WESTERN BIRDS

Vol. 40, No. 1, 2009

Western Specialty:
Gray Vireo

Photo by © Brian E. Small of Los Angeles, California:
Gray Vireo (*Vireo vicinior*)
Laguna Mountains, San Diego County, California, 5 April 2008.
The south slopes of the Laguna Mountains where this individual was photographed are one of the few sites where the Gray Vireo persists in southern California. The small remaining population is threatened by the increased frequency and size of wildfires in its chaparral habitat since 2002.

Volume 40, Number 1, 2009

Front cover photo by © Martin Myers of Truckee, California: Baird's Sparrow (*Ammodramus bairdii*), Highland Park, Tonopah, Nye County, Nevada, 6 September 2008. First confirmed occurrence of Baird's Sparrow in Nevada.

Back cover "Featured Photo" by © Steven G. Mlodinow of Everett, Washington: Variegated Flycatcher (*Empidonomus varius*), Windust Park, Franklin County, Washington, 7 September 2008. First known occurrence of this South American species in western North America and fourth known occurrence anywhere in North America.

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 matters of style consult the Suggestions to Contributors to *Western Birds* (at www.wfo-cbrc.org/journal.html).

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 40, Number 1, 2009

THE WINTER DISTRIBUTION OF THE WESTERN GULL-BILLED TERN (*GELOCHELIDON NILOTICA VANROSSEMI*)

KATHY C. MOLINA and KIMBALL L. GARRETT, Section of Ornithology, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007; kmolina@nhm.org

KEITH W. LARSON, Klamath Bird Observatory, P. O. Box 758, Ashland. Oregon 97520; current address: Department of Integrative Biology, University of Guelph, Guelph, Ontario N1G 2W1, Canada

DAVID P. CRAIG, Willamette University, 900 State Street, Salem, Oregon 97301

ABSTRACT: We surveyed 73 sites along the Gulf of California and Pacific coasts of mainland Mexico during five nonbreeding seasons from December 1999 to January 2007 to clarify the winter status and distribution of the western North American subspecies of the Gull-billed Tern (*Gelochelidon nilotica vanrossemi*), a taxon of conservation concern. We located birds at 44 of the 73 sites, (60%) with the largest numbers found around coastal lagoons with extensive tidal flats in southern Sonora, Sinaloa, and extreme northern Nayarit. Local concentrations were also noted at other sites from the Colorado River delta of extreme northwestern Sonora south to Guerrero. Resightings of birds banded as chicks at California breeding colonies establish the first evidence of connectivity to specific wintering sites in Mexico as far south as southern Sonora and possibly into Nayarit.

The Gull-billed Tern (*Gelochelidon nilotica*) is widespread in temperate, subtropical, and tropical regions of the Old and New Worlds, but many populations, particularly those in North America, appear to be declining (Parnell et al. 1995, Molina and Erwin 2006). The western North American subspecies (*G. n. vanrossemi*, the Western Gull-billed Tern) of southern California and western Mexico breeds at few known colonies, and its seasonal movements are poorly understood. The limited range and low population size of this subspecies (about 250 breeding pairs in the United States and perhaps as few as 600 pairs throughout its range in western Mexico; Molina and Erwin 2006, Palacios and Mellink 2007) has led to its listing as a species of special concern in California (Remsen 1978, Molina 2008) and a national bird of conservation concern (USDI 2002).

Gull-billed Terns are less dependent on marine and other aquatic habitats than are many other species of terns, and they commonly forage over a variety of terrestrial habitats. Their broad diet includes a variety of insects, marine invertebrates, reptiles, amphibians, small fish, and the small chicks of birds; as opportunistic feeders they often exploit ephemerally abundant populations of prey such as crickets and weevils (Molina 2008). These terns frequently forage singly or in groups of two or three individuals (Molina and Marschalek 2003). Nearly all of our knowledge of Gull-billed Tern ecology results from studies conducted during the breeding season (Parnell et al. 1995). Conservation efforts directed toward migratory species, however, require an understanding of distribution and ecology throughout the year (Coulter and Frederick 1997, Kushlan et al. 2002, Martin et al. 2007).

The winter range of the Western Gull-billed Tern has been outlined in the literature only in general terms (Howell and Webb 1995, Parnell et al. 1995), with some treatments (e.g., Hellmayr and Conover 1948, American Ornithologists' Union 1957) suggesting this subspecies winters south to Ecuador. Breeding populations in California (Salton Sea and south San Diego Bay) withdraw southward (Patten et al. 2003, Unitt 2004, Molina and Erwin 2006). Although Molina and Erwin (2006) presented more detail on winter distribution and included a brief analysis of the limited Christmas Bird Count (CBC) data available from Mexico, the extent of the subspecies' winter range in Mexico and the areas and habitats supporting important concentrations have not been described. Here we report on the results of surveys for Gull-billed Terns in western Mexico conducted during five winters between 1999 and 2007. Our objectives are to determine geographical areas and habitats of importance to this subspecies during the winter period and, secondarily, to link California-breeding Gull-billed Terns to specific sites used in the nonbreeding season. We also review other published and unpublished information on the winter range of *vanrossemi* to amplify our survey results.

METHODS

We conducted exploratory searches focused on Gull-billed Terns along the western coast of mainland Mexico south to Nayarit from December 1999 to January 2000, from December 2003 to January 2004 (Molina, Garrett), and in December 2004 (Molina, Garrett, and Larson) and along the Pacific coast of southern Mexico from Jalisco south to northwestern Chiapas in December 2004, January 2006, and January 2007 (Larson, Craig). Specific sites were visited from one to seven times over the full survey period, with ~50% of all sites visited two or more times and ~25% of sites visited three or more times (Table 1; Appendix). Our coverage extended from the Colorado River delta in extreme northwestern Sonora south to the Isthmus of Tehuantepec in northwestern Chiapas and concentrated on estuaries, tidal flats, shorelines of bays, river mouths, adjacent agricultural lands, and aquacultural impoundments. Ocean beach strands were covered less extensively. Difficulty of access prevented us from visiting the extensive estuarine flats of Bahía Adair between the Colorado River delta and Puerto

Table 1 Results of Winter Surveys for Gull-billed Terns in Western Coastal Mexico, 1999–2007

Location[a]	Maximum[b]	Mean ± SE[c]	Encounter rate[d]	N[e]	Habitats[f]
Sonora					
El Golfo de Santa Clara (1)	19	6.2 ± 3.3	0.8	5	TF, SP
Bahía Kino (2A)	0	0 ± 0	0	3	TF, SP
Estero Santa Cruz (2B)	5	3 ± 1	1	3	TF
Presa Rodríguez (3)	0		0	1	RE, SSF
Estero Tastiota (4)	0	0 ± 0	0	3	TF, SP
Miramar-Tular, Guaymas (5)	0	0 ± 0	0	3	TF
Estero El Rancho (Empalme) (6)	19	7.2 ± 3.3	0.8	5	TF
Bahía Guásimas, north at shrimp ponds (7A)	0		0	1	TF, SP
Bahía Guásimas (7B)	1	0.5 ± 0.5	0.5	2	TF, SP
Estero Lobos at Liliba (8)	1		1	1	TF
Los Medanos (9)	2		1	1	TF, SP
Huatabampo vicinity (10)	2		1	1	AG, SFF
Estero Tóbari (11)	13	5 ± 2.2	1	5	TF, SFF
El Paredón Colorado (12)	0		0	1	TF
Yavaros (13)	3	1.2 ± 0.5	0.8	5	TF
Santa Bárbara, estero (14A)	18	12.5 ± 5.5	1	2	TF, SP
Santa Bárbara, beach (14B)	1	0.5 ± 0.5	0.5	2	TF, BS
Huatabampito (14C)	0		0	1	BS, TF
Agiabampo (15)	2	1 ± 1	1	2	TF
Sinaloa					
Río Fuerte, Las Grullas Margen Izquierda (16A)	0	0	0	1	RM, RC
El Colorado (16B)	1		1	1	TF
Cerro Cabazón (17)	27	23.5 ± 3.5	1	2	TF
Huitussi (18)	16	13 ± 3	1	2	TF, SP
Costa Azul (19)	10	7 ± 3	1	2	TF
La Reforma (20)	10	14.5 ± 4.5	1	2	TF
Ensenada Pabellones, northeast shore (21A)	20	12 ± 8	1	2	TF, SP
Arenitas (21B)	4		1	1	TF, SP, AG
Altata (21C)	0		0	1	TF
El Tambor (21D)	0		0	1	TF
Dautillos (21E)	0		0	1	TF, SP
Presa Eustáquio Buelna (22)	0		0	1	RE, SFF
Cospita (23)	7	3.5 ± 3.5	0.5	2	TF, SP
Ceuta (24A)	9		1	1	TF
Marmol (24B)	4		1	1	TF
Estero de Sábalo (Mazatlán Marina) (25)	11	4.1 ± 2	0.43	7	TF
Estero Urias (La Sirena) (26)	8		1	1	TF, SP
Laguna Caimanero, n. end near T. Beltran (27)	14		1	1	TF, SFF
Laguna Caimanero, n. end near Ejido G. V. Moreno (28)	0		0	1	TF, SFF
Agua Verde/Caimanero (29)	3	1.3 ± 0.9	0.66	3	TF, SP
Rio Baluarte mouth (30)	2	1 ± 1	0.5	2	TF, SP, RM
Estacada (31A)	7	3.5 ± 3.5	0.5	2	TF
Las Cabras (31B)	0		0	1	BS
Laguna Agua Grande (32A)	140	73.3 ± 34.2	1	3	TF, SFF
Nayarit					
Teacapán (32B)	0		0	1	TF, SP

(*Continued*)

Table 1 (*Continued*)

Location[a]	Maximum[b]	Mean ± SE[c]	Encounter rate[d]	N[e]	Habitats[f]
Tecuala (32C)	0		0	1	AG, SFF, SP
Valle de la Urraca, shrimp ponds (33)	10		1	1	SP
Playa El Novillero (34A)	0	0 ± 0	0	2	BS, TF
Palmar de Cuautla (34B)	0		0	1	BS, TF
Santa Cruz, wetlands (35)	3		1	1	AG
San Blas/G. Victoria, shrimp ponds (36)	23	12.5 ± 10.5	1	2	SP
San Blas, Los Miradores (37)	40	24.7 ± 7.8	0.83	6	SFF
Peso Island/Estero Pozo (38)	0		0	3	TF
Matanchén beach (39)	0		0	5	TF, BS
Union de Corrientes (40)	3		1	1	TF
Boca de Camichin (41)	5		1	1	TF, RM
Jalisco					
Barra de Navidad (42)	0	0 ± 0	0	2	TF, BS
Colima					
Rio Pascuales mouth (43)	30		1	1	RM, BS
Boca de Coahuayana, Apiza (44)	0		0	1	RM, BS
Michoacán					
Boca del Rio Neixpa (45)	0	0 ± 0	0	3	TF, BB
Guerrero					
Laguna Coyuca, Pie de la Cuesta (46)	1	0.5 ± 0.5	0.5	2	TF, BB
Laguna Tres Palos, Barra Viejo (47)	0		0	1	TF, SFF
Río Papagayo mouth (48)	11	2.6 ± 2.1	0.43	7	TF, BB
Barra de Tecomate (49)	1		1	1	TF, SFF
Laguna Chautengo, Pico del Monte (50)	19		1	1	TF, SFF
Río Marquelia, Playa del Bocana (51)	7	4 ± 3	1	2	RM, TF
Río Quetzala, Barra de Teconapa (52)	6	1.2 ± 1.2	0.2	5	RM, TF
Oaxaca					
Río Verde, El Azufre (53)	8	2.3 ± 1.9	0.5	4	RM, TF
Laguna Chacahua (54)	0		0	1	RM, TF
Barra Colotepec (55)	0	0 ± 0	0	4	RM, TF, AG
Río Copalita mouth (56)	0		0	1	RM, TF, BB
San Mateo del Mar, Laguna Superior (57A)	0		0	1	TF, SFF
Santa María del Mar, Laguna Superior (57B)	0		0	1	TF, SFF, SP
Chiapas					
Laguna de la Joya, Boca de Cielo (58)	1		1	1	RM, TF

[a]Numbers in parentheses correspond to locations mapped in Figures 1, 2.

[b]Highest count on a single visit.

[c]SE, standard error.

[d]Encounter rates are the proportions of visits with ≥1 detection.

[e]Number of visits.

[f]AG, agriculture, pasturelands; BB. barrier beach; BS, beach strand; RC. river channels; RE. reservoir; RM. river mouths; SFF, seasonally flooded flats; SP. shrimp ponds; TF, estuarine tidal flats.

Peñasco. Because extensive coverage by others suggested that Gull-billed Terns are absent from the Puerto Peñasco area (S. Ganley pers. comm.), we did not survey that section of coastline.

Our surveys were generally limited to areas with vehicular access. Paved roads and dirt tracks to small fishing villages allowed scrutiny of multiple sites within most major bay and estuary systems from Nayarit northward, although extensive areas of the larger bays could not be reached because of impenetrable mangrove borders and a complex array of tidal channels and embayments. At a few sites, such as Estero Santa Cruz in Sonora, Ensenada Pabellones in Sinaloa, San Blas in Nayarit, and Río Papagayo in Guerrero, we employed small boats to survey portions of lagoon systems not otherwise accessible. From Jalisco southward, the coastal highway allows thorough access to most of the suitable coastal habitat, although such habitats are relatively limited because of the steeper coastal topography from Jalisco south to Guerrero. An exception is the large Laguna Cuyutlán complex in Colima, which we were unable to survey because of difficulty of access.

We used spotting scopes with 20–60× eyepieces for field identification at distances up to 1 km. The Gull-billed Tern's distinctive swooping foraging behavior (Parnell et al. 1995) often allowed identification of birds at greater distances. The duration of our observations at each site ranged from 30 minutes to several hours. At strongly tidal sites we extended our observation periods or made return visits to ensure that some data were recorded during periods when extensive tidal flats were exposed.

We recorded the coordinates at each site by the global-positioning system and classified the habitats into nine categories: beach strands (with no associated estuaries), barrier beaches (adjacent to estuaries), river mouths, estuarine tidal flats, seasonally flooded (nontidal) flats and salt pans, river channels, aquacultural (mainly shrimp) ponds, freshwater reservoirs, and agricultural areas (irrigated or not, including pastureland).

At each site we recorded the number of Gull-billed Terns encountered; when possible we scrutinized individual birds for bands. Gull-billed Terns have been banded intensively in southern California since 1993 (Molina unpubl. data). Because most western Mexican colonies have been documented only recently (Palacios and Mellink 2007), no Gull-billed Terns have been banded in these colonies (Molina et al. 2006, X. Vega pers. comm.). Therefore we have assumed that banded birds sighted in western Mexico were banded as chicks at Salton Sea or San Diego colonies in California.

We did not survey the coast south of the Isthmus of Tehuantepec because of time and funding constraints. As noted below, however, the subspecific identity of Gull-billed Terns wintering along the Pacific coast of Central America and northwestern South America is uncertain (Molina and Erwin 2006 and below), so we decided that the isthmus established an appropriate southern limit for our field surveys.

Additional information for El Golfo de Santa Clara in the Colorado River delta of extreme northwestern Sonora came from 18 visits from October to February, 1996–2007, by Molina and Garrett.

RESULTS

Survey Results

We visited 73 sites (see Appendix) and detected Gull-billed Terns at 44 (60%) of them (Table 1, Figures 1, 2), with a maximum single-day count of 140 at Laguna Agua Grande in extreme southern Sinaloa on 3 December 2004. Five other sites in Sinaloa, Nayarit, and Colima yielded single-day counts ≥20, and 12 additional sites in Sonora, Sinaloa, Nayarit, and Guerrero yielded counts ≥10. By summing the highest count for each site, we found a total of 547 birds. At sites visited three or more times (Table 1), Gull-billed Terns were detected on >50% of visits to Los Miradores, San Blas, Nayarit (5/6 visits), Río Papagayo mouth, Guerrero (4/7), Estero Tóbari, Sonora (5/5), Estero El Rancho (Empalme), Sonora (4/5), Yavaros, Sonora (4/5), Laguna Agua Grande, Sinaloa (3/3), El Golfo de Santa Clara, Sonora (4/5), Estero Santa Cruz, Sonora (3/3), and Agua Verde/Caimanero, Sinaloa (2/3).

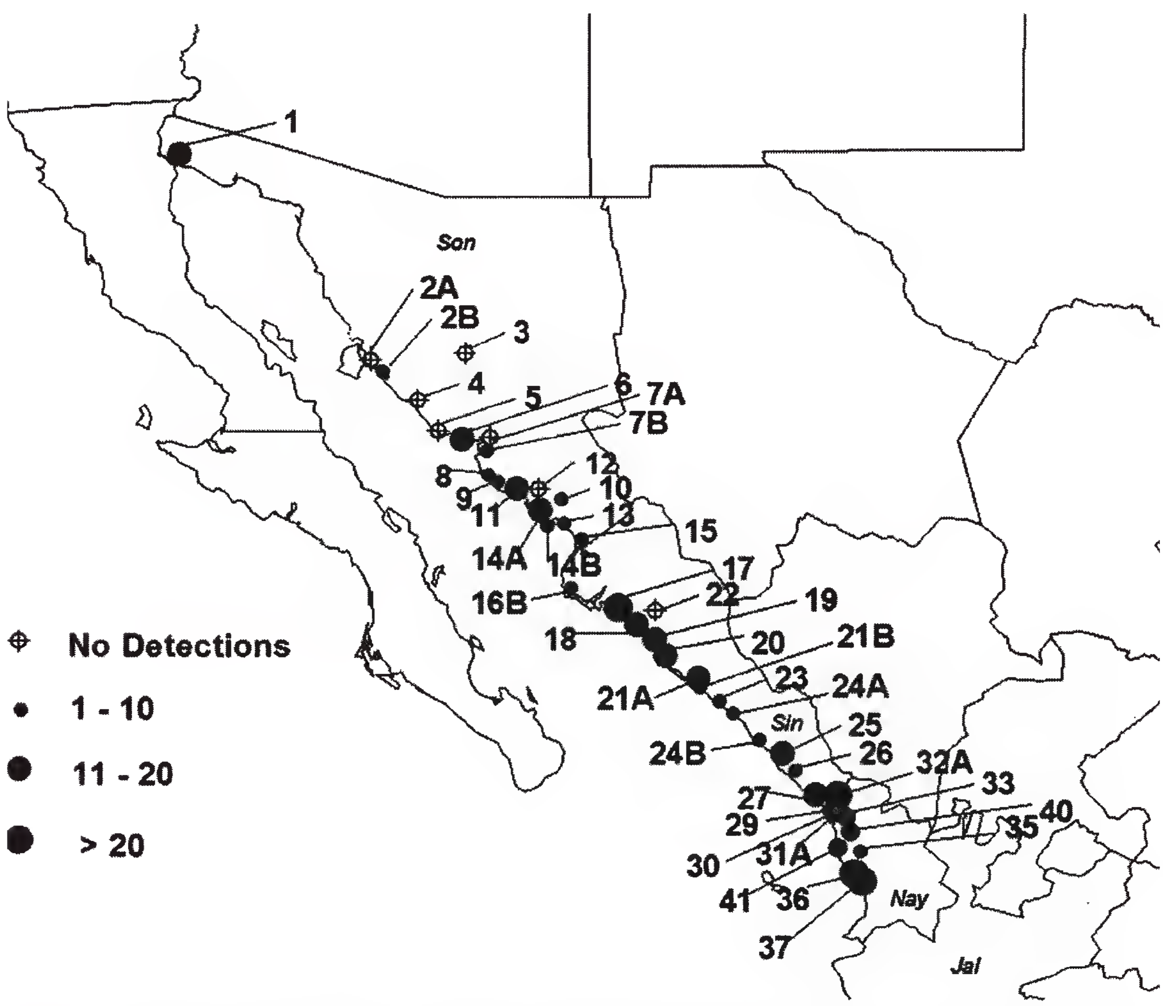

Figure 1. Locations of survey sites and maximum single-day counts of Gull-billed Terns in western Mexico, from Sonora south to Nayarit. For ease of illustration the following locations with no observations are not depicted: 14C, 16A, 21C–E, 28, 31B, 32B–C, 34A–B, 38, 39, and 44. See Table 1 for location codes.

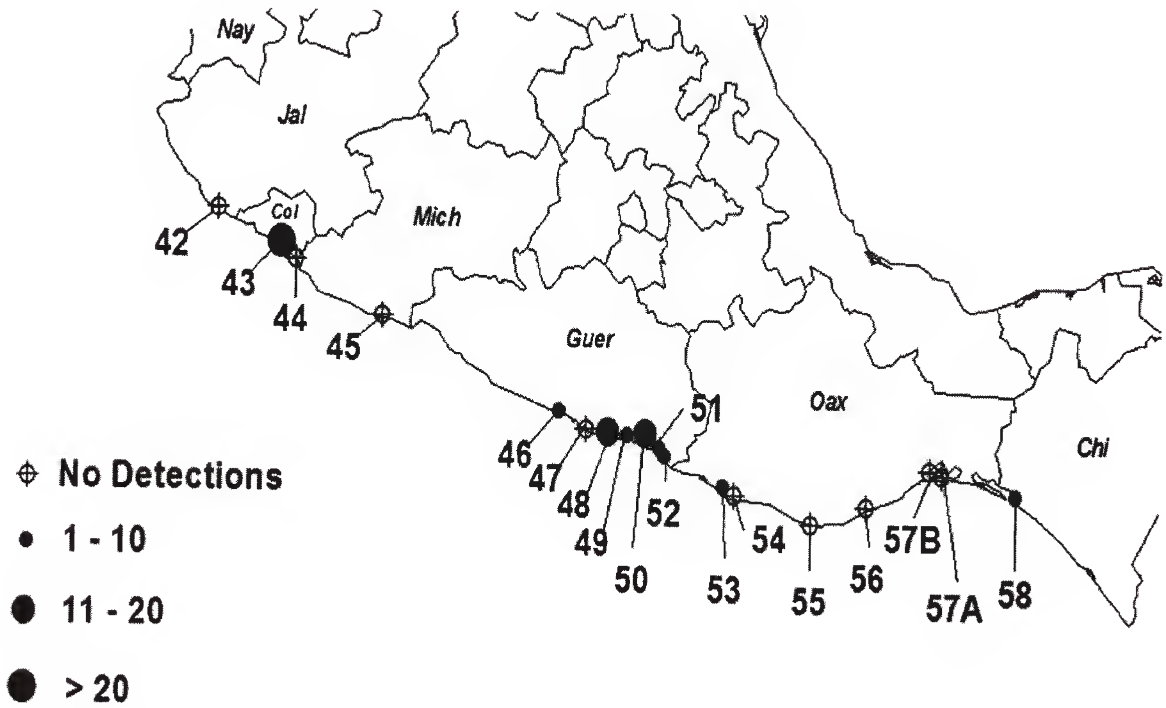

Figure 2. Locations of survey sites and maximum single-day counts of Gull-billed Terns in western Mexico, from Jalisco south to Chiapas. See Table 1 for location codes.

Habitat Associations

Some habitat affinities of wintering Gull-billed Terns emerged from our survey data. At 18 sites at which ≥10 birds were recorded on a single visit, the habitats (Table 1) were tidal flats (13 sites), shrimp ponds (7), seasonally flooded flats (5), beach strand (1), barrier beach (1), and river mouth (1). At sites with habitat complexes that included adjacent (or nearly adjacent) estuaries, tidal mudflats, and sandy beach strands we typically encountered Gull-billed Terns exclusively on tidal or seasonally flooded flats and estuaries rather than on beach strands (Table 2).

We did not detect any Gull-billed Terns at the two freshwater reservoirs we surveyed in multiple years (Presa Rodriguez in Hermosillo, Sonora, and Presa Eustáquio Buelna in Guamúchil, Sinaloa), and the species was generally absent from the extensive agricultural habitats we traversed. The

Table 2 Cumulative Number of Gull-billed Terns Found in Winter on Beaches Adjacent to Estuaries or Seasonally Flooded Mudflats in Sonora, Sinaloa, and Nayarit[a]

Site complex	Beach strand site	Birds	Estuarine site	Birds
El Golfo de Santa Clara	Playa El Golfo de S. C.	0 (25)	Delta flats	258 (25)
Bahía Kino	Playa Kino/Nuevo Kino	0 (3)	Estero Santa Cruz	9 (3)
Guaymas	Miramar-Tular	0 (3)	Estero El Rancho (Empalme)	36 (5)
Bahía Santa Bárbara	Playa Santa Bárbara	1 (2)	Estero Santa Bárbara	25 (2)
Bahía Yavaros	Huatabampito	0 (1)	Estero Yavaros	6 (5)
Mazatlán	Playas de Mazatlán	0 (7)	Estero de Sábalo	29 (7)
San Blas	Matanchén	0 (5)	Los Miradores	148 (6)

[a]Number of visits to each habitat type in parentheses.

one exception was the occurrence of two Gull-billed Terns in agricultural habitat not immediately adjacent to wetlands near Huatabampo, Sonora, on 18 December 2003.

Observations of Banded Birds

We encountered an adult with auxiliary bands indicating natal origin at the Salton Sea at Estero Santa Cruz near Bahía Kino, Sonora, on 10 January 2004 and a first-winter bird with a U.S. Geological Survey (USGS) band at Empalme, Sonora, 11 January 2004.

DISCUSSION

The largest concentrations of Gull-billed Terns during our surveys occurred around the extensive coastal lagoons of southern Sonora, Sinaloa, and northern Nayarit (Table 1, Figures 1, 2). Smaller but still significant concentrations were found in the Colorado River delta (at least in the eastern portion), in the vicinity of San Blas, Nayarit, and locally in coastal Colima and Guerrero (Figures 1, 2). Northwestern Mexico, from the Colorado River delta south to the vicinity of San Blas, Nayarit, is characterized by wide coastal plains, within which Alonso-Rodriguez and Páez-Osuna (2003) listed some 35 lagoon systems. In contrast, the coast from southern Nayarit south nearly to the Isthmus of Tehuantepec, where we encountered far fewer terns, is characterized by greater topographic relief and restricted coastal floodplains; for example, Mellink and de la Riva (2005) noted that only one large coastal wetland (Laguna Cuyutlán, Colima) is found between southern Nayarit and central Guerrero.

Our surveys, although not exhaustive, add considerably to the limited existing knowledge of the winter distribution of the Gull-billed Tern in western Mexico and adjacent regions. We did not conduct field surveys in California, Baja California, and Baja California Sur because Gull-billed Terns usually retreat south from their few breeding sites in these areas, with only small numbers remaining into early September (Patten et al. 2003, Unitt 2004). Because of the recent increase in winter reports of this species from these states, we summarize details here. There are ten mid-winter (November to February) records of one to four individuals at the Salton Sea (Patten et al. 2003, McCaskie and Garrett 2007a, b). No birds are known to have overwintered on the California coast; the latest records for the San Diego area are of single birds on 19 September 2002 (Unitt 2004) and 18–20 November 2004 (McCaskie and Garrett 2005). Isla Montague, a site of intermittent nesting in the Colorado River delta of northeastern Baja California, may hold wintering birds around the island's extensive tidal flats and channels. It is unclear whether winter surveys reported by Mellink et al. (1997) included sightings within the Baja California portion of the delta, but the habitat at Isla Montague is contiguous with the flats of the eastern delta in extreme northwestern Sonora where we regularly found relatively large numbers of birds in winter (Tables 1, 2). Gull-billed Terns depart their other regular breeding site in northeastern Baja California at the Cerro Prieto geothermal ponds (Molina and Garrett 2001) by September, but there are recent mid-winter sightings for that site as well: an adult on 6 January 2005 (Erickson et al.

2005), up to two from 13 December 2005 to 24 January 2006 (Erickson et al. 2006; R. A. Erickson pers. comm.), and three on 25 January 2007 (Hamilton et al. 2007). There are no mid-winter records for the Pacific coast of the state of Baja California; the species is unrecorded on the Ensenada Christmas Bird Count, conducted annually since December 2001.

In Baja California Sur one was found in late fall at Laguna Ojo de Liebre near Guerrero Negro (where the species has recently bred; Palacios and Mellink 2007) on 21 October 2006 (Erickson et al. 2007). A small wintering population has been recently documented in the El Centenario/Chametla wetland just west of La Paz. Up to four, representing the first confirmed winter record for the peninsula, were there from 18 October 2002 to 6 March 2003 (Erickson et al. 2003a, b). In subsequent winters up to seven individuals have been observed at this locality (Hamilton et al. 2007), although the species has not been recorded on either of the two Ensenada de La Paz CBCs (which include El Centenario) conducted since winter 2005–06.

Prior to our surveys there were few specific winter records of the Gull-billed Tern from the Pacific coast of mainland Mexico. For Sonora, Russell and Monson (1998) cited no records between 6 October and 19 February. Nine 1993–94 surveys between September and February of the Colorado River delta from El Golfo de Santa Clara west to Isla Montague (Baja California) yielded no more than a single Gull-billed Tern on any visit (Mellink et al. 1997). In contrast, our high counts at El Golfo de Santa Clara over the late fall and winter between 1996 and 2007 were of 80 on 15 October 2007, 66 on 18 November 2002, 42 on 7 October 2000, and 19 on 25 January 2004; all observations were over the extensive tidal flats along the uppermost gulf and an adjacent set of active shrimp ponds (Garrett unpubl. data). A CBC conducted since winter 2004–05 in the Colorado River delta (entirely north of the head of the Gulf and including mainly the Ciénega de Santa Clara area of Sonora) has recorded Gull-billed Terns twice, with a high count of four birds on 20 December 2006.

Of the three remaining coastal CBCs in Sonora, on 18 counts from winter 1989–90 to winter 2006–07, the one at Puerto Peñasco has never recorded Gull-billed Terns (11 birds listed in the CBC database for the 19 December 1999 count are in error, and in fact there are no October to February records of this species at Puerto Peñasco; S. Ganley pers. comm.). The San Carlos Bay CBC near Guaymas has recorded single birds twice and two birds once on 11 counts since winter 1994–95. The only CBC in coastal southern Sonora, at Navopatía on Estero Agiabampo, has been conducted just twice, yielding four birds on 29 December 2005 and seven on 29 December 2006. These CBC results corroborate our survey findings that wintering Gull-billed Terns in Sonora concentrate in the far northwestern and southern coastal regions.

Our surveys appear to provide the only detailed information on the status and distribution of Gull-billed Terns in Sinaloa, a state whose avifauna has never been summarized comprehensively. In Nayarit, the San Blas CBC reported from one to 52 terns on 12 of 14 counts conducted from 1980–81 to 2004–05. We found Gull-billed Terns most consistently and abundantly at the Los Miradores wetlands and associated shrimp ponds, both within the San Blas CBC circle.

Our survey data suggest that wintering Gull-billed Terns are generally absent from the coastal wetlands of Jalisco; this is largely confirmed by other published surveys. Gómez de Silva (2005) reported one bird at Barra de Navidad on 12 January 2005, but Esparza-Salas (2001) recorded none during monthly surveys at Laguna Xola-Paramán from November 1997 to August 1998. Hernández-Vázquez and Mellink (2001) did not detect Gull-billed Terns during ~16 censuses of the Majahuas and El Chorro estuaries from 3 September 1995 through 25 April 1996. Hernández-Vázquez (2005) later reported small numbers of birds as winter visitors from these two estuaries and at the other large coastal wetlands of Laguna Agua Dulce, Chalacatepec, and Ermitaño in surveys conducted monthly from November 1998 through February 2000, but none from the coastal wetlands of San Juan, La Manzanilla, El Tule, and Barra de Navidad. Gull-billed Terns, however, may occur regularly in the interior of Jalisco at Laguna Sayula, a shallow seasonal lake surrounded by agricultural lands north of Ciudad Guzman (at ~1500 m elevation) about 110 km inland from the coast. Howell (1994) reported six adults there on 2 March 1994, and two were there on 2 March 1995 (S. N. G. Howell pers. comm.). We are aware of one mid-winter report, of two birds, at Laguna Sayula on 16 January 2007 (C. Bushell pers. comm.).

Although Schaldach's (1963) monograph on Colima included some information from coastal censuses conducted in January and December 1959, he failed to observe Gull-billed Terns and cited no other records for the state. Howell (1994) considered the species to occur "regularly, at least in February and March, on the coast of Colima" citing three birds on 6 March 1995 in Manzanillo. Mellink and de la Riva (2005) surveyed Laguna de Cuyutlán near Manzanillo from September 1996 through March 1997 but did not record any Gull-billed Terns on eight visits. We were unable to survey Cuyutlán, but given the apparent extent of suitable habitat and our detections of birds at nearby Boca de Pascuales, it is likely that Gull-billed Terns also over-winter there.

There are no thorough published avifaunal surveys available for coastal Guerrero and Michoacán; much of the coastal slope in this region is steep and lacks large coastal wetlands suitable for Gull-billed Terns. Our data suggest that the species is relatively numerous only at several coastal sites in southeastern Guerrero; there, Palacios and Mellink (2007) reported 35 Gull-billed Terns at Laguna Coyuca on 28 October 2003. We encountered no birds in Michoacán.

In Oaxaca, Binford (1989) considered the species to be a "very uncommon winter resident;" our data agree with this characterization. Surveys by Mellink et al. (1998) in November 1995 and November 1996 along the Costa Chica (western coastline) of Oaxaca similarly lacked detections of Gull-billed Terns.

The state of Chiapas also lacks a thorough avifaunal survey. We surveyed only the far northwestern corner of Chiapas, encountering few Gull-billed Terns. Although only one of seven specimens from the Gulf of Tehuantepec was taken in winter (Molina and Erwin 2006), there are several large wetlands with seemingly appropriate habitat that require exploration.

Important Habitat Associations

Our data suggest that the most important natural habitat and foraging substrate for the Gull-billed Tern in western Mexico are the extensive tidal mudflats within large lagoons and estuaries, where we have observed crabs and small fish to be the predominant prey taken by these terns. As opportunistic foragers (Parnell et al. 1995) Gull-billed Terns frequently exploit concentrated prey at shrimp ponds, especially during the harvest when water levels are drawn down and shrimp are more accessible. In the northern part of the region the ponds are usually harvested in October and November; shrimp ponds in Sonora are typically dry and inactive from December until March (Páez-Osuna et al. 2003, Glenn et al. 2006). Farther south, in Sinaloa and Nayarit, where ambient winter temperatures are more moderate (Páez-Osuna et al 2003), shrimp ponds were still active and attractive to Gull-billed Terns into late December. Aquacultural impoundments, almost exclusively devoted to shrimp production, are becoming an increasingly prominent feature of the coastal landscape of northwestern Mexico from Sonora to Nayarit, as underscored by a recent estimate of their extent of ~51,000 hectares (Páez-Osuna et. al 2003). Only 3% of shrimp farming in Mexico occurs outside of the Gulf of California region (Páez-Osuna et al. 2003, Páez-Osuna and Ruiz-Fernandez 2005), and satellite imagery (Google Earth) and our field experience indicate that there is little or no active aquaculture from Jalisco south to the isthmus. If aquacultural ponds concentrate Gull-billed Terns, as we surmise, the scarcity of such habitats in these southern regions may contribute to the low numbers of Gull-billed Terns there relative to those encountered farther north.

We rarely found winter Gull-billed Terns along beach strands, even though other tern species (particularly the Royal, *Thalasseus maximus*, and Forster's, *Sterna forsteri*) are frequent in such habitats. In contrast, Gull-billed Terns frequently forage along beach strands near San Diego, California, during the breeding season (Molina and Marschalek 2003). Similarly, foraging over agricultural fields by these terns is very common during the breeding season in the Imperial Valley of California (Molina unpubl. data), though we detected such behavior only once in our winter surveys in Mexico. During our surveys, the agricultural lands appeared to be less intensively irrigated than those of the Imperial Valley.

Linking Breeding Colonies and Wintering Areas

In addition to the two known or presumed California-banded Gull-billed Terns we found during winter in Sonora, we know of one other bird with a USGS band in San Blas, Nayarit, on 13 January 2002 (S. N. G. Howell pers. comm.). Further evidence of linkages of natal sites in California to those sites in Mexico occupied by nonbreeding birds is our observation in May 2002 of four banded one-year-old birds (two with auxiliary bands unique to Salton Sea colonies) and one two-year-old (with auxiliary bands unique to the San Diego colony) at Estero Tóbari, Sonora. Our efforts to resight banded birds were hampered by this species' tendency not to gather in large groups and to spend considerable time in the air foraging.

Conservation Implications

Molina and Erwin (2006) estimated the total breeding population of *vanrossemi* at 600–800 breeding pairs. The overall population of this subspecies could thus be conservatively estimated at about 1500 breeding birds plus an unknown number of prebreeding individuals. On the basis of a rate of 0.75 fledglings per nesting pair per year—an average based on studies in San Diego and at the Salton Sea (Molina unpubl. data)—and an annual survival rate of about 0.8 over the first two years, suggested by studies of the Royal (Buckley and Buckley 2002, Collins and Doherty 2006) and Least (*Sternula antillarum*) Terns (Thompson et al. 1997), prebreeding birds probably number roughly 1000. Our focused surveys located about 547 total individuals (sum of the highest counts at each site, irrespective of year), indicating that (1) many more birds occupy unsurveyed sites, (2) many birds were missed at surveyed sites because of the extent of the habitats, and/or (3) many birds spend the nonbreeding season outside western Mexico, presumably from Guatemala south through Central America and perhaps to northwestern South America (though as noted below it is unlikely that many or most birds in these areas are *vanrossemi*).

Specific bays and estuaries that appear to be particularly important to the species in winter include the Colorado River delta, Estero El Rancho (Empalme), Estero Tóbari, and Bahía Santa Bárbara in Sonora; Bahía San Ignacio–Bahía Navachiste (including the Cerro Cabazón site; Figure 3), and Bahía Santa María–Ensenada Pabellones in Sinaloa, and the Marismas Nacionales, which encompass a series of coastal wetlands between Mazatlán, Sinaloa, and San Blas, Nayarit (Figure 4). The mouth of the Río Pascuales in Colima is important, and we suspect that the extensive potentially suit-

Figure 3. These extensive tidal mudflats at Cerro Cabazón, Bahía San Ignacio, Sinaloa, photographed 11 December 2004, represent a predominant foraging habitat of Gull-billed Terns wintering in western Mexico.

Photo by Kathy C. Molina

Figure 4. Our largest single-day count of wintering Gull-billed Terns in western Mexico was on 3 December 2004 at the southern end of the Laguna Agua Grande complex in the Marismas Nacionales, represented in part by these seasonally flooded flats just east of Valle la Urraca on the Sinaloa/Nayarit border.

Photo by Kathy C. Molina

able habitat surrounding nearby Laguna Cuyutlán is as well. Many of these wetlands have been identified as "Areas de Importancia para la Conservación de las Aves" (AICAs; Benítez et al. 1999) by the Mexican government. Healthy populations of *vanrossemi* Gull-billed Terns in the nonbreeding season appear to depend on maintaining the ecological integrity of these large tidal estuaries and seasonally flooded flats in western Mexico's coastal lowlands.

Several workers have expressed concern over actual and potential environmental degradation of bay and estuarine ecosystems as a result of the rapidly expanding development of the shrimp-farming industry in Mexico (Páez-Osuna et al. 2003), to which we would add the impacts of coastal development for tourism, such as at Estero Sábalo, Mazatlán Marina (pers. obs.). The negative impacts of aquaculture include the deterioration of water quality of adjacent wetlands due to eutrophication and interruptions to natural hydrology patterns, as well as the direct loss of natural habitat through conversion to aquacultural impoundments. Because shrimp ponds may concentrate foraging birds in winter, as they appear to do in the breeding season (Palacios and Mellink 2007), the occasional practice of lethal control of shrimp-eating birds at these systems (Molina and Erwin 2006) may also pose threats to Gull-billed Tern populations.

Research Recommendations

Our exploratory surveys identify and quantify important wintering areas for subspecies *vanrossemi* of the Gull-billed Tern, but substantial improvements in our understanding of the nonbreeding ecology of this subspecies are possible. Research priorities include a more thorough quantification of use of the larger coastal wetlands in western Mexico (such as the Marismas Nacionales in southern Sinaloa and northern Nayarit) as well as more rigorous examinations of habitat use at finer spatial scales. Because land-based surveys of such extensive estuaries and lagoons cannot be comprehensive, the use of boats and possibly aircraft in survey efforts is recommended. More survey effort is also needed in the lagoons and estuaries south of Nayarit such as at Laguna Cuyutlán, a known breeding locality, and in Chiapas.

Given the emerging importance of establishing the connectivity of breeding and nonbreeding sites of migratory bird populations (Martin et al. 2007), we also recommend increased efforts to ascertain such links through increased banding/resighting effort and (as developing technology allows), satellite tracking and, possibly, indirect techniques such as stable-isotope analysis.

The importance to wintering *vanrossemi* of the Pacific coast south of the Isthmus of Tehuantepec, and indeed south into northwestern South America, needs to be established by morphometric and molecular analysis to determine the subspecific identity of birds in that region. It may be reasonable to expect some Gull-billed Terns of the subspecies *G. n. aranea* from the Atlantic coast of North America and Gulf of Mexico to winter on the Pacific side; at least one other tern, the Sandwich (*T. sandvicensis*), winters commonly on the Pacific coast in this region yet breeds only on the Atlantic/Caribbean side (American Ornithologists' Union 1998). Molina and Erwin (2006) discussed the uncertainties of subspecies allocation of Gull-billed Terns along the Pacific coast of Central America and northwestern South America; in short, few reference specimens exist, and overlap in characters has hampered proper subspecies assignment. Both *vanrossemi* and *aranea* have been collected in Pacific Guatemala (Hellmayr and Conover 1948, Dickerman 2006), but we are not aware of specimens confidently assignable to *vanrossemi* taken farther south. We propose, absent convincing evidence of the regular occurrence of *vanrossemi* south of the Isthmus of Tehuantepec, that this subspecies may in fact be essentially endemic to western Mexico and adjacent southernmost California; at the very least, management of this subspecies should not be based on the unsubstantiated assumption that appreciable breeding or even nonbreeding populations exist south of there.

ACKNOWLEDGMENTS

We thank Mark J. Billings, Hank and Priscilla Brodkin, Colin Bushell, LeRoy Dorman, Richard A. Erickson, Steve Ganley, the late Loren R. Hays, Steve N. G. Howell, Marshall J. Iliff, Rodrigo Esparza-Salas, and Xicoténcatl Vega for sharing unpublished data, and Kristof Zyskowski (Yale Peabody Museum) for clarifying specimen information. We thank Evan Beuchley, Osvel Hinojosa-Huerta, Jesús Eduardo Martinez-Leyva, Anja Schiller, Eduardo Soto, Paul Swenson, and Vega for field assistance. Charles T. Collins, Howell, Philip Unitt, and an anonymous reviewer provided helpful comments on the manuscript. We are indebted to the Faucett Family Foundation, M. J. Murdock Charitable Trust, and the Sonoran Joint Venture for financial support. Larson was partially supported by a grant from Environment Canada to Keith A. Hobson.

LITERATURE CITED

Alonso-Rodríguez, R., and Páez-Osuna, F. 2003. Nutrients, phytoplankton and harmful algal blooms in shrimp ponds: A review with special reference to the situation in the Gulf of California. Aquaculture 219:317–336.

American Ornithologists Union. 1957. Check-list of North American birds, 5th ed. Am. Ornithol. Union, Baltimore, MD.

American Ornithologists Union. 1998. Check-list of North American birds, 7th ed. Am. Ornithol. Union, Washington, D.C.

Benítez, H., Arizmendi, C., and Márquez, L. 1999. Base de datos de las AICAS. www.conabio.gob.mx/aicas/doctos/aicas.html (accessed 30 November 2007).

Binford, L. C. 1989. A distributional survey of the birds of the Mexican state of Oaxaca. Ornithol. Monogr. 43.

Buckley, P. A., and Buckley, F. G. 2002. Royal Tern (*Sterna maxima*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 700. Birds N. Am., Philadelphia.

Collins, C. T., and Doherty, Jr., P. F. 2006. Survival estimates for Royal Terns in southern California. J. Field Ornithol. 77:310–314.

Coulter, M. C., and Frederick, P. C. 1997. Colonial waterbird movements and population dynamics: Guides for the temporal and spatial scales of conservation. Colonial Waterbirds 20:295–297.

Dickerman, R. W. 2006. Birds of the southern Pacific lowlands of Guatemala, with a review of *Icterus gularis*. Spec. Publ. Mus. Southwestern Biol. 7:1–45.

Erickson, R. A., Hamilton, R. A., Palacios, E., and Carmona, R. 2003a. Fall migration, Baja California Peninsula. N. Am. Birds 57:120–122.

Erickson, R. A., Hamilton, R. A., Palacios, E., and Carmona, R. 2003b. Winter season, Baja California Peninsula. N. Am. Birds 57:260–262.

Erickson, R. A., Hamilton, R. A., Carmona, R., and Ruiz-Campos, G. 2006. Winter season, Baja California Peninsula. N. Am. Birds 60:287–289.

Erickson, R. A., Hamilton, R. A., Carmona, R., and Ruiz-Campos, G. 2007. Fall migration, Baja California Peninsula. N. Am. Birds 61:147–149.

Erickson, R. A., Iliff, M. J., Palacios, E., and Carmona, R. 2005. Winter season, Baja California Peninsula. N. Am. Birds 59:328–330.

Esparza-Salas, R. 2001. Avifauna acuática de la Laguna Xola-Paramán, Jalisco. B. S. thesis, Universidad de Guadalajara, Mexico.

Glenn, E. P., Nagler, P. L., Brusca, R. C., and Hinojosa-Huerta, O. 2006. Coastal wetlands of the northern Gulf of California: Inventory and conservation status. Aquatic Conservation: Marine and Freshwater Ecosystems 16:5–28.

Gómez de Silva, H. 2005. Winter season, Mexico. N. Am. Birds 59:331–336.

Hamilton, R. A., Billings, M., Carmona, R., and Ruiz-Campos, G. 2007. Winter season, Baja California Peninsula. N. Am. Birds 61:331–333.

Hellmayr, C. E., and Conover, B. 1948. Catalogue of birds of the Americas, part 1, no. 3. Field Mus. Nat. Hist. Zool. Ser. 13.

Hernández-Vázquez, S. 2005. Aves estuarinas de la costa de Jalisco, Mexico: Análisis de la comunidad, reproducción e identificación de áreas de importancia para la conservación de las aves. Ph.D. thesis, Instituto Politécnico Nacional, Centro Interdisciplinario de Ciencias Marinas, La Paz, Baja California Sur, Mexico.

Hernández-Vázquez, S., and Mellink, E. 2001. Coastal waterbirds of El Chorro and Majahuas, Jalisco, Mexico, during the non-breeding season, 1995–1996. Revista Biología Tropical 49:359–367.

Howell, S. N. G. 1994. Additional information on the birds of Colima and adjacent Jalisco, Mexico. Euphonia 3:33–54.

Howell, S. N. G., and Webb, S. 1995. A Guide to the Birds of Mexico and Northern Central America. Oxford Univ. Press, Oxford, England.

Kushlan, J. A., Steinkamp, M. J., Parsons, K. C., Capp, J., Acosta Cruz, M., Coulter, M., Davidson, I., Dickson, L., Edelson, N., Elliot, R., Erwin, R. M., Hatch, S., Kress, S., Milko, R., Miller, S., Mills, K., Paul, R., Phillips, R., Saliva, J. E., Sydeman, B., Trapp, J., Wheeler, J., and Wohl, K. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version l. Waterbird Conservation for the Americas, Washington, DC.

Martin, T. G., Chades, I., Arcese, P., Marra, P. P., Possingham, H. P., and Norris, D. R. 2007. Optimal conservation of migratory species. PLoS ONE 2(8):e751.

McCaskie, G., and Garrett, K. L. 2005. Fall migration, Southern Pacific coast. N. Am. Birds 59:147–153.

McCaskie, G., and Garrett, K. L. 2007a. Fall migration, Southern California. N. Am. Birds 61:142–146.

McCaskie, G., and Garrett, K. L. 2007b. Winter season, Southern California. N. Am. Birds 61:326–330.

Mellink, E., and de la Riva, G. 2005. Non-breeding waterbirds at Laguna de Cuyutlán and its associated wetlands. J. Field Ornithol. 76:158–167.

Mellink, E., Luevano, J., and Zuria, I. 1998. Note on the Pelecaniformes, Ciconiiformes, terns (Sterninae) and Black Skimmers (Rynchopinae) along the Costa Chica of Oaxaca, Mexico. Ciencias Marinas 24:367–388.

Mellink, E., Palacios, E., and Gonzalez, S. 1997. Non-breeding waterbirds of the delta of the Río Colorado, Mexico. J. Field Ornithol. 68:113–123.

Molina, K. C. 2008. Gull-billed Tern (*Gelochelidon nilotica*), in California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California (W. D. Shuford and T. Gardali, eds.). Studies of Western Birds 1. W. Field Ornithol., Camarillo, CA.

Molina, K. C., and Erwin, R. M. 2006. The distribution and conservation status of the Gull-billed Tern (*Gelochelidon nilotica*) in North America. Waterbirds 29:271–295.

Molina, K. C., and Garrett, K. L. 2001. The breeding birds of Cerro Prieto geothermal ponds, Mexicali Valley, Baja California. Am. Birding Assoc. Monogr. Field Ornithol. 3:23–28.

Molina, K. C., and Marschalek, D. A. 2003. Foraging behavior and diet of breeding Western Gull-billed Terns (*Sterna nilotica vanrossemi*) in San Diego Bay. Species Conservation and Recovery Program Rep. 2003-01. Calif. Dept. Fish & Game, Habitat Conservation Planning Branch, Sacramento.

Molina, K. C., Vega, X., Román, M., and Hinojosa-Huerta, O. 2006. Monitoring breeding colonies and post-breeding movements of terns and skimmers in coastal northwestern México and southern California in 2004 and 2005. Final report to Sonoran Joint Venture, U.S. Fish & Wildlife Service, Tucson, AZ.

Páez-Osuna, F., Gracia, A., Flores-Verdugo, F., Lyle-Fritch, L. P., Alonso-Rodríguez, R., Roque, A., and Ruiz-Fernández, A. C. 2003. Shrimp aquaculture development and the environment in the Gulf of California ecoregion. Marine Pollution Bull. 46:806–815.

Páez-Osuna, F., and Ruiz-Fernández, A. C. 2005. Environmental load of nitrogen and phosphorus from extensive, semi-intensive, and intensive shrimp farms in the Gulf of California ecoregion. Bull. Env. Contam. Toxicol. 74:681–688.

Palacios, E., and Mellink, E. 2007. The colonies of van Rossem's Gull-billed Tern (*Gelochelidon nilotica vanrossemi*) in Mexico. Waterbirds 30:214–222.

Parnell, J. F., Erwin, R. M., and Molina, K. C. 1995. Gull-billed Tern (*Sterna nilotica*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 140. Acad. Nat. Sci., Philadelphia.

Patten, M. A., McCaskie, G., and Unitt, P. 2003. Birds of the Salton Sea. Univ. Calif. Press, Berkeley.

Remsen, J. V., Jr. 1978. Bird species of special concern in California. Nongame Wildlife Investigations, Wildlife Mgmt. Branch Admin. Rep. 78-1. Calif. Dept. Fish & Game, Sacramento.

Russell, S. M., and Monson, G. 1998. The Birds of Sonora. Univ. Arizona Press, Tucson.

Schaldach, W. J., Jr. 1963. The avifauna of Colima and adjacent Jalisco, Mexico. Proc. W. Found. Vert. Zool. 1.

Thompson, B. C., Jackson, J. A., Burger, J., Hill, L. A., Kirsch, E. M., and Atwood, J. L. 1997. Least Tern (*Sterna antillarum*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 290. Acad. Nat. Sci., Philadelphia.

U. S. Department of Interior (USDI). 2002. Birds of Conservation Concern. Fish & Wildlife Service, Div. Migratory Bird Mgmt., Arlington, VA.

Unitt, P. 2004. San Diego County bird atlas. Proc. San Diego Soc. Nat. Hist. 39.

Accepted 19 September 2008

APPENDIX. Dates of visits and coordinates for Gull-billed Tern survey locations in Mexico in winter 1999–2000, 2003–04, 2004–05, 2006, and 2007.

Sonora

1. El Golfo de Santa Clara, 31° 42′ 37″ N, 114° 31′ 53″ W (5 Dec 99; 29 Jan 00; 25 Jan 04; 8 Nov 04; 17 Jan 05). **2A.** Bahía Kino, 28° 50′ 33″ N, 111° 58′ 15″ W (10 Jan 04; 7, 8 Dec 04). **2B.** Estero Santa Cruz, 28° 48′ 36″ N, 111° 55′ 00″ W (10 Jan 04; 7, 8 Dec 04). **3.** Presa Rodríguez, Hermosillo, 29° 03′ 55″ N, 110° 54′ 56″ W (10 Jan 04). **4.** Estero Tastiota, 28° 22′ 31″ N, 111° 26′ 40″ W (10 Jan 04; 8, 17 Dec 04). **5.** Miramar-Tular (Guaymas) 27° 55′ 53″ N, 110° 56′ 45″ W (14 Jan 04; 8, 17 Dec 04). **6.** Estero El Rancho (Empalme), 27° 57′ 53″ N, 110° 50′ 28″ W (11, 13 Jan 04; 8, 9, 17 Dec 04). **7A.** Bahía Guásimas, north, 27° 53′ 49″ N, 110° 37′ 52″ W (11 Jan 04). **7B.** Bahía Guásimas, 27° 53′ 03″ N, 110° 35′ 23″ W (11 Jan 04; 9 Dec 04. **8.** Estero Lobos (at Liliba), 27° 21′ 08″ N, 110° 16′ 00″ W (12 Jan 04). **9.** Los Medanos, 27° 09′ 47″ N, 110° 16′ 00″ W (12 Jan 04). **10.** Huatabampo vicinity, 27° 02′ 36″ N, 109° 48′ 40″ W (18 Dec 03). **11.** Estero Tóbari, 27° 06′ 04″ N, 109° 58′ 19″ W (18 Dec 03; 12, 13 Jan 04; 9, 15 Dec 04). **12.** El Paredón Colorado, 27° 04′ 36″ N, 109° 56′ 07″ W (15 Dec 04).

13. Yavaros, 26° 42′ 09″ N, 109° 31′ 23″ W (18 Dec 03; 13 Jan 04; 10, 11, 14 Dec 04. **14A.** Santa Bárbara, estero, 26° 42′ 03″ N, 109° 39′ 13″ W (18 Dec 03; 10 Dec 04). **14B.** Santa Bárbara, beach, 26° 41′ 34″ N, 109° 39′ 04″ W (18 Dec 03; 10 Dec 04). **14C.** Huatabampito, 26° 41′ 32″ N, 109° 34′ 45″ W (10 Dec 04). **15.** Agiabampo, 26° 22′ 05″ N, 109° 09′ 46″ W (19 Dec 03; 11 Dec 04).

Sinaloa

16A. Río Fuerte, Las Grullas El Margen Izquierda, 25° 51′ 12″ N, 109° 19′ 50″ W (19 Dec 03). **16B.** El Colorado, 25° 45′ 27″ N, 109° 19′ 00″ W (19 Dec 03). **17.** Cerro Cabazón, 25° 34′ 09″ N, 108° 51′ 39″ W (19 Dec 03; 11 Dec 04). **18.** Huitussi, 25° 30′ 31″ N, 108° 44′ 56″ W (19 Dec 03; 11 Dec 04). **19.** Costa Azul, 25° 05′ 57″ N, 108° 08′ 25″ W (17 Dec 03; 12 Dec 04). **20.** La Reforma, 24° 04′ 16″ N, 108° 03′ 30″ W (17 Dec 03; 12 Dec 04). **21A.** Ensenada Pabellones, northeast shore, 24° 27′ 19″ N, 107° 29′ 38″ W (3 Jan 00; 13 Dec 04). **21B.** Arenitas, 24° 20′ 26″ N, 107° 28′ 13″ W (3 Jan 00). **21C.** Altata, 24° 37′ 49″ N, 107° 55′ 30″ W (4 Jan 00). **21D.** El Tambor, 24° 45′ 02″ N, 108° 01′ 35″ W (4 Jan 00). **21E.** Dautillos, 24° 43′ 09″ N, 107° 58′ 20″ W (4 Jan 00). **22.** Presa Eustáquio Buelna, Guamúchil, 25° 29′ 39″ N, 108° 03′ 14″ W (17 Dec 03; 12 Dec 04). **23.** Cospita, 24° 06′ 37″ N, 107° 07′ 44″ W (4 Jan 00; 20 Dec 03). **24A.** Ceuta, 23° 54′ 59″ N, 106° 58′ 13″ W (3 Jan 00; 20 Dec 03). **24B.** Marmol, 23° 29′ 14″ N, 106° 37′ 11″ W (5 Jan 00). **25.** Estero de Sábalo (Mazatlán Marina), 23° 16′ 39″ N, 106° 27′ 42″ W (3, 5, 6 Jan 00; 16, 20, 21 Dec 03; 1 Dec 04). **26.** Estero Urias (La Sirena), 23° 12′ 03″ N, 106° 21′ 44″ W (21 Dec 03). **27.** Laguna Caimanero (n. end near Teodoro Beltran), 23° 00′ 45″ N, 106° 09′ 06″ W (21 Dec 03). **28.** Laguna Caimanero (n. end near Ejido Gregorio Moreno), 22° 58′ 23″ N, 106° 07′ 18″ W (21 Dec 03). **29.** Agua Verde/Caimanero, 22° 52′ 38″ N, 106° 01′ 03″ W (28, 29 Dec 99; 13 Dec 03). **30.** Río Baluarte mouth, 22° 50′ 18″ N, 106° 02′ 20″ W (29 Dec 99; 13 Dec 03). **31A.** Estacada (s. end Laguna Grande/Las Canales), 22° 46′ 50″ N, 105° 51′ 09″ W (2 Jan 00; 3 Dec 04). **31B.** Las Cabras, 22° 44′ 38″ N, 105° 54′ 18″ W (2 Jan 00). **32A.** Laguna Agua Grande, s.e. end, 22° 32′ 52″ N, 105° 36′ 33″ W (32A);13, 16 Dec 03; 3 Dec 04.

Nayarít

32B. Teacapán, 22° 32′ 38″ N, 105° 43′ 23″ W (2 Jan 00). **32C.** Tecuala, 22° 23′ 40″ N, 105° 34′ 31″ W (13 Dec 03). **33.** Valle de la Urraca (shrimp ponds), 22° 33′ 19″ N, 105° 38′ 34″ W (16 Dec 03). **34A.** Playa El Novillero, 22° 22′ 53″ N, 105° 39′ 44″ W (13 Dec 03; 4 Dec 04). **34B.** Palmar de Cuautla, 22° 13′ 14″ N, 105° 38′ 14″ W (13 Dec 03). **35.** Santa Cruz wetlands, 21° 58′ 56″ N, 105° 27′ 34″ W (14 Dec 03). **36.** San Blas (shrimp ponds near Guadalupe Victoria), 21° 35′ 13″ N, 105° 17′ 11″ W (14, 16 Dec 03). **37.** San Blas (Los Miradores), 21° 32′ 53″ N, 105° 15′ 29″ W (31 Dec 99; 1, 2 Jan 00; 14, 16 Dec 03; 6 Dec 04). **38.** Peso Island/Estero Pozo, 21° 31′ 55″ N, 105° 17′ 19″ W (16 Dec 03; 6 Dec 04; 25 Jan 07). **39.** Matanchén, 21° 31′ 35″ N, 105° 14′ 44″ W (31 Dec 99; 1, 2 Jan 00; 16 Dec 03; 6 Dec 04). **40.** Union de Corrientes, 21° 58′ 29″ N, 105° 29′ 13″ W (15 Dec 03). **41.** Boca de Camichin, 21° 44′ 25″ N, 105° 29′ 16″ W (15 Dec 03).

Jalisco

42. Barra de Navidad, 19° 11′ 56″ N, 104° 40″ 55″ W (8 Dec 04; 23 Jan 07).

Colima

43. Boca de Pascuales, 18° 51′ 45″ N, 103° 58′ 00″ W (9 Dec 04). **44.** Río Coahuayana mouth (Apiza), 18° 42′ 00″ N, 103° 43′ 56″ W (9 Dec 04).

Michoacán

45. Boca del Río Neixpa, 18° 03′ 04″ N, 102° 36′ 14″ W (9, 10 Dec 04; 22 Jan 07).

Guerrero

46. Laguna Coyuca at Pie de la Cuesta, 16° 56′ 54″ N, 99° 52′ 56″ W (10 Dec 04; 13 Jan 06). **47.** Laguna Tres Palos, Barra Viejo, 16° 41′ 24″ N, 98° 22′ 37″ W (11 Dec 04). **48.** Río Papagayo, 16° 41′ 05″ N, 98° 23′ 43″ W (11 Dec 04; 9, 10, 11, 13, 14 Jan 06; 20 Jan 07). **49.** Barra de Tecomate, 16° 38′ 13″ N, 98° 45′ 25″ W (1 Jan 06). **50.** Laguna Chautengo, Pico del Monte, 16° 36′ 23″ N, 98° 52′ 40″ W (1 Jan 06). **51.** Río Marquelia, Playa la Bocana, 16° 33′ 17″ N, 97° 11′ 13″ W (12 Dec 04; 2 Jan 06). **52.** Río Quetzala, Barra de Teconapa, 16° 30′ 10″ N, 97° 16′ 15″ W (12 Dec 04; 2, 3, 9 Jan 06; 19 Jan 07).

Oaxaca

53. Río Verde, Azufre, 15° 59′ 07″ N, 96° 12′ 37″ W (13, 17 Dec 04; 4, 8 Jan 06. **54.** Laguna Chacahua, 15° 58′ 07′ N, 96° 18′ 58″ W (4 Jan 06). **55.** Barra Colotepec, 15° 48′ 33″ N, 96° 58′ 33″ W (13, 17 Dec 04; 5, 7 Jan 06). **56.** Río Copalita mouth, 15° 47′ 13″ N, 96° 03′ 13″ W (14 Dec 04). **57A.** San Mateo del Mar (Laguna Superior), 16° 12′ 40″ N, 93° 01′ 50″ W (6 Jan 06). **57B.** Santa María del Mar (Laguna Superior), 16° 13′ 24″ N, 93° 08′ 41″ W (6 Jan 06).

Chiapas

58. Laguna de la Joya, Boca de Cielo, 15° 50′ 52″ N, 93° 39′ 55″ W (15 Dec 04).

FIRST RECORD OF NEWELL'S SHEARWATER FROM THE MAINLAND OF NORTH AMERICA

PHILIP UNITT, San Diego Natural History Museum, P. O. Box 121390, San Diego, California 92112-1390; birds@sdnhm.org

MERYL A. FAULKNER, Project Wildlife, 5915 Desert View Dr., La Jolla, California 92037

CHARLES SWANSON, 2208 Eucalyptus Ave., Escondido, California 92029

ABSTRACT: A Newell's Shearwater (*Puffinus* [*auricularis*] *newelli*) captured alive on land at Del Mar, California, on 1 August 2007 was the first of its species to reach the continent of North America or a latitude so far north. The bird was distinguished from the similar Manx (*P. puffinus*) and Townsend's (*P.* [*a.*] *auricularis*) Shearwaters by the pattern of its undertail coverts, white basally and black distally, as well as tail length and weight. An attempt to rehabilitate it was unsuccessful, and it died after 10 months in captivity.

OCCURRENCE IN CALIFORNIA

Around 03:00 on 1 August 2007 Swanson was with a crew working on the stabilization of the sea bluffs along the railroad tracks at Del Mar, San Diego County, California, when he noticed a bird dive-bombing a co-worker. Suspecting the bird was attracted by the light from the headlamp on his co-worker's hardhat, Swanson suggested he turn the light off. He did so, but the bird continued to dive at him. The co-worker walked toward a large metal box as the bird again flew toward his head. He ducked, and the bird crashed into the box and fell to the ground. Thinking the bird was probably stunned or possibly hurt, Swanson picked it up carefully, finding it docile, and placed it in a bed of iceplant along the cliff. Some time passed, and the bird took flight, circled for a few rounds, and came back to the same area. Swanson's shift ended around 05:30, and he left the bird in the iceplant.

The following night, still 1 August, Swanson returned to work at 21:30, about 14 hours since the first encounter with the bird. At this time it was by the same metal box with which it had collided the preceding night, sitting as quietly as it had been when he left it earlier in the morning. Although the bird was not seriously injured Swanson suspected it needed medical attention and placed it in a box with some soft rags. It remained calm in the box through the night as Swanson checked on it periodically. When his shift ended at 05:30 on 2 August, he took the bird home, offering it water and three pieces of soaked bread, two of which it ate. Swanson's friend Dewilla Goldate called the San Diego Wild Animal Park, which referred her to Sea World, which referred her to Project Wildlife's care center in Carlsbad. Swanson and Goldate took the bird to this center, where volunteers identified it as a Manx Shearwater (*Puffinus puffinus*) and transferred it to Faulkner, Project Wildlife's seabird specialist. On 3 August Faulkner brought the live shearwater to the San Diego Natural History Museum, where Unitt identified it as a Newell's Shearwater (*Puffinus* [*auricularis*] *newelli*) on the basis of the pattern of its undertail coverts: white basally, black distally. He measured it and pulled three undertail coverts for preservation of some physical evidence. Dana Hogan took several photographs, and Faulkner returned the bird to her home care center.

With the assistance of Timothy Burr, we notified the authorities in Hawaii responsible for the management of this species, formally designated as threatened by the U.S. Fish and Wildlife Service. They recommended that the bird be released on the ocean near San Diego, believing this less stressful and risky for bird than sending by airplane to Hawaii (Holly Freifeld, U.S. Fish and Wildlife Service, in litt.). This decision also obviated the question of whether the bird would need quarantine if returned to Hawaii. Therefore Faulkner kept the bird under her care at her home rehabilitation center in preparation for a possible release. In captivity the Newell's Shearwater vocalized occasionally but usually remained passive in its behavior. On a daily basis it was given the opportunity to swim in a freshwater pool, where it bathed for a very short time then climbed out. Unlike other shearwaters and fulmars brought in for rehabilitation, the bird never showed a desire to remain in the water for more than a minute. Fed fish twice daily, it usually expressed a desire for food by climbing the side of its enclosure and engaging in brief wing flapping. On one occasion it climbed out of its enclosure and hid under the base of a hedge of Natal Plum (*Carissa grandiflora*), where it dug out a depression or cavity in the roots. The bird never made any attempt at flying even when launched gently in windy conditions over the pool in Faulkner's yard.

The shearwater's call in captivity (usually heard when the bird was handled or moved) was a two-noted donkeylike bray sometimes repeated up to three times. It sounded identical to the call recorded in the field and published in *Voices of Hawaii's Birds* (Pratt 1995).

A few days prior to death on 31 May 2008, it showed less interest in swallowing fish (it was gently force-fed since it refused to pick up fish from water or a surface) but otherwise showed no obvious signs of illness. Its weight remained stable during the whole time in captivity, varying from 370 to 400 g.

IDENTIFICATION

Basically black above and white below, the bird was small for a shearwater, weighing 383 grams when received by Project Wildlife. At this time the plumage was in good condition, rather fresh, with no evident molt. The upperparts were entirely sooty black, the black extending a short distance below the eye (Figure 1). The black covered the cheeks and sides of the neck, and the line between black and white turned up abruptly to meet the forward base of the wing (Figure 2). The throat, breast, and belly were pure white. The underwing coverts were white with a sharp black leading edge and some black mottling over the patagium (Figure 3). The flanks were white except that four of the longest flank feathers were largely black (Figure 4). The anterior half of the undertail coverts was largely white, the posterior half largely black, the line between black and white making the shape of the letter U (Figure 5). Some feathers near the line of division were largely white on the inner web and black on the outer web. The irides were very dark brown, almost black. The bill was black. The tarsi and feet were bluish

Figure 1. Head of Newell's Shearwater picked up at Del Mar, San Diego County, California, 2 August 2007 (photo taken 5 August 2007).

Photo by Matt Sadowski

to lavender, pinker on the webs, with black outer edges on both the tarsi and lateral toes.

The pattern of the undertail coverts is the primary feature distinguishing Newell's Shearwater from the similar Manx and Townsend's (*P.* [*a.*] *auricularis*] Shearwaters (Howell et al. 1994). In the Manx the undertail coverts are entirely or almost entirely white. In the single specimen of the Manx in the

Figure 2. Side view of Newell's Shearwater picked up at Del Mar, San Diego County, California, 2 August 2007 (photo taken 3 August 2007).

Photo by Dana Hogan

Figure 3. Underwing of Newell's Shearwater picked up at Del Mar, San Diego County, California, 2 August 2007 (photo taken 3 August 2007).

Photo by Dana Hogan

San Diego Natural History Museum the longest undertail coverts are white with slight black speckling and only a few of the lateral undertail coverts have significant black, mainly on their outer webs. In Townsend's the undertail coverts are entirely or almost entirely black. The pattern on the bird picked up at Del Mar resembles that of two specimens of Newell's Shearwater collected on Kauai, also in the San Diego Natural History Museum.

Figure 4. Flanks of Newell's Shearwater picked up at Del Mar, San Diego County, California, 2 August 2007 (photo taken 3 August 2007).

Photo by Dana Hogan

Figure 5. Undertail coverts of Newell's Shearwater picked up at Del Mar, San Diego County, California, 2 August 2007 (photo taken 3 August 2007).

Photo by Dana Hogan

When the bird from Del Mar was brought to Faulkner, its wing chord measured 232 mm, its tail (from insertion of central rectrices to their tip) 87 mm, tarsus 45 mm, exposed culmen 33.2 mm, bill depth at base 12.2 mm, and bill width at gape 14.5 mm. The measurements for the wing, tail, tarsus, and culmen are all well within the range for Newell's Shearwater given by King and Gould (1967) and republished by Ainley et al. (1997). The tail is too long for Townsend's, in which the tail ranges from 71 to 83 mm (Howell et al. 1994), and Manx, in which the tail ranges from 68 to 83 mm (Howell et al. 1994, Lee and Haney 1996: appendix 2). Also, at 383 grams the bird from Del Mar was near the average for Newell's Shearwater (381 grams, Ainley et al. 1997; 391.2 grams, King and Gould 1967). This figure is high for Townsend's Shearwater, 10 specimens of which Jehl (1982) weighed at 290 to 358 grams. In the latest (1998) A. O. U. *Check-list of North American Birds*, Newell's and Townsend's Shearwaters are classified as conspecific.

The Black-vented Shearwater (*P. opisthomelas*) is a common nonbreeding visitor off southern California but eliminated by its wholly black undertail coverts, shorter tail, and softer contrast between the dark upperparts and pale underparts. Other small shearwaters from distant parts of the globe, namely, the Audubon's (*P. lherminieri*), Little (*P. assimilis*), Fluttering (*P. gavia*), Hutton's (*P. huttoni*), Yelkouan (*P. yelkouan*), and Balearic (*P. mauretanicus*), can be eliminated by their paler upperparts, darker underparts, dark undertail coverts, or smaller size. On the basis of the mitochondrial gene cytochrome b Austin et al. (2004) reported *Puffinus assimilis myrtae*, known only from the island of Rapa in the Iles Australes of French Polynesia, as a close relative of Newell's Shearwater, though possibly of hybrid origin. Since then *myrtae* has sometimes been considered a subspecies of *newelli* (e.g., www.manu.pf/E_RAPA.html). However *myrtae* is classified, it differs from *newelli* in many respects, having white edges on the feathers of the upperparts, at least in fresh plumage, white inner vanes on the primaries, all-white undertail coverts, and white extending farther up face, to the level of the eye (see photo at www.manu.pf/E_Marins.html). It is also smaller. In the single specimen on which Bourne (1959) based the original description of *myrtae*, the wing (196 mm), tarsus (40 mm), and culmen (25 mm) are all well below the minimum of the ranges for *newelli* reported by King and Gould (1967). Steve N. G. Howell (pers. comm.) has examined the type specimen of *myrtae* and reports that in plumage it resembles the Little Shearwater.

When dissected, the Newell's Shearwater from Del Mar proved to be an adult female, ovary 12 × 5 mm, largest ovum 1.5 mm. At the time of its death on 31 May 2008 it was nearing the end of primary molt, with p9 growing. There was little molt in the rest of the plumage. Unitt prepared it as a skin and partial skeleton with the bones of the left wing and foot saved with the skeleton and the left wing partially extended. Unfortunately, the tail and undertail coverts became severely worn while the bird was in captivity, so that the diagnostic pattern of the undertail coverts is almost obliterated, and the tip of the maxilla also wore off. The specimen is catalog number 52126 in the San Diego Natural History Museum, and a tissue sample is archived at San Diego State University.

The identification was accepted unanimously by the California Bird Records Committee as record 2007-156 (G. McCaskie pers. comm.).

DISTRIBUTIONAL CONTEXT

Newell's Shearwater nests only in the Hawaiian Islands, primarily on Kauai. Its pelagic range lies primarily in the Equatorial Countercurrent, between 4° and 10° N. It occurs mainly between 160° and 120° W, but small numbers range east to 106° W, well to the east of the longitude of California (Spear et al. 1995). Only small numbers range much to the north of Kauai, to about 25° N (Ainley et al. 1997) or about 28° N (R. H. Day pers. comm.; south of Midway Atoll, R. L. Pyle and P. Pyle, unpubl. data). The species has been collected or photographed as far west as Guam (Drahos 1977) and Saipan (Jouanin 1956) in the Mariana Islands. It has been collected as far south as Tutuila, American Samoa (Grant et al. 1993), and Dargaville Beach, New Zealand (Taylor 1996). There are no previous records of Newell's Shearwater for the coast of North America or as far north as the latitude of Del Mar (32.95° N).

Threats to Newell's Shearwater include predation by feral cats and introduced Barn Owls (*Tyto alba*), collision with wires and other man-made hazards, and disorientation by artificial lighting at night (Ainley et al. 1997). On the basis of censuses at sea Spear et al. (1995) estimated the total population between 57,000 and 115,000. From 1993 to 2001, Day et al (2003) reported a decline of 61.5% on the basis of radar detections and of 72% on the basis of numbers of fledglings picked up after mishaps. Typhoon Iniki in 1992 may have killed many nestlings (Day et al. 2003). In its extremely rugged, forested nesting habitat Newell's Shearwater is impossible to census accurately.

The Manx Shearwater has occurred in the northeastern Pacific Ocean as a vagrant and possible colonist with increasing frequency since at least 1992, probably since 1975 (Kessel and Gibson 1975, Mlodinow 2004, Hamilton et al. 2007). The California Bird Records Committee had accepted 117 records through 2007 (G. McCaskie pers. comm.). This occurrence of Newell's Shearwater in southern California suggests that identifications of the Manx in this area, many of which "are supported by scant details" (Hamilton et al. 2007:103), need continued vigilance.

ACKNOWLEDGMENTS

Thank you to Dana Hogan and Matt Sadowski for the photos, to Tim Burr and Elizabeth Copper for their assistance with the bird and contacts in Hawaii, to Robert H. Day and Peter Pyle for information allowing us to put the occurrence in proper context, and to Steve N. G. Howell and Kathy C. Molina for their review of the manuscript.

LITERATURE CITED

American Ornithologists' Union. 1998. Check-list of North American Birds, 7th ed. Am. Ornithol. Union, Washington, D.C.

Ainley, D. G., Telfer, T. C., and Reynolds, M. H. 1997. Townsend's and Newell's Shearwater, in The Birds of North America (A. Poole and F. Gill, eds.), no. 297. Acad. Nat. Sci., Philadelphia.

Austin, J. J., Bretagnolle, V., and Pasquet, E. 2004. A global molecular phylogeny of the small *Puffinus* shearwaters and implications for systematics of the Little–Audubon's Shearwater complex. Auk 121:847–864.

Bourne, W. R. P. 1959. A new Little Shearwater from the Tubaui Islands: *Puffinus assimilis myrtae* subsp. nov. Emu 59:212–214.

Day, R. H., Cooper, B. A., and Telfer, T. C. 2003. Decline of Townsend's (Newell's) Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. Auk 120:669–679.

Drahos, N. 1977. Additions to the avifauna of Guam. Micronesica 13:45–48.

Grant, G. S., Trail, P. W., and Clapp, R. B. 1993. First specimens of Sooty Shearwater, Newell's Shearwater, and White-faced Storm Petrel from American Samoa. Notornis 41:215–217.

Hamilton, R. A., Erickson, R. A., and Patten, M. A. 2007. Rare Birds of California. W. Field Ornithol., Camarillo, CA.

Heindel, M. T., and Garrett, K. L. 2008. The 32nd report of the California Bird Records Committee: 2006 records. W. Birds 39:121–152.

Howell, S. N. G., Spear, L. B., and Pyle, P. 1994. Identification of Manx-type shearwaters in the eastern Pacific. W. Birds 25:169–177.

Jehl, J. R., Jr. 1982. The biology and taxonomy of Townsend's Shearwater. Gerfaut 72:121–135.

Jouanin, C. 1956. Une capture meconnue de *Puffinus puffinus newellii* Henshaw. Bull. Mus. Natl. Hist. Nat. (Paris) 28:273–274.

Kessel, B., and Gibson, D. D. 1975. Status and distribution of Alaska birds. Studies Avian Biol. 1.

King, W. B., and Gould, P. J. 1967. The status of Newell's race of the Manx Shearwater. Living Bird 6:163–186.

Lee, D. S., and Haney, J. C. 1996. Manx Shearwater, in The Birds of North America (A. Poole and F. Gill, eds.), no. 257. Acad. Nat. Sci., Philadelphia.

Mlodinow, S. G. 2004. Manx Shearwaters in the North Pacific Ocean. Birding 36:608–615.

Pratt, H. D. 1995. Voices of Hawaii's Birds [two-cassette set of recordings]. Hawaii Audubon Soc., Honolulu.

Spear, L. B., Ainley, D. G., Nur, N., and Howell, S. N. G. 1995. Population size and factors affecting at-sea distributions of four endangered procellariids in the tropical Pacific. Condor 97:613–638.

Taylor, G. A. 1996. Seabirds found dead on New Zealand beaches in 1994. Notornis 43:187–196.

Accepted 15 October 2008

NESTLING PROVISIONING BY AMERICAN DIPPERS NEAR JUNEAU, ALASKA

MARY F. WILLSON, 5230 Terrace Place, Juneau, Alaska 99801; mwillson@gci.net
KATHERINE M. HOCKER, 7995 North Douglas Hwy., Juneau, Alaska 99801

ABSTRACT: The rate of food delivery by male American Dippers (*Cinclus mexicanus*) increased as the female spent more time brooding young chicks, although the delivery rate by male parents varied greatly when the female was not brooding. Males commonly delivered food more often than females when females were brooding, but nonbrooding females sometimes made more deliveries than their mates. Pairs differed in the relative numbers of food-delivery trips by male and female. Juvenile salmon, and salmon eggs in season, were often delivered to chicks on streams with salmon spawning runs, by both parents. Single parents raised chicks successfully in three cases. One male mated bigamously, but only one of his females was successful in rearing chicks, probably because of a severe infestation of bird-blowflies.

American Dippers (*Cinclus mexicanus*) typically nest in socially monogamous pairs, and both parents participate in parental care (e.g., Kingery 1996). Only the female incubates eggs and broods young chicks (Kingery 1996, pers. obs.), but reports in the literature differ as to the roles of male and female in caring for nestlings (Willson and Hocker 2008). Here we report on the relative contributions of males and females during the nesting cycle at six nests in southeastern Alaska in 2008. We note the ability of single parents to raise chicks successfully and one case of bigamy. Because there is circumstantial evidence that the availability of small fish may influence some aspects of dipper biology (Obermeyer et al. 2006, Willson and Hocker 2008), we also recorded the frequency of adults' delivering fish to nests.

STUDY AREA AND METHODS

We studied nesting American Dippers in streams near Juneau, Alaska (58° 18′ N 134° 25′ W), from 2004 through 2008. This region supports temperate rainforest with numerous small coastal streams used by dippers. We banded adults with individually distinctive combinations of color bands (Willson and Hocker 2008). In 2008 we focused mainly on six nests, observing food-delivery rates of pairs in which at least one adult was banded. We recorded delivery rates of males and females during the early part of the nestling period when females often brooded young chicks (also recording the brooding times of the females) and after brooding ceased. Males typically feed incubating and brooding females in the nest, as well as nestlings (Kingery 1996, pers. obs.) We also recorded visits to nests in which the adults brought small juveniles and eggs of salmon. In addition, we observed a nest at which the male alone was feeding chicks. All nest watches were in units of one hour, spread over most daylight hours (0600–2000) in June, July, and early August.

Table 1 Average Food-Delivery Rates (Trips/Hour) of Male and Female American Dippers, During and After Brooding of Young Chicks

		Brooding					Not brooding				
Nest	Σ *N* (hrs)	M	F	Σ	*N* (hrs)	M > F[a]	M	F	Σ	*N* (hrs)	F > M[a]
SC	22	7.8	7.0	14.8	5	2	4.3	8.8	13.1	17	15
ML1[b]	18	4.9	5.6	10.5	8	4	5.3	8.4	13.7	10	5
ML2[c]	20	6.9	4.8	11.7	9	5	3.9	5.4	9.3	11	7
SD	24	9.3	4.5	13.8	6	5	8.4	8.1	16.5	18	5
GS	14	9.3	2.7	12.0	11	10	7.0	5.7	12.7	3	0
LF	24	--	--	--	--	--	6.5	6.5	13.0	24	8

[a]Number of observation hours in which the indicated sex made the most trips to the nest.

[b]First brood of pair ML.

[c]Second brood of pair ML.

RESULTS

Delivery Rates

Average total delivery rates to nests with nestlings ranged from about 9 to 16 trips per hour, with no evident difference between times when the female was brooding and when she was not (Table 1). While the female was brooding, the male clearly made more trips than the female at three nests, slightly more at one nest, and slightly fewer at one nest (no data for one nest). When the female was not brooding, she made markedly more trips than the male at three nests, about the same at two nests, and fewer at one nest. There was no evident trend for males that delivered more often than their mates during the brooding phase to deliver less often than their mates after brooding ceased.

These patterns are corroborated by tallying each hour of observation according to which member of the pair made more trips (so that a few hours can not overwhelm the average). At the three nests with brooding females at which the average delivery rate of the male exceeded that of the female, in the majority of observation hours we recorded a higher rate by the male (Table 1). After brooding, at the three nests where females averaged more feeding trips, the female's rate was greater than the male's in over half the observation periods.

The relative rate of feeding by males during and after the brooding period varied from pair to pair. At three of five nests with data from brooding and nonbrooding periods, males markedly decreased their feeding rate when the female was not brooding; at one nest the rate decreased slightly, and at the remaining nest the rate changed little. Females usually increased their delivery rate when not brooding, at least to some degree (Table 1).

In general, the proportion of feeding trips made by the male increased with the female's brooding time per hour ($r = 0.702$, $p = 0.000$, $n = 41$ hours for all nests pooled). This pattern held at three nests individually (ML2, $r = 0.698$, $p = 0.037$, $n = 9$; SD, $r = 0.825$, $p = 0.043$, $n = 6$; GS, $r = 0.723$, $p = 0.004$, $n = 11$) and was marginally significant at another nest

(SC, $r = 0.797$, $p = 0.106$, $n = 5$). Thus, males often increase their feeding rate as the female's brooding time increases.

The male's deliveries did not increase with the female's time spent brooding at one of the two nests of a bigamous male (ML1 in Table 1). His second nest was about 1 km upstream of the focal nest, and the date at which its chicks hatched was apparently similar. This nest failed, however, when the chicks' primary feathers were just beginning to emerge from the sheaths. The failure occurred before we could accumulate several hours of nest watching, so we could not determine the male's relative attentiveness at his two nests. This nest's failure was undoubtedly at least partly due to a severe infestation of bird-blowflies (probably *Protocalliphora aenea*; T. Whitworth pers. comm.); there were over 350 bird-blowfly larvae (with blood visible in their guts) in the nest with three dead chicks, one of which was markedly smaller than the others (28 versus 41 and 42 g). This male eventually raised a second brood with his remaining partner (ML2) and then increased his delivery rates when she brooded more.

Deliveries of Fish to Chicks

Juvenile salmon and salmon eggs were delivered to five of six nests in 2008, but the rates differed from nest to nest (Table 2). Often, more than one fish was included in a single delivery. Males delivered fish or eggs more often than females at three nests, less often than females at one nest, and at similar frequency at one nest. A female was observed to pluck salmon alevins (tiny hatchlings with yolk sac attached) from the gravel in one stream in June and both eat them herself and deliver them to her chicks.

Single Parents

At one nest in 2008, the female disappeared early in the nestling phase and the male successfully reared three chicks by himself, for at least the last nine days of the nestling period. His rate of food delivery to the nest was 12.9 trips per hour ($n = 8$ hours), including an average of four fish per hour, which compares favorably with the rates posted by pairs at other nests in 2008 (Table 1).

Table 2 Average Rates of Delivery of Fish and Fish Eggs to American Dipper Nests per Hour of Observation

	Male		Female	
Nest	Fish	Eggs	Fish	Eggs
SC	0.2		1.5	
ML1	3.3		2.6	
ML2	3.1	3.95	1.3	2.0
SD	0.3		0.2	
GS	0		0	
LF	0.5		0.1	

In 2005, a widowed female also raised at least three chicks successfully, with an average delivery rate of 13.3 trips per hour (*n* = 4 hours), including 1.3 deliveries of fish per hour. This rate, however, was lower than that of most pairs observed that year (post-brooding rates of 18–28 trips per hour at seven nests with at least 4 observation hours each; 11 trips per hour at one nest). One other widowed female is known to have fledged a brood successfully (Willson and Hocker 2008).

Chick Feeding at the Time of Fledging

The fledging of sibling dippers is often spread over two or even three days. During this time, both parents attend chicks both inside and outside the nest. In June 2008 we observed a nest at which the chicks repeatedly walked from the nest onto the nesting ledge or fluttered down to a rocky outcrop and later re-entered the nest. One temporary fledgling was seen to bathe and forage briefly. The female was aggressive toward this fledgling, pecking it and butting it with her head, and standing tall and sleek in an aggressive posture. The chick eventually re-entered the nest, flying up about 2 m. Both parents fed this chick and its siblings, on the ledge or outcrop or in the nest. By late the next day, all four chicks were outside the nest. In five years of observing dippers, this was the first time we saw fledglings re-enter their nest.

DISCUSSION

Delivery Rates of Males and Females

Pairs clearly differed in the balance between the sexes in food-delivery work, as previously suggested (Hann 1950, Willson and Hocker 2008). When females were brooding young chicks, males often made more food deliveries than females, and the female in some cases made more trips than the male when she was not brooding. In general, the more a female brooded the chicks during the early part of nestling care, the higher the delivery rate by her mate.

Our earlier study (Willson and Hocker 2008) found that early in the nesting cycle delivery trips by males exceeded those of females in 7 of 11 observation periods; after brooding ceased, relative rates of delivery during 60 observation periods were roughly equally divided among cases in which males delivered more often than females, less often than females, and about equally, with some variation among nests. For the Eurasian or White-throated Dipper (*Cinclus cinclus*), Tyler and Ormerod (1994) reported similar delivery rates by males and females during the nestling period, although females increased their rates as brooding ceased and then visited the nest slightly more often than their mates.

Relative and absolute rates of delivering food to nestlings are likely to vary with ambient temperatures and the concomitant need to brood the chicks, the nature and abundance of the food supply, and the number of chicks in the nest, among other factors. These provide useful topics for future work.

Polygyny

Bigamy is rare in American Dippers but has been reported previously (Price and Bock 1973, Marti and Everett 1978). The nest success of both females in four bigamous matings in Colorado was high for first broods (7 of 8 attempts) but considerably lower for second broods (4 of 8 attempts; Price and Bock 1973). Nevertheless, the number of fledglings attributed to bigamous males exceeded that attributed to monogamous males, while the females in bigamous and monogamous matings raised similar numbers of fledglings (Price and Bock 1973). In Utah Marti and Everett (1978) found that a bigamous male contributed to the successful rearing of two broods at each of his nests.

Polygyny is also recorded for the White-throated Dipper, in which it is sometimes quite common (Marzolin 1988, Tyler and Ormerod 1994, Wilson 1996). Polygynous males father more chicks than monogamous males (Wilson 1996). Primary females in polygynous matings had success similar to that of females in monogamous matings, but secondary females of polygynous males had broods smaller than those of monogamously mated females (Wilson 1996).

Delivery of Fish and Fish Eggs

The highest rates of fish delivery were on a stream noted for good salmon runs (especially chum, *Oncorhynchus keta*, and coho, *O. kisutch)*, followed by those on a stream that has good runs of sockeye (*O. nerka*) and coho. Dippers nesting on the remaining streams did not have access to runs of anadromous fish but only to small populations of resident Dolly Varden (*Salvelinus malma*) or introduced brook charr (*S. fontinalis*). Both chum and sockeye enter freshwater streams at times that overlap with dipper nesting, so their eggs are available to nesting dippers. Dippers capture unburied, drifting salmon eggs and pluck shallowly buried eggs and alevins from the gravels. Circumstantial evidence suggests that availability of small fish may lead to greater chick mass at a given age, reduce the amount of brood reduction (progressive loss of chicks from the brood, usually beginning with the smallest), and increase the probability of a second brood being raised in the same season (Obermeyer et al. 2006, Willson and Hocker 2008).

Contrary to our previous findings (Willson and Hocker 2008), females did not deliver fish more often than males in 2008 (Table 2). The earlier study found that, at nests where fish were a relatively common prey, males provided 0.23 fish per trip while females delivered 0.41 fish per trip. The difference between this report and the previous one may be related to individual idiosyncrasies of parent birds foraging in differing circumstances. Perhaps a much larger sample size would permit detection of a consistent pattern, but the observed variation among pairs, locations, or years may be more interesting and ultimately more informative than any general trend.

Single Parents

Single parents, male or female, are clearly capable of raising chicks alone (Hann 1950, Kingery 1996). It seems likely, however, that single males would not be able to do so until the nestlings acquired some ability to thermoregulate, because only females brood young chicks. Indeed, both in Hann's case and in ours, the successful solo males became sole providers in the latter part of the nestling period. In all of our single-parent cases, small fish were relatively abundant in the territory and were fed to nestlings fairly frequently at two of such nests that we were able to watch. It would be interesting to know if the abundance of fish facilitated the success of single parents. In both cases, there was a spread of at least two days between the fledging of the first and last chicks from the nest, but in some years the spread was just as wide at some nests with two parents (pers. obs.; Willson and Hocker 2008).

The ability of single parents to increase delivery rates to compensate for the absence of the other parent may differ, as seen in this report. Compensation is likely to be easier on productive reaches of streams where the density of prey near the nest is high and the body condition of the solo parent can be maintained. Also, the need to try to compensate may vary with brood size at the time one mate disappears. Our sample of single parents was too small to determine if their fledging success was less than at nests with both parents attending. In *C. cinclus* Tyler and Ormerod (1994) observed single parents delivering food at rates higher than those of individual mated birds, in general, but single parents did not match the combined rates of mated pairs, and their broods were small.

ACKNOWLEDGMENTS

The Alaska Department of Fish and Game (non-game program) provided the principal funding for this study.

LITERATURE CITED

Hann, H. W. 1950. Nesting behavior of the American Dipper in Colorado. Condor 52:49–61.

Kingery, H. E. 1996. American Dipper (*Cinclus mexicanus*), in The Birds of North America (A. Poole and F. Gill , eds.), no. 229. Acad. Nat. Sci., Philadelphia.

Marti, C. D., and Everett, S. W. 1978. Polygyny in Utah dippers. W. Birds 9:174.

Marzolin, G. 1988. Polygynie du Cincle plongeur (*Cinclus cinclus*) dans les côtes de Lorraine. L'Oiseau Rev. Fr. Ornithol. 58:277–286.

Obermeyer, K. E., White, K. S., and Willson, M. F. 2006. Influence of salmon on the nesting ecology of American Dippers in southeastern Alaska. Northwest Science 80:26–33.

Price, F. E., and Bock, C. E. 1973. Polygyny in the Dipper. Condor 75:457–459.

Tyler, S. J., and Ormerod, S. J. 1994. The Dippers. Poyser, London.

Willson, M.F. and Hocker, K. M. 2008. Natural history of American Dippers in southeastern Alaska. Northwestern Naturalist 89:97–106.

Wilson, J. D. 1996. The breeding biology and population history of the Dipper *Cinclus cinclus* on a Scottish river system. Bird Study 43:108–118.

Accepted 12 November 2008

NOTES

FIRST MODERN RECORD OF THE WHITE-TAILED EAGLE IN HAWAII

BRENDA J. ZAUN, U.S. Fish and Wildlife Service, Kauai National Wildlife Refuge Complex, P. O. Box 1128, Kilauea, Hawaii 96754; Brenda_Zaun@fws.gov

The White-tailed Eagle (*Haliaeetus albicilla*) is distributed widely in northern Europe and Asia (Forsman 1999), where it breeds from western Greenland, Iceland, and Scandinavia to the Russian Far East and Attu in the Aleutian Islands (AOU 1998); the members of this genus are commonly called sea-eagles. During the 1950 and 1960s, the White-tailed Eagle declined dramatically in many regions of Europe because of environmental contaminants, habitat loss, persecution, and human disturbance, and the species was eventually listed as threatened by the International Union for the Conservation of Nature (IUCN 2006). After intensive conservation actions and successful reintroductions in its historic range, the White-tailed Eagle was downlisted to a species of least concern (IUCN 2006). It is a year-round resident in most portions of its range, but seasonal movements are evident in fringe populations (Forsman 1999). Mullarney et al. (1999) reported that most adults are resident except in far northern Eurasia, while juveniles are more migratory. Here I report the first White-tailed Eagle observed in the Hawaiian Islands, describe its prey selections, and briefly review the fossil record of the genus *Haliaeetus* in Hawaii.

At about 12:45 on 5 March 2007, I observed a White-tailed Eagle at a distance of approximately 50 m, soaring just below the crest of the 200-m coastal cliffs in Kilauea Point National Wildlife Refuge, Kauai. The eagle was heading west, soaring on the updrafts produced by onshore winds striking the cliffs. Staying close to the cliff edge, it followed the curve of the cliffs, then turned and headed east, again passing in front of me, this time at a higher altitude and slightly more distant. It continued east and then turned south (inland), and I lost sight of the bird. I observed the bird through Swarovski 10 × 42 EL binoculars and photographed the bird with a Canon EOD 20D equipped with a 100–300 mm Canon telephoto lens (Figure 1).

The White-tailed Eagle was brown overall with a dull whitish head, which did not contrast sharply with the body plumage, and a relatively short wedge-shaped tail, whiter than the head. Neither the head nor tail was immaculate white. The eagle had a large yellow beak and yellow eyes. Since no eagle normally occurs in the Hawaiian Islands, its overall large size and large broad wings with flared outer primaries were very impressive.

The photographs were of a quality sufficient to estimate the bird's minimum age and degree of molt in the primary feathers. Eagles of the genus *Haliaeetus* molt by the pattern of *Staffelmauser*, a strategy in which one wave of molt begins before the preceding wave has been completed (Pyle 2006). Because each wave is incomplete, the number of waves indicates the bird's minimum age (Pyle 2005). The photographs suggest that on the left wing P2, P4, P6, P8, and possibly P10 are newer and darker than the other primaries, implying five waves of *Staffelmauser*. Molt in the two wings appears to be asymmetrical. The right wing appears to have new, dark feathers only at P4, P9 and possibly at P7. The overall coloration and patterns of remigial molt indicate this bird is at least five years old (adult plumage). Young birds have dark-edged rectrices, while in the final subadult stage the rectrices have dark terminal tips (Forsman 1999, Mullarney et al. 1999).

This bird was almost certainly observed on Kauai as early as 30 December 2006, when Cindy Granholm and Dale McBeath saw "what appeared to be an eagle" on a rock jutting above a tidepool on the north coast of Kauai approximately 3.2 km east

Figure 1. White-tailed Eagle on Kilauea Point National Wildlife Refuge, Kauai, Hawaii.

Photo by Brenda Zaun

of the refuge. Their description of the size and coloration of the bird's plumage, beak, legs, and feet suggested this eagle. Subsequently, on 4 January 2007 Fawne Frailey and Sebastian Romero observed an eagle, fitting the same description, feeding on a Laysan Albatross (*Phoebastria immutabilis*) within 1 km of the first sighting. A few other possible sightings were reported in February 2007, but no detailed description or photograph of this eagle was obtained until 5 March. I observed the eagle twice thereafter, on 8 March and on 2 May, as it soared over Kilauea Point. Through July 2007, I received several reports of eagle sightings on Kauai, two of which were confirmed by photographs: Jim Devries, Brad Schram, Daniel Gruneburg, and their birding colleagues observed and photographed the eagle near the Kawai'ele Bird Sanctuary on the south shore of Kauai on 22 March 2007, and Eric VanderWerf photographed the White-tailed Eagle in the same area on 20 April 2007.

White-tailed Eagles consume fish, birds, and carrion (Mullarney et al. 1999). During the seven months in which this bird was observed irregularly on Kauai, the only confirmed prey items were two adult Laysan Albatrosses, and the eagle was suspected in the predation of another three. Three Laysan Albatross carcasses with evidence of raptor predation were found in January 2007, and another two were seen in March 2007. On 8 March 2007 at approximately 17:10, the eagle was seen to attack and kill an adult Laysan Albatross on a remote, open, grassy portion of Kilauea Point National Wildlife Refuge. The adult albatross, a parent which had returned to feed its 34-day-old chick, was struck by the eagle shortly after it landed, according to the observer. When I arrived approximately 20 minutes later, the eagle was feeding on the albatross. When the eagle saw my truck approach to approximately 50 m, it took flight. The eagle had plucked and clipped the breast feathers, which were strewn on

Figure 2. Laysan Albatross preyed upon by White-tailed Eagle, Kilauea Point National Wildlife Refuge, Kauai, Hawaii.

Photo by Brenda Zaun

the downwind side. The breast cavity was exposed, revealing that most of the pectoral muscle had been consumed. After photographing the albatross remains (Figure 2), I collected the carcass and submitted it to the U.S. Geological Survey's Biological Resources Division in Honolulu, Hawaii, where veterinarian Thierry Work performed a necropsy. He reported the albatross was "an adult male in good body condition with gross lesions indicative of predation by a large raptor (skeletonized sternum, ribs clipped off at base, skeletonized appendages, and missing internal organs with associated bleeding)."

Predation by eagles on albatrosses has been reported previously. A Steller's Sea-Eagle (*H. pelagicus*) was suspected of killing three adult Black-footed Albatrosses (*P. nigripes*) on Torishima Island in early February 2001 (F. Sato pers. comm.). In February 1960, seven Short-tailed Albatross (*P. albatrus*) chicks on Torishima Island were taken by a raptor (Fujisawa 1967). White-tailed Eagles have been seen on Torishima and Mukojima islands as recently as March 2008 (for the latter), and carcasses of Black-footed Albatrosses with evidence of raptor predation were observed. Additionally, in March 2008 several carcasses of Black-footed Albatrosses were found on Nakodojima Island, located 5 km south of Mukojima (T. Deguchi pers. comm.).

There are few records of any sea-eagles in the Hawaiian Islands. Historical records are of a Steller's Sea-Eagle at Midway and Kure atolls in early 1978 and another at Tern Island in 1983 (Balazs and Ralph 1979; R. L. Pyle pers. comm.). Predation on a Laysan Albatross was witnessed at Kure, and carcasses of both Laysan and Black-footed albatrosses were found with evidence of raptor predation (Balazs and Ralph 1979). Archeological remains of several specimens of *Haliaeetus* on three Hawaiian islands (Maui, Molokai, and Oahu) attest to the occurrence, and possible colonization, of this genus in the Hawaiian archipelago long ago (James and Olson 1991, Fleischer et al. 2000). These bones have been dated to a time preceding the arrival of the islands' first human colonists by at least 1300 years (James 1987). Fleischer et al. (2000) sequenced mitochondrial DNA from a nearly complete skeleton found in a cave on Maui in 1988. They found the DNA sequence very similar to that of a White-tailed Eagle and suggested that Maui eagle was conspecific, representing a disjunct Hawaiian population of the White-tailed Eagle.

I thank Peter Pyle and Ann Edwards for their invaluable expertise in interpreting the feather molt patterns, and I sincerely appreciate their review and improvements of the manuscript. I am grateful to Tomohiro Deguchi, who kindly provided information on eagles and depredations on islands near Japan. I thank Mike Hawkes and Kirke King for their helpful and insightful comments on the first draft of this manuscript, and I am sincerely obliged to Cindy Granholm and Dale McBeath for communicating their sightings and to Steve Frailey for his aid in tracking the eagle's movements that made the initial photographs possible.

LITERATURE CITED

American Ornithologists' Union. 1998. Check-list of North American Birds, 7th ed. Am. Ornithol. Union, Washington, D.C.

Balazs, G. H., and Ralph, C. J. 1979. A Steller's Sea Eagle at Kure and Midway: First Hawaii record. 'Elepaio 39:117.

Fleischer, R. C., Olson, S. L., James, H. F., and Cooper, A. C. 2000. Identification of the extinct Hawaiian Eagle (*Haliaeetus*) by mtDNA sequence analysis. Auk 117:1051–1056.

Forsman, D. 1999. The Raptors of Europe and the Middle East. T. & A. D. Poyser, London.

Fujisawa, T. 1967. Albatross. Toko Shoin Press, Tokyo.

International Union for the Conservation of Nature. 2006. IUCN Red List of Threatened Species. Int. Union Cons. Nat., Gland, Switzerland.

James, H. F. 1987. A late Pleistocene avifauna from the island of Oahu, Hawaiian Islands. Documents des Laboratoires de Géologie de la Faculté des Sciences de Lyon 99:221–230.

James, H. F., and Olson, S. L.. 1991. Descriptions of thirty-two new species of birds from the Hawaiian Islands: Part 1. Non-Passeriformes. Ornithol. Monogr. 45.

Mullarney, K., Svensson, L., Zetterstrom, D., and Grant, P. J. 1999. Birds of Europe. Princeton Univ. Press, Princeton, NJ.

Pyle, P. 2005. Remigial molt patterns in North American Falconiformes as related to age, sex, breeding status, and life-history strategies. Condor 107:823–834.

Pyle, P. 2006. *Staffelmauser* and other adaptive wing-molt strategies in larger birds. W. Birds 37:179–185.

Accepted 30 October 2008

EGG RETRIEVAL BY THE HAWAIIAN GOOSE AFTER ATTEMPTED PREDATION BY A CAT

BRENDA J. ZAUN, U.S. Fish and Wildlife Service, Kauai National Wildlife Refuge Complex, P. O. Box 1128, Kilauea, Hawaii 96754; Brenda_Zaun@fws.gov

WESLEY W. WEATHERS, University of California, Animal Science Dept., One Shields Avenue, Davis, California 95616-8521

The Hawaiian Goose or Nēnē (*Branta sandvicensis*), Hawaii's only extant endemic goose, was nearly extirpated by hunting, habitat loss, and depredation by introduced predators and is among the most threatened of waterfowl. By the 1950s, the wild population was estimated at only about 30 individuals (Smith 1952). Captive propagation programs, reintroductions, and continuing predator control have resulted in increased populations, particularly on Kauai. Currently, populations of the Hawaiian Goose exist on the islands of Kauai, Maui, Hawaii, and Molokai. Listed as endangered under the Endangered Species Act in 1967 (U.S. Fish and Wildlife Service 1967), Hawaii's wild population is currently estimated to be around 2000 individuals (Ann Marshall pers. comm.) Predator control is essential for the recovery of this species. Here we report an attack by a feral cat on a Hawaiian Goose nest and the first documented egg retrieval by the Hawaiian Goose.

The female goose selects a nest site that is typically concealed under shrubs. Nests are shallow, round depressions in the ground containing leaves and twigs with down lining the interior. The diameter of the typical nest averages 28 cm, and the rim is generally <5 cm above ground level (Banko et al. 1999). We positioned an infrared CCD (charge-coupled device) video camera near an active nest of a wild Hawaiian Goose in Kilauea Point National Wildlife Refuge, Kauai, Hawaii, from 26 December 2007 through 3 January 2008 to record the female's nesting behavior. In the Hawaiian Goose only the females incubate the eggs, while the male guards nearby. The camera was placed near the nest during approximately the second week of incubation. We recorded the video signal continuously with a PVR-330 digital video recorder after passing the signal through a SuperCircuits electronic time/date stamp.

On the night of 3 January 2008, a cat arrived at the nest at 21:00 and the goose immediately fled the camera's field of view (Figure 1). The cat remained at the nest site for 52 minutes, intermittently biting and pawing the three eggs in the nest. After unsuccessfully attempting to break the eggs, the cat lay down within approximately 30 cm of the nest and appeared to fall asleep. At 21:44, the female goose returned to the nest area. She and the cat scrutinized each other for about 2 minutes from a distance of approximately 60 cm. The cat then lunged toward the goose, and the goose immediately fled the camera's view again. The cat departed 6 minutes later. At 22:06 the goose returned to the nest and resumed incubation until 23:13, when the cat again approached the nest, causing the goose to retreat a second time. Using its front feet and mouth, the cat rolled 1 egg approximately 30–40 cm away from the nest. Again unsuccessful at breaking an egg, the cat departed at 23:21.

Five minutes later, the female goose returned and stood next to the nest, which now contained just two eggs. She surveyed the area for 11 minutes, walked to the displaced egg and began retrieving it by extending her head and neck over the egg and pulling it backward toward her feet by using the underside of her bill (Figure 2). After moving the egg halfway to the nest, the female turned and sat on the nest for 9 seconds before resuming egg retrieval. Using this rolling technique again, she got the egg onto the edge of the nest bowl. She then attempted to settle on the three eggs and incubate, but was unable to because of the retrieved egg's position. She stood and moved the two eggs in the nest with her bill to make room for the third egg, which she nudged into the nest cup. She then settled on the nest and incubated

Figure 1. Sequence of events captured by a covert infrared CCD video camera at Kilauea Point National Wildlife Refuge, Kauai, Hawaii. A, Hawaiian Goose incubating eggs on nest. B, Cat approaches nest and goose flees (goose's wing visible above and to left of egg). C, Cat attempting to depredate eggs.

but appeared nervous, watchful, and alert. We discontinued video taping at this nest the day following the cat's attack. Although the female goose continued incubating, none of the eggs hatched, and the nest was abandoned on 24 January 2008. Soon after abandonment, egg candling confirmed that the eggs were infertile.

Prevett and Prevett (1973) reported retrieval of eggs displaced from nests by numerous species of ground-nesting birds, including over a dozen species of Anseriformes. The Hawaiian Goose's closest living relative is the Canada Goose (*Branta canadensis*) (Banko et al. 1999), and Paxinos et al. (2002) suggested that the Hawaiian Goose likely diverged from the Canada Goose. Duncan (1984) documented egg retrieval by the Canada Goose so it is reasonable that the Hawaiian Goose would also be capable

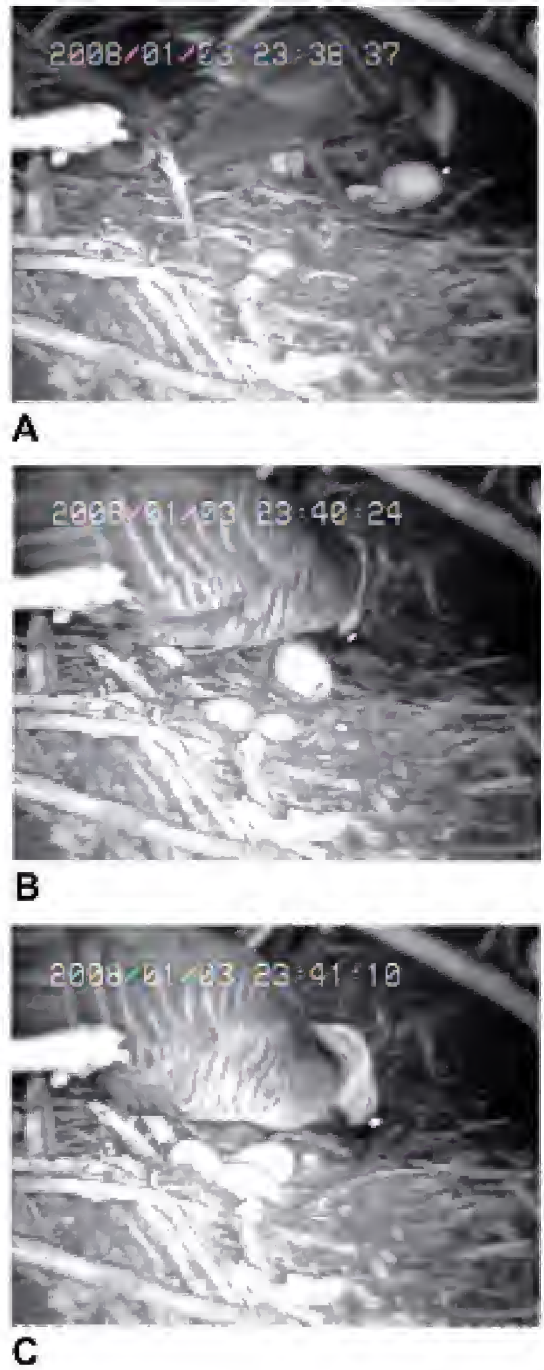

Figure 2. Hawaiian Goose retrieving egg that was removed from nest by a cat. Photos captured by a covert infrared CCD video camera at Kilauea Point National Wildlife Refuge, Kauai, Hawaii.

of this behavior. Rylander (2002) described egg-retrieval behavior as an instructive example of a fixed-action pattern. Fixed-action patterns are innate and stereotyped behaviors that vary little from performance to performance and from individual to individual. He reported that even geese raised in isolation exhibit this behavior. Experiments on Blue Snow Geese (*Anser caerulescens*) and Canada Geese by Prevett and Prevett (1973) and Duncan (1984), suggested that 1 m approaches the limit from which these species will retrieve eggs. At 30–40 cm, the displacement of the Hawaiian Goose egg was well within its congener's documented range of egg retrieval.

We thank Kirke King, Beth Flint, and Annie Marshall for their helpful and perceptive review and comments on the manuscript. We are grateful to Mike Hawkes, Refuge Manager, for his support of this project.

LITERATURE CITED

Banko, P. C., Black, J. M., and Banko, W. E.. 1999. Hawaiian Goose (Nene) (*Branta sandvicensis*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 434. Birds N. Am., Philadelphia.

Duncan, D. C. 1984. Egg retrieval by Canada Geese: Apparent interspecific retrieval and test of egg displacement. Auk 101:886–887.

Paxinos, E. E., James, H. F., Olson, S. L., Sorenson, M. D., Jackson, J., and Fleischer, R. C. 2002. mtDNA from fossils reveals a radiation of Hawaiian geese recently derived from the Canada Goose (*Branta canadensis*). Proc. Natl. Acad. Sci. 99:1399–1404.

Prevett, J. P., and Prevett, L. S. 1973. Egg retrieval by Blue Geese. Auk 90:202–204.

Rylander, K. 2002. The Behavior of Texas Birds: A Field Companion. Univ. Tex. Press, Austin.

Smith, J. D. 1952. The Hawaiian Goose (Nene) restoration program. J. Wildlife Mgmt. 16:1–9.

U.S. Fish and Wildlife Service. 1967. Endangered Species List—1967. Federal Register 32:4001.

Accepted 24 November 2008

Hawaiian Goose (Nēnē)

Sketch by Narca Moore-Craig

BOOK REVIEWS

Identification Guide to North American Birds, Part 2 by Peter Pyle, with S. N. G. Howell, Siobhan Ruck, and David F. DeSante. 2008. Slate Creek Press. 836 pages, illustrated. Paperback, $62.38, ISBN 9780961894047. Order online from www.slatecreekpress.com/order_us.htm.

Prior to writing this review, I asked a number of active banders whether they would be willing to review Part 2 of Peter Pyle's vast ornithological fact-swamp. Each of them scuttled rapidly away muttering about being asked to review the Bible. A technical review of Part 2 from a bander's perspective is neither appropriate nor feasible for *Western Birds*. Most of our readers are more interested in what aspects of the book are likely to be of use to them in the field, rather than for examining birds in the hand.

The Pyle guides are sometimes treated as though they are conceptually unique and have no ancestry. In fact, they are part of a long natural progression in American ornithology and have a few ancestors worth mentioning. If we think of Pyle guides as equivalent to the compact edition of the Oxford English Dictionary, we should look back to the full-length predecessors. The most important of these are the 11-volume *Birds of North and Middle America* by Robert Ridgway and Herbert Friedmann (1901–1950) and the two-volume fifth edition of *Key to North American Birds* by Elliott Coues (1903).

However, there are precursors in the "compact" realm as well, the best of which might be Thomas S. Roberts' *Manual for the Identification of the Birds of Minnesota and Neighboring States*, which first appeared as part of his two-volume *Birds of Minnesota* and was issued in 1932 (with reprints through at least 1974) as a single volume on its own. Portable books serving a similar field-reference function in the early 20th century include such standards as Frank M. Chapman's *Handbook of Birds of Eastern North America* and Florence M. Bailey's *Handbook of Birds of the Western United States,* both of which went through several revisions.

It is important to note what the Pyle guides really are: compact, portable encyclopedias. A good encyclopedia provides a condensed version of complex information in a form understandable to a nonspecialist and refers interested people to additional sources. If we take this definition as our basic standard for the Pyle guides, they succeed admirably as compact, portable, and condensed. Owing to their profound suffusion with banding terminology and a debilitating load of abbreviations they are only partly successful as understandable to nonspecialists; in short, they require study. They are superb as a source of further information on identification, being in effect the best bibliography for North American identification issues.

People who study birds of the American West for fun or in a professional setting deal with exceptional complexity and subtlety on a regular basis. Anyone who gets beyond his back-yard feeder comes face-to-bill with things that don't appear in basic field guides almost immediately. In midsummer there will be juvenile sparrows not far beyond the back fence. At the lake will be collections of overlapping terns and clumps of gulls whose so-called plumage would seem evidence of some epic natural disaster were it not for the fact that *all* of them look that way, with subtle differences. At the park will be waterfowl that seem to have dipped themselves in something to leach all of their field marks to a ghastly brown mush. The *Empidonax* sitting on the mailbox speaks for itself.

Yet all of these birds have something in common. They have details, especially structural details, that allow almost all of them to be identified by a patient observer. I must emphasize the words "patient" and "observer," for it is for such people that the Pyle guides are intended. The Pyle guides are field *references*, not field guides. If you try to use them in the hand while the bird is still flitting 20 yards away, you are already in deep trouble. They don't work that way.

Pyle rewards the observer who does what the best observers have always done: obtain as many details as possible in the field. This can be done by note-taking, photography, or surreptitiously grabbing the odd feather that spirals down when the bird flies across a river for good.

When you have in hand all possible details about a bird you see, part 1 (1997) or part 2 is what you may need, particularly if you are observing juvenile terns or other difficult groups of birds. The gull section, to which Steve Howell made significant contributions, is in effect a pocket version of much useful information from *Gulls of the Americas* (S. N. G. Howell and J. Dunn, 2007, reviewed in *Western Birds* 39:47–50) and might almost be copied and kept in the glove compartment for convenient access. It is certainly one of the sections that will be most often used by nonbanders. The terns and alcids are an underappreciated identification challenge, and their treatment in part 2 is among the best and most easily usable in any guide.

A few things could be better. Part 2 is very similar to part 1, in one respect too similar: the publisher would have done users of both a kindness by making part 2 bunting blue or goldfinch yellow instead of gold-on-black, identical to Part 1. As in part 1, the references, a section of the book to which many users refer quite often, are printed in a typeface that ought to be a felony, brutally small and painful to read.

Part 2 has a fair number of typos, e.g., mislabeling the drawing of an Eared Grebe face as Horned Grebe, as well as misspellings. Given the mass of text, some such errors are inevitable. I surmise that any of these that have a bearing on part 2's utility will be corrected on the publisher's web site in the same way as such errors in part 1 were handled.

Part 2 has considerable line art, which is a mixed bag, ranging from excellent (molt limits, loons, egret feet, Soras, gulls, terns, puffin faces) to rather dubious (most sandpipers, large tern heads). The unevenness in the art is too bad, partly because the drawings will get heavy use from nonbanders and partly because some users will not be sure which drawings are exact and which are not. In some cases (e.g., Dunlin/Curlew Sandpiper) heads are too large for bills, while in others (e.g., other peep heads and bills) the reverse is true: bills are attached to micro-heads. This mish-mash is distracting and confusing. My own banding experience was mostly with peeps, and this kind of drawing is not sufficient.

Some really useful drawings include the underwings of snipes. Their utility may not be immediately apparent to nonbanders, but note that Oregon has recently recorded two Jack Snipes, on the basis of birds shot by hunters. Excellent photographs are available, and one of the specimens has been preserved. If a Common Snipe from Asia has to be distinguished from Wilson's Snipe, Pyle part 2 is ready.

The dedication and sheer brute doggedness required to produce a book like this reaches the far limits of what can be expected of anyone, and the fact that we who work with and enjoy birds have the privilege of living in the era of Peter Pyle and seeing these guides come into use is something that we must never take for granted.

Alan Contreras

Field Guide to Owls of California and the West, by Hans Peeters. 2007. California Natural History Guide No. 93, University of California Press. 326 pages, profusely illustrated with photos and art. $50.00 hardcover,$19.95 paperback. ISBN 978-0-520-25280-6

This fat little guide is one of the finest works of natural history that I have read in years. I can say "read," not merely referred to (or worse: utilized), because it is not only as fact-laden as most utilizers might want, it is written almost as a work of literature and can be read for pleasure. Before all of you hard-science types creep off to digest the molt limits in Peter Pyle's new guide rather than risk the shoal waters of "read-able" bird books, note that Peeters' new owl guide is exceptionally well-referenced (the citation list takes 24 pages) and can serve as a resource as well as a read.

The best natural-history writing typically includes three features. It is based on accurately recorded personal observation over time, it demonstrates familiarity with the literature related to the subject, and it shows good writing ability. Many books manage two out of three; *Field Guide to Owls* showcases all three at an exceptionally high level. The tradition of bird books that serve as serious references as well as works of art represented the norm, or at least a fairly common, respected format in the 19th and early 20th century, falling somewhat out of fashion as ornithology became more the province of professionals and technicians. We have some good examples, however, in the works of Margaret Morse Nice, Kevin Zimmer, John Janovy, Ralph Hoffmann, Ted Floyd, Ned Brinkley, and others.

Field Guide to Owls is divided about evenly between an extensive section on owls as a biological category, with examples of what they are like and what they do, and well-illustrated species accounts. My personal need is for a book that is a bit heavier on species accounts and lighter on the generic information, yet the latter is so well written and illustrated and contains so much of real interest (plenty of "I didn't know that") that I could hardly recommend that such material be cut. It is, in short, as good a balance as we are likely to see. Although much of the content is natural history in the biological sense, there are many interesting and humorous asides, for example, the Great Horned Owl trained for falconry that turned out, when hunting in the wild, to have a strong preference for Western Toads.

The illustrations are top-level, almost without exception, and there are hundreds of them. The owl photos are as good as any I know. The author's full-page paintings of owls in this guide are unsurpassed and rarely equaled in any book I have seen. They easily stand comparison to those of Fuertes, Sutton, Tunnicliffe, Liljefors, or McQueen. There are also many small, intricate, pristine illuminations (the word "illustrations" hardly does them justice) of such things as talons, feathers, pellets, and disappearing mice. This is the work of a master, based on a lifetime of study and practice.

The art is quite varied in subject, and the photos are not without humor: one shows a supposedly fledged Northern Pygmy-Owl dangling upside down by one foot, having found flight something of a challenge. A plate showing size comparisons of all the owls lined up next to each other is a simple idea that I found surprisingly useful. We almost never get to see owls, unlike many other kinds of birds, near each other or even one species right after another.

The only sour note in this book is the distribution maps, which range from adequate to bad. They are made rather casually, unlike everything else in the book, and should not be considered accurate, at least for the Pacific Northwest, the region with which I am most familiar. This is an unfortunate aspect, but in fact good maps are very time-consuming (and therefore expensive) to produce, and most bird books have at least some that are pretty dubious. I know from my own experience working on three books featuring maps that issues of both accurate content and technical presentation are very significant. Making accurate maps is a massive undertaking, and in the case of these owl species, maps are not of much importance.

For some species, such as the Long-eared Owl, a map is very hard to produce no matter how much energy is spent on it. The data are simply too limited, contradictory, or murky, plagued by the question of level of scale, and spatial distribution is an issue only locally. For others, such as the Northern Saw-Whet or Snowy, a static representation such as a map displays what is *least* interesting about the species' spatial characteristics; the most interesting aspects are the movements. These movements, to the extent that they are known, are adequately presented in the text. I would have liked to have seen more information on the migratory movements of species for which significant data are available, for example, the exceptional flights of Saw-whets banded at Boise Ridge, Idaho, in some years.

The book's title says "California and the West" but that means simply that a lot of the examples, including a fair chunk of the habitat-use data, relate substantially to California situations. However, I found the information, except the maps, to be quite accurate or easily convertible to what I know or want to know about owls in my region. I suspect that the same would be true for other parts of the West.

In terms of detail and technical information, this book is a notch below such definitive portable family studies as *Warblers* (Dunn and Garrett, 1997) or shoulder-straining references like *Pipits and Wagtails* (Alstrom and Mild, 2003). It is what it says it is, a natural-history guide, not a technical reference. It shows, however, just how superb a true natural-history guide can be as both science and art, and establishes a standard to which other writers might profitably aspire. It is a standard that few will ever reach.

Alan Contreras

Short-eared Owl

Sketch by Narca Moore-Craig

FEATURED PHOTO

FIRST RECORD OF THE VARIEGATED FLYCATCHER FOR WESTERN NORTH AMERICA

STEVEN G. MLODINOW, Puget Sound Bird Observatory, 5501 17th Ave NE, Seattle, Washington 98105; SGMlod@aol.com

DAVID S. IRONS, 2125 Hayes Street, Eugene, Oregon 97405; llsdirons@msn.com

Late in the afternoon of 6 September 2008, Mike and MerryLynn Denny found and photographed a bird in southeastern Washington that they suspected was a Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*). The bird was along the Snake River at Windust Park, Franklin County, close to where we happened to be spending the night. The Dennys quickly posted news of their discovery to birding list-servers for Washington and Oregon, including links to photographs of the bird. We were able to view those photos from our hotel as well as to receive an e-mail from Charlie Wright outlining why the photographed bird was a Variegated Flycatcher (*Empidonomus varius*), not a Sulphur-bellied or a Piratic Flycatcher (*Legatus leucophaius*).

We arrived at Windust Park at 07:00 on 7 September, shortly after sunrise, finding no other birders at the park. About 20 minutes later, we found the bird where it had last been seen the previous afternoon, in trees behind a house adjacent to the park. Beyond several trees reaching a height of approximately 15 meters, only disturbed grassland and lawn surrounded the house. For the first 20 to 30 minutes, when the sun angle was still low, the bird was flycatching from exposed branches about 5 meters above the ground in one of the taller trees. As the temperature rose, it began foraging from exposed branches nearer the tree's crown. It also came to the ground to drink from a puddle, less than 5 meters from us. About an hour later, it behaved oddly, perching for 10 minutes on the lip of a white bucket on an open lawn, allowing photographers to approach closely. By 09:00, approximately a dozen observers had gathered, and the bird moved into the more heavily wooded park, where it spent most of the remainder of the day. It was last seen back near the house at sunset.

The characteristics distinguishing this bird from the Sulphur-bellied and Piratic Flycatchers were readily apparent. It was distinctly smaller than a Sulphur-bellied Flycatcher and too large for a Piratic: it was noticeably larger than nearby House Finches (*Carpodacus mexicanus*) and obviously smaller than nearby American Robins (*Turdus migratorius*). Its size was more akin to that of a Cedar Waxwing (*Bombycilla cedrorum*), although it seemed a bit larger than that species. Its bill was moderately stout, larger than that of a Piratic Flycatcher but distinctly smaller than that of a Sulphur-bellied (see photos on this issue's back cover). Its extensively rusty tail (see top photo on back cover) was more typical of the Sulphur-bellied and Variegated Flycatchers, but some immature Piratic Flycatchers show substantial rust on the tail (J. V. Remsen pers. comm.). The rusty rump with large dusky streaks, however, was a trait not seen in the Piratic. Finally, the solidly dark crown and auriculars combined with a more diffuse malar stripe (see bottom photo on back cover) were consistent with the Variegated Flycatcher and eliminated the other two species. Two other species also deserve mention: the Streaked Flycatcher (*Myiodynastes luteiventris*) and Crowned Slaty Flycatcher (*Griseotyrannus aurantioatrocristatus*). The Streaked Flycatcher was eliminated by the same marks that ruled out the Sulphur-bellied. Juvenile Crowned Slaty Flycatchers bear some resemblance to the Variegated Flycatcher but lack the Variegated's densely streaked underparts and malar stripe and have unstreaked upperparts (Schulenberg et al. 2008).

The Variegated Flycatcher inhabits most of South America east of the Andes, where it occupies a variety of habitats from humid forest canopy to shrubby clearings with scattered trees (AOU 1998, Hilty 2003). *Empidonomus varius* consists of two subspecies, the more northern *E. v. rufinus* and the more southern *E. v. varius*, which is migratory and winters north to Colombia, Venezuela, the Guianas, and rarely Trinidad during the austral winter (AOU 1998). Austral migrants are present in Venezuela mostly from mid-March to mid-September and Colombia from March to August (Hilty and Brown 1986, Hilty 2003).

Prior to its appearance in southeastern Washington, the Variegated Flycatcher had been recorded only three times north of the range described above (A.O.U. 1998, Pranty et al. 2008): Biddeford Pool, York County, Maine, 5–11 November 1977 (Abbott and Finch 1978), near Reelfoot Lake, Obion County, Tennessee, 13–15 May 1984 (Nicholson and Steadman 1988), and at Toronto, Ontario, 7 October–6 November 1993 (Houle and Houle 1993). Note that a bird reported as a Variegated Flycatcher on Garden Key, Dry Tortugas, Florida, 15 March 1991 (Bradbury 1992) later proved to be a Piratic Flycatcher (Pranty et al. 2008).

Empidonomus v. rufinus differs from nominate *varius* "by inferior size; smaller bill; paler (brownish rather than blackish) spotting above, with the margins of the feathers lighter olivaceous; and less pronounced, also more restricted streaking underneath" (Hellmayr 1927:113); "streaking below more clouded, less distinct than in *varius*" (Hilty and Brown 1986:517). None of the Variegated Flycatchers in North America have been identified to race (B. Pranty pers. comm.). Recent study by T. Chesser (in litt.) of specimens of *varius* and *rufinus* confirms the validity of these marks and finds that *varius* is longer winged. There is overlap in bill length and wing length, however, enough so that these characters cannot be used to identify a bird from a photograph; also, evaluation of underpart streaking and back color are highly dependent on lighting (see this issue's back cover and Figure 1), making identification based on photos difficult. The photographs of the Washington Variegated Flycatcher suggest that it is *varius*, largely on the basis of the extent of streaking below, but are not diagnostic (T. Chesser in litt.).

We suspect that the migratory race, *varius*, is the more likely to reach North America, paralleling the pattern of vagrancy of the Fork-tailed Flycatcher (*Tyrannus savana*). Most records of the Fork-tailed Flycatcher from the United States and Canada are of the highly migratory subspecies of southern South America, *T. s. savana*, rather than the Middle American *T. s. monachus* (McCaskie and Patten 1994). Presumably, as with *T. s. savana*, the fall (austral spring) records of the Variegated Flycatcher in North America represent birds that spent the austral winter in their usual range but then migrated north rather than south with the onset of the austral spring.

The Variegated Flycatcher in Washington was a first-year bird, as evidenced by a juvenile outer rectrix (see Figure 1). It also has a worn tertial (see bottom photo on back cover), suggesting retained juvenile plumage. The great majority of Fork-tailed Flycatchers found in the United States and Canada have also been first-year birds (McCaskie and Patten 1994).

The Variegated, Sulphur-bellied, Piratic, Streaked, and Crowned Slaty Flycatchers all have populations that are highly migratory. The Sulphur-bellied breeds north to southeastern Arizona, Chihuahua, and Tamaulipas (AOU 1998). The Piratic breeds nearly as far north, reaching San Luis Potosí and Veracruz, but in Mexico its breeding range is limited to the eastern slope of the Sierra Madre Oriental (AOU 1998). The Sulphur-bellied has wandered as far northeast as southern Ontario, 28 September–1 October 1986 (James 1991), and New Brunswick, 14–15 October 1990 (Christie et al. 2004). Northward vagrancy of the Sulphur-bellied in western North America is relatively infrequent, with no records from Oregon and Washington and only 15 for California, north to Humboldt County, all but one of which are for September and October (Hamilton et al. 2007, Glover et al. 2007). The Piratic Flycatcher has been recorded north of Mexico seven times, with six records from New Mexico or Texas and one from Florida (Pranty et al. 2008). Four of these records are for September

Figure 1. Variegated Flycatcher at Windust Park, Franklin County, Washington, on 7 September 2008. Note the juvenile outer rectrix projecting outward.

and October, three for March and April (Pranty et al. 2008). The Streaked Flycatcher is a migratory species that ranges from northeastern Mexico to Argentina (Howell and Webb 1995), and the Crowned Slaty Flycatcher is an austral migrant that breeds south of the Amazon River from eastern Brazil and northern Bolivia to central Argentina and Uruguay and winters north to southern Venezuela and Colombia (Hilty 2003). The Streaked Flycatcher has yet to be recorded north of Mexico, but a Crowned Slaty Flycatcher was collected in Cameron Parish, Louisiana, on 3 June 2008 (Conover and Myers 2009).

The discovery of a Variegated Flycatcher in Washington serves as a good reminder that when a vagrant could be one of several related species or subspecies, the one breeding the nearest is not necessarily the most likely. For instance, note that at latitudes of 42° N or higher, the Variegated Flycatcher has been recorded more often than the Sulphur-bellied.

We thank Mike and MerryLynn Denny not only for finding this spectacular bird but also for promptly placing photos of it on the Internet. Many thanks to Charlie Wright for rapidly providing its identification, and to J. V. Remsen and Alvaro Jaramillo for furnishing further input on identification and for reviewing and improving the manuscript. Terry Chesser was generous in sharing his knowledge of the Variegated

Flycatcher's subspecies. We greatly appreciate Bill Pranty allowing us access to the most recent American Birding Association Checklist before its publication, and we also owe a debt of thanks to Peter Pyle and Dennis Paulson for their input on this bird's molt state and age, and to Buford Myers and Paul Conover for informing us of the Crowned Slaty Flycatcher in Louisiana.

LITERATURE CITED

Abbott, D. J., and Finch, D. W. 1978. First Variegated Flycatcher (*Empidonomus varius*) record for the United States. Am. Birds 32:161–163

American Ornithologists' Union. 1998. Check-list of North American Birds, 7th ed. Am. Ornithol. Union, Lawrence, KS.

Bradbury, R. C. 1992. First Florida record of Variegated Flycatcher (*Empidonomus varius*) at Garden Key, Dry Tortugas. Florida Field Nat. 20:42–44.

Christie, D. S., Dalzell, D. E., David, M., Doiron, R., Gibson, D. G., Lushington, M. H., Pearce, P. A., Tingley, S. I., and Wilson, J. 2004. Birds of New Brunswick: An annotated list. New Brunswick Mus., St. John, NB.

Conover, P. E., and Myers, B. M. 2009. First United States record of Crowned Slaty Flycatcher (*Empidonomus aurantioatrocristatus*) from Louisiana. N. Am. Birds 62(4): in press.

Glover, S. A., Pandolfino, E., Terrill, S. B., and Rogers, M. M. 2007. Northern California region. N. Am. Birds 62:144–149.

Hamilton, R. A., Patten, M. A., and Erickson, R. A., eds. 2007. Rare Birds of California. W. Field Ornithol., Camarillo, CA.

Hellmayr, C. E. 1927. Catalogue of the birds of the Americas and the adjacent islands. Field Mus. Nat. Hist Zool. Ser. 13 (5).

Hilty, S. L. 2003. Birds of Venezuela, 2nd ed. Princeton Univ. Press, Princeton, NJ.

Hilty, S. L., and Brown, W. L. 1986. A Guide to the Birds of Colombia. Princeton Univ. Press, Princeton, NJ.

Houle, D., and Houle, J. 1993. First record of Variegated Flycatcher for Canada. Birders' Journal 2:291–300.

Howell, S. N. G., and Webb, S. 1995. A Guide to the Birds of Mexico and Northern Central America. Oxford Univ. Press, Oxford, England.

James, R. D. 1991. Annotated Checklist of the Birds of Ontario, 2nd ed. Royal Ontario Mus., Toronto.

Jaramillo, A. 2003. Birds of Chile. Princeton Univ. Press, Princeton, NJ.

McCaskie, G., and Patten, M. A. 1994. Status of the Fork-tailed Flycatcher (*Tyrannus savana*) in the United States. W. Birds 25:113–127.

Nicholson, C. P., and Steadman, S. J. 1988. The official list of Tennessee birds, addendum I. Migrant 59:14.

Pranty, B., Dunn, J. L., Heinl, S. C., Kratter, A. W., Lehman, P. E., Lockwood, M. W., Mactavish, B., and Zimmer, K. J. 2008. ABA Checklist: Birds of the ABA Checklist Area. Am. Birding Assoc., Colorado Springs, CO.

Schulenberg, T. S., Lane, D. F., O'Neill, J. P., and Stotz, D. F. 2008. Field identification of juvenile *Empidonomus* tyrants. Neotropical Birding 3:31–36.

WESTERN BIRDS

World Wide Web site:
www.westernfieldornithologists.org

Quarterly Journal of Western Field Ornithologists

Membership dues, for individuals and institutions, including subscription to *Western Birds*: Patron, $1000.00; Life, $600 (payable in four equal annual installments); Supporting, $75 annually; Contributing, $50 annually; Family $40; Regular U.S. $35 for one year, $60 for two years, $85 for three years. Dues and contributions are tax-deductible to the extent allowed by law.

Send membership dues, changes of address, correspondence regarding missing issues, and orders for back issues and special publications to the Treasurer. Make checks payable to Western Field Ornithologists.

BACK ISSUES OF *WESTERN BIRDS* WITHIN U.S. $40 PER VOLUME, $10 FOR SINGLE ISSUES, INCLUDING SHIPPING AND HANDLING. OUTSIDE THE U.S. $55 PER VOLUME, $15 FOR SINGLE ISSUES, INCLUDING SHIPPING AND HANDLING.

The California Bird Records Committee of Western Field Ornithologists revised its 10-column Field List of California Birds in July 2005. The last list covered 613 accepted species; the new list covers 630 species. Please send orders to WFO, c/o Robbie Fischer, Treasurer, 1359 Solano Drive, Pacifica, CA 94044. California addresses please add 8.25% sales tax.
Quantity: 1–9, $1.50 each, includes shipping and handling; 10–39, $1.30 each, add $2.00 for shipping and handling; 40 or more, $1.15 each, add $4.00 for shipping and handling.

Published March 1, 2009 ISSN 0045-3897