

The Importance of Life History Parameters for Assessing Marine Mammal and Fisheries Interactions

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Introduction:

Often marine mammal-fisheries interaction projects only concentrate on evidence of interactions on carcasses. However, life history data from stranded and by-caught cetaceans provide valuable information on the age structure, age at sexual maturity and longevity of a population and are essential for constructing life tables and estimating mortality rates. Threatened populations are thought to reach sexually maturity younger and smaller. Agreement on the Conservation of Small Cetaceans of the Baltic and North Sea (ASCOBANS) and the International Whaling Commission (IWC) state that 2 % annual removal of a population by anthropogenic means is unacceptable. The north-west Iberian Peninsula (NWIP: Galicia, north-west Spain and northern Portugal, figure 1) is one of the world's main fishing areas and cetacean by-catch rate is thought to be unsustainable although no mortality rates exist. *Delphinus delphis* (fig. 2) is the most abundant cetacean in the area and accounts for over half of the strandings. The Iberian *Phocoena phocoena* (fig. 3) is a genetically isolated population and of great conservation importance.

The present project aims to estimate overall and fisheries mortality rates for *Delphinus* and *Phocoena* in the NWIP.

Materials and methods:

Standardised necropsies were carried out on 'freshly decomposed' stranded and by-caught *Delphinus* and *Phocoena* along the NWIP between 1990 and 2008. Evidence of fisheries interactions was recorded according to Kuiken, 1994. Age and maturity status were determined using standard methods.

Fig. 1) NWIP study area



Fig. 2) *Delphinus delphis*



Fig. 3) *Phocoena phocoena*



Results:

***Delphinus*:** Females and males reach sexual maturity at 8.5 and 7.5 years old respectively (fig. 4). 60 % of necropsies have evidence of fisheries interactions. The life table indicates 12 % annual mortality. It is estimated that 7.2 % of the population dies annually from fisheries interactions. No significant difference in by-catch rate was observed between males and females, chi-square test, $p = 0.051$ (fig. 5). However, by-caught *Delphis* were found to die significantly younger, chi-squared test, $p = < 0.001$ (fig. 6). No temporal differences were observed in the age of sexually maturity suggesting although fisheries by-catch is high, the population is not threatened.

***Phocoena*:** 50 % of strandings have indications of fisheries interactions. The life table indicates 15 % annual mortality in the population, suggesting that 7.5 % of the population dies annually due to fisheries interactions. No significant difference in the by-catch rate was observed between males and females, chi-square test, $p = 0.071$ (fig. 7).

Conclusions:

- Necropsy data suggests a high rate of fisheries interactions in the NWIP
- Estimated annual fisheries mortality rates in the NWIP: *Delphinus*: 7.2 % and *Phocoena*: 7.5 %
- Estimated mortality rates from fisheries interactions in the NWIP greatly exceed the 2% limit set by ASCOBANS and the IWC
- Life history data is essential for analysis of marine mammal-fisheries interactions
- By-catch needs to be monitored with on-board observers to obtain better mortality estimates

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Reference: Kuiken, T., 1994. Diagnosis of by-catch in cetaceans. European Cetacean Society Newsletter 26

Fig. 4) Predicted age at which 50 % of DDE are sexually mature

Fig. 4) DDE survivorship curve

