible, help fill in gaps to make future editions more comprehensive.

Steve N. G. Howell

FEATURED PHOTO

AN UNUSUAL PLUMAGE VARIANT OF THE HEERMANN'S GULL

KIMBALL L. GARRETT, Section of Vertebrates, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007

Minor individual plumage variation in gulls is one of many factors confounding field identification of this notoriously difficult group. Plumage variation can sometimes take the form of more extreme anomalies such as leucism and albinism (Grant 1986). A well-known variant of the Heermann's Gull, *Larus heermanni*, shows patches of white on the greater primary-coverts (Hubbs and Bartholomew 1951), as depicted, for example, by Sibley (2000); some individuals have additional white on other wing coverts, scapulars, or remiges (pers. obs.). White primary-covert patches occur in 0.01% (Hubbs and Bartholomew 1951) to 0.5% (Sibley 2000) of Heermann's Gulls. I photographed a different Heermann's Gull variant in Santa Barbara, Santa Barbara County, California, on 16 January 2000 (see back cover).

Typical of leucistic or albinistic gulls (Grant 1986), the Santa Barbara bird shows bare parts (bright red basal four-fifths of bill and thin red orbital ring) that are normally pigmented and in this case suggest that the bird was an adult in definitive plumage. The normal dark grays of the body plumage have been replaced by paler gray (many upperwing coverts and scapulars) or creamy white (underparts, center of back, greater secondary coverts, and tertials). Other photographs not reproduced here show pale gray underwing coverts and confirm that the normally blackish areas of the remiges and rectrices were dusky brown (secondaries, incoming inner two primaries, dark areas of rectrices) to pale brown (outer eight primaries, which are presumably faded). Active primary molt in Heermann's Gulls generally commences in May (S. N. G. Howell pers. comm.), so this individual is anomalous in this regard, as well as in its pigmentation. The pure white head indicates definitive alternate plumage, which is typically acquired between November and January (S. N. G. Howell pers. comm., contra Dwight 1925).

The bird is at least 2.5 to 3.5 years old and thus may have survived into adulthood in this leucistic plumage; alternatively, it bore normal subadult plumages and exhibited leucism only in its first (or a subsequent) definitive plumage. In this case a suite of characters including size, shape, and, most importantly, bare-part coloration makes the identification of this unusual variant simple. However, varying degrees of leucism shown by other gulls, in particular the large white-headed gulls of the northern hemisphere, can lead to difficult or intractable field-identification problems.

I thank Steve N. G. Howell and Philip Unitt for comments that improved the manuscript.

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PRESIDENT'S MESSAGE

At our annual meeting in Reno last fall your WFO board of directors made several important decisions aimed at improving the quality of our journal, increasing our appeal to a broader range of field ornithologists and ensuring the continued financial health of your organization. *Western Birds* has and always will be the primary focus of WFO, and we continue to work for its improvement. The publication fund we established about a year ago is the primary tool for this objective, and to that end we have substantially increased the amount in the fund. In the most recent issue of *Western Birds* we appealed for donations to the publication fund, and you have been both quick to respond and generous with your gifts. For those of you who have already responded we are pleased and very grateful. If you have not yet sent us your contribution please consider doing so. The recent WFO-sponsored trip to Yucatan, Mexico, led by Steve Howell and David Yee was a great success, and the tour participants also contributed generously to the publication fund. Because of your generosity we expect in the near future to publish more color photographs in the journal and continue our series of monographs. Thank you all for your support!

Since its inception 31 years ago the WFO board of directors has been made up of nine members. Both to improve the balance of the board and to increase our appeal to a broader constituency we changed the WFO by-laws to increase the membership to 12. The board is currently well represented by top field ornithologists and experts from wildlife agencies. While maintaining our focus on field ornithology, we hope to improve the board by filling the new positions with members who have experience and expertise in the areas of law, marketing, and fund raising. If any of you have some of these qualifications I invite you to join the board. If you are interested you should submit your name and biography to the nominations committee, chaired by Dave Krueper, or to Dave Shuford or Gjon Hazard who also serve on the committee.

In the past few months there have been several changes among key positions in WFO. For nearly nine years Dori Myers has served as your treasurer and membership chair. This is a very important responsibility in WFO, and Dori has served us very well for all those years. It was with great reluctance that we accepted her resignation at the last board meeting. Fortunately, Robbie Fisher has stepped in as her replacement, and recently the transition from Dori to Robbie was completed in a smooth and timely manner. At about the same time Lucie Clark resigned as recording secretary, but we were very fortunate that Kei Sochi has stepped forward to fill that position. To represent the Great Basin region better the newest member elected to the Board is Ted Floyd from the Great Basin Bird Observatory, who replaces Mark Sogge from Arizona. Thanks to all who have served us so well, and welcome to the new officers and board members.

The annual WFO meetings continue to improve and grow in appeal to our membership. The upcoming meeting in Orange County should prove to be no exception. Under the fast-paced and very capable leadership of Catherine Waters from Sea and Sage Audubon, our co-sponsor, the meeting is shaping up to be one of the best ever. It will include a Friday evening barbecue and feature the great seabird expert Bob Pitman as our banquet speaker. The field trips should appeal to every level of interest among birders and include a wide variety of destinations. For the meeting, we have booked a first-class facility, the Ayers Country Inn and Suites in Costa Mesa, so mark your calendars for 10–13 October 2002.

Look for details on our web site, **www.wfo-cbrc.org**. We hope to see you there.

Mike San Miguel
President, WFO

27th ANNUAL MEETING OF WESTERN FIELD ORNITHOLOGISTS

will be held 10–13 October 2002 at the San Joaquin Wildlife Sanctuary in Irvine, California, and at Ayres Country Inn in nearby Costa Mesa. The meeting is hosted and co-sponsored by the Sea and Sage Audubon Society.

Our featured speaker on Saturday evening, 12 October, will be famed marine biologist Robert L. Pitman, addressing the seabirds of the eastern Pacific. We'll enjoy also day and evening field trips, a pelagic field trip, afternoon scientific research presentations, and break-out sessions focusing on documentation for the California Bird Records Committee, an update by Philip Unitt on the surprises revealed by the San Diego County Bird Atlas, and social activities.

Membership in Western Field Ornithologists, subscription to *Western Birds*, and the afternoon sessions are included in the meeting registration fee. For details see the WFO website (**www.wfo-cbrc.org**) or the Sea and Sage Audubon website (**www.seaandsageaudubon.org**) or contact Catherine Waters at robcatwaters@earthlink.net or 562-869-6718.

Call for Papers

Oral and poster presentations should reflect original research, or summarize existing unpublished information, and be presented in a manner that will be of interest to serious amateur field ornithologists. We welcome talks on a wide variety of topics relevant to the ornithology of western North America, such as distribution, migration, identification, geographic variation, behavior, ecology, conservation, and field techniques. Plan on 20 minutes per oral presentation, which should include 5 minutes for questions and discussion. Slide and overhead projectors will be available. Should you wish to make a presentation by means of Power Point, you must bring the equipment necessary and test it before your presentation. Posters should fit within a width of 6 feet.

An abstract of your talk in the following format should be submitted no later than 20 June to Philip Unitt at birds@sdnhm.org or San Diego Natural History Museum, P. O. Box 121390, San Diego, CA 92112-1390.

LAST NAME, FIRST NAME. Your affiliation (if any), complete mailing address, and (optional) e-mail address. Title of Your Talk. Brief (300-word maximum) summary of the goals, results, and conclusions of your study.

Procedures for submission can also be downloaded from the Sea and Sage Audubon website (www.seaandsageaudubon.org) or the WFO website (www.wfo-cbrc.org), or contact Catherine Waters at 562-869-6718 or robcatwaters@earthlink.net.

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President: Mike San Miguel, 2132 Highland Oaks Dr., Arcadia, CA 91006; sanmigbird@aol.com

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Photo Editor: Peter La Tourrette, 1019 Loma Prieta Ct., Los Altos, CA 94024

Featured Photo: Robert A. Hamilton, 34 Rivo Alto Canal, Long Beach, CA 90803

Book Reviews: Steve N.G. Howell, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970

Secretary, California Bird Records Committee: Guy McCaskie, P.O. Box 275, Imperial Beach, CA 91933-0275; guymcc@pacbell.net

Chairman, California Bird Records Committee: Richard A. Erickson, LSA Associates, 1 Park Plaza, Suite 500, Irvine, CA 92614; richard.erickson@lsa-assoc.com

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