PRESENCE AND DISTRIBUTION OF THE ZIPHIIDAE FAMILY IN THE SOUTH WEST COAST OF TENERIFE. CANARY ISLANDS

Manuel Carrillo
Tenerife Conservación Cetacean Research Society
C/Heraclio Sánchez, 23.F-46. 38204 La Laguna. S/C deTenerife. Islas Canarias
canariasconservacion@yahoo.es

INTRODUCTION

The world wide distribution of the various species of the Ziphiidae Family is primarily known due to the data on the stranded animals and sporadic sightings (Mead 1989; Odell 1991; Early and McKenzie 1991; Jefferson et al. 1993). The peculiar characteristics of the Ziphiidae family, which are a strict oceanic habitat, a discreet surfacing behaviour and small social units, reduce to a great extent the sighting probabilities and also reduce the data on strandings in continental areas with large coastal shelves. The volcanic origin and oceanic location of the Canarian Archipielago however promote oceanographical and geomorphological conditions that favour the stranding of well preserved animals and facilitate the observation of these oceanic animals near the coast line (Vonk and Martín 1988; Carrillo and Lopez-Jurado 1998; Carrillo and Martín 1999).

The study of stranded animals and sightings in the Canary Islands have allowed the identification of 5 species of 3 genera: 1) Cuvier´s beaked whale, *Ziphius cavirostris*: nowadays is the most frequently stranded species as well as in the 80s, due to the mass strandings that occurred in the coasts of Fuerteventura and Lanzarote in that decade (Martín *et al* 1992; Martín and Carrillo 1992. Martin. *pers. com*). The sightings of this species are well documented (Politi, E. *et al.* 1996; Martín,V and Carrillo, M. LIFE Project 2000; Ritter, F 1996). 2) Gervais´ beaked whale *Mesoplodon europaeus*: there are strandings in Lanzarote, Fuerteventura and Tenerife (Vonk and Martín 1988; Martín *et al.*1990; Martín and Carrillo 1992; Martín *et al* 1994) and only 2 sightings, 1 in Tenerife (Carrillo and Martín 1999) and other in Gran Canaria (Martín V and Carrillo, M. LIFE Project 2000). 3) Blainville´s beaked whale *Mesoplodon densirostris:* there are strandings in La Palma (Carrillo and Lopez-Jurado 1998; Martín and Carrillo 1999), Fuerteventura and Lanzarote (Vonk and Martín 1988; Martín *et al* 1994; Martín and Carrillo 1999; Carrillo *et al*. 2002), and sightings in all the islands (Carrillo, M *et al.* 1998; Martín, V and M.Carrillo. LIFE Project 2000). 4) True's beaked whale *Mesoplodon mirus:* there is only 1 stranding in Lanzarote (Vonk and Martin 1988; Martin and Carrillo 1992) and no sightings of the species have been recorded. 5) Bottlenose beaked whale *Hyperoodon ampullatus*: there is only 1 stranding recorded in Fuerteventura in 1988 (Martín, V. *pers com*). A confirmed sighting in February 2002 in the south east of Gran Canaria

This paper, developed as part of the project "Studies applied to the conservation of cetacean in the Canary Islands, funded by the Canarian government, analyses and provides geographical and biological data of two stranding events and 66 sightings of the Ziphiidae Family recorded in the Special Area of Conservation ES-7020017 off the coast of the sw of Tenerife between 1995 and 2002.

STUDY AREA

The total study area is approximately 180 km2. The sea bottom is characterised by a smooth and continuous slope reaching a 200 m in depth. Then, it falls abruptly as far down as 500 m deep. Most of the shelf departs from Los Gigantes cliffs, extending between 200 m and 2.5 miles offshore. On the other hand, and as it is expected in volcanic origin islands, there are large depths between neighbouring islands. The maximum depth between Tenerife and La Gomera, located 14 miles to the SW, goes beyond 1500 m. Oceanographically, the study area is subject to the called "Island Mass Effect" (Hernández-León, 1986). According to this effect, the island acts a wall against the relatively cold descending Current of the Canaries. Therefore the waters of the study area do mix very little with adjacent water masses, being warmer and thermically more stable. On the other hand, the constricted mixture zones are characterised by "cyclonic" and "anticiclonic" swirls that cause micro-upwelling events and an increase in local biological productivity, which are the causes of the thermic gradient of almost 1 degree centigrade that has been detected between the limits of the study area (Fig. 1).

MATERIALS AND METHODS

The sightings recorded were opportunistic ones obtained during the field seasons carried out in the SW of Tenerife which targeted the resident populations of bottlenose dolphins (*Tursiops truncatus*) and tropical pilot whales (*Globicephala macrorhynchus*), as well as from the whalewatching boats working in the area. The use of several sighting platforms, the non homogeneous search in the area and the absence of a constant effort, make impossible the obtaining of abundance and density indexes of the species in the area. To a large extent, the best-searched area is the northern limit, from Playa de San Juan to the cliffs of Los Gigantes. The sea depths in the sighting points taken from commercial boats were obtained by extrapolating from the nautical charts of the Spanish army hydrographic Institute and the sightings from the R/S Monachus were obtained with sonar Furuno of 2000 m. In order to identify the age class in Cuvier´s beaked whale, coloration patterns of the animals were used (Martín, 1999). In the sightings of this species we recorded as inmate animals those that showed a well

defined eye patch and grey colour in the lateral and dorsal area, animals close to puberty those that showed a grey colour on the head and dorsal area and low level of contrast with the white colour of the throat and ventral region and adult animals those that presented a well defined white colour on the head. The gender was only registered in the case of adult males (teeth visible) and adult females if the animal was together with a calf. In Blainville's beaked whale we used the peculiar morphology of the head, the marks and scars on the skin and the size of the animal to separate: adult males, in which the mandible arch and the lowering of the skull are very acute generally visible teeth and many marks in the dorsal area. In older animals the teeth may not be visible due to erosion and seasonally can be covered with barnacles. This last factor leads to a peculiar external appearance of these males. Subadult males are those that don't have visible teeth, although they have a prominence in the mandible arch, skull lowering and some marks of teeth on the dorsal area; adult females, in which the cetacean is together with a small animal (calf) or those of large sizes that do not show males characteristics (Carrillo et al., 1998). The group composition data of the sightings was recorded following the protocol recommended by the beaked whale-working group of the European Cetacean Society.

RESULTS

The 66 sightings recorded have made possible the identification of 3 species: 58 cases of Blainville´s beaked whale (88%), 4 records Cuvier´s beaked whale (5,9%), and 1 case of Gervais´ beaked whale (1,4%). In tree sightings was impossible to determine the specie (4,4%). The two stranding recorded were a Cuvier´s beaked whale, 1 female in advance state of decomposition and 1 male of 525 cm with signs of interaction with maritime traffic. The position of the sightings is shown in Fig. 2.

Cuvier´s beaked whale The 4 sightings were recorded in August/95, May/96, August/99 and October/99. The average depth was 384,7 m with a minimum of 150 m and a maximum of 700 m. (SD=265,738) (Table 1). 2 of the sightings were composed of only 1 animal, probably young male. 1 of the sightings was composed of 2 unknown animals and other group consisted of 4 individuals including 1 adult male. In all sightings there was an avoidance reaction of this specie in the presence of the boat. The stranding of 2 individuals of Cuvier´s beaked whale have been recorded: 1 individual in 1999 of sex and size unknown and advanced decomposition state, and 1 male of 525cm. in June 2002 with signs of interaction with marine traffic.

Gervais´ beaked whale One single recorded in January de 1999 at a depth of 1750 m. A group of 3 indeterminate animals that came to the prow of the boat. The excellent photographic material obtained from this sighting made possible the confirmation of the identification of the species. This is one of the few sightings of this species in the Atlantic Ocean (Carrillo and Martin, 1999).

Blainville´s beaked whale With 57 sightings (88%), this is the beaked species most frequently sighted in the SW of Tenerife. With the exception of the month of December, it has been present in the area all the years (Fig. 3) and months of the study. October, with 31% of the recordings is the month with most sightings (Fig. 4). The depth ranged from 75 m and 1630 m with an average of 462,15 m. (Table. 2). The distribution by depth ranks is shown in Fig. 5. 34% of the sightings were recorded as unknown groups. The average number of animals in the group (Table. III) was 4,59 animals with a maximum of 10 (SD=2,043). The distribution by size ranks (Fig.6) shows that the most frequent groups are composed of between 2 and 6 individuals (71%). Within the groups, 74% of the individuals were classified as unknown age and sex. There were adult males in 27 groups (47%, n=58), with a maximum of 2 per group. There were groups including both 1 adult male and 1 subadult male in 4 sightings. Adult females were recorded 19 times (33%, n=58) with a maximum of 2 per group. 10 groups were included calves/juveniles with the highest frequency in October with 5 recordings (Fig. 7).

Indeter. beaked whale 3 records: 1 in September 1996 at a depth of 120m. Group of 6-8 animals of similar morphology to Blainville´s beaked whale, 1 in September 1997 at a depth of 500 m. Group of 2 animals and 1 in October 1999 at a depth of 950. Group of 2 animals.

DISCUSSION

There are recordings of sightings of Blainville´s beaked whale every year, although the yearly frequency sighting is very variable. During august, September and October, the months with the warmest temperatures, there is an increase in the frequency of sightings, and this could be related to a flux of animals coming from more tropical waters.

The higher frequency of calves/juveniles in October, the presence of new-borns in august and November and the foetus in a late development stage studied in April 1998 in the nearby island of La Palma, make us believe that the summer months are the breeding season. Nevertheless, the information available is not enough to establish the degree of residence or seasonally of presence in the area of these species.

The depth distribution shows an average of 462m., which seems to be too small if we take into account the oceanic characteristics described for the species. Nevertheless, this average depth is similar to that recorded in Bahamas (MacLeod, C. *com. per*).

The high frequency of unknown individuals in the recorded group composition (74%) could be due to the short duration of the sightings. Most of the groups were composed of 1 adult male (475), 1-2 adult females (33%), 1 calf/juvenile (21%) and 2 to 3 unknown animals.

The reduction in the number of sightings in the last 3 years might be due to a certain seasonal factor affecting the presence of the species and the influence of unknown oceanographic factors. The high percentage of sightings and its wide temporal distribution shows the importance of the SW area of Tenerife for research and conservation of this species in the Atlantic.

REFERENCES

Carrillo, M. 1996. Cetáceos varados en las islas Canarias: 1992-95. Informe Técnico Delfinario Aqua Park Octopus. Adeje. Tenerife.

Carrillo, M., P. López, and L.F. López-Jurado. 1998. Occurrence, group structure and behaviour of the Blainville's beaked whale, *Mesoplodon densirostris* (de Blainville, 1817) off Tenerife, Canary Islands. World Marine Mammal Science Conference. Mónaco.

Carrillo, M. and Martín, V. 1999. First sighting of Gervais Beaked Whale *(Mesoplodon europaeus* Gervais, 1855) (Cetacea; Ziphiidae) from the nor oriental Atlantic Coast. In: *European Research on Cetaceans - 13*. (Eds: P.G.H. Evans). Proc. XIII Annual Conference of The European Cetacean Society, Valencia, España.

Carrillo, M., M. Tejedor, A. Peña and G. González. 2002. Estudios Aplicados a la conservación de los cetáceos en la provincia de S/C de Tenerife. Informe Técnico (no publicado). Dirección General de Política Ambiental. Gobierno de Canarias.

Early, G. and T.P. McKenzie. 1991. The Northeast Regional Marine Mammal Stranding Network. Pages 63-69. In: *Marine mammal stranding in the United States*. Proceedings of the second marine mammals stranding workshop; 3-5 December 1987, Miami, FL.J.E. Reynolds and D.K. Odell, eds. NOAA. Technical Report. NMFS 98.

Hernández-León, S. (1986). Efecto de masa de isla en aguas del Archipiélago Canario según estudios de biomasa y actividad de sistema de transporte de electrones en el mesozooplancton. Tesis doctoral de la facultad de Biología de la Universidad de La Laguna. 402 p.

Jefferson, T., Leatherwood, S., and Webber, M.A., 1993. *Marine Mammals of the World*. FAO. Species Identification Guide. Food and Agriculture Organisation of the United Nations, Rome.

López Jurado, L.F and M. Carrillo.1998. Stranding of a Blainville's beaked whale *(Mesoplodon densirostris)* pregnant female in the Canary Islands. World Marine Mammal Science Conference. Mónaco.

Martín. V., R. Vonk. S. Escorza and R. Montero. 1990. Records of Gulf Stream beaked whale *(Mesoplodon europaeus)* on the Canary Islands. In: *European Research on Cetaceans - 4*. (Eds: P.G.H. Evans). Proc. IV annual Conference of The European Cetacean Society. Palma de Mallorca. España.

Martín, V and M. Carrillo. 1992. Programa de Estudio de Cetáceos Varados 1991. Inf. Tec. Viceconserjería de Medio Ambiente. Gobierno de Canarias.

Martín, V., R. Montero, J. R. Heimlich-Boran and S. Heimlich-Boran. 1992. Preliminary observations of the cetacean fauna of Canary Islands. In: *European Research on Cetaceans - 6*. (Eds: P.G.H. Evans). Proc. of the Sixth Annual Conference of the European Cetacean Society, San Remo, Italy.

Martín, V., M. Carrillo, M. André and V. Hernández. 1995. Records of cetaceans stranded on the Canary Islands coast from 1992 to 1994. International Council for Exploration of the Sea. Marine Mammals Committee. CM 1995/N:9.

Martín, V., V. Iani and F. Schweikert. 1998. Cetaceans sighted in the Canary Islands during the Caremex expedition (January-April 1997). World Marine Mammal Science Conference. Mónaco.

Martín, V and M. Carrillo, 1999. Informe Técnico sobre varamientos de cetáceos en las Islas Canarias. Abril 1998-abril 1999. Dirección General de Política Ambiental. Gobierno de Canarias

Martín, V. 1999. A new approach to the coloration patterns of the Cuvier´s beaked whale. Proc. XIII Annual Conference of The European Cetacean Society, Valencia, España

Martín, V., M. Carrillo y L.F. López Jurado. 2000. Informe Proyecto Life de Apoyo a la Conservación de la tortuga boba *Caretta caretta* y del delfín mular *Tursiops truncatus* en las Islas Canarias. Consejería de Política Territorial y Medio Ambiente. Gobierno de Canarias.

Mead, J.G. 1989. Beaked Whale of the Genus Mesoplodon. Pages 349-430. In: *Handbook of Marine Mammals*. Volume 4. (S:H:Ridgway and R. Harrison, eds) . Academic Press, London.

Odell, D.K. 1991. A Review of the Southeastern United States Marine Mammals Stranding Network: 1978-1987. Pages 19-23. In: *Marine mammals stranding in the United States*. Proceedings of the second marine mammals stranding workshop; 3-5 December 1987, Miami, F.L.J.E. Reynols and D.K. Odell, eds. NOAA. Technical Report. NMFS 98

Politi, E., G. Notarbartolo di Sciara and C. Mazzanti 1996. Cetaceans found in the waters surrounding Lanzarote, Canary Islands. Proc. X Annual Conference of the European Cetacean Society, Lisboa, Portugal.

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

Vonk, R and V. Martín. 1988. First list of odontocetes from the Canary Islands, 1980-1987. Proc. II Annual Conference of the European Cetacean Society, 31-33. Setubal, Portugal

Table 1.- Statistical analysis for the depth of the cuvier´s beaked whale sightings.

	Valid	Mean	Confid.-95,0%	Confid.+95,0%	Median	Min.	Max.	Low. Quart.	Upp. Quart.	Quart. Range	Std.Dev.
DEPTH	4	384,75	-38,1	807,6	344,5	150	700	165	604,5	439,5	265,738

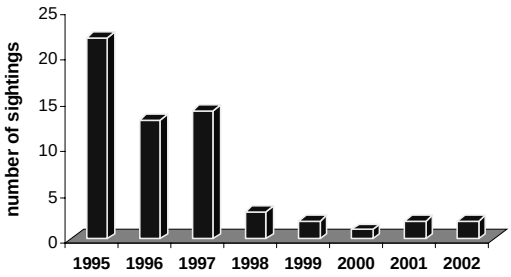

Fig.3- Annual frequency of blainville´s beaked whale sightings

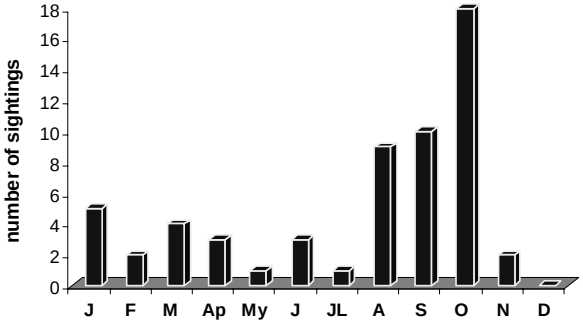

Fig.4- Monthly frequency of blainville´s beaked whale sightings

Table 2.- Statistical analysis for the depth of the blainville´s beaked whale sightings.

	Valid N	Media	Confid. -95,00%	Confid. +95,00%	Median	Minim	Maxim	Lower Quartile	Upper Quartile	Std. Dev.
DEPTH	58	462.15	365.52	558.78	426.50	75	1630	130	650	367.51

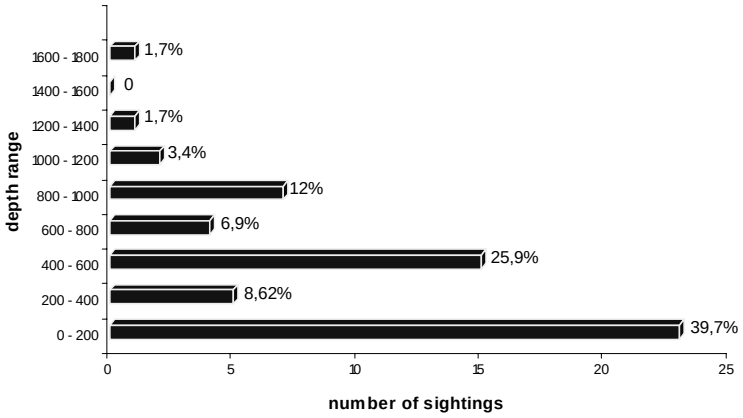

Fig.5- Distribution by depth ranks and frequency of Blainville´s beaked whale sightings

Table 3.- Statistical analysis for the group size of the Blainville´s beaked whale sightings.

	Valid N	Mean	Confid -95,0%	Confid +95,0%	Median	Minim	Maxim	Low. Quart.	Upp. Quart.	Quart. Range	Std.Dev.
GROUP SIZE	58	4,59	4,05	5,12	4	1	10	3	6	3	2,0437

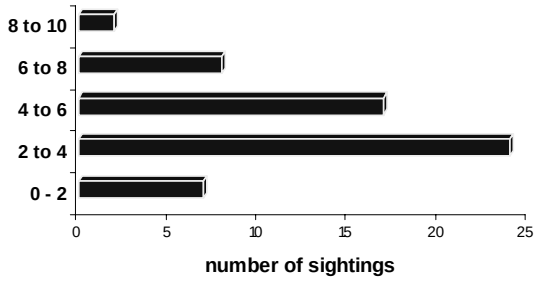

Fig.6- Distribution by size ranks of Blainville´s beaked whale sightings

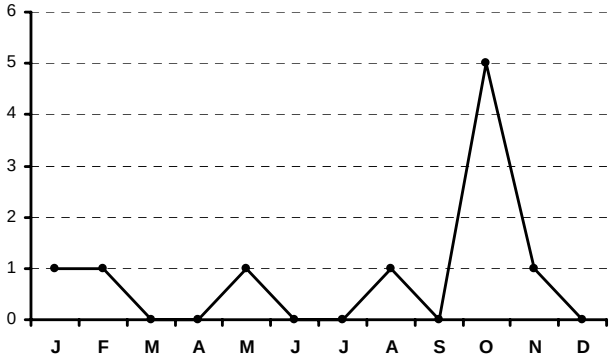

Fig.7- Monthly frequency of the presence of calves in the groups of Blainville´s beaked whale

Fig.2- Location of the sightings