Breeding Success and Nest Site Selection by a Caribbean Population of Wilson's Plovers

Author(s): Adam C. Brown and Kevin Brindock
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Breeding Success and Nest Site Selection by a Caribbean Population of Wilson's Plovers

Adam C. Brown[1,2] and Kevin Brindock[1]

ABSTRACT.—We report breeding success of Wilson's Plovers (*Charadrius wilsonia*) on St. Martin in the Lesser Antilles during 2004. We located 35 nests among six wetlands and apparent nest success was 37.1%. Nest initiation on St. Martin was earlier than in the United States and breeding success was higher earlier in the season than later in the season. There were two distinct peaks in nest initiation; the second peak coincided with peak fledging of chicks from the first nest initiation. Nests on St. Martin were associated with bare ground and were much closer together than in previous studies reported elsewhere. Ten nests were predated by feral dogs (*Canis lupus familiaris*) and three nests were crushed by vehicles. *Received 12 December 2010. Accepted 15 April 2011.*

Wilson's Plover (*Charadrius wilsonia*) is distributed along coastal habitats extending from North America to South America including the West Indies (Corbat and Bergstrom 2000). Populations of the Caribbean race (*C. w. cinnamominus*) occur in the Bahamas, Greater Antilles, Virgin Islands, and throughout the Lesser Antilles (Hoogerwerf 1977, Collazo et al. 1995, Raffaele et al. 1998, Smith and Smith 1999). The most recent global population estimate of Wilson's Plover is 6,000 individuals; however, this number is tenuous as the estimate was provided with a low level of confidence (Brown et al. 2001). Wilson's Plovers are listed as a Species of High Concern in the U.S. Shorebird Conservation Plan due to a low population estimate (Brown et al. 2001). The primary threat to Wilson's Plovers in the United States is habitat loss resulting from development (Corbat and Bergstrom 2000).

There has been little research on Wilson's Plovers in the West Indies; thus, there are currently no population estimates for the region and breeding ecology in this area is poorly understood. The absence of population estimates and data on breeding ecology of Wilson's Plovers in the Caribbean, highlight the need for further study to understand the status of this species in the region and to guide conservation efforts to maintain this population. We studied a breeding population of Wilson's Plovers on St. Martin, Lesser Antilles in 2004. Our objectives were to: (1) investigate attributes of the plover's nesting ecology and, (2) factors affecting breeding success.

METHODS

Study Area.—St. Martin, Lesser Antilles (18° 03′ N, 63° 03′ W; 100 km^2) includes several breeding sites used by Wilson's Plovers, making it a suitable study area to examine their breeding ecology. The island includes 21 wetland sites providing suitable nesting habitat for this plover. Sites ranged in size from 0.136 to 2.2626 ha. Every wetland was surrounded by vegetation comprised mainly of red mangroves (*Rhizophora mangle*), black mangroves (*Avicennia germinans*), white mangroves (*Laguncularia racemosa*), buttonwood (*Conocarpus erectus*), and sea-grape (*Coccoloba uvifera*). There was sparse mangrove vegetation scattered throughout the wetlands as well. Each wetland was surveyed from multiple observation points, assuring the shoreline of each wetland was observed in its entirety.

Nest Observations.—We surveyed all sites (n = 21) on St. Martin from 1 January through 30 July 2004, every 5 days using binoculars and spotting scopes to detect breeding shorebirds (Fig. 1). Once a Wilson's Plover was detected, observers recorded the bird's behavior, including that suggestive of active nesting, such as birds flying back-and-forth towards a specific spot, males chasing other birds in the hunched-over territorial, mock-brooding, or broken-wing displays (Bergstrom 1988). We then approached the area where the bird was observed and searched all adjacent suitable habitats in a grid-like pattern for a nest scrape. Plover tracks were often followed to help observers locate the nest scrape. Observers estimated and recorded the stage of nesting

[1] Environmental Protection in the Caribbean, 200 Dr. Martin Luther King Jr. Boulevard, Riviera Beach, FL 33404, USA.

[2] Corresponding author; e-mail: abrown@epicislands.org

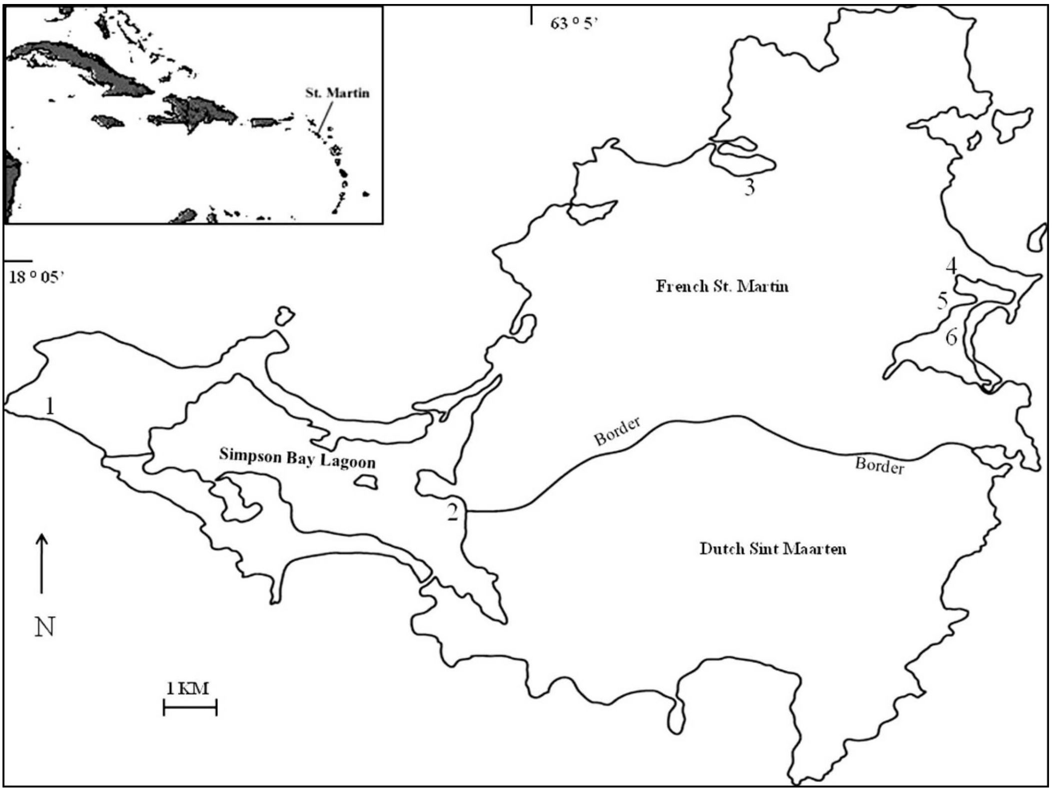

FIG. 1. St. Martin, Lesser Antilles. Numbers indicate Wilson's Plover population locations. 1 = Grand Etang, 2 = Simpson Bay Lagoon, 3 = Grand Case Pond, 4 = Orient Pond, 5 = Gallion Pond, and 6 = Etang Poisson.

(empty scrape, number of eggs, and number of chicks) and date once a nest was located. We recorded the contents of the scrape from the center out for 10 cm documenting presence or absence of shells, vegetation, rocks, and bare ground in the immediate area of the nest scrape.

Visits were conducted every 5 days to record the current nest contents following the initial detection of a nest scrape. Nests were considered successful when ≥1 chick hatched, and unsuccessful (failed) when no chicks were produced from the nest. We surveyed the area for signs suggesting cause (i.e., tracks from a predator leading to the nest) in the event a nest failed. We recorded number of chicks and their feathering status during each survey once chicks hatched and were mobile. Chicks were not marked but nest origins were generally identifiable by their geographic location and large space between active nests with chicks. Chicks were followed until the end of the survey period, but were considered fledged after 21 days (Tomkins 1944). We attempted to identify the cause of disappearance of chicks before fledging.

We returned to the nest to collect data characterizing the habitat near the nest once a nest scrape was abandoned following hatching or nest failure. A 2-m radius from the center of the scrape was surveyed within which we recorded the percentage of live vegetation, dead/woody vegetation, rock, and bare ground using 5% increments.

RESULTS

We found 35 Wilson's Plover nests on St. Martin: 15 at Orient Pond, 10 at Grand Etang, five at Gallion Pond, three at Etang Poisson, and one each at Grand Case Pond and Simpson Bay Lagoon (Fig. 1). Nineteen chicks fledged from the 35 nests (Table 1). The mean (± SD) clutch size was 2.37 ± 0.597 and the mean laying date was 13 April (range = 28 Feb–7 Jun). There were two one-egg clutches, 18 two-egg clutches, and 15 three-egg clutches. The mean number of chicks/

TABLE 1. Number of nests initiated and apparent nest success at Wilson's Plover nest sites during 2004 on St. Martin. Apparent successful nests refers to the total number of nests that fledged at least one chick.

Wetland	Total attempts	Apparent successful nests	First nest initiated	Mean eggs/pair	Mean chicks/pair	Mean fledge/pair	Area of colony (ha)	Mean distance between nests (m)
Orient	15	3	3 Mar	2.20 ± 0.59	0.26 ± 0.59	0.20 ± 0.41	1.5374	13.9
Grand Etang	10	6	21 Mar	2.70 ± 0.48	1.00 ± 1.05	0.90 ± 0.99	0.1360	14.6
Gallion	5	1	3 Mar	2.20 ± 0.45	0.40 ± 0.89	0.40 ± 0.89	0.1353	15.4
Etang Poisson	3	2	10 Mar	2.66 ± 0.57	1.00 ± 1.00	1.00 ± 1.00	0.2399	17.3
Grand Case	1	1	28 Mar	2.00	2.00	2.00	0.4943	N/A
Simpson Bay Lagoon	1	0	10 May	2.00	0.00	0.00	2.2626	N/A

nest was 0.6 ± 0.768 with 25.3% of total eggs hatching; mean hatching date was 16 April (range = 28 Mar–26 Apr). The mean (± SD) number of fledged chicks/nest was 0.54 ± 0.707 with 90.5% of chicks fledging; the mean fledging date was 7 May (range = 18 Apr–17 May) (Fig. 2).

Apparent nest success, the proportion of observed nesting attempts that succeeded, was 37.1%, but varied among sites. Orient Pond, the site with the most nesting attempts (n = 15) and most failed nests, had 20% apparent nest success. The next largest population, Grand Etang (n = 10) had 60% apparent nest success. Gallion Pond, the third largest colony (n = 5), had 20% apparent nesting success. The smaller populations had more widespread nest success, Etang Poisson (n = 3) had apparent nest success of 67%, Grand Case (n = 1) had an apparent nest success of 100%, and Simpson Bay Lagoon (n = 1) had an apparent nest success of 0%.

There were two peaks in nest initiation: 3–21 March and 10–26 May (Fig. 2). Nests that successfully fledged at least one chick were

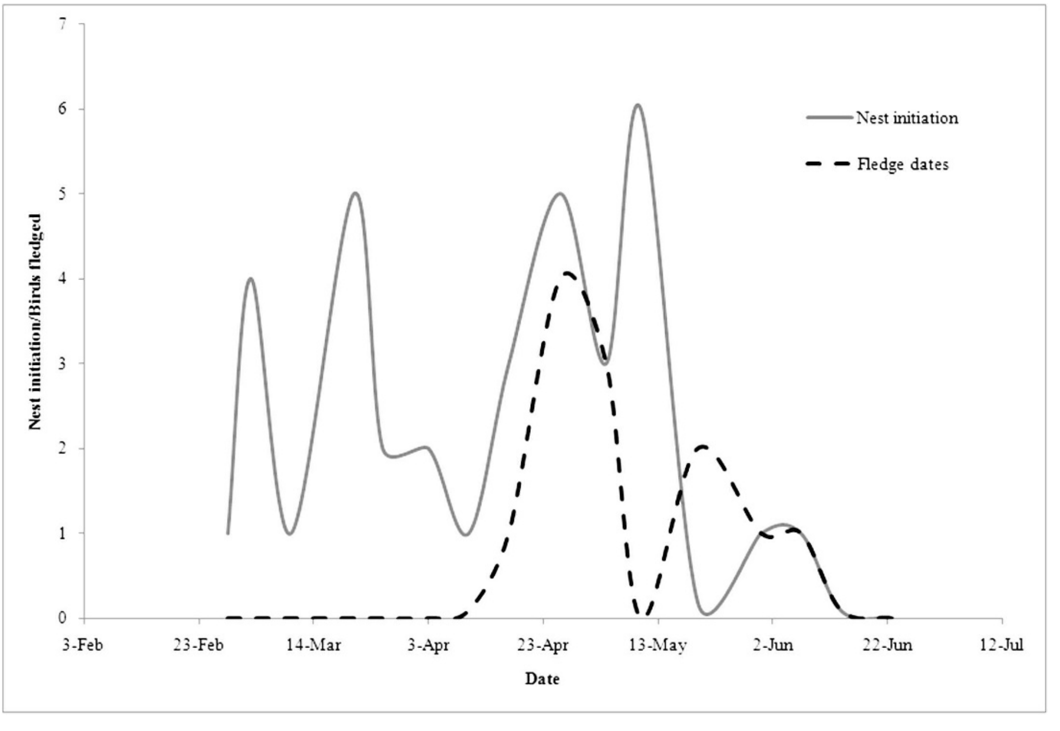

FIG. 2. Number of nests initiated and individuals fledged at all Wilson's Plover population sites on St. Martin during 2004.

TABLE 2. Wilson's Plover nest-habitat and nest-scrape descriptions. Values reported in habitat adjacent to the nest are the mean percentages for each site. Values reported in nest-scrape content are the percentage of nests per location that contained the content. Percentages were estimated to the nearest 5%.

Wetland	Habitat adjacent to nest				Nest scrape contents			
	Percent live vegetation	Percent dead vegetation	Percent rock	Percent bare ground	Shells	Vegetation	Rock	Bare ground
Orient	35	2	14	49	46	40	60	100
Grand Etang	44	11	6	39	40	60	60	100
Gallion	27	6	5	62	40	60	20	100
Etang Poisson	25	0	0	75	100	66	0	100
Grand Case	15	10	10	65	100	100	100	100
Simpson Bay Lagoon	0	0	0	100	0	0	100	100

generally initiated earlier than those that were unsuccessful (successful: $n = 13$, mean date = 17 Mar; unsuccessful: $n = 22$, mean date = 29 Apr). Apparent nest success was higher in the earlier part of the nesting season when 75% of nests initiated prior to the mean laying date (28 Feb–13 Apr; $n = 16$ attempts) were successful. Nests initiated after the mean laying date (14 Apr–23 Jun; $n = 19$ attempts) had an apparent nest success of 5%.

We documented the probable cause of failure for 13 of the 22 nests that failed through identification of tracks leading to and away from the nest scrape. Ten nests were predated by feral dogs (*Canis lupus familiaris*) and three nests were crushed by vehicles. We could not identify the cause of failure for nine nests. Seven of the nine nests were predicted to hatch near the period of our nest check, and failure could have been with either the eggs or the chicks. The eggs in two of the failed nests disappeared well before the predicted hatching date, suggesting egg predation.

Wilson's Plover nests were on the shorelines of saltwater ponds surrounded by mangroves. All wetlands with plover colonies were within 250 m of small towns or housing establishments (mean distance = 106.09 ± 0.248 m). All nests were on flat ground within 0.25 m of pond elevation level. The sediment at all nest locations was fine-sized light-colored sand. Nest scrapes included a mix of shells, vegetation, rocks, and bare ground (Table 2). We observed shells in 48.6% of nests, vegetation in 51.4% of nests, rock in 51.4% of nests, and bare ground in 100% of nest scrapes. The mean distance between nests within colonies with multiple nests, was 14.7 m ($n = 23$; range = 10–19 m).

We used the percentage at each nest of the four habitat parameters (live vegetation, dead vegetation/woody debris, rock, and bare ground) recorded within a 2-m radius of the nest center to calculate mean nest habitat. The mean nest habitat was 52% bare ground, 34% live vegetation, 9% rock, and 5% dead vegetation/woody debris (Table 2). Five nests were surrounded by 100% bare ground, including three that successfully fledged chicks.

DISCUSSION

Apparent nest success of Wilson's Plovers on St. Martin was similar to that reported in the United States. Causes for nest failure on St. Martin were comparable to those reported at other breeding sites, mainly mammalian predation and human disturbance.

Introduced predators were a common threat to breeding Wilson's Plovers on St. Martin. Dogs were often observed near one of the breeding sites beginning in late May, near the time of a potential peak in chick hatching. Dogs were not observed eating eggs or chicks, but dog tracks were identified approaching and leaving nest scrapes during nest checks when eggs were initially observed missing. Predation by rats (black [*Rattus rattus*] and Norway [*R. norvegicus*]) and Indian mongoose (*Herpestes javanicus*), which are present and common on St. Martin (Brown 2008), may explain failure of nine additional plover nests where shell fragments were found near nests.

Human disturbance was also identified as a cause of nest failure on St. Martin. All locations where Wilson's Plovers bred on St. Martin were within 250 m of housing developments. Vehicles were often observed driving to and from developments across wetlands and subsequently drove over and crushed eggs in three different plover nests. Repeated disturbance by vehicles traveling through the nesting colony may have caused adult plovers to abandon nesting attempts, explaining failure of nine nests where cause of failure was not identified.

Nesting Wilson's Plover began earlier on St. Martin than described for populations within the United States. Wilson's Plover nests in the United States with the exception of a single March nest initiation date are initiated in April (Stevenson and Anderson 1994, Corbat and Bergstrom 2000). Bergstrom (1988) reported the first nest initiation on 15 April in Texas with two distinct peaks, 21–29 April and 18–31 May. Corbat (1990) reported the first nests occurred in Georgia in mid-April and nesting continued through June. Nest initiation on St. Martin appeared to occur at wetlands once ponds were nearly dry and provided adequate area for nesting attempts. There was little open shoreline along ponds prior to drying, likely inhibiting nesting due to lack of suitable habitat.

The second nest initiation peak in mid-May coincided with fledging of young for pairs that nested during the first nest initiation peak. Multiple peaks have been described in previous breeding descriptions (Bergstrom 1988), that have been attributed to re-laying efforts of birds whose attempts during the first nest initiation period failed. This was likely the case on St. Martin. There is a single record of a Wilson's Plover re-laying after a successful nesting attempt in the United States (Corbat 1990) and, with the extended breeding season on St. Martin, this may be a possible explanation as well.

Pairs that initiated nests earliest had the highest breeding success. It is possible dogs, which may have depredated 10 of the later initiated nests, did not detect the plover colony until later in the season when nest density increased. Small amounts of water in the ponds early in the breeding season would have limited vehicle access to these areas, decreasing the likelihood that an earlier nest would be destroyed by a vehicle.

Spacing between nests at sites on St Martin was different than at sites in the United States. Spacing between nests in wetlands was close (mean distance = 14.7 m). Bergstrom (1988) reported greater distances between nests in Texas with the closest nests 35.5 m and most nests were >250 m distant. The closeness of nesting plovers on St. Martin is likely due to the limited amount of suitable nesting habitat on the island.

The amount of vegetation and other objects near nest scrapes appears similar to populations described in Texas (Bergstrom 1988) and Georgia (Corbat 1990). All nests were in areas that were underwater during the wet season and early part of the dry season (Sep–Feb); little vegetation grew in these areas due to the hyper-saline nature of the ponds (90 ppt). Nest scrapes were most often in areas containing primarily bare ground with limited cover (vegetation or debris). The presence of cover or objects near nests may limit the ability of plovers to detect predators, decreasing nest success.

Mammalian predation and human disturbance issues on St. Martin are due in large part to increased development of coastal and wetland areas. The available wetland habitat for plovers to breed and forage is decreasing as development on the island increases. St. Martin has recently taken steps in protecting wetland habitat, but enforcement to protect wetlands from encroachment by development is lacking and remains important in protecting critical plover habitat.

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LITERATURE CITED

BERGSTROM, P. W. 1988. Breeding biology of Wilson's Plovers. Wilson Bulletin 100:25–35.

BROWN, A. C. 2008. Status and range of introduced mammals on St. Martin, Lesser Antilles. Living World, Journal of the Trinidad and Tobago Field Naturalist Club 2008:14–18.

BROWN, S. C., C. HICKEY, B. HARRINGTON, AND R. GILL. 2001. The U.S. Shorebird Conservation Plan. Second Edition. Manomet Center for Conservation Sciences, Manomet, Massachusetts, USA.

COLLAZO, J. A., B. A. HARRINGTON, J. S. GREAR, AND J. A. COLON. 1995. Abundance and distribution of shorebirds at the Cabo Rojo Salt Flats, Puerto Rico. Journal of Field Ornithology 66:424–438.

CORBAT, C. A. 1990. Nesting ecology of selected beach-nesting birds in Georgia. Dissertation. University of Georgia, Athens, USA.

CORBAT, C. A. AND P. W. BERGSTROM. 2000. Wilson's Plover (*Charadrius wilsonia*). The birds of North America. Number 516.

HOOGERWERF, A. 1977. Notes on the birds of St. Martin, Saba, and St. Eustatius. Studies on the Fauna of

Curacao and other Caribbean islands 54(176):60–123.
RAFFAELE, H., J. WILEY, O. GARRIDO, A. KEITH, AND J. RAFFAELE. 1998. A guide to the birds of the West Indies. Princeton University Press, Princeton, New Jersey, USA.
SMITH, P. W. AND S. A. SMITH. 1999. The breeding of Wilson's (*Charadrius wilsonia*) and Collared (*Charadrius collaris*) plovers in the southern Lesser Antilles. El Pitirre 12:50–51.
STEVENSON, H. M. AND B. H. ANDERSON. 1994. The birdlife of Florida. University Press of Florida, Gainesville, USA.
TOMKINS, I. R. 1944. Wilson's Plover in its summer home. Auk 61:259–269.