

Conservation and restoration of insular habitats in favor of native vegetation and nesting marine bird populations

Institution: SPEA, projeto LIFE Berlengas

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Marine Biology Master
25/2/2016

1. INTRODUCTION

Berlengas archipelago is placed on the western coast of Portugal near Peniche (~10km), and comprises Berlenga Island and associated reefs, Farilhões and Estelas islets. Berlengas has an important conservation value not only terrestrial, because of its endemic plant species, but also marine, being a nesting hotspot for endangered marine birds. Berlengas archipelago is the most important area in mainland Portugal for breeding seabirds. The archipelago hosts the only known breeding population of the vulnerable Cory's Shearwater (*Calonectris diomedea borealis*) in mainland Portuguese coastal waters (Lecoq, Ramírez, et al. 2011). In addition to this, one of the main concerns is the propagation of the invasive species Ice plant (*Carpobrotus edulis*).

LIFE Berlengas project (May 2016-September 2018) will contribute to the sustainable management of this Special Protection Area (SPA) with the objective of conserving its habitats, endemic plants and marine birds species (SPEA 2015). The LIFE Berlengas is coordinated by the Portuguese Society for the Study of Birds (SPEA; Portuguese BirdLife partner), in partnership with the national Institute for Nature Conservation and Forests (ICNF), Peniche Municipal Council (CMP), the Faculty of Social Sciences and Humanities of the Universidade Nova de Lisboa (FCSH) and as an external observer, the School of Tourism and Maritime Technology from Instituto Politécnico de Leiria.

Despite of the localization near land and easy accessibility of Berlengas archipelago, its marine bird populations aren't well known yet, being important the lack of information for the conservation of Cory's shearwater (*Calonectris borealis*), Band-rumped storm petrel (*Hydrobates castro*), European shag (*Phalacrocorax aristotelis*) and Common murre (*Uria aalge*). They are still unknown the effects of predation by Black rat (*Rattus rattus*) and Yellow-legged gull (*Larus michahellis*), boats, fishing impacts, and other human interactions with their ecosystem.

Accidental marine birds deaths due to interaction with fisheries it is widely unknown in Portugal (SPEA 2015). Those species that feed dive, looking for pelagic fishes or small cephalopods, are the most susceptible. Examples are the European shag or the Cory's shearwater, whose populations are under a decreasing trend according to IUCN.

Cory's Shearwater is the most abundant bird that nest in Portugal, although it exclusively does it in Açores, Madeira and Berlengas. The reproduction begins at the beginning of the spring, when the first birds arrive between February and March. Nest are located in natural cavities like under the ground or in holes in rocky walls, being really rare to find them exposed. Cory's Shearwater only lay one egg per reproductive season; therefore, juveniles when they are still unable to fly, are vulnerable to the predation by the Black rat and the Yellow-legged gull. Juveniles are left alone in the nest while the parents go to find food during the day, coming back at night to the nests to feed their offspring. Since Berlengas waters are rich in nutrients and fishes due to upwelling phenomena, it is not uncommon to observe large groups of adults looking for food close by the colony. Tardy juveniles leave the nest at the beginning of November, period when it is common to see large flocks resting near Berlengas since they will shortly start the migration dislocation mainly to the South Atlantic.

2. DESCRIPTION OF THE WORK

a. WORK LOAD:

The internship started 20/10/2015 and ended 27/10/2015. Due to the trips (to Peniche and boat trip to Berlengas Archipelago), the morning of the 20th and afternoon of the 27th, weren't counting as working activity. Every day we were working around 7h, organized in different shifts:

- Cory's shearwater weighing and measuring: Morning shift (6h-8h), afternoon shift (17h-20:30h) and night shift (24h-2h)
- Cory's shearwater monitoring of adults: Afternoon shift (17h-20h)
- Iceplant removal: Morning shift (10h-13h)
- Seeding of native species: Morning shift (10h-12h)
- *Rattus rattus* demographic study: Morning shift (9h-12h), afternoon shift (16h-18h)

b. DIFFERENT STAGES OF THE LEARNING PROCESS:

- MONITORING OF CORY'S SHEARWATER REPRODUCTION:

Most of the work we carried out was related to the study of the reproduction of Cory's shearwater. The work could be divided in two types: measuring and weighing of juveniles, and adults monitoring. The part that involved more efforts was measuring and weighing the juveniles three times per day. There were a total of 40 nests, and each day 20 of them were measured. In the first shift, at 6 am, the only objective was weighing. In order to do this, nest by nest we had to catch the bird with a glove to prevent injuries and pull it out of the nest. Once we caught it, we had to put it in a cloth bag and weigh it. In the second shift, at 5:30 pm we had not only to weigh each bird but also measure the wing length,

peak and tarsus length. Because of the difficulty of doing it accurately since they are wild animals and they offer resistance at the same time we need to reduce as much as possible the stress we cause, the work was especially slower than other shifts. Finally, during the night shift, we had to weigh again the juveniles and count the adults that we could find in the colony. The objective of weighing was to assess if they juveniles were fed or not during the night, which also indicated the grade of parental care they are receiving, being less and less the older they get, in order to boost their release from the nests.

The second part of the work was the monitoring of the adults that were resting on the water by scopes and binoculars at different strategic points of the island. Especially at the end of the week, the number of birds found were higher, and an average of 3 groups of 200 individuals was found in each counting point.

With all of this information, the objective was relating the growth of the juveniles and the reproductive ecology with the support of the adult colonies and fishing boats near the island.

- DEMOGRAPHIC STUDY OF *Rattus rattus*:

The Black rat is a direct predator of marine bird eggs, juveniles and even adults depending on the size of the species. In Berlengas there is an important population of *Rattus rattus*, so the objective of this study was to evaluate the current state of the population. For this purpose, a total of 29 traps were installed throughout the island in order to estimate the population size using the mark-and-recapture method. The work consisted in, firstly, installing the traps with peanut butter as bait, leaving them open for two days for the animals to get accustomed to them. After this period of acclimation, during which each trap was cleaned and (re-)baited, the experiment started. It was conducted for 4 days in a row, being the capture 1, 3, 2 and 1 the total captures per day respectively, being always one capture per trap. There was no recapture. In each of the capture we had to put an earring tag, measure legs, check

sex, weigh and take a tissue sample from the ear in order to do DNA analysis, everything without any direct contact with the animal in order to minimize disease transmission.

- REMOVAL OF ICE PLANT INVASIVE SPECIES AND SEEDLING OF NATIVE SPECIES

The native flora of the island is in danger due to the expansion of the Ice plant (*Carpobrotus edulis*). This plant grows really fast and covers completely all the surface of the land, with really well established roots. The fact that the roots are so deep, makes the removal a really exhausting task and must be done by hand since it is the only way to prevent its propagation again. The removal is made by the formation of rolls with the plant itself, and always alternately in order to prevent soil erosion and falling off the hillside.

3. APPLICATIONS OF THE METHODOLOGIES

Reproduction and demographic studies of marine birds are a necessary tool to reach an effective management of their populations and their conservation. Many examples of demographic studies of Cory's Shearwater can be found (Telailia et al. 2014; Lecoq, Geraldles, et al. 2011; Lecoq, Ramírez, et al. 2011; Catry et al. 2009) since it is considered a vulnerable species (Anselme et al. 2012). Data are still lacking and investigations are needed in order to reach a clear understanding of populations dynamics (Telailia et al. 2014). In order to do that, different techniques can be carried out like studying the breeding biology and nestling growth and compare with other regions to identify general trends (Telailia et al. 2014), studying the duration of the brood-guarding stages (Catry et al. 2009), making estimates of the breeding populations to localize important spots to reproduce (Lecoq et al. 2011) as well as the general trends of the reproductive behavior (Lecoq et al. 2011).

Studies of demographic trends of introduced predators that are considered a threat are often as important as applying conservation efforts directly in the vulnerable population. However, the magnitude of their impact has not often been studied (Iguar et al. 2006). This is the case for the introduced alien Black rat *Rattus rattus*, which is being studied by a mark recapture method in order to carry on future rat control campaigns or not, technique which is also used with other mammal predators (Hervías et al. 2013).

4. REFERENCES

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5. ANNEX



Fig 1. Measuring juveniles of Cory's shearwater surrounded by rocky nests.



Fig 2. Pulling from the nest one juvenile of Cory's shearwater in order to proceed with the weighing and measuring.



Fig 3. Tarsus measuring of one juvenile of Cory's shearwater using a caliper.



Fig 4. Peak measuring of one juvenile of Cory's shearwater using a caliper.



Fig 5. *Rattus rattus* being released from a trap after tagging and doing all the biometric measurements and observations.



Fig 6. Removing Ice plant in of the hills, pulling it down by making a roll in order optimize the removal of the roots. It was made by alternating stripes so the risk of sliding the hillside down was minimized.



Fig 7. Seedling native and endemic species: *Narcissus bulbocodium*, *Armeria berlengensis*, *Herniaria berlengiana*, *Pulicaria microcephala*.