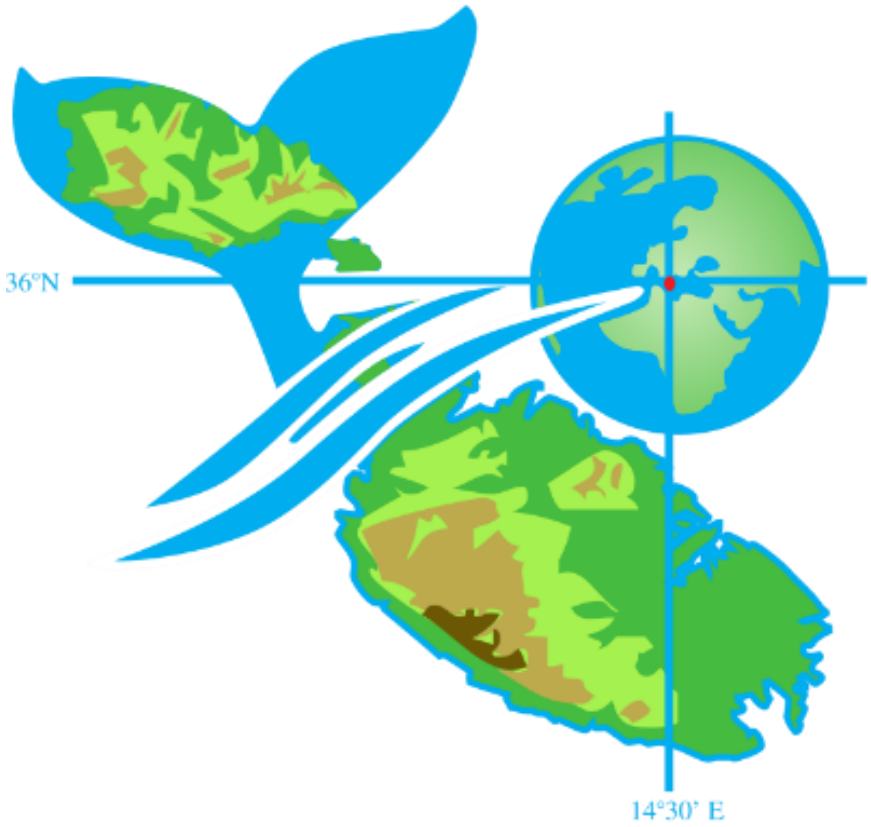
MARINE MAMMAL CONSERVATION FROM LOCAL TO GLOBAL



29TH CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY

23rd to 25th March, 2015
St Julian's Bay, MALTA

European Cetacean Society

BICREF

UNIVERSITY OF MALTA
L-Università ta' Malta

ABSTRACT BOOK

Edited by Adriana Vella, Noel Vella and Clare Marie Mifsud

O-06: Long-term trends in diet and mortality in harbour porpoises in Scottish waters

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Data on diet and age of harbour porpoise, *Phocoena phocoena,* have been assembled over 23 years based on the Scottish cetacean strandings monitoring programme, part of the UK CSIP. Here we integrate previously unpublished data from the mid-2000s onwards. While the same prey species continue to predominate in the diet, the contribution of sandeels (Ammodytidae) has declined over the last decade while Gadidae are more dominant. The way in which sandeel abundance has been assessed by ICES has changed since 2009, making it hard to directly compare porpoise diet selection and fish abundance trends; however diet composition has likely followed trends in prey availability. Age data were used to construct life tables and to estimate mortality rate; observed changes in mortality are mainly driven by the varying proportion of young animals, among which starvation/loss of condition is an important component of mortality, suggesting a link to food availability. Focusing on the period 1994-2005, we examine the changes which coincided with the apparent southwards shift in distribution recorded by the SCANS surveys. The importance of sandeels in the diet generally declined, and sandeel abundance in the North Sea declined after 1998. The importance of whiting in the diet fell during the first part of the 2000s, corresponding to low levels of stock abundance in the North Sea, and there was an apparent increase in porpoise mortality at the end of the 1990s. Finally we test the sensitivity of the provisional conclusions to likely biases in the data, including under-representation of age zero animals and changes in data collection protocols.

O-27: Fisheries interactions of *Delphinus delphis* in the north-east Atlantic with an emphasis on Galicia, north-west Spain

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Bycatch from interactions with fisheries remains the biggest global threat to marine mammals. Galicia, north-west Spain, is one of the world's main fishing regions and a high level of cetacean-fisheries interactions has been reported from on-board observers, interviews with fisheries stakeholders and analysis of stranded and by-caught carcasses. *Delphinus delphis* is the most abundant cetacean in the area and since 1990 necropsies of over 1800 stranded and by-caught *Delphinus* have been conducted. Life history data (age, maturity, and pregnancy rate data) from stranded and by-caught cetaceans can be used to construct life tables and to estimate overall mortality and fisheries mortality rates. Age and maturity were determined from stranded and by-caught *Delphinus* between 1990 and 2009. Males and females reach sexual maturity at 8.5 and 7.5 years of age, respectively, and no temporal difference in age at sexual maturity was observed. Results indicate 13% annual mortality in the *Delphinus delphis* north-east Atlantic population and necropsy data suggests that 60% of mortality (i.e. 7.2% annual mortality) is attributable to fisheries interactions, predominantly from pair trawls and gillnets. By-caught *Delphinus* were found to die significantly younger than non-by-caught animals ($p=<0.001$) although no sex-related difference in bycatch rate was observed ($p=0.051$). The estimated annual mortality due to fisheries interactions greatly exceeds the 2% limit set by ASCOBANS and the IWC and high bycatch rates are also reported for other countries e.g. the UK, France and Portugal. Although *Delphinus delphis* in the north-east Atlantic is one continuous population, the high level of bycatch occurring in parts of the range is most likely unsustainable and will be discussed. There is a need to carry out on-board monitoring, notably in the north-west Iberian Peninsula (Galicia and Portugal), to incorporate cetacean bycatch into fisheries advice and, above all, to start introducing mitigation measures.

O-30: Utilising land watch data to determine long-term trends in abundance

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Every six years, under the Habitats Directive, EU coastal states are obliged to assess the conservation status of cetaceans. However, resources are rarely sufficient to achieve this using conventional methods such as systematic aerial and vessel surveys. For those species spending significant amounts of time in coastal waters, a cost-effective alternative is to undertake dedicated land-based watches. This study analyses over 75,000 hours of watches and c. 50,000 associated sightings of bottlenose dolphin and harbour porpoise, from 678 sites around the UK coast during 1965-2014, investigating spatial and temporal trends and comparing these to results from offshore data. The data are also used to identify areas of persistent high occurrence and relative abundance for possible establishment of Natura 2000 protected areas. Presence-absence and average sightings and count rates per unit effort were summarised by site and by day (thus eliminating within-day autocorrelation), filtering out records associated with high sea state and short observation duration. Generalised Additive Models were run for three time periods (1965-1993, 1994-2003, 2004-2014), along with mixed models (GAMMs) to quantify the effect of autocorrelation between consecutive days of observation. The results showed clear spatial patterns of distribution for both species, which broadly mirrored the results of offshore surveys, but the significantly larger quantity of effort revealed several additional spatio-temporal trends. Bottlenose dolphins were concentrated around W Wales and E Scotland, with very few in the southern North Sea or eastern Channel. Porpoises were more evenly distributed but eight, mostly persistent, hotspot areas were identified. Strikingly, the distributions of the two species showed little overlap, possibly due to the fact that bottlenose dolphins are known to attack porpoises where the two co-occur. Porpoises have declined in importance in NE Scotland but increased on the east and south coasts of England. Bottlenose dolphins showed no significant temporal trend.

O-33: Abundance and distribution of the common dolphin (*Delphinus delphis*) in the north of the Iberian Peninsula

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Common dolphins (*Delphinus delphis*) are one of the most abundant species of small cetacean in northeast Atlantic Ocean and the most abundant in Atlantic shelf waters of the Iberian Peninsula. However, the abundance, distribution and population trends in the recent years of this species are poorly known, but such information is needed to develop population dynamic models. Thus far, the only absolute abundance estimate in the shelf Atlantic waters of the Iberian Peninsula was obtained in 2005 during the SCANS-II survey. Along the north and northwest coasts of the Iberian Peninsula, the Spanish Institute of Oceanography has carried out annual acoustic surveys to estimate pelagic fish biomass for the last two decades. Since 2007, an observer program for top predators has been integrated into these surveys, collecting sightings on cetaceans, seabirds and other species using line-transect methodology. Common dolphin sightings from 2007 to 2014 were analyzed with Distance software to estimate relative population size. Because attraction to the vessel could inflate population estimates, common dolphin abundance was estimated using a detection function only from sightings where no attraction were recorded and also using Bayesian methods to combine previous data on attraction collected during SCANS-II with data collected from the acoustic fish surveys. Dolphin density estimated with both methods was < 0.3 dolphins/km^2, which is similar to the density estimated by SCANS-II. The Bayesian framework allows us to work with the scarcity and uncertainty of the data, particularly when obtaining annual estimates. Because cetacean sightings were collected during fish acoustic surveys, pelagic fish abundance (e.g. sardine and blue whiting), obtained concurrently to the sightings, can be used, along with other environmental variables, to model dolphin habitat and to predict dolphin abundance and distribution.