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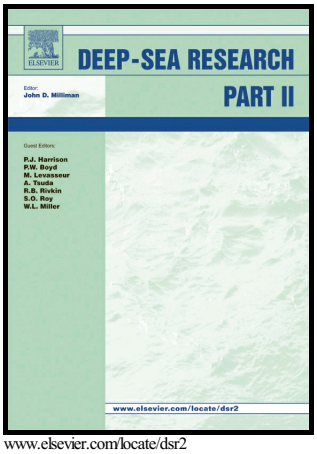


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# Habitat modelling predictions highlight seasonal relevance of Marine Protected Areas for marine megafauna

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**Abstract**

According to the European Union Habitats and Birds Directives, EU Member States must extend the Natura 2000 network to marine ecosystems, through the designation of marine protected areas (MPAs). However, the initial status of cetacean and seabird communities across European waters is often poorly understood. It is assumed that an MPA is justified where at least 1% of the "national population" of a species is present during at least part of its biological cycle. The aim of the present work was to use model-based cetacean and seabird distribution to assess the networks of existing Natura 2000 sites and offshore proposed areas of biological interest. The habitat models used here were Generalised Additive Models computed from aerial surveys observational data collected during the winter 2011-2012 and the summer 2012 across the English Channel, Bay of Biscay and north-western Mediterranean Sea. Based on these models, a ratio between species relative abundance predicted within each MPA and the total relative abundance predicted over the French Atlantic or Mediterranean marine regions was computed and compared to the 1% threshold. This assessment was conducted for winter and summer independently, providing information for assessing the relevance of individual MPAs and MPA networks at a seasonal scale. Our results showed that the existing network designed for coastal seabird species was relevant in both marine regions. In contrast, a clear shortfall was identified for offshore seabird species in the Atlantic region and for cetaceans in both regions. Moreover, the size of MPAs appeared to be a crucial feature, with larger MPAs being relevant for more species. Finally, we showed that the proposed large offshore areas of interest would constitute a highly relevant network for all offshore species, with *e.g.* up to 61% of the Globicephalinae population in the Atlantic French waters being present within these areas.

*Keywords:* Natura 2000, Marine Protected Areas, Cetaceans, Seabirds, eastern North-Atlantic, Mediterranean, Habitat Modelling

## 1. Introduction

The marine environment is facing numerous pressures [1, 2, 3] and Marine Protected Areas (MPAs) are seen as a powerful tool to conserve oceans by managing human activities [3, 4]. Over the last few decades,

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