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Behavioural observations of dense beaked whales (*Mesoplodon densirostris*) off La Gomera, Canary Islands (1995–1997)

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Abstract

Dense beaked whales (*Mesoplodon densirostris*) were sighted 24 times during 1 September 1995 through 31 August 1997 off La Gomera, Canary Islands. Sightings occurred year round. Group size was estimated to range from 2 to 9 individuals (mean 3.44, SD=2.07, n=23). Of the seven sightings for which such information was recorded, mean depth was 320 m (SD=270 m), and mean distance from shore was 4.39 km (SD=1.85 km). Adult males and calves were both observed during many encounters. The reaction of the animals to the observation vessel varied from avoidance to approach. During two encounters swimmers were able to approach the whales underwater.

Introduction

This paper describes sightings of dense beaked whales (*Mesoplodon densirostris*) off the island of La Gomera between the years 1995–1997.

Dense beaked whales are one of the least known cetacean species. Details on their distribution are mainly taken from stranded animals, and behavioural data is very scarce (Mead, 1989). This species lives in all oceans in warm temperate and tropical waters and is probably the most widely distributed of the 13 known mesoplodonts (Mead, 1990). In the eastern Atlantic Ocean, there have only been three records for the European mainland (Valverde, 1996) and some strandings and occasional sightings off the Canary Islands (Martin *et al*., 1990; Sequeira, 1990; Simmonds & Lopez-Jurado, 1991). However, the frequency of live sightings in the Canaries has increased during the last few years due to intensified sighting effort off Tenerife (Carillo & Lopez-Jurado, 1998), and in the study area described here.

La Gomera (17°15′W–17°21′W and 28°1′N–28°14′N) is one of the Western Canary Islands and lies about 400 kilometres off the West African mainland in the Atlantic Ocean. The islands are steep volcanoes surrounded by deep waters close to the coast. Some authors describe the oceanographic circumstances as an absence of a shelf (Martin *et al*., 1992). In the Western part of the archipelago, the sea-bottom drops steeply to about 4000 metres into the Canaries basin (Rothe, 1986). In the south-west, a depth of 2000 m is only a few kilometres away from the coast. The climate is mainly determined by the island's position in the north-eastern trade-wind. Water temperatures are approximately 22°C–24°C in summer and about 17°C–19°C in winter. This temperature is lower than might be expected for a subtropical region, mainly due to the cold upwelling off West Africa and the cooler Canaries Current (Montero & Arechavaleta, 1996).

Methods

Off La Gomera, small whale watching vessels operate from the Valle Gran Rey, situated in the south-west of the island. One of these boats—the Viena, a 9 m long former fishing boat—has been used as the platform for the systematic collection of data on cetacean sightings since 1995.

From 1 September 1995 to 31 August 1997 sighting data (i.e. species, time, group size, and sighting duration) were collected during the regular whale watching trips of the Viena, which usually are run once or twice a day and throughout the year. Each trip lasts approximately 3–4 hours. Depending on weather and sea state, trips can reach a distance of up to 15 km off the coast. However, most of the trips are conducted much closer to the coast.

Additional behavioural data were collected during the period from 1 September to 31 December 1995. Behaviours were sampled in 3-min scan samples (Altmann, 1974), with emphasis given to the observation of interactive behaviours and the spatial relationship of boat and animals. Thus, not only behavioural events but also the animals' reactions and their interactions with the observation platform were noted during each sample.

The sightings were categorized according to their intensity, as defined by the duration of the encounter, the minimum distance between boat and animals, the occurrence of interactive behaviours (see Table 2 for definitions), and the occurrence of in-water-encounters (until 1996 swimming with cetaceans was not yet prohibited in the Canary Islands).

Other data collected during September to December 1995 included distance to coast (determined by 3-point-bearings using a handbearing compass), sea depth (using a Spanish sea chart: SP 517, Instituto Hidrografico—Cadiz, 1990), group structure (i.e. the spacial relationship of the animals to one another), group composition, dive time, and details of the in-water-encounters (number of swimmers, duration, interaction with swimmers).

Photographs were taken above and below sea level using a Canon T90 single lens camera, equipped with a 70–210 mm zoom lens. For underwater pictures the camera was equipped with a 50 mm lens and put into a flexible underwater camera housing.

Results

510 whale watching trips were conducted in total. This corresponds to nearly 1800 hours of sighting effort, given an average duration of 3.5 hours per trip. There were 483 cetacean sightings in total, of which 24 (5%) were of dense beaked whales. Total time of observation of dense beaked whales slightly exceeded $4\frac{1}{2}$ hours. Sightings were made throughout the year. The number of sightings per month varied from 0 to 6 (mean 2, SD=1.8, n=12). The number of trips per month ranged from 22 to 68 (mean 42.5, SD=11.0, n=12). The mean sighting rate thus was 5.2 % (range 0–13.6, SD=4.5, see Fig.1). Mean group size was 3.44 (range 2–9, SD=2.07, n=23). The mean duration of the sightings was 12.27 min (range 1–100, SD=22.08, n=22).

Additional behavioural data was collected for seven sightings of dense beaked whales, which totalled 3 hours and 31 minutes of observation. The mean distance from the coast was 4.39 km (range 1.48–7.41, SD=1.85, n=7). The mean sea depth was 320 m (range 100–850, SD=270, n=7; see Table 1).

During 3 sightings, dense beaked whales avoided the research vessel, e.g. by increasing the distance to the boat and/or disappearance (Avoidance). During 2 sightings the whales remained at a distance for most of the time. Only few interactive behaviours were observed during one of these encounters (Distant Encounters). During 2 sightings, however, whales were curious toward the research vessel and swimmers in the water, i.e. they stayed close to or approached the boat and swimmers respectively, frequently showing interactive behaviours (Intense Encounters).

In general, the surface behaviour was inconspicuous, only in one case two consecutive tailslaps were observed, a breach was recorded only once, and on three occasions headraises were observed. During two sightings the groups moved in one general direction, with one of the groups repeatedly diving for 3 to 5 minutes. During one encounter, the direction of the group changed with almost each surfacing. In most cases, the dense beaked whales dived synchronously. Long dive times of more than 10 minutes were recorded, with the whales disappearing and not being resighted at times. The group cohesion was very strong: the animals remained very close together most of the time, i.e. within 1 to 5 body lengths from each other.

Another sighting revealed a surprisingly active behaviour: a group of two adults and a juvenile sprinted several hundred meters with the animals repeatedly porpoising at a high speed.

In most of the sightings, the group composition could be easily determined because of the sexual dimorphism in this species. In four out of the seven groups, an adult male was present and six groups had at least one juvenile. Sometimes nursing calves were observed and nursing was observed during one in-water-encounter. Subadult males were never seen, so the groups were solely composed of adult males and/or adult females together with juveniles or calves (see Table 1).

Dense beaked whales showed the following five types of interactive behaviours (Table 2) in the order of decreasing frequency (no. of occurrence): approach (10), scouting (7), accommodation of speed (4), accommodation of direction (1) and orientation towards boat (1).

During two of the seven sightings there were 8 in-water-encounters (3 and 5 per sighting respectively). In these situations, 1 to 6 (mean 2.44) swimmers entered the water and stayed there for a mean of 4.4 min (range 1–11 min). Dense beaked whales never avoided swimmers directly, but sometimes moved away after a short while. At times, they showed very curious behaviours towards swimmers, e.g. approaching, scouting and parallel swimming. During the longest sighting (1 h 40 min, group size 9_animals) we were able to take underwater pictures of each member of the group, including females, juveniles, calves and a mature male (Figs 2 and 3).

The colouring pattern of animals of several different groups was striking, as some animals had ochre to gold fins as well as coloured parts in the eye-, flipper- and blowhole-area (Fig. 4).

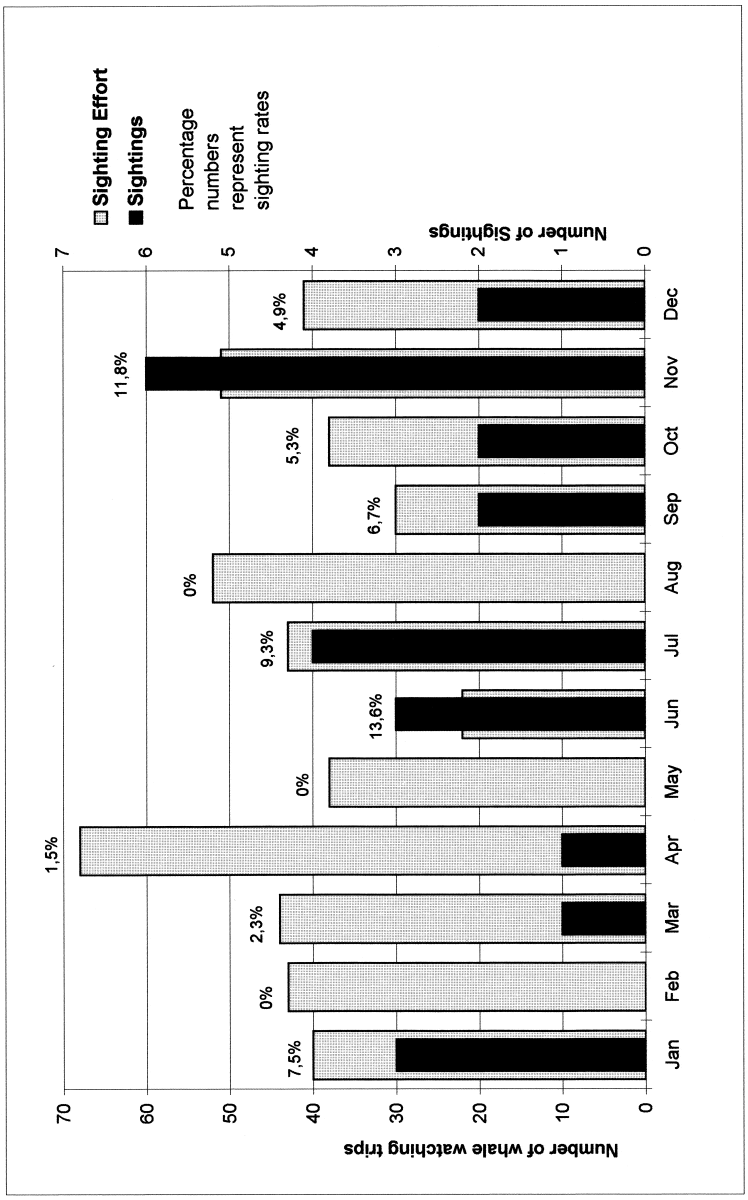

Figure 1. Seasonal distribution of dense beaked whales off La Gomera, 1 September 1995–31 August 1997 (n=24).

Table 1. Descriptive statistics of dense beaked whale sightings off La Gomera, 1 September–31 December 1995

Date	Group size	Group composition	Dist. to shore (nm)	Depth (m)	Duration (min)	Sighting category*
06.09.95	6	1M, 3F, 1J, 1C	0.8	100	38	I
27.09.95	5	1M, 3F, 1J	3.2	500	20	D
16.10.95	9	1M, 4F, 3J, 1C	2.2	140	100	I
02.11.95	5	1M, 2F, 2J	2.0	120	31	D
20.11.95	3	1F, 2J	2.4	200	3	A
28.12.95	3	2F, 1J	2.0	300	12	A
31.12.95	2–3	?	4.0	850	6	A

*A=Avoidance, D=Distant Encounter, I=Intense Encounter.

Table 2. Interactive behaviours towards the boat shown by dense beaked whales during whale watching trips off La Gomera (1 September–31 December 1995, Ritter, 1996)

1 Approach	Reduction of the distance between animals and boat, the latter maintaining a constant direction or being motionless
2 Scouting	Brief approach toward the boat up to a few metres and then moving away
3 Orientation towards the boat	Animal(s) floating or swimming very slowly at the surface turning toward boat
4 Accommodation of Speed	Changes in the speed of animal(s) in accordance to changes in boat speed
5 Accommodation of direction	Change of direction of animals(s) in accordance to changes in boat direction (while animal(s) close to the boat)

Discussion

Dense beaked whales are regarded as purely pelagic animals (Mead, 1989; Hoyt, 1991), which are rarely sighted inshore. However, 6 of the 7 sightings for which depth information was recorded took place in sea depths of less than 500 m, and in two cases the depths was only about 100 m. In contrast, 16 sightings off the Hawaiian Islands were recorded between depths of 700–1000 m (Shallenberger, 1981; Mead, 1989).

Dense beaked whales are the 6th most common of 17 cetacean species sighted off La Gomera to date (Ritter & Brederlau, unpubl. data). However, the reasons for the high relative abundance of dense beaked whales off La Gomera are not known.

The group size of dense beaked whales is generally described as 'small' (Mead, 1989; Claridge & Balcomb, 1995). Where numbers are given, they are usually in a range of 3 to 12 individuals (Shallenberger, 1981; Mead, 1990; Hoyt, 1991). An average group size of 3.64 (Silva *et al*., 1994) was indicated for '*Mesoplodon* spp.' off the Azores. Off Tenerife, the range of group size was 1–10 (Carillo & Lopez-Jurado, 1998). This is supported by the results of this study.

Whereas Mead (1989) speaks of extreme difficulties in identifying individuals, 35 dense beaked whales could be individually photo-identified from 1991 to 1995 off the Bahamas Islands (Claridge & Balcomb, 1995) by using the shape of the dorsal fin, with scars being used as secondary markers. Individual identification of the dense beaked whales off La Gomera may also be possible, due to individually shaped fins and the scar patches which are especially characteristic in adult males but may also be distinctive in females and other individuals (McLeod & Claridge, 1998; Figs 3 and 4). However, it is not really known how long the scars last (Colin McLeod, pers. comm.). The striking ochre-yellowish 'pigmentation' patches, which also have been reported for *M. densirostris* off Tenerife (Carillo & Lopez-Jurado, 1998) derive from diatoms which colonize the whales' skin. These may change in time (Vidal Martin, pers. comm.), and so cannot be reliably used as identification marks. We could not re-identify individuals comparing the photographs of adult males taken during this study.

Figure 2. Dense beaked whales (La Gomera, October 1995) showing females with calves.

Figure 3. Adult male dense beaked whale (La Gomera, October 1995).

Dense beaked whales are described as timid and shy animals difficult to trace (Carwardine, 1995). They dive for up to 45 min (Barnes, 1988; Mead, 1990), and even during shorter dives of 10–15 minutes probably travel horizontally, which we experienced in some cases when they submerged and were not seen again.

Off Tenerife, *M. densirostris* typically avoided boats, but sometimes also stayed close to boats for up to 15 min (Carillo & Lopez-Jurado, 1998). In

Figure 4. Surfacing dense beaked whale showing patches of diatoms around the blowhole (La Gomera, October 1995).

spite of their reported shyness, dense beaked whales also demonstrated a broad range of reactions towards us, and they interacted more frequently with the boat than other cetacean species did (Ritter, 1996).

The existence of some underwater pictures of dense beaked whales (e.g. Martin (ed.), 1990) suggests that there have already been people who were tolerated by these whales in the water for at least a short time. To the contrary, the average duration of the in-water-encounters we had with dense beaked whales was longer and the relative proportion of sightings with in-water-encounters was higher than for other cetacean species off La Gomera (Ritter, 1996). The animals partly behaved very tranquilly. They repeatedly made the impression of curious animals which at times at least do not avoid the presence of man. It is interesting that the extraordinarily long sighting, which included the longest in-water-encounter (11 min) with the most swimmers (6 swimmers) was with the largest group size (9 individuals) we ever recorded in dense beaked whales.

The use of whale watching vessels as a platform of opportunity herewith was demonstrated to be very effective to collect data on a regular basis. Even if certain restraints have to be accepted (e.g. the limited time frame and range of the whale watching trips), the cooperative partnership of tour operator and researchers like on La Gomera can be called a vital example for the reciprocal coexistence of tourism and scientific work.

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References

Altmann, J. (1974) Observational study of behaviour: sampling methods. *Behav.* **49,** 227–267.

Barnes, L. G. (1988) Die Wale der Welt: Zahnwale. Pp. 66–83. In: J. Keller, (ed.) *Wale und Delphine*. Jahr Verlag GmbH & Co: Hamburg, 239 pp.

Carillo, M. & Lopez-Jurado, L. F. (1998) Structure and behaviour of a Blainville's beaked whale (*Mesoplodon densirostris*) group in Tenerife (Canary Islands). *World Mar. Mamm. Sci. Conf.* 20–24 January, 1998, Monaco (Abstract).

Carwardine, M. (1995) Baleines, dauphins et marsouins. Bordas, Paris, 256 pp.

Claridge, D. E. & Balcomb, K. C. (1995) Photo-Identification of dense beaked whales (*Mesoplodon densirostris*) in the Northeastern Bahamas. *11th Bien. Conf. Biol. Mar. Mamm.* 14–18 December 1995, Orlando, FL (Abstract).

Hoyt, E. (1991) Alle Wale der Welt. The whale watchers handbook. Conrad Stein Verlag: Kiel, 202 pp.

IFAW, Tethys and Europe Conservation (1995) Report of the workshop on the scientific aspects of whale watching. Montecastello di Vibio, Italy. 30 March–4 April 1995, 45 pp.

Martin, A. R. (ed.) (1990) Wale und Delphine. Mosaik Verlag GmbH: Muenchen, 192 pp.

Martin, V., Vonk, R., Escorza, S. & Montero, R. (1990) Records of Gervais beaked whale *Mesoplodon europaeus* on the Canary Islands. European Research on Cetaceans 4. *Proc. 4th Ann. Conf.* ECS, 2–4 March, 1995, Palma de Mallorca, Spain.

Martin, V., Montero, R., Heimlich-Boran, J. & Heimlich-Boran, S. (1992) Preliminary observations of the cetacean fauna of the Canary Islands. European Research on Cetaceans 6. *Proc. 6th Ann. Conf.* ECS, 20–22 February 1992, 61–63, San Remo, Italy.

McLeod, C. D. & Claridge, D. E. (1998) Scarring in a living population of dense beaked whale, *Mesoplodon densirostris*, off the island of Great Abaco, The Bahamas. *World Mar. Mamm. Sci. Conf.* 20–24 January, 1998, Monaco (Abstract).

Mead, J. G. (1989) Beaked whales of the genus *mesoplodon*. Pp 349–430. In: S. H. Ridgeway & R. Harrison (eds) *Handbook of marine mammals*. Volume 4. River dolphins and the larger toothed whales. Academic Press Ltd: London, 452 pp.

Mead, J. G. (1990) Blainville-Schnabelwal *Mesoplodon densirostris*. P. 115. In: A. R. Martin (ed.) *Wale und Delphine*, 1–192, Mosaik Verlag GmbH: Muenchen.

Montero, R. & Arechavaleta, M. (1996) Distribution patterns: relationships between depths, sea surface temperature, and habitat use of Short-finned pilot whales south-west of Tenerife. European Research on Cetaceans 10. *Proc. 10th Ann. Conf.* ECS, 11–13 March, 1996, 193–198, Lisbon, Portugal.

Ritter, F. (1996) Abundance, distribution and behaviour of cetaceans off La Gomera (Canary Islands) and their interaction with whale whatching-boats and swimmers. Diploma Thesis to the University of Bremen, Faculty of Biology, 114 pp.

Rothe, P. (1986) Sammlung Geologischer Fuehrer, 81: Kanarische Inseln. Gebrueder Borntraeger, Berlin.

Sequeira, M. L. (1990) On the occurrence of Ziphiidae in Portuguese waters. European Research on Cetaceans 4. *Proc. 4th Ann. Conf.* ECS, 2–4 March, 1990, 91–93, Palma de Mallorca, Spain.

Shallenberger, E. W. (1981) The status of Hawaiian cetaceans. *Mar. Mamm.* Commn rep no. MMC-77/23 (NTIS PB82-109398). (Not seen, cited in Mead, 1989).

Silva, A. G., dos Santos, M. E., Harzen, S. & Viallelle, S. (1994) Cetacean sightings from a vantage point on the Azorean island of Pico during the summer of 1993. European Research on Cetaceans 8. *Proc. 7th Ann. Conf.* ECS, 2–5 March, 1994, 124–126, Montpellier, France.

Simmonds, M. P. & Lopez-Jurado, L. F. (1991) Whales and the military. *Nature* **351,** 448.

Valverde, J. A. (1996) Notes on a specimen of Blainville's beaked whale *Mesoplodon densirostris* (de Blainville, 1817), stranded in the coast of Donana, Huelva, southern Spain. European Research on Cetaceans 10. *Proc. 10th Ann. Conf.* ECS, 11–13 March, 184–189, Lisbon, Portugal.