

THE SIGNIFICANCE OF BONAIRE, NETHERLANDS ANTILLES, AS A BREEDING SITE FOR TERNS AND PLOVERS

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Abstract: We carried out surveys to document numbers of nesting terns and plovers on Bonaire and Klein Bonaire, Netherlands Antilles from 4-7 July 2001. Significant numbers of several species were counted including Snowy Plover (*Charadrius alexandrinus*; 46 adults), Wilson's Plover (*Charadrius wilsonia*; 24-26 adults), and Least Tern (*Sternula antillarum*; 360 adults) as well as smaller numbers of Royal Tern (*Sterna maxima*), Sandwich "Cayenne" Tern (*Sterna sandvicensis eurygnatha*), and Common Tern (*Sterna hirundo*). Evidence of breeding was found in all but the Royal Tern. Bonaire, Curaçao, and Aruba appear to have regionally significant populations of terns and plovers of several species. With increased protection from introduced predators and human disturbance, Bonaire and its sister islands have the potential to become major source populations to maintain southern Caribbean metapopulations of terns and plovers.

Key words: *Charadrius alexandrinus*, *Charadrius wilsonia*, conservation, Netherlands Antilles, plovers, seabirds, *Sterna hirundo*, *Sterna sandvicensis eurygnatha*, *Sternula antillarum*, terns

Resumen: LA IMPORTANCIA DE BONAIRE, ANTILLAS HOLANDEASAS, COMO SITIOS DE CRÍA PARA LAS GAVIOTAS Y LIMÍCOLAS. Se llevaron a cabo expediciones para documentar las cantidades de gaviotas y limícolas nidificantes en Bonaire y Klein Bonaire, Antillas Holandesas, entre el 4 y el 7 de julio de 2001. Significantes cantidades de varias especies fueron encontradas, incluyendo al Frailecillo Blanco (*Charadrius alexandrinus*; 46 adultos), al Títere Playero (*Charadrius wilsonia*; 24-26 adultos), y la Gaviotica (*Sternula antillarum*; 360 adultos) así como pequeños números de la Gaviota Real (*Sterna maxima*), la Gaviota de Sandwich "Cayenne" (*Sterna sandvicensis eurygnatha*) y la Gaviota Común (*Sterna hirundo*). Evidencias de cría fueron halladas para todas, excepto para la Gaviota Real. Bonaire, Curaçao, y Aruba aparentan tener poblaciones regionalmente significativas de gaviotas y limícolas de varias especies. Con la protección creciente contra depredadores introducidos y disturbios humanos, Bonaire y su isla hermana, tienen el potencial para convertirse en una importante población fuente para la mantención de la metapoblación caribeña de gaviotas y limícolas.

Palabras clave: aves marinas, Antillas Holandesas, *Charadrius alexandrinus*, *Charadrius wilsonia*, conservación, gaviotas, limícolas, *Sterna hirundo*, *Sterna sandvicensis eurygnatha*, *Sternula antillarum*

Résumé : L'IMPORTANCE DE BONAIRE, ANTILLES NÉERLANDAISES, COMME SITE DE NIDIFICATIONS POUR LES STERNES ET LES GRAVELOTS. Nous avons entrepris des recherches du 4 au 7 juillet 2001 pour estimer le nombre de sternes et de gravelots nicheurs à Bonaire et Klein Bonaire, Antilles néerlandaises. Un nombre significatif d'individus de différentes espèces a été compté, incluant le Gravelot à collier interrompu (*Charadrius alexandrinus*, 46 adultes), le Gravelot de Wilson (*Charadrius wilsonia*, 24-26 adultes), et la Petite Sterne (*Sternula antillarum*, 360 adultes) ainsi que des effectifs plus réduits de Sterne royale (*Sterna maxima*), de Sterne de "Cayenne" (*Sterna sandvicensis eurygnatha*), et de Sterne pierregarin (*Sterna hirundo*). Des indices de nidification ont été trouvés pour toutes les espèces à l'exception de la Sterne royale. Bonaire, Curaçao, et Aruba possèdent des populations d'importance régionale pour plusieurs espèces de sternes et de gravelots. Avec une meilleure protection contre les prédateurs introduits et le dérangement humain, Bonaire et ses îles sœurs ont le potentiel pour jouer un rôle majeur dans le maintien des métapopulations de sternes et de gravelots du sud de la Caraïbe.

Mots-clés : Antilles néerlandaises, *Charadrius alexandrinus*, *Charadrius wilsonia*, conservation, gravelots, oiseaux de mer, pluviers, *Sterna hirundo*, *Sterna sandvicensis eurygnatha*, sternes, *Sternula antillarum*

RECENTLY, THERE HAS BEEN increased recognition of the islands of the Caribbean as important breeding areas for various species of waterbirds, including several tern and plover species (Schreiber and Lee 2000). To better understand the relative importance of each site, species abundance and distribution must be documented and monitored

(Schreiber 2000). Using this baseline information, effective conservation actions can be implemented to stabilize and increase populations.

In early July 2001, we conducted surveys of tern and plover populations on the island of Bonaire, Netherlands Antilles, and its nearby offshore island of Klein Bonaire. Bonaire and its sister islands of

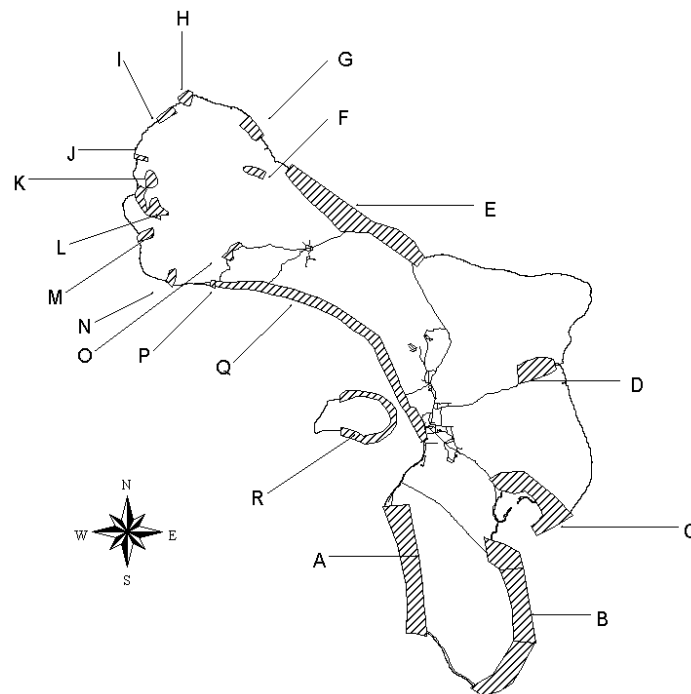


Fig. 1. Areas surveyed for terns and plovers on Bonaire, Netherlands Antilles, in July 2001. Sites identified by letters on the map are keyed to Table 1, which summarizes the numbers of birds, nests, and fledglings found at each site. See the text for survey details. Geographic names for the survey areas identified on the map are as follows: A—west side of Pekelmeer; B—east side of Pekelmeer; C—north side Lac Bay; D—Washikemba; E—shoreline near Boca Onima; F—Salina Matijs; G—Playa Macoshi; H—Malmok Lighthouse; I—Boca Bartol; J—Playa Funchi; K—Salina Wayaca; L—Slagbaai; M—Playa Frans; N—Playa Tam; O—Lake Goto; P—mouth of Goto; Q—southcentral coast; R—Klein Bonaire.

Curaçao and Aruba have historically been known to harbor breeding populations of a number of species of terns and plovers (Voous 1983). Some surveys have been carried out for a few tern nesting islands (e.g. San Nicolas reef islands on Aruba and Jan Thiel islands on Curaçao) but no comprehensive surveys of breeding terns have been reported for Bonaire and no surveys of plovers have been reported for Bonaire, Curaçao, or Aruba. We visited breeding locales on Bonaire noted in Voous (1983) as well as areas we suspected might be used by terns and plovers. Specifically, the species for which we were able to collect baseline breeding population data were Snowy Plover (*Charadrius alexandrinus*), Wilson's Plover (*Charadrius wilsonia*), Royal Tern (*Sterna maxima*), "Cayenne" Sandwich Tern (*Sterna sandvicensis eurygnatha*), Common Tern (*Sterna hirundo*), and Least Tern (*Sternula antillarum*).

In this paper we provide information on numbers of pairs found at each site, breeding status if known, and information on productivity based on numbers of fledglings observed.

METHODS

We carried out surveys of different sections of Bonaire from 4-7 July and on Klein Bonaire on 7 July 2001. We began our surveys at approximately 06:30 hr and continued until approximately 11:00 hr. We resumed surveys after 16:00 most days, when temperatures had begun to decline, until dusk. To survey areas we drove access roads along coastline, bays, salt pans, and lagoons and systematically scanned all possible areas with 10×40 binoculars and 20-45× telescope. In areas where it was difficult to effectively view and count with optical equipment, we walked toward colonies or nesting areas but in all cases we limited time in the area to reduce

Table 1. Summary of adults, young, and nests of plovers and terns found during surveys for terns and plovers on Bonaire, Netherlands Antilles, in July 2001. Survey sites are illustrated in Fig. 1.

Survey Site	Snowy Plover	Wilson's Plover	Sandwich Tern	Common Tern	Least Tern
A	14 adults	1 adult	4 adults	6 adults	22 adults
B	7 adults	0	0	18 adults 7 fledglings 3-4 nests	187 adults 49 fledglings 29 nests
C	10 adults 4 with young	8-10 adults	0	1-2 adults	30 adults 2+ nests
D	0	0	0	0	6 adults 1 nest
E	0	0	0	0	31 adults
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	2 adults	0	8 adults
I	0	0	0	2 adults	6 adults
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	2 adults	49 adults 27 nests
M	0	2 adults	0	0	0
N	0	0	0	12 adults	0
O	8 adults	0	5 adults 4 nests	0	2 adults
P	0	2 adults	0	4 adults	0
Q	1 adult	1 adult	0	0	0
R	6 adults	8 adults	0	0	16 adults 6 nests

disturbance. On Klein Bonaire we walked the coastline approximately half way around the island. The areas surveyed are illustrated in Fig. 1. Our surveys represent minimum numbers present on the islands, since we were unable to visit or view every area. In particular, we were unable to access interior portions of the Pekelmeer that are part of the commercial salt operations and that harbored major tern colonies in the past. Also, at least in the tern species, some birds may have already nested and moved away from the islands, since breeding can begin as early as April or May (Voous 1983).

RESULTS

SNOWY PLOVER

Our surveys documented a total of 46 adults, 40 on mainland Bonaire and six on Klein Bonaire (Fig. 1, Table 1). Evidence of breeding was shown by

seven pairs, five of which were seen with chicks and two that gave distraction displays. Largest numbers were found in the southern part of Bonaire, especially along the western side of the Pekelmeer (Fig. 1—Site A), the salinas on the north side of Lac Bay (Fig. 1—Site C), and the northeast side of the Pekelmeer (Fig. 1—Site B). Four pairs at the Lac Bay site had chicks ranging from one pair with three chicks to one pair with only one very young (1-3 d old) chick. We also found a concentration of 8 adults in the southern part of the Lake Goto (Fig. 1—Site O). Two pairs, apparently nesting along the roadside, gave distraction displays. We counted six adults on Klein Bonaire (Fig 1—Site R), all near an area marked as Tanki Kalabas on some maps. There, one chick was observed with a pair of adults.

WILSON'S PLOVER

Our surveys documented a total of 24-26 adults,

16-18 on mainland Bonaire and eight on Klein Bonaire (Fig. 1, Table 1). We found a concentration of 8-10 adults near the salinas on the north side of Lac Bay (Fig. 1—Site C), and six were together at a site on Klein Bonaire (Fig. 1—Site R), though none of these showed any evidence of breeding. Otherwise, birds were seen in pairs or singly. One chick was noted at Lac Bay and several of the pairs at that site were agitated, as though they had eggs or young nearby. One pair near Tanki Kalabas on Klein Bonaire was also agitated by our presence and clearly had eggs or young nearby.

ROYAL TERN

Although small numbers were seen at various locations throughout the island, we found no direct evidence of nesting and none of the birds showed a complete black cap extending to the base of the upper mandible. Individuals were seen flying by carrying fish at Playa Tam and Klein Bonaire but most sightings involved loafing birds or birds foraging offshore. The largest number of individuals was a count of 12 on 4 July near the salinas along the north side of Lac Bay. We did not observe any juvenile birds.

SANDWICH TERN

Sandwich Terns were observed at three locations with confirmed nesting at one location (Fig. 1, Table 1). Of 11 individuals observed, all but one were of the yellow-billed “Cayenne” form. Four individuals were noted on 5 July sitting on nests on a small unnamed island in the Lake Goto (Fig. 1—Site O). Four individuals were loafing on 4 July along the western side of the Pekelmeer (Fig. 1—Site A). Two individuals flew by Malmok, Washington-Slagbaai National Park (Fig. 1—Site H) on 6 July, one of which was of the black-billed form.

COMMON TERN

Foraging and loafing birds were seen at as many as ten locations around the island but breeding was confirmed at only one location (Fig. 1, Table 1). We tallied a minimum of 48 adults, seven fledglings, and at least 3-4 nests. At many of the locations, we observed only 1-2 birds, but 12 foraging birds were seen at Playa Tam (Fig. 1—Site N), and six loafing birds were seen along the west side of the Pekelmeer (Fig. 1—Site A). At the single confirmed nesting location along the east side of the Pekelmeer, we counted 18 adults, of which 3-4 were on nests, and seven fledglings (Fig. 1—Site B).

LEAST TERN

Least Terns were the most abundant breeding tern on the island. We tallied a minimum of 360 adults at 13 sites, 62 fledglings, and at least 73 nests (Fig. 1, Table 1). Nests were confirmed at 10 of the 13 sites that had concentrations of Least Terns. Because we tried to limit disturbance, especially as temperatures increased, our estimates of the number of nests are certainly lower than the actual number. There were also likely more colonies along sections of the coast that we were not able to survey and within the interior portions of the Pekelmeer, which are part of the commercial salt operations on the island. Largest concentrations of birds and nests were along the eastern side of the Pekelmeer (Fig. 1—Site B), on an island at Boca Slagbaai (Fig. 1—Site L), near Boca Onima (Fig. 1—Site E), and near Lac Bay (Fig. 1—Site C). The high number of fledglings indicates that many of the birds had already completed breeding and had been successful.

DISCUSSION

Schreiber (2000) presented estimates of numbers of pairs of various species of seabirds breeding in the Caribbean including four of the species we surveyed—Royal Tern, Common Tern, Sandwich “Cayenne” Tern, and Least Tern. Though the estimates do not include numbers from Bonaire, Curaçao, or Aruba, or the nearby Venezuelan island bird colonies, they do provide a gauge for the significance of the numbers from our surveys on Bonaire. For example, Common Terns occur as breeders in the Caribbean in only small numbers (Buckley and Buckley 2000) making even the relatively small colony we documented on Bonaire of conservation significance. Similarly, the total Caribbean breeding population of Least Terns has been estimated at 1500-3000 pairs (Jackson 2000) suggesting that the 180 pairs on Bonaire are a significant regional population, especially as this breeding location is at the species southern range limit, i.e., there are no breeding records from mainland South America (Hilty 2003). The numbers of Least Terns we documented on Bonaire are also within the range estimated to breed on Aruba (100-200 pairs) from several anecdotal observations (Jackson 2000) but significantly less than numbers documented on Bonaire and Curaçao in 2002 (A. Debrot pers. comm.).

The numbers of “Cayenne” Terns that we documented on Bonaire are much lower than the hundreds or thousands (estimated 3-4,000 pairs) that nested intermittently at various sites on Bonaire from the 1960s through at least the early 1980s

(Voous 1983). Common Terns have apparently always bred in relatively small numbers on Bonaire with 10-15 pairs estimated in 1961 (Voous 1965). Royal Terns likewise have historically been known to breed irregularly in very small numbers on Bonaire (Voous 1983). The number of Least Terns that we documented on Bonaire is much lower than that indicated as occurring prior to the early 1980s by Voous (1983), who wrote that "...the total number [on Aruba + Curaçao + Bonaire] in some years may be close to one thousand pairs, the majority of which on Bonaire." However, surveys completed in 2002 indicated as many as 800 pairs on Bonaire that year (A. Debrot pers. comm.). We did not observe any Roseate Terns (*Sterna dougallii*), a species mentioned by Voous (1983) as a former breeder on Bonaire.

While the numbers of "Cayenne" Terns and Least Terns may have declined as compared to pre-1980 estimates, we do note the possibility that the seabirds nesting on Bonaire may be part of a metapopulation that could shift breeding sites from among a set of islands including (W to E) Aruba, Curaçao, Bonaire, and the Venezuelan islands of Las Aves, Los Roques, and La Orchila. Unfortunately, such major shifts in breeding sites would likely be attributable to major nest predation events that trigger the colony to seek a new, safer location to breed. Predators on any of these islands could include rats and cats that are known to occur at some sites. At many locations, humans may still be taking eggs to sell for food as well. Ideally surveys of all tern nesting areas within the south Caribbean area should be carried out within the same season and over several years to assess whether birds here do indeed represent a metapopulation, the degree of movement of population segments among locations across years, and the overall number of breeding terns in the region.

Less information is available on the status of the two plover species so it is more difficult to place our survey information in context. There are no estimates available for total population size of the *cinnamominus* subspecies of Wilson's Plover (Wetlands International 2002), the subspecies that breeds along the northern coast of South America and nearby islands including Bonaire, nor are there any estimates of numbers on Bonaire, Curaçao, or Aruba (Voous 1983). Published estimates of total population size of the Snowy Plover population that breeds in the eastern USA, eastern Mexico, and the Caribbean put the total number of birds at 2 200 to 2 800 (Wetlands International 2002). Based on this

estimate, the number of Snowy Plovers breeding on Bonaire would approach 2% of this population and would suggest that the island supports a regionally important breeding concentration. The numbers on Bonaire are further interesting and potentially significant given that Snowy Plovers have not been confirmed as breeders on the coast of Central America (Page *et al.* 1995), northern South America (Hilty 2003), or in the Lesser Antilles (Raffaëlle *et al.* 1998).

Bonaire and the nearby islands of Aruba, Curaçao, Las Aves, Los Roques, and La Orchila have the potential to be very important tern and plover breeding locations in a regional and global context. Bonaire, because of its strong natural resource-based ecotourism economy and its history of park designation and natural resource stewardship, is especially well suited to implementing a tern and plover conservation strategy that could increase the numbers and productivity of breeding terns and plovers. In the USA, many seabird and plover conservation and management techniques have been developed and effectively implemented to increase, stabilize, or restore populations. Some of these techniques could certainly be employed on Bonaire to the benefit of tern and plover populations. In particular, we would recommend that Klein Bonaire be considered as a location to attempt to establish a protected tern colony using decoys, calls, and other social attraction methods (Kress 1998) ideally after ensuring that the island, now owned and managed by the National Marine Park, is rid of any invasive rats or cats.

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