



# Marine Monitoring Handbook

## March 2001

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## Bottlenose dolphin *Tursiops truncatus*

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**Figure 4.4** Bottlenose dolphin *Tursiops truncatus* (from Lighthouse Field Station, University of Aberdeen Internet site)

### Introduction to the species' interest

Bottlenose dolphins may attain a length of 2.7m and weigh up to 275kg (both measurements for adult males).<sup>1</sup> They are long-lived marine mammals living up to 50 years of age. Females reach sexual maturity at 5–12 years of age and may produce a calf every 2–3 years throughout their 40–50 year life span. Births occur over an extended period with a peak in March to May, and possibly during August and September. This species is widely distributed in the North Atlantic, West African, Mediterranean and UK coastal waters, with most sightings within 10km of land. Two predominant populations occur in UK inshore waters – Cardigan Bay and the Moray Firth. In addition, small groups appear to be resident or near-resident in waters off Cornwall and Dorset. The total population in the inshore waters of the UK is probably between 300 and 500 individuals. The species used to be more widespread, especially in the southern North Sea and English Channel, and has certainly declined in range. Their diet is predominantly fish, although cephalopod invertebrates (squid and cuttlefish) are consumed.

Aberdeen University<sup>2</sup> and the SMRU<sup>3</sup> have studied the dolphin population in the Moray Firth since 1988. Since 1989 they started a joint project to develop photo-identification techniques in an attempt to study the size and dynamics of the Moray Firth population.

In order for site designation under the Directive to be an appropriate mechanism for protection of Annex II species, it is expected that clearly identifiable areas can be defined that have the physical and biological factors essential to the life and reproduction of a population of the species. Only two areas in UK waters have been identified that meet this criterion for bottlenose dolphins; both these localities have been selected holding the only two substantial resident populations of the species in UK waters. While the individuals using the two sites may range further afield for part of the year, dolphins are present throughout the year and easily recognised individuals have been seen over periods of several years. This repeated occurrence and continual presence indicates that the sites are critical for the maintenance of these populations.

### Monitoring requirements and suggested techniques for bottlenose dolphin

To help implement the UK's Common Standards for Monitoring programme, it is necessary to recommend a small number of techniques that are likely to provide comparable measures for each of attribute (Table 4-3). The UK Marine SACs project evaluated the inter-comparability of some of these techniques (for example, acoustic versus visual counts of dolphins), but considerable further work is required to establish suitable techniques for many attributes. The advice presented below will be updated when new information becomes available.

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1 These statistics and the following text are taken from: Evans, P G H (1990) Whales, Dolphins and Porpoises: Order Cetacea – Bottlenose dolphin, in: Harris, S and Corbet, G B (eds) *The Handbook of British Mammals*, Chapter 9, pp. 331–333. Blackwells, Oxford.

2 See <http://www.abdn.ac.uk/~nhi519/lighthse/dolphins/dolphins.htm>

3 See [http://smub.st-and.ac.uk/ch4\\_5.html](http://smub.st-and.ac.uk/ch4_5.html)

**Table 4-3** Suggested techniques for measuring the attributes that may be used to define favourable condition of bottlenose dolphin populations. Guidance will be developed for the techniques listed.

<i>Generic attribute</i>	<i>Feature attribute</i>	<i>Technique</i>
Quantity (Abundance)	Population size	Counts; Mark/recapture by photo-ID; Acoustic techniques
Population dynamics	Recruitment	Count juveniles
	Mortality	Fishery by-catch survey; Stranded carcass returns;
	Immigration	Photo-ID of individuals
Population structure	Age structure	
	Sex ratio	
	Fragmentation/isolation	
	Genetic diversity	
Habitat requirements	Area for breeding	
	Area for feeding	Habitat mapping (AGDS; side scan sonar); Prey census techniques
	Environmental processes	Measure water quality factors; <sup>4</sup> Debris/litter survey in relation to injury to animals; <sup>5</sup> Incidence of skin lesions

## Specific issues affecting the monitoring of bottlenose dolphin

### *Population size*

For the Moray Firth population, the estimate of population size was derived from a mark-recapture model using the proportion of photographed individuals in several separate samples. It is important to standardise the recording period (using time) to avoid any bias in the results; that is, the counts are effort-limited. Consistent identification of an individual relies on markings that persist between surveys (Figure 4.5). This may require more regular surveillance visits than condition monitoring events (perhaps every six years). In the Moray Firth, there is a photo-archive of over 395 'individuals'. Some animals occur more than once either because their identifying marks were lost between photographs, or because the photographs represent left and right views that it had not been possible to link together.

<sup>4</sup> To determine levels of nutrients, pollutants and pathogens.

<sup>5</sup> For example, discarded monofilament nets and ropes may entangle seals causing lacerations.



**Figure 4.5** Examples of some of the main types of natural markings used to identify individual bottlenose dolphins in the Moray Firth population. Clockwise from the top left: dorsal fin nicks, depigmented areas, rake marks; and skin lesions (after Lighthouse Field Station, University of Aberdeen<sup>6</sup>)

Shore or boat-based counting techniques that do not involve any identification of individual animals are prone to error due to the mobility of the animals both within and between counting periods. Individual dolphins can move rapidly throughout their range; for example, one individual in the Moray Firth was sighted at locations 190km apart within a 5-day period.<sup>a</sup> Nevertheless, visual counts at stations known to be regularly frequented by dolphins may be important for assessing the effectiveness of any management actions, and if undertaken regularly may act as a regular ‘health check’ between monitoring events.

Passive acoustic monitoring of dolphin vocalisations may be useful for estimating the abundance of individuals within an SAC, particularly for monitoring changes in distribution and abundance in small, localised areas<sup>b</sup>. This technique has the advantages of time/weather independence and it can detect dolphins over much greater ranges than visual census techniques<sup>c</sup>. However, it is not possible to assess the proportion of individuals calling at any one time. Acoustic monitoring can provide a valuable adjunct to a visual census, and may provide a valuable tool for the long-term surveillance of dolphin activity patterns within an SAC. Photo-identification techniques are considered to be the more appropriate method for estimating changes in dolphin abundance over a wider area (whole SAC).<sup>b</sup>

None of these counting techniques provides an absolute population size, rather a minimum estimate of population size for a defined period.

### *Population dynamics*

It is possible to compile an inventory of individual dolphins within an area using photographic identification. From repeated observations it should be possible to track an individual dolphin through time. Aggregating the results for many individuals may provide a basic understanding of a population’s dynamics over time.

Analysis of stranded animals or corpses may provide surveillance data to support an assessment of the ‘health’ of dolphin populations. The UK Government funds schemes to report and collect stranded carcasses for post-mortem analysis.<sup>7</sup>

6 See: <http://www.abdn.ac.uk/~nhi519/lighthse/dolphins/mfdolfhid.htm>

7 For example, the Natural History Museum operates a stranding project (Tel: +44 (0)20 7938 8861); also the Collaborative Celtic Marine Strandings Project operates in Wales and Ireland.

### Habitat requirements

The precise habitat requirement of bottlenose dolphins is poorly understood. Dolphins used different areas in the Moray Firth through the year<sup>a</sup> and their distribution showed distinct geographical stratification. This stratification may restrict the animal's movements in confined sites such as firths and they may not be able to move away from localised disturbance or pollution.

Unless the entire SAC is being investigated, monitoring the extent and quality of prey habitats must be linked to contemporary surveys of the geographical location of dolphin populations rather than simply returning to the same area at each monitoring event. Dolphins can forage widely and therefore a decline in prey abundance in one area may not impact the population.

Incidence of skin lesions (Figure 4.5) has been tenuously linked to environmental factors (low water temperature and low salinity) and may be linked to anthropogenic contamination.<sup>3</sup> At present there is no conclusive evidence for the latter although clearly a precautionary approach to SAC management would be advisable. Populations have only been studied for a proportion of an individual's likely life cycle (~12 out of 40–50 years) and chronic effects may yet materialise.

### Health and safety

Bottlenose dolphins may occur in offshore and potentially remote areas. Staff must follow all standard procedures, particularly in relation to working alone (to be avoided), working in remote areas and working from small boats. Some specific risks include:

- using boats in offshore areas: it is imperative that suitable vessels are used in offshore locations; weather and sea conditions can deteriorate rapidly creating very hazardous conditions;
- working on isolated beaches/offshore rocks: difficulties associated with landing, wave surges, being stranded by a rising tide.

Swimming with dolphins is strongly discouraged – there is a potential risk of attack.

It is important to avoid disturbing or harassing dolphins with the survey vessel. Guidance is available on the Whale & Dolphin Conservation Society Internet site,<sup>8</sup> and the Department for the Environment, Transport and the Regions (DETR) Internet site.<sup>9</sup> DETR have recently published guidelines on minimising disturbance from whale watching operations under ASCOBANS.<sup>10</sup>

The Wildlife and Countryside Act 1981<sup>11</sup> (dolphins are a Schedule 5 species) and the Animals (Scientific Procedures) Act 1986<sup>12</sup> control and regulate the study of wild animals that involves the capture and release, handling or remote sampling of individuals. Under this legislation, a licence is required from the UK Government for all activities that require the capture or handling of bottlenose dolphins.

### Bibliography

- a Wilson, B, Thompson, P A and Hammond, P S (1997) Habitat use by bottlenose dolphins: seasonal distribution and stratified movement patterns in the Moray Firth, Scotland. *Journal of Applied Ecology*, **34**, 1365–1374.
- b Thompson, P, Tufft, L, Spencer, N, Grellier, K and Durban, J (2000) *Evaluation of techniques for monitoring the abundance and behaviour of bottlenose dolphins – the Kessock Channel as a case study*. Scottish Natural Heritage Commissioned Report F99LE01 (unpublished).
- c Clark, C W and Charif, R A (1998) *Acoustic monitoring of large whales to the west of Britain and Ireland using bottom-mounted hydrophone arrays: October 1996–September 1997*, JNCC Report No. 281. Joint Nature Conservation Committee, Peterborough.

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8 See: <http://www.wdcs.co.uk/>

9 See: <http://www.wildlife-countryside.detr.gov.uk/whales/index.htm>

10 Agreement on the Conservation of Small Cetaceans of the Baltic and North Sea.

11 See: <http://www.wildlife-countryside.detr.gov.uk>

12 See: <http://www.homeoffice.gov.uk>