

# White-beaked dolphin (*Lagenorhynchus albirostris*) occurrence in the Minch (Scotland, UK), August 2007

Weir, Caroline R. (1), Calderan, Susannah (2), Unwin, Michael (3), Pitman, Robert L. (4), Booth, Cormac (5), Photopoulos, Theoni (6) and Robinson, Kevin, P. (7)

(1) Ketos Ecology, 44 Lord Hay's Grove, Aberdeen AB24 1WS, UK; (2) Hebridean Whale and Dolphin Trust, 28 Main Street, Tobermory, Isle of Mull, Argyll, PA75 6NU, UK; (3) Flat 3, 214 Mansfield Road, Mapperley, Nottingham, NG5 2BU, UK; (4) NOAA Fisheries, Southwest Fisheries Science Center, La Jolla, CA, 92037, USA; (5,6) Sea Mammal Research Unit, Gatty Marine Laboratory, University of St Andrews, St Andrews, KY16 8LB, UK; (7) Cetacean Research & Rescue Unit (CRRU), PO Box 11307, Banff AB45 3WB, Scotland, UK

## INTRODUCTION

The white-beaked dolphin (*Lagenorhynchus albirostris*) is endemic to cold waters of the North Atlantic Ocean. The British Isles comprise a significant portion of their known worldwide range, where they primarily inhabit the central and northern North Sea and shelf waters (<200 m depth) off northern and north-west Scotland (Weir et al., 2001; Reid et al., 2003). The main concentrations within Scottish waters occur in the northern Minch, around the Western Isles and in a strip along the east coast of Britain from the Orkney Islands south to Yorkshire (Northridge et al., 1995; Reid et al., 2003). However, a recent study reported an apparent decline in the occurrence and abundance of white-beaked dolphins within their former Minch stronghold, identifying local increases in water temperature as a likely causal factor (MacLeod et al., 2005).

## AIMS

The present study aimed: (1) to establish to what extent white-beaked dolphins still inhabit the Minch; (2) to assess their current distribution and relative abundance; and (3) to collect baseline data (particularly via photo-identification, behavioural and acoustic work) on their ecology in the region.

## METHODS AND DATA ANALYSIS

The study occurred in the Minch, located between the Scottish mainland and the Isle of Lewis (Figure 1). Dedicated observers maintained a watch from the port and starboard sides of the 16 m research ketch 'Silurian', using the naked eye and binoculars. Standardised effort, environmental and sighting forms were completed. The vessel position and sea surface temperature (SST) were logged at 1-min intervals using a Garmin 76CSx GPS and a Minilog 8-bit data logger respectively. Water depth was recorded using a ST60 Autohelm echosounder. Photo-identification (under an SNH licence) was carried out using a range of Nikon and Canon digital SLR camera equipment. Mean water depth, SST and distance from shore (using ArcView GIS software) of sightings were calculated.

## RESULTS

Between 2 and 11 August 2007, a total of 66.3 hr survey coverage (3,980 min) was collected, covering a total linear distance of 793 km. A total of 738 km of survey coverage was acquired in Beaufort sea states  $\leq 4$ , including coverage across ten  $\frac{1}{4}$  ICES (International Council for the Exploration of the Sea) rectangles. The water temperature during the survey varied from 11.5 to 14.9°C. There was a total of 10 white-beaked dolphin sightings during the survey, comprising a minimum estimate of 70 animals.

### Spatial distribution and relative abundance

White-beaked dolphin sightings were restricted to a relatively small spatial area in the northern part of the Minch between the Butt of Lewis and Kinlochbervie, including only two  $\frac{1}{4}$  ICES rectangles. However, relative abundance (data from sea states  $\leq 4$  only) in this region was high at 0.4–0.5 animals/km.



### Habitat preferences

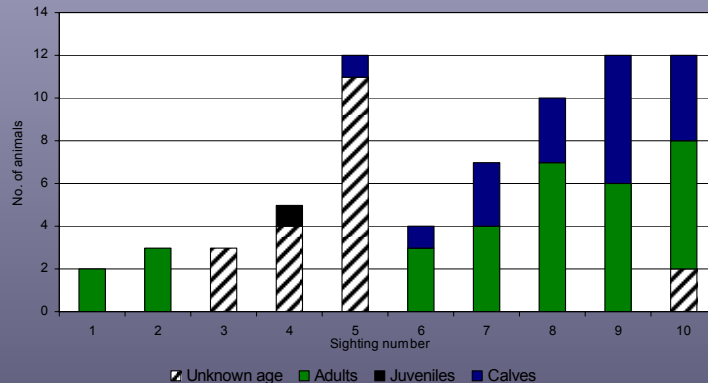
Within the range surveyed, white-beaked dolphins showed a preference for deeper, offshore waters (Table 1). Sightings were concentrated mid-way across the central northern Minch in open water habitat and within the deepest areas. The SST range of the sightings was narrow, and did not include the coolest waters sampled. Most animals were observed in waters of  $\geq 100$  m depth and of 13.0 to 13.9°C SST.

Table 1. Habitat parameters for white-beaked dolphin sightings

Parameter	Range	Mean	SD
Distance from shore (km)	22–32	26	2.9
Water depth (m)	107–135	122.5	8.67
SST (°C)	13.2–13.5	13.4	0.12

### Group composition

Group size ranged from two to 12 animals, with a mean of 7.0 animals (SD=4.14). The two smallest groups (comprising two and three animals) contained adults only. Five sightings comprised animals of mixed age including calf proportions of 25 to 50%, indicating that some white-beaked dolphin pods in the Minch consisted entirely of mother-calf pairs.



### Photo-identification

A total of 272 white-beaked dolphin images were analysed and catalogued. Of these, most (86%) images were poor quality. Only three individuals were photo-identified from permanent markings on the dorsal fin. A further five individuals were tentatively identified from temporary markings (N=2) and/or permanent features (N=3) that were visible (but ill-defined) in poor-quality images. No individuals were re-sighted over the duration of the study.

## CONCLUSIONS

1. White-beaked dolphins were found in a similar area of concentration to that noted previously (e.g. Northridge et al., 1995; Weir et al., 2001; Reid et al., 2003)
2. A habitat preference for open, deeper waters within the Minch was identified
3. The data suggest that some white-beaked dolphins occur in schools that are segregated by age and/or sex, and that schools containing calves tend to be larger than those consisting of adult animals only
4. Photo-identification of white-beaked dolphins proved difficult, due to their elusive behaviour. However, this technique did identify three individuals and may be useful for future monitoring of the species in the Minch
5. Further work is required in order to determine seasonal variation in the relative occurrence (distribution and abundance) of white-beaked dolphins in relation to habitat parameters, and to further investigate the feasibility of long-term photo-identification of this species in the Minch

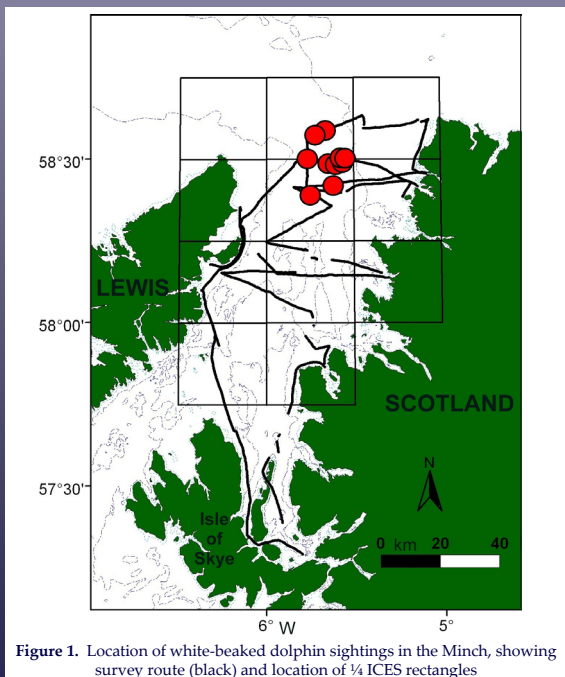


Figure 1. Location of white-beaked dolphin sightings in the Minch, showing survey route (black) and location of  $\frac{1}{4}$  ICES rectangles

ACKNOWLEDGEMENTS: The funding for this project was kindly co-provided by Scottish Natural Heritage (SNH) and Ketos Ecology. Thanks to Katie Gillham, Tamara Lawton, Dave Mackay and Mark Steward of SNH, and to Peter Stevick, Barbara Weir, Dave Hanna and Mat Brook of the Hebridean Whale and Dolphin Trust (HWDT).

LITERATURE CITED: Gillibrand, P.A., Sammes, P.J., Slesser, G. and Adams, R.D. (2003). Seasonal water column characteristics in the Little and North Minches and the Sea of Hebrides. I. Physical and chemical parameters. Fisheries Research Services Internal Report No. 08/03. 40 pp. MacLeod, C.D., Bannon, S.M., Pierce, G., Schweder, C., Learmonth, J.A., Reid, R.J. and Herman, J.S. (2005). Climate change and the cetacean community of North-west Scotland. Biological Conservation, 124: 477–483. Northridge, S.P., Tasker, M.L., Webb, A. & Williams, J.M. (1995). Distribution and relative abundance of harbour porpoises (*Phocoena phocoena* L.), white-beaked dolphins (*Lagenorhynchus albirostris* Gray), and minke whales (*Balaenoptera acutorostrata* Lacépède) around the British Isles. ICES Journal of Marine Science, 52: 55–66. Reid, J.C., Evans, P.G.H. and Northridge, S.P. (2003). Atlas of cetacean distribution in Northwest European waters. Joint Nature Conservation Committee, Peterborough, UK. Weir, C.R., Pollock, C., Cronin, C. and Taylor, S. (2001). Cetaceans of the Atlantic Frontier, north and west of Scotland. Continental Shelf Research, 21: 1047–1071.