



First complete census of Cory's Shearwaters *Calonectris diomedea borealis* breeding at Berlengas Islands (Portugal), including the small islets of the archipelago

Primeiro censo completo da população nidificante da Cagarra *Calonectris diomedea borealis* nas ilhas Berlengas (Portugal), incluindo os ilhéus do arquipélago

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RESUMO - O arquipélago das Berlengas, situado na costa ocidental portuguesa, concentra a maioria da população reprodutora da Cagarra *Calonectris diomedea borealis* da costa Atlântica continental da Península Ibérica. Em Junho de 2010 e de 2011 foi realizado o primeiro censo global do arquipélago tendo-se estimado a população reprodutora em 980-1070 casais, dos quais 170-210 casais se encontravam dispersos por oito pequenos ilhéus. Até à data não era ainda conhecida a importância dos pequenos ilhéus para a nidificação da Cagarra. Apesar de representarem uma área de ca. 10% da superfície terrestre, os oito ilhéus albergam ca. 20% da população reprodutora.

The Cory's Shearwaters *Calonectris diomedea borealis* breeding in the Atlantic coast of the Iberian Peninsula are largely concentrated at the Berlengas archipelago (figure 1), where censuses have been carried out in the last decades (Teixeira 1983; Granadeiro 1991; Lecoq *et al.* 2010). The species is also present at Coelleira and Sisargas islands (NW Iberian coast), where a few pairs were found breeding during 2007-2009 with a population tentatively estimated at 30-40 pairs (Docampo *et al.* 2010).

Despite a detailed survey in 2005 carried out in the larger islands of the archipelago (Lecoq *et al.* 2010), there is still a lack of information on the importance

of the smaller rocky islets of the archipelago. Here we update the estimates of the breeding population for the whole archipelago, including the first data on numbers of Cory's shearwaters breeding on most of the smaller islets.

The Berlengas archipelago (39°24'N, 9°30'W) covers ca. 104 ha and can be divided in three groups of rocky islands, Berlenga island, Estelas and Farilhões, each comprising several islets and stacks (figure 1). We considered an islet all sites smaller than 5 ha. Only those islets (n=8) large enough (i.e. larger than ca. 0.5 ha) to support breeding shearwaters were targeted. All islands and islets almost lack flat ground (except Berlenga) and are mostly surrounded by steep cliffs. The small islets are characterised by bare rock faces and the presence of little (typically *Suaeda* sp.) or no vegetation cover. Black rats *Rattus rattus* and wild rabbits *Oryctolagus cuniculus* are known from Berlenga only.

Counts were carried out following the methods adopted in previous assessments (see Lecoq *et al.* 2010 for details), and involved direct counts of active nests, and abandoned or predated eggs. Berlenga island was surveyed between 6 and 10 June 2010, and the other islands and islets were counted from 8 to 10 June 2011 (with the exception of Cerro da Velha islet, which was visited on 15 June 2011). Field work involved a team of up to three experienced surveyors corresponding to ca.

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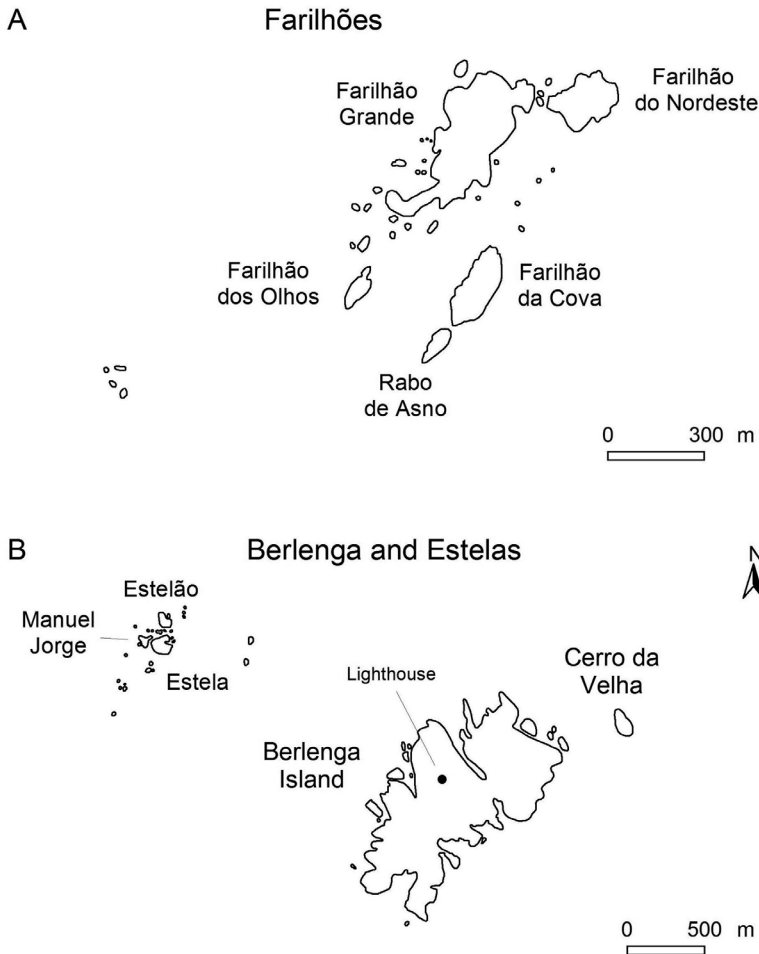


Figure 1. Detailed maps of Farilhões (A) and Berlenga and Estelas (B).

Figura 1. Mapas pormenorizados dos Farilhões (A) e da ilha da Berlenga e das Estelas (B).

80 man-hours (including 13 man-hours on the islets and 35 on Farilhão Grande). We used climbing equipment in order to assess numbers of birds nesting in steep areas at Farilhão Grande, F. da Cova and F. do Nordeste. The number of pairs breeding in inaccessible areas was estimated (and presented separately) by assessing the proportion of available breeding habitat in these areas, following Lecoq *et al.* (2010).

A total of seven islands and islets were counted (figure 1 and table 1). Estelão, Manuel Jorge and Farilhão dos Olhos islets could not be visited due to adverse sea conditions. We estimate a total of 310 pairs at Berlenga island in 2010 and 500-550 pairs at

Farilhão Grande island in 2011 (table 1). This adds to 170-210 pairs estimated to breed on the islets of the archipelago in 2011.

These results update the most recent estimates and reveal the importance of the small islets for breeding Cory's shearwaters at Berlengas islands. The islets cover an area no larger than ca. 10 ha and yet they account roughly for 20% of the breeding population at Berlengas archipelago. The importance of the islets for breeding Cory's shearwaters has been overlooked throughout the years by the previous observers (*e.g.* Teixeira 1984; Granadeiro 1991; Lecoq *et al.* 2010). On the islets we

Table 1. Counts and population estimates of Cory's Shearwaters breeding at Berlengas archipelago in 2010 and 2011. Names of locations referred to islets, unless otherwise stated. The approximate area for each island and islet was calculated based on the projected surface, i.e., without taking into account the topography.

Tabela 1. Contagens e estimativas da população reprodutora da Cagarra no arquipélago das Berlengas em 2010 e 2011. Os nomes dos locais amostrados referem-se aos ilhéus, excepto se indicado de outro modo. A área aproximada de cada ilha foi calculada considerando a projecção vertical sem correcção do relevo.

Island/islet	Year counted	Area (ha)	No. breeding pairs		Notes
			Counted	Estimate for 2011	
<i>Berlenga group</i>					
Berlenga island	2010	79	237	310	Ca. 58% of the nests in three colonies; 12 nests predated or abandoned.
Cerro da Velha	2011	1.4	19	25	Nests in two colonies in shallow caves and under <i>Suaeda</i> sp.
<i>Estelas group</i>					
Estela	2011	1.2	3	10-15	Nests in burrows and under <i>Suaeda</i> sp.; one egg abandoned.
Estelão	–	0.6	–	5	Estimates based on size and similarity with the nearby Estela.
Manuel Jorge	–	0.4	–	5	
<i>Farilhões group</i>					
Farilhão Grande island	2011	8.2	261	500-550	41 nests showed signs of predation; 20 nests found on walls with climbing equipment.
Far. da Cova	2011	2.3	58	100-120	Accessible areas on the top and cliffs in the N-NW slope were surveyed; nests in rock crevices, burrows, and under the cover of vegetation (including under wild olive trees <i>Olea europaea</i> var. <i>sylvestris</i>); 18 nests showed signs of predation.
Far. do Nordeste	2011	2.4	9	15-20	Nests in rock crevices and relatively exposed; five nests showed signs of predation.
Far. dos Olhos	–	0.5	–	5-10	Estimates based on similarity with the nearby Rabo de Asno.
Rabo de Asno	2011	0.5	3	5-10	Nests in shallow rock crevices; two eggs abandoned.
TOTAL		97.7	590	980-1070	

also noticed that many nests were easily accessible by gulls. Indeed, we observed predation of eggs by Yellow-legged gulls *Larus michabellis* at Farilhões (e.g. 31% of the counted eggs at Farilhão da Cova and 56% at F. do Nordeste; see table 1) which is in accordance with previous observations (Lecoq *et al.* 2010).

Numbers on Berlenga were very similar (214 counted nests in 2005 comparing with 237 nests in 2010) suggesting a stable or favorable trend for this island (Lecoq *et al.* 2010). In contrast, our numbers for Farilhão Grande (261 pairs in 2011) are lower than those obtained in 2005 when 401 pairs were counted. It should be stressed that during the present survey we did not count two important caves due to rough sea conditions where 40 pairs were breeding in 2005 (M. Lecoq unpublished data). However, this seems insufficient to explain such a difference in numbers between the two censuses. Instead, this discrepancy probably reflects a reduction in the number of eggs laid in 2011 at Berlengas archipelago, a situation observed elsewhere in the Atlantic (e.g. Selvagem Grande, Madeira, P. Catry *pers. com.* and Corvo, Azores, S. Hervías *pers. com.*). In fact, a decrease in numbers (eggs laid) of about 25% in the three main colonies at Berlenga was also noticed during a partial survey of this island conducted in June 2011 (M. Lecoq, unpublished data). Taking that into account, we assume a more reliable population estimate for F. Grande of 500-550 pairs (Lecoq *et al.* 2010), and a global population estimate for the whole archipelago of 980-1070 pairs in 2011.

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