Aerial census: Abundance and distribution of marine birds along the Portuguese Continental coast

MARPRO

Conservation of marine protected species in mainland Portugal

SANTOS

Jorge Santos is presently involved in many conservation projects concerning marine environments and has been developing his PhD research within the MARPRO framework.

Santos, Jorge (1, 2), Helder Araújo (1, 2), Pedro Rodrigues (1,2,3) Marisa Ferreira (1, 3) Silvia Monteiro (3), Andreia Pereira (1), Catarina Eira (1, 2), José V. Vingada (1, 2, 3)

(1) Sociedade Portuguesa de Vida Selvagem. Departamento de Biologia, Universidade do Minho, Campus de Gualtar, 4720-057 Braga, Portugal

(2) Centre for Environmental and Marine Studies (CESAM) & Department of Biology. University of Aveiro, Campus Universitário de Santiago. 3810-193, Aveiro, Portugal

(3) Molecular and Environmental Biology Centre (CBMA) & Department of Biology, Universidade do Minho, Campus de Gualtar, 4710-047 Braga, Portugal

INTRODUCTION

One of the main constraints to the enlargement of the Natura 2000 network to marine environments is the lack of information on species and environmental characteristics far off the coast. Therefore, it is important to refine data on target species populations and implement standardized census methodologies acting as constant long-term surveillance mechanisms. The aerial census is the most cost-effective way to perform this kind of studies.

METHODS

Aerial surveys were carried out along the Portuguese coast between August and October of 2010, September of 2011 and September of 2012 to estimate seabird distribution, abundance and habitat use (Figure 1).

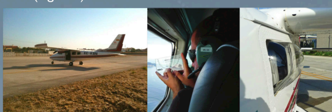

Figure 1 - On board work conditions and detailed view of the Vulcanair P-68 Observer II

The prospected region comprises the Portuguese Continental coast between Caminha and Vila Real de Sto António up to the 50nm mark. This area was stratified into 5 subareas (or strata): "NORTE", "CENTRO", "ALENTEJO" and "ALGARVE". The "GALIZA" occurrences were also considered for continuity purposes with a combined total area of 74870 km2.

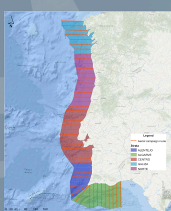

Figure 2 - Survey area and design

The survey was conducted using the line transect sampling method consisting on 100-Km transects perpendicular to the coast and spaced 18,5 Km apart (Figure 2). The observation team included two trained observers and a data recorder. Surveys were made on a Partenavia P-68 modified with "bubble windows" in continuous effort. Distance® software was used to calculate abundance estimates for the detected species.

RESULTS AND CONCLUSION

We present results for Calonectris diomedea, Puffinus gravis, Puffinus puffinus, Morus bassanus and Stercorarius skua (Table I). Data on Puffinus mauretanicus will be dealt with elsewhere. The Cory's Shearwater occurred in all three years showing one of the highest abundance values (1923 to 58637 individuals) with a measurable annual increment, especially in 2012. Great shearwater and Manx shearwater abundance estimates were calculated based only on data collected in 2012, when enough sightings to perform abundance calculations were recorded (36467 and 4105 individuals, respectively). Northern Gannets occurred in all three years always with high abundance estimates (32473 to 90428 individuals) presenting annual and stratum fluctuations. The Great Skua also occurred in all three years presenting abundance values between 5954 and 7344 individuals with a slight annual increase.

Table I - Abundance estimates for each species

		Cory Shearwater			Northern Gannet			Great Shearwater			Manx Shearwater			Great Skua		
		N	% CV	95% CI	N	% CV	95% CI	N	% CV	95% CI	N	% CV	95% CI	N	% CV	95% CI
2010	Norte	0	-	-	10943	18.75	7438-16099	-	-	-	-	-	-	1059	38.58	494-2271
	Centro	831	73.71	204-3391	21976	17.87	15084-32016	-	-	-	-	-	-	1249	90.56	231-6740
	Alentejo	0	-	-	12243	28.46	6390-23459	-	-	-	-	-	-	617	74.75	132-2886
	Algarve	1092	61.57	315-3783	25790	13.37	19583-33964	-	-	-	-	-	-	3029	43.09	1219-7523
	TOTAL	**1923**	**48.05**	**722-5120**	**70952**	**12.05**	**55941-89989**	-	-	-	-	-	-	**5954**	**42.89**	**2577-13758**
2011	Galiza	812	29.29	414-1594	2842	18.25	1853-4359	-	-	-	-	-	-	922	37.00	422-2014
	Norte	3230	17.18	2266-4605	10670	9.40	8790-12951	-	-	-	-	-	-	2843	25.51	1713-4717
	Centro	2643	21.57	1677-4165	12757	19.05	8464-19228	-	-	-	-	-	-	1622	48.71	608-4328
	Alentejo	1476	14.04	1085-2008	2752	26.62	1420-5333	-	-	-	-	-	-	224	89.40	33-1535
	Algarve	468	26.85	262-833	3452	21.03	2172-5487	-	-	-	-	-	-	511	80.69	106-2468
	TOTAL	**8629**	**12.35**	**6761-11014**	**32473**	**11.49**	**25784-40897**	-	-	-	-	-	-	**6122**	**25.73**	**3709-10105**
2012	Galiza	3387	40.83	1338-8570	7991	16.93	5538-11531	6585	128.34	708-61261	377	191.80	20-7079	2270	32.49	1198-4301
	Norte	16172	33.63	8141-32125	26175	18.54	17817-38454	440	177.30	33-5867	782	129.39	97-6318	1761	40.19	801-3871
	Centro	18524	29.68	10202-33633	20964	22.52	13022-33749	1466	133.45	170-12657	2425	137.83	265-22177	1369	41.87	600-3122
	Alentejo	6072	29.76	3152-11695	16676	22.98	9933-27996	7854	158.92	549-112300	521	231.39	24-11497	760	59.24	222-2604
	Algarve	14482	27.05	8256-25407	18622	15.11	13638-25428	20122	107.91	3506-115490	0	-	-	1184	43.67	498-2814
	TOTAL	**58637**	**25.68**	**35622-96524**	**90428**	**12.28**	**71010-115160**	**36467**	**114.67**	**5850-227320**	**4105**	**131.30**	**518-32513**	**7344**	**30.06**	**4097-13167**

Kernel density maps were produced in order to visualize geographic areas of high probability of occurrence for each of the 5 species, using data from the 3 yearly campaigns (Figure 3). The Great Skua, the Cory's Shearwater and the Northern Gannet presented the widest distribution throughout the study area. Great Shearwaters were more concentrated in the Algarve whereas Manx Shearwaters showed greater concentration areas between Berlengas and Cabo Raso.

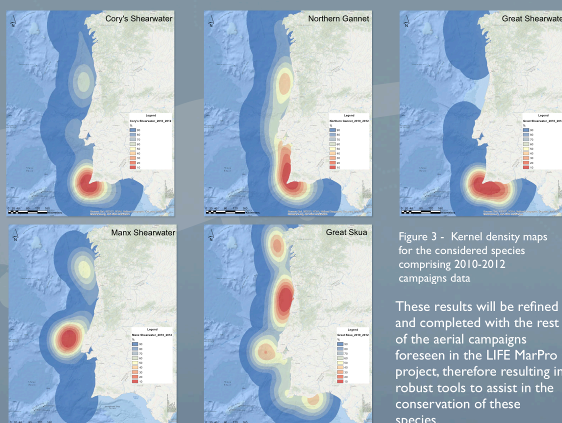

Figure 3 - Kernel density maps for the considered species comprising 2010-2012 campaigns data

These results will be refined and completed with the rest of the aerial campaigns foreseen in the LIFE MarPro project, therefore resulting in robust tools to assist in the conservation of these species.

Project partners

visit our website at

http://marprolife.org

Financed by