RESIDENCE PATTERNS, SITE FIDELITY AND POPULATION DYNAMICS OF BOTTLENOSE DOLPHINS IN CARDIGAN BAY, WALES

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INTRODUCTION

Cardigan Bay in West Wales is known since at least the early 1920s as home to a population of bottlenose dolphins (*Tursiops truncatus*). However, the whole home range of this population, and its level of residency, site fidelity and exchange of individuals with adjacent waters have yet to be fully elucidated. This is the aim of this study.

MATERIALS AND METHODS

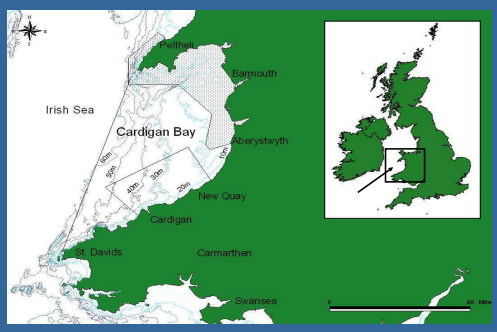

Fig.1. The study area.

• Photo-identification data collected during boat surveys from April to October over 2001-07 have been analyzed.

•The photo-identification protocol followed Würsig and Jefferson (1990).

• The matching phase followed Defran *et al.* (1990), Würsig and Jefferson (1990), Hammond (1986), Scott *et al.*, (1990) and Stevick *et al.* (2001).

• Data were analyzed with MARK and CAPTURE, using both the Chao(mth) model for a closed population (Chao *et al.*, 1992) and the Pollock's robust design model for an open population (Kendall *et al.*, 1997; Kendall and Nichols, 1995).

RESULTS

• 985 trips were carried out, during which 28,535 km were travelled in positive conditions, 2,044 bottlenose dolphins sightings and 1,777 individual identifications were recorded.

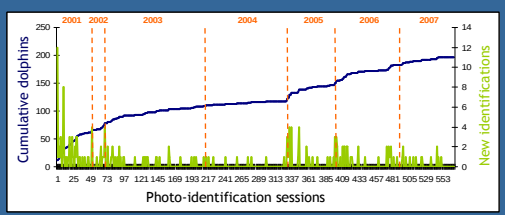

Fig.2. Rate of discovery for all the marked individuals of Cardigan Bay.

• 197 well-marked dolphins were identified (Fig. 2), with individuals seen up to 48 times. Daily sighting frequencies ranged from 1 to 26 (mean=4.13, SD=6.23) and yearly ones from 11 to 57 (mean=28.14, SD=17.69; Fig. 3).

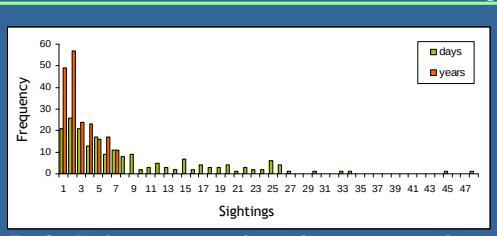

Fig.3. Daily (green) and yearly (orange) sighting frequencies for the 197 dolphins.

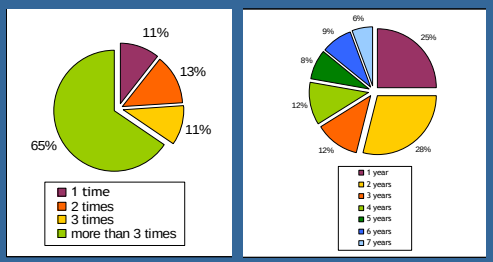

Fig.4. Percentage of dolphins seen 1,2,3 or more times (left) and from 1 to 7 years (right).

• 28% of the dolphins were defined as common (seen ≥12 times), 11% frequent (seen 8-11 times), 26% occasional (4-7), and 35% rare (1-3), see Fig. 5.

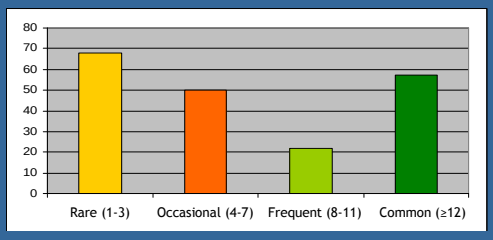

Fig.5. Rare, occasional, frequent and common dolphins.

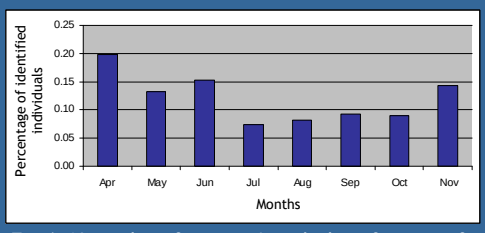

Fig.6. New identifications/total identifications for each month of the study period.

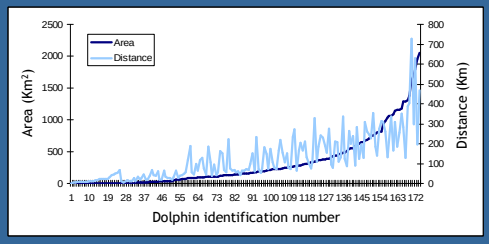

Fig.7. Areas and distances travelled by each marked dolphin.

The best fitting model that resulted from the mark-recapture analysis for the 2001-07 pooled data revealed that the emigration rate (gamma '') between years was 10%, and the likelihood that emigrated animals stayed out of the bay the next year (gamma ') was as high as 80% (Fig. 9).

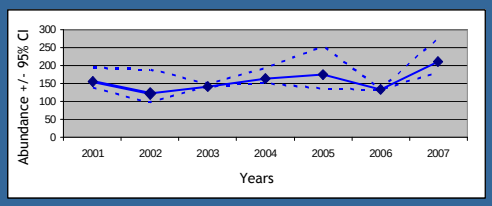

Fig.8. The annual population estimates obtained with the closed population model.

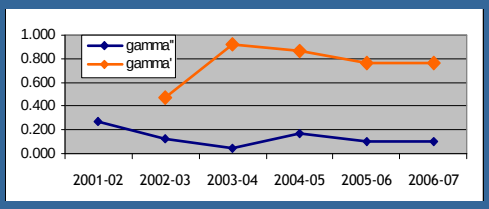

Fig.9. Gamma'' (probability of emigration) and gamma' (probability of an emigrated animal staying outside the study area).

CONCLUSION

• The Cardigan Bay dolphins show **some level of residency and site fidelity** but also a **consistent number of transients and infrequent individuals.**

•The population **is better described by an open model** with immigrations and emigrations.

• It is most likely a **meta-population, probably drawn from a much larger one, encompassing part if not all of the Irish Sea.**

•This has important implications for management, since **the Cardigan Bay bottlenose dolphin population is only partially protected.**

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