



HABITAT PARTITIONING BY CETACEANS IN A MULTI-SPECIES ECOSYSTEM AROUND THE OCEANIC ISLAND OF LA GOMERA (CANARY ISLANDS)



VOLKER SMIT, FABIAN RITTER, ANDREA ERNERT & NINA STRÜH
M.E.E.R. e.V., Bundesallee 123, 12161 Berlin - Germany - info@m-e-e-r.de

INTRODUCTION

The distribution of cetaceans within deep water environments is linked to the physical characteristics of their habitat (Baird *et al.*, 2003; Certain *et al.*, 2008). Habitat selection can be well described by using features like distance to nearest coast, water depth, and sea bottom slope (Canadas *et al.*, 2002; Ingram & Rogan, 2002), which can be derived from GPS position data. Here, we describe differences between habitat characteristics in the five most abundant species inhabiting the same general area off an oceanic island (La Gomera, Canary Islands). Oftentimes, more than one species can be seen here swimming together, or actually intermingling with, another species.

METHODS

La Gomera lies about 400 kilometres off the West African mainland in the Northeast Atlantic Ocean. The island is of volcanic origin and surrounded by waters up to about 4,000 metres deep. Data on cetacean abundance was collected during a long term monitoring scheme resulting from a co-operation between the non-profit association MEER and local whale watching operators. From 1st September 1995 to 16th November 2007, sighting data was collected during regular whale watching trips, usually taking place once or twice a day according to sea state and tourist demand. Together with the collection of general data, depth and distance to the coast were derived using a Spanish sea chart (SP 517, Instituto Hidrografico, Cadiz 1995). Slope was calculated using ArcGIS (ESRI corp.). Statistical calculations were made with SPSS. A Kruskal Wallis-Test was applied to test the inter-species differences for significance.

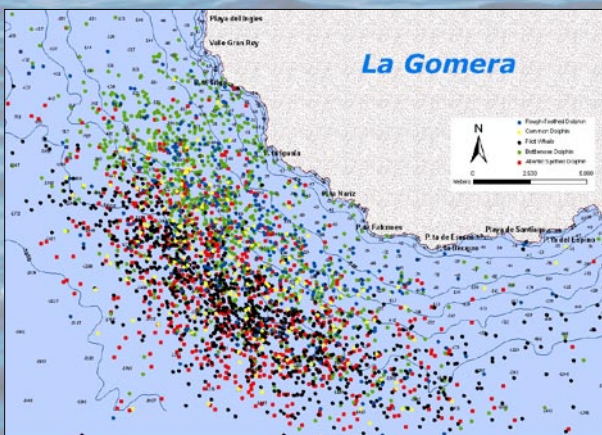


Figure 1: Sightings of cetaceans off La Gomera (1995-2007)

RESULTS

A total of 5,739 sightings were made: 1,673 with bottlenose dolphins, 1,235 with short-finned pilot whales, 1,233 with Atlantic spotted dolphins, 592 with rough-toothed dolphins and 271 with common dolphins (see Figure 1). These five species thus accounted for 87% of all sightings.

It was found that each species preferred a certain range of either habitat characteristic, with bottlenose and rough-toothed dolphins on average being found closest to the coast and pilot whales farther offshore than all others (see Table 1 & Figure 2a). Mean depth values mirrored this general distribution trend (see Figure 2b). Slope values also varied significantly between species, with pilot whales and spotted dolphins preferring steeper bottom topography, while bottlenose and rough-toothed dolphins were found where the bottom slope gradient was smaller (see Table 1 & Figure 2c).

237 sightings (5%) were made with more than one species. The most common aggregation of two species were pilot whales together with bottlenose dolphins (164 sightings), accounting for 10% of bottlenose dolphin and 13% of pilot whale sightings, respectively. All of the five species were seen at least a few times together with each other, except the common dolphin, which was not seen together with bottlenose and rough-toothed dolphins. During 13 sightings, three species were seen together, and three encounters involved four species.

Table 1: Distance, depth & slope values of cetaceans off La Gomera (1995-2007)

	Median (m)		Mean	N (Dist)
	Depth	Distance		
BD	565	2,46	11,14	1552
PW	1119	3,68	14,77	1121
ASD	988	3,43	14,31	1146
RTD	489	2,25	10,34	548
CD	799	3,08	14,06	254

	Minimum			N (Depth)
	Depth	Distance	Slope	
BD	10	0,05	0,25	1515
PW	210	1,5	0,54	1143
ASD	19	0,4	0,38	1109
RTD	20	0,1	0,39	534
CD	62	0,4	0,43	254

	Maximum			N (Slope)
	Depth	Distance	Slope	
BD	2350	8,5	29,07	1060
PW	2500	8,8	26,35	914
ASD	2701	9,5	26,99	912
RTD	2500	8,4	26,04	350
CD	2200	6,8	26,13	186

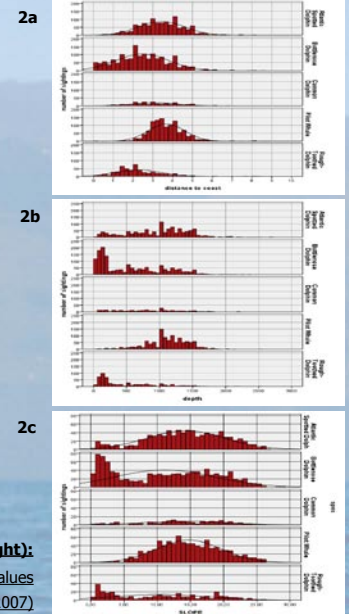


Figure 2 (right): Distribution of distance, depth & slope values in cetaceans off La Gomera (1995-2007)

DISCUSSION

This long-term study showed that the distribution of cetaceans is related to physical characteristics of their habitat. Different species' abundance was significantly correlated to water depth, distance to coast and sea bottom slope. Similar findings involving small odontocetes were made e.g. in Ireland (Ingram & Rogan, 2002), the Mediterranean Sea (Canadas *et al.*, 2002), the Bay of Biscay (Certain *et al.*, 2008), and the Hawaiian archipelago (Baird *et al.*, 2003; Webster *et al.*, 2005). Different species may use the same habitat e.g. by separating abundance on a fine spatial scale, the pursuit of different prey organisms and/or hunting at different times of day. It has been suggested that dietary divergence is the dominating factor (see Bearzi, 2005; Herzing *et al.*, 2003; Querouil, 2008). But why do animals of different species actively seek out the company of each other, as is apparently the case with bottlenose dolphins and pilot whales off La Gomera? It is reasonable to think that the mutual protection from predators in an open deep water habitat may play a role. In multi-species aggregations, a social factor might also be in place, as during such encounters the animals sometimes behaved like one group and/or altered their usual behaviour significantly and performed close interspecies interactions. Nonetheless, the animals probably are in pursuit of the same available prey patches (i.e. fish shoals). Aggressive interactions do appear to be more the exception than the rule, at least off La Gomera, as we have observed apparent agonistic behaviours between species only very rarely.

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