

## Recent data on whales and dolphins (Mammalia: Cetacea) from the Cape Verde Islands, including records of four taxa new to the archipelago

Cornelis J. Hazevoet <sup>1</sup>, Vanda Monteiro <sup>2</sup>, Pedro López <sup>3</sup>, Nuria Varo <sup>4</sup>,  
Gergely Torda <sup>5</sup>, Simon Berrow <sup>6</sup> & Barbara Gravanita <sup>7</sup>

Keywords: Cetacea, whales, dolphins, Cape Verde Islands, distribution

### ABSTRACT

Based on both stranding and sighting records, recent data on the status and distribution of whales and dolphins in the Cape Verde Islands are presented, including records of four taxa new to the archipelago, viz. Common minke whale *Balaenoptera acutorostrata*, Dwarf sperm whale *Kogia sima*, beaked whale *Mesoplodon* cf. *europaeus* and False killer whale *Pseudorca crassidens*. Distribution elsewhere in the tropical eastern Atlantic and some taxonomic issues are discussed.

### RESUMO

São apresentados dados recentes sobre a distribuição de baleias e golfinhos em Cabo Verde, obtidos com base em registos de avistamentos e arrojamentos, incluindo quatro taxa novos para o arquipélago, viz. Baleia-anã *Balaenoptera acutorostrata*, Cachalote-anã *Kogia sima*, baleia-de-bico *Mesoplodon* cf. *europaeus* e Orca-bastarda *Pseudorca crassidens*. É igualmente discutida a distribuição no Atlântico leste tropical, bem como um conjunto de aspectos taxonómicos.

---

<sup>1</sup> Instituto de Investigação Científica Tropical – Jardim Botânico Tropical, Unidade de Zoologia, Rua da Junqueira 14, 1300-343 Lisboa, Portugal; email: [cjhazevoet@gmail.com](mailto:cjhazevoet@gmail.com)

<sup>2</sup> Instituto Nacional de Desenvolvimento das Pescas, C.P. 132, Mindelo, São Vicente, Republic of Cape Verde; email: [yamarmont2004@yahoo.com](mailto:yamarmont2004@yahoo.com)

<sup>3</sup> Naturalia Capa Verde Lda, C.P. 100, Sal Rei, Boavista, Republic of Cape Verde

<sup>4</sup> Departamento de Biología, Universidad de Las Palmas de Gran Canaria, Apdo. 550, 35080 Las Palmas de Gran Canaria, Spain

<sup>5</sup> James Cook University and Australian Institute of Marine Science, 4810 Townsville, Queensland, Australia

<sup>6</sup> Shannon Dolphin and Wildlife Foundation and Irish Whale and Dolphin Group, Merchants Quay, Kilrush, County Clare, Ireland

<sup>7</sup> SY Simile, Santa Maria, Sal, Republic of Cape Verde

## INTRODUCTION

The Cape Verde Islands are situated in the eastern Atlantic, *ca.* 500 km west of Senegal, West Africa. The archipelago consists of 10 islands (nine of which are inhabited) and several uninhabited islets (Fig. 1). The total land area is 4,033 km<sup>2</sup>, scattered over 58,000 km<sup>2</sup> of ocean. While the terrestrial climate is dry tropical, sea conditions are heavily influenced by the cool Canary current that flows from the north. Average sea surface temperatures range from 20° C in February-March to 26° C in September-October.

The occurrence of Cetacea in the archipelago of Cape Verde was most recently summarized by Hazevoet & Wenzel (2000), who listed 18 species, including one only tentatively identified (*Balaenoptera cf. borealis*), while records of another (Long-finned pilot whale *Globicephala melas*) are no longer considered valid (see account on Short-finned pilot whale *G. macrorhynchus* below).

During the past decade, a basic stranding scheme, coordinated by the second author (VM) at the *Instituto Nacional de Desenvolvimento das Pescas* (INDP) in Mindelo, São Vicente, has been developed, while the first author (CJH) aims to collect all information on cetacean distribution (both sightings and strandings) in the Cape Verde region. Combined, these efforts – designated the Cape Verde Cetacean Database – have resulted in a considerable increase in data having become available compared to pre-2000 years. However, much depends on the continued efforts of only a handful of people. For instance, the large number of stranding data from Boavista are almost solely due to the presence there of the third author (PL), who also maintains a modest collection of specimens, the Boavista Reference Collection (BVRC). In marked contrast, stranding data from the Fogo-Brava area (where there is only limited beach front and most coast consists of cliffs) are just about absent. Over the past 10 years, observation effort has also grown due to other factors. In addition to a number of dedicated pelagic surveys (see below), the growing popularity of Cape Verde as a holiday

and/or birdwatching destination has resulted in an ever increasing number of opportunistic observations being reported. Moreover, a local whale-watching industry is emerging, particularly on the islands of Sal and Boavista, which have turned into ever expanding centres of tourism. It is expected that at least some of the data resulting from touristic whale-watching activities will be made available for inclusion in the Cape Verde Cetacean Database. Whale-watching has already resulted in a considerable number of fluke photos of Humpback whales *Megaptera novaeangliae*, thus contributing to 20 years of research on these migrant mysticetes in Cape Verde (cf. Wenzel *et al.* 2009).

Since Hazevoet & Wenzel (2000), the first documented occurrences of Fin whale *Balaenoptera physalus* in Cape Verde seas were published by Moore *et al.* (2003), while Torda *et al.* (2010) reported the first records of Fraser's dolphin *Lagenodelphis hosei*. Results of ongoing research on the wintering population of Humpback whales in Cape Verde were recently summarized by Wenzel *et al.* (2009). Jann *et al.* (2003) reported on a Humpback whale photographed in the Denmark Strait off Iceland and resighted in Cape Verde. Here we report on four cetacean taxa newly recorded in the Cape Verde region, as well as detailing records of a number of other species. These include strandings and incidental observations, as well as observations made during dedicated surveys aboard research vessels – the Spanish *Proyecto Hydrocarpo* in 2003 and 2005 (Anonymous 2006) and by the Irish Whale and Dolphin Group (IWDG) in 2003 and 2006 (Berrow 2003, 2006).

The current paper does not intend to comprehensively overview all cetacean taxa recorded in the Cape Verde region. While all stranding data that we are aware of have been included (except for one unidentified rorqual *Balaenoptera* sp.), sightings of some of the commoner species (e.g. *Steno bredanensis*, *Stenella attenuata*, *S. frontalis*, *Globicephala macrorhynchus*) are not detailed as these were too numerous for the present purpose.

## METHODS

The geographical limits of the study area are broadly defined as latitudes 14°-18° and longitudes 22°-26°W. A few records just outside this range have been included when they add significantly to the status information of the species in Cape Verde seas. Records prior to 2000 were compiled by Hazevoet & Wenzel (2000) and, with few exceptions, data herein stem from the years 2000-2010, although older records are included when appropriate. Two sources of data were employed, i.e. sightings and strandings. The

latter were verified through photographs, documented voucher skulls or skeletal specimens. Sightings were accepted when detailed written descriptions and/or photographs were available, or when recorded by an experienced observer familiar with the species concerned. Taxonomy follows Rice (1998). In the following, 'West Africa' refers to those countries bordering the tropical East Atlantic coast from Mauritania in the north to Angola in the south.

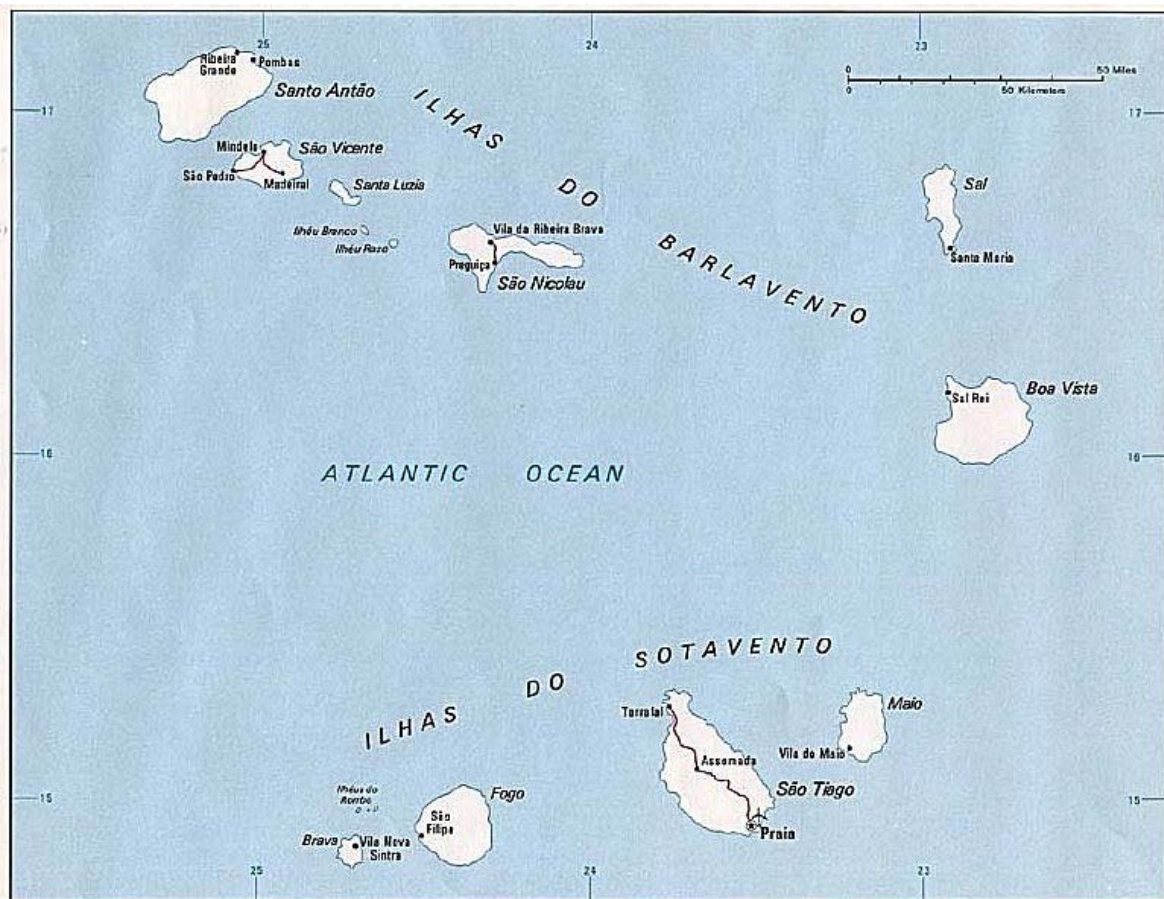


Fig. 1. Map of the Cape Verde Islands.

## SPECIES ACCOUNTS

**Common minke whale *Balaenoptera acutorostrata* Lacépède, 1804**

A Common minke whale (length 4-5 m) was found stranded at Praia de Boa Esperança, Boavista, 12 May 2000 (Fig. 2). The animal showed three parallel cuts on its left flank and rostrum, clearly marks of a collision with a ship's propeller. General morphology, size and white patches on the flippers confirmed the identification as Common minke whale. The skull was preserved, but unfortunately was subsequently destroyed by dogs.

This is the first documented record of *B. acutorostrata* for the Cape Verde Islands. Previously, a juvenile whale, stranded at Cidade Velha, Santiago, 2 November 1983, photographs of which appeared in a local newspaper (see Hazevoet & Wenzel 2000), was said to be "likely a minke whale" by Lagendijk (1984), but listed (without further reasoning) as Fin whale *B. physalus* by Reiner

*et al.* (1996). Subsequently, the animal was identified as probably a Sei whale *Balaenoptera cf. borealis* (Hazevoet & Wenzel 2000).

Common minke whale occurs in the Atlantic and Pacific Oceans, as well as at tropical latitudes in the southern hemisphere (Rice 1998). In West Africa, there are sightings off Western Sahara, strandings from Mauritania and Senegal, possible sightings off The Gambia (Van Waerebeek *et al.* 1999) and a bycatch landing from Guinea (Bamy *et al.* 2010). The collision of a minke whale with a ship's propeller off Boavista is only the second documented case of a whale struck by a vessel in West Africa, after a Sei whale was brought into the port of Dakar, Senegal, on the bow bulb of a container ship (Félix & Van Waerebeek 2005).



Fig. 2. Common minke whale *Balaenoptera acutorostrata*, Praia de Boa Esperança, Boavista, 10 May 2000 (Nuria Varo).



Fig. 3. Bryde's whale *Balaenoptera brydei*, 20°55'N, 22°25'W, 20 October 2009 (Mike Greenfelder).

### **Bryde's whale** *Balaenoptera brydei* Olsen, 1913

A Bryde's Whale was observed at 20°55'N, 22°25'W, 20 October 2009 (Fig. 3), and another was seen within one mile of Porto Novo, Santo Antão, 21 October 2009 (Mike Greenfelder & Richard White *in litt.*). Both animals showed the diagnostic three ridges on the rostrum. Previously, Hazevoet & Wenzel (2000) reported a cow and calf off Tarrafal, São Nicolau, 28 September 1988, and a stranded calf on Boavista, 29 February 1996 (both listed as *B. edeni*).

'Bryde's whales' occur in tropical and subtropical oceans around the world. The taxonomy of the Bryde's whale *B. edeni/brydei* complex is confused and in need of further study (Perrin & Reeves 2004). Until recently, most authors followed Junge (1950), who considered *edeni* and *brydei* to be conspecific, a conclusion now deemed premature (cf. Rice 1998, Mead & Brownell 2005). Although in recent years considerable effort has been made

in clarifying the taxonomy of these whales, studies have mostly dealt with Indo-Pacific populations (e.g. Perrin *et al.* 1996, Yoshida & Kato 1999, Kanda *et al.* 2007), while Atlantic populations have not been considered so far. Pending results of further research and following Best (2007), we refer Atlantic populations to *brydei*.

Due to possible confusion with Sei whale *B. borealis*, the status of Bryde's whale in the East Atlantic off West Africa is unclear. Ruud (1952) reported catches of Bryde's whale off Gabon, Congo and Angola. There are two (both juvenile) stranding records from Senegal (Cadenat 1955, Van Waerebeek *et al.* 2000, 2003), while at least some of several unidentified balaenopterids stranded on the Senegalese coast during the 1940s and 1950s may have been Bryde's whales (Van Waerebeek *et al.* 2000). There are also stranding records from Western Sahara

(Notarbartolo di Sciara *et al.* 1998) and Guinea (Bamy *et al.* 2010). Weir (2010a) concluded that many of the whaling records from the Gulf of Guinea, referred to as Sei whale in whaling logs, were in fact Bryde's whale and listed catches off Côte d'Ivoire, Ghana, Gabon, São Tomé, Annobón (Equatorial Guinea), Congo and Angola. Weir (2007) found Bryde's whale to be the most numerous *Balaenoptera* whale off Angola, with a total of 19 sightings during surveys in 2004 and 2005. Additionally, they

were common off southern Angola during the summer in coastal waters (Weir 2010b) and nine sightings were obtained in waters off Gabon in March-August 2009 (de Boer 2010b). Recent sightings (including cow and calf pairs) have also been reported from the Azores (<10; Steiner *et al.* 2007) and the Canary Islands (>100; Ritter & Neumann 2006), together with the Cape Verde records indicating a regular occurrence in the northeastern subtropical to tropical Atlantic.

### Sperm whale *Physeter macrocephalus* Linnaeus, 1758

Sperm whale was the second most important target (after Humpback whale) for 19<sup>th</sup> century whalers in Cape Verde seas and, based on logbooks of American whaleships, Townsend (1935) mapped a large number of catches from the area. During the years 2000-2010, sightings of Sperm whale were regularly reported and the species is apparently still widespread in Cape Verde seas. Indeed, with 25 sightings and 16 acoustical records in seven weeks, Moore *et*

*al.* (2003) found the Sperm whale to be the most commonly detected cetacean around the Cape Verde archipelago during surveys in November-December 2000, when it was commonly found in waters deeper than 500 m, north and west of Sal and Boavista, and between Boavista and São Nicolau. We are aware of four stranding events during the past 10 years, each involving a single animal (Table 1).

Date	Sex & length	Location	Source
10 January 2003	pregnant ♀, TL 11.5 m	Praia do Norte, São Vicente	INDP
22 October 2005	sex unknown, TL 8 m	Ponta Preta, Sal	INDP
8 March 2006	♀, TL 7.5-8 m	Praia de Roque, Boavista	INDP, PL
28 May 2009	unknown	Pedra Badejo, Santiago	<a href="#">Expresso das Ilhas</a>

Table 1. Strandings of Sperm whale *Physeter macrocephalus* in the Cape Verde Islands during the years 2001-2010. INDP – Instituto Nacional de Desenvolvimento das Pescas; PL – Pedro López.

The Sperm whale occurs throughout the deep waters of all the world's oceans and confluent seas, from the equator to the edges of the polar pack ice (Rice 1998). There are many records from the tropical East Atlantic (e.g. Townsend 1935, Cadenat 1954, 1956, Slijper *et al.* 1964,

Van Waerebeek *et al.* 2000, 2009, Weir 2007, 2010a, de Boer 2010b), with females and immatures being present throughout the year and adult and sub-adult males migrating to higher latitudes in spring/summer, returning to lower latitudes in winter (Rice 1989, 1998).

### Dwarf sperm whale *Kogia sima* (Owen, 1866)

The carcass of a kogiid of unknown sex and in an advanced state of decomposition was found at Ponta Forno Cal, Boavista, in late August

2004. The skull and mandible were preserved (Fig. 4), but subsequently lost. The specimen was identified as Dwarf sperm whale *Kogia*

*sima* rather than Pygmy sperm whale *K. breviceps* because of 1) the short and rounded snout compared to the more elongated snout of *breviceps* (only in juveniles of *breviceps* the rostrum is slightly less in length than width); 2) the short mandibular symphysis (long in *breviceps*); 3) the left and right cranial fossae being similar in shape and size (left fossa being conspicuously longer and narrower than right fossa in *breviceps*); 4) the sagittal septum at the vertex being noticeably narrow (thick-set in *breviceps*) (cf. Owen 1866, Handley 1966, Ross 1979, Nagorsen 1985, Caldwell & Caldwell 1989, Porter & Morton 2003). The mandibles of both *K. sima* and *K. breviceps* are unusually delicate for a toothed whale, often being paper thin and translucent (Caldwell & Caldwell 1989), and often resulting in broken mandibles during skeletal preparation (cf. Fig. 4).



This is the first documented record of Dwarf sperm whale for the Cape Verde Islands. A listing, without further details, for Cape Verde (Martin *et al.* 1992) is not accepted. The precise geographic range of *K. sima* is unknown, but stranding records suggest that it is distributed throughout tropical and warm temperate waters worldwide (Nagorsen 1985, Caldwell & Caldwell 1989, Jefferson *et al.* 1993). In West Africa, there are stranding records from Senegal (Maigret & Robineau 1981) and a bycatch landing from Ghana (Van Waerebeek *et al.* 2009). There are also stranding records from the Canary Islands (Hutterer 1994) and the Azores (Gonçalves *et al.* 1996). Weir (2007) reported 14 sightings of *K. sima* offshore of northern Angola, noting that it was the fifth most commonly sighted cetacean in Angolan waters during surveys in 2004 and 2005.

Based on cytochrome *b* sequencing, Chivers *et al.* (2005) found two reciprocally monophyletic groups within *K. sima*, one Indo-Pacific and the other Atlantic, but these authors stopped short of formally recognizing a third species of *Kogia* because of a lack of additional molecular and biological evidence. Should further research justify recognizing a third *Kogia* based on a division between Indo-Pacific and Atlantic populations, then the latter would be in need of a new name, as the type locality of *Physeter (Euphysetes) simus* Owen, 1866 is Andhra Pradesh (formerly Madras Presidency), India.

Fig. 4. Skull and mandible of Dwarf sperm whale *Kogia sima*, Ponta Forno Cal, Boavista, 3 September 2004 (Nuria Varo).

#### Cuvier's beaked whale *Ziphius cavirostris* (G. Cuvier, 1823)

Three individuals were seen at 14°49'N 24°36'W (depth 1,000 m), east of Brava, 4 September 2003, two at 14°55'N 23°40'W (depth >500 m), southwest of Santiago, 5 September 2003, and again two at 15°32'N 23°02'W (depth 1,600 m), north of Maio, 6 September 2003 (Proyecto Hydrocarpo). The

animals off Santiago and Maio were seen taking 2-3 breaths before diving. Identification of these individuals was based on the characteristic brownish body colour, the small falcate dorsal fin at the rear third of the body length and tail shape, which was clearly seen before the deep dive. Two of the individuals

east of Brava were breaching 3-4 times and, apart from the characteristics mentioned above, the characteristic short and blunt head and body shape were noted (photographs of these observations exist, but these are currently unavailable due to logistical reasons).

The only previous record of Cuvier's beaked whale in the Cape Verde region was of a group of five individuals at 14°19'N 23°13'W, just south of the archipelago (Haase 1987). Cuvier's beaked whale occurs in all

temperate and tropical oceans around the world (Rice 1998, MacLeod *et al.* 2006). In West Africa, there are stranding records from Mauritania and Senegal (Robineau & Vély 1998, Van Waerebeek *et al.* 2000), and a landing from Ghana (Van Waerebeek *et al.* 2009), while Weir (2006) observed the species off Angola. There are numerous stranding and sighting records from the Canary Islands (e.g. Vonk & Martin Martel 1988, 1989, Martin *et al.* 1992, 2004, Aguilar de Soto *et al.* 2007).

#### Beaked whale *Mesoplodon cf. europaeus* (Gervais, 1855)

Four beaked whales *Mesoplodon* sp., probably including a mother and calf pair, were seen at 16°32'N, 22°52'W (depth 500-1,000 m), south of Santa Maria, Sal, 11 February 2010 (Fig. 5-6). The adults were *ca.* 4.5-5 m in length, the presumed juvenile *ca.* 3-3.5 m.

More than 20 photographs were obtained of these animals, but none clearly showed the beak, rendering specific identification problematic. Therefore, a number of experts on the identification of *Mesoplodon* whales were consulted. Based on the photographs, Diane Claridge and Vidal Martin (*in litt.*) identified these whales as Gervais' beaked whale *M. europaeus*, because of the unique dorsal colouration pattern, characterized by a dark line on the back, with vertical fringes or streaks along the flanks of the dorsum. These characteristics have not been described previously in the literature, but are now considered diagnostic of *M. europaeus*

and have been genetically confirmed through biopsy samples (Diane Claridge and Vidal Martin *in litt.*). However, as this concerns as yet unpublished information, we refrain from unambiguously referring the animals seen off Sal to *M. europaeus*. Besides, colour may be lighter in an active animal dissipating body heat, whereas an inactive animal may appear dark grey to black (Norman & Mead 2001).

This constitutes the first record of *Mesoplodon* whales for the Cape Verde Islands. Gervais' beaked whale is endemic to the warm-temperate to tropical Atlantic (MacLeod *et al.* 2006). In West Africa, it is known from strandings in Mauritania (Robineau & Vély 1993, 1998) and Guinea-Bissau (Reiner 1980). In the Canary Islands, there have been 23 strandings and 30 well-documented at sea observations since 1980 (Vonc & Martin Martel 1988, Martin *et al.* 1990, 2004; Vidal Martin *in litt.*).



Fig. 5-6. Beaked whales *Mesoplodon cf. europaeus*, off southern Sal, 11 February 2010 (Linda Aspden).



**Rough-toothed dolphin** *Steno bredanensis* (G. Cuvier in Lesson, 1828)

First reported from the region in 1989 (Hazevoet & Wenzel 2000), Rough-toothed dolphin is now known to be amongst the commoner dolphin species occurring in Cape Verde seas. Over the past decade many sightings were reported and it was the dolphin species most frequently encountered during the IWDG surveys in April 2003 and February-March 2006 (Berrow 2003, 2006). We know of three strandings – a single animal (sex unknown), 2.45 m in length, at Praia de Estoril, Boavista, 7 March 2001 (INDP, PL), a live stranding of a juvenile in bad condition at Praia de Ervatão, Boavista, 3 October 2010 (PL), and a mass stranding of 43 animals at Praia de Estoril and 10 at nearby Ilhéu de Sal Rei, Boavista, out of a group of *ca.* 100 that

appeared close to the shore (of which *ca.* 50 were returned to the sea with the help of local people or managed to return to the open sea by themselves), 19 October 2010 ([A Nação, Expresso das Ilhas](#); Fig. 7). In addition, a Rough-toothed dolphin was landed by local fishermen at Santa Maria, Sal, 15 August 2010 (BG). It is unknown if this was caught as bycatch or deliberately taken. A mandible (without number or further data) of the species is kept at the INDP premises in São Vicente.

Rough-toothed dolphin is distributed in deep tropical and subtropical oceanic waters worldwide (Miyazaki & Perrin 1994) and is probably found throughout the tropical and subtropical East Atlantic (cf. Jefferson *et al.* 1997, de Boer 2010a, b, Weir 2010a).



Fig. 7. Rough-toothed dolphins *Steno bredanensis*, Praia de Estoril, Boavista, 20 October 2010 (Mário Évora/A Nação).

**Pantropical spotted dolphin** *Stenella attenuata* (Gray, 1846)

Pantropical spotted dolphin is thought to be one of the commoner dolphin species in Cape Verde seas and numerous sightings were reported over the past 10 years. Only a single stranding came to our notice. On 1 April 2005, 17 Pantropical spotted dolphins stranded at Praia de Laginha in the town of Mindelo, São Vicente (INDP; Fig. 8). With the help of the local population, these dolphins were returned to the sea and were not seen or heard of thereafter. An alleged record of *ca.* 30 Clymene dolphins *S. clymene* off southern Maio, 5 March 2006 (Berrow 2006), in fact concerned Pantropical spotted dolphins, as demonstrated by photographs of the animals.

Pantropical spotted dolphin occurs in tropical and subtropical seas worldwide

between *ca.* 40°N and *ca.* 40°S (Perrin 2001). It is likely to be widely distributed off West Africa. However, because at sea identification of spotted dolphins can be difficult for inexperienced observers, the possibility of confusion with *S. frontalis* exists. Moreover, as the taxonomy of these dolphins was only sorted out by Perrin *et al.* (1987), it is often unclear to which taxon records previous to that date should refer. Distribution off West Africa is poorly understood and was summarized by Jefferson *et al.* (1997) and Weir (2010a). The latter specified a number of cases in which *attenuata* had been wrongly identified as *frontalis* and *vice versa*. For detailed information on the identification of Pantropical spotted dolphin, see Perrin (2001).



Fig. 8. Pantropical spotted dolphins *Stenella attenuata*, Praia de Laginha, Mindelo, São Vicente, 1 April 2005 (Carlos Pulú).

### Atlantic spotted dolphin *Stenella frontalis* (G. Cuvier, 1829)

Like its pantropical congener, Atlantic spotted dolphin ranks amongst the dolphin species most often encountered in Cape Verde waters and there were numerous reports of sightings (including photographic evidence) over the past 10 years. Only a single stranding was reported to us. A total of *ca.* 30 Atlantic spotted dolphins stranded at Praia da Chave, Boavista, 29 and 30 April 2006 (Fig. 9-10), of which 11 adults and three juveniles died, while the remainder were returned to the sea by local people (INDP, PL).

Atlantic spotted dolphin is endemic to the tropical and warm-temperate Atlantic, from *ca.* 45°N to *ca.* 35°S in the west and from the Azores, Madeira, the Canary Islands and Mauritania to Angola in the east (Perrin 2002, Weir 2007, 2010a, de Boer 2010b). As in Pantropical spotted dolphin, proper understanding of its distribution is hampered by identification problems and its confused taxonomy in the past. For detailed information on the identification of Atlantic spotted dolphin, see Perrin (2002).



Fig. 9-10. Atlantic spotted dolphin *Stenella frontalis*, immature and adult, Praia da Chave, Boavista, 29 April 2006 (Pedro López).

### Melon-headed whale *Peponocephala electra* (Gray, 1846)

Prior to the year 2000, only two records of Melon-headed whale were known from Cape Verde, i.e. one found at Praia do Norte, São Vicente, 10 July 1993, and one harpooned by fishermen off Tarrafal, São Nicolau, 16 December 1994 (cf. Reiner *et al.* 1996, Hazevoet 1999, Hazevoet & Wenzel 2000), but a considerable number of records has become known since. Strandings during the years 2001-2010 are summarized in Table 2. Of three animals stranded at Praia de Santa Monica, Boavista, 8 November 2003, two were returned to the sea by fishermen, while the other died. At Baía da Murdeira, Sal, 20 October 2005, seven of the nine stranded animals were returned to the sea by volunteers,

while two died. Of *ca.* 70 animal stranded at Praia de Boca da Salina, Boavista, 19 November 2007, *ca.* 65 were refloated by volunteers, while five remained grounded and died.

In addition, the following sightings of Melon-headed whale were reported: 20-50 animals at 16°43'N 24°39'W, northeast of Santa Luzia, 23 May 2005 (Proyecto Hydrocarpo), 75-100 animals traveling eastwards in various smaller groups, off the southern tip of Brava, 30 September 2008 (Mike Greenfelder *in litt.*), *ca.* 15 between Sal and Boavista, 2 October 2009 (BG), and *ca.* 100 at 16°47'N, 24°48'W, between Santa Luzia and São Vicente, 9 October 2010 (PL).

Date	Number	Location	Source
August 2001	>30, incl. adults and young	Praia de Abrolhal, Boavista	INDP, PL
27 September 2001	one adult ♂, TL 240 cm	Praia de Boca da Salina, Boavista	INDP, PL
1 October 2003	ca. 150	northern shore of Maio	INDP
1 November 2003	165, incl. several pregnant ♀♀	Praia dos Achados, Santa Luzia	INDP
8 November 2003	three, incl. adult ♂, TL 270 cm	Praia de Santa Monica, Boavista	INDP, PL
6 May 2004	54, incl. several pregnant ♀♀	Ponta Rica de Porto Cais, Maio	INDP
20 October 2005	nine	Baía da Murdeira, Sal	INDP
17 November 2007	ca. 265	Praia da Chave, Boavista	GG, MR
19 November 2007	ca. 70	Praia de Boca da Salina, Boavista	GG, MR

Table 2. Stranded Melon-headed whales *Peponocephala electra* in the Cape Verde Islands during the years 2001-2010. INDP – Instituto Nacional de Desenvolvimento das Pescas; GG – Gabriella Gatt; MR – Manuel Rodrigues; PL – Pedro López.



Fig. 11. Melon-headed whales *Peponocephala electra*, Praia da Chave, Boavista, 18 November 2007 (courtesy of Gabriella Gatt).

In view of the number of strandings and sightings and the number of animals involved, we may conclude that Melon-headed whale occurs commonly in Cape Verde seas. Melon-headed whale is distributed throughout the world's tropical and subtropical deep oceanic waters, mostly from 20°N to 20°S, with records from temperate regions probably representing strays (Jefferson & Barros 1997, Rice 1998). Reports from West Africa are scarce (cf. Jefferson *et al.* 1997), with records from Mauritania (Robineau & Vély 1998), Senegal (van Bree & Cadenat 1968), Guinea-Bissau (Van Beneden & Gervais 1880, van Bree &

Duguy 1977), Ghana (Ofori-Danson *et al.* 2003, Van Waerebeek *et al.* 2009), off Gabon (Findlay *et al.* 2006, de Boer 2010b) and off Angola (Weir 2007, 2010a).

Melon-headed whale is highly gregarious, occurring in groups of up to 500 animals, with apparently strong social bonds (Jefferson & Barros 1997). Mass strandings of up to 250 animals have been reported (Jefferson & Barros 1997, Southall *et al.* 2006, Brownell *et al.* 2009), rendering the events on Boavista in November 2007 (Table 2; Fig. 11) amongst the largest known so far (cf. Brownell *et al.* 2006).

#### False killer whale *Pseudorca crassidens* (Owen, 1846)

Photographs of a mass stranding at Praia do Canto, Boavista, involving 14 False killer whales (Fig. 12), were kindly put at our disposal by Mr. José Geraldo Évora of Boavista. The precise date of the event could

not be determined anymore, but this was either during the late 1980s or early 1990s. Apparently, all animals died on the beach. A single animal of unknown sex, *ca.* 2.5-3 m in length, was found at Praia de João Barrosa,



Fig. 12. False killer whale *Pseudorca crassidens*, Praia do Canto, Boavista, *ca.* 1990 (courtesy of José Geraldo Évora).

Boavista, 22 July 2007 (Fig. 13). In addition, the right mandible of a False killer whale (BVRC 025) was retrieved from an indeterminate beach on Boavista at some time during the last decade.

These are the first documented records of False killer whale for the Cape Verde Islands. Previously, Odell & McClune (1999) mapped a single record, without a source or further details, near the Cape Verde archipelago. False killer whale occurs worldwide in tropical to warm temperate seas, usually in deep offshore waters (Stacey *et al.*

1994, Rice 1998), but records from West Africa are few. A skull was collected in Côte d'Ivoire (van Bree (1972), Ofori-Danson *et al.* (2003) listed a record from Ghanaian coastal waters, Debrah *et al.* (2010) reported landings from Ghana, Van Waerebeek *et al.* (2001) reported a specimen from Benin, Van Waerebeek & De Smet (1996) detailed a live stranding from Gabon and there has been at least one sighting off Gabon (Findlay *et al.* 2006). Weir (2007) recorded nine sightings (including pods of up to 35 animals) offshore of Angola.



Fig. 13. False killer whale *Pseudorca crassidens*, Praia de João Barroso, Boavista, 22 July 2007 (Carlos Angulo Preckler).

#### **Killer whale *Orcinus orca* (Linnaeus, 1758)**

A female or juvenile male Killer whale was photographed by yachtsmen off western Boavista, 21 September 2001 (Fig. 14). The animal in the photograph shows a medium-sized and horizontally oriented eye-patch and

no cape, thus – at least in outward appearance – corresponding to type A of Pitman & Ensor (2003), the ‘regular’ Killer whale of worldwide distribution. Whether the Killer whales occurring in Cape Verde would genetically

correspond to ENA (Eastern North Atlantic) type 1 of Morin *et al.* (2010) remains to be seen, due to the lack of sampling in the tropical Atlantic. ENA type 1 contains animals previously categorized as a generalist type (North Atlantic type 1) that includes individuals specializing on fish and individuals that are thought to predate both fish and mammals (Foote *et al.* 2009).

Hazevoet & Wenzel (2000) listed a

single sighting record of Killer whale for the Cape Verde Islands, i.e. a pod of nine animals south of Sal, 29 February 1996. Killer whales are distributed throughout the world's oceans, although they are more common at high latitudes (Dahlheim & Heyning 1999). Records from West Africa were summarized by Jefferson *et al.* (1997); see also Hammond & Lockyer (1988), Van Waerebeek *et al.* (2009), Weir (2010a) and Weir *et al.* (2010).



Fig. 14. Killer whale *Orcinus orca*, off western Boavista, 21 September 2001 (Wolfgang Ensbacher).

#### **Short-finned pilot whale** *Globicephala macrorhynchus* Gray, 1846

During the past decade, seven stranding events of Short-finned pilot whale have come to our attention (Table 3). In the late October/early November 2009 stranding, carcasses were spread over a large stretch of beach, with most between 16°13'N, 22°44'W and 16°12'N,

22°45'W (Fig. 15). The two strandings in June 2010 received considerable attention in the local press (cf. Table 3; note that the photograph in the *Expresso das Ilhas* report does not pertain to the stranding event on Sal), as well as on television.

Date	Number	Location	Source
5 August 2002	1 ♂, 8 ♀♀	Praia de Escurrelete, Santo Antão	INDP
25 January 2003	>12 adults	Praia de Boa Esperança, Boavista	INDP, PL
21 June 2003	5 adults, 1 juv	Praia das Gatas, Boavista	INDP, PL
late Oct/early Nov 2009	46, incl. >10 ♂♂, 4 juv	Praia do Carvão and Praia de Abrolhal, Boavista	PL
19 June 2010	ca. 50	Praia do Coqueiro, Santa Cruz, Santiago	<a href="#">A Semana</a> <a href="#">A Semana</a>
19 June 2010	42	Praia de Monte Leão, Sal	<a href="#">Expresso das Ilhas</a>
28 September 2010	3 ♂♂, 2 ♀♀	Praia de Boa Esperança, Boavista	GG, MR

Table 3. Stranded Short-finned pilot whales *Globicephala macrorhynchus* in the Cape Verde Islands during the years 2001-2010. INDP – Instituto Nacional de Desenvolvimento das Pescas; GG – Gabriella Gatt; MR – Manuel Rodrigues; PL – Pedro López.



Fig. 15. Short-finned pilot whales *Globicephala macrorhynchus*, Mindelo, São Vicente, 6 August 2002; stranded at Praia de Escurrelete, Santo Antão, 5 August 2002 (Carlos Pulú).





Fig. 16. Short-finned pilot whales *Globicephala macrorhynchus*, Praia de Abrolhal, Boavista, 8 November 2009 (Pedro López).



Fig. 17. Short-finned pilot whales *Globicephala macrorhynchus*, Praia do Coqueiro, Santa Cruz, Santiago, 19 June 2010 (Eneias Rodrigues/A Semana).



Fig. 18-19. Short-finned pilot whales *Globicephala macrorhynchus*, Praia de Monte Leão, Sal, 19 June 2010 (Jacquie Cozens/www.sostartarugas.org).

Mass strandings of Short-finned pilot whale have been a long known phenomenon in the islands and in the past the meat of these whales was readily flensed and often preserved for later consumption (cf. Hazevoet & Wenzel 2000). Today, on Boavista, teeth of stranded pilot whales are often extracted for use in the production of tourist souvenirs. The animals on Santiago and Sal in June 2010 were removed and buried within a day by the local authorities, thus preventing any proper investigation of the events. Short-finned pilot whale is one of the commoner cetaceans occurring in the Cape Verde region (Hazevoet & Wenzel 2000) and apart from the strandings listed here, many live sightings were reported during the last 10 years.

Short-finned pilot whales inhabit tropical to warm-temperate seas worldwide. In the East Atlantic, they occur from the Azores, with occasional records as far north as the Bay of Biscay, to Angola in the south (Nores & Pérez 1988, Prieto & Fernandes 2007, Weir 2007, 2010a).

A stranding record of 5-8 Long-finned pilot whales *Globicephala melas* on Sal in March 1995 (Hazevoet & Wenzel 2000) is no longer accepted. Identification was carried out in the field, but no specimens were preserved or photographs made. Moore *et al.* (2003) referred skulls of 34 pilot whales found on the eastern shore of Boavista in December 2000, to *G. melas*. As no photographs of these skulls were published and no specimens were

preserved, it is impossible to establish their taxonomic identity. Moore *et al.* (2003) gave some cranial measurements, but these are not diagnostic as there is a large degree of overlap in condylobasal length between the two taxa (cf. van Bree 1971). Earlier, Lagendijk (1984) – who surveyed Cape Verde seas in March 1984 – reported sightings of both *G. melas* and *G. macrorhynchus*, without, however, specifying how these were distinguished.

In the eastern North Atlantic, the southernmost record of *G. melas* is from 17°13'N in Mauritania (Robineau & Vély 1998). Prieto & Fernandes (2007) reported two confirmed sightings of *G. melas* from the Azores in 2003 and 2006 and reviewed previous references to the species in that archipelago, finding them unsubstantiated. Similarly, a pilot whale caught in Madeira in June 1936 was reported as *G. melas* (Nobre 1938), but the published photographs show it to be *G. macrorhynchus*. In the Canary Islands, where *G. macrorhynchus* is common, there are only two records of *G. melas*, i.e. one each from the eastern islands of Lanzarote and Fuerteventura (specimens in the Museo de Cetáceos de Canarias, Lanzarote; Vidal Martin *in litt.*). Properly distinguishing between the two species of pilot whale only became widespread after van Bree (1971) had shed light on their taxonomy. There are no validated records of Long-finned pilot whale for the Cape Verde Islands and its occurrence there should be regarded as unsubstantiated.

## DISCUSSION

During the past 10 years, there has been a considerable increase in observation effort of cetaceans in Cape Verde, resulting in a previously unheard of number of records. For instance, whereas Hazevoet & Wenzel (2000) were able to report only a handful of records of Melon-headed whale *Peponocephala electra*, Rough-toothed dolphin *Steno bredanensis*, Common dolphin *Delphinus* sp., Striped dolphin *Stenella coeruleoalba*, Pantropical *S. attenuata* and Atlantic spotted dolphin *S. frontalis*, all of these have been frequently reported during the past 10 years and are now known to regularly occur in the study area. Sightings of Short-finned pilot whale *Globicephala macrorhynchus* and Bottlenose dolphin *Tursiops truncatus*, both already considered common by Hazevoet & Wenzel (2000), were also frequently reported. No stranding records of Common dolphin, Striped dolphin or Bottlenose dolphin were received. Species most often observed during the Proyecto Hydrocarpo surveys in August–September 2003 and May 2005 were Short-finned pilot whale, Pantropical spotted dolphin and Atlantic spotted dolphin (Anonymous 2006), while Rough-toothed dolphin was the cetacean most often seen during the IWDG surveys in April 2003 and February–March 2006 (Berrow 2003, 2006). During the years 2000–2010, no records were received of Risso’s dolphin *Grampus griseus* and Spinner dolphin *S. longirostris*, both of which have been reported from Cape Verde seas in the past (cf. Reiner *et al.* 1996, Hazevoet & Wenzel 2000). Reiner *et al.* (1996) reported the sighting of a Blue whale *Balaenoptera musculus*, but there have been no recent reports of the species. So far, beaked whales *Mesoplodon* spp. have remained exceedingly rare, with only the very first known sighting being reported here. Whether this reflects a true pattern of spatial and numerical distribution or merely reflects their elusive behaviour remains to be established.

Only few bycatches or purposeful catches of cetaceans have come to our

attention and their incidence in Cape Verde artisanal fisheries is apparently low at present. However, as a large foreign (predominantly Japanese and Korean) fishery fleet roams Cape Verde seas, we do not know what is really going on in this connection and investigation of the matter is warranted.

During the years 2007–2010, at least six mass strandings took place on the islands of Sal, Boavista and Santiago. In each of these cases, the stranded animals were removed and buried immediately after the event by the local authorities and no proper pathological investigation was carried out. Although health concerns have been given to justify these speedy actions, at the same time they have given rise to conspiracy theories amongst the general public, as they were perceived as an indication that the authorities “were trying to hide the true cause” of these strandings, the implication being that the dolphins had become victims of the use of sonar by submarines or other naval activities. However, without proper investigation, any guess as to the cause of these strandings amounts to mere speculation. It is therefore highly desirable that in case of future mass strandings, qualified personnel are given the time and opportunity to carry out autopsies and collect samples soon after the event and before any removal actions are undertaken. Indeed, empiricism is what is most needed if we want to come closer to an understanding of the many possible causes that may give rise to cetacean mass strandings (Bradshaw *et al.* 2006).

With the possible exception of Humpback whale (cf. Wenzel *et al.* 2009), despite the recent increase of attention given to cetaceans in Cape Verde, knowledge of their spatial and temporal distribution in the region is only just beginning to take shape. Observers who visit Cape Verde and its seas are urged to either publish their observations or to make them available to the present authors for inclusion in the Cape Verde Cetacea Database, maintained simultaneously in São Vicente and Lisbon.

## ACKNOWLEDGEMENTS

We wish to thank José Geraldo Évora ('Zinho') for making available photographs of the *Pseudorca* mass stranding on Boavista. Wolfgang Ensbacher (SY Itoma) provided the photograph of *Orcinus* off Boavista. Jacquie Cozens kindly allowed the use of her photos of stranded pilot whales on Sal. Linda Aspden generously shared her photos of *Mesoplodon* whales off Sal and Diane Claridge, Colin MacLeod, Vidal Martin and Koen Van Waerebeek commented on their specific identity. We thank Gabriella Gatt and Manuel

Rodrigues for providing details of mass strandings on Boavista. Mike Greenfelder and Richard White informed us about the cetaceans seen during their work with Lindblad Expeditions. Bill Perrin and Koen Van Waerebeek confirmed the specific identity of the *Kogia* specimen. Vidal Martin provided unpublished information on the occurrence of Long-finned pilot whale in the Canary Islands. Comments by Koen Van Waerebeek and Caroline Weir significantly improved the manuscript.

## REFERENCES

- Anonymous, 2006. Proyecto Hydrocarpo. Gestión sostenible del patrimonio natural costera y de los recursos marinos vivos de la República de Cabo Verde. Vol. 3. Estudios sobre especies de vertebrados marinos con potencial eco-turístico y amenazados de extinción: aves, cetáceos y tortugas marinas. Unpublished report, Instituto Canario de Ciencias Marinas, Telde, Gran Canaria. 24 pp.
- Aguilar de Soto, N., M. Johnson, P. Madsen, F. Díaz, I. Domínguez, C. Aparicio, A. Bocconcelli, C. Militello & A. Brito, 2007. Nuevos descubrimientos sobre cetáceos de buceo profundo en Canarias: relación con su conservación. *Makaronesia* 9: 70-84.
- Bamy, I.L., K. Van Waerebeek, S.S. Bah, M. Dia, B. Kaba, N. Keita & S. Konate, 2010. Species occurrence of cetaceans in Guinea, including humpback whales with southern hemisphere seasonality. *Marine Biodiversity Records* 3, e48, doi: 10.1017/S1755267210000436.
- Berrow, S., 2003. From Cape Clear to Cape Verdes, in search of Port na bPucal and the Humpback Whales. Unpublished report, Irish Whale and Dolphin Group. 20 pp.
- Berrow, S., 2006. [Cape Verde 2006](#). Unpublished report, Irish Whale and Dolphin Group. 25 pp.
- Best, P.B., 2007. Whales and dolphins of the southern African subregion. Cambridge University Press, Cape Town. 352 pp.
- Bradshaw, C.J.A., K. Evans & M.A. Hindell, 2006. Mass cetacean strandings – a plea for empiricism. *Conservation Biology* 20: 584-586.
- Brownell, R.L., T.K. Yamada, J.G. Mead & B.M. Allen, 2006. Mass strandings of melon-headed whales, *Peponocephala electra*: a worldwide review. International Whaling Commission, Scientific Committee, Paper SC/58/SM8. 12 pp.
- Brownell, R.L., K. Ralls, S. Baumann-Pickering & M.M. Poole, 2009. Behavior of melon-headed whales, *Peponocephala electra*, near oceanic islands. *Marine Mammal Science* 25: 639-658.
- Cadenat, J., 1954. Echouage d'un cachalot sur les côtes du Sénégal. *Notes Africaines* 64: 119-121.
- Cadenat, J., 1955. A propos d'un échouage de baleine à Dakar. *Notes Africaines* 67: 91-94.
- Cadenat, J., 1956. A propos de cachalot. *Notes Africaines* 71: 82-92.
- Caldwell, D.K. & M.C. Caldwell, 1989. Pygmy Sperm Whale *Kogia breviceps* (de Blainville, 1838) and Dwarf Sperm Whale *Kogia simus* Owen, 1866. Pp. 235-260 in:

- S.H. Ridgway & R. Harrison (eds.), Handbook of Marine Mammals, Vol. 4. Academic Press, London & San Diego.
- Chivers, S.J., R.G. Leduc, K.M. Robertson, N.B. Barros & A.E. Dizon, 2005. Genetic variation of *Kogia* spp. with preliminary evidence for two species of *Kogia sima*. Marine Mammal Science 21: 619-634.
- Dahlheim, M.E. & J.E. Heyning, 1999. Killer Whale *Orcinus orca* (Linnaeus, 1758). Pp. 281-322 in: S.H. Ridgway & R. Harrison (eds.), Handbook of Marine Mammals, Vol. 6. Academic Press, London & San Diego.
- de Boer, M.N., 2010a. First record of a white rough-toothed dolphin (*Steno bredanensis*) off West Africa including notes on rough-toothed dolphin surface behaviour. Marine Biodiversity Records 3, e66, doi:10.1017/S1755267210000539.
- de Boer, M.N., 2010b. Cetacean distribution and relative abundance in offshore Gabonese waters. Journal of the Marine Biological Association of the United Kingdom 90: 1613-1621.
- Debrah, J.S., P.K. Ofori-Danson & K. Van Waerebeek, 2010. An update on the catch composition and other aspects of cetacean exploitation in Ghana. International Whaling Commission, Scientific Committee, Paper SC/62/SM10. 6 pp.
- Félix, F. & K. Van Waerebeek, 2005. Whale mortality from ship strikes in Ecuador and West Africa. Latin American Journal of Aquatic Mammals 4: 55-60.
- Findlay, K.P., T. Collins & H.C. Rosenbaum, 2006. Environmental impact assessment and mitigation of marine hydrocarbon exploration and production in the Republic of Gabon. Report of the Wildlife Conservation Society, New York. [not seen, cited in Weir (2010a).]
- Foote, A.D., J. Newton, S.B. Piertney, E. Willerslev & M.T.P. Gilbert, 2009. Ecological, morphological and genetic divergence of sympatric North Atlantic killer whale populations. Molecular Ecology 18: 5207-5217.
- Gonçalves, J.M., J.P. Barreiros, J.M.N. Azevedo & R. Norberto, 1996. Cetaceans stranded in the Azores during 1992-96. Arquipélago (Life and Marine Sciences) 14A: 57-65.
- Haase, B.J.M., 1987. A group of Goose-beaked Whales *Ziphius cavirostris* G. Cuvier, 1823 near the Cape Verde Islands. Lutra 30: 107-108.
- Hammond, P.S. & C. Lockyer, 1988. Distribution of killer whales in the eastern North Atlantic. Rit Fiskideildar 11: 24-41.
- Handley, C.O., 1966. A synopsis of the genus *Kogia* (pygmy sperm whales). Pp. 62-69 in: K.S. Norris (ed.), Whales, Dolphins and Porpoises. University of California Press, Berkeley.
- Hazevoet, C.J., 1999. Whales and dolphins (Mammalia, Cetacea) in the collections of the Museu Bocage, past and present. Arquivos do Museu Bocage, Nova Série 3: 337-354.
- Hazevoet, C.J. & F.W. Wenzel, 2000. Whales and dolphins (Mammalia, Cetacea) of the Cape Verde Islands, with special reference to the Humpback Whale *Megaptera novaeangliae* (Borowski, 1781). Contributions to Zoology 69: 197-211.
- Hutterer, R., 1994. Dwarf sperm whale *Kogia simus* in the Canary Islands. Lutra 37: 89-92.
- Jann, B., J. Allen, M. Carrillo, S. Hanquet, S.K. Katona, A.R. Martin, R.R. Reeves, R. Seton, P.T. Stevick & F.W. Wenzel, 2003. Migration of a humpback whale (*Megaptera novaeangliae*) between the Cape Verde Islands and Iceland. Journal of Cetacean Research and Management 5: 125-129.
- Jefferson, T.A. & N.B. Barros, 1997. *Peponocephala electra*. Mammalian Species 553: 1-6.
- Jefferson, T.A., S. Leatherwood & M.A. Webber, 1993. Marine mammals of the world. FAO & UNEP, Rome. 320 pp.
- Jefferson, T.A., B.E. Curry, S. Leatherwood & J.A. Powell, 1997. Dolphins and porpoises of West Africa: a review of records (Cetacea: Delphinidae, Phocoenidae). Mammalia 61: 87-108.
- Junge, G.C.A., 1950. On a specimen of the rare fin whale, *Balaenoptera edeni* Anderson, stranded on Puli Sugi near Singapore.

- Zoologische Verhandelingen 9: 1-26, Plates I-IX.
- Kanda, N., M. Goto, H. Kato, M.V. McPhee & L.A. Pastene, 2007. Population genetic structure of Bryde's whales (*Balaenoptera brydei*) at the inter-oceanic and trans-equatorial levels. *Conservation Genetics* 8: 853-864.
- Legendijk, P., 1984. Report of a study of the present status of Humpback whales around the Cape Verde Islands, March 1984. International Whaling Commission, Scientific Committee, Paper SC/36/PS16. 8 pp.
- MacLeod, C.D., W.F. Perrin, R. Pitman, J. Barlow, L. Ballance, A. D'Amico, T. Gerrodette, G. Joyce, K.D. Mullin, D.L. Palka & G.T. Waring, 2006. Known and inferred distributions of beaked whale species (Cetacea: Ziphiidae). *Journal of Cetacean Research and Management* 7: 271-286.
- Maigret, J. & D. Robineau, 1981. Le genre *Kogia* (Cetacea, Physeteridae) sur les côtes du Sénégal. *Mammalia* 45: 199-204.
- Martín, V., R. Vonk, S. Escorza & R. Montero, 1990. Records of Gervais' beaked whale *Mesoplodon europaeus* on the Canary Islands. *European Research on Cetaceans* 4: 95.
- Martín, V., R. Montero, J. Heimlich-Boran & S. Heimlich-Boran, 1992. Preliminary observations of the cetacean fauna of the Canary Islands. *European Research on Cetaceans* 6: 61-65.
- Martín, V., A. Servidio & S. García, 2004. Mass strandings of beaked whales in the Canary Islands. *European Cetacean Society Newsletter* 42 (Special Issue): 33-36.
- Mead, J.G. & R.L. Brownell, 2005. Order Cetacea. Pp. 723-743 in: D.E. Wilson & D.M. Reeder (eds.), *Mammal Species of the World*. 3<sup>rd</sup> edition. Johns Hopkins University Press, Baltimore.
- Miyazaki, N. & W.P. Perrin, 1994. Rough-toothed Dolphin *Steno bredanensis* (Lesson, 1828). Pp. 1-21 in: S.H. Ridgway & R. Harrison (eds.), *Handbook of Marine Mammals*, Vol. 5. Academic Press, London & San Diego.
- Moore, M., L. Steiner & B. Jann, 2003. Cetacean surveys in the Cape Verde Islands and the use of cookiecutter shark bites lesions as a population marker for fin whales. *Aquatic Mammals* 29: 383-389.
- Morin, P.A., F.I. Archer, A.D. Foote, J. Vilstrup, E.E. Allen, P. Wade, J. Durban, K. Parsons, R. Pitman, L. Li, P. Bouffard, S.C. Abel Nielsen, M. Rasmussen, E. Willerslev, M.T.P. Gilbert & T. Harkins, 2010. Complete mitochondrial genome phylogeographic analysis of killer whales (*Orcinus orca*) indicates multiple species. *Genome Research* 20: 908-916.
- Nagorsen, D., 1985. *Kogia simus*. *Mammalian Species* 239: 1-6.
- Nobre, A., 1938. O «*Globicephalus melas*» nos mares do arquipélago da Madeira. *Anais da Faculdade de Ciências do Porto* 22: 234-240, Plates I-III.
- Nores, C. & C. Pérez, 1988. Overlapping range between *Globicephala macrorhynchus* and *Globicephala melaena* in the northeastern Atlantic. *Mammalia* 52: 51-55.
- Norman, S.A. & J.G. Mead, 2001. *Mesoplodon europaeus*. *Mammalian Species* 688: 1-5.
- Notarbartolo di Sciara, G., E. Politi, A. Bayed, P.-C. Beaubrun & A. Knowlton, 1998. A winter cetacean survey off southern Morocco, with a special emphasis on right whales. Report of the International Whaling Commission 48: 547-550.
- Odell, D.K. & K.M. McClune, 1999. False Killer Whale *Pseudorca crassidens* (Owen, 1846). Pp. 213-243 in: S.H. Ridgway & R. Harrison (eds.), *Handbook of Marine Mammals*, Vol. 6. Academic Press, London & San Diego.
- Ofori-Danson, P.K., K. Van Waerebeek & S. Debrah, 2003. A survey for the conservation of dolphins in Ghanaian coastal waters. *Journal of the Ghana Science Association* 5: 45-54.
- Owen, R., 1866. On some Indian Cetacea collected by Walter Elliot, Esq. *Transactions of the Zoological Society of London* 6: 17-47, Plates III-XIV.
- Perrin, W.F., 2001. *Stenella attenuata*. *Mammalian Species* 683: 1-8.
- Perrin, W.F., 2002. *Stenella frontalis*. *Mammalian Species* 702: 1-6.

- Perrin, W.F. & R.R. Reeves, 2004. Report of the working group on species- and subspecies-level taxonomy. Pp. 26-61 in: R.R. Reeves, W.F. Perrin, B.L. Taylor, C.S. Baker & S.L. Mesnick (eds.), Report of the workshop on shortcomings of cetacean taxonomy in relation to needs of conservation and management, April 30-May 2, 2004, La Jolla, California. Society for Marine Mammalogy.
- Perrin, W.F., E.D. Mitchell, J.G. Mead, D.K. Caldwell, M.C. Caldwell, P.J.H. van Bree & W.H. Dawbin, 1987. Revision of the spotted dolphins, *Stenella* spp. Marine Mammal Science 3: 99-170.
- Perrin, W.F., M.L.L. Dolar & E. Ortega, 1996. Osteological comparison of Bryde's Whales from the Philippines with specimens from other regions. Report of the International Whaling Commission 46: 409-413.
- Pitman, R.L. & P. Ensor, 2003. Three forms of killer whales (*Orcinus orca*) in Antarctic waters. Journal of Cetacean Research and Management 5: 131-139.
- Porter, L. & B. Morton, 2003. A description of the first intact Dwarf Sperm whale from the South China Sea and a review of documented specimens of the Kogiidae (Cetacea) from Hong Kong. Systematics and Biodiversity 1: 127-135.
- Prieto, R. & M. Fernandes, 2007. Revision of the occurrence of the long-finned pilot whale *Globicephala melas* (Traill, 1809), in the Azores. Arquipélago (Life and Marine Sciences) 24: 65-69.
- Reiner, F., 1980. First record of an Antillean beaked whale *Mesoplodon europaeus* Gervais, 1855 from República Popular da Guiné-Bissau. Memórias do Museu do Mar (Série Zoológica) 1 (8): 1-8.
- Reiner, F., M.E. dos Santos & F.W. Wenzel, 1996. Cetaceans of the Cape Verde archipelago. Marine Mammal Science 12: 434-443.
- Rice, D.W., 1989. Sperm Whale *Physeter macrocephalus* Linnaeus, 1758. Pp. 177-233 in: S.H. Ridgway & R. Harrison (eds.), Handbook of Marine Mammals, Vol. 4. Academic Press, London & San Diego.
- Rice, D.W., 1998. Marine Mammals of the World. Systematics and Distribution. Society for Marine Mammalogy, Special Publication 4: 1-231.
- Ritter, F. & K. Neumann, 2006. [The year of the whale: extraordinary occurrence of Bryde's whales off La Gomera \(Canary Islands\)](#). Poster presented at the Annual Conference of the European Cetacean Society, Gdynia, Poland, April 2006.
- Robineau, D. & M. Vély, 1993. Stranding of a specimen of Gervais' beaked whale (*Mesoplodon europaeus*) on the coast of West Africa (Mauritania). Marine Mammal Science 9: 438-440.
- Robineau, D. & M. Vély, 1998. Les cétacés des côtes de Mauritanie (Afrique du nord-ouest). Particularités et variations spatio-temporelles de répartition: rôle des facteurs océanographiques. La Terre et la Vie - Revue d'écologie 53: 123-152.
- Ross, G.J.B., 1979. Records of pygmy and dwarf sperm whales, genus *Kogia*, from southern Africa, with biological notes and some comparisons. Annals of the Cape Provincial Museums (Natural History) 15: 259-327.
- Ruud, J.T., 1952. Catches of Bryde-whale off French Equatorial Africa. Norsk Hvalfangst-Tidende 12: 662-663.
- Slijper, E.J., W.L. van Utrecht & C. Naaktgeboren, 1964. Remarks on the distribution and migration of whales, based on observations from Netherlands ships. Bijdragen tot de Dierkunde 34: 3-93.
- Southall, B.L., R. Braun, F.M.D. Gulland, A.D. Heard, R.W. Baird, S.M. Wilkin & T.K. Rowles, 2006. Hawaiian melon-headed whale (*Peponocephala electra*) mass stranding event of July 3-4, 2004. NOAA Technical Memorandum NMFS-OPR-31. 73 pp.
- Stacey, P.J., S. Leatherwood & R.W. Baird, 1994. *Pseudorca crassidens*. Mammalian Species 456: 1-6.
- Steiner, L., M.A. Silva, J. Zereba & M.J. Leal, 2007. Bryde's whales, *Balaenoptera edeni*, observed in the Azores: a new species record for the region. JMBA2 Biodiversity Records 5728: 1-6.

- Torda, G., P. López Suárez & L.F. López Jurado, 2010. First records of Fraser's Dolphin *Lagenodelphis hosei* for the Cape Verde Islands. *Zoologia Caboverdiana* 1: 71-73.
- Townsend, C.H., 1935. The distribution of certain whales as shown by logbook records of American whalerships. *Zoologica* 19: 1-50.
- Van Beneden, P.J. & P. Gervais, 1880. *Ostéographie des Cétacés vivants et fossiles, comprenant la description et l'iconographie du squelette et du système dentaire de ces animaux, ainsi que des documents relatifs à leur histoire naturelle.* Arthus Bertrand, Paris. viii + 634 pp. & Atlas, Plates I-LXIV.
- van Bree, P.J.H., 1971. On *Globicephala seiboldi* Gray, 1846, and other species of pilot whales. *Beaufortia* 19: 79-87.
- van Bree, P.J.H., 1972. Sur la présence de *Pseudorca crassidens* (Owen, 1846) (Cetacea, Globicephalinae) au large des côtes d'Afrique occidentale. *Bulletin de l'Institut fondamental d'Afrique noire* 34 (Série A): 212-218.
- van Bree, P.J.H. & J. Cadenat, 1968. On a skull of *Peponocephala electra* (Gray, 1846) (Cetacea, Globicephalinae) from Sénégal. *Beaufortia* 14: 193-202.
- van Bree, P.J.H. & R. Duguay, 1977. Catalogue de la collection des mammifères marins du muséum de Bordeaux. *Annales de la Société des Sciences naturelles de la Charente-Maritime* 6: 289-307.
- Van Waerebeek, K. & W.M.A. De Smet, 1996. A second confirmed record of the false killer whale *Pseudorca crassidens* (Owen, 1846) (Cetacea, Delphinidae) from West Africa. *Mammalia* 60: 319-322.
- Van Waerebeek, K., M. André, M. Sequeira, V. Martín, D. Robineau, A. Collet, V. Papastavrou & E. Ndiaye, 1999. Spatial and temporal distribution of the minke whale, *Balaenoptera acutorostrata* (Lacépède, 1804), in the southern northeast Atlantic Ocean and the Mediterranean Sea, with reference to stock identity. *Journal of Cetacean Research and Management* 1: 223-237.
- Van Waerebeek, K., E. Ndiaye, A. Djiba, M. Diallo, P. Murphy, A. Jallow, A. Camara, P. Ndiaye & P. Tous, 2000. A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. UNEP/CMS Secretariat, Bonn. 80 pp.
- Van Waerebeek, K., S. Tchibozo, J. Montcho, G. Nobime, Z. Sohou, P. Sehouhou & C. Dossou, 2001. The Bight of Benin, a North Atlantic breeding ground of a southern hemisphere Humpback whale population, likely related to Gabon and Angola substocks. International Whaling Commission, Scientific Committee, Paper SC/53/IA21. 7 pp.
- Van Waerebeek, K., L. Barnett, A. Camara, A. Cham, M. Diallo, A. Djiba, A. Jallow, E. Ndiaye, A.O. Samba Ould-Bidal & I.L. Bamy, 2003. Conservation of Cetaceans in The Gambia and Senegal 1999-2001, and status of the Atlantic Humpback Dolphin. UNEP/CMS Secretariat, Bonn. 56 pp.
- Van Waerebeek, K., P.K. Ofori-Danson & J. Debrah, 2009. The cetaceans of Ghana, a validated faunal checklist. *West African Journal of Applied Ecology* 15: 61-90.
- Vonk, R. & V. Martín Martel, 1988. First list of Odontocetes from the Canary Islands, 1980-1987. *European Research on Cetaceans* 2: 31-35.
- Vonk, R. & V. Martín Martel, 1989. Goose-beaked whales *Ziphius cavirostris* mass strandings in the Canary Islands. *European Research on Cetaceans* 3: 73-77.
- Weir, C.R., 2006. Sightings of beaked whales (Cetacea: Ziphiidae) including first confirmed Cuvier's beaked whales *Ziphius cavirostris* from Angola. *African Journal of Marine Science* 28: 173-175.
- Weir, C.R., 2007. Occurrence and distribution of cetaceans off northern Angola, 2004/05. *Journal of Cetacean Research and Management* 9: 225-239.
- Weir, C.R., 2010a. A review of cetacean occurrence in West African waters from the Gulf of Guinea to Angola. *Mammal Review* 40: 2-39.
- Weir, C.R., 2010b. Cetaceans observed in the coastal waters of Namibe Province, Angola, during summer and winter 2008. *Marine*



- Biodiversity Records 3, e27, doi: 10.1017/S1755267210000230.
- Weir, C.R., T. Collins, I. Carvalho & H.C. Rosenbaum, 2010. Killer whales (*Orcinus orca*) in Angolan and Gulf of Guinea waters, tropical West Africa. *Journal of the Marine Biological Association of the United Kingdom* 90: 1601-1611.
- Wenzel, F.W., J. Allen, S. Berrow, C.J. Hazevoet, B. Jann, R.E. Seton, L. Steiner, P. Stevick, P. López Suárez & P. Whooley, 2009. Current knowledge on the distribution and relative abundance of Humpback Whales (*Megaptera novaeangliae*) off the Cape Verde Islands, eastern North Atlantic. *Aquatic Mammals* 35: 502-510.
- Yoshida, H. & H. Kato, 1999. Phylogenetic relationships of Bryde's Whales in the western North Pacific and adjacent waters inferred from mitochondrial DNA sequences. *Marine Mammal Science* 15: 1269-1286.

Received 30 June 2010  
Revised 1 September 2010  
Accepted 25 October 2010