

FORAGING ALONG A MARINE PRODUCTIVITY GRADIENT: THE PLASTICITY OF A PELAGIC SEABIRD SPECIES, THE CORY'S SHEARWATER

Paiva Vitor H.^{1,3}, Pedro Geraldés², Ivan Ramirez², Ana Meirinho², Stefan Garthe³ and Jaime A. Ramos¹

¹ IMAR-Institute of Marine Research, c/o Department of Zoology, University of Coimbra, 3004-517 Coimbra, Portugal
E-mail: vitorpaiva@ci.uc.pt

² SPEA-Sociedade Portuguesa para o Estudo das Aves, Avenida da Liberdade N°105 2° Esq., 1250-140 Lisboa, Portugal

³ Research and Technology Centre (FTZ), University of Kiel, Hafentörn 1, D-25761 Büsum, Germany

Foraging behaviour is largely constrained by the distribution, abundance, mobility and predictability of food resources and many animals show a certain degree of plasticity, *i.e.* a variation in behaviour in response to varying environments. We compared the behavioural foraging plasticity of a pelagic seabird species, Cory's Shearwater (*Calonectris diomedea*), during incubation and chick-rearing among seven different breeding areas of the North Atlantic (in the Azores, Madeira, Selvagens and Berlengas archipelagos) with contrasting ecological conditions, by deploying two types of data-loggers; the compass-Temperature log (from the family of the dead-reckoning devices) and Preci-Temperature Depth devices. Our measures (currencies) of foraging distribution and effort comprised: (1) diving rate, (2) midnight SST, (3) % of time travelling, (4) trip duration, (5) latitude of foraging areas, (6) longitude of foraging areas, (7) Dive depth, (8) dive duration and, (9) numbers of U-shape and V-shape dives/trip. Using these variables a principal component analysis separated the populations into two main groups, one with the Berlengas' population (foraging in the continental shelf) and the other, with populations from Azores, Madeira and Selvagens (foraging in pelagic oceanic areas). Trip duration and % of time travelling showed strong differences between study areas, presenting a clear dual foraging strategy for the species. Birds from Selvagens travelled longer distances for a longer time (82% of the trips were long trips (> 5 days of duration), whereas birds from Berlengas used mainly short trips (97%; < 4 days of duration) to forage along the Portuguese continental coast close to the colony. There was a positively significant correlation between the percentage of short foraging trips that birds performed in the different study areas and the concentration of chlorophyll-*a* in the waters surroundings the breeding places ($r_s = 0.65$, $P = 0.05$, $N = 10$). Birds exploiting marine areas along the continental shelf used shallow depths and shorter dives (for both V and U-shape types) than birds feeding in oceanic waters. This meaning that birds adapted their modes of predation in order to cope with the diverse distribution of their prey items. The behavioural responses of birds was mainly dictated by the heterogeneity of their habitat that in time was driven by two productivity gradients present upon the north Atlantic. Firstly, productivity should increase from the subtropical warmer waters present close to Selvagens to northern colder waters on the north of the Azorean archipelago. Secondly, oceanic environments should be less profitable than coastal environments (upwelling areas), such as the Portuguese and African coastal environments.