

The Wilson Journal of Ornithology 122(4):788–791, 2010

First Reproductive Record of Wilson's Plover in Baía de Todos os Santos, Northeastern Brazil

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ABSTRACT.—The Wilson's Plover (*Charadrius wilsonia*) is widely distributed along the coast of the Americas. We present the first reproductive record in Baía de Todos os Santos, Brazil, broadening the southernmost limit of its breeding area along the Atlantic Coast to 12° 44' S, 38° 45' W. We recorded a family with a subadult in 2007, and a family with chicks and a nest in 2008. The female invested more time in incubation than the male in 96 hrs of diurnal nest observations. There were 102 interruptions during incubation due to the approximation of domestic animals (cattle and horses). The nest was abandoned

9 days after egg laying. An experiment with artificial nests suggests that 30% of Wilson's Plover nests may be destroyed by free-ranging domestic animals in this Baía. Received 11 January 2010. Accepted 5 June 2010.

The Wilson's Plover (*Charadrius wilsonia*) is a widely distributed Charadriidae associated with coastal habitats in the Americas with resident populations in numerous sites. It breeds on the Atlantic Coast, between the eastern USA and northeastern Brazil, in the Caribbean Islands, and on the Pacific Coast, between Mexico and northwestern Peru (Corbat and Bergstrom 2000). The species exhibits plumage differences throughout its range, which attracted the attention of systematists, leading to subdivision of the species into five subspecies (Wiersma 1996, Corbat and Bergstrom 2000, Grantsau and Lima 2008). Wilson's Plover is seemingly monogamous (Corbat and Bergstrom 2000), and both males and

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females are capable of performing incubation (Bergstrom 1981).

Historically, the breeding range of Wilson's Plover has been contracting and reproductive populations in the current northernmost limit are threatened, mainly due to destruction of breeding areas and interference during reproduction and while resting. However, little is known about threats outside this region (Corbat and Bergstrom 2000).

Records of reproduction and information about populations of Wilson's Plover in the Southern Hemisphere are scarce and restricted to a few sites (Tovar 1968, Rodrigues et al. 1996, Wiersma 1996, Corbat and Bergstrom 2000, Grantsau and Lima 2008). We describe: (1) the first breeding record of Wilson's Plover in the southernmost limit of its breeding range on the Atlantic Coast (Baía de Todos os Santos, Brazil), and (2) features of the species' reproductive behavior and potential threats to the study population.

METHODS

Monitoring of Nests and Families.—We recorded breeding of Wilson's Plover in the coastal region of Saubara, Bahia, western coast of Baía de Todos os Santos, Brazil (12° 44' S, 38° 45' W). This region is characterized by a complex of salt marshes (restingas), mangroves (*Rhizophora*, *Laguncularia*, *Avicennia*), supratidal salt flats (apicum), and intertidal areas. The climate is humid tropical with distinct dry (September–February) and rainy (March–October) seasons. We compared photos of individuals from the study site for species identification with specimens deposited in the Museu de Zoologia da Universidade de São Paulo–MZUSP (specimens: 41395, 41396, 42745, 80034, and 80035). We based our comparisons on the Wilson's Plover subspecies identification key to the Atlantic Coast developed by R. Grantsau (Grantsau and Lima 2008).

OBSERVATIONS

The first evidence of breeding of Wilson's Plover in the region was the record of a family, comprising a pair with a subadult, foraging in the intertidal zone on 17 December 2007. The following year, we found a Wilson's Plover nest with two eggs on 13 August 2008 in a restinga area. The next morning, taking advantage of the absence of the pair from the nest, we took nest and egg measurements and recorded a third egg

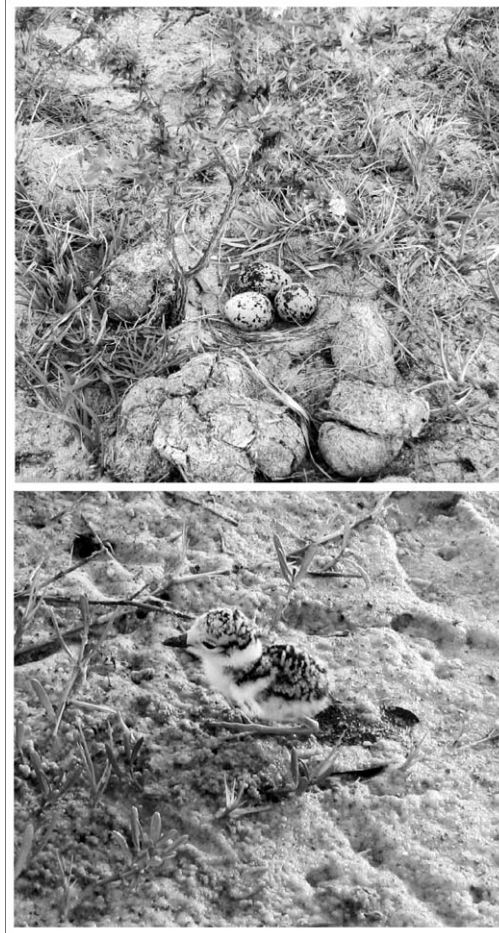


FIG. 1. Nest and chick of Wilson's Plover at Baía de Todos os Santos, Brazil. Photographs by Vitor O. Lunardi.

Fig. 1). We performed 96 hrs of focal observation of the nest to examine parental investment in incubation, between 0600 and 1800 hrs, during the first 8 days of incubation (14 to 21 August 2008). Observations were conducted from a fixed point inside of the mangrove, 26 m from the nest, to avoid investigator disturbance. The nest with the eggs was abandoned on 22 August 2008, probably due to the intense disturbance by domestic animals (cattle and horses). The nest with eggs remained intact until 30 August 2008, when they were found destroyed.

On 27 August 2008 we found another family of Wilson's Plover with three chicks in an apicum area. Each chick (Fig. 1) was measured, weighed, and marked with a metal band (CEMAVE/Brazil). This family remained for the next 7 days at the

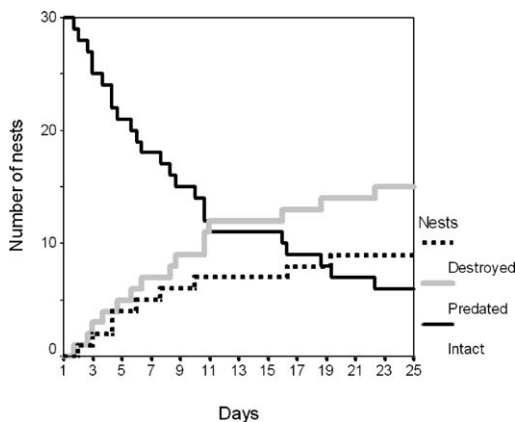


FIG. 2. Number of artificial nests destroyed, predated, and intact in a restinga area at Baía de Todos os Santos, Brazil, during 25 days.

same site with the aggregated chicks always accompanied by the adults.

Experiment to Verify Predation Intensity.—We observed Wilson's Plover pairs defending territories in a restinga area between May and October 2007 and 2008, also used as pasture by free-ranging cattle and horses from the local community. We conducted an experiment with artificial nests to estimate nest loss considering these animals may destroy nests. We built 30 artificial nests (cavities in the soil similar in shape and size to Wilson's Plover nests) in January 2009, placed in a series, 30 m apart, along a strip of restinga. We added three Common Quail (*Coturnix coturnix*) eggs to each artificial nest. We made three daily visits to each nest (0600, 1200, and 1800 hrs) over 25 days (approximate incubation time for the species) to record nests that were: (1) intact, (2) destroyed (with at least 1 destroyed egg and tracks of domestic animals), and (3) predated (absence or destruction of at least 1 egg; no signs of domestic animals).

Nine of 30 artificial nests (Fig. 2) were destroyed with 77.7% of occurrences during the day (0600–1800 hrs). Fifteen nests were predated with 66.7% of these events at night (1800–0600 hrs).

Monitoring of Nests and Families.—The only nest found consisted of a 25-mm cavity in sandy soil with a diameter of 102 mm and fragments of dry vegetation around the eggs. It was next to horse feces and a shrubby false buttonweed (*Spermacoce verticillata* L., Rubiaceae; height 17.5 cm) surrounded by grasses (Fig. 1). The

three eggs measured: length = 34.9, 34.8, and 34.2 mm; width = 25.2, 25.0, and 24.4 mm; and mass = 14.0, 14.0, and 13.5 g. The eggshells were colored light cream with dark brown stains over the entire surface, but with a higher concentration on the blunt end.

The female invested 53.3 hrs (93.3%) in incubation during the observation period while the male invested 3.8 hrs (6.7%). The female was observed incubating between 0600 and 1733 hrs, and the male after 1714 hrs. The female interrupted incubation 125 times ($\bar{x} \pm SD = 1.29 \pm 1.41/\text{hr}$, $n = 96$) of which 102 (81.6%) were caused by approach of domestic animals, mainly cattle. After leaving the nest, the female often exhibited alarm and distraction behaviors: *squatting*, *head-up* (followed by vocalization), *mock-brooding* and/or *broken-wing*. In 54.3% of these interruptions the male approached the nest, exhibiting *head-up* and *crouch-run* display (behavioral descriptions in Bergstrom 1988b). The female was reluctant to return to the nest after disturbances.

The measures obtained for the three chicks were: right tarsus = 23.5, 23.3, and 22.1 mm; culmen = 17.3, 16.8, and 16.1 mm; and mass = 17.0, 16.5, and 15.5 g. The beaks were black; legs and feet grayish; plumage upperparts were brownish and black in a scalloped pattern, and underparts and neck were white. The age and gender of the chicks could not be assigned.

DISCUSSION

We present the first breeding record of Wilson's Plover in Baía de Todos os Santos, Brazil. This is the southernmost record on the Atlantic Coast for the species, representing an extension of their breeding range (Corbat and Bergstrom 2000, Grantsau and Lima 2008). Grantsau and Lima (2008) recorded breeding for Wilson's Plover (*C. wilsonia brasiliensis*) in Mangue Seco, Brazil, ~230 km north of Baía de Todos os Santos. The plumage of the males and females in our study area was similar to that of *C. w. brasiliensis* deposited at MZUSP, and strongly suggests our records correspond to this subspecies.

Bergstrom (1988a) reported Wilson's Plover nests mainly near vegetation and occasionally near objects (e.g., cow manure, stones), emphasizing that both may function as a protection barrier against the wind. Objects and vegetation provided protection for the nest that we found against

easterly and southeasterly winds, which are predominant in August, when we found the nest.

The number, dimensions, and color of the eggs and size of the chicks we report are similar to those previously published for the species (Rodrigues et al. 1996, Corbat and Bergstrom 2000, Grantsau and Lima 2008). The female invested more time in diurnal incubation than the male. However, the male may have invested in nocturnal incubation, since they initiated this activity at the end of the day. Previous observations for the species indicate males incubate mainly at night (Thibault and McNeil 1995).

The experiment with artificial nests revealed that, in addition to natural threats (predators), use of coastal areas for grazing is another hazard to the reproductive success of Wilson's Plover in Baía de Todos os Santos. Trampling by roaming animals was previously considered a potential threat for Wilson's Plover eggs and recent hatched nestlings at Ilha do Curupu, Maranhão, Brazil (Rodrigues et al. 1996). Plovers leave their nests when disturbed and are extremely reluctant to return when intruders are present near nest sites. The constant interruption of incubation by interference may lead to inadequate egg temperature regulation, and exposing eggs to predation and overheating (Corbat and Bergstrom 2000). The female often left its nest when disturbed by free-ranging cattle and horses. Both females and males invested actively in predator avoidance behaviors. We assume the intense disturbance was the primary cause of nest and egg desertion.

Our observations confirm Baía de Todos os Santos as a breeding area of Wilson's Plover, extending the limit of its breeding range. Use of coastal areas for grazing is critical to consider in any project directed at conserving this population.

ACKNOWLEDGMENTS

This research was supported by fellowships from Conselho Nacional de Desenvolvimento Científico e Tecnológico and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. We are grateful to CEMAVE/ICMBio for authorization to capture and band the birds. We thank L. F. Silveira for authorization and access to the collection of MZUSP, J. G. Jardim for taxonomic identification of *S. verticillata*, and D. G. Lunardi for revision of an earlier version of the manuscript. We thank two anonymous referees for helpful and constructive comments on the manuscript.

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