

GROUP DYNAMICS OF BOTTLENOSE DOLPHINS ENGAGING IN GILL-NET FEEDING ACTIVITIES IN THE BOCHE DI BONIFACIO INTERNATIONAL MARINE PARK (ITALY-FRANCE)

A. Rotta ¹, A. Pira ¹, A. Floris ², M. Piras ³, M. G. Pennino ^{3*}, G. G. Leoni ⁴, M. Ugo ⁵, J. M. Culioli ⁶, N. Negre ⁶, F. Berlinguer ¹ and S. Naitana ¹

¹ Dipartimento di Biologia Animale, Sezione di Fisiologia, Facoltà di Medicina Veterinaria, Università degli Studi di Sassari.

² Parco nazionale dell'Arcipelago di la Maddalena

³ Dipartimento per l'ambiente, Centro Turistico Studentesco. - graziapennino@yahoo.it

⁴ Servizi Generali, Facoltà di Medicina Veterinaria, Università degli Studi di Sassari.

⁵ Dipartimento di Scienze Fisiologiche, Biochimiche e Cellulari, Facoltà di Medicina Veterinaria, Università degli Studi di Sassari

⁶ Office de l'Environnement de la Corse. France

Abstract

Foraging specializations among marine mammals are susceptible to social transmission and could lead to the separation of distinct social units, thus increasing conservation challenges. We analysed the association patterns of the bottlenose dolphins population of the Bocche di Bonifacio International Marine Park to verify the existence of two distinct communities based on different feeding strategies. No correlation was found between the dolphin foraging tactics and community membership. Moreover, the population seems to be ruled by a random association strategy. For these reasons the managing authorities should treat this population as one entity and take effective synergic actions to ensure the conservation of this resource and its habitat.

Keywords: Cetacea, Marine Parks

Introduction

Culturally differentiated communities among marine mammals populations are widely documented [1]. The transmission of cultural traits, such as peculiar foraging tactics, to preferred associates can trigger the development of behaviourally differentiated units belonging to the same population [2,3]. Bottlenose dolphins inhabiting the waters of the 'Bocche di Bonifacio' International Marine Park regularly interact with the trammel nets set by the coastal fisheries operating in this area. The purpose of this paper is to describe the patterns of associations of this bottlenose dolphins population and investigate whether the net-foraging behaviour is a cultural trait which influences the dolphin social structure distinguishing a community from another within the population.

Material and Method

From July 2006 to July 2008, 139 boat-based surveys, leading to 112 dolphin sightings, were made in the study area (408 km²). During each encounter date, sex and behaviour were recorded and 71 individuals were photo-identified and catalogued. Dolphins were categorized as 'trammel-feeders' (Tf) or 'non-trammel-feeders' (Ntf) based on whether they had ever been observed foraging on gillnets [4]. Association analysis were carried out on 23 animals sighted at least 5 times using the Half Weight Index of association [5] in Socprog 2.3. Firstly, the degree of social interaction between dolphins with different feeding habits was assessed. Secondly, the null hypothesis that individuals associate randomly was tested for the whole population and separately for each dyad.

Results and Discussion

Although within-classes associations (Tf-Tf = 0.13; Ntf-Ntf = 0.25) were higher than between-classes (Tf-Ntf = 0.06), the differences were not significant ($t = 6.20$, $p = 1$, correlation coefficient = 0.38), highlighting that individuals significantly and frequently interact also with animals that have different foraging tactics. No evidence of significantly high associations coefficients was detected, since the standard deviations for both observed and randomly permuted HWI means had very similar values ($P > 0.5$). Furthermore, only one dyad showed a significant level of association ($P > 97.5$), a value even lower than that expected if associations were completely random. In conclusion, the foraging specialization detected in the population cannot demonstrate the existence of culturally separated communities based on social learning of different feeding strategies. For these reasons the Bocche di Bonifacio dolphin society should be considered as one entity. Furthermore, since no significantly high or small associations indexes were detected either at population or at dyadic level, it can be inferred that this community lives in a fission-fusion society where companions are likely to be chosen randomly. These results represent important findings that the managing authorities of the Bocche di Bonifacio international Marina Park, namely the "Arcipelago of La Maddalena" National Park and the "Bocche di Bonifacio" Natural Reserve, should consider as fundamental assumptions when addressing the conservation issue of this biological resource.

References

- 1 - Whitehead H, Rendell L, Osborne RW, Würsig B., 2004. Culture and conservation of non-humans with reference to whales and dolphins: review and new directions. *Biological Conservation* Vol. 120:427-437.
- 2 - Chilvers BL, Corkeron PJ., 2001. Trawling and bottlenose dolphin social structure. *Proceedings of the Royal Society of London B* 268: 1901-1905.
- 3 - Krützen M, Mann J, Heithaus MR, Connor RC, Bejder L, Sherwin WB., 2005. Cultural transmission of tool use in bottlenose dolphins. *Proc. Natl. Acad. Sci. U.S.A.* 102: 8939-8943.
- 4 - Chilvers BL, Corkeron PJ., 2002. Association patterns of bottlenose dolphins (*Tursiops aduncus*) off Point Lookout, Queensland, Australia. *Canadian Journal of Zoology*, 80: 979-979.
- 5 - Cairns JS, Schwager SJ., 1987. A comparison of association indices. *Animal Behaviour*, 35: 1454-1469.