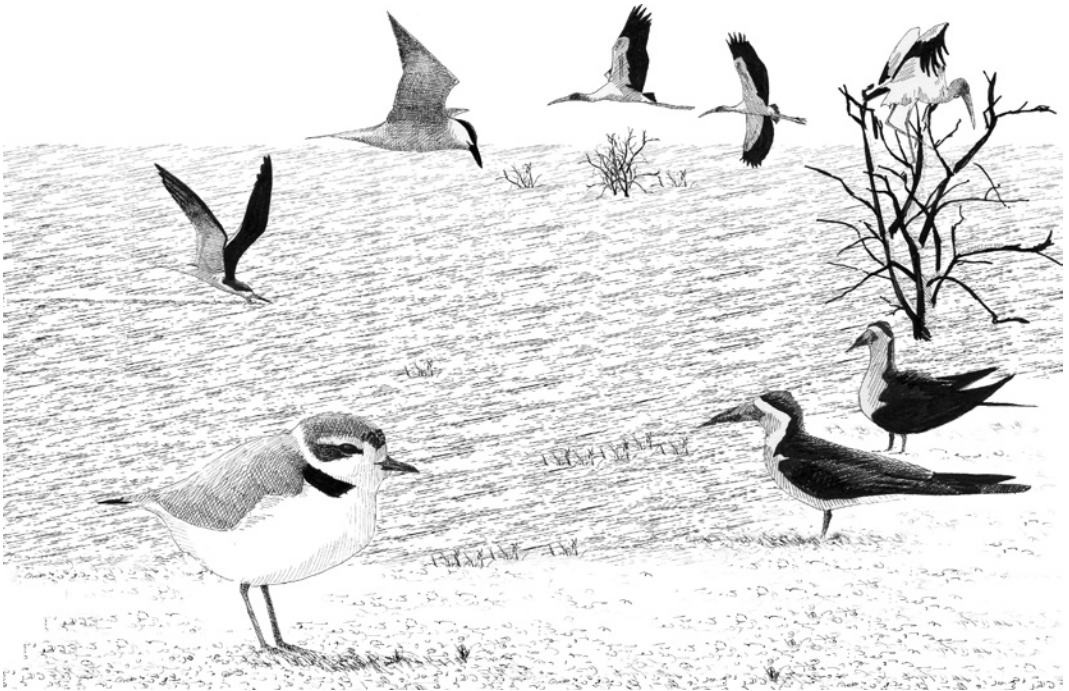


## II

---

# SPECIES ACCOUNTS

---



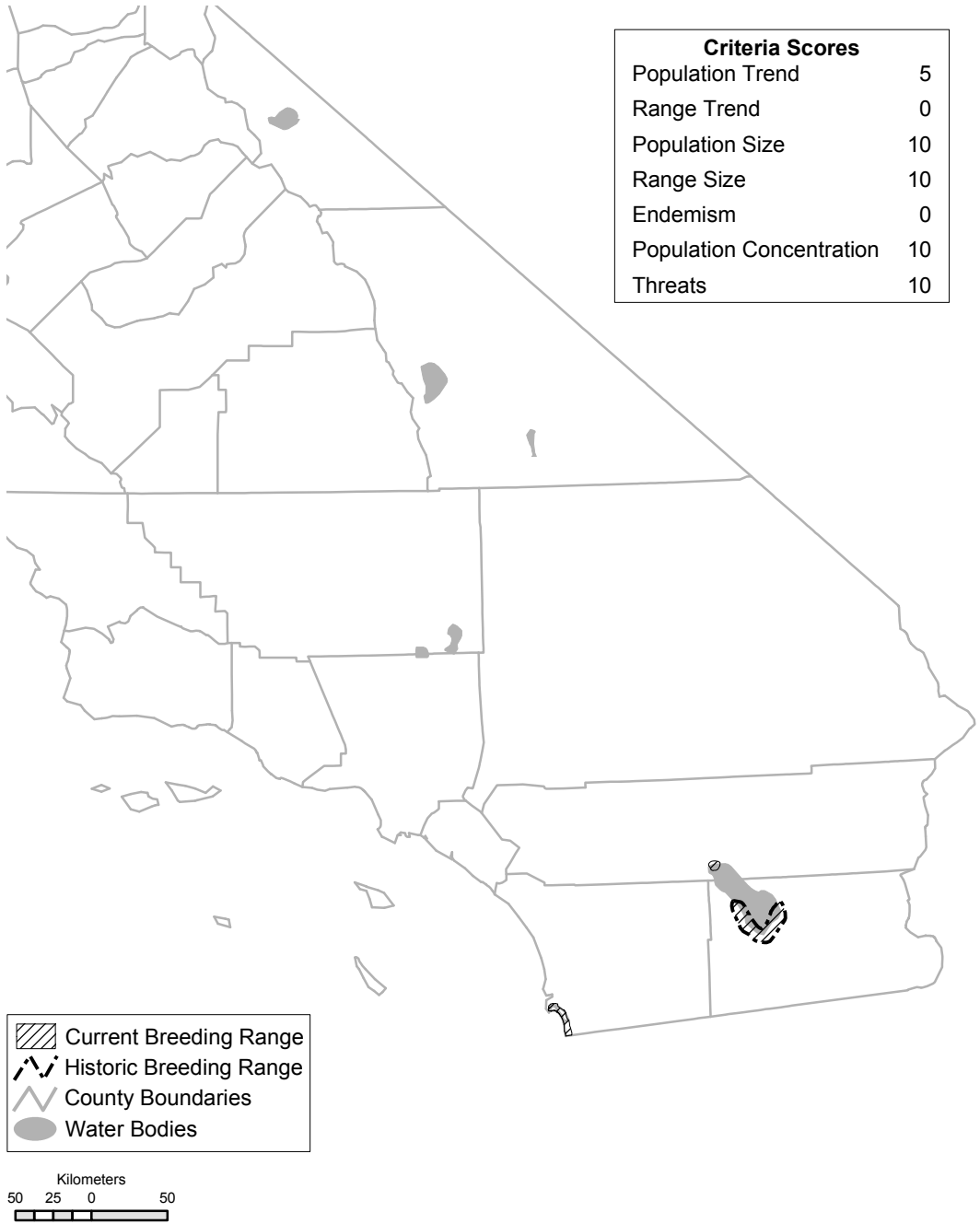
*Andy Birch*

**PDF of Gull-billed Tern account from:**

Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

# GULL-BILLED TERN (*Gelochelidon nilotica*)

KATHY C. MOLINA



Current and historic (ca. 1944) breeding range of the Gull-billed Tern in California. Numbers of breeding pairs have declined, but the first colony at the Salton Sea (1920s) was augmented by a second at San Diego Bay (1986).

**SPECIAL CONCERN PRIORITY**

Currently considered a Bird Species of Special Concern (breeding), priority 3. Included on the list since its inception (Remsen 1978, 2nd priority; CDFG 1992).

**BREEDING BIRD SURVEY STATISTICS FOR CALIFORNIA**

Data are inadequate for trend assessment (Sauer et al. 2005).

**GENERAL RANGE AND ABUNDANCE**

Cosmopolitan species with a global population of about 55,000 pairs breeding at highly localized colonies (Gochfeld and Burger 1996). Three (possibly four) subspecies in the Old World, two (possibly three) in the New World; none considered to be very abundant (Parnell et al. 1995, Gochfeld and Burger 1996).

In the New World, *G. n. vanrossemi* breeds locally in southern California (Parnell et al. 1995) south to Baja California Norte (Molina and Garrett 2001, Palacios and Mellink 1993) and Baja California Sur, Mexico (Danemann and Carmona 2000), and very locally along the west coast of Mexico (AOU 1957, 1998) from northern Sinaloa to Nayarit and Colima (Palacios and Mellink 2003). Although the tern is suspected of having nested in Sonora (van Rossem 1945), colony locations have not been documented there (Russell and Monson 1998). The size of the *vanrossemi* population is estimated to be 600–700 pairs (Molina 2000, Molina and Erwin 2006). *Vanrossemi* winters in small numbers in the Colorado River delta in the northern Gulf of California, and locally along the west coast of Mexico, from southern Sonora south to Nayarit and Oaxaca (Binford 1989, J. Engel pers. comm.), and perhaps to Honduras and Costa Rica. Subspecific identity of local, poorly documented breeding populations in northwestern South America is unclear, but may represent *vanrossemi* (Marchant 1958) or *G. n. aranea* (Blake 1977). *G. n. aranea* breeds locally along the Atlantic and Gulf coasts of the United States and in the Caribbean, and winters long the Atlantic coast occasionally from North Carolina but more regularly from southwestern Florida across the Gulf coast to Mexico (Parnell et al. 1995). Estimates of this population range from about 3000 to 4000 pairs (Parnell et al. 1995, Molina and Erwin 2006).

*Vanrossemi*, described from Salton Sea specimens by Bancroft (1929), differs from *aranea* in

certain measurements. Grinnell and Miller (1944) did not recognize *vanrossemi*, but the AOU (1957) did; a rigorous analysis of geographical variation in this species is needed using the range of classical and modern techniques.

**SEASONAL STATUS IN CALIFORNIA**

Occurs primarily as a summer resident, arriving early to mid-March and departing by mid-September (Parnell et al. 1995, Patten et al. 2003); breeds from mid-April (Molina unpubl. data) to late July (Parnell et al. 1995). Very rarely occurs as a winter visitor (Garrett and Dunn 1981, Patten et al. 2003).

**HISTORIC RANGE AND ABUNDANCE IN CALIFORNIA**

Grinnell and Miller (1944) considered the Gull-billed Tern a summer visitant in the extreme southeastern part of state. They knew of only one breeding colony, which was established on small sandy islets at the southeast end of the Salton Sea and contained about 500 pairs in 1927. On the basis of anecdotal evidence, the colony was thought to have been active since about 1920 (Pemberton 1927). Population declines were evident during the 1930s; by 1942, the Salton Sea population had decreased to 100–200 pairs (L. C. Goldman, written notes in Salton Sea NWR files).

**RECENT RANGE AND ABUNDANCE IN CALIFORNIA**

As a breeding visitor to the Salton Sea in Imperial and Riverside counties, the Gull-billed Tern continued to decline in abundance through the 1980s. However, there has been a slight increase in its breeding range, which now includes a small coastal colony in San Diego Bay (see map). Despite the species' historical decline at the Salton Sea, reports in *Audubon Field Notes/American Birds* indicate that Gull-billed Terns continued to breed there, but with less regularity and with further substantial decreases in population size from the 1950s through 1980s. The best estimates reported in *Audubon Field Notes/American Birds* for each decade during this period were nearly 50 pairs in 1959 (AFN 13:455), 11 pairs in 1961 (AFN 15:493), up to 40 pairs in 1974 (AB 28:949), and up to 75 pairs in 1986 (AB 40:1255). Although these reports are by no means the result of focused surveys of Gull-billed Terns, the extensive attention and coverage the Salton Sea received from the 1960s through the 1980s suggests that these

trends probably track the population there fairly accurately. In 1986, one pair colonized the salt works in south San Diego Bay, establishing a second breeding location for the state. By 1989, the population at San Diego had increased to six pairs (AB 43:1368). Since then, numbers in San Diego have fluctuated from 30 pairs in 1992 to just 8–16 pairs between 1993 and 1999 (R. Patton unpubl. data). During the 2000s, the population size has increased and become more stable at 24–40 pairs (R. Patton unpubl. data). From 1992 through 2004 (excluding 1996, when data are unavailable for San Diego), the mean number of pairs breeding at the Salton Sea, south San Diego Bay, and at both sites combined were, respectively, 114 pairs (SD = 28, range = 65–155 pairs; Molina 2004), 22 pairs (SD = 12, range = 8–40 pairs; Patton 1999, unpubl. data), and 136 pairs (SD = 31, range = 82–190 pairs).

### ECOLOGICAL REQUIREMENTS

Most studies of nesting habitat selection, diet, and foraging behavior of the Gull-billed Tern have been conducted in Europe (Moller 1981, Fasola and Canova 1992). In North America, quantitative studies on breeding habitat use and colony-site dynamics exist primarily for Atlantic coast populations (Erwin 1980, Erwin et al. 1998). At the Salton Sea, from 1991 to 2001, this tern more consistently established colonies on small islands in a managed impoundment than at three other nearshore island sites (Molina 2004). The Gull-billed Tern is less faithful to nest sites after large-scale disturbances (Erwin et al. 1998) and may be less tolerant of colony intrusion than are other tern species (Parnell et al. 1995).

In California, the Gull-billed Tern requires isolated nesting habitat, including small, bare islets of fine clay within impoundments at the Salton Sea or isolated sections of earthen levees at the salt works in south San Diego Bay (Parnell et al. 1995). Vegetation, when present, is sparse. Unlike the California Least Tern (*Sternula antillarum browni*), but similar to other species of terns breeding in the state, it does not use beach strand, dune, or other shoreline habitats for nesting. Colonies are usually associated with shallow wetland areas and bays. Nests range from simple bare scrapes to those with more elaborate nest rims and linings composed of bits of vegetation, gravel, small bones, or dried flakes of silt (Parnell et al. 1995, Molina pers. obs.).

Opportunistic feeders with a broad diet, Gull-billed Terns forage along inshore marine habitats

such as the edges of shallow embayments, exposed or shallowly flooded mudflats, the surf line of sandy beaches, beach strands and dunes, tidal flats, and freshwater drainages and canals, and over agricultural fields and scrub habitats (Parnell et al. 1995). Their diet at the Salton Sea consists of small fish (particularly juvenile *Tilapia* and *Bairdiella*; Molina 2000), a variety of insects (crickets and grasshoppers; Orange Sulphurs, *Colias eurytheme*; dragonflies; and occasionally cicadas), Side-blotched Lizards (*Uta stansburiana*), and crayfish (*Procambarus* spp.; Parnell et al. 1995). At San Diego Bay, Molina and Marschalek (2003) reported Mole Crabs (*Emerita analoga*), small fish, and Side-blotched Lizards to be, in descending order, the most frequent prey items delivered to chicks. Less frequently taken were the very young chicks of the Least Tern, Snowy Plover (*Charadrius alexandrinus*), Killdeer (*C. vociferus*), and Black-necked Stilt (*Himantopus mexicanus*). At the Salton Sea, the stilt is the only one of these three species taken, though despite its abundance and frequent nesting association with Gull-billed Terns it is observed only rarely in the tern's diet (Molina unpubl. data).

### THREATS

A potential future threat to the state's largest breeding population at the Salton Sea is the loss of the few suitably isolated nesting habitats, which are primarily located in the south end, to receding water levels, connecting them to the mainland (Molina 2004). The expected diminution of freshwater and agricultural inflows to the sea will likely reduce the extent and quality of the brackish and saline shallows over which the tern forages. Such diminished supplies of water within the extensive network of smaller drains feeding the Salton Sea will likely also adversely affect important prey populations that occupy those habitats. Continued decreases in the extent of irrigated farmlands near the Salton Sea in the Imperial Valley and changes in the spatial distribution of such lands may adversely affect important foraging areas (Molina and Shuford 2004, Molina and Erwin 2006). Proposed habitat restoration in south San Diego Bay, which may include the conversion of some or all of existing nesting and foraging habitats at the salt works to salt marsh with a more natural tidal regime, may also adversely affect the population there (R. Patton pers. comm.).

Because of the Gull-billed Tern's low tolerance for disturbances and high susceptibility to terrestrial predators, the proximity of colonies to

populations of feral and domestic pets accompanying areas of dense human population, particularly apparent at south San Diego Bay, potentially threatens reproductive success (R. Patton pers. comm.). Repeated disturbance to breeding colonies as a result of human intrusion can have deleterious effects on seabird productivity and colony site fidelity (Carney and Sydeman 1999); such disturbance by recreationists, researchers, and others would be a threat to California colonies (R. Patton pers. comm., Molina pers. obs.).

Because the diet of Gull-billed Terns can consist in part of young chicks of various charadriiform birds, including federally listed Snowy Plovers and Least Terns, the U.S. Fish and Wildlife Service has implemented the lethal control of Gull-billed Tern adults in south San Diego Bay in recent years. But little information exists regarding population-level effects of such predation on the state's listed populations of these two species. Keane (2001), however, indicated that known losses of Least Tern reproductive effort caused by Gull-billed Terns in San Diego County in 1999 were less than 1%, suggesting that impacts of such predation were minimal. Seven adult Gull-billed Terns were lethally removed between 1992 and 1995 (R. Patton in litt.; fide J. Turman, Wildlife Services files) while presumably foraging over nesting areas of the two listed species. The stomachs and crops of two of the five birds that were deposited with the San Diego Natural History Museum contained only Side-blotched Lizards; the stomachs of the remaining three were not examined (P. Unitt pers. comm.), nor apparently were those of the two that were not deposited in ornithological collections. Although a moratorium on the lethal control of Gull-billed Terns is presently in effect, its reactivation or the implementation of other efforts (e.g., the removal of nests) to limit the population around south San Diego Bay potentially threatens the existence of this species as a breeder in one of the state's two colony locations. Additional lethal control of adult Gull-billed Terns as a result of a perceived aircraft strike hazard occurred in 2004, when two birds were taken at North Island Least Tern and plover colonies (T. Conkle, U.S. Navy, in litt.). One of these birds was deposited with the San Diego Natural History Museum; its stomach contained only insect remains (P. Unitt pers. comm.).

Although levels of selected contaminants in a small sample of eggs from the Salton Sea and San Diego Bay were below those thought to cause obvious reproductive impairment, they were still of conservation concern (USFWS 1995, Audet et

al. 1997). Exposure to upstream chemical use, oil spills, and urban and industrial wastes at either San Diego Bay or the Salton Sea may pose additional potential threats to the terns' upland and aquatic foraging habitats.

## MANAGEMENT AND RESEARCH RECOMMENDATIONS

- Ensure in the long term that sufficient amounts of suitable nesting and foraging habitats are provided for in the restoration plans for the Salton Sea and south San Diego Bay. Protect and maintain all existing nesting habitat; modify existing nesting habitat to enhance substrate and isolation from terrestrial predators and human intruders where feasible. Enhancements include the augmentation of silty nesting substrates with sand/fine gravel mixtures, the deposition of rock around perimeters to minimize erosion of islands, the recontouring of impoundment surfaces and levees to maintain water levels that are sufficiently deep to deter access by terrestrial predators, and the implementation of electric fencing or other barriers where feasible. All of these measures have been tested successfully on a small scale at the Sonny Bono Salton Sea NWR.
- Establish additional colony sites at the north and south ends of the Salton Sea, where crowding and interference by dense aggregations of other colonial species appear to be influencing nesting success (Molina 2004), and evaluate the feasibility of establishing additional sites at San Diego Bay.
- Protect productive foraging areas that may be especially vulnerable to contamination, such as protected inlets, bays, and lagoons. Maintain sufficient upland foraging areas (agricultural and scrub lands) in the vicinity of nesting areas.
- Work to ensure that water conservation practices and proposed transfers of water from the Imperial Valley will maintain adequate water supplies to the Salton Sea to protect the health and survival of populations of Gull-billed Terns and other piscivorous birds (Molina and Shuford 2004).
- Evaluate the population-level effects, on both the Gull-billed Tern and associated threatened and endangered species nesting in proximity, of an experimental moratorium on predator control measures (includ-



ing lethal take of adults and the removal of nests and eggs) against the Gull-billed Tern in San Diego Bay.

- Undertake detailed studies of contaminants in Gull-billed Terns at the Salton Sea and south San Diego Bay.
- Continue to identify important nesting locations for the subspecies in northwestern Mexico to completely document the extent of the breeding range and to formulate accurate estimates of its population size.
- Conduct demographic studies to determine survival, fecundity, and the degree of mixing among breeders at sites within the southern California–Baja California–northwestern Mexico region.

### MONITORING NEEDS

Because of the Gull-billed Tern's small population size and limited nesting sites, annual censuses conducted at the Salton Sea and San Diego Bay should be continued and expanded to include at least the northern Gulf of California. Where feasible, censuses should be performed from outside colonies to minimize chances of colony abandonment, since this species shows poor site fidelity with repeated disturbance. Measures of colony success through counts of fledging-/near-fledging-age young should be obtained annually in the state and at Gulf of California colonies where feasible. Surveys of known and potential breeding locations throughout western Mexico should be performed every two to three years.

### ACKNOWLEDGMENTS

I thank K. Garrett, R. Patton, X. Vega, and the Salton Sea NWR staff for providing unpublished information. K. Garrett, K. Keane, R. Patton, and W. D. Shuford made helpful comments on earlier drafts of the manuscript.

### LITERATURE CITED

American Ornithologists' Union (AOU). 1957. Checklist of North American Birds, 5th ed. Am. Ornithol. Union, Baltimore.

American Ornithologists' Union (AOU). 1998. Checklist of North American Birds, 7th ed. Am. Ornithol. Union, Washington, DC.

Audet, D. J., Shaughnessy, M., and Radke, W. 1997. Organochlorines and selenium in fishes and colonial waterbirds from the Salton Sea. U.S. Fish & Wildl. Serv., Environ. Contaminants Div., Carlsbad, CA.

Bancroft, G. 1929. A new Pacific race of the Gull-billed Tern. *Trans. San Diego Soc. Nat. Hist.* 5:283–286.

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

Blake, E. R. 1977. *Manual of Neotropical Birds*, vol. 1. Univ. Chicago Press, Chicago.

California Department of Fish and Game (CDFG). 1992. Bird species of special concern. Unpublished list, July 1992, Calif. Dept. Fish & Game, 1416 Ninth St., Sacramento, CA 95814.

Carney, K. W., and Sydeman, W. J. 1999. A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds* 22:68–79.

Danemann, G. D., and Carmona, R. 2000. Breeding birds of the Guerrero Negro saltworks, Baja California Sur, Mexico. *W. Birds* 31:195–199.

Erwin, R. M. 1980. Breeding habitat use by colonially nesting waterbirds in two mid-Atlantic U.S. regions under different regimes of human disturbance. *Biol. Conserv.* 18:39–51.

Erwin, R. M., Nichols, J. D., Eyley, T. B., Stotts, D. B., and Truitt, B. R. 1998. Modeling colony-site dynamics: A case study of Gull-billed Terns (*Sterna nilotica*) in coastal Virginia. *Auk* 115:970–978.

Fasola, M., and Canova, L. 1992. Nest habitat selection by eight syntopic species of Mediterranean gulls and terns. *Colonial Waterbirds* 15:169–291.

Garrett, K., and Dunn, J. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles Audubon Soc., Los Angeles.

Gochfeld, M., and Burger, J. 1996. Family Sternidae (Terns), in *Handbook of the Birds of the World*, vol. 3, Hoatzin to Auks (J. del Hoyo, A. Elliott, and J. Sargatal, J., eds.), pp. 624–667. Lynx Edicions, Barcelona.

Grinnell, J., and Miller, A. H. 1944. The distribution of the birds of California. *Pac. Coast Avifauna* 27.

Keane, K. M. 2001. California Least Tern breeding survey, 1999 season. *Species Conserv. and Recovery Program Rep.* 2001-01, Calif. Dept. Fish & Game, Sacramento.

Marchant, S. 1958. The birds of the Santa Elena Peninsula, S. W. Ecuador. *Ibis* 100:349–387.

Molina, K. C. 2000. Breeding populations of Gull-billed Terns (*Sterna nilotica vanrossemei*) in southern California, 2000. Contract No. 101810M393, final report to U.S. Fish & Wildl. Serv., 2730 Loker Avenue West, Carlsbad, CA 92008.

Molina, K. C. 2004. Breeding larids of the Salton Sea: Trends in population size and colony site occupation. *Studies Avian Biol.* 27:92–99.

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 the Cerro Prieto geothermal ponds, Mexicali Valley, Baja California. *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, California. Species Conserv. and Recovery Program Rep. 2003-01, Calif. Dept. Fish & Game, Habitat Conserv. Planning Branch, Sacramento.
- Molina, K. C., and Shuford, W. D. 2004. Introduction. Studies Avian Biol. 27:1–11.
- Moller, A. P. 1981. Breeding cycle of the Gull-billed Tern (*Gelochelidon nilotica*) especially in relation to colony size. Ardea 69:193–198.
- Palacios, E., and Mellink, E. 1993. Additional records of breeding birds from Montague Island, northern Gulf of California. W. Birds 24:259–262.
- Palacios, E., and Mellink, E. 2003. Status, distribution, and ecology of nesting larids in western Mexico, with emphasis on *vanrossemi* Gull-billed Terns and Caspian Terns. Final report to U.S. Fish & Wildl. Serv., Migratory Birds and Habitat Programs, 911 NE 11th Ave., Portland, OR 97232.
- 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. The Birds of the Salton Sea: Status, Biogeography, and Ecology. Univ. Calif. Press, Berkeley.
- Patton, R. 1999. The status of California Least Terns and breeding waterbirds at south San Diego Bay National Wildlife Refuge in 1999. Final report to U.S. Fish & Wildl. Serv., San Diego NWR Complex, 2736 Loker Avenue West, Carlsbad, CA 92008.
- Pemberton, J. R. 1927. The American Gull-billed Tern breeding in California. Condor 29:253–258.
- Remsen, J. V., Jr. 1978. Bird species of special concern in California: An annotated list of declining or vulnerable bird species. Nongame Wildl. Invest., Wildl. Mgmt. Branch Admin. Rep. 78-1, Calif. Dept. Fish & Game, 1416 Ninth St., Sacramento, CA 95814.
- Russell, S. M., and Monson, G. 1998. The Birds of Sonora. Univ. Ariz. Press, Tucson.
- Sauer, J. R., Hines, J. E., and Fallon, J. 2005. The North American Breeding Bird Survey, results and analysis 1966–2004, version 2005.2. USGS Patuxent Wildl. Res. Ctr., Laurel, MD. Available at [www.mbr-pwrc.usgs.gov/bbs/bbs.html](http://www.mbr-pwrc.usgs.gov/bbs/bbs.html).
- U.S. Fish and Wildlife Service (USFWS). 1995. Proposed South San Diego Bay National Wildlife Refuge level III preacquisition survey. Div. Environ. Contaminants, Carlsbad, CA.
- van Rossem, A. J. 1945. A distributional study of the birds of Sonora, Mexico. Louisiana State Univ., Mus. Zool. Occ. Papers 21.