Rev. peru. biol. **15(1):** 117-120 (Julio 2008)

Versión *Online* ISSN 1727-9933

NOTA CIENTÍFICA

A breeding colony of Wedge-rumped Storm-Petrel, *Oceanodroma tethys* kelsalli (Lowe 1925), on Santa Island-Peru

Una colonia reproductiva de la Golondrina de la Tempestad Peruana, *Oceanodroma tethys* kelsalli (Lowe 1925), en la Isla Santa, Perú

Liliana Ayala[1], Raul Sanchez-Scaglioni[2], Samuel Amoros[1] y Luis Felipe[3]

1 APECO, Peruvian Association for the Conservation of Nature. Parque José Acosta 187, Magdalena, Lima, Perú.
Email Liliana Ayala: lilianayala_ayala@yahoo.com

2 GEA-Perú, Grupo de Estudios Ambientales del Perú.

3 HIDRONAV. Directorate of Hydrography and Navigation of the Peruvian Navy.

Abstract

The important breeding areas of Wedge-rumped storm petrel were unkwnown until recently. This species breeding in the central cost of Peru: Ferrol, Chao and Corcovado islands. We reported Santa island as a breeding area of this seabird. We located a total of 407 active nests, including 92 (22%) with eggs and 7 (8%) with chicks. Most breeding birds were found in an area near to the guard house in the east of the island,in the south and southwest of the island, where guano birds and large numbers of ticks were registered, we found few storm petrel nests. The south and southwest of the island has a high humidity and several of the dry-stone walls were covered with moss and algae. In those walls no storm petrel nests were found. It is possible other breeding sites exist on the Peruvian coast. Surveys of nesting areas in coastal Peru will provide much-needed information on Wedge-rumped storm-petrel status.

Keywords: Breeding biology, Humboldt Current, Peruvian island, Wedge-rumped storm-petrel.

Resumen

Las áreas reproductivas de la Golondrina de la tempestad Peruana eran desconocidas hasta hace poco. Esta especie anida en la costa central del Perú, en las islas: Ferrol, Chao y Corcovado. Reportamos un área reproductiva para esta ave marina en la isla Santa. Localizamos un total de 407 nidos activos, incluyendo 92 (22%) con huevos y 7 (8%) con polluelos. La mayor parte de las aves reproductivas se hallaron cerca de la casa al este de la isla, en el sur y suroeste, donde se registraron aves guaneras y altas cantidades de garrapatas pocas golondrinas fueron halladas. En el sur y suroeste de la isla la humedad contribuye a que algunas pircas estén cubiertas de musgos y algas, en estas paredes no se hallaron aves anidando. Es posible que existan otras áreas de reproducción en la costa peruana. Estudios de las áreas de anidación en la costa del Perú proveerá la información necesaria sobre el estatus de la Golondrina de la Tempestad Peruana.

Palabras clave: Biología reproductiva, Corriente de Humboldt, Golondrina de la tempestad Peruana.

Presentado: 23/01/2008
Aceptado: 20/04/2008
Publicado *online*: 21/07/2008

Introduction

Several species of storm-petrels breed in the Humboldt Currrent System between northern Peru (4° S) and Chiloe Island, Chile, (42° S). These include the Wedge-rumped Storm-petrel (*Oceanodroma tethys*), Markham's Storm-petrel (*Oceanodroma markhami*), Elliot's Storm-petrel (*Oceanites gracilis*) and Hornby's Storm-petrel (*Oceanodroma hornbyi*) (Murphy 1936, Harrison 1983, Carboneras 1992, Brooke 2004).

Storm petrels collected by various researchers in the Humboldt Current System between 1913 and 1923 were reported by Murphy (1936). Prior to this, the only known breeding localities were of the Wedge-rumped Storm-petrel *Oceanodroma tethys kelsalli*. In recent years, additional storm petrel colonies have been discovered along the Peruvian and Chilean coast, although very little is known about the breeding biology and numbers of these birds (Jahncke 1992, Schlatter & Marin 1983, Simeone et al. 2003, Ayala et al. 2004, Bernal et al. 2006, Ayala & Sanchez-Scaglioni 2007).

Oceanodroma tethys kelsalli was first found breeding in natural crevices in rocks on Gallinazo and Guaca Islets, Pescadores Islands, and on San Gallan Island off the coast of central Peru in 1912 (Murphy 1936, Harrison 1983, Duffy et al. 1984). In Chile, a small breeding colony was reported on Isla Grande (Simeone et al. 2003, Bernal et al. 2006). In Peru, Ayala et al. (2004) found 100 pairs breeding in crevices along dry-stone walls on Chao and Corcovado Islands and Ayala & Sanchez-Scaglioni (2007) found 176 nests on nearby Ferrol Island in Chimbote bay. That specie is not protected by Peruvian Government because of lack of information.

We present information from another newly discovered breeding colony of the Wedge-rumped Storm-petrel on Santa Island, off the coast of north-central Peru.

Methods

The island of Santa (09°01' S; 78°40' W) has an area of 1,42 km^2 and reaches a maximum height of 141 m and is located about 5,66 km from Chimbote (Fig. 1). The Santa Island is administrated by PROABONOS (Special Project for the Promotion of the Use of Guano Coming from Seabirds), that regulates the disturbance to breeding of guano birds on Peruvian islands (Ayala & Sanchez-Scaglioni 2007).

We visited Santa overnight on 29—30 April 2007 and conducted a nocturnal census of storm-petrel nests in dry stone walls were conducted from 18—23 h during the two days spent at the island. The counts were made. Due to nest characteristics it was impossible to detect activity otherwise. We made systematic searches of likely nesting habitat with a torch, especially in the more highly populated areas. In some areas with a low density we used the playback method (Ratcliffe 1998) to locate storm-petrel nests. Observers walked slowly around the stone walls, playing a tape recording of a Wedge-rumped storm petrel calling from the nest (Whittington et al., 1999). Approximately 80% of the island was searched for storm petrel nests. However, a nearby islet could not be searched due to its inaccessibility. A nest was counted as active if eggs were visible from the burrow entrance or if adults were visible inside the nest.

In addition, the widest and narrowest dimensions of the nest openings and their depth were measured, as were some

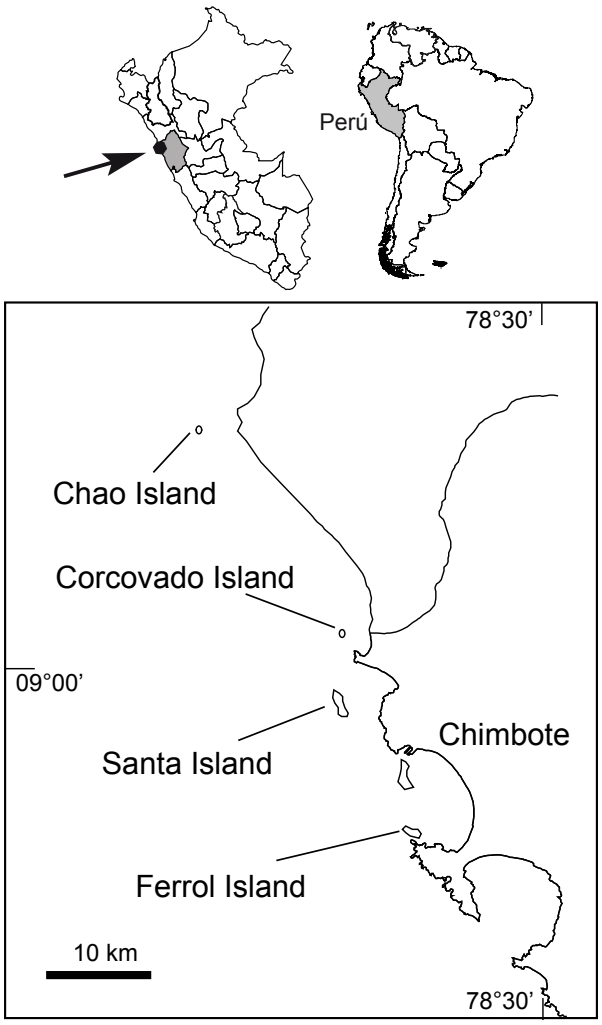

Figure 1. Map of Peruvian islands, important breeding localities of the Wedge-rumped Storm petrel : Ferrol, Chao, Corcovado and Santa Islands.

eggs and breeding adults. We measured body mass (±1 g using a l00 or 300 g Pesola spring balance), wing chord (±1 mm using a stopped ruler), exposed culmen length (±0,1mm using a caliper) and tarsus length (±0,1 mm using a caliper). All measurements and weights are expressed as mean ±SD. Egg volume was calculated using V= 0,51 x L x B^2, where B= breadth and L= length (Hoyt 1979).

Results and discussion

A total of 407 active nests were located, including 92 (22%) with eggs and 7 (8%) with chicks. All the nestlings were covered in down, one of them also having grown some quills (Table1).

Table 1. Measurements of Wedged rumped storm petrel chicks found at Santa Island, Peru.

Molt description	Completely downy. Eyes closed	Completely downy. Eyes closed	Callamus at superior and inferior dorsum. Eyes closed
Wing (mm)	10	12	15
Bill (mm)	6,9	7,1	8,8
Tarsus (mm)	8,6	10,1	12,9
Mass (g)	4	5,75	15,75

Most breeding birds were found in an area near to the guard house in the east of the island, one dry stone wall in this area contained 82 nests, and here some storm petrels were heard with out using tape recorder. In the south and southwest of the island, where about 4500 nesting Peruvian Boobies *Sula variegata* and 500 Guanay cormorants *Phalacrocorax bougainvilli* were recorded, 65 Wedge-rumped storm petrel nests were found. Large numbers of ticks (O*rnithodorus amblus*) were present and since high densities of ticks may lead to the death of young birds and the desertion of nests or even whole colonies (Duffy 1983), may explain why this area had relatively few storm petrel nests. The south and southwest of the island has relatively high humidity and several of the dry-stone walls were covered with moss and algae. In those walls no storm petrel nests were found. Wilson Storm Petrel showed a preference for rocky slopes rather than moss-covered hillsides (Orgeira 1997). Moss helps to retain the humidity (Singer & Corte 1962) and may explain why these walls are not selected by breeding Wedge-rumped Storm petrels.

In the north 26 nests were counted. This area had a big colony of Inca tern *Larosterna inca*. Inca Terns nest in crevices along the coast of the islands and lay one or more frequently two eggs (Velando et al. 2001). Besides, storm petrels fly away from nest sites during light hours while a member of pair terns is in the nest. Interspecific differences in habit preferences permit coexistence of species within mixed colonies by decreasing territorial aggression which is especially detrimental to the subordinate species (Fasola & Canova 1992). In this case, areas with large numbers of nesting storm petrel do not have nesting terns although areas with large numbers of nesting terns have some nesting storm petrel.

The widest part of the opening of 11 burrows had a mean of 146±72 mm (range 40—270 mm) and the narrowest part a mean of 76±42 mm (range 20—130 mm). The mean depth was 346±146 mm (range 220—570 mm).

Three eggs had mean dimensions of 26,2±0,07 mm by 19,9±0,02 mm. The egg measurements are similar to those of eggs measured on the Pescadores (Murphy 1931) (Table 2). Seven unsexed adults had mean culmen measurements of 11,5±0,7 mm (range 10,4—12,5 mm), wing length 113±4,4 mm (range 121—130 mm), tarsus 22,1±1,1 mm (range 20,4—23,8 mm) and mass 20,7±1 g (range 20—22 g) (Table 2).

A pair of dismembered wings of this storm petrel was found near to the dry stone walls in the north of Santa. Potential predators present at the island include an expanding population of the Kelp Gull (*Larus dominicanus*) and the Peregrine Falcon (*Falco peregrinus*). The island is free of terrestrial predators.

Chimbote Bay and the surrounding area, including Santa, Ferrol, Chao and Corcovado islands (Fig. 1), are important breeding localities of the Wedge-rumped Storm petrel (Ayala et al. 2004, Ayala & Sanchez-Scaglioni 2007)(Table 3). Santa is the biggest of this group of islands. Chimbote is near to an important upwelling area located between 7° and 9º S (Guillen 1983, Guillen & Calienes 1981), and is an important port of the anchovy (*Engraulis ringens*) fishery (Estrella et al. 2001). The nesting period of *O. t. kelsalli* appears to correspond with the peak period of anchovy recruitment in Peru (Ayala & Sanchez-Scaglioni 2007).

Table 2. Comparative data on adult measurements and egg size of Wedge-rumped storm petrel in Peru. Lengths in millimeters, weight in grams.

	Chao - Corcovado I. (*)	Ferrol I. (**)	Santa I. (***)	Peruvian coast (****)
Adults	n=6	n=7	n=7	n=14
Bill length	12,1 ± 0,2	11,3 ± 0,1	11,8 ± 0,7	11,7
Tarsus	21,7 ± 1,0	21,4 ± 0,5	22,2 ± 1,1	21,5
Wing length	123 ± 2,6	125 ± 5,2	127 ± 4,4	123,9
Mass	23 ± 2	22,1 ± 1,4	20,7 ± 1	
Eggs	n=3		n=3	Pescadores island n=6
Length	26,2 ± 1,6		26,2 ± 0,07	27,3 ± 0,9
Width	19,5 ± 0,7		19,9 ± 0,02	19,9 ± 0,6
Weight	5,7 ± 0,6		5,1 ± 0,5	-
Volume cc	5,4 ± 0,1		5,3 ± 0,3	5,5 ± 0,2

* Data from Ayala et al. (2004)
** Data from Ayala & Sanchez-Scaglioni (2007)
*** This study
****Data from Murphy (1936)

Spear & Ainley (2007) believe that the breeding seasons of *O. t. kelsalli* may be more protracted than suspected or even biseasonal. Thus, abundance was ~1,2× greater during the austral autumn than in spring, analyses for this species pertain to waters from 32° N to 30° S and to 400 km off shore. This difference was unexpected, given that the breeding season of this taxon is in autumn (Spear & Ainley 2007). In Peru the peak of laying is in April and May (Ayala et al. 2004, Ayala & Sanchez-Scaglioni 2007). In Chile, the first egg laying may occur in late December (Bernal et al. 2006). On 24 and 25 December 2002, Santa Island was visited and some abandoned eggs were found, but no adults. Staff inhabiting this island indicated what Wedge-rumped Storm- Petrels had nested several months previously (Ayala unpub. data). Murphy (1925) reported *O t kelsalli* as nesting during the southern hemisphere winter.

Spear and Ainley (2007) reported abundance estimates of *O. t. kelsalli* were 1258700 and 1451800, respectively in spring and autumn. However, we know of only 800 pairs breeding on one Chilean and four Peruvian islands. In contrast, Harris (1969) reported 200000 nests in Galapagos for *O. t. tethys* and Spear and Ainley (2007) reported abundance estimates of 1136900 and 628000 respectively in spring and autumn. The islands reported by Murphy (1936) do not have breeding storm petrels (Ayala & Sanchez-Scaglioni 2007). It is possible other breeding sites exist on the Peruvian coast; also it is necessary to collect individuals in the sea of this bird because subspecies cannot be identified at sea. Surveys of nesting areas in coastal Peru will provide much-needed information on Wedge-rumped storm-petrel status.

Acknowledgments

APECO (Peruvian association for the conservation of nature) provided logistical support. P. Whittington and M. Plenge made some useful comments on the manuscript. PROABONOS authorized our research on Santa Island. To Artisanal fishermen from Chimbote that kindly provided transport.

Literature cited

Ayala, L. & R. Sanchez-Scaglioni. 2007. A new breeding location for the Wedge-rumped Storm-Petrel Oceanodroma tethys kelsalli in Peru. Journal of Field Ornithology 78(3): 303-307. DOI: 10.1111/j.1557-9263.2007.00106.x.

Ayala, L., C. Mendoza, & J. Perez. 2004. Two new breeding localities for the Wedge-rumped Storm-Petrel Oceanodroma tethys kelsalli in Peru. Marine Ornithology 32: 107-108.

Bernal M., Simeone A. & M. Flores. 2006. Breeding of Wedge-rumped Storm-Petrel (Oceanodroma tethys) in northern Chile. Ornitologia Neotropical 17: 283-287.

Brooke, M. de L. 2004. Albatrosses and petrels across the world. Oxford University Press, Oxford, UK.

Carboneras, C. 1992. Family Hydrobatidae (storm-petrels). In: del Hoyo, J., Elliot, A. & Sargatel, L. (Eds). Handbook of the birds of the world. Vol. 1. Ostrich to ducks. Barcelona: Lynx Edicions. pp. 258–271.

Crossin, R. S. 1974. The storm-petrels (Hydrobatidae). Pages 154–205 in Pelagic Studies of Seabirds in the central and eastern Pacific Ocean (W. B. King, Ed.). Smithsonian Contributions to Zoology, no. 158.

Duffy, D.C. 1983. The ecology of tick parasitism on densely nesting Peruvian seabirds. Ecology 64: 110—119.

Duffy, D.C., C. Hays, & M. A. Plengue. 1984. The conservation status of Peruvian seabirds. In: Status and conservation of the world's seabirds (J. P. Croxall, P. G. H. Evans, and R. W. Schreiber, eds), pp. 245-259. International Council for Bird Preservation Technical Publication 2, Cambridge, UK.

Estrella C, Palacios J., Avila W. & A. Medina. 2004. Informe estadístico de los recursos hidrobiologicos de la pesca artesanal marina por especies, artes meses y lugares de desembarque durante el Segundo semestre del 2000. Informe Instituto del Mar del Perú. 164. 163p.

Fasola M. & L. Canova. 1992. Nest habitat selection by eight syntopic of Mediterranean gulls and terns. Colonial Waterbirds 15: 169-291.

Guillen, O. 1983. Condiciones oceanograficas y sus fluctuaciones en el Pacifico Sur Oriental. In Proceedings of the expert consultation to examine changes in abundance and species composition of neritic fish resources. (G.D. Sharp and J. Csirke eds.) FAO Fisheries Report. 291:3

Guillen, O. & R. Calienes. 1981. Upwelling off Chimbote. In Coastal and Estuarine Science. 1:312-326. Reimers, C. and E. Suess Eds.

Harris, M.P. 1969. The biology of storm petrels in the Galapagos Islands. Proceedings of the California Academy of Sciences 4: 95-166.

Harrison, P.C. 1983. Seabirds: an identification guide. Houghton Mifflin, Boston, MA.

Hoyt, D. F. 1979. Practical methods of estimating volume and fresh

weight of bird eggs. Auk 96: 73-77.
Jahncke J. 1992. Primer informe del area de anidacion de la golondrina de la tempestad negra Oceanodroma markhami (Salvin 1883). Memoria X CONABIOL. 339-343.
Murphy, R.C. 1925. Bird islands of Peru. G.P.Putnams & sons. New York & London. 61p.
Murphy, R.C. 1936. Oceanic birds of South America, volume II. The Macmillian Company, New York, NY.
Orgeira, J.L. 1997. Nidificacion y habitat del petrel de Wilson Oceanites oceanicus en Punta Cierva, Costa de Danco, Peninsula Antartica. Ornitología Neotropical 8: 49-56.
Ratcliffe, N., D. Vaughan, C. Whyten, & M. Shepherd. 1998. Development of playback census methods for Storm Petrels Hydrobates pelagicus. Bird Study 45: 302-312.
Schlatter, R. & M. Marin. 1983. Breeding of Elliot's Storm Petrel Oceanites gracilis in Chile. Le Gerfaut 73: 197-199.
Simeone A., G. Luna-Jorquera, M. Bernal, S. Garthe, E. Sepúlveda, R. Villablanca, U. Ellenberg, M. Contreras, J. Muñoz, & T. Ponce. 2003. Breeding distribution and abundance of seabirds on islands off north-central Chile. Revista Chilena de Historia Natural 76: 323-333
Singer, R., & A. Corte. 1962. Estudio sobre los basidiomicetes antárticos. Contribución Inst. Antártico Argentino no.7. 1-13.
Spear L. B. & D. G. Ainley. 2007. Storm-petrels of the eastern Pacific Ocean: Species assembly and diversity along marine habitat gradients. American Ornithologists' Union. Ornithological Monographs. 62: 1–77.
Velando, A., C. M. Lessells & J. C. Marquez. 2001. The function of female and male ornaments in the Inca Tern: evidence for links between ornament expression and both adult condition and reproductive performance. Journal of Avian Biology 32: 311-318.
Vilchis L. I., L. T. Balance & P. C. Fielder. 2006. Pelagic habitat of seabirds in the eastern tropical Pacific: Effect of foraging ecology on habitat selection. Marine Ecology Progress Series 315:279–292.
Whittington P., B. Dyer, R. Crawford & A. Williams. 1999. First recorded breeding of Leach's Storm Petrel Oceanodroma leucorhoa in the Southern Hemisphere, at Dyer Island, South Africa. Ibis 141: 327-330.