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"CONSERVATION AND RESTORATION OF ISLAND HABITATS FOR THE BENEFIT OF NATIVE VEGETATION AND POPULATIONS OF BREEDING SEABIRDS"

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Figure1: Berlengas Island (pictures from Luis Ferreira)

1. INTRODUCTION

Berlengas Islands (See fig.1) situated on the western coast of Portugal (39°24'N, 9°30'W), are a small group of granitic islands and are important due to the presence of the only colony of Cory's Shearwater of all the Atlantic coast of Iberia (Granadeiro et al., 1991). These birds (*Calonectris diomedea*) (*fig.2*) are adapted to the marine life, they mainly feed on actively swimming squid, crustaceans, and small fish (Haney et al., 1985), they breed mainly on the Macaronesian Islands (as Canaries,

Madeira and Azores) and as write beforehand in Berlenga's off Portugal. During their not breeding seasons (from November to May) they can be found in the South Atlantic ocean offshore from Brazil, Uruguay and Argentina and close to southern Africa, including Indian Ocean. These birds are pelagic from temperate water (more or less 16°C) to warmer water and from coastal to offshore (took from the website: http://nzbirdsonline.org.nz/species/corys-shearwater). Several invasive mammals (as: mice, rats, cats and so on) have been introduced all around the world, where they keep affect, negatively, the native biodiversity (Hervías et al., 2013). Indeed, in the case of this particular island and this particular sea bird, rats are likely to cause a decline on this population.

Figure 2: Cory's shearwater (pictures from Luis Ferreira)

2. OBJECTIVE

The aim of this project, from the SPEA organization, is to understand the hazard that are affecting seabird and endemic plant species on this particular island and try to find solutions in order to minimize the issues. This analysis includes monitoring schemes and, whenever possible, the supervision of the main activities of the area: fisheries, recreational activities and tourism. Furthermore, since there is a connection between these species and alien plants and different terrestrial mammals, the organization is also studying the human's effects on the seabirds. (ec.europa.eu).The purpose of this field work was to analyze the study of Cory's shearwater (See fig.2), especially of the chick's growing and the risks they have to face, like the presence of rats. Furthermore, during these hours spent with SPEA, we realized how important is to remove invasive species and plant endemic ones.

3. MATERIAL AND METHODS

3.1 Study of the Cory's shearwater

Figure 3: artificial nest positioned from SPEA (picture from Lecoq, M., & Oliveira, N. 2011)

Spea' organization decided to place nests in particular sites around the island, to facilitate the presence of the Cory's shearwater and to monitor them in an easiest way.

3.1.1 Weight of the chick and measuring of it

Figure4: capturing and weight of Cory's shearwater' chick

The studied bird (male or female) may go to feed the chick once a day during the breeding season; what the organization wants to understand is at what time of the day the little Cory's shearwater are fed by the parents and if the reason why some of them are not fed anymore is because they are already adults. For these research, 3 different turns were organized during the day, as follow: 5.30 pm, 24.00 and 7.30 am. During all the turns they are captured to see if any changes of weight occurs during the day. (See fig. 4). At 5.30 pm they are also measured (beak, tarsus and wings) to see their growing. Sometimes it is possible to observe some chick out of their nest, looking the horizon. These probably means they have grown, they are looking around and maybe recording all the environment. As soon as they are starving they are going to leave the island and start to live as adults.

3.1.2 Bird watching and counting at the ocean's surface

Figure 5: observation of Cory's shearwater (jangadas)

With a proper telescope it is possible to find, on the ocean's surface, a group of Cory's shearwater (See fig.5). As soon as the group is identified, helped by a ruler, the distance between the horizon and the group can be measured to calculate their approximate location. Thereafter, with a compass, also the direction of the group is measured. With all these information, it may be possible

to estimate the amount of this particular species, coming to the island.

3.2 Invasive and endemic species

Figure 6: removing of ice plant (picture from Luis Ferreira)

Figure 7: planting of endemic species (picture from Luis Ferreira)

As wrote in chapter 2, Spea organization is also monitoring the flora of the Berlengas Island. The invasive species *Carpobrotus edulis,* imported from South Africa to Europe, can be found all over the island because human planted them years ago. The rising of those species stopped the growth of the endemic species of the island as: *Armenia berlengensis, Herniaria berlengiana* and *Pulicaria microcephala*. The aim was to remove the invasive species and recovered the endemic ones that are disappearing. Some lines of *Carpobrotus edulis* have been removed from the field in order to create canals and bunches of the invasive species. The roots were put at the top of the bunches, so that, they could be drought out by the heat of the sun and die (See fig 6). Different seeds of native species (*Thapsia villosa, Angelica pachycarpa, Armeria berlengensis, Scrophularia sublyrata, Graminia, Lavatera arborea*) were put on the site where *Carpobrotus edulis* wasn't present anymore, in order to improve the recovering (See fig. 7).

3.2 Rats' monitoring

Figure 8: placement of peanut butter to attract rats

As already mentioned in chapter 1, Cory's shearwater are in danger because of the predation by mammals, in this case rats, which are not native from here. It is studied that, the eradication of those invasive mammals has had positive effects on many species of

seabirds (Hervías et al., 2013). Spea's team decided to do, for one week every month, the monitoring of the rats

Figure 9: measuring of rat

and successively study a possible removal. The researchers put traps in two previously defined grids (5*6 traps) located in two different sites who were recorded by gps and every day, the team pass by all the traps to check if there were some rats; if no rats were found they leave peanut butter to attract them and outside sprayed a particular composition to removed human' smell (See fig.9). If they find rats, they put them in a cage where researches could get all the necessary data: measured back foot, tag the ear, weight, recorded the sex and their state of reproduction, age and take a tissue sample for DNA analysis (See fig 8). The aim is to remove rats from the island, so they need to do all the studies described above in order to have a thorough knowledge about the rats, their population dynamic and from the DNA it may be possible to check if from the mainland others are coming. After the complete removal of the rats from the island, by creating a poison line, around the harbor, they can check if there are others and in this case people have to be careful when they leave the mainland to go to the island. Even so, it is important to say that, the removal of an invasive species may have abundance changes in another species; indeed, it is truly important the understanding of the impact of several invasive species and so the effect that can create, before proceeding with the eradication programs (Hervías et al., 2013).

3.4 Madeiran storm petrel

Figure 10: Madeira storm petrel

Madeira storm petrel (See fig.10) are the smallest species among the Procellariiformes, there are three breeding colonies in the Azores, on islands where are free from mammal's predator. In Europe these birds are breeding also in the Madeiran archipelago, the Salvages, on the

Canary Islands and on Farilhão Grande off continental Portugal (Bolton et al., 2004), the last one is the one that is taken in consideration in this study. The organization set a net in a specific point for 4 hours and they checked once an hour to see if they catch any birds. As written previously these birds are breeding on other island near by Berlengas (Farilhãoes) and they aimed to check if they were actively prospecting Berlega Island to attempt to nest.. On the Madeiran storm petrel is put a ring in order to recognize them in the future, they are measured and the reproductive stage is checked before letting them free again.

4. CONCLUSION

Spea's organization is expecting as results to have the three endemic species (*Armenia berlengensis, Herniaria berlengiana* and *Pulicaria microcephala*) mapped and monitored, including of course, the impacts of introduced plant species, with the study of eradication methods at specific areas. Moreover, another aim is monitoring, for 2 years at least, the breeding of seabirds species like: Cory's shearwater, Madeiran storm petrel, cormorant, *common guillemot, yellow-legged gull, lesser black-backed gull.* In this way they can also check their distribution, fisheries interactions and predation. The team put geolocation devices in Cory's shearwater and in 5 years, when it will come back to the island to breed, they will check the data and it may be possible to have a better knowledge at sea behavior during the non-breeding season.

5. REFERNCES

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