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Conserving cetaceans and manatees in the western African region

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"Compilation of articles based on the Scientific Symposium of the Western African Talks on Cetaceans and their Habitats (WATCH) in Adeje, Tenerife, 2007

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Extended to 2008 2007 Year of the Dolphin

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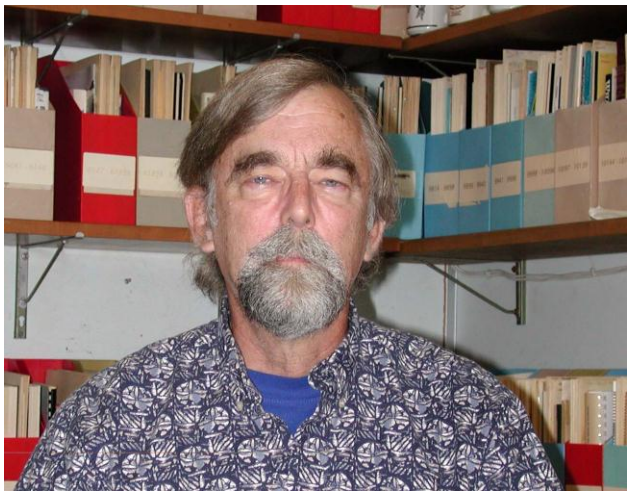
Foreword by Elizabeth Maruma Mrema
UNEP/CMS Executive Secretary

Marine mammal conservation is a crucial component of the work of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), which aims to conserve and manage avian, aquatic and terrestrial migratory species and their habitats throughout their range.

Effective conservation can only be achieved based on sound science. However, the biology, distribution and threats to marine species are especially hard to study. It is therefore all the more crucial to make the existing information readily available. This publication is based on the programme of a scientific symposium convened by UNEP/CMS in 2007, which dealt specifically with marine mammals of the African eastern Atlantic basin. Speakers and authors of posters have provided updated accounts on research, threats and action taken to mitigate them. Following the scientific symposium, an intergovernmental agreement covering small cetaceans and the West African manatee was negotiated for the region. This instrument is designed to streamline and coordinate conservation efforts and to support countries with the implementation at national and local level. Besides government institutions, non-governmental organizations often play an important role on the ground.

Only if all stakeholders work hand in hand can we hope to preserve these fascinating creatures of the oceans and rivers for future generations. We hope that this publication will be a valuable resource for scientists and conservation managers alike!

Foreword by William B. Perrin
National Marine Fisheries Service, NOAA



The Memorandum of Understanding on Small Cetaceans and Manatees of West Africa has brought long needed attention to the assessment and conservation of the small-cetacean fauna of the eastern tropical Atlantic and the threatened West African manatee.

The papers in this volume reflect a sample of the recent and developing programmes of research that hopefully will lead to increased awareness and concern about the fate of these animals into the future.

The needs for expertise, infrastructure and financial resources to tackle the many emerging problems of conservation are great across the region. If significant progress is to be made, international cooperation, capacity building, funding and other assistance must be forthcoming. We now know that the needs are there, and now is the time to build momentum to bring about change. Without action on the ground, the MoU will be only an empty gesture.

Foreword by Patrick K. Ofori-Danson
University of Ghana

Small cetaceans and manatees form an important component of marine biological diversity in the western Africa and Macaronesian region. Although legal protection has been established for these mammals in these areas, enforcement is frustrated by a lack of resources, manpower, limited awareness of existing regulations and expanding human populations. Hunting and conflict with fishermen have left these mammals severely threatened. In particular the West African manatee, *Trichechus senegalensis*, is the least studied sirenian species and is Red Listed as 'vulnerable' by the IUCN Species Survival Commission Sirenia Species Group. The species' cultural significance is evidenced by a widespread association between manatees and the Mami Water spirit, stories, songs and some indigenous practices. Thus any information that may be obtained on these mammals will be important for conservation initiatives both locally and regionally.

The first WATCH negotiation meeting (16-20 October 2007) held in Tenerife, Spain, marked an emergent synergy which has catalyzed efforts to develop a West African and Macaronesian Conservation Strategy for these animals at the international level. This document, which draws from papers presented at this meeting, will help to fill in information needs required to reach appropriate organizations in order to foster conservation actions aimed at protecting these animals.

Foreword by Koen Van Waerebeek
Editor of this publication

As African coastlines are developed at breakneck speed, formidable conservation challenges emerge. If a number of current unsustainable practices in fisheries and coastal development are not adapted decisively, some of Africa's marine habitats risk severe, possibly irreversible, degradation.

One example, the endemic Atlantic humpback dolphin, long assumed to be widely distributed along all west African shores, is actually confirmed in only a fraction of its potential range. Significant coastal sections in the northern Gulf of Guinea appear devoid of the species, and the threat of local extinction can no longer be ignored. High fisheries pressure and disturbance from all types of coastal development are the main suspects.

Surely not all is gloom. As occurred in South America in the 1980s, a new generation of dynamic, well-trained researchers and managers with a regional vision are taking charge, aptly illustrated by the many African authorships herein. Inevitably this novel trend will not evolve without obstacles, but it is quite irreversible. Count on home-grown activities like long-term aquatic mammal field programmes involving increasing numbers of students at African universities, border-transcending collaborations, consultations on management policies between governmental institutions, academia and native NGOs.

Ultimately, enhanced awareness at all levels of society should grant the political powers the popular mandate to install innovative conservation strategies that would have a chance of bearing results. Institutions like CMS and individual experts will surely continue to assist where requested. The WATCH talks greatly contributed to this emerging dynamic and the present proceedings stand witness to that.

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Introduction

Reinventing the whale

Stanley Johnson

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“I can promise you the trip of a lifetime". It was my first evening on board *Searcher* and the speaker was the vessel's captain, Art Taylor, a rugged 50-year-old Californian. Four times a year for the last 15 years, Art has been taking a maximum of 24 passengers on board his 95ft vessel on 12-day whale watching and nature tours around Mexico's Baja peninsula, at 800 miles one of the longest and narrowest in the world.

During that first briefing session, Art ran through the essentials. The accommodation would be comfortable with air-conditioned cabins. The food would be plentiful, the crew skilled and knowledgeable. For those of us who wanted to see a desert environment, Baja California was *sans pareil*. On half a dozen occasions, we would be landing from skiffs on the mainland or on one of the islands and we would have a chance to hike through the wilderness, keeping a wary eye out for rattle-snakes, scorpions, tarantulas, centipedes and sandflies. As for those of us who wanted above all to observe marine wildlife, we would, Art hoped, return home satisfied. He ticked off the species we would be most likely to encounter: seals and sea lions, dolphins, pelicans, ospreys, humpback whales. "You may even get to see a blue whale", he said. "We usually do on these trips". I have to admit, when I heard that last claim I was incredulous. As far as I knew, the blue whale, the largest creature ever to exist on the planet, was effectively extinct, its population driven to such low levels by dec-ades of commercial whaling that it could never recover. Was Art joking, I wondered?

Five days later, we had just finished lunch in the salon when we heard the captain's voice over the loudspeaker. "Blue whale on the surface. Two hundred yards at one o'clock". As I rushed to the bow, I heard a great swooshing noise. In the water just in front of the boat, I saw an immense blue-grey shape. The column of spray must have reached 30 or 40ft into the air, rising straight up like some gigantic geyser. We stayed with that blue whale for three-quarters of an hour that afternoon. It spouted two or three times more as it moved slowly through the water ahead of us. Rob Nowajchik, *Searcher*'s resident marine mammal expert and

on-board lecturer, told us what was happening: "After three or four spouts, he'll be getting ready to dive". I could see that the leviathan now seemed to be hunching its enormous back. The head was already under the surface and the dorsal fin had appeared. "He's going to fluke!" Rob said. A blue whale fluking at a distance of not much more than 100 yards is one of the most awe-inspiring sights I have ever witnessed. Ahead of us, the water boiled and churned and then, suddenly, we found ourselves once more looking at an empty ocean.

There is luck in this, of course. But there is also judgment. Experienced whale watchers look for the whale's "footprints", unnaturally smooth and glassy patches of water caused by the upward pressure of the flukes on the water column. With clear seas and an animal the size of the blue whale, you can actually see the outline under water long before it rises to the surface. Still, as *Searcher* continued south, rounding the Cabo San Lucas and entering the Sea of Cortez, I found myself wondering whether that one sighting of a blue whale had been an accident. Seeing one specimen, however splendid, did not mean that the species as a whole had been clawed back from extinction. The Sea of Cortez, otherwise known as the Gulf of California, runs up on the inland side of the Baja California peninsula. Biologically, it is one of the richest bodies of water on the planet, supporting 900 species of marine vertebrates and 2,000 invertebrates. *Searcher* steamed north among some of the many islands that, collectively, have been designated a World Heritage Site.

Around 4pm on Sunday April 1, we were off the northern end of San José Island when we had a blue-whale experience that made that first afternoon's sighting seem like nothing more than the hors d'oeuvre. We found ourselves in the presence, not just of one blue whale but as many as 20. At one point, a whale actually swam right under the boat. Its head emerged one side of the vessel while passengers were still leaning over the rail on the other side watching the tail. "Must be a juvenile," Rob said, standing next to me. "It's not big enough for an adult". I found myself uttering a quiet prayer of thanks. Here at least, I thought, in Mexico's Sea of Cortez, the blue whale must be breeding. If the species could bounce back here, maybe it could bounce back in other parts of the world as well. During our time on the Sea of Cortez, we did not just see blue whales. We saw humpbacks and sperm whales as well as fin and Bryde's whales- the whole enchilada. And the two days we spent with the grey whales in their lagoon breeding grounds on Baja's Pacific coast were, for many of those on board, as memorable as that magical afternoon we spent with the blue whales in the Sea of Cortez.

On our way south from San Diego, *Searcher* had encountered at various times at least 10 grey whales, heading north on their annual journey from the lagoons of Baja where they mate and breed, to their feeding grounds in the Bering Sea, 6,000 miles to the north off the coast of Alaska. This is one of the world's most spectacular migrations. The grey whale may not be as large as the blue whale (around 40 or 50ft in length as opposed to 100), but it is nonetheless one of the great denizens of the deep. Hunted virtually to extinction in the 19th and 20th century, the grey whale has made an extraordinary recovery, and the population is now around 18,000.

Around 10am one morning, after waiting for the tide to rise, *Searcher* crossed the sandbar which separates San Ignacio lagoon from the open sea. Here each year, the grey whales come to calve, the warm waters of the lagoon providing an ideal nursery for their young which, as it were, find their feet here before accompanying their mothers on the long journey north. Almost as soon as we had entered the lagoon, we could see whales spouting around us. The funnel of spray as a

grey whale "blows" does not rise as high into the air as that of a blue whale, but it is still a dramatic sight. And the closer you get to them, the more remarkable these whales appear. For a species that has absolutely no reason not to fear and loathe the human race, the grey whale seems remarkably forgiving. Indeed, one of the remarkable features of whale watching in San Ignacio lagoon is that quite often this seems to be a two-way process. You can be out on the lagoon with a local boatman in one of the licensed pangas when a grey whale, often with her calf, will push alongside the boat. They will raise their huge heads right over the side of the panga and you can find yourself, literally, eyeballing a 50-tonne monster, which could, if it so decided, send your frail craft to the bottom of the sea with one flick of its enormous tail. I held out my hand to one animal as it approached us and felt the strange rubbery texture of the hide. There seems to be no evidence that the whales object to this close contact and plenty of reason to suppose the opposite.

Our Mexican boatman that morning told us how a few years earlier, Mexico's then President Zedillo came to the lagoon with his wife and family. This was a crucial moment. The Japanese giant Mitsubishi was pressing very hard for permission to open a huge salt factory on the lagoon that could have threatened the very survival of the grey whale. "The President and his wife and kids, they come out in my boat," Ernesto told us. "The President's wife, she kissed the whale right on its head that day. I saw it. I was there. So the president, when he saw his wife kissing the whale, he said 'Right. No more salt factory. We keep the lagoon just for the whales.' And he announced the end of the salt project that very day!" This was not some apocryphal story. The Mitsubishi threat had been a real one. With an $80 million investment, the company hoped to generate annual revenues of $85 million. President Zedillo's intervention came in the nick of time. He left office the next day. Whatever Mexico may have lost in terms of direct investment as a result of his brave decision, it has - I am sure - more than made up through the income generated by whale watching in Baja.

But the story does not end there. The international ban on commercial whaling, which has been in force since the mid-80s, is coming under increasing pressure. The battle between pro-whaling and anti-whaling nations was joined again in May 2006 in Alaska, when the International Whaling Commission held its annual meeting. The Mexican government, proud of all that it has achieved in Baja, once more took the lead among nations determined to keep the ban in place. As a result, moves to end the moratorium on commercial whaling were defeated. As the importance of whale watching as an alternative to whaling is now increasingly being recognized, we must hope that those countries which still ignore or subvert the ban - such as Japan, Iceland and Norway - will finally realize that killing whales has no economic, moral or environmental justification.

Looking back at those 12 days on board *Searcher* off the coast of Baja California, I can't help thinking that Art Taylor's talk of a "trip of a lifetime" was amply justified. Eco-tourism is a term much misused. But in this particular case, I think we all of us felt that we were somehow helping to strike a blow that might in the long run - perhaps the very long run - restore the whales to their rightful place in the ocean.

Photos © Stanley Johnson

Status and distribution of small cetaceans and manatees in western Africa and Macaronesia

The small-cetacean fauna of the west coast of Africa and Macaronesia: diversity and distribution

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This review is an attempt to summarize the existing information in the literature on distribution of small cetaceans in the region, by species and by country. A constraint on the time available for preparation has limited the scope of the review; it is not exhaustive, and records not noted here undoubtedly exist, especially for Macaronesia. The summary tables given here can serve as a basis for further review. The tables and list of references consulted are available from the authors as electronic files.

The area covered includes the entire west coast of Africa from Morocco to South Africa (Atlantic coast) and the archipelagos of Macaronesia (Canary Islands, Madeira, Azores and Cape Verde Islands). Little is known about the distribution of most small cetaceans along the west coast of Africa; roughly 25-30 species are thought to occur there, depending on the source consulted (Jefferson *et al*., 1993; Rice, 1998; Culik, 2004; IUCN Red List, 2007; others). The small cetacean fauna of most of Macaronesia is better known, as there have been a number of cetological surveys, stranding programs, and reviews initiated there in recent years (e.g. Steiner and Gordon, 1993; Martin *et al*., 1992; Hazevoet and Wenzel, 2000; Moore *et al*., 2003; Silva *et al*., 2003). Records of a total of 31 species were found in the present review.

The records on which the table is based are of varying reliability. Some are confirmed by specimens, photographs, or the opinion of an on-site expert; many others are not. Unless it could be determined from data or photographs in the reference that the record was likely to be erroneous, it was included. The aim was to develop an overall picture of diversity and distribution. Before a definitive checklist can be developed for a country, the putative records should each be closely checked for likely validity. The tables are organized with countries and territories arranged roughly from north to south and the small-cetaceans grouped into 1) north-temperate, 2) tropical, 3) south-temperate, 4) antitropical, and 5) cosmopolitan species.

Some of the north-temperate species (Table 1) have been recorded as far south as Senegal (*Phocoena phocoena*) or Guinea Bissau (*Mesoplodon mirus*), but their core range is likely to be restricted to cooler waters from northern Mauritania.

Many of the mainly tropical species have been recorded from the Azores, reflecting the influence of the northeastern extension of the Gulf Stream. While all have been recorded from Senegal and many from Côte d'Ivoire, the small-cetacean fauna of most of the tropical waters of West Africa remains very poorly known. For example, none have been recorded in the references seen from São Tomé and Principe, Togo or Nigeria. All or most of the tropical dolphins and small toothed whales can be expected to occur along the entire coast, although it is possible that some species may have been extirpated by fisheries bycatch in the waters of some countries (e.g., see Van Waerebeek *et al*., 2003, 2009 and Van Waerebeek, 2006b on *Sousa teuszii*). The occurrence of both north-temperate and tropical species in the northern portions of the region is due to complex oceanographic structure, including seasonal and interannual shifts in sea-surface temperature and other features. For example, marked interannual differences occur in the species make-up of small cetaceans around the Azores (Clua and Grosvaler, 2001).

Three of four south-temperate species (Table 2) have only been recorded from the waters of Namibia and South Africa; the fourth, Heaviside's dolphin (*Cephalorhynchus heavisidii*), also occurs off Angola, in the south of the country.

Two species have antitropical distributions. *Mesoplodon mirus* has been recorded only from the Azores and the Canary Islands in the north and South Africa in the south. *Globicephala melas* has been recorded from as far south as Mauritania in the north and from South Africa in the south.

The more cosmopolitan species are well known from the north down to Senegal and from the far south but not from the intervening region, where they all can be expected to occur. The exception is the killer whale (*Orcinus orca*), which is easily seen and identified.

The relative lack of information on the distribution of tropical and cosmopolitan species in the waters of the countries of tropical West Africa suggests a need for increased field research there, to conduct surveys of distribution and abundance, collect data on bycatch in fisheries, and collect stranded and bycaught animals for confirmation of species and study of their systematics, life history and ecology.

Table 1. Reported distribution of north-temperate and tropical small cetaceans on the west coast of Africa and in Macaronesia. P = reported present.

	NORTH-TEMPERATE SPECIES				TROPICAL SPECIES												
	Hyperoodon ampullatus	*Mesoplodon bidens*	*Mesoplodon europaeus*	*Phocoena phocoena*	*Mesoplodon densirostris*	*Feresa attenuata*	*Globicephala macrorhynchus*	*Grampus griseus*	*Lagenodelphis hosei*	*Peponocephala electra*	*Pseudorca crassidens*	*Sousa teuszii*	*Stenella attenuata*	*Stenella clymene*	*Stenella frontalis*	*Stenella longirostris*	*Steno bredanensis*
Azores (Portugal)	P	P	P		P		P	P			P				P		
Morocco	P			P				P			P						
Western Sahara				P								P					
Madeira (Portugal)		P			P		P										P
Canary Islands (Spain)	P	P	P		P	P	P	P	P						P	P	P
Mauritania			P	P	P		P	P		P		P		P	P		P
Cape Verde Islands						P	P	P		P			P		P	P	P
Senegal				P	P	P	P	P	P	P	P	P	P	P	P	P	P
The Gambia							P					P		P			
Guinea Bissau			P				P	P		P		P					
Guinea - Conakry							P					P	P		P	P	P
Sierra Leone																	
Liberia																P	
Ivory Coast							P	P			P		P		P	P	P
Ghana						P	P	P	P	P	P		P	P	P	P	P
Togo													P				
Benin										P					P		
Nigeria																	
Cameroon												P					
Equatorial Guinea						P							P		P		
Sao Tome & Principe																	
Gabon											P	P	P				
Congo - Brazzaville														P			
Dem. Rep. of the Congo																	
Angola												P		P			
Namibia						P											P
South Africa (Atl. Coast)					P	P		P									

Table 2. Reported distribution of south-temperate, antitropical and cosmopolitan small cetaceans on the west coast of Africa and in Macaronesia. P = reported present.

	SOUTH-TEMPERATE SPECIES					ANTI-TROPI-CAL SPP.		COSMOPOLITAN SPECIES							
	Mesoplodon grayi	*Mesoplodon layardii*	*Cephalorhynchus heavisidii*	*Lagenorhynchus obscurus*	*Lissodelphis peronii*	*Mesoplodon mirus*	*Globicepahala melas*	*Kogia breviceps*	*Kogia sima*	*Ziphius cavirostris*	*Delphinus capensis*	*Delphinus delphis*	*Orcinus orca*	*Stenella coeruleoalba*	*Tursiops truncatus*
Azores						P	P	P	P	P			P	P	P
Morocco							P			P		P	P		P
Western Sahara												P	P		
Madeira								P				P	P		P
Canary Islands						P	P	P		P	P		P	P	P
Mauritania							P	P		P			P	P	P
Cape Verde Islands							P			P		P	P	P	P
Senegal								P	P	P	P	P	P	P	P
The Gambia							P				P		P		P
Guinea Bissau												P			P
Guinea - Conakry								P				P			P
Sierra Leone															
Liberia													P		
Ivory Coast													P		P
Ghana									P	P	P		P		P
Togo											P		P		
Benin															
Nigeria															
Cameroon															
Equatorial Guinea													P		
Sao Tome & Principe													P		P
Gabon											P	P	P		
Congo - Brazzaville											P	P			
Dem. Rep. Congo											P	P			
Angola			P								P	P		P	
Namibia	P		P	P	P			P		P			P		P
South Africa (Atl.)		P	P	P		P	P	P		P		P	P	P	P

References

Annabam & López, A. (1994). Cranio de *Mesoplodon densirostris* das augas do norte de Africa. *Eubalaena* 5:7-13.

Anonymous. (2001). Report of the Workshop on the Conservation and Management of Small Cetaceans of the Coast of Africa (translation from the French by W. F. Perrin). CMS/ScC/Inf. 20.

Addink, M.J. & Smeenk, C. (2001). Opportunistic feeding behaviour of rough-toothed dolphins *Steno bredanensis* off Mauritania. *Zoölogische Verhandelingen Leiden* 334:37-48.

Bamy, I.L., Van Waerebeek, K., Bah, S.S., Dia, M., Kaba, B., Keita, N., Konate, S. & Tall, H. (2006). The cetaceans of Guinea, a first check-list of documented species. IWC Scientific Committee document SC/58/O15. 7pp.

Bamy, I.L., Kaba, B., Konate, S., Keita, N., Dia, M., Tall, H. & Van Waerebeek, K. (2012). Inventory and status of cetaceans in Guinea. In *Conserving cetaceans and manatees in the western African region*. CMS Technical Series No. 26. UNEP/CMS. 18pp.

Bayed, A. & Beaubrun, P.-Ch. (1987). Les mammifères marins du Maroc: Inventaire préliminaire. *Mammalia* 51:431-440.

Best, P.B. (1970). Records of the pygmy killer whale, *Feresa attenuata*, from southern Africa, with notes on behaviour in captivity. *Annals of the South African Museum* 57:1-14, pl. 1-9.

Borobia, M. (1996). Notes on whaling catch statistics and the genus *Lagenorhynchus* in West and Central Africa. IWC Scientific Committee document SC/48/SM51.

Borobia, M. (1997). Small cetaceans of eastern, western and central African regions: a summary report. IWC Scientific Committee document SC/49/SM48.

van Bree, P.J.H. (1968). On a skull of *Peponocephala electra* (Gray, 1846) (Cetacea, Globicephalinae) from Sénégal. *Beaufortia* 177:193-202.

van Bree, P.J.H., Best, P.B. & Ross, G.J.B. (1978). Occurrence of the two species of pilot whales (genus *Globicephala*) on the coast of South Africa. *Mammalia* 42:323-328.

Brown, S.G. (1982). Southern right whale dolphins off the south west African coast. *Marine Observer* 52:33-34.

Cadenat, J. (1948). Observations de Cétacés au Sénégal. *Notes Africaines* 34:20-23.

Cadenat, J. (1956). Un Delphinidae encore mal connu de la côte occidentale d'Afrique: *Sotalia teuszii* Kukenthal 1892. *Bulletin de l' IFAN* 18, sér. A:556-566.

Cadenat, J. (1957). Observations de Cétacés, Siréniens, Chéloniens et Sauriens en 1955-1956. *Bulletin de l' IFAN* 19, sér. A:1358-1375.

Cadenat, J. (1958). Notes sur les Delphinidés ouest-africains. 2. Un spécimen du genre *Feresa* capturé sur les côtes du Sénégal. *Bulletin de l'IFAN* 20, sér. A: 1486-1493.

Cadenat, J. (1959). Rapport sur les petits Cétacés ouest-africains. Résultats des recherches enterprises sur ces animaux jusqu'au mois de mars 1959. *Bulletin de l'IFAN* 21, sér. A:1367-1409, pl .1-31.

Cadenat, J. & Doutre, M. (1958). Notes sur les Delphinidés ouest-africains. 1. Un *Prodelphinus*? indéterminé des côtes du Sénégal. *Bulletin de l'IFAN* 20, sér. A:1483-1485.

Cadenat, J. & Doutre, M. (1959). Notes sur les Delphinidés ouest-africains. 5. Sur un Prodelphinus à long bec capturé au large des côtes du Sénégal *Prodelphinus longirostris* (Gray) 1828? *Bulletin de l'IFAN* 21, sér. A:787-792, pl. 1-6.

Cadenat, J. and Paraiso, F. (1957). Nouvelle observation de *Sotalia* (Cétacé, Delphinidé) sur les côtes du

Sénégal. *Bulletin de l'IFAN* 19, sér. A:324-332.

Carrillo, M. & López-Jurado, L.F. (1998). Structure and behaviour of a Blainville's beaked whale (*Mesoplodon densirostris*) group in Tenerife (Canary Islands). The World Marine Mammal Science Conference, Monaco, 20-24 January 1998. Abstracts: 24.

Cassens, I., Van Waerebeek, K., Best, P.B., Tzika, A., van Helden, A., Crespo, E.A. & Milinkovitch, M.C. (2004). Evidence for male dispersal along the coasts but no migration in pelagic waters in dusky dolphins (*Lagenorhynchus obscurus*). *Molecular Ecology* 14:107-121.

Clarke, R. (1981). Whales and dolphins of the Azores and their exploitation. *Reports of the International Whaling Commission* 31:607-615.

Clua, E. & Grosvaler, F. (2001). Mixed-species feeding aggregations of dolphins, large tunas and seabirds in the Azores. *Aquatic Living Resources* 14:11-18.

Culik, B.M. (2004). Review of small cetaceans. Distribution, behaviour, migration and threats. UNEP/CMS Secretariat, Bonn, Germany.

Donahue, M.A. & Edwards, E.F. (1996). An annotated bibliography of available literature regarding cetacean interactions with tuna purse-seine fisheries outside of the eastern tropical Pacific. Southwest Fisheries Science Center Administrative Report LJ-96-20.

Duguy, R. (1976). Contribution a l'étude des mammifères marins de la côte nord-ouest Afrique. *Revue de Travail de l'Institut de Pêches maritimes* 39:321-332.

Dupuy, A.R. (1975). Un orque épaulard dans la baie de Hann (Sénégal). *Notes Africaines* 142:40-42.

Dupuy, A.R. and Maigret, J. (1976). Les Mammifères marins des côtes du Sénégal. 2. Observations signalées en 1977. *Bulletin de l'IFAN* 38, sér. A:922-928.

Dupuy, A.R. and Maigret, J. (1978). Les Mammifères marins des côtes du Sénégal. 2. Observations signalées en 1977. *Bulletin de l'IFAN* 40, sér. A:458-465.

Dupuy, A.R. and Maigret, J. (1979). Les Mammifères marins des côtes du Sénégal. 3. Observations signalées en 1978. *Bulletin de l'IFAN* 41, sér. A:430-439.

Dupuy, A.R. and Maigret, J. (1980). Les Mammifères marins des côtes du Sénégal. 4. Observations signalées en 1979. *Bulletin de l'IFAN* 41, sér. A:401-409.

Dupuy, A.R. and Maigret, J. (1982). Les Mammifères marins des côtes du Sénégal. 5. Observations signalées en 1980-1981. *Bulletin de l'IFAN* 44, sér. A:213-220.

Fertl, D., Jefferson, T.A., Moreno, I., Zerbini, A.N. & Mullin, K.D. (2003). Distribution of the Clymene dolphin *Stenella clymene*. *Mammal Review* 33:253-271.

Findlay, K.P., Best, P.B., Ross, G.J.B. & Cockcroft, V.G. (1992). The distribution of small odontocete cetaceans off the coasts of South Africa and Namibia. *South African Journal of Marine Science* 12:237-270.

Fraser, F.C. (1949). A specimen of *Sotalia teuszii* Kükenthal from the coast of Senegal. *Journal of Mammalogy* 30:274-276.

Fraser, F.C. (1950). Description of a dolphin *Stenella frontalis* from the coast of French Equatorial Africa. *Atlantide Reports* 1:61-84, pl. 6-9.

Fraser, F.C. (1958). Common or harbour porpoises from French West Africa. *Bulletin de l'IFAN* 20, sér. A:276-285.

Fraser, F.C. (1960). A specimen of the genus *Feresa* from Senegal. *Bulletin de l'IFAN* 22, sér. A:700-707.

Fraser, F.C. (1973). Record of a dolphin (*Sotalia teuszii*) from the coast of Mauritania. *Transactions of the New York Academy of Sciences*, Ser. 2, 35:132-135.

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.

Hazevoet, C.J. & Wenzel, F.W. (2000). Whales and dolphins (Mammalia, Cetacea) of the Cape Verde Islands, with special reference to the humpback whale *Megaptera novaeangliae* (Borowski, 1781). *Contributions in Zoology* 69:197-211.

Hervé-Gruyer, C. (1989). Sightings and behaviour of cetaceans of the Canary Islands. *European Research on Cetaceans* 3:71-72.

Jallow, A., Cham, A.M., Barnett, L. & Van Waerebeek, K. (2005). Conservation of cetaceans in The Gambia: whale and dolphin field research. pp. 37-54. In: *Proceedings from the First Biodiversity Research Symposium The Gambia*. Ed. L. Barnett, Makasufu Wildlife Trust, Darwin Initiative Project, The Gambia.

Jefferson, T.A. & Curry, B.E. (2003). *Stenella clymene*. *Mammalian Species* 726:1-5.

Jefferson, T.A., Leatherwood, S. & Webber, M.A. (1993). Marine mammals of the world. FAO, Rome.

Jefferson, T.A., Curry, B.E., Leatherwood, S. & Powell, J.A. (1997). Dolphins and porpoises of West Africa: a review of records (Cetacea: Delphinidae, Phocoenidae). *Mammalia* 6:87-108.

Joleaud, L. (1934). Cétacés du Maroc. *La Nature* 2827: 360-363.

de Kock, A.C., Best, P.B., Cockcroft, V. & Bosma, C. (1994). Persistent organochlorine residues in small cetaceans from the east and west coasts of southern Africa. *Science of the Total Environment* 154:153-162.

MacLeod, C.D., Perrin, W.F., Pitman, R., Barlow, J., Ballance, L., D'Amico, A., Gerrodette, T., Joyce, G., Mullin, K.D., Palka, D.L. & Waring, G.T. (2006). Known and inferred distributions of beaked whale species (Cetacea: Ziphiidae). *The Journal of Cetacean Research and Management* 7:271-286.

McCann, C. & Talbot, F.H. (1964). The occurrence of True's beaked whale (*Mesoplodon mirus* True) in South African waters, with a key to South African species of the genus. *Proceedings of the Linnean Society of London* 175:137-144, pl. 1-6.

Maigret, J. (1972-1976). Les Mammifères marins des côtes de Mauritanie. État des observations en 1960. *Bulletin du Centre National de Recherches Océanographiques des Pêches,* Nouadhibou 9:130-152.

Maigret, J. (1979a). Bibliographie pour server à l'étude de Mammifères marins des côtes nord-ouest africaines. Groupe d'Étude de Mammifères Marins de l'Atlantique Tropical Africain (GEMMATA). Doc. Scient. 1:1-9.

Maigret, J. (1979b). Les échouages massifs de Cétacés dans la région du Cap-Vert (Sénégal). *Notes Africaines* 161:23-28.

Maigret, J. (1980). Données nouvelles sur l'écologie du *Sousa teuszii* (Cetacea, Delphinidae) de la côte ouest africaine. *Bulletin de l'IFAN* 42, sér. A:619-633.

Maigret, J. (1981). Rapport Mammifères marin/pêche dans l'Atlantique tropical. Groupe d'Étude de Mammifères Marins de l'Atlantique Tropical Africain (GEMMATA). Document Scientifique 3:3-9.

Maigret, J. (1982). Recherches scientifiques dans les parcs nationaux du Sénégal. XVIII. Les Mammifères marins du Sénégal. État des observations dans les parcs nationaux. *Mémoire de l'IFAN* 92:221-231.

Maigret, J. (1990). Observations d'Orques *Orcinus orca* Linné, 1758 sur les côtes nord ouest africains. *Bulletin de l' IFAN* 47 A:190-197.

Maigret, J. (1994). Marine mammals and fisheries along the West African coast. Pages 307-316 in Gillnets and cetaceans (W.F. Perrin, G.P. Donovan and J. Barlow, eds.). *Report of the International Whaling Commission.* (Special Issue) 15.

Maigret, J. & Robineau, D. (1981). Le genre *Kogia* (Cetacea, Physeteridae) sur les côtes du Sénégal. *Mammalia* 45:199-204.

Martin, A.R. (1986). Feeding association between dolphins and shearwaters around the Azores Islands. *Canadian Journal of Zoology* 64:1372-1374.

Martin, A.R. (1988). Cetaceans around the central Azores Islands in the summers of 1985 and 1986. *Mammalia* 52:541-547.

Martin, V.R., Montero, R., Escorza, S. & Vonk, R. (1990). Records of the Gulf Stream beaked whale (*Mesoplodon europaeus*) on the Canary Islands coast. Fourth Annual Conference of the European Cetacean Society, Palma de Mallorca, 2-4 March 1990. Abstracts: 55.

Martin, V., Vonk, R., Escorza, S. & Montero, R. (1990). Records of Gervais' beaked whale *Mesoplodon europaeus* on the Canary Islands. European Research on Cetaceans 4:95.

Martin, V., Montero, R. & Heimlich-Boran, S. (1992). Prelimary observations of the cetacean fauna of the Canary Islands. *European Research on Cetaceans* 6:61-65.

Maul, G.E. Sergeant, D.E. (1977). New cetacean records from Madeira. *Bocagiana* 43:1-8.

Montero, R. & Martin, V. (1992). First account on the biology of Cuvier's beaked whale, *Ziphius cavirostris*, in the Canary Islands. *European Research on Cetaceans* 6:97-99.

Moore, M., Steiner, L. & Jann, B. (2003). Cetacean surveys in the Cape Verde Islands and the use of cookiecutter shark bite lesions as a population marker for fin whales. *Aquatic Mammals* 29:383-389.

Murphy, P.F., Van Waerebeek, K. & Jallow, A. (1997). Cetaceans in Gambian coastal waters. IWC Scientific Committee document SC/49/SM11, Bournemouth, UK. 8pp.

Nieri, M., Grau, E., Lamarche, B. & Aguilar, A. (1999). Mass mortality of Atlantic spotted dolphins (*Stenella frontalis*) caused by a fishing interaction in Mauritania. *Marine Mammal Science* 15:847-854.

Nores, C. & Pérez, C. (1988). Overlapping range between *Globicephala macrorhynchus* and *Globicephala melaena* in the northeastern Atlantic. *Mammalia* 52:51-55.

Ofori-Danson, P.K., Van Waerebeek, K. & Debrah, S. (2003). A survey for the conservation of dolphins in Ghanaian coastal waters. *Journal of the Ghana Science Association* 5(2):45-54.

Ofori-Danson, P.K. & Odei, M.A. (1997). Preliminary observations of the common dolphin, *Delphinus delphis*, (order Cetacea; fam. Delphinidae) in the Ghanaian coastal waters. IWC Scientific Committee document SC/49/SM3.

Peddemors, V.M. (1999). Delphinids of southern Africa: A review of their distribution, status and life history. *The Journal of Cetacean Research and Management* 1:157-165.

Pelletier, F.X. (1975). Symbiose entre l'Amrig et le dauphin sur la côte Mauritanienne. Pages 171-176 in *L'homme et l'animal*. Institut International d'Ethnosciences, Paris.

Perrin, W.F. (1998). Stenella longirostris. *Mammalian Species* 599:1-7.

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., Mitchell, E.D., Mead, J.G., Caldwell, D.K. & van Bree, P.J.H. (1981). *Stenella clymene*, a rediscovered tropical dolphin of the Atlantic. *Journal of Mammalogy* 62:583-598.

Perrin, W.F., Mitchell, E.D., Mead, J.G., Caldwell, D.K., Caldwell, M.C., van Bree, P.J.H. & Dawbin, W.H. (1994). Revision of the spotted dolphins, *Stenella* spp. *Marine Mammal Science* 3:99-170.

Picanço, C., Carvalho, I. & Brito, C. (2009) Occurrence and distribution of cetaceans in São Tomé and Príncipe tropical archipelago and their relation to environmental variables. *Journal of the Marine Biological Association of the United Kingdom* 89(5):1071-1076.

Plön, S.E.E., Bernard, R.T.F., Cockcroft, V.G.C. & Best, P.B.B. (1997). Age, growth and reproduction of pygmy

(*Kogia breviceps*) and dwarf (*Kogia simus*) sperm whales stranded along the southern African coastline. IWC Scientific Committee document SC/49/SM45.

Reiner, F. (1986). First record of Sowerby's beaked whale from Azores. *Scientific Reports of the Whales Research Institute* 37:103-107.

Reiner, F. (1990). Records of marine mammals of the Azorean islands. *Garcia de Orta, Série de Zoologia, Lisboa* 15:21-36.

Reiner, F., dos Santos, M.E. & Wenzel, F.W. (1996). Cetaceans of the Cape Verde Archipelago. *Marine Mammal Science* 12:434-443.

Rice, D.W. (1998). Marine mammals of the world. Systematics and distribution. Society of Marine Mammalogy Special Publication 4.

Rice, F.H. & Saayman, G.S. (1987). Distribution and behaviour of killer whales (*Orcinus orca*) off the coasts of southern Africa. *Investigations on Cetacea* 20:231-250.

Ritter, F. (2002). Behavioural observations of rough-toothed dolphins (*Steno bredanensis*) off La Gomera, Canary Islands (1995-2000), with special reference to their interactions with humans. *Aquatic Mammals* 28:46-59.

Robineau, D. & Vely, M. (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. & Vely, M. (1997a). Données préliminaires (taille corporelle, craniométrie) sur le grand dauphin (*Tursiops truncatus*) des côtes d'Afrique du nord-ouest (Mauritanie, Sénégal). *Mammalia* 61:443-448.

Robineau, D. & Vely, M. (1997b). Small cetaceans in coastal waters of Mauritania (NW Africa). IWC Scientific Committee document SC/49/Info8.

Robineau, D. & Vely, M. (1998). Les cétacés des côtes de Mauritanie (Afrique du Nord-Ouest). Particularités et variations spatio-temporelles de répartition: rôle des facteurs océanographiques. *Revue d'Ecologie (La Terre et la Vie)* 53:123-152.

Robineau, D., Vely, M. & Maigret, J. (1994). *Stenella clymene* (Cetacea, Delphinidae) from the coast of West Africa. *Journal of Mammalogy* 75:766-767.

Rose, B. & Payne, A.I.L. (1991). Occurrence and behavior of the southern right whale dolphin *Lissodelphis peronii* off Namibia. *Marine Mammal Science* 7(1):25-34.

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 Museum (Natural History)* 11:259-327.

Ross, G.J.B. & Tietz, R.M. (1972). Records of Cuvier's beaked whale, *Ziphius cavirostris* from southern Africa. *Annals of the Cape Provincial Museum (Natural History)* 9:1-10.

Segniagbeto, G.H. & Van Waerebeek, K. (2012). Some data on the presence of cetaceans in Togo's marine waters. In *Conserving cetaceans and manatees in the western African region*. CMS Technical Series No. 26. UNEP/CMS. 31pp.

Silva, M.A., Feio, R., Prieto, R., Gonçalves, J.M. & Santos, R.S. (2002). Interactions between cetaceans and the tuna fishery in the Azores. *Marine Mammal Science* 18:893-901.

Silva, M.A., Prieto, R., Magalhães, S., Cabecinhas, R., Cruz, A., Gonçalves, J.M. & Santos, R.S. (2003). Occurrence and distribution of cetaceans in the waters around the Azores (Portugal), summer and autumn 1999-2000. *Aquatic Mammals* 29:77-83.

Steiner, L., Gordon, J. & Beer, C.J. (1998). Marine mammals of the Azores. The World Marine Mammal Science Conference, Monaco, 20-24 January 1998. Abstracts: 128.

Steiner, L. & Gordon, J. (1993). Cetacean sightings in the Azores 1987-1991 (excluding sperm whales).

European Research on Cetaceans 7:152.

Tchibozo, S. & Van Waerebeek, K. (2012). The humpback whale, West African manatee and dolphins are potential resources of nature tourism in Benin. In *Conserving cetaceans and manatees in the western African region*. CMS Technical Series No. 26. UNEP/CMS. 34pp.

Van Waerebeek, K. (1997). Long-beaked and short-beaked common dolphins sympatric off Central-West Africa. IWC Scientific Committee document SC/49/SM46.

Van Waerebeek, K. (2003). A newly discovered stock of humpback whales in the northern Gulf of Guinea. CMS Bulletin 18:6-7.

Van Waerebeek, K. (2007a). Conservation status of the Clymene dolphin in West Africa. CMS/Sc14/Doc. 5.

Van Waerebeek, K. (2007b). Conservation status of the Atlantic humpback dolphin, a compromised future? CMS/Sc14/Doc. 6.

Van Waerebeek, K. (2007c). Conservation status of the Northwest Atlantic population of the harbour porpoise. CMS /ScC14/Doc. 7.

Van Waerebeek, K. & De Smet, W.M.A. (1996). A second record of the false killer whale *Pseudorca crassidens* (Owen, 1846) (Cetacea, Delphinidae) from West Africa. *Mammalia* 60(2):319-322.

Van Waerebeek, K. & Jefferson, T. (2004). Dolphins under threat. Conservation of humpback dolphins. *Species* 41.

Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. & Bamy, I.L. (2004). Distribution, status and biology of the Atlantic humpback dolphin *Sousa teuszii* (Kükenthal, 1892). *Aquatic Mammals* 30(1):56-83.

Van Waerebeek, K., Diallo, M. & Ndiaye, E. (1997). Cetacean research in Senegal 1995-97, an overview. IWC Scientific Committee document SC/49/SM10, Bournemouth, UK. 8pp.

Van Waerebeek, K. & Ofori-Danson, P.K. (1999). A first checklist of cetaceans of Ghana, Gulf of Guinea, and a shore-based survey of interactions with coastal fisheries. IWC Scientific Committee document SC/51/SM35.

Van Waerebeek, K., Ofori-Danson, P.K. & Debrah, J. (2009) The cetaceans of Ghana: a validated faunal checklist. *West African Journal of Applied Ecology* 15:61-90**.**

Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P., Jallow, A., Camara, A., Ndiaye, P. & Tous, P. (2000). A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. UNEP/CMS Secretariat, Bonn, Germany.

Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A. Ndiaye, E., Samba Ould-Bilal, A.O. & Bamy, I.L. (2003). Conservation of cetaceans in The Gambia and Senegal, 1999-2001, and status of the Atlantic humpback dolphin. UNEP/CMS Secretariat, Bonn, Germany.

Van Waerebeek, K., Tchibozo, S., Montcho, J., Nobime, G., Sohou, Z., Sohouhoue, P. & Dossou, C. (2001). The Bight of Benin, a North Atlantic breeding ground of a Southern Hemisphere humpback whale population, likely related to Gabon and Angola substocks. IWC Scientific Committee document SC/53/IA21. 8pp.

Viallelle, S. (1997). Dauphins et baleines des Açores. Espaço Talassa, Porto, Portugal.

Vonk, R. & Martin Martel, V. (1988). First list of odontocetes from the Canary Islands, 1980-1987. European Research on Cetaceans 2:31-35.

Vonk, R. & Martin Martel, V. (1989). Goose-beaked whales *Ziphius cavirostris* mass strandings in the Canary Islands. *European Research on Cetaceans* 3:73-76.

Vonk, R. & Martin Martel, V. (1900). Fraser's dolphin *Lagenodelphis hosei* Fraser, 1956: First record on the Canary Islands. *European Research on Cetaceans* 4:70-71.

Weir, C.R. (2006a). 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. (2006b). First confirmed records of Clymene dolphin, *Stenella clymene* (Gray, 1850), from Angola and Congo, south-east Atlantic Ocean. *African Zoology* 41:297-300.

Weir, C.R., Debrah, J., Ofori-Danson, P.K., Pierpoint, C. & Van Waerebeek, K. (2008). Records of Fraser's dolphin *Lagenodelphis hosei* Fraser, 1956 from the Gulf of Guinea and Angola. *African Journal of Marine Science* 30(2):241-246.

Wilson, C.E., Perrin, W.F., Gilpatrick Jr., J.W. & Leatherwood, S. (1987). Summary of worldwide locality records of the striped dolphin, *Stenella coeruleoalba.* NOAA Technical Memorandum NMFS-SWFC-90.

Inventory and status of cetaceans in Guinea

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On the occasion of the workshop organized in 2000 by CMS and the Government of Guinea on the conservation of aquatic mammals, a number of recommendations had been made: namely an inventory of Cetacean species in the Guinean Exclusive Zone; and the collection and compilation of available data for each country of the sub-region. A preliminary study allowed the preparation of a systematic checklist (Bamy *et al.*, 2006). Information was collected on the strandings, the accidental capture and the various surveys, as well as a bibliographical review on the Cetacea of Guinea. These data were filed with the Centre National des Sciences Halieutiques de Boussoura (CNSHB). Twelve species were inventoried: three baleen whales; *Balaenoptera brydei, Balaenoptera acutorostrata* and *Megaptera novaeangliae*; and nine species of odontocetes; *Kogia breviceps, Tursiops truncatus, Sousa teuszii, Stenella frontalis, Stenella attenuata, Delphinus delphis*, *Steno bredanensis, Globicephala macrorhyn-*

chus and *Physeter macrocephalus*. This list offers an incomplete image of the biological diversity of Cetacea in Guinea, and other surveys that update and study the spatial and temporal models of the habitat and distribution of each cetacean species along Guinea's coast are awaited. Some accidental captures landed by artisanal fishermen are used locally. For the moment there is no evidence that any substantial captures occur, but coastal monitoring should be reinforced. The establishment of a reference collection and a national database is hoped for. The populations of Atlantic humpback dolphin, the Minke whale and the Humpback whale deserve particular protection, being either vulnerable populations or of unknown status.

The regional workshop sponsored by CMS and convened in Conakry, Guinea, 8-12 May 2000, was devoted to the conservation and the management of small cetaceans of the west coast of Africa. Approved by the 8th Meeting of the Scientific Committee at Wageningen in June 1995 and adopted thereafter by the COP in Geneva in April 1996, the workshop organized by the Ministry of Agriculture, Water and Forests, aimed at, amongst other things, the training of local researchers. An action plan was drafted to initiate projects which would contribute to the development of local expertise in cetacean biology, in order to build the ability to evaluate the threats towards these animals and gradually reduce the pressures which weigh on them, by integrating to the maximum the fishermen and the local communities which live from marine resources. In the short term, the Conakry workshop launched a call: to implement observations of dolphins, the monitoring and regulation of fisheries; the inventory of cetacean species; the collection, processing and the compilation of data for each State (CMS, 2000; Archer and Van Waerebeek, 2000).

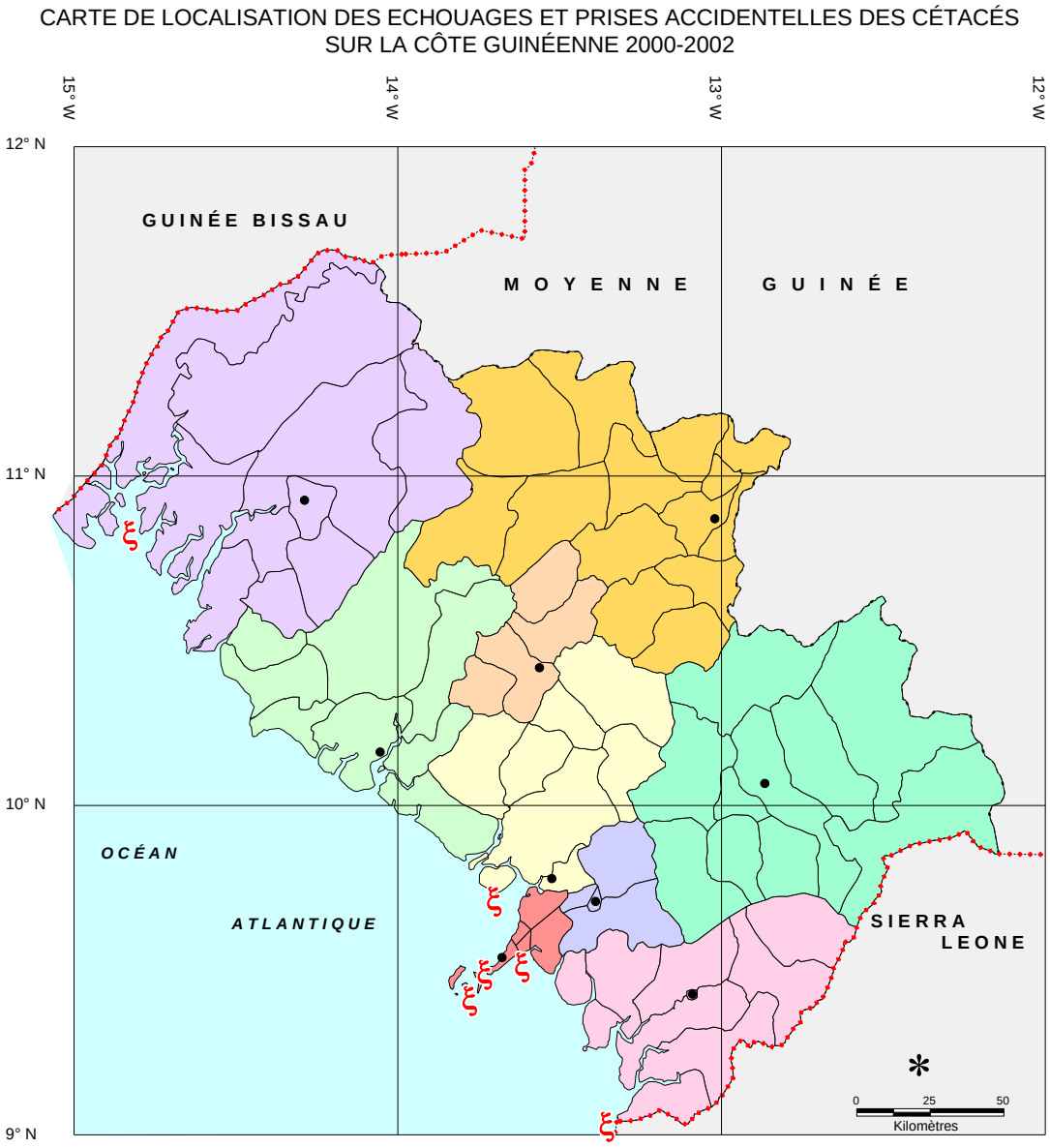
Significant progress was made in field research with the acquisition of new data mainly for Senegal, the Gambia, Guinea-Bissau, Togo, Ghana and Benin (for example, Jallow *et al*., 2005; Ofori-Danson *et al*., 2003; Van Waerebeek *et al.*, 2000, 2001, 2003, 2004) but also in Guinea (Bamy *et al*., 2006; S.T. Diallo *et al.*, 2002, 2004). The advances in regional planning appeared less obvious while one was facing a lack of financing and competition emanating from public issues of greater priority. Nonetheless, the exchange of information and expertise between scientists and other stakeholders, in accordance with the stated objectives of Conakry in 2000, constitute a significant advance. Hence, the Guinean authorities reiterated their interest in the coordination of future actions.

Guinea is a coastal country with a 300 km littoral zone in the Atlantic (see Figure 1). The country has ratified the principal international conventions which cover the field of management and the conservation of Cetacea (CBD, CITES, CMS, IWC, Ramsar, UNCLOS). However, no document that describes the composition and the spatial and temporal distribution of dolphins and whales in Guinean waters has yet been published. This situation complicates other more general studies, for example on the trophic composition of the marine ecosystem of Guinea (I. Diallo *et al.*, 2004) which was based on assumptions with regard to population structure, distribution and abundance of Cetacea and on their feeding biology, leading to necessarily speculative interpretations.

During a consultation among the relevant institutions in Guinea in April 2006, it was agreed to complete a first compilation of recorded cetaceans, to establish a national database and a reference collection of marine mammals. This study by Guinean scientists indicates a continued involvement despite limited resources. In 2001 and 2003, the Centre national des Sciences Halieutiques de Boussoura (CNSHB) monitored and identified the sites where strandings and accidental catches of cetaceans occurred. The principal material

for the inventory was primarily composed of specimens (crania, skeletons), photographs and/or detailed descriptions of characters observed. Isami Yoshima kindly provided digital photographs of cetaceans observed between the southern part of Guinea (Conakry) and Dakar, from the Guinean R/V *Lansana General Conté*, between January and February 2004 (S.T. Diallo *et al*., 2004). A specialist in cetacean taxonomy (KVW) confirmed identifications. Data were collected on beaches, biological stations, fishing docks and from a literature review. Strandings are regarded as useful opportunities for biological data gathering in an economical way. After analysis the causes of mortality in stranded whales could not be established; however, collisions with large ships are suspected. It should be mentioned that the majority of the strandings of large cetaceans (on average, at least twice a year) took place in the estuaries, such as the estuary of Koukoubaya, sub-prefecture of Kanfrandé, in the administrative area of Boké. This shallow area is also hazardous to ships as they strand regularly.

Figure 1. Map showing location of strandings and by-catches of cetaceans along the Guinean Coast 2000-2002



By-catches of cetaceans in Guinea's waters

Sousa teuszii **(Atlantic humpback dolphin)**
By-catch in the Bay of Sangaréah, fish landing site of Dixinn on 13 March 2002

Kogia breviceps **(pygmy sperm whale)**
By-catch observed at the fish landing site of Dabondi-Tanènè on 2 May 2002

Tursiops truncatus **(common bottlenose dolphin)**
By-catch made in the area of Salatougou, on 10 March 2002

Photos © Idrissa L. Bamy

References

Archer, E. & Van Waerebeek, K. (2000). Workshop in Guinea-Conakry on the conservation and management of marine mammals in West Africa. *CMS Bulletin* 11:12-13.

Bamy, I.L., Van Waerebeek, K., Bah, S.S., Dia, M., Kaba, B., Keita, N., Konate, S. & Tall, H. (2006). The cetaceans of Guinea, a first check-list of documented species. IWC Scientific Committee document SC/58/O15. 7pp.

CMS. (2000). Rapport sur la Conservation et la gestion des petits cétacés de la côte d'Afrique. Atelier, Conakry, Guinée, 8-12 May 2000.

Diallo, T.T., Cissé, I., & Bah, A. (2004). Modèle trophique du système côtier du plateau continental guinéen, p. 113-123. Dans: Palomares, M.L.D., Pauly, D. (eds). West African marine ecosystems: models and fisheries impacts. Fisheries centre Research Reports 12(7). Fisheries Centre, UBC, Vancouver.

Diallo, S.T., Yoshida, H., Samoura, A.B., Sow, M., Camara, M., Bah, F.B., Monteiro, V., Fall, M., Da Fonseca, L.M., Almeida, A.F. & Rerambyath, G.A. (2002). Campagne d'observation des cétacés dans les eaux côtières de l'Afrique du Nord Ouest (de la Guinée au Sénégal), 7-23 décembre 2002. Rapport de Mission, CNSHB, Ministère de la Pêche et de l'Aquaculture, République de Guinée. Rapport interne non-publié.

Diallo, S.T., Bah, F.B., Sow, M., Camara, Y., Cissé, M., Monteiro, V., Sylla, S., Da Fonseca, L.M., Almeida, A.F.M., Rerambyath, G.A., Yoshima, I. & Yoshida, H. (2004). Campagne d'observation des cétacés dans les eaux côtières de l'Afrique du Nord Ouest (de la Guinée au Sénégal), 23 janvier au 10 février 2004. Rapport de campagne, CNSHB, Ministère de la Pêche et de l'Aquaculture, République de Guinée. Rapport interne, non-publié.

Jallow, A., Cham, A.M., Barnett, L. & Van Waerebeek, K. (2005). Conservation of cetaceans in the Gambia: whale and dolphin field research. Pp. 37-54. Dans: *Proceedings from the first Biodiversity Rechearch symposium the Gambia*. Ed. L. Barnett, Makasufu Wildlife Trust, Darwin Initiative Project, The Gambia.

Ofori-Danson, P.K., Van Waerebeek, K. & Debrah, S. (2003). A survey for the conservation of dolphins in Ghanaian coastal waters. *Journal of the Ghana Science Association* 5(2):45-54.

Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P., Jallow, A., Camara, A., Ndiaye, P. and Tous, P. (2000) A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. UNEP/CMS Secretariat, Bonn, Germany.

Van Waerebeek, K., Tchibozo, S., Montcho, J., Nobime, G., Sohou, Z., Sohouhoue, P. & Dossou, C. (2001). The Bight of Benin, a North Atlantic breeding ground of a Southern Hemisphere humpback whale population, likely related to Gabon and Angola substocks. IWC Scientific Committee document SC/53/IA21. 8pp.

Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A. Ndiaye, E., Samba Ould-Bilal, A.O. & Bamy, I.L. (2003). Conservation of cetaceans in The Gambia and Senegal, 1999-2001, and status of the Atlantic humpback dolphin. UNEP/CMS Secretariat, Bonn, Germany.

Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. & Bamy, I. L. (2004). Distribution, status and biology of the Atlantic humpback dolphin *Sousa teuszii* (Kükenthal, 1892). *Aquatic Mammals* 30(1):56-83.

Survey for the conservation status of small cetaceans in Ghanaian coastal waters

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There is generally low awareness about the presence of dolphins and whales by the ordinary Ghanaian even though they are well known by local fishers under various local names. Dolphins are legally protected in Ghana by the 1971 Wildlife Conservation Regulation, yet there is paucity of scientific knowledge to support conservation measures due to a lack of aquatic mammal researchers, very limited resources and cost of samples. Using Technical Staff with basic training from the Fisheries Division and species identification confirmation from photographic evidence, valuable data have been collected from surveys of regular dolphin landings in at least eight ports along the coast of Ghana (i.e. Jamestown, Tema, Kpone, Apam, Winneba, Shama, Dixcove, Axim) between 1998 and 2000. Heads were collected selectively for a reference collection and population studies when resources were available. For a total of 58 specimens encountered, at least 13 small cetacean species were documented in the survey. These were dominated by the Clymene dolphin, *Stenella clymene* (34.5%) followed by the pantropical spotted dolphin, *Stenella attenuata* (17.2%), common bottlenose dolphin, *Tursiops truncatus* (15.5%), Risso's dolphin *Grampus griseus* (6.9%) and Atlantic spotted dolphin (5.2%) (Ofori-Danson *et al.*, 2003). Incidental catches are turning into targeted fishing, stimulated by a decline in traditional fishing

stocks and increasing demand for dolphins both as food and as bait in shark fisheries which supply the shark-fin trade. The danger of overexploitation has prompted CMS Parties to list the West African stock of *S. clymene* on CMS Appendix II in accordance with Scientific Council recommendation (CMS/ScC14/-Doc.5), as well as up-listing the Atlantic humpback dolphin *Sousa teuszii* to Appendix I, also following scientific advice (CMS/ScC14/Doc.6). Despite extensive field effort, the Atlantic humpback dolphin has not yet been encountered in Ghana (Van Waerebeek *et al.*, 2009) which has led to concern about possible local extinction. There is an urgent need for continued monitoring of cetacean landings nation-wide to provide precise catch statistics for management purposes including periodic status evaluations. Also, better knowledge of the spatial and temporal distribution of cetaceans could contribute to the development of local dolphin and whale-watching ventures as a sustainable alternative to the current lethal utilization of aquatic mammal resources.

References

Ofori-Danson, P.K., Van Waerebeek, K. & Debrah, S. (2003). A survey for the conservation of dolphins in Ghanaian coastal waters. *Journal of the Ghana Science Association* 5(2):45-54.

Van Waerebeek, K., Ofori-Danson, P.K., & Debrah, J. (2009). The cetaceans of Ghana: a validated faunal checklist. *West African Journal of Applied Ecology* 15:61-90.

Marine mammal sightings off the Angolan coast recorded from the R/V *Dr. Fridtjof Nansen* in August 2004 and July 2005

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In Angola, the institution which is responsible for biodiversity preservation is insufficiently informed concerning the current status of Angola's marine mammals. In fact, there are no systematic national surveys to evaluate the presence and status of these animals. Therefore, our objective was to study the distribution of marine mammal species along the Angolan coast, considering depth, latitude and longitude. The investigation took place during a research cruise with the R/V *Dr. Fridtjof Nansen*, as to complement the information collected by other investigators. Our results include data collected from 16-26 July 2005 between 05°-09°S, and from 8-25 August 2004 between the latitudes 09° and 17°30'S. To collect data it was necessary to execute transects perpendicular to the shoreline, which covered different depths and extended over the entire Angolan coast. Daily observations took place from a platform 15m above sea level, between 7:00h - 12:00h and 12:30h - 18:00h. All sightings were recorded during the survey in a 2.5km range around the vessel. Geographic position coordinates and depth readings from echo sounders were obtained from the vessel's navigation control system.

During the cruises 11 species of marine mammals were observed: 10 species of Cetacea (two Mysticeti, eight Odontoceti) and one species of Carnivora. Among the Mysticeti, two species were confirmed: *Megaptera novaeangliae* and *Balaenoptera brydei*. Eight species of the family Delphinidae were confirmed: *Stenella attenuata*, *Stenella clymene*, *Tursiops*

truncatus, *Delphinus delphis*, *Cephalorhynchus heavisidii*, *Lagenorhynchus obscurus*, *Peponocephala electra* and *Globicephala macrorhynchus*. Among the Carnivora order, the sub order Pinnipedia was represented by *Arctocephalus pusillus* (Otariidae family).

In 2005, 54 humpback whales were recorded in the area between Cabinda and Luanda (latitudes 05°S - 09°S) and in 2004, 19 animals were recorded between Luanda and the Cunene River mouth (09°S - 17°30'S). Data from the two cruises made in the dry season of 2004 and 2005, suggested that the species occurred with higher densities along the shore between 05° and 10°S and that most distributed upon the continental shelf with depths between 10 and 200m. Still, animals were registered in areas up to 400m depth (Fig. 1 and 2).

In 2005, seven Bryde's whales were registered between 05° and 09°S and six animals in 2004 between 09°S and 17°30'S. Fifteen individuals, in 12 sightings, assigned to *Balaenoptera sp.* observed during the two cruises could not be identified to species level. All were recorded north of 07°S. *B. brydei* were observed between the shoreline and the continental shelf edge, up to 800m depth (Fig. 1 and 2).

Individuals of *S. attenuata* were observed only once in a group of 30 animals. This record occurred at 07°03.240'S, 11°56.940'E in an area of 207m depth (Table 1; Fig. 1 and 2). There was also a single record of *Stenella clymene* registered at 07°51.540'S, 12°59.700'E, a school of 150 animals in an area of 50m depth (Table 1; Fig. 1 and 2). Three schools of *Stenella sp.* were observed for which it was not possible to identify the species. One school was recorded at 07°59.100'S, 12°42.300'E of about 200 animals and in 230m of depth. Two other schools were observed near 10°30'S and 15°30'S (Table 1; Fig. 1) with around 120 and 11 animals respectively at depths of 580 and 110 m (Fig. 2).

Tursiops truncatus was sighted four times between latitudes 11° and 16°S in localities with 100 and 200m depth (Table 1; Fig. 1 and 2). The schools varied from 6 to 82 animals with the total observed number estimated at 125.

Two schools of *Delphinus sp.* were observed at two instances, each estimated at about 150 and 160 animals. Records were made at 09°10.936'S, 12°56.724'E and 15°20.223'S, 11°56.980'E, at 28 and 206m depth respectively (Table 1; Fig. 1 and 2).

Cephalorhynchus heavisidii is endemic of the Benguela Current Large Marine Ecosystem and a total of eight individuals were observed in two occasions at positions 16°48.958'S, 11°42.563'E and 17°11.337'S, 11°32.507'E in 20 and 120m depth respectively (Table 1; Fig. 1 and 2). This species can only be found off South West Africa, between Angola and South Africa.

One sighting of *Lagenorhynchus obscurus* was recorded at 16°48.609'S, 11°31.116'E in an area of 107m depth (Table 1; Fig. 1 and 2). Group size was estimated at around 34 animals.

A school of around 40 animals of *Peponocephala electra* was observed at 07°31.200'S, 12°23.280'E (Table 1; Fig. 1) at some 587m depth (Fig. 2). A total of 84 individuals of *Globicephala macrorhynchus* were observed on eight different occasions, between 100 and 1,000m depth and between 08° and 16°S (Table 1; Fig. 1 and 2).

The South African fur seal *Arctocephalus pusillus* was found along the Angolan coast at around 06°S (Fig. 1). The colony at Baía dos Tigres was estimated at about 4,000 animals. This species can be observed off the Angolan coast mostly at around 1,000m depth (Fig.2).

Table 1: Small cetacean sightings along the Angolan coast

Species	Date	Position		Depth (m)	Group size
		Latitude S	Longitude E		
Stenella attenuata	21-07-05	7°03.240'	11°56.940'	207.1	30
Stenella clymene	24-07-05	7°51.540'	12°59.700'	52.0	150
Stenella sp.	24-07-05	7°59.100'	12°42.300'	230.0	200
"	12-08-04	10°56.746'	13°23.420'	584.3	120
"	19-08-04	15°37.168'	11°49.691'	110.5	11
Tursiops truncatus	13-08-04	11°14.507'	13°33.990'	202.6	10
"	17-08-04	13°27.946'	12°31.569'	238.7	82
"	19-08-04	15°19.149'	11°55.154'	124.1	27
"	"	15°36.696'	11°45.592'	115.3	6
Delphinus sp.	08-08-04	9°10.936'	12°56.724'	28.3	150
"	18-08-04	15°20.223'	11°56.980'	206.6	160
Cephalorhynchus heavisidii	22-08-04	16°48.958'	11°42.563'	20.5	2
"	23-08-04	17°11.337'	11°32.507'	118.5	6
Lagenorhynchus obscurus	22-08-04	16°48.609'	11°31.116'	107.3	34
Peponocephala electra	23-07-05	7°31.200'	12°23.280'	587.7	40
Globicephala macrorhynchus	12-06-04	10°51.541'	13°19.468	460.7	25
"	13-08-04	11°14.543'	13°32.277	281.2	10
"	17-08-04	13°27.946'	12°31.369'	238.7	16
"	"	13°42.520'	12°25.382'	280.6	7
"	"	13°47.320'	12°26.282'	909.0	5
"	19-08-04	15°19.149'	11°55.154'	124.1	8
"	"	15°24.031'	11°52.298'	224.2	12
"	24-07-05	8°02.040'	12°36.000'	693.9	6

Figure 1: Records of marine mammals along the Angolan coast

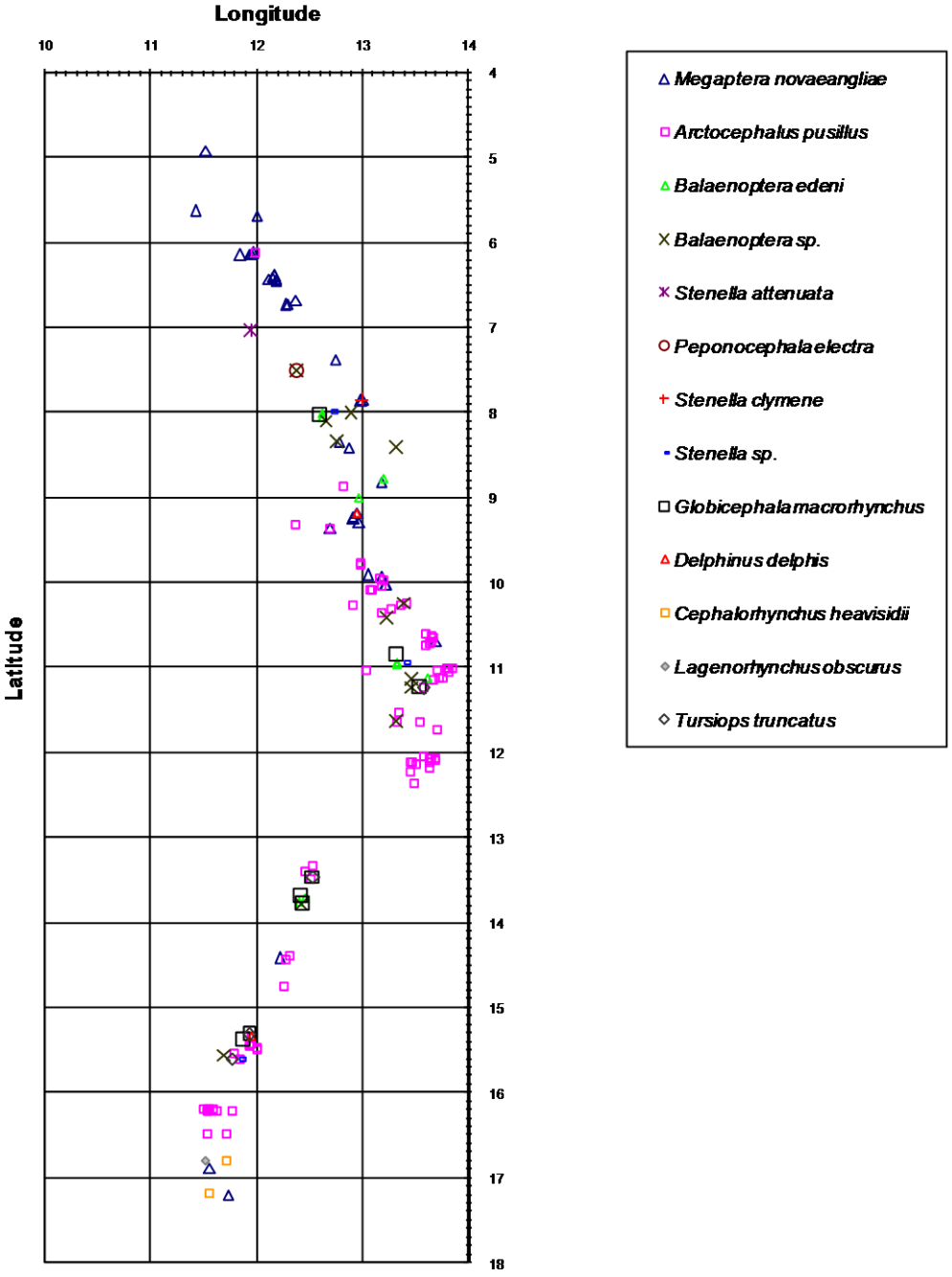
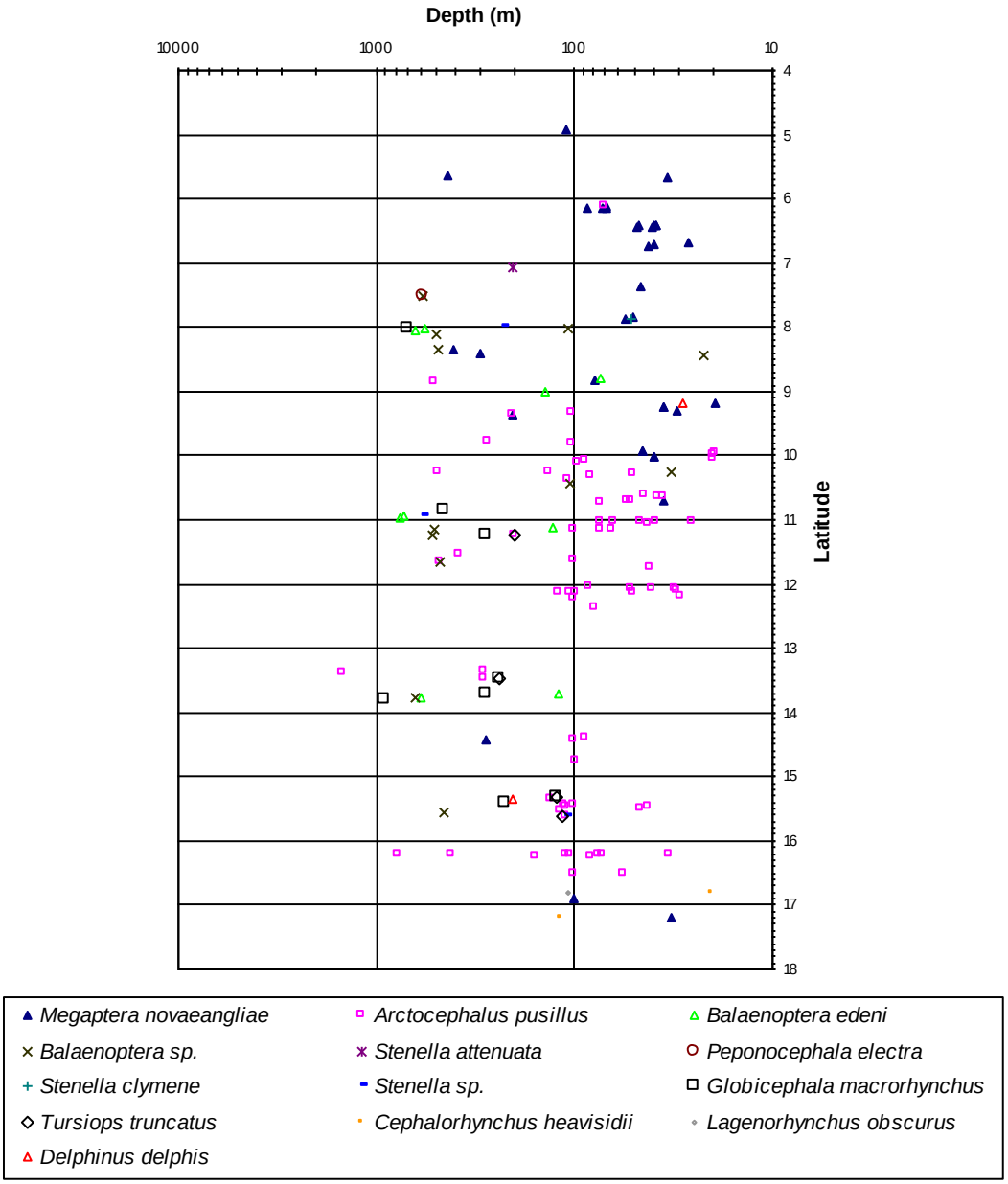


Figure 2: Marine mammals' distribution according to bathymetric lines and latitudes along the Angolan coast



Some data on the presence of cetaceans in Togo's marine waters

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For the Gulf of Guinea very few papers discuss cetaceans and their distribution (e.g., Kükenthal, 1892; Van Waerebeek and De Smet, 1996; Ofori-Danson *et al*., 2003; Weir *et al.*, 2008; Van Waerebeek *et al.*, 2009; Picanço *et al.*, 2009). These papers demonstrate the presence of at least 19 species in the Gulf of Guinea. Several raised concerns on the capture of dolphins in artisanal fisheries. For Togo no results from published studies on cetaceans are available. In a national monograph on biological diversity (PNEA, 2002), the presence of cetaceans in Togo was indicated but no nominal taxa were mentioned. The species, their seasonality, the possible threats specific for Togo, including any interactions between these marine mammals and the coastal fishermen, are yet to be established.

To answer these questions, specimens (skulls, vertebrae and other osteological parts) were collected in coastal villages such as Ablogame, Agbodrafo, Devikinme, Gbetsogbe, Kodjoviakopé, N'Lessi, Baguida. Observations on free-ranging cetaceans were carried out on the Togolese coast between December 2002 and November 2003. With support of the fishermen data cards to record daily observations at sea were distributed. The results of this first investigation can be summarized as follows: six species were confirmed including the humpback whale *Megaptera novaeangliae* (10 osteological items and 3 strandings recorded), a minke whale *Balaenoptera* cf. *B. bonaerensis* (one accidental entanglement in nets), a Bryde's whale *Balaenoptera brydei* (one vertebra, stranding), sperm whale *Physeter*

macrocephalus (one skull, from a stranding), common dolphin *Delphinus sp.* (one skull), pantropical spotted dolphin *Stenella attenuata* (one skull) and, probably, the common bottlenose dolphin *Tursiops truncatus* (vertebrae and some ribs). Killer whales *Orcinus orca* and their behaviour were described in some detail by the skipper of a whale-watching boat (Franck Barbé, personal communication). The period of presence of the majority of these species in Togolese water is unclear. Humpback whale groups of two to four individuals are encountered from July till early December. Small groups of dolphins of 8 to 50 individuals, several described as "spotted" (i.e. *S. attenuata* or *S. frontalis*), are regularly seen in shallow waters (15-60m) by local fishermen. Captures of small cetaceans are confirmed (probably mainly *S. attenuata* and *T. truncatus*), but in most cases these were not identified to species. The fishermen, who risk being fined by Togo's Fisheries Department for taking protected species, are very wary of providing information on the capture of dolphins.

The groups of humpback whales observed in Togo show a seasonality indicative of a South Atlantic stock and form part of a population which reproduces in the northern Gulf of Guinea (Van Waerebeek *et al*., 2001, 2009). Whale calves, their small size indicating newborns, are sighted close to shore. The accidental capture of a newborn of 4.5m (measured by GHS) in a beach seine on 22 August 2005, and its subsequent stranding on the beach of Lomé, are indicative. It is believed that calving and suckling of offspring in shallow, inshore waters reduce the probability of an attack by large pelagic predators such as killer whales and sharks. Also, during the whole period when they remain in Togolese waters and the Gulf of Guinea, the humpback whales probably do not feed. On the contrary, they engage in a whole range of behaviours linked to reproduction and the breeding of whale-calves. The period when humpback whales are present in Togolese water coincides with the Ivoiran-Ghanaian upwellings (Roy, 1991), creating specific, but probably neutral, physico-chemical conditions (temperature, wind and salinity).

Almost all the species of small cetaceans known in the Gulf of Guinea suffer more or less frequent captures. Our interview surveys of the fishermen in Togo showed that the semi-resident communities of Ghanaian fishermen in particular, the most important in the Gulf of Guinea (see Ofori-Danson *et al*., 2003), regularly capture and use dolphins and other small cetaceans. The captured animals are cut in pieces before being landed clandestinely and sold for local consumption. The skeletons and any other part of no use are dumped at sea before the landing procedure as to avoid fines imposed by agents of the Fisheries Department. The current scarcity of the coastal fishing resources may be an important factor which leads the fishermen to exploit marine mammals and other protected species in order to maintain or increase their production.

A report by FAO (1995) indicated that the fishing resources in Togo are overexploited and that the size of the catches decreased just as the output was in fall. The race for profitability would lead the fishermen to capture species which did not form part of their usual catches. Probably these animals are also threatened by coastal marine water pollution in Togo, more specifically by the dumping of phosphate muds. The presence of heavy elements in Togolese phosphate (Gnandi & Tobschall, 1999) is of great concern for the contamination of these ecosystems.

It is necessary to define and implement an integrated management programme for the coasts of the Gulf of Guinea including a biological perspective, taking into account, for example, the ecotourism potential such as whale and dolphin watching and tourism with sea turtles.

References

FAO. (1995). Définition d'une politique et d'un Plan d'Action pour la pêche au Togo. Projet TCP/TOG/3454.

Gnandi, K. & Tobschall, H.J. (1999). The pollution of marine sediments by trace elements in the coastal region of Togo caused by dumping of cadmium-rich phosphorite tailing into the sea. *International Journal of Geosciences* 38(1):13-24.

Kükenthal, W. (1892). *Sotalia teuszii* n. sp. ein pflanzenfressender (?) Delphin aus Kamerun. *Zoologische Jahrbücher Abteilung Systematick* 6(3):442-446.

Ofori-Danson, P.K., Van Waerebeek, K. & Debrah, S. (2003). A survey for the conservation of dolphins in Ghanaian coastal waters. *Journal of the Ghana Science Association* 5(2):45-54.

Picanço, C., Carvalho, I. & Brito, C. (2009). Occurrence and distribution of cetaceans in São Tomé and Príncipe tropical archipelago and their relation to environmental variables. *Journal of the Marine Biological Association of the United Kingdom* 89(5):1071-1076.

PNAE. (2002). Monographie nationale sur la diversité biologique. Rapport intégral. MERF-Togo. 172pp.

Roy, C. (1991). Les upwellings: le cadre physique des pêcheries côtières ouest-africaines. Dans: *Pêcheries ouest africaines: Variabilité, Instabilité et Changement*, Paris, éd. ORSTOM: 38-66.

Van Waerebeek, K. & De Smet, W.M.A. (1996). A second record of the false killer whale *Pseudorca crassidens* (Owen, 1846) (Cetacea, Delphinidae) from West Africa. *Mammalia* 60(2):319-22.

Van Waerebeek, K., Tchibozo, S., Montcho, J., Nobime, G., Sohou, Z., Sohouhoue, P. & Dossou, C. (2001). The Bight of Benin, a North Atlantic breeding ground of a Southern Hemisphere humpback whale population, likely related to Gabon and Angola substocks. IWC Scientific Committee document SC/53/IA21, London, July 2001. 8pp.

Van Waerebeek, K., Ofori-Danson, P.K. & Debrah, J. (2009). The cetaceans of Ghana: a validated faunal checklist. *West African Journal of Applied Ecology* 15:61-90**.**

Weir, C.R., Debrah, J., Ofori-Danson, P.K., Pierpoint, C. & Van Waerebeek, K. (2008). Records of Fraser's dolphin *Lagenodelphis hosei* Fraser, 1956 from the Gulf of Guinea and Angola. *African Journal of Marine Science* 30(2):241-246.

The humpback whale, West African manatee and dolphins are potential resources of nature tourism in Benin

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Field work was implemented in 1999, 2002 and 2006 in the search for evidence of the presence of the West African manatee *Trichechus senegalensis* in the various wetlands of Benin. Results indicate that the species is present in the valleys of the Rivers Ouémé, Mono and Niger. More advanced data collection effort is needed in order to obtain a more detailed idea of the spatial and temporal distribution of the species.

Aiming at an evaluation of whale-watching potential in coastal waters of Benin, exploratory ship-board transects were made in 2000-2002 supported by the Netherlands Committee for IUCN (NC-IUCN) and the Centre Béninois de Développement Durable (CBDD). The encounter rate of groups of humpback whales *Megaptera novaeangliae* was 0.448 observations/hour or 0.072 observations/nautical mile. The average group composition was 1.52 individuals (range 1-5) and relative density 0.109 whale/nautical mile (Van Waerebeek *et al.*, 2001). Observations of neonates are common. Also, surface-active groups suggest behaviour related to reproduction. The whales often engage in aerial and energetic surface behaviour which is highly visible to tourists. The presence of humpback whales off Benin and Togo is seasonal, i.e. from early August till the end of November. Although geographically situated in the North Atlantic (at ca. 06°N), the

seasonality conforms with a breeding ground of a Southern Hemisphere 'Bay of Benin' humpback whale population, probably related to Gabon and Angola substocks (Van Waerebeek *et al.*, 2001). Sea conditions were favourable and during every trip we observed at least one whale, which confirms the touristic potential. Ecotourism sorties have been organized in 2005 and 2007 and annually since. The presence of humpback whales is confirmed also, over the same period, in neighbouring countries of Benin, i.e. Côte d'Ivoire, Ghana, Togo, Nigeria, São Tomé & Principe and Equatorial Guinea (Van Waerebeek *et al.*, 2001, 2009; Picanço *et al.*, 2009). Due to its wide range, the name 'Gulf of Guinea' stock has been suggested (Van Waerebeek *et al.*, 2009). Atlantic spotted dolphin (*Stenella frontalis*), common bottlenose dolphin (*Tursiops truncatus*) and common dolphins (*Delphinus sp.*) were observed during exploratory transects at sea. Furthermore, one specimen, the mummified head of a false killer whale (*Pseudorca crassidens*) was found on an indeterminate site of Benin. Research on the marine mammals of Benin should be continued.

References

Picanço, C., Carvalho, I. & Brito, C. (2009). Occurrence and distribution of cetaceans in São Tomé and Príncipe tropical archipelago and their relation to environmental variables. *Journal of the Marine Biological Association of the United Kingdom* 89(5):1071-1076.

Van Waerebeek, K., Tchibozo, S., Montcho, J., Nobime, G., Sohou, Z., Sohouhoue, P. & Dossou, C. (2001). The Bight of Benin, a North Atlantic breeding ground of a Southern Hemisphere humpback whale population, likely related to Gabon and Angola substocks. Paper SC/53/IA21 presented to the Scientific Committee of the International Whaling Commission, London, July 2001. 8pp.

Van Waerebeek, K., Ofori-Danson, P.K. & Debrah, J. (2009). The cetaceans of Ghana: a validated faunal checklist. *West African Journal of Applied Ecology* 15:61-90.

La baleine à bosse et le lamantin d'Afrique, des potentielles ressources de tourisme de la nature au Bénin

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Résumé

Des travaux ont été réalisés sur le lamantin d'Afrique *Trichechus senegalensis* en 1999, 2002 et 2006 pour signaler sa présence dans différentes zones humides du Bénin. Les résultats démontrent qu'il est présent dans les Vallées de l'Ouémé, du Mono et le fleuve Niger. La collecte des données doivent êtres approfondies pour avoir une meilleure idée de la répartition temporelle et spatielle de l'espèce. Visant à évaluer la possibilité d'un tourisme de baleines en eaux côtières du Bénin, des transects exploratoires en bateau ont été faits en 2000-2002 avec l'appui de NC-IUCN et du CBDD. La densité relative des groupes de baleine à bosse *Megaptera novaeangliae* était 0.448 observations/heure ou 0.072 observations/mille marin. La composition moyenne de groupe était 1.52 individus (rangée 1-5) et la densité relative 0.109 baleine/mille marin. Des observations de nouveaux-nés sont fréquents; aussi des groupes actifs en surface suggèrent un comportement lié à la reproduction. Les baleines s'engagent dans des comportements aériens et de surface énergique, entre autres, de haute visibilité pour les touristes. La présence des baleines à bosses au Bénin et au Togo est saisonnière, à partir de début août jusqu'à fin novembre. Bien que géographiquement situé dans l'Atlantique nord (06° N), le caractère saisonnier est conforme à un endroit de reproduction d'une population de l'hémisphère sud, probablement relié aux 'substock' du Gabon, Congo et de l'Angola. Les conditions de mer étant favorables et à chaque sortie nous observons au moins une baleine, ce qui confirmait le potentiel touristique. Des sorties éco-touristiques ont été organisées en 2005 et 2007. La présence de la baleine à bosse est signalée aussi dans les pays voisins du Bénin, c.-à-d. Côte d'Ivoire, Ghana, Togo et Nigeria. Des dauphins *Stenella frontalis*, *Tursiops truncatus* et *Delphinus* sp. ont été observés pendant les transects exploratoires en mer et de plus un spécimen d'ossement de faux épaulard *Pseudorca crassidens* a été retrouvé chez les populations de la côte. Les travaux de recherche sur les mammifères marins du Bénin doivent être poursuivis.

Mots-clés: Baleine à bosse, Lamentin d'Afrique, Dauphins, Bénin, Afrique de l'Ouest.

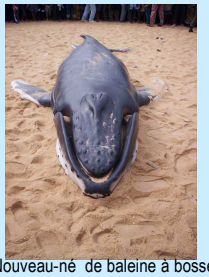
RESULTATS

La présence de *Trichechus senegalensis* est confirmée dans les Vallées de l'Ouémé, du Mono (Sud du Bénin) et le fleuve Niger (Nord du Bénin). Ces zones peuvent être aménagées après une étude de faisabilité pour commencer un éco-tourisme. L'espèce est très menacée par la pression démographique et la chasse.

Trichechus senegalensis, chassés dans la vallée de l'Ouémé

Urgence d'établir des communications directes pour un changement de comportement (CCC) avec les communautés locales afin de les sensibiliser, et développer par exemple la pisciculture pour freiner la chasse aux lamantins.

Pendant les transects scientifiques nous avions observé 40, 26 et 42 baleines à bosse respectivement en 2000, 2001 et 2002.



Nouveau-né de baleine à bosse *Megaptera novaeangliae* retrouvée morte à la plage du Togo

Dorsale et nageoires d'une baleine à bosse

Tête de *Pseudorca crassidens*

Des sorties éco-touristiques ont été organisées en 2005 et 2007.

Embarquement des éco-touristes

Recherche et photographie des cétacés

Conclusion

L'écotourisme est possible mais il faut en plus un bateau en permanence. Les travaux de recherche sur les cétacés et le lamantin doivent se poursuivent à longue terme, avec des ressources plus appropriées.

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Threats to small cetaceans and manatees

The West African manatee: A flagship wetland species in decline

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The West African manatee *Trichechus senegalensis* is a large aquatic mammal of the order Sirenia found in coastal and inland wetlands of western Africa between Mauritania and Angola, and inland as far as Mali, Niger and Chad. Its average length is around 3m and its weight about 500kg (Powell, 1996; Powell 2002; Dodman *et al.*, 2008).

Habitat and diet

The West African manatee lives in a wide variety of wetland habitats, including estuaries, coastal lagoons, rivers, lakes and floodplains. Manatees have favoured resting areas, where they may spend much of the day. The manatee feeds especially on submerged or semi-aquatic grasses, but it has a varied diet including mangrove leaves, various aquatic plants, fruits and seeds and even shellfish (Dodman *et al.*, 2008; Kone and Diallo, 2002).

Culture and values

The manatee has important cultural significance in western Africa, and is widely respected in many local customs, often likening the manatee to a mermaid or water deity. It is also highly valued in traditional medicine and widely for its meat.

Threats

The pressures on the manatee are manifold, and manatee populations across the range are impacted by capture in fishing nets, hunting, trading, the modification of its habitat, such as destruction of mangroves, and through the impacts of development works, such as dams. The main threats are:

- Loss of habitat, resulting from both climate change and human pressures;
- Incidental capture in fishing nets;
- Traditional hunting and commercial

poaching activities;

- Isolation of populations, especially by dams.

International aspects

The West African manatee is listed as Vulnerable on the IUCN Red List of Endangered Species. Trade in the West African manatee is restricted, as it is listed in Annex II of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES). The manatee does move between some countries, and is listed in Annex II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

Conservation Strategy and Action Plan

Wetlands International has led the development of a conservation strategy, with support of the Abidjan Convention, the Regional Programme for the Conservation and Management of Coastal and Marine Resources in West Africa (PRCM) and national and local partners (Dodman *et al.*, 2008). The strategic objective is to improve the conservation status of the West African manatee across its range. The specific objectives are to:

1. Improve policies and legislation for manatee protection, and strengthen their implementation.
2. Improve understanding of the West African manatee and use information for its conservation management.
3. Reduce pressures on the West African manatee through the restoration and safeguarding of its habitats.
4. Instil a wide appreciation of the West African manatee and its ecological and cultural values through targeted communication, education and public awareness.

This strategy was used as a basis for development of an Action Plan for the conservation of the West African Manatee under UNEP/CMS, which was adopted during the final negotiation of a Memorandum of Understanding concerning the Conservation of the Manatee and Small Cetaceans of Western Africa and Macaronesia (UNEP/CMS 2009). Together, these documents provide practical guidance and templates for future conservation initiatives of this threatened African mammal.

References

Dodman, T., Ndiaye, M.D.D. & Sarr, K. (eds). (2008). Conservation Strategy for the West African Manatee. UNEP, Nairobi, Kenya & Wetlands International, Dakar, Senegal.

Kone, B. & Diallo, M. (2002). Rapport d'étude sur le lamantin au Mali (*Trichechus senegalensis*). Initiatives du Bassin du Fleuve Niger. Wetlands International, Sévaré, Mali.

Powell, J.A. (1996). The Distribution and Biology of the West African Manatee (*Trichechus senegalensis* Link, 1795. United Nations Environmental Programme, Regional Seas Programme, Oceans and Coastal Areas, Nairobi, Kenya.

Powell, J.A. (2002). *Manatees & Dugongs*. Colin Baxter Photography, Grantown-on-Spey, Scotland.

UNEP/CMS. (2009). Annex I to the Memorandum of Understanding Concerning the Conservation of the Manatee and Small Cetaceans of Western Africa and Macaronesia UNEP/CMS, Bonn (http://www.cms.int/species/waam/manatee_ap_E.pdf).

Manatee rescued at Wendu Kanel, Senegal River, north Senegal, April 2007
Photo © D. Mignont

Conkouati Lagoon, prime manatee habitat in the Parc National du Conkouati-Douli, Congo
Photo © T. Dodman

Cetaceans in the Macaronesia region (Eastern Central Atlantic Ocean) and threats faced in the Canary Islands

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Abstract

In the Eastern Central Atlantic Ocean, the Macaronesian region, composed of five volcanic archipelagos, the Azores, Madeira, Salvagens, the Canary Islands and Cape Verde, presents a privileged situation, between the North Atlantic Ocean and the tropical zones, which allows the coexistence in its waters of a great variety of species. In this respect it is necessary to emphasize the great importance that the archipelagos have as "hot spots" of Atlantic diversity, because of the fact that 31 of the 38 species that can be found in the North Atlantic Ocean (81.58%) live in such a small sector of the ocean. Although hunting was the most obvious direct threat to cetacean species and populations during the last century, the relative impact of other threats such as by-catch in fishing operations, acoustic and chemical pollution, prey depletion and collisions with ships has been increasing over the last few decades. This article presents the results of 556 strandings recorded by the author in the Canary Islands between 1991 and 2007 (Canary Island Network of Cetacean Strandings) to add to our knowledge on collisions and to promote measures aimed at reducing their impact. In 59 of these strandings (10.6%), the animals presented wounds compatible with a collision with a ship. At each stranding, information on the species, date, location and wound characteristics has been recorded. Eight of the 29 species reported in the archipelago were affected by collisions. The most often affected are sperm whales (*Physeter macrocephalus*) accounting for 41% of cases, and pygmy sperm whales (*Kogia breviceps*) with 17%. The lack of information about the distribution of cetaceans, the kind and speed of the ships involved in the colli-

sions, the precise location of the accidents and the behaviour of the individuals before being hit, is a major problem in evaluating the impact of collisions and makes it difficult to establish preventive policies.

Introduction

Macaronesia includes the Atlantic archipelagos of the Azores, Madeira, the Salvagens, the Canary Islands and Cape Verde, together with what is known as the continental enclave, a stretch of the African coast running from the Western Sahara to the River Gambia. Their insular character and position in the Atlantic Ocean, volcanic origin, mild climate with little variation, the influence of the NE Trade Winds and the cold Canary Current are just some of the common aspects that characterize the archipelagos of Macaronesia.

The Canary Current, one of the signs of identity of the Macaronesia region, is a branch of the Gulf Stream that flows S-SW, crossing the islands with waters colder than one would expect from their latitudinal range, 17-18°N in winter, and 22-25°N in summer, with variations of 1-3 degrees related to the areas of upwelling (Barton *et al.*, 1998; Aristegui *et al.*, 1997; Barton *et al.*, 2004). The volcanic origin of the islands of Macaronesia has generated peculiar oceanographic and geomorphologic features which create a wide variety of environmental conditions that make it possible for representatives of tropical fauna to frequent and share these waters with other, temperate and cold water species. Macaronesia is in a privileged position in the Eastern Central Atlantic, between the northern North Atlantic and the tropical zones, permitting a wide variety of species to live together in these waters. This is an area characterised by high diversity but low abundance ecosystems (A. Brito, pers. communication, 2007), a legacy of great heritage value that requires that we accept responsibility for its conservation by virtue of the fragility that is inherent to its very nature.

Cetaceans in Macaronesia

Fifty-six species of cetaceans have been recorded in the Atlantic Ocean, 38 of which in the Northern Hemisphere and 48 in the Southern Hemisphere (Jefferson *et al.*, 1993; Reeves *et al.*, 2003). Thirteen of the 56 species are endemic. At least 31 species belonging to seven families have been recorded in Macaronesia (Table 1). The Delphinidae family is the best represented, with 14 species (45.16%), followed by the Ziphiidae and the Balaenopteridae, with six species each (19.35%). There are two species of the Kogiidae family (6.45%) and one species each of the Physeteridae, Balaenidae and Phocoenidae families (3.22%).

Concerning the distribution of cetaceans in the different archipelagos: in the Azores, there are 25 recorded species (Barreiros *et al.*, 2006), 12 of which have a cosmopolitan distribution (48%), nine live in warm temperate waters (36%) and four in cold temperate waters (16%). In the Canary Islands, there are 29 species, 12 of which have a cosmopolitan distribution (41.38%), 12 live in warm temperate waters (41.38%) and five in cold-temperate waters (17.24%). Twenty-one species are known from the waters of Madeira (L. Fleitas, pers. communication, 2007), 12 of which have a cosmopolitan distribution (57.14%), seven live in warm temperate waters (33.33%) and two in cold temperate waters (9.52%). Of the 22 species that live in the waters of Cape Verde (Hazevoet and Wenzel, 2000; Marques and López, 2007), 11 have a cosmopolitan distribution (50%), nine live in warm temperate waters (41%) and two in cold temperate waters (9%).

Because of the number of cetacean species present in the waters of Macaronesia, the importance of these archipelagos as high-diversity areas of Atlantic cetaceans should be stressed: 31 of the 38 species known from the North Atlantic Ocean (81.6%) can be found in this small ocean sector.

Threats faced in the Canary Islands: ship strikes

Hunting was the most obvious direct threat to cetacean species and populations in Macaronesia over the past one hundred years, but the relative impact of other threats, such as by-catch in fishing operations, acoustic and chemical pollution, prey depletion and collisions with ships has been increasing over the past few decades. (Prideaux, 2003; Dinis *et al*., 2006; Tregenza *et al.*, 2000).

Based on 138 necropsies conducted in the Canary Islands, Arbelo (2007) analysed the cause of death of stranded cetaceans. His results showed that 62.2% of animals for which a cause of death was determined, died from natural pathological conditions and 33.3% where killed by man made causes.

The impact of fishing operations affected 13.8%, atypical stranding of beaked whales associated with military manoeuvres, 9.4% and collisions with ships, 5.8%. In a global context it is possible that the effect of ship collisions is not affecting the viability of a species, but this can be a serious threat for small populations, especially in resident groups. In those areas where the high density of marine transport coincides with critical cetacean habitat, collisions can be frequent, and may affect the long-term viability of these populations. (Laist *et al*., 2001; Van Waerebeek *et al*. 2007).

With a view to enhancing our knowledge about collisions and to promote measures aimed at reducing their potential impact, this paper presents the results of 556 strandings recorded in the Canary Islands between 1991 and 2007 (Canary Island Cetacean Stranding Network). Cetacean carcasses were found stranded on the shoreline or were reported floating at sea. Fifty-nine animals, representing 10.6% of the strandings, showed signs of a collision or were reported being hit by a ship (nine occasions), whereas 50 animals were directly investigated by the author and members of the Canary Island Cetacean Stranding Network. One fin whale was found on the bow of a large vessel. At each stranding, information is recorded about species, date, location, and wound characteristics (Table 2).

Eight of the 29 species reported in the Canary Islands are affected by collisions. The most affected species are the sperm whale (*Physeter macrocephalus*, N= 24; 41% of total) and the pygmy sperm whale (*Kogia breviceps* N= 10; 17%), Cuvier's beaked whale (*Ziphius cavirostris*, N= 7; 12%), the short-finned pilot whale (*Globicephala macrorhynchus*, N= 6, 10%) and one True's beaked whale (*Mesoplodon europaeus).* At least three baleen whale species (N= 9; 15%) were found after having being hit by a vessel: two fin whales (*Balaenoptera physalus*), two Bryde's whales (*B. edeni*) and one sei whale (*B. borealis*). Four balaenopterid whales could not be identified at the species level, and in another two cases, neither genus nor species could be determined (Figure 1, Table 2).

The time distribution of strandings suggests a pronounced increase and indicates that the number of collisions is on a consistently high level since 1999. From 1991 to 1998, the number of registered ship strikes varied from zero to three, with an average of one per year. From 1999 to 2007, this number ranged from three to nine, averaging 6.4 per year.

Ackowledgements

I would like to thank all members of the Red Canaria de Cetaceos Varados (*Canary Island Cetacean Stranding Network).* The Canary Island Cetacean Stranding Network is supported by the Dirección General del Medio Natural, Government of the Canary Islands.

Table 1. Cetacean species reported in the Atlantic and Macaronesia region. Endemic= Atlantic Ocean.

	Atlántico N	Atlántico S	Endemic	Azores	Canarias	Madeira	Cabo Verde
Familia Balaenopteridae							
Rorcual azul (*Balaenoptera musculus*)	X	X		X	X	X	X
Rorcual común (*Balaenoptera physalus*)	X	X		X	X	X	X
Rorcual norteño *(Balaenoptera borealis*)	X	X		X	X	X	
Rorcual tropical (*Balaenoptera edeni*)	X	X			X	X	X
Rorcual aliblanco común (*Balaenoptera acutorostrata*)	X			X	X	X	X
Rorcual aliblanco antártico (*Balaenoptera bonaerensis*)		X					
Yubarta (*Megaptera novaeangliae*)	X	X		X	X	X	X
Familia Eubalaenidae							
Ballena franca del Atlántico Norte (*Eubalaena glacialis*)	X		X	X	X	X	
Ballena franca meridional (*Eubalena australis*)		X					
Ballena franca pigmea (*Caperea marginata*)		X					
Familia Physeteridae							
Cachalote (*Physeter macrocephalus*)	X	X		X	X	X	X
Familia Kogiidae							
Cachalote pigmeo (*Kogia breviceps*)	X	X		X	X	X	
Cachalote enano (*Kogia sima*)	X	X		X	X		X
Familia Ziphiidae							
Zifio común (*Ziphius cavirostris*)	X	X		X	X	X	X
Zifio de Blainville (*Mesoplodon densirostris*)	X	X			X	X	
Zifio de Gervais (*Mesoplodon europaeus*)	X	X	X	X	X		
Zifio de Sowerby (*Mesoplodon bidens*)	X		X	X	X	X	
Zifio de True (*Mesoplodon mirus*)	X			X	X		
Zifio calderón boreal (*Hyperoodon ampullatus*)	X		X	X	X		
Berardio de Arnoux (*Berardius arnuxii*)		X					
Zifio de Sheperd (*Tasmacetus sheperdi*)		X					
Zifio calderón austral (*Hyperoodon planifrons*)		X					
Zifio de Hector (*Mesoplodon hectori*)		X					
Zifio de Gray (*Mesoplodon grayi*)		X					
Zifio de Layardi (*Mesoplodon layardi*)		X					
Familia Phocoenidae							
Marsopa común (*Phocoena phocoena*)	X			X	X		
Marsopa de anteojos (*Phocoena dioptrica*)		X					
Marsopa negra (*Phocoena spinipinnis*)		X					
Familia Delphinidae							
Delfín gris (*Grampus griseus*)	X	X		X	X	X	X
Delfín mular (*Tursiops truncatus*)	X	X		X	X	X	X
Delfín común de hocico corto *(Delphinus delphis*)	X	X		X	X	X	X
Delfín común de hocico largo (*Delphinus capensis*)	X	X					
Delfín de Fraser (*Lagenodelphis hosei*)	X	X			X		X
Delfín listado (*Stenella coeruleoalba*)	X	X		X	X	X	X
Delfín moteado atlántico(*Stenella frontalis)*	X	X	X	X	X	X	X
Delfín moteado pantropical (*Stenella attenuata)*	X	X					X
Delfín acróbata de hocico largo (*Stenella longirostris*)	X	X			X		X
Delfín dientes rugosos (*Steno bredanensis)*	X	X		X	X	X	X
Delfín de hocico blanco (*Lagenorhynchus albirostris*)	X		X				
Delfín de flanco blanco del Atlántico (*Lagenorhynchus acutus*)	X		X				
Delfín de Commerson (Cephalorhynchus commersonii)		X	X				
Delfín de Heaviside (Cephalorhynchus heavisidii)		X	X				
Delfín atlántico jorobado (*Souza teuszii*)	X	X	X				
Tucuxi (*Sotalia fluviatilis*)	X	X	X				
Delfín Clymene (*Stenella clymene*)	X	X	X				
Delfín de Fitzroy (*Lagenorhychus obscurus*)		X					
Delfín de Peale (*Lagenorhynchus australis*)		X					
Delfín del Antártico (*Lagenorhynchus cruciger*)		X					
Delfín sin aleta meridional *(Lissodelphis peronii*)		X					
Orca *(Orcinus orca*)	X	X		X	X	X	X
Orca enana (*Peponocephala electra*)	X	X					X
Orca pigmea (*Feresa attenuata*)	X	X					
Falsa orca (*Pseudorca crassidens*)	X	X		X	X	X	X
Calderón común (*Globicephala melas*)	X	X			X		X
Calderón tropical (*Globicephala macrorhynchus*)	X	X		X	X	X	X
Familia Pontoporidae							
Franciscana (*Pontoporia blainvillei*)		X	X				

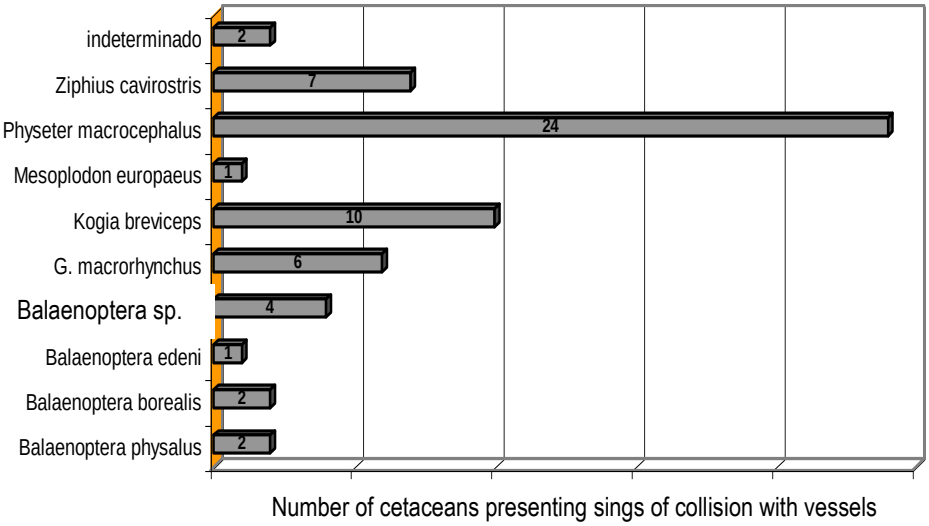
Table 2. Details of vessel-whale collision cases in the Canary Islands (1991-2007)

Table II: Details of vessel-whale collision cases in the Canary Islands (1991-2007).

Date	*Species*	Code	Island	Length (cm)	Sex	Condition	Age Class	Notes
07.07.1991	*Physeter macrocephalus*	Pm.070791	TF	n.n.	F	Fresh	Calf	Huge cuts. Collision with jet-foil (Company Trasmediterranea).
07.07.1991	*Physeter macrocephalus*	Pm.070791	TF	n.n.	F	Fresh	Adult	Huge cuts. Collision with jet-foil (Company Trasmediterranea).
26.02.1992	*Globicephala macrorhynchus*	Gm.260292	TF	340	F	MoD	Juvenile	Found floating on 22/02/92 with a large dorsal cut .
28.02.1992	*Indeterminado*		FV	1200				Impact with ferry "Princesa Teguise". Described as large cetacean of > 12 m. Passengers: 1 injury and 18 with contusions.
30.05.1992	*Ziphius cavirostris*	Zc.300592	TF	550	M	MoD	Juvenile	Clear cut which separated the caudal peduncle from body. Cookie cutter marks and other shark bites.
12.07.1995	*Physeter macrocephalus*	Pm.120795	TF	n.n.		Fresh	Calf	Only head of animal was found.
09.04.1996	*Physeter macrocephalus*	Pm.090496a	GC	1010	F		Adult	Ferry Armas.
09.04.1996	*Physeter macrocephalus*	Pm.090496b	GC	680	M		Calf	Ferry Armas.
04.05.1999	*Balaenopteridae*	B.040599	GC	n.n.				Collision observed by fishermen.
10.06.1999	*Globicephala macrorhynchus*	Gm.100699	TF	n.n.				Collision with ferry "Gomera Jet".
00.07.1999	*Balaenoptera physalus*	Bp.000799	TF	n.n.			Adult	Male of more than 20m. Press report in " La Gaceta" (18 Sep 99): "¿Por qué mueren las ballenas?".
04.08.1999	*Physeter macrocephalus*	Pm.040899	TF	n.n.				Head separated from body. Burried by technicians from Tenerife Council (Servicio de Recuperación Fauna).
06.08.1999	*Physeter macrocephalus*	Pm.060899	TF	1050	F	Fresh	Adult	Deep mediodorsal cut. Found floating and brought into harbour.
10.09.1999	*Balaenopteridae*	B.100999	LG	n.n.				Rorqual tropical with a deep cut. Body was hauled off.
06.10.1999	*Balaenoptera edeni*	Be.061099	GC	1200	F	MoD	Adult	Hematoms found all over the body.
20.01.2000	*Balaenopteridae*	B.200100	LG	n.n.				Reported by passenger of ferry "Gomera Jet".
09.06.2000	*Ziphius cavirostris*	Zc.090600	TF	n.n.	F	Fresh	Juvenile	Cut at the level of dorsal fin.
06.04.2000	*Physeter macrocephalus*	Pm.060400	LZ	n.n.	M	MoD	Calf	Two cuts on head typical for propeller strikes.
12.06.2000	*Physeter macrocephalus*	Pm.120600	TF	n.n.		Fresh	Juvenile	Head separated from body. Many plastic items found in stomach.
21.08.2001	*Physeter macrocephalus*	Pm.210801	TF	600	F	Fresh	Calf	Large wound on posterior third of body: 600 cm.
23.09.2001	*Physeter macrocephalus*	Pm.230901	TF	n.n.		Fresh	Calf	Length of the head (which was separated from the body): 135 cm.
24.09.2001	*Physeter macrocephalus*	Pm.240901	TF	790	M	AD		Deep lateral cut lefthand side from lower jaw to dorsal fin.
07.02.2002	*Kogia breviceps*	Kb.070202	TF	240	M	AD	Juvenile	Deep cuts mediodorsal and caudal.
18.04.2002	*Globicephala macrorhynchus*	Gm.180402	TF	167	F	AD	Calf	Politraumatised on the skull, jaws, ribs and vertebrae, but without external marks.
21.06.2002	*Ziphius cavirostris*	Zc.210602	TF	525	M	AD	Adult	Medio-lateral cut at the height of the dorsal fin.
02.04.2003	*Globicephala macrorhynchus*	Gm.020403	TF	1,60(+)		AD	Adult	Support from technicians of the "Servicio de Fauna del Cabildo de Tenerife". Only first third of body appeared.
28.04.2003	*Kogia breviceps*	Kb.280403	TF	250	M	AD	Juvenile	Body cut at two locations: 1. At the height of the lung, 2. At the height of reproductive organs.
30.06.2003	*Kogia breviceps*	Kb.300603	TF	238	M	AD	Juvenile	Deep cut from pectoral flipper to the vertebral column.
02.07.2003	*Kogia breviceps*	K.020703	LP	300		AD	Adult	Deep sagittal cut.
05.07.2003	*Physeter macrocephalus*	Pm.050703	TF	490	M	Fresco	Calf	Two traversing cuts: 1. From head to behind the blowhole, 2. Deep cut close to dorsal fin.

Date	*Species*	Code	Island	Length (cm)	Sex	Condition	Age Class	Notes
11.10.2003	*Physeter macrocephalus*	Pm.111003	H	953	M	AD	Joven	Deep dorsal cut (mid body).
14.11.2003	*Mesoplodon europaeus*	Me.141103	TF	282+	M	AD	Adult	Body cut off behind the genital area. Has been floating several days.
25.11.2003	*Physeter macrocephalus*	Pm.251103	GC	1200				Referenced in the press media.
15.04.2004	*Balaenoptera borealis*	Bb.150404	GC	n.n.	F	AD	Joven	Body cut into halves behind the dorsal fin.
06.05.2004	*Ziphius cavirostris*	Zc.060504	TF	n.n.		MoD	Adult	Animal cut at the onset of dorsal fin.
21.06.2004	*Kogia breviceps*	Kb.210604	TF	188	M	AD	Juvenile	Appeared the day before at La Caleta, then drifted to harbour of Güimar. Partially sectioned in front of dorsal fin.
12.08.2004	*Physeter macrocephalus*	Pm.120804	LG	n.n.		AD	Juvenile	Body cut in front of pectoral fin. Animal brought quickly to dumping site.
01.10.2004	*Physeter macrocephalus*	Pm.011004	TF	1050	F	AD	Adulto	Cut at the height of cervical vertebrae.
31.12.2004	*Ziphius cavirostris*	Zc.311204	TF	620	M	AD	Adult	Hauled off by Guardia Civil but the resighted. Cut at the height of digestive apparatus.
15.02.2005	*Physeter macrocephalus*	Pm.150205	TF	500	M	AD	Calf	Deep cuts at level of thorax. Numerous shark bites.
11.05.2005	*Physeter macrocephalus*	Pm.110505	FV	686	F	Fresh	Calf	Numerous propeller cuts.
25.05.2005	*Balaenopteridae*	B.250505	LG	1000		AD	Joven	First seen floating off Tenerife, stranded on 22 May on La Gomera.
29.06.2005	*Globicephala macrorhynchus*	Gm.290605	TF	115	M	AD	Calf	Floating body was accompanied by bottlenose dolphins up to the harbour of Alcalá. Head cut off.
20.07.2005	*Indeterminado*	I.200705	FV	n.n.				Referenced in the press media. Probable collision with jet-foil.
27.09.2005	*Kogia breviceps*	Kb.270905	GC	285	F	Fresh		Referenced in the press media/internet.
31.03.2006	*Kogia breviceps*	Kb.310306	LG	280	F	Fresh	Juvenile	Found floating off LG. Full necropsie by veterenarians of the Las Palmas University. Hematoms present. No obvious markings.
18.04.2006	*Kogia breviceps*	Kb.180406	TF	274	F	AD	Adult	Fetus of 37 cm length. Skull destroyed.
27.04.2006	*Physeter macrocephalus*	Pm.270406	TF	460	F	Fresh	Calf	Appeared 28/05/06 at Las Maretas. Longitudinal mediodorsal cut.
04.06.2006	*Ziphius cavirostris*	Zc.040606	LG	490+	M	AD	Adult	Deep cut which separated the tail stock.
05.07.2006	*Ziphius cavirostris*	Zc.050706	TF	400+	F	AD		Animal was observed 4 days floating in the area. No shark bites. Last third of body cut off at the level of genitals.
25.02.2007	*Balaenoptera physalus*	Bp.250207	GC	1700		MoD	Juv	Animal wedged on the bow of monohull ferry (Company Trasemediterranea).
06.04.2007	*Kogia breviceps*	Kb.060407	TF	275(282)	F	SD	Adult	Dorsal and mediodorsal cuts of 15-30 cm lenth and up to 12 cm deep. Orca attack?
16.05.2007	*Physeter macrocephalus*	Pm.160507	TF	325 (+)	M	SD	Calf	Animal cut at the level of the anus. Numerous shark bites.
04.06.2007	*Globicephala macrorhynchus*	Gm.010607	TF	100 (+)	F	AD	Newborn	Animal cut at the end of the genital opening. Curved cuts 25-30 cm length. Shark bites. Clearly visible fetal folds on right side.
20.03.2007	*Balaenoptera borealis*	Bb.200307	GC	1390	F	MoD	Adult	Fractured thoracic vertebrae. Hematoms (anterior region right side).
00.07.2007	*Physeter macrocephalus*	Pm.000707	GC	n.n.		AD		Only part of the first third appeared.
20.06.2007	*Kogia breviceps*	Kb.200607	GC	170 (+)		AD		Curved mediodorsal cuts. Stomach contents present.
08.07.2007	*Physeter macrocephalus*	Pm.080707	H	n.n.		AD		Deep cut at the head. No skull present. Stomach contents present.
16.07.2007	*Physeter macrocephalus*	Pm.160707	GC	1300		AD		Deep cut at the level of cervical vertebrae. Head separated from body at the stranding site.

Figure 1. Frequency and distribution of cetaceans presenting signs of collision with vessels (1991-2007)



References

André, M. (1997). Distribución y conservación del cachalote *Physeter macrocephalus* en las Islas Canarias. PhD thesis, University of Las Palmas de Gran Canaria. 238pp.

Arbelo, M. (2007). Causas de la muerte de los cetáceos varados en Canarias. 1999-2005. PhD Thesis. University of Las Palmas de Gran Canaria. 606pp.

Arístegui, J., Tett, P., Hernández-Guerra, A., Basterretxea, G., Montero, M.F., Wild, K., Sangrá, P., Hernández-León, S., Cantón, M., García Braun, J.A., Pacheco, M. & Barton, E.D. (1997). The influence of island-generated eddies on chlorophyll distribution: a study of meso-scale variation around Gran Canaria. *Deep-Sea Research I*, 44:71-96.

Barreiros, J.P., Teves, M. & Rodeia, J. (2006). First record of the harbour porpoise, *Phocoena phocoena* (Cetacea: Phocoenidae) in the Azores (NE Atlantic). *Aqua: journal of ichthyology & aquatic biology* 11(2):45-46.

Barton, E.D., Arístegui, J., Tett, P., Canton, M., García-Braun, J., Hernández-León, S., Nykjaer, L., Almeida, C., Almunia, J., Ballesteros, S., Basterretxea, G., Escánez, J., Garcia-Weill, L., Hernández-Guerra, A., López Laatzen, F., Molina, R., Montero, M.F., Navarro-Pérez, E., Rodríguez, J.M., Van Lenning, K., Vélez, H. & Wild, K. (1998). The transition zone of de Canary Current up-welling region. *Progress in Oceanography* 41:455-504.

Barton, E.D., Arístegui, J., Tett, P. & Navarro-Pérez, E. (2004). Variability in the Canary Islands Area of filament-eddy exchanges*. Progress in Oceanography* 62:71-94.

Carrillo, M., Jann, B., Seton, R. & Wenzel, F. (1999). Present status of humpback whales in the Cape Verde Islands. Abstract XIII Biennial Conference of the Society for Marine Mammalogy, Maui, Hawaii.

Carrillo, M., Jann, B. & López Jurado, L.F. (1999). Cape Verde Sightings Survey 1997-1998: first record of rough-toothed dolphin *Steno bredanensis*. Abstract XIII Annual Conference of The European Cetacean Society, Valencia, Spain.

De Stephanis, R. & Urquiola, E. (2006). Collisions between ships and cetaceans in Spain. Paper SC/58/BC5 presented to the IWC Scientific Committee (unpublished).

Dinis, A., Alves, F. & Freitas, L. (2006). Assessment of cetacean threats in Madeira archipelago: an approach to conservation measures. Abstract CM10, 20th Annual Conference of the European Cetacean Society, Gdynia, Poland.

Hazevoet, C. & Wenzel, F. (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(3):197-211.

Jefferson, T.A., Leatherwood, S. & Webber, M.A. (1993). *FAO species identification guide. Marine mammals of the world.* FAO, Rome. 320pp.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. & Podesta, M. (2001). Collisions between ships and whales. *Marine Mammal Science* 17(1):35-75.

Marques, V. & López, P. (2007). Cetáceos de Cabo Verde. Instituto Nacional Desarrollo Pesca. Gobierno de Cabo Verde. Poster Year of the Dolphin, CMS-WATCH, Tenerife, España.

Prideaux, M. (2003). Conservación de Cetáceos. La Convención de Especies Migratorias (CMS) y sus Acuerdos relevantes para la Conservación de Cetáceos. Website WDCS. Munich. Alemania. 24pp.

Reeves, R.R., Smith, B.D., Crespo, E.A. & Notarbartolo di Sciara, G. (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans.* IUCN/SSC, Cetacean Specialist Group, IUCN, Gland, Switzerland and Cambridge, UK. 139pp.

Tregenza, N., Aguilar, N., Carrillo, M., Delgado, I., Díaz, F., Brito, A. & Martín, V. (2000). Potential impact of

fast ferries on whale populations. A simple model with examples from the Canary Islands. *European Research on Cetaceans, 2000*. 14:195-197.

Tregenza, N., Aguilar, N., Carrillo, M., Delgado, I., & Diaz, F. (2002). Collisions between fast ferries and whales in the Canary Islands: observational data and theoretical limits. IWC Scientific Committee. SC/54/BC4. 7pp.

Van Waerebeek, K., Baker, A.N., Félix, F., Gedamke, J., Iñiguez, M., Sanino, G.P., Secchi, E., Sutaria, D., van Helden, A. & Wang, Y. (2007). Vessel collisions with small cetaceans worldwide and with large whales in the Southern Hemisphere, an initial assessment. *The Latin American Journal of Aquatic Mammals* 6(1): 43-69.

The strandings of cetaceans along the Mauritanian coast

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Cetaceans show both a great biodiversity and are abundant in Mauritania's EEZ waters. To date 21 species have been reported: *Globicephala melas, Globicephala macrorhynchus, Grampus griseus, Orcinus orca, Peponocephala electra, Sousa teuszii, Stenella coeruleoalba, Stenella clymene, Tursiops truncatus, Steno bredanensis, Delphinus delphis, Phocoena phocoena, Kogia breviceps, Physeter macrocephalus, Mesoplodon densirostris, Mesoplodon europaeus, Ziphius cavirostris, Balaenoptera acutorostrata, Balaenoptera physalus, Balaenoptera borealis, Megaptera novaeangliae* (Robineau and Vely, 1998; Van Waerebeek and Jiddou, 2006).

For more than ten years, high mortality levels of cetaceans have been observed during the same period (summer time) mainly in the southern zone of the Mauritanian coastline. The causes of this phenomenon are still not known. Since 1994, IMROP has initiated a programme called "Study and follow-up of marine mammals" which is interested in, inter alia, these strandings by organizing field work missions. The Institute has established a network of observers based along the Mauritanian coast and since 2009 has integrated a body of scientific observers at sea. These two arrangements make it possible to document any eventual strandings observed during their activities. Several hypotheses have been put forward but they have only partially explained the possible causes of this mortality (pollution, pathologies, interactions with fishing gear, physicochemical conditions, acoustic pollution). Similar cases have been observed in other regions of the world, several without leading to any further explanations. Taking into account the gravity of this repetitive phenomenon and the ecological importance of Cetacea, the Mauritanian Institute of Oceanographical Research and Fisheries (IMROP) suggests setting up an early warning system along the entire littoral zone in collaboration with national and international partners. Parallel to this action, a multidisciplinary research programme should be set up.

References

Robineau, D. & Vely, M. (1998). Les cétacés des côtes de Mauritanie (Afrique du Nord-ouest). Particularités et variations spatio-temporelles de répartition ; rôle des facteurs océanographiques. *Revue d'Ecologie (La Terre et la Vie)* 53:123-152.

Van Waerebeek, K. & Jiddou, A. (2006). Deuxième cours de formation théorique et pratique sur l'identification des mammifères aquatiques de l'Afrique de l'Ouest et méthodologies de collecte de données. Rapport de Progrès. Institut Mauritanien de Recherches Océanographiques et des Pêches, Nouadhibou, Mauritanie, novembre 2006. 13pp.

Status of small cetaceans and manatees on the coast of Cameroon and threats to conservation

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Introduction: Description of the study site

Cameroon's coast covers more than 402km (Sayer *et al.*, 1992), from the border with Nigeria in the north (Akawayafe River, 04°40'N, 08°15'E) to the border with Equatorial Guinea in the South (Ntem River, 02°20'N, 09°30'E) (Figure 1). The coastal strip in Cameroon covers approximately 10,600km² and presents a gradual slope from 30 to 100m of depth (Morin *et al.*, 1989; Boye *et al*., 1974). According to Kramkimel and Bousquet (1987) the coastal and hydrological landscape of Cameroon presents four principal zones. From Campo to the River Nyong, the zone presents an alternation of rocky coasts and sand banks, from the mouth of the Nyong River to the town of Limb, the coast is low and characterized by the presence of many estuaries and fluvial mangroves separated from the Atlantic forest by marshy wetlands with brackish water. From Limbé to Idinau, the coast is volcanic and dominated by Mount Cameroon, its summit reaching 4,095m above Fako D'Idinau at the border of Nigeria, but this zone is also low and marshy.

The coastal climate of Cameroon, as that of the remainder of the Gulf of Guinea is influenced by the meteorology of the equator, which is the meeting point of the anticyclone of the Azores (North Atlantic) and that of Saint Helen (South Atlantic). The average precipitation is around 3,000-4,000mm, but reaches more than 11,000mm at Debundsha on the western slope of the Mount Cameroon. There are two distinct seasons, a long rainy season of approximately 8 months and a dry season from November to February. The air temperature is high year-round and oscillates around 25°C. The winds

are characterized by Guinean type monsoons, predominantly from the south-west (Mmoby Etia, 1979). Surface waters are warm year-round, the temperature oscillating around 24°C. This layer of warm water is approximately 20 to 30m deep (Crosnier, 1964) depending on the seasons and the zones. Tides generally are of the semi-diurnal type with amplitudes varying from 0.3 to 3m according to location (Morin *et al.*, 1989).

According to a general census of the population in 1987, the demography of the zone amounts to approximately 15% of the total population at the national level. The coastal region is regarded as the economic centre accounting for more than 70% of the socio-economic activities of the country. Most infrastructure such as roads, ports, airports, telecommunications, schools, hospitals, etc. are located in this area. However, an appreciable portion of the coastal area is occupied by mangroves and creeks and consequently is fairly fragmented. The most important activity of the rural population in this zone concerns artisanal fisheries.

The status of species

a) Presence of species

The literature indicates the presence of cetacean species such as the Atlantic humpback dolphin *Sousa teuszii*, endemic of West Africa (Van Waerebeek *et al.*, 2004), which is listed on CITES Appendix I (May 2007) and CMS Appendix I. Knowledge on the presence of certain other delphinids, such as the common bottlenose dolphin *Tursiops truncatus*, remains very limited in terms of observations of strandings or captures (Figure 3). Moreover, there are no indications about their temporal and spatial distribution. In the case of the manatee *Trichechus senegalensis*, it is present along Cameroon's coastal area and in the estuaries of the rivers including the Ntem, Nyong, Sanaga, Dibamba, Wouri, Moungo, Meme and Ndian. It is also reported in certain lake ecosystems such as the Ossa and Tissongo lakes (CWCS, 2001).

b) Threats

Bycatches

Bycatch constitutes the principal threat to aquatic mammals all along Cameroon's coast due to the high intensity of this activity. For example, in 2001 a dolphin stranded on the beach of Yoyo (Figure 3) which had possibly died from an accidental catch. Fisheries in Cameroon use several types of fishing gear such as drift gill nets, purse-seines to take sardines (*Sardinella*), with some nets longer than 3 to 4 km, and shrimpers; none of these apply any protection measures for aquatic mammals. During the past few years, a strong increase in the presence of Chinese, Korean and Japanese trawlers was witnessed off the coast of Cameroon (Figure 2), which do not respect any existing fisheries regulations.

Habitat degradation

The Cameroon coast shelters one third of the national population. To meet the needs of development an unregulated growth in agricultural activities has taken place, such as palm plantations which border the central coast in the area between Douala and Cape Bakassi, at the border with Nigeria, as well as agricultural processing industries such as SOCAPALM (Cameroonian Company of Palm plantations), CDC (Cameroon Development Co-operation) and PAMOL (Palm oil). The development of large agglomerations such as Kribi, Edéa, Douala and Limbé imply corollaries for infrastructure such as roads, ports and airports. In addition, semi-industrial fisheries target in particular sardines (*Sardinella*) and the most convenient means to conserve this food resource is smoking it with wood harvested from mangroves. According to the Cameroon Wildlife Conservation Society (CWCS, 2001) the rate of harvesting is approximately 5,000m³ of wood per day in periods of fishing, which means approximately 2,700m³/day with a reduction of forest cover of the mangroves of 1% per annum. Also, a vast array of seismic prospecting activities and oil exploitation are

occurring along this coast with consequences such as the disturbance of cetaceans on their feeding grounds due to acoustic contamination.

Pollution

Pollution could constitute an important threat towards this fauna because of the presence of agro-industries which abundantly use pesticides as well as fertilizers. Through the effect of drainage these chemicals would end up in the marine environment. The installation of the principal oil refinery in Limbé on the coast and of the oil terminals of Kribi will result in the production of pollutants that can harm the health of marine mammals. The presence of ports and large agglomerations produce solid and liquid waste products which end up in the sea likely causing negative effects on the health of these mammals and on their habitats.

Collisions with ships

The threat of collisions with vessels such as fishing boats and cargo ships is known on this coast. Strandings due to ship strikes are frequently observed; most recently the stranding of an unidentified whale calf at Mombo at the mouth of the Sanaga River in September 2007 and another in Lolabé, south of the town of Kribi, in January 2008. However no specific information exists on the impact of these threats.

Inappropriate legislation

In Cameroon many texts regulate the activities in the coastal and maritime field for the protection of the biodiversity in these environments, inclusive of rules from certain international agreements such as the conventions of CBD, CITES, CMS, IWC, Ramsar, etc. At the national level, animals are classified in categories according to their relevance for conservation actions such as many cetaceans and the West African manatee which are in category A and thus enjoy full protection. According to decree 2005/152 of 4 March 2005, in connection with the organization of the Ministry of Fisheries and Animal Industries, a task force was created within the Department of Fisheries and Aquaculture (Section IV) to control and monitor fisheries. At the level of the Ministry of Forests and Fauna the creation of marine national parks is envisioned. Despite all these positive intentions, they have yet to be implemented in the field and consequently no monitoring unit of marine fisheries has been created nor any marine protected areas.

Directed catches

The evaluation of direct takes remains difficult in the case of small cetaceans, but for the manatee, Cameroon appears to remain within a range where the hunting of manatees for their flesh is practised (see Figure 4). It is not uncommon to find the meat of this species in markets and restaurants. According to Ayissi (2007), approximately 35 manatees are killed annually inside the Douala-Edéa Fauna Reserve and a record of 18 individuals were taken in nets over a period of three weeks in the Dipombé river in the Douala-Edéa reserve. The hunting methods used include nets, harpoons and chemicals.

Necessary actions

Considering this worrisome situation, many actions need to be taken in the long- and medium-term, if not short-term, in order to safeguard this heritage for present and future generations, the legitimate custodians of the integrity of our coasts and oceans.

Training and research

It is desirable that in the near future persons concerned about the conservation and research of Cameroon's coastal area receive training in the biology and ecology of the affected species. The goal consists in addressing the lack of information on these species, their presence, distribution and status considering the many threats they face. Such training could be provided by the visit in-situ of a specialist as to evaluate needs, or through exchange visits with others involved in conser-

vation on the West African coast.

Lobbying

The suggested lobbying should occur at the local and international level through conservation and management organizations such as e.g. CMS, WWF, IUCN, Wetlands International and IFAW. Such a mobilization could lead to decision makers at all levels allocating resources including personnel and funds.

Education and awareness-raising

Public awareness campaigns of the development of alternative activities to generate income such as ecotourism could be initiated with the fishermen communities along the coast.

In addition the proposal of measures towards a new environmental legislation within the framework of the management of marine protected areas with other partners could be encouraged. These educational and awareness-raising programmes should target the masses through NGOs, universities, research centres, scientific journals and local radio and television transmissions.

Figure 1. Map illustrating Cameroon's coastline (2006). Courtesy of the Cameroon Wildlife Conservation Society.

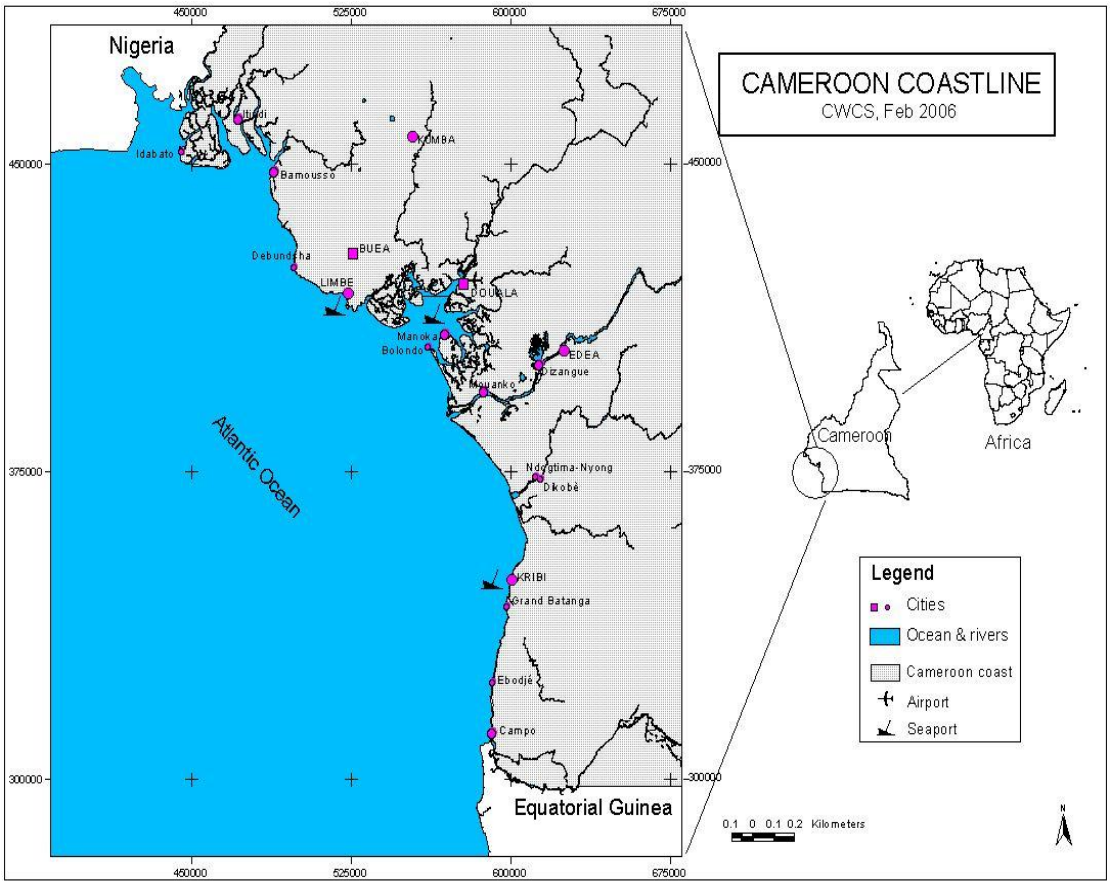

Figure 2. Asian trawlers off Yoyo, Cameroon, in 2006. Photo © Ayissi, taken from the beach

Figure 3. A dolphin, probably *Tursiops truncatus*, found stranded on the beach of Yoyo, in 2001. Photo © Ayissi

Figure 4. A manatee trap commonly used in the Cameroon estuary, here at Yassoukou, 2006. Photo © Ayissi

References

Ayissi, I. (2007). Preliminary assessment on biology of West African manatee in Douala-Edea wildlife reserve of establishment of long term monitoring program. Presented at Earthwatch training on biology and conservation of West African manatee, Lake Lagoon-Ghana, 17-30 November 2007 (non-publié).

Boye, M., Baltzer, F. & Caratini, C. (1974). Mangrove of the Wouri estuary. 435-455pp. In: International Symposium of biology and management of mangrove. Honolulu, Hawaii.

Crosnier, A. (1964). Fonds de pêche le long des côtes de la République Fédérale du Cameroun. Cah. ORSTOM, Numéro spécial, *ORSTOM-Paris*. 133pp.

CWCS. (2001). Cameroon Wildlife Conservation Society Douala-Edea Forest Project-Activity-Report 1999-2000. 132pp.

Kramkimel, J.M. & Bousquet, B. (1987). Les Mangroves du Cameroun. 127-137 pp. In: *Mangrove d'Afrique et de Madagascar*. CEE, SECA, Luxembourg.

Mmoby Etia, P. (1979). Les climats du Cameroun. 25-27 pp. In: P. Mmoby Etia (ed). *Atlas de la République Unie du Cameroun*. Editions Jeune Afrique.

Morin, G. & Kuete, M. (1989). Le Littoral Camerounais: problèmes morphologiques. *Travaux du Laboratoire de Géographie Physique Appliquée*. Institut de Géographie, Université de Bordeaux III, 11:5-53.

Sayer, J.A., Harcourt, C.S. & Collins, N.M. (Eds). (1992). *The Conservation Atlas of Tropical Forests: Africa*. Macmillan Publishing Ltd., London.

Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. & Bamy, I.L. (2004). Distribution, status and biology of the Atlantic humpback dolphin *Sousa teuszii* (Kükenthal, 1892). *Aquatic Mammals* 30(1):56-83.

Rapid assessment of marine mammal and sea turtle mortality in small-scale fisheries

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Populations of marine mammals and sea turtles worldwide are at risk due to high levels of incidental mortality (bycatch) in marine fisheries (Lewison *et al*., 2004). Management to reduce mortality and its demographic impacts on these taxa is impeded by a lack of reliable information on the spatial-temporal distribution of fishing effort and how many individuals are captured in various fishing fleets. Data limitation is particularly problematic for small-scale fisheries in developing countries, where these taxa may be captured in large numbers (Peckham *et al*., 2007; Alfaro-Shigueto *et al*., 2008) but where even basic data on the number of fishers, types of gear used, and species of mammals and turtles caught are often unreliable, unavailable, or not collected.

From 2005-2008, Project GloBAL (Global Bycatch Assessment of Long-lived species) assessed the magnitude and population impacts of bycatch of marine mammals, sea turtles and seabirds in commercial and artisanal fisheries around the world using a variety of approaches. With respect to small-scale fisheries in developing nations, we have been developing a rapid assessment protocol to gather basic information about fisheries and affected megavertebrate taxa (Moore *et al*., 2010). Our protocols combine inventories of fishing villages, boat-counts in a subset of fishing villages, and questionnaire data from interviews with fishermen. In seven developing countries where the protocols were initially evaluated, the interview process was led and conducted by resident scientists.

Our interview-based bycatch research is ongoing, with principal goals being to develop a flexible but standardized data collection and analysis protocol that can be easily and cost-effectively applied to data-limited fisheries around the world, and to generate semi-quantitative estimates of fishing effort and mortality of these sensitive taxa. Given the known limitations of using interview data for obtaining unbiased estimates of target or non-target catch in fisheries (Lien *et al*., 1994; Northridge, 1996), our objective was merely to generate semi-quantitative information that could provide useful indices of marine mammal and sea turtle bycatch in small-scale fisheries. We believe these surveys can provide characterizations of fisheries that will be useful to a variety of fisheries management applications, and may provide information to help manage fisheries and reduce mortality of species such as marine mammals and sea turtles. When implemented throughout a large geographic region, these surveys may assist in a 'triage' approach to the problem of marine mammal and sea turtle mortality in fisheries. That is, information generated from this protocol could highlight potential 'hotspots' of marine mammal and sea turtle mortality, thus guiding where resources should be directed to address the problem in greater detail. By emphasizing standardization of interview-survey protocols and fundamental sampling design considerations, we also aim to promote greater consistency and quality of interview-based approaches to studying small-scale fisheries so that information may be more comparable across independent research efforts.

To date, we have completed a pilot phase of this project that included data collection in three countries in West Africa (Sierra Leone, Nigeria, Cameroon), two countries in East Africa (Tanzania, the Comoros), one country in Asia (Malaysia), and one country in the Caribbean (Jamaica). A complete assessment of these data was completed in early 2009. Here we summarize some basic findings from our surveys.

During 2007 and 2008, over 6100 interviews in seven countries were conducted for a total cost of approximately US$46,000. Interviews consisted of "short-form" (5-10 min to complete) and "long-form" type (20-30 min to complete). The long form contained all short-form questions, plus others. While this does not reflect the cost of protocol development or

data analysis, it does include all implementation components of the research, including training costs and most data entry. On average per country, 876 surveys from 46 sites were conducted over 4.6 months for approximately US$6,500. All countries completed roughly 300 surveys or more in fewer than 10 months and all except Malaysia did so for less than US$8,000.

Across the seven countries investigated, fishing gear use was diverse but generally dominated by gillnets, which were employed by roughly 33% to 62% of fishing boats except in the Comoros, where simple hook-line fisheries were most commonly used. Other common fishing methods were longlining (most common in the West African countries) and other hook-line techniques, and various applications of seine nets (beach seine, surround seine, purse seine). Trawl fishing was less common by numbers but was the dominant form of industrial fishing in several countries (e.g., Malaysia [Sabah], Cameroon, Tanzania, Nigeria). Gillnets resulted in the highest bycatch overall, but in some regions other gears such as seine netting and longlining also led to relatively high bycatch.

Although our objective was to obtain species-specific annual bycatch estimates (per-boat rates and total bycatch) for each pilot study area, in practice there were several factors that precluded estimation of bycatch. Therefore, we provide simple summaries of reported bycatch information rather than extrapolate total bycatch estimates. The proportion of fishermen reporting catch of sea turtles annually varied from a low of 0.06 in Tanzania to a high of 0.70 in one region in Sierra Leone. Of those fishermen who caught turtles, the number they reported to catch annually varied from < 1 per year to '>10' per year in Tanzania and Cameroon, up to 15 per year in Jamaica, 50 or 150 per year for some fishermen in Sierra Leone (for long and short form data, respectively), and as many as 300 per year for some fishermen in Sabah. Even if a conservative value of one turtle per year is used for each boat reporting bycatch, then the proportion of boats per study area that reported bycatch suggests that the number of turtles caught per year may number at least in the low thousands in each country studied.

The proportion of fishermen reporting to catch cetaceans (all odontocetes) varied from zero in parts of several study countries to a high of 0.29 (long-form) and 0.69 (short-form) in Sierra Leone. The high in other countries (for either form type) was ≤ 0.15. A conservative estimate (again, if only one individual per year is captured by respondents reporting bycatch) based on these incidence rates suggests at least several hundred small cetaceans are caught in each of these countries each year.

Sirenian bycatch occurred almost exclusively in gillnets (but was also reported for hook-line gear in the Comoros and Cameroon). However, direct harvest of West African manatee – via use of nets, traps, and harpoons – was also voluntarily reported throughout West African study areas. In Sierra Leone, 12% of all respondents reportedly captured approximately 2,100 manatees in a year. Interviewees in Nigeria and Cameroon reported a total of 180 and 290 manatee kills, respectively. Actual numbers caught throughout the countries are presumably much higher. Bycatch of dugongs (in Tanzania, Comoros, Sabah) and Antillean manatees (Jamaica) was rare, with many fishermen in range countries indicating this as a once in a lifetime event.

In summary, rapid interview surveys allowed us to collect considerable information about the characteristics of artisanal fisheries and bycatch of over broad geographic areas at a relatively low cost. Data from our efforts to date suggest that high bycatch of marine mammals and sea turtles is the rule rather than the exception in the world's artisanal fisheries. The apparent magnitude of cetacean and sea

turtle bycatch in each country was comparable to the alarming numbers from recent case studies of other artisanal fisheries (Lee Lum, 2006; Peckham *et al*., 2007; Alfaro-Shigueto *et al*., 2008). We encountered challenges that preclude us from using our initial data to make comparative analyses of the frequency of bycatch across species, regions or gear types.

Given methodological improvements to interview survey protocols for studying bycatch in artisanal fisheries, and we believe study-specific modifications our questionnaire will provide high quality human response data. We feel this approach has the potential to become an important conservation tool for studying the bycatch of large vertebrates, as it has for understanding other aspects of artisanal fisheries. This protocol, however, is not intended as a substitute for empirical research to estimate bycatch and its population-level effects on marine wildlife. There are inherent limitations in the accuracy of even the most carefully collected human response data, and the reliability of such data for conducting comparative bycatch analyses is yet to be determined. Independent validation will be required to describe the link between truth and reported bycatch information, and whether the correspondence between these can be predicted under different cultural, environmental or socio-economic circumstances.

References

Alfaro-Shigueto, J.A., Mangel, J.C. & Van Waerebeek, K. (2008). Small cetacean captures and CPUE estimates in artisanal fisheries operating from a port in northern Peru, 2005-2007. International Whaling Commission, Scientific Committee Paper SC/60/SM19. 13pp.

Lee Lum, L. (2006). Assessment of incidental sea turtle catch in the artisanal gillnet fishery in Trinidad and Tobago, West Indies. *Applied Herpetology* 3:357-368.

Lewison R.L., Crowder, L.B., Read, A.J. & Freeman, S.L. (2004). Understanding impacts of fisheries bycatch on marine megafauna. *Trends in Ecology and Evolution* 19:598-604.

Lien, J., Stenson, G.B., Carver, S. & Chardine, J. (1994). How many did you catch? The effect of methodology on by-catch reports obtained from fishermen. Pages 535-540 in W.F. Perrin, G.P. Donovan and J. Barlow (eds). Gillnets and Cetaceans. *Reports of the International Whaling Commission* (Special Issue 15).

Moore, J.E., Cox, T.M., Lewison, R.L., Read, A.J., Bjorkland, R., McDonald, S.L., Crowder, L.B., Aruna, E., Ayissi, I., Espeut, P., Joynson-Hicks, C., Pilcher, N., Poonian, C., Solarin, B. & Kiszka J. (2010). An interview-based approach to assess marine mammal and sea turtle captures in artisanal fisheries. *Biological Conservation* 143:795-805.

Northridge, S.P. (1996). A review of marine mammal bycatch observer schemes with recommendations for best practice. JNCC Report 219. Joint Nature Conservation Committee. Aberdeen, United Kingdom.

Peckham, S.H., Diaz, D.M., Walli, A., Ruiz, G., Crowder, L.B. & Nichols, W.J. (2007). Small-scale fisheries bycatch jeopardizes endangered Pacific loggerhead turtles. *Public Library of Science* (PLoS) One 2, e1041, 6pp.

Conservation action

Towards the establishment of a Marine Protected Area for cetaceans in Macaronesia

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The establishment of a Marine Mammal Sanctuary in Macaronesia is a long-held dream, initially proposed by the International Fund for Animal Welfare (IFAW) and the Gesellschaft zum Schutz der Meeressäugetiere (GSM). In the early 1980s Loro Parque Fundación (LPF) adopted this Sanctuary as one of its conservation goals and since then, it has been promoting it at the regional level. In the last twenty years a major leap in scientific knowledge about the cetaceans in Macaronesia and threats to them has occurred and, simultaneously, cetacean protection has evolved from the primitive concept of sanctuary to the more holistic of Marine Protected Area (MPA) in order to accomplish the new conservation challenges in the marine systems. In the light of this new knowledge, it seems clear that a simple extension of the Madeira Sanctuary for Marine Mammals would not be enough to ensure the protection of cetacean biodiversity in the region. A Macaronesian Sanctuary for Cetaceans should be part of a major strategy for the conservation of the Eastern Atlantic cetacean populations. On the other hand, the conservation of the cetacean populations should not rely only on the whaling prohibition, but more likely, on a holistic ecosystem management perspective. As a consequence, the initial idea must be renewed, reviewed and discussed, in order to find out the best way to protect these cetacean populations.

This is the reason why Loro Parque Fundación has identified the Year of the Dolphin, and the West Atlantic Talks on Cetaceans and their Habitats (WATCH) as major opportunities to gather the most renowned researchers and experts on MPAs and brought them together to work towards a Macaronesian Cetacean Marine Protected Area. As a result, LPF has promoted the celebration of the Side Event "Macaronesia Initiative" that will focus on the review of the threats to the cetaceans in

Macaronesia and the Eastern Atlantic, the most effective tools to protect the cetaceans in the area, the identification of research priorities, and the production of a road map to the MPA declaration.

Why Cetaceans?

Loro Parque Fundación (LPF) is a NGO linked to a world-class zoo, Loro Parque (Tenerife, Spain). Our goal is the nature conservation, and we try to achieve this objective by funding conservation projects, developing in-house research, and raising awareness through a comprehensive educational programme. In the past two decades LPF has become a leading force in parrot conservation and, as a consequence, we are playing a major role in biodiversity conservation, focusing on many of the world's biodiversity hotspots, and using parrots as flag-ship species. Besides to our terrestrial biodiversity conservation activities, LPF is also committed to marine conservation as a result of the former whaling operations in the northeast Atlantic Ocean. In the early 1980s sperm whale populations in Madeira were still subject to a high hunting pressure (Avila de Melo and Martin, 1985; Klinowska, 1991). Thanks to the effort of international organizations and researchers, Madeira stopped whaling operations and promoted a Marine Mammal Sanctuary in its EEZ, which was finally approved in 1987. Since then, the creation of similar sanctuaries to establish a network of Marine Mammal Sanctuaries in Macaronesia (Azores, Madeira, Selvagems, Canaries and Cape Verde) has become one of the LPF goals.

Why Macaronesia?

The Canary Islands can be considered one of the world's biodiversity hotspots for cetaceans, with 29 species reported so far (Perez-Valazza *et al.*, 2008). The Azores and Madeira have 25 registered cetacean species (Steiner *et al.*, 2007; Freitas *et al*., 2004), and the Cape Verde archipelago 13 (Reiner *et al*., 1996). This high diversity, and the high abundance of species with potential interest for commercial whaling operations, has been the initial reason to promote a sanctuary.

During the past 20 years LPF has been supporting the efforts of the Gesellschaft zum Schutz der Meeressäugetiere (GSM) promoting the creation of a regional Marine Mammal Sanctuary, to extend the protection achieved by Madeira to the rest of the region. Simultaneously, LPF has been also financing different cetacean conservation projects. Funds had been channeled to cover the needs of the researchers working in this area, since the studies that provided first insights and described the species and their population status (Heimlich-Boran and Heimlich-Boran, 1990; Heimlich-Boran and Heimlich-Boran, 1991), to the latest studies that focused on the main threats (accidental capture, collision, noise pollution, etc.) faced by the cetaceans in this region (Aguilar, *et. al*., 2000; Silva *et al.*, 2002; Fernández *et al.*, 2004; Fernández *et al.*, 2005; de Stephanis and Urquiola, 2006).

In this context, when LPF found out about the Convention on Migratory Species (CMS) initiative to establish an international agreement to protect the small cetaceans in the African Atlantic Basin and Macaronesia, it immediately supported the idea. LPF has provided the WATCH initiative not only with funds but also with a wide set of educational activities (a 12 panel exhibit about cetacean threats, videoconference about the Year of the Dolphin, research excursions in whale-watching boats for students, an internet campaign to collect support video-messages on dolphin conservation, dolphin modeling with disabled people, etc.). At the same time, we understood that WATCH would be a unique opportunity to launch the project of a Marine Protected Area in Macaronesia. That is the reason why LPF in cooperation with the UNESCO centre in the Canary Islands decided to give special attention to this issue during the conference, devoting a side event entirely to the establishment of a

'Protected Area for Cetaceans in Macaronesian Waters'.

What are our expectations?

Our commitment is that this Side Event must be the first step on the way to the declaration of a Marine Protected Area (MPA) in Macaronesia. In the course of the past 20 years the threats faced by cetaceans in Macaronesia have changed, becoming more intense and diverse. The economic development of the region is threatening long-term viability of some cetacean populations (Silva *et al.*, 2002; Fernández *et al.*, 2005; de Stephanis and Urquiola, 2006). That we believe is the reason why a comprehensive review of the cetacean populations' biogeography and diversity, conservation status, threats and risks to their long-term viability in the area should be accomplished.

Once the current conservation status has been clearly evaluated, the most appropriate measures to protect the cetacean populations must be determined. It is clear that Macaronesia contains important cetacean habitat, and it can also be presumed that some of its populations are threatened by different causes (Vonk and Martín, 1989; Santos *et al.*, 1995; Laist *et al.*, 2001). Nevertheless, that does not mean that the creation of a Marine Protected Area would address all the cetacean conservation problems. In some cases (as threats related to specific fishing devices, or pathologies) such problems could be solved with simpler and cheaper measures. If the creation of a MPA is finally identified as the best solution, the cetacean critical habitat must be determined, in order to obtain more detailed information on threats. The identification of the critical habitat can be derived, to some extent, from existing oceanographic knowledge. And this preliminary information can be helpful to evaluate future research needs. Modern research in cetacean habitat is pointing out the importance of mesoscale oceanographic structures, such as meanders, filaments, eddies, etc. (Ballance *et al.*, 2006; Tynan *et al.*, 2005, Redfern *et al.*, 2006) This approach would suggest further research should be directed to the zones with the highest mesoscale variability, as the Azores front, the Canaries Current (specially downstream of the Canary Islands) and the North Atlantic Subtropical Gyre (Pollard and Pu, 1985; Barton *et al.,* 1998; González *et al.*, 2001). Once the critical habitat has been identified it should be possible to identify the government bodies having jurisdiction over the area. And it can be presumed that a Marine Protected Area in Macaronesia would involve different states and international waters. All these issues should be discussed and reviewed in order to draft a road map to the MPA declaration.

From our point of view the protection of the cetaceans in Macaronesia is a goal in itself, but it would be nonsense to limit conservation activities to this group. A marine sanctuary focused only on the cetaceans would fail in the long term. The ecological role of the cetaceans makes it necessary to use an integrated perspective, more related to the ecosystem level management that ideally should be the cornerstone of the modern MPAs. The resulting Marine Protected Area, with an appropriate ecosystem level management, would be an excellent tool to preserve the ecosystems of the most complex eastern boundary current front (Barton *et al*., 1998).

It's time to join forces

LPF has identified the opportunity to use WATCH as the starting point of this initiative and now the time has come to join forces. It is imperative to build a consensus not only among scientists, conservationists, NGOs and politicians, but also with other stakeholders, such as the whale watching, transportation and fishing industries. This must be a joint effort to protect our special marine resources, as this is the only way to be successful.

References

Aguilar, N., Carillo, M., Delgado, I., Díaz, F. & Brito, A. (2000). Fast ferries impact on cetaceans in the Canary Islands: collisions and displacement. Proceedings 14th Annual Conference ECS, Cork, Ireland, 164pp.

Avila de Melo, A.M. & Martin, A.R. (1985). A study of male sperm whale length data from the Azorean and Madeiran catches, 1947-82. *Report of the International Whaling Commission* 35:209-215.

Ballance L.T., Pitman R.L. & Fiedler F.C. (2006). Oceanographic influences on seabirds and cetaceans of the eastern tropical Pacific: a review. *Progress in Oceanography* 69:360-390.

Barton, E.D., Arístegui, J., Tett, P., Cantón, M., García-Braun, J.A., Hernández-León, S., Nykjaer, L., Almeida, C., Almunia, J., Ballesteros, S., Basterretxea, G., Escánez, J., García-Weill, L., Hernández-Guerra, A., López-Laatzen, L., Molina, R., Montero, M.F., Navarro-Pérez, E., Rodríguez, J.M., van Lenning, K., Vélez, H. & Wild, K. (1998). The Transition Zone of the Canary Current Upwelling Region, *Progress in Oceanography* 41:455-504.

de Stephanis, R. & Urquiola, E. (2006). Collisions between Ships and Cetaceans in Spain. International Whaling Commision. Scientific Committee SC/58/BC5.

Fernández, A., Arbelo, M., Deaville, R., Patterson, I.A.P., Castro, P., Baker, J.R., Degollada, E., Ross, H.M., Herraez, P., Pocknell, A.M., Rodríguez, F., Howie, F.E., Espinosa, A., Reid, R.J., Jaber, J.R., Martín, V., Cunningham, A.A. & Jepson, P.D. (2004). Beaked whales, sonar and decompression sickness. *Nature* 428(6984):U1-2.

Fernández, A., Edwards, J.F., Rodríguez, F., Espinosa de los Monteros, A., Herraez, P., Castro, P., Jaber, J.R., Martín, V. & Arbelo, M. (2005). 'Gas and fat embolic syndrome' involving a mass stranding of beaked whales (family Ziphiidae) exposed to anthropogenic sonar signals. *Veterinary Pathology* 42:446-57.

Freitas, L., Dinis, A., Alves, F. & Nóbrega, F. (2004). *Cetáceos no Arquipélago da Madeira. Projecto para a Conservação dos Cetáceos no Arquipélago da Madeira.* Ed. Madeira WhaleMuseum, Machico. 62pp.

González, N., Anadón, R., Mouriño, B., Fernández, E., Sinha, B., Escánez, J. & de Armas, D. (2001). The metabolic balance of the planktonic community at the North Atlantic Subtropical Gyre: the role of mesoscale instabilities. *Limnology and Oceanography* 46:946-952.

Heimlich-Boran, J.R. & Heimlich-Boran S.L. (1990). Occurrence and group structure of short-finned pilot whales *Globicephala macrorhynchus* off the western coast of Tenerife, Canary Islands. Pp. 102-104. En: European research on cetaceans – 4. Eds. P.G.H. Evans, A. Aguilar and C. Smeenk. European Cetacean Society, Cambridge.

Heimlich-Boran, J.R. & Heimlich-Boran S.L. (1991). Social structure and behavioral ecology of short-finned pilot whales, *Globicephala macrorhynchus*, off Tenerife, Canary Islands. Abstract presented at the Ninth Biennial Conference on the Biology of Marine Mammals, Chicago, II, December 5-9, 1991.

Klinowska, M. (1991). *Dolphins, porpoises and whales of the world: the IUCN Red Data Book*. IUCN – the World Conservation Union, Gland, Switzerland. 429pp.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. & Podesta, M. (2001). Collisions between ships and whales. *Marine Mammal Science* 17:35-75.

Pollard, R.T. & Pu, S. (1985). Structure and circulation of the upper Atlantic Ocean northeast of the Azores. *Progress in Oceanography* 14:443-462.

Pérez-Valazza, C., Álvarez-Vázquez, R., Cardona, L., Pintado C. & Hernández-Brito, J. (2008). Cetacean diversity at the west coast of La Palma Island (Canary Islands). *Journal of the Marine Biological Association of the United Kingdom*, 88:1289-1296.

Redfern, J.V., Ferguson, M.C., Becker, E.A., Hyrenbach, K.D., Good, C., Barlow, J., Kaschner, K., Baumgartner, M., Forney, K.A., Ballance, L.T., Fauchald, P., Halpin, P., Hamazaki, T., Pershing, A.J., Qian, S., Read, A., Reilly, S., Torres, L. & Werner, C. (2006). Techniques for cetacean-habitat modeling. *Marine Ecology Progress Series*

310:271-295.

Reiner, F., Dos Santos, M.E. & Wenzel, F. (1996). Cetaceans of the Cape Verde Archipelago. *Marine Mammal Science*, 12(3):434-443.

Santos, S.R., Hawkins, S.J., Montieiro L.R., Alves M. & Isidro, E.J. (1995). Marine research, resources and conservation in the Azores. *Aquatic Conservation - Marine and Freshwater Ecosystems* 5:311-354.

Silva, M.A., Feio, R., Prieto, R., Gonçalves, J.M. & Santos, R.S. (2002). Interactions between cetaceans and the tuna fishery in the Azores. *Marine Mammal Science* 18(4):893-901.

Steiner, L., Silva, M.A., Zereba, J. & Leal, M.J. (2007). Bryde's Whales, Balaenoptera edeni, observed in the Azores: a new species record for the region. *Journal of the Marine Biological Association of the United Kingdom*. Biodiversity Records, 6pp.

Tynan, C.T., Ainley, D.G., Barth, J.A., Cowles, T.J., Pierce, S.D. & Spear, L.B. (2005). Cetacean distributions relative to ocean processes in the northern California Current System. *Deep-Sea Research II* 52:145-167.

Vonk, R. & Martín, V. (1989). Goose-beaked whales (*Ziphius cavirostris*) mass strandings in the Canary Islands. Pp. 73-77. En: European Research on Cetaceans – 3. Proceedings 3rd Annual Conference ECS, La Rochelle, France, 24-26 Feb, 1989. (Eds. P.G.H. Evans and C. Smeenk). European Cetacean Society, Leiden, The Netherlands. 132pp.

Sub-regional Action Plan for the conservation of cetaceans in western Africa

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The WAMER Ecoregion (Western African Marine Ecoregion) shelters an important part of the representatives of the species of cetaceans known in the world. Twenty-seven species of cetaceans, belonging to five families, are encountered in the West African region (Bamy *et al.*, 2006; Fall *et al.*, 2008; Ndao, 2006; Van Canneyt and Dabin, 2007; Van Waerebeek *et al.*, 2000, 2003). These species globally face a variety of threats: interactions with fisheries, pollution of all types (chemical, physical and acoustic), collisions with vessels, habitat degradation, development of tourist activities and emerging pathologies (Van Bressem *et al*., 2009).

The action plan has as general objective the conservation of the populations of cetaceans in West Africa. It defines itself by four specific objectives:

1. The reduction of negative impacts of human activities on cetaceans;
2. The development of research on the cetaceans in the sub-region;
3. The development of programmes adapted towards better Information, Education and Communication (IEC) on cetaceans;
4. The improvement in the coordination of conservation activities of cetaceans.

Apart from the strategic plan, the collaboration between the member states of the Subregional Commission of Fisheries (CSRP) – through the institutions involved in training, research, monitoring and conservation – and other implied actors (non-governmental organizations, professionals, the press, etc.) will be necessary. For a better coherence of the activities, the plan integrates itself in the framework of the Species Action Plan of WWF (http://www.panda.org/specieswork) and establishes synergies with the component "Species and Habitats" Regional Programme of Conservation of the Marine and Coastal zone

(PRCM), as well as with the Species Action Plan in preparation in the framework of a partnership PRCM-CCLME (Canary Current Wide Navy Ecosystem).

National Action Plans on cetaceans will be prepared with the support of WWF during the second year of the project. National focal points in charge of the plans will be chosen and will have the responsibility for coordination at the national level. These plans will have to be adopted officially after a wide consultation between the actors through workshops of consultation and validation. A sub-regional network on cetaceans will serve as regular channel to communicate on the actions undertaken and results obtained, which in turn will allow the international community to be informed.

References

Bamy I.L., Van Waerebeek, K., Bah, S.S., Diallo, M., Diallo, S.T., Kaba, B., Keïta, N., Konaté, S. & Tall, H. (2006). The cetaceans of Guinea, a first check-list of documented species. IWC Scientific Committee Document SC/58/O15, 8pp.

Fall, M., Niamadio I., Diallo M. & Bèye C. (2008). Eclairages sur l'échouage de cétacés survenu en mai 2008 au Sénégal. Document CRODT/WWF-WAMER/Wetlands International: 7 pages. Disponible sur http://www.zhw1.info/.

Ndao, I. (2006). Bio écologie des cétacés et enjeux de leur conservation pour les états côtiers africains comme le Sénégal. Thèse de Doctorat d'Etat Vétérinaire, EISMV, Dakar: 12, 104 pages + annexes.

Van Bressem, M.F., Raga, J.A., Di Guardo, G., Jepson, P.D., Duignan, P., Siebert, U., Barrett, T., de Oliveira Santos, M.C., Moreno, I.B., Siciliano, S., Aguilar, A. & Van Waerebeek, K. (2009). Emerging infectious diseases in cetaceans worldwide and the possible role of environmental stressors. *Diseases of Aquatic Organisms* 86:143-157.

Van Canneyt O. & Dabin, W. (2007). Protocole de collecte de prélèvements. Observatoire des mammifères marins des côtes françaises. Centre de Recherche sur les mammifères marins (CRMM), La Rochelle, France: 6 pages.

Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A., Ndiaye, E., Samba Ould-Bilal, A. O. & Bamy, I.L. (2003). Conservation of cetaceans in The Gambia and Senegal, 1999-2001, and status of the Atlantic Humpback Dolphin. WAFCET-2 Report. UNEP/CMS Secretariat, Bonn, Germany: 56pp.

Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P., Jallow, A., Camara, A., Ndiaye, P. & Tous, P. (2000). A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. WAFCET-1 Report. UNEP/CMS Secretariat, Bonn, Germany: 80pp.

Awareness-raising: Year of the Dolphin in Kenya

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Pollmans Tours & Safaris and TUI Kenya, in response to the UNEP/CMS declaration of the "Year of the Dolphin 2007", undertook a collective approach by developing a partnership that linked the lead conservation agency, the Kenya Wildlife Service, the coastal tourism fraternity, NGOs involved in marine conservation, local elders and coastal communities and schools in a defined strategy to attain the objectives of the Year of the Dolphin (YoD).

The initiative was based on the premise that would inform, educate and engage Kenyans, primarily the policy makers and stakeholders, in raising awareness and to establish a long-term educational and conservation strategy for dolphin protection, and in taking actions that would help dolphin conservation and the protection of their habitats and ecosystems. The process involved identification of locations where a high prevalence of interaction between dolphins and the people occurred which formed the initial focus area for the awareness campaign. These coastal settlements included Shimoni, Mombasa Watamu and Malindi that were either a fishing community settlement or a tourism recreation centre or both. The strategy was to engage the principals, the tourism industry and the local community, primarily, the fishermen and boat operators to engage in responsible dolphin-watching and sustainable livelihood practices and in obtaining the commitment of all the stakeholders to engage in responsible and sustainable practices in harnessing marine resources.

By networking with the Kenya Wildlife Service, the Kenya Association of Tour Operators, the Kenya Association of Hotel Keepers & Caterers, The East African Wildlife Society, the Kenya Marine Fisheries & Research Institute, the Kenya Forest Service and the Fisheries Department, the YoD Kenya coordinators modelled the approach on grassroots participation. It encouraged a proactive involvement of local community elders and established educational workshops for the local community, boat operators, fishermen, hoteliers, tour operators,

the Kenya Wildlife Service rangers, the Women's Group for the protection of the mangrove forests and coral reefs through the Community Resource Enterprise (CORE) and, importantly, the coastal schools both in the urban and rural settings. It aimed to introduce these stakeholders to dolphin behaviour, species identification, dolphin threats, challenges of dolphin conservation and basic marine ecology.

A calendar event was set which captured several inter-school educational and informative activities and competitions such as logo design, football, art and drawings depicting dolphins, dolphin sculptures, poem, netball, volleyball, colouring contest, short essays on dolphins and beach clean-ups. As an incentive to the schools' contribution, schoolchildren earned an opportunity that they had never previously had, to visit the Kisite & Mpungutuni Marine Park, snorkel, and see bottlenose dolphins or the less frequently sighted humpback and spinner dolphins. In recognition of the exemplary contribution by the three primary schools, Shimoni, Wasini and Mkwiro, TUI AG donated nine laptop computers and two generators for the schools, which will greatly aid accessing educational materials and information and also link up with other schools on the internet.

In the intervening period, an awareness day was launched in Shimoni, Mombasa and Watamu and also during the Marine Environment Day when more than 200 schoolchildren from various schools performed and presented the message on the threats to dolphins to the Kenyan public and appealed for dolphin protection and safeguarding the seas. In retaining the message more than 50 schools received the YoD dolphin manual presented by UNEP/CMS and informative posters on bottlenose, Indo-Pacific humpback, pantropical spotted and spinner dolphins found in our coastal waters.

The outcome of the efforts is measured by the results that for the first time in Kenya a code of conduct was developed that set the guidelines for marine wildlife watching activities. The tour operators responded by pledging a dollar for every tourist booked on dolphin watch trips towards the dolphin "Kitty" fund that was established to ensure continuity of the awareness campaign.

Informed and aware of the ramifications, the Shimoni tourism stakeholders and local community were garnered into taking action against a long-liner that crossed over illegally into protected waters and the vessel's fishing lines were cut by members of the local community. A simultaneous response by boat operators on venturing out to sea to inspect the fishing implements, cut out a 20 metre-long fishing net and thus freed an entangled humpback whale, a species that seasonally visits the Shimoni channel. The 15 boat operators in Shimoni, all of who encouraged the tourists to swim with dolphins, withdrew from this practice and conformed to the prescribed code of conduct, which is now read out to the tourists before starting the dolphin watch excursion. The response from the local community and the Kenya Association of Tour Operators Coast testifies to a willingness to help protect the dolphins and reflects the capacity and resolve by the citizenry to protect the sea and the marine life on which they depend.

The YoD Kenya coordinators, in collaboration with UNEP/CMS and other entities, will pursue the efforts in raising awareness in the Kenyan coastal community and strive to provide opportunities for sustainable practices.

Education of Shimoni schools

Local elders' education

Educational workshops

Computer training for schools

Kenya Wildlife Marine Wardens receiving code of conduct

Sand drawing by schools

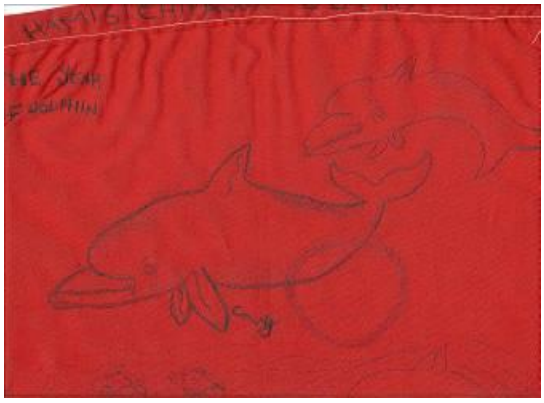
Dolphin sculpture made by a student

Schools performing on Marine Environment Day

Beach clean up by schools

Schools receiving YoD manual during launch

Dolphin mosaic display by schools



Dolphin drawing by schools

Year of the Dolphin in Kenya

Year of the dolphin sculpture

Photos © Abdulaziz Abdalla

Sustainable whale-watching tourism

Regulation of whale-watching tourism in Spain: Rules to ensure an adequate protection of cetaceans

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In 2007 Royal Decree no. 1727 was published which established rules for the protection of cetaceans, with the purpose of regulating the increasing activity of whale-watching tourism that exists in Spain. The most innovative aspect of this regulation is the creation of a concept referred to as 'Espacio móvil de protección de cetáceos' (Mobile Space for the Protection of Cetaceans) a space which is automatically created around a cetacean or a group of cetaceans within which a number of rules of conduct must be observed as to mitigate disturbance.

The Mobile Space for Protection of Cetaceans (EMPC), is defined as the space of which its perimeter forms the surface of an imaginary cylinder with a 500m radius which envelopes the marine and air space that extends 500m up in the air and down to 60m depth in the submarine space, centred around a cetacean or a group of cetaceans (see Figure 1). Within this space, five zones are distinguished, depending on their distance to the animals:

1. *Exclusion Zone*, with a radius not less than 60m, measured at the water surface around the cetacean or group of cetaceans. No vessel or swimmer may enter this area.
2. *Zone of Restricted Access*, which covers

the water surface that lies between the Exclusion Zone (60m) and the border of the Zone of Closing (300m).

3. *Zone of Closing,* which covers the water surface that lies between 300m of the border of the Zone of Restricted Access and 500m of the external contour of the Mobile Space for Protection of Cetaceans.

4. *Aerial Zone*, which comprises the air space vertically up to 500m and horizontally within the 500m radius of the imaginary cylinder measured from the cetacean or group of cetaceans.

5. *Submarine Zone*, which comprises the submarine space within the 500m radius of the imaginary cylinder horizontally, from the cetacean or group of cetaceans, and extends 60m deep below the latter.

Within the EMPC the following general rules for their protection must be observed:

1. Any conduct that may cause death, injury, disturbance or restlessness in cetaceans must be avoided.

2. It is considered that the following actions may damage, molest or disturb cetaceans:

a) Any physical contact between vessels or persons and the cetacean or group of cetaceans.

b) Feeding the animals, throwing food, bottles, garbage or any other object, be it a solid or liquid substance that may be detrimental to the cetaceans.

c) Impeding the free movement of cetaceans, intercepting their trajectory, cutting off their movement or moving through a group of cetaceans at whatever moment and direction.

d) Separating or dispersing a group of cetaceans and especially going between an adult and its calf.

e) Producing noise and loud or strident sounds in an attempt to attract them or scare them away, including emitting any sound underwater.

f) Swimming or diving in the Exclusion Zone.

The approach to the cetaceans must be gentle while converging with the animals' course and direction of swimming at an approximate 30° angle, i.e. never head-on, straight from behind or perpendicular to their course. During the observation of the cetaceans navigation must be maintained in a parallel trajectory, without abrupt changes in course or speed.

- The vessels that simultaneously approach the same cetacean or group of cetaceans should co-ordinate by radio their approach and manoeuvres in such a way that the impact on the animals remains minimal.
- When the engine is shut off or started up, it should be kept in neutral or disengaged from transmission during a period of time, at least one minute. All changes in speed or revolutions of the engine must always be applied progressively and slowly.
- One should never backtrack except in an emergency situation or to prevent a collision with another vessel or with a cetacean.
- It is prohibited to navigate in a circle around a cetacean or a group of cetaceans.

Moreover, some specific rules of conduct are established for each of the zones of the Mobile Space:

In the Exclusion Zone

- It is prohibited to enter or dwell in this zone except in cases of emergency or urgent need, that is, only for strict motives concerning the security and health of persons.
- If the cetaceans are closing in or emerge unexpectedly at less than 60m from a vessel, one must switch the engine to neutral or disengage and reduce to low revolutions or, if necessary, one should stop.
- In cases where the animals that close in on the vessel are dolphins or porpoises, it is allowed to continue navigating, maintaining the same speed and course.
- Any sonar and depth sounder must be switched off.

In the Zone of Restricted Access

- It is prohibited to enter this zone if there are isolated adult cetaceans with calves or isolated calves.
- In this zone a maximum of two vessels are permitted simultaneously.

In the Zone of Closing

- In this zone a maximum of two vessels can wait to enter the Zone of Restricted Access if this is already occupied by vessels and until these leave the area. To that purpose all vessels must be in permanent radio contact as to co-ordinate their maneuvers.

In the Aerial Zone

- It is prohibited to enter at all times.

In the Submarine Zone

- It is prohibited to enter at all times.

In short, we may conclude that Spain has a new legal instrument unique in Europe which, without doubt, will contribute to the conservation of a group of species that play a key role in the functioning of marine ecosystems and which are increasingly valued by society as a whole.

Figure 1. Graphic scheme of the Mobile Space for Protection of Cetaceans

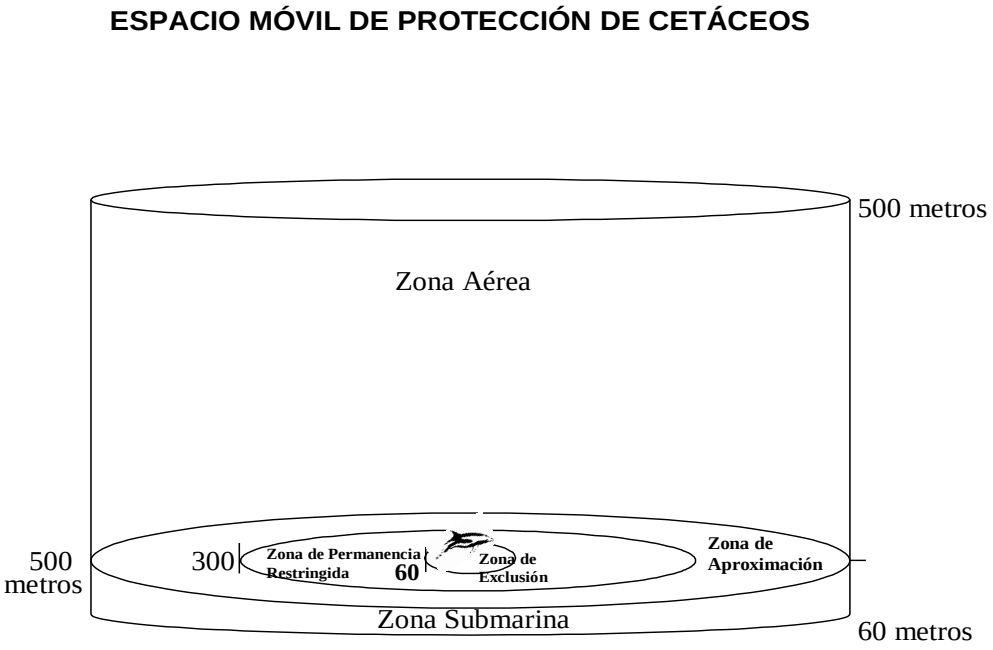
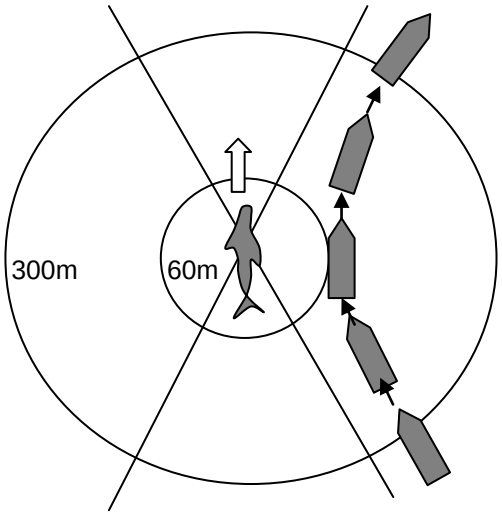


Figure 2. The correct way for a vessel to get closer to cetaceans



Building the ground for whale watching management: Lessons from a „best practice“ perspective at La Gomera, Canary Islands

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This presentation summarizes the activities of the project *MEER La Gomera*, which aims at studying cetaceans within the context of whale watching so as to develop sustainable ways to observe cetaceans in the wild. The project is hosted by *M.E.E.R. e.V.*, an NGO based in Berlin and on La Gomera, Canary Islands.

In waters off La Gomera (17°15'W - 17°21'W and 28°1'N - 28°14'N), 21 cetacean species have been identified so far (Ritter, 2001, see Table 1). Relative to the size of the study area, this constitutes the highest cetacean species diversity in Europe. Small former Canarian fishing boats are used for whale watching trips, which are conducted year-round. These trips take several thousand tourists out to sea every year, so whale watching tourism is still relatively modest in volume compared e.g. to neighbouring Tenerife. In 1995, co-operation with a local operator was started.

There exist several efforts to educate the public about the biology of whales and dolphins and the need to protect them. The project *MEER La Gomera* produced several multilingual materials including brochures, DVDs and a trilingual website. Moreover, lectures are given, both in the Canaries and in Germany. Weekly information evenings are conducted year-round, and special events such as concerts and clean-up-the-ocean trips are organized on La Gomera. Additionally, public courses in behavioural biology are conducted. These two-week

courses are organized twice a year and have turned out to be a very effective way to transfer detailed knowledge about cetaceans to students and members of the general public.

Co-operation exists with several local, national and international organizations, universities and authorities. Research findings are regularly presented to the Scientific Committee of the International Whaling Commission (IWC). Besides the joint venture with the whale watching operator, partnerships with local travel agencies and institutions have been initiated. The project's website contains background information specifically designed for tour operators and travel agencies. The project has won the international environmental award in "Tourism & Environment" in 2001.

Through the use of regular whale watching boats as platforms of opportunity, scientific studies have been conducted and hosted. The central aspects of the research are a) year-round collection of sighting data and b) behavioural research of the interactions of cetaceans with whale watching boats. Moreover, several additional research efforts are being implemented, amongst others, photo-identification, land-based observations (Smit *et al*., 2003), tourist surveys and socio-economic studies. Through the partnership with high schools and universities several Masters and Diploma theses were hosted. As early as 1995 a permanent sighting scheme was created. Since then, data on species identity, group size, geographical position, presence of calves and juveniles, duration of the sighting, and other parameters were collected during each whale watching trip. Meanwhile, the sighting database has grown to encompass more than 5,000 entries.

Relative abundance data show that common bottlenose dolphins (*Tursiops truncatus*), Atlantic spotted dolphins (*Stenella frontalis*), short-finned pilot whales (*Globicephala macrorhynchus*) and rough-toothed dolphins (*Steno bredanensis*) make up about 75% of all sightings (Ritter, 2003). Photo-ID efforts confirmed that these species are resident or semi-resident off La Gomera (Mayr and Ritter, 2005). Distribution maps were elaborated for each species and group size, distance to coast, water depth, and other parameters were statistically analysed.

Thanks to this ongoing work, La Gomera's waters have become one of the most intensely studied areas within the Canarian archipelago. It was concluded that the collection of sighting data on board regular whale watching trips is a most cost-effective way to contribute to the understanding of cetacean biology.

Behavioural research has gained insights into the life of some rare species, such as dense-beaked whales (*Mesoplodon densirostris*) and rough-toothed dolphins (Ritter and Brederlau, 1999; Ritter, 2002, 2007). The interactions between cetaceans and whale watching boats are one main focus. Several behaviours were defined as "interactive" or "boat-related"; examples include bowriding behaviour, approaches initiated by the animals or the accommodation of the animals' swimming speed or direction to the boats. In a second step, each sighting is classified into one of four sighting categories related to the occurrence and frequency of boat-related behaviours: avoidance, no response, proximity and interaction (Ritter, 2003).

By assessing boat-related behaviours and categorizing cetacean sightings, it was found that different species react in significantly different ways to the presence of whale watching boats. Significant differences within species also were found, i.e. cetaceans differ in their responsiveness according to their behavioural state. Behaviourally characterizing different species makes it possible to design rules which deal with their peculiarities. In this way, the research is directly applicable to the manage-

ment of whale watching.

To summarize, it became clear from our studies that the behaviour of cetaceans around whale watching boats is compellingly dynamic. By adapting the design of our study to the context of whale watching we were able to show that operators can play a central role in the collection of information for the study of whales and dolphins and thus contribute to the conservation of the natural resource they utilize, both in an ecological and economic sense.

MEER La Gomera therefore advocates:

- The integration of scientific research and public education into whale watching activities from the very beginning of its development. More specifically, it is recommended to use whale watching boat as platforms of opportunity
- The setting up of a system to systematically document cetacean sightings, evidence which can be interpreted by scientists
- Integration of eloquent education to reach and teach tourists and locals
- Starting a co-operation with local, regional or international NGOs and tourism planners
- Talking to authorities at an early stage of whale watching development
- Seeking partnerships with scientists and scientific institutions
- Studying the responsive behaviours of cetaceans.

References

(Abstracts/PDF versions available at: http://m-e-e-r.org/index.php?id=166&L=2)

Mayr, I. & Ritter, F. (2005). Photo-Identification of rough-toothed dolphins off La Gomera with new Insight into Social Organisation. Proceedings Annual Conference of the ECS, La Rochelle, France, April 2005.

Ritter, F. & Brederlau, B. (1999). Abundance, Distribution and Behaviour of Dense Beaked Whales (*Mesoplodon densirostris*) off La Gomera (Canary Islands) and their Interactions with Humans. *Aquatic Mammals*, 25.2:55-61.

Ritter, F. (2001). Twenty-one Cetacean Species off La Gomera (Canary Islands): Possible Reasons for an extraordinary Species Diversity. Proceedings Annual Conference of the ECS, 5-7 May 2001, Rome, Italy.

Ritter, F. (2002). Behavioural Observations of Rough-toothed dolphins (*Steno bredanensis*) off La Gomera (Canary Islands) with a special Reference to their Interactions with Humans. *Aquatic Mammals* 28.1:46-59.

Ritter, F. (2003). *Interactions of Cetaceans with Whale Watching Boats – Implications for the Management of Whale Watching Tourism*. M.E.E.R. e.V., Berlin, Germany, 91pp. Available from the author.

Ritter, F. (2007). Behavioral responses of rough-toothed dolphins to a dead new-born calf. *Marine Mammal Science* 23(2):429-433.

Smit, V., Ritter, F. & Neumann, K. (2003). Feasibility study: Land-based observations of cetaceans off La Gomera. Proceedings Annual Conference of the ECS, Gran Canaria, Spain, 2003.

Table 1: Cetacean species sighted off La Gomera (Canary Islands) 1995-2007

A. Toothed whales:

(1) Common bottlenose dolphin (*Tursiops truncatus*)

(2) Rough-toothed dolphin (*Steno bredanensis*)

(3) Atlantic spotted dolphin (*Stenella frontalis*)

(4) Striped dolphin (*Stenella coeruleoalba*)

(5) Short-snouted common dolphin (*Delphinus delphis*)

(6) Fraser's dolphin (*Lagenodelphis hosei*)

(7) Risso's dolphin (*Grampus griseus*)

(8) Short-finned pilot whale (*Globicephala macrorhynchus*)

(9) Orca (*Orcinus orca*)

(10) False killer whale (*Pseudorca crassidens*)

(11) Dense-beaked whale (*Mesoplodon densirostris*)

(12) Cuvier's beaked whale (*Ziphius cavirostris*)

(13) Northern bottlenose whale (*Hyperoodon ampullatus*)

(14) Sperm whale (*Physeter macrocephalus*)

(15) Pygmy sperm whale (*Kogia breviceps*)

B. Baleen whales:

(16) Fin whale (*Balaenoptera physalus*)

(17) Sei whale (*Balaenoptera borealis*)

(18) Bryde's whale (*Balaenoptera brydei*)

(19) Humpback whale (*Megaptera novaeangliae*)

(20) Blue whale (*Balaenoptera musculus*)

(21) *Northern right whale (Eubalaena glacialis)*

Whale and Dolphin Conservation Society (WDCS): "Our role in sustainable whale-watching"

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The over-arching organizational objectives of WDCS are to reduce and eliminate continuing threats to cetaceans and their habitats and to raise awareness of cetaceans and educate people about the need to address the continuing threats to their welfare and survival. WDCS is dedicated to the conservation and welfare of all species of whale, dolphin and porpoise and by supporting conservation and research projects around the world, is making a daily difference to the long-term security of cetaceans and local communities. Ideally whale-watching should be an example of eco-tourism at its best. To achieve this it must benefit local communities, be environmentally sustainable, have conservation value and educate and inspire visitors. WDCS promotes and supports only well-managed and sustainable whale-watching.

Responsible whale-watching guidelines include:

1. Approach dolphins from the side using a converging approach.
2. Maintain a steady course and slow speed during encounters.
3. Limit time spent with the animals, especially groups with young calves.
4. Always be aware of and sensitive to the animals' movements.
5. Do not pursue or try to re-encounter dolphins if they move away.
6. Do not allow anyone to touch, feed or swim with the dolphins.
7. Dispose of rubbish, waste oil and fuel using appropriate facilities onshore.

Some of the many benefits of whale-watching are that it is an alternative to captivity and

hunting; has significant economic benefits for local communities; is a platform for changing attitudes and behaviour and for marine research. Responsible whale-watching educates and inspires.

So does whale-watching really do *what it says on the tin*? Unfortunately, much whale-watching is less educational, conservation-orientated and scientifically useful than it should be. Too many boats, bad boating practice or both, as well as a lack of guidance can lead to a degraded visitor experience and negative impacts (immediate, short-term and long-term) on the animals concerned. In many areas whale-watching is failing to fulfil its promise as an important conservation tool. To help change this, and to ensure that whale-watching is beneficial for both the animals and the participants, WDCS is engaged in a variety of activities. These include:

- Providing training workshops for operators and onboard naturalists;
- Providing educational resources for whale-watchers;
- Campaigning for national/regional regulations;
- Developing a "code of conduct" for interactions with cetaceans;
- Supporting local management initiatives (e.g. Dolphin Space Programme (DSP), Scotland and DolphinSMART, USA);
- Lobbying and assisting in drawing up or revising regulations;
- Promoting land-based whale-watching;
- Encouraging further research into the impact of whale-watching; and
- Provision of a whale-watching website with information on responsible whale-watching around the world.

An example of the work that WDCS is engaged in can be seen in the Moray Firth, Scotland where we co-ordinate the Dolphin Space Programme (DSP) Accreditation Scheme in partnership with the statutory nature conservation agency, Scottish Natural Heritage (SNH).

The DSP is a co-operative approach to sustainable wildlife tourism launched in June 1995. Its aim is to encourage dolphin watchers in the Moray Firth to *"watch how they watch"* and to respect the dolphins need for space.

The population of common bottlenose dolphins (*Tursiops truncatus*) inhabiting the Moray Firth, northeast Scotland, are the most northerly inshore population of bottlenose dolphins in the world. Coastal species are particularly vulnerable to human activities and despite their protected status, with an estimated population size of approximately 130 individuals, this small isolated population is no exception and is vulnerable to extinction. Some of the threats they face include: pollution, offshore and coastal development, interactions with fisheries, prey depletion and disturbance by vessels. Northeast Scotland is one of the best areas in the UK for watching dolphins, whales and porpoises and cetacean watching from both boats and land is very important to the local communities.

The DSP aims to achieve "space for dolphins" through the following complementary objectives:

- Reducing the potential impact of cetacean-watching boats on the status, distribution or behaviour of the Moray Firth bottlenose dolphins;
- Raising awareness and encouraging conservation of marine wildlife through high quality training, education and interpretation;
- Encouraging collaboration between wildlife tour operators, management agencies, conservation organizations, members of the public and other water users, including recreational boats and shore-based wildlife watchers; and
- Encouraging the long-term viability of responsible wildlife tourism in the Moray Firth.

Boat operators who join the DSP follow its "code of conduct" and are encouraged to provide educational materials to their partici-

pants and to take part in on-going research. They take part in DSP training days, meetings and workshops and have marketing materials consistent with DSP aims. In return the DSP offers promotion and marketing benefits, free educational and interpretive materials, training for operators on non-threatening/responsible boat-handling and tour guide training; interpretive, guiding, communication and customer service skills. Guides can help ensure the provision of an educational and inspiring adventure and they can also conduct research on the animals encountered, helping towards their conservation in the long term. This additional investment in the community is likely to have conservation, education and financial benefits. With the DSP in place, WDCS is investigating how effective this programme really is at minimizing disturbance to the animals by conducting appropriate impact studies.

Figure 1. Map of the Moray Firth, Scotland

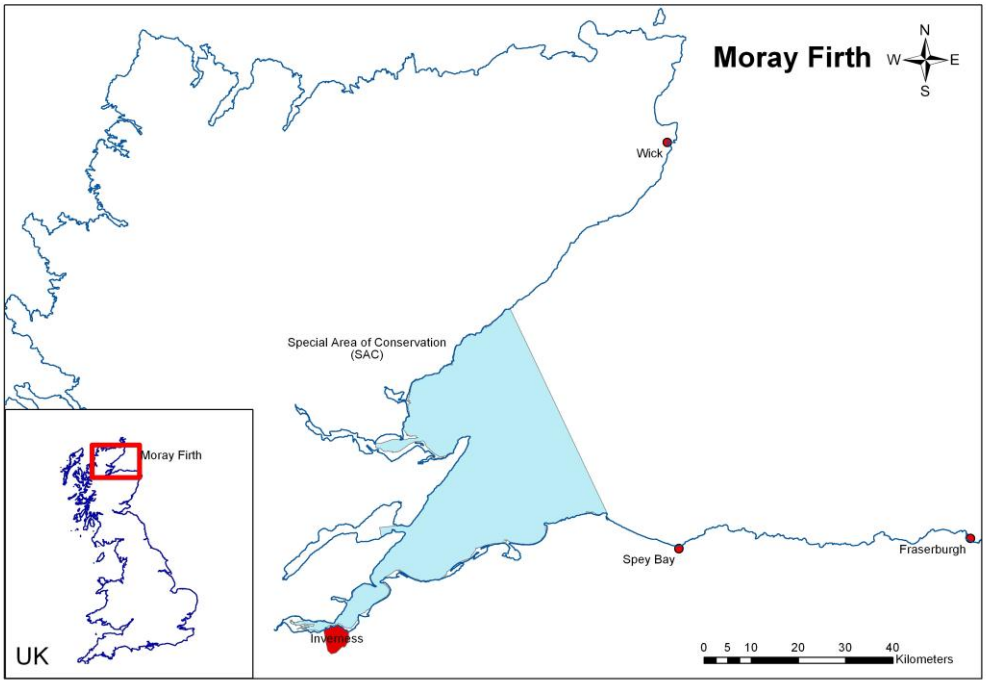

Figure 2. WDCS supports the Dolphin Space Programme

Photos © WDCS/Charlie Phillips

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