



Environmental correlates of behaviour and group composition of bottlenose dolphin in Cardigan Bay, Wales

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Introduction

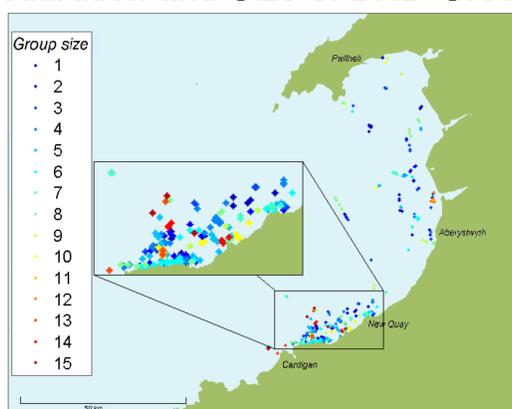
It has been previously shown that bottlenose dolphin encounter rates and distribution in Cardigan Bay have a non-random distribution (Pesante *et al.*, 2008; Barba Villaescusa *et al.*, 2008). Dolphins are encountered more frequently in shallow waters over a sandy substrate mixed with gravel or cobbles. Here, we extend those analyses and consider variation in specific behavioural states, group size and composition in relation to spatial distribution of bottlenose dolphins within Cardigan Bay using data from 2007-10.

Methods

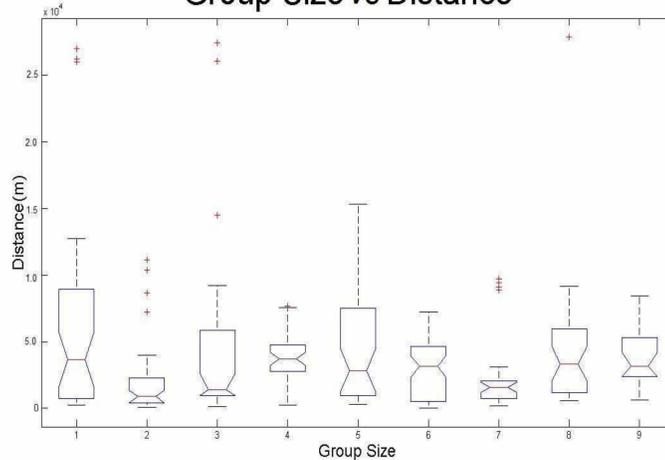
Behavioural sampling was undertaken during land and boat based surveys (line transect and *ad libitum*). Data relating to group size, group composition and main behaviours were collected at 6 minute intervals in favourable weather conditions (Beaufort 3). A random subset of these data was selected for analysis. Data manipulation, statistical analysis (Chi Square, Kruskal Wallis test) and mapping were conducted within Matlab (Mathworks Inc.).

Results

Distribution and Size of BND Groups

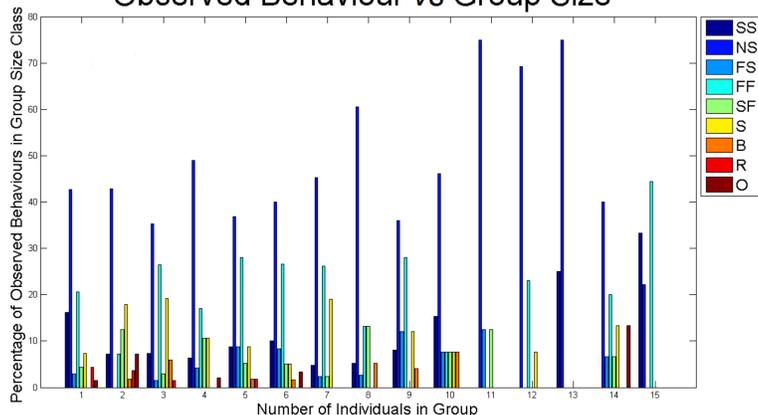


Group Size vs Distance



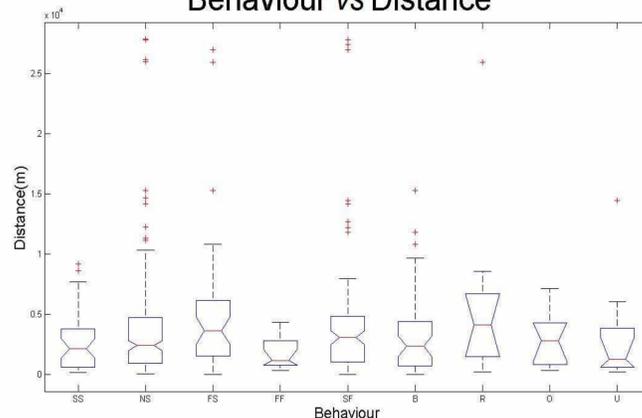
Observations are classed by group size and the shortest distance to coast for each observation is deduced from the coordinates. Observed distances from coast vary significantly for each group size class ($P < 0.001$). Median distance is under 5 km from the coast for all group size classes but the range of distances observed for each class varies significantly.

Observed Behaviour vs Group Size



The Chi Square Test shows that the frequency of observed behaviours is not statistically independent of group size ($P < 0.001$). Swimming behaviours were the most frequently observed overall with an increase in larger groups of animals.

Behaviour vs Distance



Observed behaviour is statistically independent of the distance from the coast, although "Feeding" behaviour was only observed within 5 km from the coast whereas "Normal Swimming" and "Fast Swimming" behaviours were observed up to 10 km off the coast.

Analysis of data relating to group composition demonstrated that presence or absence of calves within the group bears no statistical relationship to behaviour, group size or distance from coast.

SS=Slow swim, NS=Normal Swim, FS=Fast Swim, FF=feeding/foraging, SF=Suspected Feeding, S=Socialising, B=Bowriding, R=Resting, O=Other

Conclusions

The results of this study indicate that group size is dictated by distance to coast and that behaviour is strongly associated with group size and to a lesser extent with distance from coast. As previously observed (Pierpoint *et al.*, 2009), group sizes inshore tend to be small (<3 individuals) whereas group sizes vary more widely offshore. Swimming and feeding behaviours were most frequent for all group sizes with an overall increase in swimming behaviour with group size. Further studies are necessary to determine the causal link between behaviour and group size. Isolated incidents (outliers) of feeding offshore could also indicate a relationship between seasonal pelagic prey availability and behaviour (Baines *et al.*, 2008).

References

Barba Villaescusa, L., Pesante, G., Anderwald, P. and Evans, P.G.H. (2008) Habitat preferences and distribution of bottlenose dolphins (*Tursiops truncatus*) in Cardigan Bay, Wales. Poster at the 22th Annual Conference of the European Cetacean Society, Egmond aan Zee, Netherlands, 10-12 March 2008.
Pierpoint, C., Allan, L., Arnold, H., Evans, P., Perry, S., Wilberforce, L., and Baxter, J. (2009) Monitoring important coastal sites for bottlenose dolphin in Cardigan Bay, UK. Journal of the Marine Biological Association of the United Kingdom, 89, 1033-1043.
Baines, M.E., Evans, P.G.H. and Shepherd, B. (2000) Bottlenose dolphins in Cardigan Bay, West Wales. First Report to EU INTERREG & Countryside Council for Wales. Sea Watch Foundation, Oxford.
Pesante, G., Evans, P.G.H., Baines, M.E., and McMath, M. (2008) Abundance and Life History Parameters of Bottlenose Dolphin in Cardigan Bay: Monitoring 2005-2007. CCW Marine Monitoring Report No. 61, 1-75.

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