Nesting Sites and Population Estimates of Seabirds and other Waterbirds of the Gulf of Chiriquí, Panamá

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Abstract.—Little information exists on nesting by seabirds and coastal waterbirds in Panamá. The present study of the Gulf of Chiriquí complements our previous study of nesting waterbirds of the Gulf of Panamá. In April 2012, about 4,000 nests of seven species of seabirds and other colonial waterbirds were identified during a complete survey by small plane and boat within and adjacent to the Gulf of Chiriquí. Seventeen colony sites were found, 12 of which are reported here for the first time. Nesting species included Brown Booby (*Sula leucogaster*; the most abundant species with nearly 2,500 nests), Brown Pelican (*Pelecanus occidentalis*), Magnificent Frigatebird (*Fregata magnificens*), Bridled Tern (*Onychoprion anaethetus*; second nesting site for Panamá), Wood Stork (*Mycteria americana*; third nesting site for Panamá), Great Egret (*Ardea alba*), and Cattle Egret (*Bubulcus ibis*). The largest nesting site in the Gulf of Chiriquí was the Islas Ladrones, with 2,200 Brown Booby nests (the largest site for this species in Panamá) and 130 Magnificent Frigatebird nests. Unlike most of the sites found in this study, these islands are not currently officially protected. *Received 17 April 2014, accepted 22 June 2014.*

Key words.—Bridled Tern, Brown Booby, Brown Pelican, conservation, *Fregata magnificens*, Magnificent Frigatebird, *Mycteria americana*, *Onychoprion anaethetus*, Pacific, *Pelecanus occidentalis*, seabird populations, *Sula leucogaster*, Wood Stork.

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Despite more than a century of incidental observations, the seabirds and coastal waterbirds of Panamá remain poorly known. Prior to our studies in the Gulf of Panamá (Angehr and Kushlan 2007), there had been no published systematic surveys of nesting seabirds or waterbirds for any region of Panamá. This deficit has both biological and conservation implications, as the nesting ranges of the species along the Panamá Pacific coast are not well understood, nor have potentially important sites for conservation been identified.

Lying to the west of the Gulf of Panamá is the nearly equally extensive Gulf of Chiriquí. In this paper, we report on a complete inventory of the Gulf of Chiriquí and its adjacent wetlands for nesting seabirds and other colonial waterbirds and contrast our findings with those from the Gulf of Panamá. The present study complements Angehr and Kushlan (2007) by completing the inventory of Panamá's Pacific coast and islands to the Costa Rican border.

Methods

Study Area

The Gulf of Chiriquí occupies the western Pacific coast of the Republic of Panamá. It is bounded on the west by the Burica Peninsula and on the east by the Azuero Peninsula (Figs. 1 and 2). The Gulf of Chiriquí contains Isla Coiba (50,314 ha), the largest island off the coast of Central America; smaller islands associated with Coiba; and other archipelagos including the Islas Ladrones, Isla Partida and its satellite islands, the Islas Secas, and the Islas Contreras, as well as isolated Isla Montuosa 77 km offshore. The continental shelf falls off abruptly just beyond the Islas Ladrones, Isla Montuosa, and Isla Jicarita to the south of Coiba. Additional islands are found closer to the coast, including those in the Bahía de Muertos area (Islas Boca Brava, Sevilla, and others) and those near the Golfo de Montijo (Islas Cébaco, Gobernadora, Leones, and others). Isla Coiba is a national park and World Heritage Site, and other islands of the Gulf of Chiriquí are contained within the Golfo de Chiriquí Marine Park.

Extensive areas of mangroves occur around the Bahía de Muertos-Boca de San Pedro, the Golfo de Montijo, and smaller areas in estuaries and at the mouths of major rivers. The tidal range in the Gulf of Chiriquí is 3-4 m, considerably less than in the Gulf of Panamá. Aside from mangrove areas, the western coast of the Gulf of Chiriquí is characterized mostly by sandy beaches, while the coasts of the Soná and Azuero Peninsulas are mostly rocky. The Golfo de Montijo is a Ramsar Wetland of International Importance, and the Playa de La Barqueta Agrícola and Playa Boca Vieja Wildlife Refuges protect sea turtle nesting beaches and some mangroves on the coast. Inland from the coast the land is mostly devoted to agriculture, including cattle ranching and rice farming.

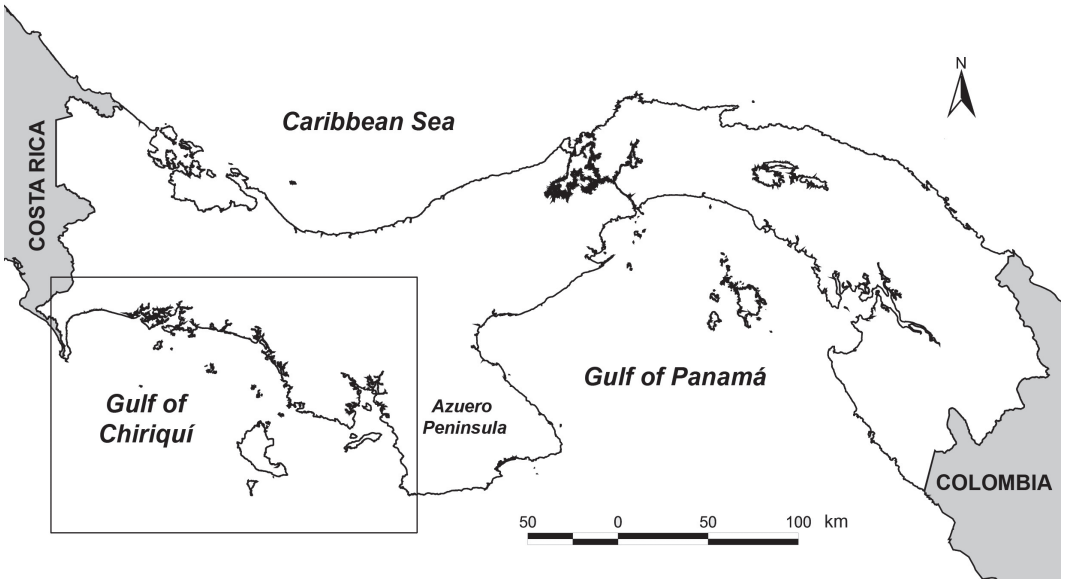

Figure 1. Panamá with the area of the study indicated by the rectangle.

Repeating the procedures we used for the Gulf of Panamá study (Angehr and Kushlan 2007), we first carried out a complete aerial survey of the coastal wetlands (from the mouth of the Rio Chiriquí Viejo on the west to Punta Naranjo at the tip of the Azuero Peninsula on the east) and all offshore islands. On 23 and 24 April 2012, we flew in a Cessna 182S at altitudes of 100-200 m at speeds of less than 100 km/hr. Once found, colony

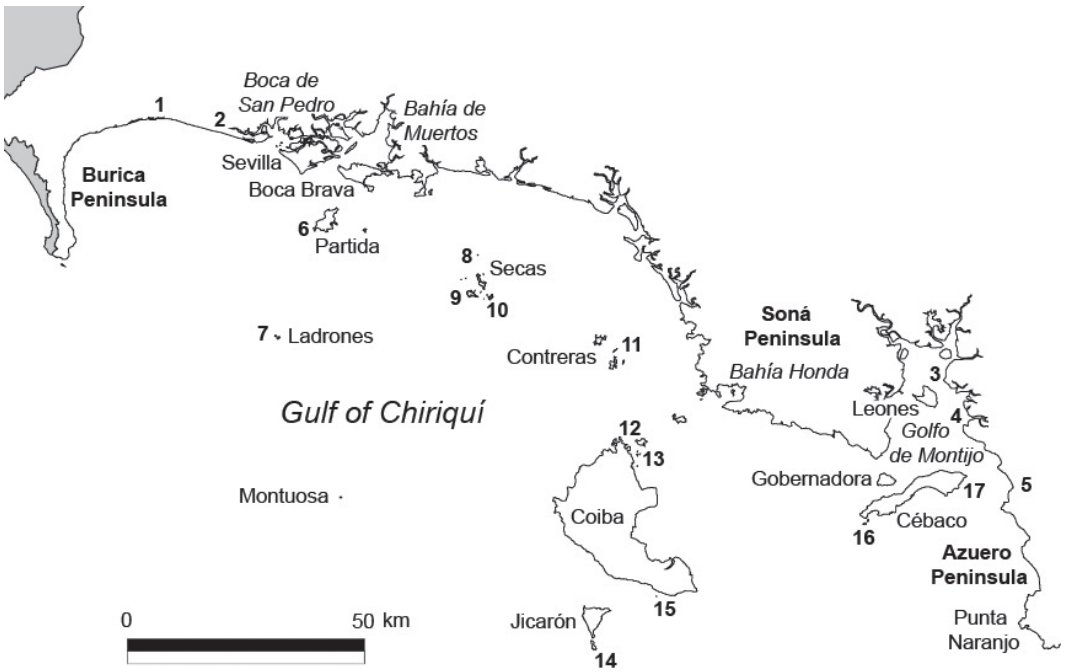

Figure 2. The Gulf of Chiriquí, showing the locations of nesting sites of seabirds and colonial waterbirds and other places mentioned in the text. Numbers indicate colony sites listed in Table 1.

sites were approached closely enough to identify species and count visible nests. In all cases, nests were on top of the vegetation or in the open on the ground, allowing adequate counts from the air. From 25 to 29 April, we visited all offshore islands in the Gulf of Chiriquí by boat including those covered by air previously, except for the distant Isla Montuosa where no nesting was observed from the air. Our boat, a 10-m long motor craft, was capable of coming close enough to shore to examine sites and count nests. All nests were visible from the boat, making landings unnecessary.

RESULTS

We found a total of 22 nesting colonies of seabirds and colonial waterbirds at 17 sites within and adjacent to the Gulf of Chiriquí (Figs. 1 and 2). Twelve of these sites and 17 of these colonies represent new discoveries, not having been noted in the literature previously. Colony sites in the Gulf of Chiriquí may be divided into two groups: coastal wetlands (1, 2, 5) and small nearshore islands (3, 4) used by herons and storks, and offshore islands (6-17) used by seabirds (Table 1).

We found seven species nesting at these sites. At 14 of the sites, we found species that had not previously been reported as nesting (Table 1). We recorded nearly 4,000 nests of seabirds and other colonial waterbirds nesting in the study area (Table 1). Doubling the nest count to estimate the number of nesting pairs, we documented nearly 8,000 birds nesting in and near the Gulf of Chiriquí.

Brown Boobies (*Sula leucogaster*), with nearly 2,500 nests, were the most abundant species. By far, the most important site was the Islas Ladrones, a group of eroded rock stacks with steep sides. Nests were found on each of the three largest islands of the group, the two largest of which had sparse tree and shrub cover, while the third was mostly bare. On the Islas Secas, Brown Booby nests were on two small rocky islets west of Isla Barracuda (the southeasternmost island of the group), on the western end of Isla Pargo (the southwesternmost island), and on a small islet off Isla Pargo's northern side. Brown Boobies also nested at the south end of a small island to the north of Isla

Table 1. Number of nests of seabirds and other colonial waterbirds in the Gulf of Chiriquí, Panamá, 2012. Names in parentheses indicate the largest adjacent island or the island group to which the site belongs. Numbers in bold indicate species nesting at sites that had not previously been reported in the literature.

Code	Sites	Brown Booby	Brown Pelican	Magnificent Frigatebird	Bridled Tern	Great Egret	Cattle Egret	Wood Stork	Total
	Mainland and nearshore islands								
1	Rio Chiriquí Viejo					**30**	**10**	**50**	90
2	Playa Barqueta						90		90
3	Isla Perdomo					**19**			19
4	Isla Tres Hermanas					**150**			150
5	Rio Quebró						**70**		70
	Offshore islands								
6	Isla La Barita (Parida)		**32**						32
7	Islas Ladrones	2,200		**130**					2,330
8	Isla Coco (Secas)			**290**					290
9	Isla Pargo (Secas)	**44**							44
10	Isla Barracuda (Secas)	**53**							53
11	Isla Uva (Contreras)	**28**		220					248
12	Islas Frijoles (Coiba)				**16**				16
13	Islas Cocos (Coiba)		150						150
14	Isla Jicarita (Coiba)	**120**	**80**						200
15	Isla Barco Quebrado (Coiba)		35						35
16	Isla Tintorera (Cébaco)		**159**						159
17	Punta Campana (Cébaco)		**10**						10
	TOTAL	2,445	466	640	16	199	170	50	
	GRAND TOTAL								3,986

Uva in the Islas Contreras, and on the south end of Isla Jicarita. At both of the latter localities, the nests were on sea cliffs. Some sites appeared as if they might have had additional nesting birds earlier in the season. We observed a few Blue-footed Boobies (*S. nebouxii*) throughout the region during our surveys, but found no nests.

Magnificent Frigatebird (*Fregata magnificens*) colonies were found in the Islas Ladrones on the largest central island; on Isla Coco, the northernmost member of the Islas Secas group (not to be confused with the Islas Cocos near Coiba); and on the north end of a small island north of Isla Uva in the Islas Contreras (the same island that had a colony of Brown Boobies at the southern end). In all cases, the nests were in trees.

Brown Pelicans (*Pelecanus occidentalis*) nested in trees at most sites, including Isla La Barita, a tiny islet just west of Isla Parida; the Islas Cocos (three small islets near the northern end of Isla Coiba); Isla Jicarita; Isla Tintorera; and at Punta Campana at the eastern end of Cébaco. On Isla Barco Quebrado, an eroded stack to the southwest of Coiba, pelicans nested mostly on the ground in grassy vegetation, but some nests were in the few trees present.

A small colony of Bridled Terns (*Onychoprion anaethetus*) was found on one of the Islas Frijoles, small rocky islets near the north end of Coiba. We observed what were probably Bridled Terns entering vegetation on a small islet near Isla Uva during our aerial census, suggesting they may have nested there as well, but we did not see them when we visited the island by boat a few days later. We also observed small numbers of Brown Noddies (*Anous stolidus*) at several localities, including Islas Ladrones and Secas and near Coiba.

Great Egrets (*Ardea alba*) nested in large trees in wetlands near the mouth of the Río Chiriquí Viejo, and on two small islands, Perdomo and Tres Hermanas, in the Golfo de Monjito. Cattle Egrets (*Bubulcus ibis*) nested in trees and tall shrubs in wetlands at the Río Chiriquí Viejo and Playa Barqueta and in shrubs at a small farm pond near the Río Quebró on the western side of the Azuero Peninsula. A small colony of Wood Storks (*Mycteria americana*) was in trees at the Río Chiriquí Viejo together with the Great Egrets and Cattle Egrets.

DISCUSSION

The 17 nesting colony sites we found in the Gulf of Chiriquí were 12 more than previously known, significantly enhancing knowledge of the seabirds and other colonial waterbirds of this region. These were many fewer than the 57 sites we found in the similarly sized Gulf of Panamá, and the number of nesting birds was also lower, with almost 4,000 nests in the Gulf of Chiriquí vs. nearly 26,000 nests in the Gulf of Panamá (Angehr and Kushlan 2007). We suggest the primary reason for the differences is the lack of seasonal upwelling in the Gulf of Chiriquí as contrasted with the Gulf of Panamá. The dry-season trade winds that cause upwelling of nutrient-rich waters and high productivity in eastern Panamá including the Gulf of Panamá, are blocked by mountains in western Panamá so that upwelling does not occur there and the waters are less productive (Jackson and D'Croz 1997; Morrison *et al.* 1998). In addition, the smaller tidal range in the Gulf of Chiriquí provides less feeding area on intertidal mudflats for coastal wading birds (Morrison *et al.* 1998).

The Gulf of Chiriquí is by far the most important nesting area for Brown Boobies in Panamá having 2,445 nests compared to just 233 nests in the Gulf of Panamá (Angehr and Kushlan 2007). The extent of nesting by Brown Boobies in the Gulf of Chiriquí was previously unknown. Wetmore (1965), based on second-hand reports, mentioned probable nesting by this species at the Islas Ladrones, without information on numbers. Murphy (1956) reported large concentrations of Brown Boobies near the Islas Ladrones and remarked on the probability of nesting there. The only other report of breeding by Brown Boobies in the Gulf of Chiriquí was by Garcés and Mena (1997), who described nesting in rock cavities on Isla Frijoles in 1996 without giving numbers.

We found no nests at this site during our survey, although it appeared that it might have been used earlier in the season.

We found only 466 Brown Pelican nests in the Gulf of Chiriquí, compared to 4,877 nests in the Gulf of Panamá (Angehr and Kushlan 2007). Brown Pelicans previously had been reported breeding in the Gulf of Chiriquí by Ridgely and Gwynne (1989), with about 150 pairs recorded at Isla Barco Quebrado in April, 1976, and by Garcés and Mena (1997), with about 50 nests recorded on the Islas Cocos in 1996. We found the species breeding at both sites during our surveys.

Magnificent Frigatebirds, with 640 nests, were also fewer than in the Gulf of Panamá, where we found 2,216 nests (Angehr and Kushlan 2007). The only previous report of breeding in the Gulf of Chiriquí was by Wetmore (1965), in the Islas Contreras at the same locality where we found them nesting. Wetmore did not provide an estimate of numbers, although Olson (1997) quotes him as describing the colony as "small."

The Bridled Tern colony we found on islets near Isla Coiba is only the second documented nesting site in Panamá, the first being a colony we previously reported, having about 50 nests, on the Islas Frailes off the southeastern tip of the Azuero Peninsula. The colony at the Islas Frailes also included about 3,000 nests of Sooty Terns and about 50 of Brown Noddies (Angehr and Kushlan 2007). Regular sightings of Brown Noddies in the Gulf of Chiriquí (G. R. Angehr, pers. obs.) raise the possibility that this species may also nest there.

Numbers of Great Egrets and Cattle Egrets in the Gulf of Chiriquí were also small compared with those we found in the Gulf of Panamá, which had 1,366 and 6,262 nests, respectively. Both species have previously been reported nesting at Playa Barqueta, along with Black-crowned Night-Herons (*Nycticorax nycticorax*) and White Ibis (*Eudocimus albus*) (Angehr 2003). On 22 June 2011, the colony at Río Quebro, in addition to Cattle Egrets, had nesting White Ibis and Boat-billed Herons (*Cochlearius cochlearius*), as well as a nesting pair of Little Blue Herons (*Egretta caerulea*), only the third nesting record of the latter species for Panamá (W. Adsett and C. Paiva, pers. commun.). Jiménez and Aparicio (2002) reported a colony of 15 nests of Great Egrets, along with nests of Tricolored Herons (*Egretta tricolor*), Cattle Egrets, and White Ibis on Isleta Lerín, a small island in Bahía Honda on the coast opposite Coiba. Our inventory was relatively early in the breeding season for these colonial waterbirds; surveys later in the year might have detected more colonies and a larger number of nests. In addition, Cattle Egrets regularly nest in small farm ponds in inland areas that we did not survey.

The Wood Stork nesting colony at the Río Chiriquí Viejo is only the third documented for Panamá. About 40 nests were found near the coast near Las Lajas, Chiriquí, in February-March 1976 (R. Ridgely, unpub. data), and about 12 nests (date not specified) were reported at the mouth of the Río Pavo, Veraguas, near the southwestern tip of the Azuero Peninsula (Ridgely and Gwynne 1989).

Nearly all of the nesting colonies in the Gulf of Chiriquí are located within existing protected areas. The Playa Barqueta heron colony is within the wildlife refuge of the same name, and the Islas Perdomo and Tres Hermanas are in the Golfo de Montijo Wetland of International Importance. Islas Uva, Frijoles, Cocos, Barco Quebrado, and Jicarita are within Coiba National Park, and Isla La Barita is in the Golfo de Chiriquí Marine Park.

The Brown Booby colony at the Islas Ladrones , numbering 2,200 pairs (4,400 individuals), qualifies the site as an Important Bird Area at the global level with ≥ 1% of the global population of a congregatory seabird species, the threshold level for Brown Booby being 2,000 individuals (Devenish *et al.* 2009). Although this site remains officially unprotected, the islands are small, remote, extremely rugged, and probably lack permanent water, making them an unlikely site for development. A protected designation for the site would provide official acknowledgment of their importance and further discourage disturbance.

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LITERATURE CITED

Angehr, G. R. 2003. Directory of important bird areas in Panamá. Panamá Audubon Society, Panamá City, Panamá.

Angehr, G. R. and J. A. Kushlan. 2007. Seabird and colonial wading bird nesting in the Gulf of Panamá. Waterbirds 30: 335-357.

Devenish, C., D. F. Díaz Fernández, R. P. Clay, I. Davidson and I. Yépez Zabala (Eds.). 2009. Important bird areas Americas: priority sites for biodiversity conservation. BirdLife Conservation Series No. 16, BirdLife International, Quito, Ecuador.

Garcés, P. A. and A. Mena. 1997. Estado actual y distribución de las comunidades de aves en el Parque Nacional Coiba. Scientia (Panamá) 12: 119-155.

Jackson, J. B. C. and L. D'Croz. 1997. The ocean divided. Pages 38-71 *in* Central America: a Natural and Cultural History (A. G. Coates, Ed.). Yale University Press, New Haven, Connecticut.

Jiménez, B. and K. Aparicio. 2002. Aves del área de Bahía Honda (Veraguas, Panamá). Unpublished report, LiquidJungleLab, Isla Canal de Tierra, Veraguas, Panamá.

Morrison, R. I. G., R. W. Butler, F. S. Delgado and R. K. Ross. 1998. Atlas of nearctic shorebirds and other waterbirds on the coast of Panama. Canadian Wildlife Service Special Publication, Canadian Wildlife Service, Ottawa, Ontario.

Murphy, R. C. 1956. The vertebrates of SCOPE, November 7-December 16. Birds. Pages 121-140 *in* Physical, Chemical, and Biological Observations in the Eastern Tropical Pacific, November-December 1956 (R. W. Holmes, Ed.). Scripps Institute of Oceanography, La Jolla, California.

Olson, S. L. 1997. Avian biogeography in the islands of the Pacific Coast of western Panama. Pages 69-82 *in* The Era of Allan R. Phillips: a Festschrift (R. W. Dickerman, Compiler). Horizon Communications, Albuquerque, New Mexico.

Ridgely, R. S. and J. A. Gwynne. 1989. A guide to the birds of Panamá. Princeton University Press, Princeton, New Jersey.

Wetmore, A. 1965. The birds of the Republic of Panamá. Part 1: Tinamidae (Tinamous) to Rynchopidae (skimmers). Smithsonian Miscellaneous Collections 150: 1-483.