Mapping Marine Mammal Distributions For Conservation Management

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Introduction

Accurately determining species distribution patterns and how these vary in space and time are central to conservation management. Here we analyse marine mammal distributions in Welsh waters (and adjacent Irish Sea). Commonly the main limitation is lack of sufficient data to draw inferences, so that it is often necessary to combine datasets derived from diverse sources. For this project, sixteen research groups contributed 37,266 h of survey effort data, spanning the years 1990-2007.

Methods

Potential biases in sightability relating to survey/platform type and speed, were assessed using data gathered from different activities in the same area over the same time period. GIS maps of sighting rates were prepared using a grid with resolution 10' latitude x 10' longitude, following correction for variation in sightability of different species at different sea states, for land based watches using scan sampling, and for aerial vs vessel surveys. A variety of kriging methods were examined to assess the best way to interpolate the data and for plotting smoothed maps of relative abundance. Cells with low effort were filtered out to reduce potential bias.

Results

The project database comprised 22,422 sightings (77,799 individuals) of twelve species. Interpolated distribution maps of the four most common species are presented below.

Harbour Porpoise   Bottlenose Dolphin   Common Dolphin   Minke Whale
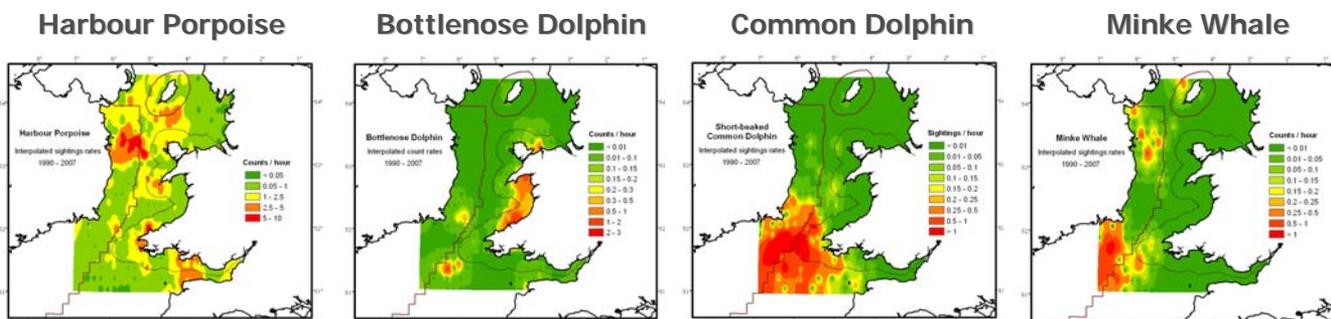
The harbour porpoise is the commonest and most widespread species, present year-round and with hot spots north and west of Anglesey, off Co. Dublin in Ireland, west of Pembrokeshire and in the Bristol Channel. The bottlenose dolphin is the next most frequently recorded species, with a predominantly coastal distribution, particularly concentrated in Cardigan Bay in summer and north and east of Anglesey in winter. The short-beaked common dolphin and minke whale both have largely offshore distributions centred upon the Celtic Deep where water depths exceed 50 metres. Both species are mainly summer visitors to the Irish Sea.
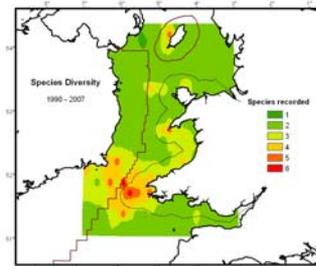
Distribution of Effort
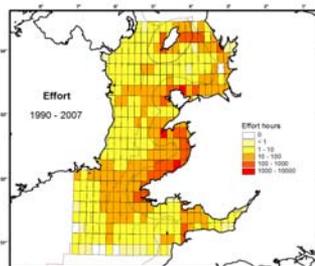
Spatial coverage amounted to 376 (>90%) of the 414 cells of the study area, but varied, being greatest within 12nm of the coast, and seasonally (mainly between March and Sept).

Species diversity varied spatially, being greatest in the Celtic Deep and west of Anglesey, i.e. closest to the possible influence of the two major frontal systems.

Biodiversity

Conclusions and Recommendations

Although the majority of cells would benefit from greater effort, and coverage in winter months is limited, the integration of diverse data sets reveals biologically meaningful distribution patterns that support findings from systematic surveys. For relatively low cost, they offer potential for identification of areas of relative high usage that can inform conservation management.

Reference

Baines, M.E. and Evans, P.G.H. (2009) *Atlas of the Marine Mammals of Wales.* CCW Marine Monitoring Report No. 68. 84pp.

Acknowledgements