Annex L

Report of the Sub-Committee on Small Cetaceans

Members: Fortuna (Chair), Amaral, Bamy, Bejder, Bjørge, Brito, Brockington, Brownell, Campbell, Cañadas, Carvalho, Castellote, Cerchio, Chilvers, Choi, Cipriano, Collins, Cozzi, Davies, de Stephanis, Deimer-Schüette, Donoghue, Edwards, Flores, Fossi, Frasier, Funahashi, Gallego, Hammond, Hoelzel, Holm, Hughes, Iñíguez, Jaramillo-Legorreta, Kasuya, Kock, Lang, Larsen, Lauriano, Lens, Liebschner, Lovell, Lusseau, Marcondes, Moore, Muller, Nelson, Ofori-Danson, Palacios, Palka, Panigada, Parsons, Perrin, Podestá, Reeves, Ridoux, Ritter, Roel, Rojas-Bracho, Rosenbaum, Rowles, Simmonds, Solarin, Stachowitsch, Stephane, Štrbenac, Suydam, Taylor, Tchibozo, Tiedemann, Urbán, Vazquez, Vély, Weller, Werner, Williams, Ylitalo, Young, Zerbini.

1. OPENING REMARKS

Fortuna welcomed participants to the meeting noting that, given its location, the priority topic for the sub-committee this year was the review of the status of small cetaceans of northwestern African and eastern tropical Atlantic waters (Fig. 1 and Table 1).

2. ELECTION OF CHAIR

Fortuna was elected Chair.

3. ADOPTION OF AGENDA

The adopted Agenda is given in Appendix 1.

4. APPOINTMENT OF RAPPORTEURS

Reeves acted as main rapporteur, supported by Amaral.

5. REVIEW OF AVAILABLE DOCUMENTS

Documents available for the work of the sub-committee were: SC/62/SM1-12; SC/62/WW4; SC/62/BC6 (only small cetaceans); National Progress Reports; Weir (2006; 2007; 2008; 2009; 2010); Smit *et al.* (2010); Picanço *et al.* (2009); Bamy *et al.* (2010); Van Waerebeek *et al.* (2008a; 2004); Murphy *et al.* (1997); Richard *et al.* (2010); Fertl *et al.* (2003); Flores (2008); Santos *et al.* (2009); Tavares *et al.* (2010); and De Boer (2010a; 2010b).

6. REVIEW OF THE STATUS OF SMALL CETACEANS OF NORTHWESTERN AFRICA AND THE EASTERN TROPICAL ATLANTIC

The West Africa region encompasses 16 countries distributed over an area of approximately 5 million km^2, including the coastlines of Morocco, Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea and Sierra Leone. Further south, the oceanic border of the Gulf of Guinea extends from Cape Palmas in Liberia to Cape Lopez in Gabon (Anon., 1953) and includes the coastlines of 11 countries from Côte d'Ivoire south to Angola and two offshore island states, St Helena (UK) and the Democratic Republic of São Tomé and Príncipe (Weir, 2010). This region features a wide variety of habitat types, from rocky cliffs, broad sandy beaches and extensive seagrass beds in the north, to dense mangrove forests and large deltas and estuaries further south. Coral reefs and powerful coastal upwellings of cold water characterise the Canary and Benguela current systems (Anon., 2008).

The Eastern Tropical Atlantic (ETA) and sub-tropical regions are characterised by complex oceanographic and topographic features. There are a number of oceanographic provinces, encompassing contrasting ecosystems, such as upwelling regions and oligotrophic subtropical gyres. The ETA is the wider province. The ETA extends from Cap Vert peninsula (Dakar, Senegal) south to the Cunene River (southern Angola) and includes the tropical offshore islands. The Benguela Current, which originates in the central Atlantic and Indian Oceans, brings cold, nutrient-rich water northwards along the coasts of Namibia and South Africa (Hardman-Mountford *et al.*, 2003).

Weir and Van Waerebeek both prepared documents for this meeting and are authors/co-authors of many relevant published papers but were unable to attend the meeting, so their contributions were summarised by other participants. The sub-committee was pleased to have the benefit of participation by scientists from Nigeria (Solarin), Ghana (Ofori-Danson) and Benin (Tchibozo). Unfortunately Segniagbeto (Togo) and Uwagbae (Nigeria) were not able to attend, but they did send information on the occurrence of cetaceans in Togo and Nigeria.

Weir (2010) reviewed cetacean occurrence (sightings, strandings, direct captures, bycatch) in West African waters from the Gulf of Guinea to Angola based mainly on the published literature, providing an update of the 1997 review by Jefferson *et al*. (1997). At least 21 odontocetes (including at least 17 delphinids) have been documented in the study region. A warm temperate and tropical deep-water cetacean community dominates the area. Cooler water from the Benguela Current influences southern Angola (16°S latitude). Angola, with 21 confirmed species, appears to have the most diverse cetacean community in the region. Only three or fewer species have been confirmed in the waters of Togo, Nigeria, Cameroon and the Democratic Republic of Congo. Seventeen or more species have been documented in Ghana, Gabon and Angola, where dedicated cetacean research projects have been initiated in recent years. Common bottlenose dolphins and Atlantic spotted dolphins have been recorded in more than half of the countries. Weir (2010) stressed that West Africa's cetacean fauna faces a number of threats including bycatch and direct capture for human utilisation (e.g. in Ghana and Togo) as well as potential effects of oil and gas development on them and their habitats.

SC/62/SM9 reviewed recent information on humpback dolphins in Gabon and Republic of Congo. Between Port Gentil, Gabon and the Congo border with Cabinda (Angola) the coast is exposed and generally uniform with a few minor capes and embayments providing shelter from prevailing south-westerly swells. Large inshore lagoon systems are prominent and these typically open to the sea via narrow and dynamic tidal inlets that occasionally close. The lagoon systems include mangrove and seasonally flooded swamp

forests and provide excellent nursery habitat for fishes and crustaceans. Gabon and Congo have large and diverse national park systems that include protected coastal habitat. Four of these parks have a marine component, including the exclusively marine Mayumba National Park and the Conkouati-Douli National Park (CDNP) in Congo.

Dedicated small boat surveys for humpback dolphins were completed between 2004 and 2006 in the environs of Libreville and Mayumba National Park. These were always of short duration (a few days) and conducted using a variety of small boats. Initial efforts focused on areas considered favourable for humpback dolphins based on published reports. A dual focus beach survey design facilitated both fisheries and dolphin-specific sightings data to be collected. Observers walked predefined sections of the shore and made dedicated searches approximately every 500m from the highest available point (typically the beach crest or backshore) using the naked eye and binoculars. They also searched whilst walking between stations. Observers focused on the area from the beach to approximately 500m offshore and recorded any marine mammals sighted. The boat surveys covered over 5,000km but only yielded five sightings of *Sousa*. A sighting of 30-40 individuals was made on 16 November 2003 near Petit Loango, Gabon. Beach surveys from March to December 2009 resulted in a total of 136 hours of dedicated search effort, of which 16 hours were spent watching dolphins. A total of 38 humpback dolphin sightings were reported during the nine month survey period (total individuals=408, average=13, median=10, maximum=35). Sighting rates, when compared to boat-based work, were much higher and included an apparent peak in sighting rates during July and August. Large groups were also observed from shore. All sightings made during this work were within 1km of shore and, thus, the animals would be at least nominally protected by either the coastal fisheries buffer exclusion zone or the national park rules. The degree to which the species is afforded protection within these areas, however, remains uncertain. Given the low human population densities and the extent of relatively undisturbed habitat in Gabon and northern Congo, this region may represent a stronghold for the species. The relatively high sighting rate is encouraging, as are occasional sightings of large groups. However, bycatch and evidence of dolphins in the bushmeat trade give cause for concern, particularly as the demand for fish in cities increases. Review of the available control post logbooks for bushmeat at CDNP revealed four separate incidents of dolphin bushmeat seizures. Since the meat was smoked in each case, the species identification and precise provenance of each item could not be reliably ascertained.

However, the beach observation team found four bottlenose dolphin carcasses and one Atlantic humpback dolphin carcass. The latter had been captured at the coastal fishing village of Paris and was seen being butchered and distributed amongst fishermen for consumption almost as soon as it was landed.

The sub-committee commended the authors for their efforts in the Gabon-Congo area and **recommended** that research, monitoring and conservation efforts for humpback dolphins along the coast of Gabon and Congo continue.

SC/62/SM12 presented a general overview of fisheries in Nigeria and some information on confirmed presence of cetacean species there. Cetaceans occur throughout Nigerian coastal waters in the Gulf of Guinea, but there has been little directed cetacean research and much of what is known comes from opportunistic observations by marine mammal observers aboard fishing vessels. The rich and diverse marine fish and shellfish populations in Nigerian coastal waters show signs of over-exploitation out to depths of about 50m where trawl fisheries are concentrated. Manatees (*Trichechus senegalensis*) and sea turtles are intensively exploited by artisanal fishermen. The manatees are taken in gillnets and trigger traps and the sea turtles in gillnets or while on the beach during nesting. The industrial shrimp trawl nets are fitted with turtle excluder devices, which according to Solarin, prevent the capture of turtles, large fish and cetaceans. Uncontrolled trawling operations contribute to habitat degradation. Also the high volume of solid waste and debris in trawl nets towed at depths of up to 100m signifies the indiscriminate dumping of non-biodegradable nylon and plastic products and household items. Governments are installing some facilities to encourage the recycling of domestic waste, especially pure water sachets.

Solarin stated that it would be desirable to have a multipurpose fisheries and oceanographic vessel for research in both the territorial and high seas. International and regional collaboration should be encouraged for resource surveys. A uniform regime of enforcement is needed in the region and this would be more achievable if compatible vessel monitoring systems were in place. Solarin emphasised that poaching should be curbed and that illegal, unregulated and unreported fishing practices should be deterred. An ultimate goal of fisheries management, according to Solarin, should be to achieve an ecosystem approach with participation by all stakeholders.

Solarin also drew the sub-committee's attention to a recent publication on bycatch of protected species carried out in the framework of a large-scale series of interview surveys in 2007 and 2008 in fishing communities from seven countries: Sierra Leone, Cameroon, Nigeria, Tanzania, Comoros, Malaysia and Jamaica (Moore *et al.*, 2010). During the interviews in Nigeria, no reported records on cetacean bycatch were obtained, whereas considerable information was obtained on bycatch of manatees and sea turtles. It was acknowledged that a zero bycatch rate in Nigeria was not credible, given that interview-based information from Nigerian fishermen obtained outside of the study indicated that cetacean bycatch does occur.

The sub-committee noted that the interview coverage in Nigeria was extremely low (only 648 fishermen were interviewed out of more than 700,000 existing full-time fishermen in the country).

Moore *et al.* (2010) provided information on reported cetacean bycatch in Sierra Leone (the unconfirmed list of species included *Sousa teuszii, Stenella* sp. *Tursiops truncatus, Steno bredanensis, Delphinus* sp. *Globicephala* sp. *Kogia* sp.) and Cameroon (species not identified).

SC/62/SM1 reported on an interview survey carried out in Nigeria among artisanal fishermen from Brass Island, Niger Delta, in 2008-09. This survey revealed, for the first time, regular takes of delphinids in Nigerian coastal waters. Three fishermen at Imbikiri, Brass Island, were identified as dedicated 'dolphin hunters'. One intentional catch of a bottlenose dolphin (*T. truncatus*) was documented. Average catch per dolphin hunting trip was reported as 25 adults, once every 12 weeks, with a dolphin selling for an equivalent of EUR 150-300. Under such a regime, a hunter could take more than a hundred dolphins each year. Most of the meat is used for human consumption. Boats are locally-manufactured open, wooden canoes powered by outboard engines. SC/62/SM1 concluded that considering the widespread consumption of bushmeat in West Africa, including cetaceans or so-called

Table 1

Occurrence of small cetacean species in the priority region.

	Cetacean species (see codes below)																									
Country name (north to south)	1 *Pp*	2 *Pc*	3 *Fa*	4 *Oo*	5 *G me*	6 *G ma*	7 G sp	8 *Pe*	9 *Gg*	10 *Sb*	11 *St*	12 *Tt*	13 *Sa*	14 *Sf*	15 *Sl*	16 *Scl*	17 *Sc*	18 *Lh*	19 *Dd*	20 *Dc*	21 D sp	22 *Ks*	23 *Kb*	24 *Zc*	25 *Me*	Human utilisation^
Morocco	Y	Y	-	Y[7]	Y	Y[7]	-	-	Y	-	Y[7]	Y[7]	-	-	-	-	Y[7]	-	Y	-	Y	-	-	Y	Y[10]	
Canary Islands	Y[10]	Y[2]	-	Y[2]	Y[10]	Y[22]	-	-	Y[10]	Y[22]	-	Y[22]	-	Y[22]	Y[10]	-	Y[7]	Y[10]	Y[22]	-	-	Y[10]	Y[10]	Y[10]	Y[10]	
Mauritania	Y[8]	-	-	Y[8]	-	Y[8]	-	Y[8]	Y[8]	S	Y[8]	Y[8]	-	Y[9]	Y	Y[6, 8]	Y[8]	-	Y	Y	Y[8]	Y[8]	Y[8]	Y[8]	Y[8]	Yes[5, 13]
Cape Verde	-	Y[3]	-	Y	-	Y[3]	-	Y[3]	Y	Y[3]	-	Y	S	S[4]	Y	-	-	-	-	-	Y	-	-	Y	-	Yes[31]
Senegal	Y[11]	-	Y[11]	Y[11]	-	Y[11]	-	Y[11]	-	Y[11]	Y[11]	Y[11]	S[11]	S[11]	Y[11]	Y[6]	Y[11]	-	Y[11]	Y[11]	-	Y[11]	Y[11]	-	-	Yes[5, 13]
The Gambia	-	-	-	-	-	-	-	-	-	-	Y[12]	Y[12]	-	-	-	Y[12]	-	-	-	-	-	-	-	-	-	Yes[12, 13]
Guinea-Bissau	-	-	-	-	-	-	-	Y[3]	-	-	Y[5]	Y[13]	-	-	-	-	-	-	-	-	-	-	-	-	-	
Guinea-Conakry	-	-	Y[1]	-	-	Y[14]	-	-	-	Y[14]	Y[14]	Y[14]	S[14]	Y[14]	-	-	-	-	Y[14]	-	-	-	Y[14]	-	-	Yes[5, 13, 14]
Sierra Leone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liberia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ivory Coast	-	Y[19]	-	-	-	-	-	-	-	-	-	Y[13]	-	Y[4]	-	-	-	-	-	-	-	-	-	-	-	Yes[13]
Ghana	-	Y[19]	Y[27]	Y[27]	-	Y[27]	-	Y[27]	Y[27]	Y[27]	-	Y[27]	Y[27]	Y[27]	Y[27]	Y[27]	-	Y[27]	S[27]	S[27]	Y[27]	Y[27]	-	Y[27]	-	Yes[5, 27]
Togo	-	-	-	Y[28]	-	-	Y[28]	-	-	-	-	Y[13]	Y[28]	S[4]	-	-	-	-	-	-	Y[28]	-	-	-	-	Yes[28]
Benin	-	Y[15]	-	-	-	-	-	-	-	-	-	Y[15]	-	Y[15]	-	-	-	-	-	-	Y[15]	-	-	-	-	
Nigeria	-	-	-	-	-	Y[24]	-	-	-	-	S[5]	Y[30]	U[5]	S[4]	-	S[5]	-	U[19]	Y[23]	-	-	S[5]	-	-	-	Yes[30]
São Tomé/Principe	-	-	-	Y[25]	-	-	Y[25]	-	-	-	-	Y[25]	Y[25]	Y[4]	-	-	-	-	-	-	-	-	-	-	-	
Cameroon	-	-	-	Y[18]	-	-	-	-	-	-	Y[29]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Equatorial Guinea	-	-	-	-	-	-	-	-	-	-	S[5]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gabon	-	Y[16]	-	Y[18]	-	Y[23]	-	-	-	-	Y[29]	-	Y[16]	Y[16]	-	-	-	-	Y[16]	-	-	-	-	-	-	Yes[13]
Rep. of Congo	-	-	-	-	-	-	-	-	-	-	Y[29]	-	-	-	-	Y[20]	-	-	-	-	-	-	-	-	-	Yes[29]
Cabinde	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dem. Rep. of Congo		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
St Helena	-	-	-	-	-	-	-	-	-	-	-	-	-	Y[27]	-	-	-	-	-	-	-	-	-	-	-	
Angola	-	Y[19]	S[19]	Y[18]	-	-	Y[19]	Y[19]	Y[19]	Y[19]	Y[26]	Y[26]	Y[23]	Y[23]	-	Y[20]	Y[23]	Y[19]	-	-	Y[20]	Y[23]	-	Y[23]	-	Yes[26]

Species codes and numbering

1. Harbour porpoise (*Phocoena phocoena*); 2. False killer whale (*Pseudorca crassidens*); 3. Pygmy killer whale (*Feresa attenuata*); 4. Killer whale (*Orcinus orca*); 5. Long-finned pilot whale (*Globicephala melas*); 6. Short-finned pilot whale (*Globicephala macrorhynchus*); 7. *Globicephala* sp.; 8. Melon-headed whale (*Peponocephala electra*); 9. Risso's dolphin (*Grampus griseus*); 10. Rough-tooth dolphin (*Steno bredanensis*); 11. Atlantic humpback dolphin (*Sousa teuszii*); 12. Common bottlenose dolphin (*Tursiops truncatus*); 13. Pantropical spotted dolphin (*Stenella attenuata*); 14. Atlantic spotted dolphin (*Stenella frontalis*); 15. Spinner dolphin (*Stenella longirostris*); 16. Clymene dolphin (*Stenella clymene*); 17. Striped dolphin (*Stenella coeruleoalba*); 18. Fraser's dolphin (*Lagenodelphis hosei*); 19. Short-beaked common dolphin (*Delphinus delphis*); 20. Long-beaked common dolphin (*Delphinus capensis*); 21. *Delphinus* sp.; 22. Dwarf sperm whale (*Kogia simus*); 23. Pygmy sperm whale (*Kogia breviceps*); 24. Cuvier's beaked whale (*Ziphius cavirostris*); 25. Gervais' beaked whale (*Mesoplodon europaeus*).

Key for occurrence

Y=confirmed presence; S=suspected presence; U=unconfirmed presence. ^Confirmed cases of human consumption, marketing or directed take.

Sources of information

[1]Bamy, pers. comm.; [2]Ritter, pers comm.; [3]Van Waerebeek *et al*. (2008b); [4]Perrin (2002); [5]Van Waerebeek *et al*. (2004); [6]Fertl *et al*. (2003); [7]Notarbartolo di Sciara *et al*. (1998); [8]Robineau and Vély (1998); [9]Nieri *et al*. (1999); [10]Vidal *et al*. (2009); [11]Van Waerebeek *et al*. (1997); [12]Murphy *et al*. (1997); [13]Van Waerebeek *et al*. (2008a); [14]Bamy *et al*. (2009); [15]Tchibozo and Van Waerebeek (2007); [16]Van Waerebeek and De Smet (1996); [17]Picanço *et al*. (2009); [18]Weir *et al*. (2010); [19]Weir (2010); [20]Weir (2006); [21]Weir (2009); [22]Smit *et al*. (2010); [23]Weir (2008); [24]SC/62/SM12; [25]SC/62/SM8; [26]SC/62/SM6; [27]SC/62/SM10; [28]SC/62/SM11; [29]SC/62/SM9; [30]SC/62/SM1; [31]Brito, pers. comm.

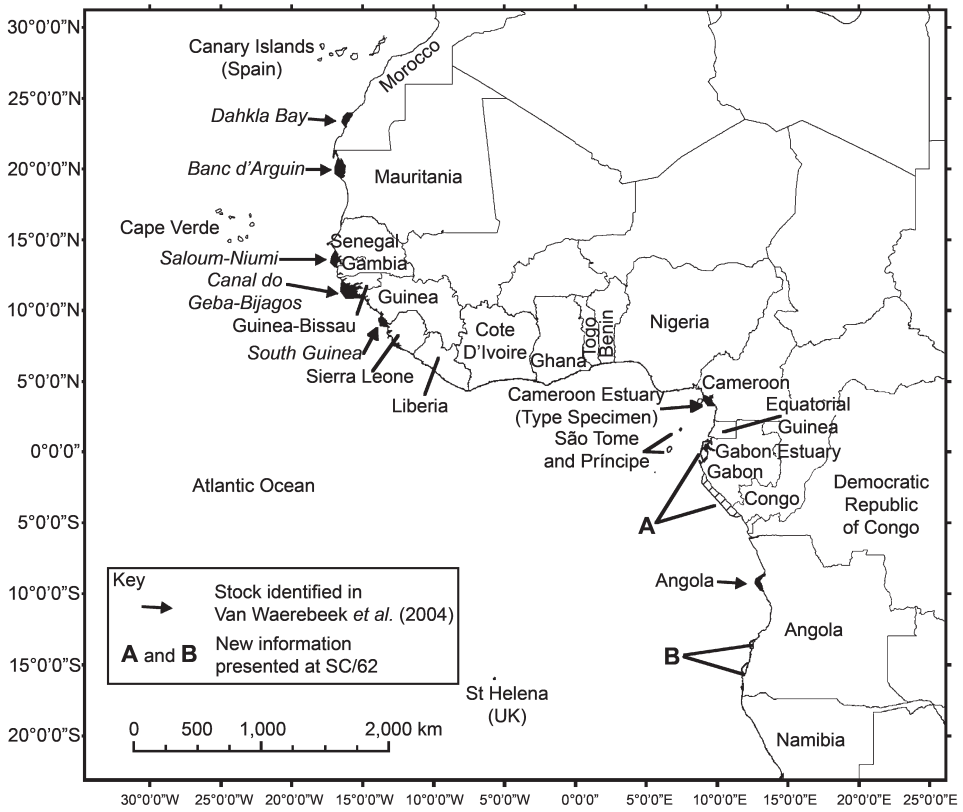

Fig. 1. Map of the northwestern and western African countries relevant to this review.
Key: A=information from SC/62/SM9; B=information from SC/62/SM6.

'marine bushmeat' (Clapham and van Waerebeek, 2007), and the regular catches of small cetaceans in nearby Ghana, e.g. see SC/62/SM10 and Van Waerebeek *et al.* (2008a) and Togo, there is no reason to think that small cetaceans are not also routinely exploited in Nigeria. The absence of monitoring may explain the lack of information. In this regard, Solarin pointed out that the Niger Delta region was only sparingly covered in the interview surveys reported by Moore *et al.* (2010) due to restiveness and militancy in the area.

SC/62/SM1 also reiterated the suggestion by Van Waerebeek *et al*. (2004) that Atlantic humpback dolphins (*S. teuszii*) inhabited the Niger Delta before large-scale oil exploration and extraction altered the coastal environment.

The sub-committee welcomed the new information in SC/62/SM1 and SC/62/SM12 and noted that Nigeria is one more country to add to the list of those in which directed hunts for small cetaceans have emerged over the last several decades, probably related to the growth of human population and decline of other available sources of food and income.

SC/62/SM10 summarised information on cetaceans of Ghana with emphasis on the capture of small cetaceans in artisanal fisheries, mainly using drift gillnets. Catches have been documented periodically from three fish landing ports (Axim, Dixcove and Apam), albeit on a limited scale, since 1995. Using photographs of 231 landed specimens (212 identifiable), 15 species have been identified. Video evidence recorded from a drilling platform in Ghana's Jubilee Field showed the capture of a small sperm whale by the crew of a large canoe and this adds the sperm whale as the 16th species documented as taken in artisanal fisheries, the great majority in gillnets and a few in set gillnets and purse-seines. The species most frequently bycaught are the Clymene dolphin (*S. clymene*; 24.5%), pantropical spotted dolphin (*S. attenuata*; 12.3%) and common bottlenose dolphin (*T. truncatus*; 12.3%). There is evidence of landings in other, unmonitored ports (e.g. two bottlenose dolphins at Jamestown in 1994, one Clymene dolphin at Winneba in 1998 and one Clymene dolphin at Ada-Foah in 2003), showing that catches recorded for the three monitored ports do not represent full accounting for the country.

Although aquatic mammals are on the first schedule of Ghana's 1971 Wildlife Conservation Regulations (Legal Instrument 685) and are protected by law, there are no explicit regulations concerning the use of cetaceans killed in nets. As a result, the use of dolphin meat as bait in shark fisheries and for human consumption is not considered illegal, which means that catch statistics can be obtained (i.e. catches are not concealed for fear of sanctions) and this makes it feasible to study trends and carry out biological studies based on carcass sampling protocols (e.g. morphology, growth and reproduction, feeding ecology, stock identification, genetics, parasitology, contaminant loads and pathology).

There was some discussion of the increasing trend suggested by the 1999-2010 catch series presented in SC/62/SM10. Specifically, there appears to have been an increase in the scale of landings beginning in 2002 or 2003. Ofori-Danson explained that although there had been some variability in monitoring effort through time, the impression is accurate that once the practice of catching and marketing cetacean products becomes established, it can escalate rapidly as implied in the existing catch series.

A question was raised concerning the statement in SC/62/SM10 that traditional taboos against catching dolphins were rapidly eroding in the Volta Delta region. Ofori-Danson explained that on the west coast this is not a taboo; whereas on the east coast it is and cetaceans traditionally have been returned to the sea or buried after traditional ceremonies. This seems to happen in some areas of Nigeria too. One important development is that the monetary value of a small cetacean is now roughly equivalent to that of a similar-sized large billfish. In fact, even more money can be earned by selling the cetacean carcass for shark bait; the export market in Asia for shark fins is lucrative and growing.

The sub-committee expressed appreciation to Ofori-Danson for bringing this information to the meeting and commended him and his colleagues in Ghana (with Van Waerebeek) for their efforts to document cetacean catches and use biological material to improve scientific understanding. It also noted that the evidently close cooperation with fisheries officials is especially encouraging.

Tchibozo summarised information on small cetaceans along the 124km coastline of Benin (Tchibozo and van Waerebeek, 2007). The presence of four species of small cetaceans has been confirmed: *Stenella frontalis*, *Tursiops truncatus*, *Pseudorca crassidens* and *Delphinus* sp. There have been no systematic studies on the distribution, abundance or ecology of small cetaceans in Benin. Although bycatch of cetaceans is known to occur in fisheries along the entire coast, a dedicated data collection programme is needed to quantify and characterise this. Small cetaceans are legally protected in Benin and the government has signed and ratified a number of international conservation agreements, including the CMS, IWRC and CBD.

Tchibozo emphasised the need for stronger regional collaboration among cetacean biologists, including joint research projects, and the need for training national fisheries observers in basic data recording protocols for cetacean sightings and catches. The fisheries department should collect such data as standard procedure.

SC/62/SM11 confirmed the presence of four small cetaceans in Togo's coastal waters: *Stenella attenuata*, *Delphinus* sp., *Globicephala cf. macrorhynchus* and *Orcinus orca*. There is no information concerning the abundance, natural history or ecology of small cetaceans in Togo. Cetaceans are legally protected and the government has signed and ratified a number of international conservation agreements, including the CMS, IWRC and CBD. The main potential threats are: (1) bycatch in fisheries, with the possibility that this has led or soon will lead to directed taking as has been observed elsewhere; and (2) severe chemical pollution due to mining phosphorites and discharge of phosphate-rich mud into coastal waters. There is a clear need for expanded field research on small cetaceans in Togo. It was suggested that a broad collaboration among the fisheries department, the wildlife department and Lomé University would enable pooling of resources and improve data collection. As in Benin, there is a need for training national fisheries observers in basic data recording protocols for cetacean sightings and catches and for the fisheries department to implement such data collection as standard procedure.

According to Bamy *et al*. (2010) four odontocete species are definitely known to occur along the 300km coastline of Guinea: *Tursiops truncatus*, *Sousa teuszii*, *Stenella frontalis* and *Kogia breviceps*. Three additional species have been reported and are probably present in Guinean waters, but there is insufficient evidence to confirm this unequivocally: *Globicephala macrorhynchus*, *Steno bredanensis* and *Delphinus* spp. This information comes mainly from observations during irregular, largely opportunistic surveys of fishing communities in 2001-03 by personnel from

Guinea's Centre National des Sciences Halieutiques de Boussoura (CNSHB). In 2001 the CNSHB embarked on an initial effort to collect basic field data, evaluate evidence from various sources and produce a first inventory of cetacean biodiversity. Although there was no evidence of substantial takes of small cetaceans, either directly or as bycatch (e.g. at the scale reported in Ghana), monitoring and reporting have been limited. There is evidence that bycaught small cetaceans and a stranded whale were used for human consumption. The authors expressed concern about even occasional catches of Atlantic humpback dolphins.

Guinean fisheries have developed rapidly in recent decades. In 1995 some 75,300MT of fish products were landed, and about 69% of those products came from artisanal fisheries involving some 2,300 canoes. In view of the intense fishing effort, it is likely that the handful of documented instances of cetacean bycatch is unrepresentative of the true scale of cetacean mortality. There are no trained observers, limited port surveillance and few incentives to report illegal landings. While there is no evidence for substantial dolphin landings, of the kind seen in Ghana for instance, better monitoring is needed. Fish, molluscs and other marine products may still largely satisfy local demand, but as soon as this changes, cetacean exploitation is likely to increase dramatically as it has in Ghana.

In discussion, Bamy cited the need for fishery observers stationed at ports and fish landing sites to report information on cetacean landings, bycatch and strandings as part of their normal duties (preferably with photographs as documentation). He emphasised that fishery officers should refrain from assessing fines or confiscating carcasses and instead carefully document the circumstances of takes, e.g. type of vessels and gear involved, utilisation (food, bait, medicine, etc.), destinations (local, hinterland, city market, movement across international border, etc.), processing (fresh, smoked, salted, etc.), levels of market demand and other factors that determine the dynamics of the 'marine bushmeat' trade (e.g. encompassing cetaceans, turtles and manatees).

During discussion, reference was made to the study by Brashares *et al*. (2004) on the relation between declining fish supplies in West African waters and the increase in hunting for 'bushmeat' and consequent declines in wildlife populations. This concept was extended by Clapham and Van Waerebeek (2007), who stated:

> '…often overlooked is the fact that such terrestrial hunting is either preceded or coincident with increased exploitation of marine wildlife. With the introduction of virtually indestructible nylon fishing nets in the 1960s, incidental catches of cetaceans, sea turtles and other marine fauna rose exponentially worldwide; while initially discarded by fishermen in some nations [including several in West Africa], these animals were subsequently sold as by-catch, then ultimately became the targets of directed hunting as fish landings plummeted'.

SC/62/SM8 elaborated on a recently published paper on small cetaceans off São Tomé and Príncipe (Picanço *et al.*, 2009). The waters surrounding this archipelago in the Gulf of Guinea are inhabited by at least four species of small cetaceans, of which the common bottlenose dolphin and pantropical spotted dolphin are most numerous. During a pilot study conducted between July 2002 and September 2006, bottlenose dolphins were observed all along the coast whereas spotted dolphins were seen mainly in the deeper waters to the northeast of São Tomé. Bottlenose dolphins had the highest sighting rate and spotted dolphins had the greatest abundance. Killer whales were observed on six occasions and pilot whales (species uncertain) once (in a mixed group with bottlenose dolphins). The authors of SC/62/SM8 expressed concern about the potential for direct and incidental catches, for disturbance by unregulated dolphin-watching tourism and for ecosystem degradation from the expanding offshore oil industry in the Gulf of Guinea. This paper also corrected a misidentification of *Globicephala melas* contained in Picanço *et al*. (2009), which more correctly should be listed as *Globicephala* sp.

Brito and Carvalho brought to the sub-committee's attention the fact that several species of small cetaceans were hunted historically in the Cape Verde Islands using hand harpoons. Also, in spite of protective legislation (species are not specified), cetaceans are still captured occasionally and their meat is sold and consumed (Hazevoet and Wenzel, 2000; Reiner *et al.*, 1996). There is some evidence that bones and skulls from small cetaceans (locally named as 'blackfish') are used in local handicrafts.

Vély informed the sub-committee on cetacean occurrence in Mauritania, including stranded animals, between 1987-93. This work was carried out on a voluntary basis when he was based at the Centre National d'Etudes et de Recherches Veterinaires (CNERV) in Nouakchott. Dedicated surveys were conducted from platforms of opportunity in two main areas, one along the Mauritanian beach between the southern border with Senegal and the village of Nouamghar at the northern entrance of the National Park of Banc d'Arguin (PNBA) and the other the entire PNBA. From 1993-95 the European Development Fund project 'Biodiversité du littoral mauritanian' implemented more dedicated and in-depth surveys of marine mammals in the two areas. Daniel Robineau (Grande plage) and Vély (PNBA) were involved as experts. Species observed at sea were *Tursiops truncatus, Sousa teuszii* and *Orcinus orca*. Stranded specimens included *Phocoena phocoena, Stenella clymene, Delphinus* sp.*, Grampus griseus, Peponocephala electra, Globicephala macrorhynchus, Kogia breviceps, Kogia sima, Ziphius cavirostris* and *Mesoplodon europaeus.*

Smit *et al*. (2010) summarised current information on the presence and distribution of small cetaceans off the coast of La Gomera (Canary Islands), where numerous cetacean species can be sighted. From 1995 until 2007, cetaceans were monitored year round from whalewatching vessels. A total of 5,739 cetacean sightings of 21 species were made. The five most abundant species (87% of sightings) were common bottlenose dolphins (*T. truncatus*), short-finned pilot whales (*G. macrorhynchus*), Atlantic spotted dolphins (*S. frontalis*), short-beaked common dolphins (*D. delphis*) and rough-toothed dolphins (*S. bredanensis*). Distance to coast, depth and sea bottom slope showed significant inter-species differences. None of the most abundant species occurred exclusively alone. It appears that habitat selection by a given species is driven by a specific set of habitat characteristics together with the presence/absence of other cetacean species. Some of the species combinations were observed regularly, e.g. bottlenose dolphins with pilot whales. However the tendency of one species to mingle with another was variable; some species were generally not seen around other cetaceans.

6.1 Harbour porpoise (*Phocoena phocoena*)

No information was presented at this meeting on taxonomy, population structure, abundance, life history and ecology, including habitat and related issues, directed and incidental takes for this species.

This species has been reported to occur in Morocco, Mauritania (Vély) and Senegal (Van Waerebeek *et al.*, 1997). Cadenat (1957) listed Guinea as a range state but did

so on the basis of an unsubstantiated sighting by the crew of a tuna boat operating at latitude *ca* 08°30'N, off northern Sierra Leone. Bamy *et al*. (2010) rejected this record as unsubstantiated, noting that waters south and east of Senegal, bathed by the Guinea Current, are almost certainly too warm for this temperate-zone species.

The IUCN Red list status of the species is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.2 Rough-toothed dolphin (*Steno bredanensis*)

No information was presented at this meeting on taxonomy, population structure, abundance and incidental takes for this species. The species occurs in Côte d'Ivoire, Ghana, Gabon, Angola, Guinea and St Helena. See SC/62/SM10; Bamy *et al*. (2010); De Boer (2010a; 2010b) and Weir (2010).

Rough-toothed dolphins inhabit shelf-edge and deep oceanic waters. Sightings occurred in water depths of 402 to over 4,000m off Ghana, Gabon and Angola, as noted in SC/62/SM10, De Boer (2010a; 2010b) and Weir (2010), but close to shore off the island of St. Helena. Usually they are seen in groups of more than 20 animals although a pod of 40 was observed off Ghana. They are gregarious species, associating with bottlenose dolphins off Gabon and St Helena and with short-finned pilot whales off Angola and Gabon (De Boer, 2010a; Weir, 2010). An anomalously white rough-toothed dolphin was recorded off Gabon (De Boer, 2010b). In Ghana 6.1% of total landings are represented by this species (including a mixture of bycatch and direct catch) (SC/62/SM10), and three specimens were captured in Côte d'Ivoire (Weir, 2010).

The IUCN Red list status of the species is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.3 Atlantic humpback dolphin (*Sousa teuszii*)

Van Waerebeek *et al*. (2004) reviewed the state of knowledge on *S. teuszii* following the 2002 meeting of this sub-committee where the genus *Sousa* had been the priority topic but where discussions more centred on the animals in the Indo-Pacific (IWC, 2003).

Van Waerebeek *et al*. (2004) proposed eight provisional management stocks based on the fragmentary information available at the time of their study. Six of these stocks were confirmed as extant based on recent records: Dakhla Bay (Western Sahara), Banc d'Arguin (Mauritania), Saloum-Niumi (Senegal, Gambia), Canal do Gêba-Bijagos (Guinea-Bissau), South Guinea and Angola. The other two (Cameroon Estuary and Gabon) were considered historical. Those authors also noted the 'potential existence' of a western Togo stock. They concluded that there were nine confirmed range states: Morocco (including Western Sahara), Mauritania, Senegal, The Gambia, Guinea-Bissau, Guinea-Conakry, Cameroon, Gabon and Angola (Fig. 1).

6.3.1 Taxonomy and population structure

Taxonomy of the genus *Sousa* remains largely unresolved. Although three putative or nominal species have been widely discussed (*S. chinensis*, *S. plumbea* and *S. teuszii*), the IWC presently recognises only two, the Atlantic species *S. teuszii* and a geographically widespread Indo-Pacific species *S. chinensis*. Although there is general agreement on the validity of *S. teuszii*, e.g. on the basis of cranial characteristics, tooth counts and external features (Jefferson and Van Waerebeek, 2004), there has not been resolution on the number of species and their systematic relationships throughout the rest of the range of the genus *Sousa*.

Rosenbaum updated the sub-committee of the ongoing collaborative study to resolve these questions within the genus Sousa using nearly 300 samples from the major populations throughout their range from strandings, bycatch and biopsy. A multiple lines of evidence and combined analysis approach is nearing completion, which will provide the most definitive and comprehensive analysis and includes multiples sources of morphological and molecular datasets. Rosenbaum estimated that by the end of 2010, there should be a manuscript completed and submitted for peer-reviewed publication. Until the acceptance of this publication, the number of species should remain unchanged.

Rosenbaum also indicated that analysis of the few existing samples indicated that mtDNA variation was very low. Collins indicated that there are other samples throughout the region, but some facilitation of collection and exporting samples is needed. These few samples would be very useful for taxonomy questions for *Sousa* and the population variation in *S. teuszii*. Rosenbaum confirmed that if samples could be shipped soon, they could be included in these analyses.

The sub-committee **recommended** that efforts be made to provide any samples from *S. teuszii* as soon as possible so that they can be included in the ongoing efforts described above which are essential for resolving species questions in the genus *Sousa* and population variation questions for *S. teuszii*.

Bamy *et al*. (2010) considered the degree of distributional continuity and gene flow between the provisionally defined 'South Guinea stock' and other provisionally defined stocks (Van Waerebeek *et al.*, 2004) to be uncertain. As in Guinea-Bissau, most of Guinea's coastline has features suitable as humpback dolphin habitat: warm and shallow waters on a shelf extending up to 200km from shore, with extensive mangrove creeks around four main river mouths. The lack of sighting records must be partly due to the small amount of near-shore survey effort.

6.3.2 Abundance and distribution

The Atlantic humpback dolphin is endemic to the eastern Atlantic, limited to tropical and subtropical waters very near shore from Western Sahara in the north to Angola in the south (Van Waerebeek *et al.*, 2004). The distribution is patchy and limited to particular stretches of coastline separated by gaps of absence or very low density (Van Waerebeek *et al.*, 2004). In many cases it is unclear whether the absence of records from an area means the species naturally does not occur there, if it has been extirpated in the area, or if search effort and reporting have been insufficient (Van Waerebeek *et al.*, 2004).

S. teuszii was observed regularly between 1987 and 1995 in the channels of Banc d'Arguin and in the open waters of the Baie St Jean and the Baie d'Arguin. Strandings were common (Van Waerebeek *et al.*, 2004) within the PNBA. Some have been found on the beach south of Nouamghar (vicinity of the southern border of the PNBA). But only one has been found south of Nouakchott (about 200km south of the PNBA).

Weir (2009) investigated the distribution and behaviour of *S. teuszii* off Flamingos, southern Angola, during summer and winter 2008 using boat- and shore-based surveys. In all, 71 *S. teuszii* sightings were recorded, ranging from one to eight animals.

Although the species is thought to be widely distributed in Guinea, the only documented specimen was landed by artisanal fishermen at Dixinn, Baie de Sangaréah, in 2002 (Bamy *et al.*, 2010). No other recent sightings are known,

but Cadenat (1956) stated that humpback dolphins were present in the 'silt-laden inshore waters' south of Conakry and Cadenat (1959) considered them 'very common' in Guinea. Fishermen interviewed in the Baie de Sangaréah in April 2006 described dolphins matching the diagnostic features of humpback dolphins as 'occasionally entangled in their nets' and a Dutch ornithologist sighted two humpback dolphins near Iles Tristao during a seabird survey in 2009, so the species is certainly still present in Guinean waters.

6.3.3 Life history and ecology, including habitat

The typical habitat of *S. teuszii* has been described conventionally as shallow coastal waters, especially estuaries, mangrove systems and sheltered bays (Van Waerebeek *et al.*, 2004).

Vély informed the sub-committee that in Mauritania groups of up to 10 humpback dolphins have been observed between Nouamghar and Regueiba (Baie St Jean). Dolphins were seen to feed regularly on mullet (*Mugil* sp.). The Imragen apparently have been fishing mullet for many years as these fish migrate along the coast to and from Senegal. This fishing was traditionally carried out with the 'help' of bottlenose dolphins and sometimes humpback dolphins associated with the bottlenose dolphin pods. The Imragen used to produce a very profitable product with dried mullet eggs called *poutargue* which was sold abroad. Since the late 1990s this product has been exploited on a more industrial basis, leading to a decline in the mullet migration into the PNBA. Vély suggested that it would be interesting to explore whether and how changes in the fishery have affected the local ecology and in turn the local population of humpback dolphins in the PNBA.

The *S. teuszii* off Flamingos (southern Angola) inhabited shallow, nearshore waters throughout the region, with the exception of southern areas adjacent to fishing villages. Small bays, sheltered waters behind reef-breaks and areas off dry river mouths were used for foraging/feeding behaviour, whereas most travelling occurred along exposed coast (Weir, 2009). In the area off Flamingos 10 individuals were photo-identified. Multiple resightings (and absence of unmarked animals) indicate that all individuals present at the time of the surveys were photo-captured, exhibited high site fidelity and had occurred year-round. Association indices of 0.77-1.0 indicated strong social affiliation between eight individuals, particularly in winter (Weir, 2009).

Collins pointed out that in Gabon and Congo and elsewhere in the southern range of the species, humpback dolphins are regularly observed on open coastlines that do not conform to their traditionally recognised habitat preference. Therefore, effort should not be limited to traditionally recognised areas.

The loss and fragmentation of habitat due to expanding coastal communities, coastal development, dredging, trawling, deforestation, mangrove destruction, pollution, eutrophication and oil spills also threaten this species. The species' preference for shallow, nearshore and estuarine habitat would render it particularly vulnerable to ubiquitous inshore set gillnets, beach seines and other anthropogenic disturbances. Alternatively, a natural distribution gap may exist off Ghana/Togo related to periodical cool upwelling. Evidence from Benin and Brass Island, Niger Delta, shows that inshore bottlenose dolphins are present in the Bight of Benin (SC/62/SM10).

The reliance of humpback dolphins on restricted nearshore waters in Namibe Province renders them especially vulnerable to habitat degradation, a threat that has also been identified for Atlantic humpback dolphins in Senegal (Van Waerebeek *et al.*, 2004). In Angola (SC/62/SM6), habitat degradation may result particularly from expanding coastal fishing communities, trawling, harbour construction and expansion (the Namibe Province study area is located between two major Angolan fishing ports and shipyards; Tombwa, located 5km to the south and Namibe, located 13km to the north), and offshore industry (e.g. construction of liquid natural gas plants, pipelines and coastal terminals).

6.3.4 Directed takes

SC/62/SM6 stated that specific accounts of directed takes of Atlantic humpback dolphins are scarce, but they are believed to occur with some regularity (Van Waerebeek and Perrin, 2007).

6.3.5 Incidental takes

Incidental capture in fishing gear is the main source of anthropogenic mortality for small cetaceans worldwide (Reeves *et al.*, 2003), including humpback dolphins in West Africa (Van Waerebeek *et al.*, 2004; Tim Collins, pers. comm.). One documented specimen, a 222cm male, was landed by artisanal fishermen in Guinea (Dixinn, Baie de Sangaréah) in 2002 (Bamy *et al.*, 2010). One Atlantic humpback dolphin was taken alive in a beach seine in Senegal (Van Waerebeek *et al.*, 2004). This species has been consistently absent from port surveillance records in Ghana (SC/62/SM10).

6.3.6 Conclusions and consideration of status

The sub-committee **agreed** that there was ample evidence for serious concern about the conservation status of this species (see SC/62/SM6, SC/62/SM9, SC/62/SM10). Although quantitative data or even good qualitative data (e.g. confirmation of species presence or absence) are lacking for much of the known or suspected range, the information available from areas where cetaceans have been consistently studied (e.g. Ghana and Guinea) indicates that the overall population is fragmented, bycatch (if not also directed catch) is occurring, and habitat conditions are deteriorating. Populations in Gabon and northern Congo appear healthy, but recently documented bycatches in Congo may be indicative of a growing reliance on non-fish marine wildlife, including dolphins.

The IUCN Red list status of the Atlantic humpback dolphin is Vulnerable.

Weir (2009) emphasised that the species occurs only in small numbers off Flamingos (Angola) and exhibits high site fidelity to a relatively small stretch of nearshore habitat, making it vulnerable to local extirpation.

Several members of the sub-committee noted that public awareness is lacking and needs to be a focus of conservation efforts. Also, any conservation initiative needs to be accompanied by consideration for social and economic circumstances. It was also noted that there are links between fishing intensity in West African coastal waters and the demand for fish and shellfish products in European markets. Therefore, the scope of conservation initiatives may need to extend beyond the local conditions and concerns.

Attention was drawn to the fact that humpback dolphins (*S. chinensis*) persist, although under serious threat, in parts of eastern Asia (e.g. Taiwan, Hong Kong) despite an incredible amount of habitat loss and modification of their habitat.

6.4 Risso's dolphin (*Grampus griseus*)

No information was presented at this meeting on taxonomy, population structure, abundance or directed takes for this species.

This species is considered relatively common along the entire West African coast. It is currently present in Ghana (SC/62/SM10), off Côte d'Ivoire, Gabón and Angola (De Boer, 2010a; Weir, 2007; 2010). An encounter rate of 0.02 animals/100min was recorded off northern Angola (2007) and 0.12 animals/100km off Gabon (De Boer, 2010a).

This species seems regularly present year-round in deep waters at least off Angola (mean depth=1,770m, SD=374.9) and there is a sighting record on the Gabon shelf at 225m (Weir, 2007; 2010). Group sizes are ≤ 15 animals (mean=8.3, SD=3.9) (Weir, 2007; 2010).

Ten specimens, positively identified through photographs, were bycaught in the artisanal fishing ports of Dixcove, Axim and Apam in Ghana since 1999. This represents the 4.7% of total landings (including a mixture of bycatch and direct catch (SC/62/SM10). Most captured cetaceans of all species are used either for human consumption or as shark bait (SC/62/SM10).

The IUCN Red list status of the species is Least Concern. Given the scarcity of information, the sub-committee was not in the position to evaluate status in the region.

6.5 Common bottlenose dolphin (*Tursiops truncatus*)

6.5.1 Taxonomy and population structure

Population structure and genetics have not been studied, however cranial morphology suggests that the West Africa bottlenose dolphins differ from North Sea dolphins (Van Waerebeek *et al.*, 2008a). A bycaught 340cm adult female landed in fresh condition at Bonfi, 200km northwest of Conakry, was the first documented bottlenose dolphin record for Guinea (Bamy *et al.*, 2010). Bottlenose dolphins in West Africa attain great body length, up to 368cm in Senegal. The hypothesis of a Mauritania/Senegal population linked to the NW African upwelling zone and characterised by a long rostrum and a relatively smaller neurocranium (Robineau and Vely, 1997) deserves further study. Bamy *et al*. (2010) considered that the Bonfi specimen could indicate that such a form has a wider distribution off western Africa than previously recognised.

Van Waerebeek *et al*. (2008a) noted that inshore bottlenose dolphins were targets of a live-capture fishery in the Gambia (past), Senegal (recent) and Guinea-Bissau (confirmed in the past).

6.5.2 Abundance and distribution

The species was confirmed for Côte d'Ivoire, Ghana, Benin Nigeria, Guinea, Guinea Bissau, Gambia, Gabon, Angola and St Helena (coastal and in an estuary). It also occurs in São Tomé Island (São Tomé and Príncipe) (SC/62/SM8) with a sighting per unit of effort (SPUE) of 0.065 (sightings/60min), and abundance per unit of effort (APUE) of 0.074 (individuals/60min). It also occurs in Gabon with a relative abundance of 0.65 individuals/100km (De Boer, 2010a) and in Angola with a relative abundance of 0.051 (individuals/100min) (Weir, 2010).

6.5.3 Life history and ecology, including habitat

The common bottlenose dolphin is widely distributed, both temporally and spatially along São Tomé Island (São Tomé and Príncipe), mostly at depths from 20 to 100m and at a wide range of sea surface temperatures (SSTs) (SC/62/SM8). Suggestion of year-round presence in both coastal and deep offshore waters off Gabon, at mean depths of 1,760m and mean SST of 27.5°C (De Boer, 2010a). Distributed off Angola all year round and occurring at mean depths of 1,187m and mean group size of 14.9 (Weir, 2010). Off Guinea-Bissau, the group sizes of inshore bottlenose dolphins are small and number of individuals has been decreasing (Van Waerebeek *et al.*, 2008a).

6.5.4 Directed takes

Direct takes occur in Nigeria (SC/62/SM1). In the past they were documented in Guinea Bissau, the Gambia, Senegal (Van Waerebeek *et al.*, 2008a) and Togo (SC/62/SM11). A small-scale live-capture operation took place in Senegal in 2003 and all five captured animals died (Van Waerebeek *et al.*, 2008a).

6.5.5 Incidental takes

This species represents 12.3% of total cetacean landings in Ghana (including a mixture of bycatch and direct catch (SC/62/SM10). There is evidence of bycatch in Guinea (Bamy *et al.*, 2010) and it is likely that incidental takes occur in Nigeria, Guinea-Bissau, São Tomé and Príncipe and Gambia.

6.5.6 Conclusions and consideration of status

The IUCN Red list status of the species is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.6 Atlantic spotted dolphin (*Stenella frontalis*) and pantropical spotted dolphin (*Stenella attenuata*)

6.6.1 Taxonomy and population structure

No information was presented at this meeting on taxonomy and population structure of Atlantic spotted dolphin (*Stenella frontalis*) or pantropical spotted dolphin (*Stenella attenuata*).

6.6.2 Abundance and distribution

The Atlantic spotted dolphin was confirmed in Mauritania, Senegal, Côte d'Ivoire, Ghana, Benin, Equatorial Guinea, Guinea and Cape Verde and Canary Islands; not known for Nigeria and São Tomé and Príncipe; see SC/62/SM8 and Weir (2007; 2010). It occurs off Gabon with relative abundance of 1.00 individuals/100km (De Boer, 2010a). It also occurs off Angola with relative abundance of 1.46 individuals/100min. It possibly is also occurring in St Helena (Weir, 2007).

The pantropical spotted dolphin was confirmed for Ghana, Togo, Angola and St Helena in SC/62/SM10, SC/62/SM11 and Weir (2010). It is the most abundant small cetacean with wide temporal and spatial distribution along São Tomé Island (no information exists for Príncipe Island, São Tomé and Príncipe), with a SPUE of 0.024 (sightings/60min) and an APUE of 0.389 (individuals/60min) (SC/62/SM8). It occurs off Gabon with a relative abundance of 1.46 individuals/100km (De Boer, 2010a). Not known for Nigeria, but possibly occurring.

6.6.3 Life history and ecology, including habitat

The Atlantic spotted dolphin occurs off Gabon at mean depths of 1,988m and mean SST of 21.5°C (de Boer 2010a). It also occurs off Angola all year round and at mean depths of 1,633m and with mean group sizes of 103.9 individuals (Weir, 2007; 2010).

Pantropical spotted dolphins were encountered in large groups, mostly at depths between 1,000-2,000m and SST of 26°-27°C off São Tomé Island (no information exists for Príncipe Island, São Tomé and Príncipe) (SC/62/SM8). This species also occurs off Gabon, at mean depths of 516m and mean SST of 21.5°C (De Boer, 2010a); off Angola at mean depths of 1,900m and with mean school sizes of 85 individuals (Weir, 2007; 2010).

6.6.4 Directed takes
No information was available on direct takes of these two species.

6.6.5 Incidental takes
Atlantic spotted dolphins are 0.5% of total landings in Ghana (including a mixture of bycatch and direct catch) (SC/62/SM10); possibly in St Helena (Weir, 2010).

Pantropical spotted dolphins are 13.2% of total cetacean landings in Ghana (including a mixture of bycatch and direct catch) (SC/62/SM10). There is also bycatch in Gabon and St Helena (Weir, 2010).

6.6.6 Conclusions and consideration of status
The IUCN Red list status of the Atlantic spotted dolphin is Data Deficient and of the pantropical spotted dolphins is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status of these species in the region.

6.7 Spinner dolphin (*Stenella longirostris*)
No information was presented at this meeting on taxonomy, population structure, abundance, life history and ecology, including habitat and related issues for this species.

The spinner dolphin is reported to occur in Ghana, Côte d'Ivoire, Angola and St Helena (SC/62/SM10; Weir (2010)) with sightings of groups of 20-200 animals in water depths exceeding 3,500m.

In Ghana, spinner dolphins represent 2.8% of total cetacean landings (including a mixture of bycatch and direct catch) (SC/62/SM10).

The IUCN Red list status of the species is Data Deficient. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.8 Clymene dolphin (*Stenella clymene*)
Fertl *et al*. (2003) reviewed the distribution of the Clymene dolphin, (*Stenella clymene*), with emphasis on the South and mid-Atlantic waters, where the range of the species was not well documented. This review also focused on clarifying the literature because confusion surrounding the identifying characteristics of this species has contributed to a general lack of knowledge of this species. Published and unpublished records were compiled and species identification was verified based on: (1) photographs or a detailed description of the animals including diagnostic features; and (2) identifications made by trained observers familiar with Clymene dolphins and examination of voucher material deposited in institutions (e.g. museum collections). A total of 195 records (109 sightings, 67 strandings and 19 captures) were compiled. Relatively small information was available for the eastern Atlantic (only 12 records). In this region, Clymene dolphins were observed in Mauritania (1 stranding), Senegal (5 strandings and 2 captures), Ghana (1 stranding, 1 sighting and 1 capture) and Ascension Island (1 capture). The northernmost record of the species in the eastern Atlantic was in Mauritania (~19°N) and the southernmost record in Ascension Island (St Helena) (3°40'S).

6.8.1 Taxonomy and population structure
No information was provided at this meeting on taxonomy and population structure for this species.

6.8.2 Abundance and distribution
This species has only recently been described to regularly occur in the eastern tropical Atlantic (Weir, 2006). Its occurrence is confirmed for Mauritania, Ghana, Congo, Angola and Gambia in SC/62/SM10 (De Boer, 2010a; Fertl *et al.*, 2003; Murphy *et al.*, 1997; Weir, 2006; 2007; 2010).

6.8.3 Life history and ecology, including habitat
Sightings have occurred over water depths from 466 to >5,000m, indicating a shelf-edge and oceanic occurrence. It is considered to be the most common cetacean off Ghana, based on bycatch records. The species appears to be gregarious, with the four at-sea sightings comprising groups of 12, 50, 250 and 1,000 animals. There is also record of mixed-species school with common dolphins (SC/62/SM10; Weir, 2007; 2010) and with spinner dolphins (Fertl *et al*., 2003).

6.8.4 Directed takes
Fertl *et al*. (2003) reported the evidence of 2 captures in Senegal, 1 in Ghana and 1 in the Ascension Island (St Helena).

6.8.5 Incidental takes
Commonly landed in Ghana as a result of bycatch, with 24.5% of total landings. The species is also caught in tuna purse seine fisheries within the Gulf of Guinea (SC/62/SM10; Weir, 2010).

6.8.6 Conclusions and consideration of status
The IUCN Red list status of the species is Data Deficient. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region. However, the sub-committee **expressed serious concern** about the ongoing observed bycatch of this species in Ghana.

6.9 Short-beaked common dolphin (*Delphinus delphis*) and long-beaked common dolphin (*Delphinus capensis*)
6.9.1 Taxonomy and population structure
Although both short-beaked and long-beaked common dolphins have been reported to occur in West Africa, the taxonomy of the genus is still uncertain in the area (Weir, 2010). Therefore, it is preferable to refer them only to *Delphinus* sp. whilst describing them as short- or long-beaked according to the classification originally made by the author of the given reports.

Amaral drew attention to her ongoing study of the global systematics of the genus and stressed the importance of obtaining specimens from West Africa. Ofori-Danson indicated that numerous skulls were available from Ghana. Amaral confirmed that both tissues and photographic images would be useful.

6.9.2 Abundance and distribution
Both long-beaked and short-beaked common dolphins occur in Côte d'Ivoire, Ghana, Gabon and Angola (Weir, 2010). In Benin a common dolphin has been recorded and in Congo only long-beaked common dolphins have been recorded (SC/62/SM10) (Weir, 2010). Common dolphins have also been recorded to occur in Togo (SC/62/SM11) and Nigeria (SC/62/SM12). Both forms appear to be sympatric throughout West Africa. In Angola it has been suggested that the long-beaked is more coastal and the short-beaked occurs in more offshore waters, corresponding to the habitat partitioning described to occur in the northeast Pacific (Heyning and Perrin, 1994; Weir, 2010). Off Gabon, common dolphins were seen in deep oceanic waters (>2,400m) (De Boer, 2010a). Reported group sizes vary from one to 500 individuals. Sightings and specimen records indicate a year round occurrence of common dolphins in West Africa.

6.9.3 Life history and ecology, including habitat
The SST in coastal waters of Nigeria where common dolphins have been reported varies between 25 and 34.5°C (SC/62/SM12).

6.9.4 Directed takes
The long-beaked form is one of the regular species caught in Ghana, representing 9.4% of total landings of cetaceans in artisanal fisheries (including a mixture of bycatch and direct catch) (SC/62/SM10).

6.9.5 Incidental takes
Bycatch of common dolphins has been reported for Ghana (SC/62/SM10) and for the Gulf of Guinea (Weir, 2010).

6.9.6 Conclusions and consideration of status
The IUCN Red list status of the long-beaked common dolphin is Data Deficient and of the short-beaked common dolphin is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.10 Striped dolphin (*Stenella coeruleoalba*)
No information was presented at this meeting on taxonomy, population structure, directed and incidental takes for this species.

A stranding in Côte d'Ivoire is the only verified record for northern Gulf of Guinea (Weir, 2010). A few sightings were reported off Angola (Weir, 2010) and a stranding was reported in southern Gabon in 2008 (Collins, pers. comm.). Encounter rate of 0.16 animals/100min off northern Angola (Weir, 2007). All sightings were recorded in deep waters of more than 1,500m (mean=1,785m, SD=229.2). Group sizes range from 8-200 animals (mean=59, SD=62.9). It is suspected to inhabit waters off Angola all year round (Weir, 2007; 2010).

The IUCN Red list status of the species is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.11 Fraser's dolphin (*Lagenodelphis hosei*)
No information was presented at this meeting on taxonomy, population structure, abundance and directed takes for this species.

This species occurs in Ghana, Angola, Nigeria and in the Gulf of Guinea (SC/62/SM10; Weir, 2010). Weir *et al*. (2008) reviewed the existent records of Fraser's dolphin from the Gulf of Guinea and Angola. There is only one record of this species for the Atlantic side of the African mainland, which is a skull found on the beach of Sangomar Island, Senegal, in 1997 (Van Waerebeek *et al.*, 2000). Within the Gulf of Guinea, records are limited to two bycaught specimens in Ghana. Fraser's dolphins represent <2% of total cetacean landings in Ghana (including a mixture of bycatch and direct catch (SC/62/SM10). For Angola, two at-sea sightings have been recorded (Weir *et al.*, 2008). All new sightings occurred in over 1,000m water depth and comprised 60-150 animals. This species is expected to occur all year round (Weir, 2010; Weir *et al.*, 2008). Off Nigeria a pod of 150 animals was observed and the animals were around 2.5m long. Off Angola sightings occurred in water temperatures of 25°C (Weir *et al.*, 2008).

The IUCN Red list status of the species is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.12 Melon-headed whale (*Peponocephala electra*)
No information was presented at this meeting on taxonomy, population structure and incidental takes for this species.

The melon-headed whale has been reported to occur in Ghana, Gabon and Angola (SC/62/SM10; Weir, 2010). Off Angola sightings report groups of 100-300 animals, at water depths of 1,330-2,265m (Weir, 2010). Off Gabon, melon-headed whales have been sighted in deep waters (de Boer, 2010a). This species represents 10.4% of total cetacean landings in Ghana (including a mixture of bycatch and direct catch) (SC/62/SM10).

The current IUCN status for the melon-headed whale is Least Concern. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.13 Pygmy killer whale (*Feresa attenuata*)
No information was presented at this meeting on taxonomy, population structure, abundance, life history and directed takes for this species. The only available information is that the species is rarely landed as bycatch in Ghana (representing 0.5% of total cetacean landings; SC/62/SM10).

The IUCN Red list status of the species is Data Deficient. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.14 False killer whale (*Pseudorca crassidens*)
No information was presented at this meeting on taxonomy, population structure, abundance, life history and ecology, including habitat and directed takes.

This species has been reported to occur in Côte d'Ivoire, Ghana, Benin, Gabon (Collins mentioned that he has four biopsies from here) and Angola (Weir, 2010). It is considered resident in Angola, with sightings of groups of up to 35 animals and in water depths of over 1,400m with highest relative abundance occurring at depths of 2,000-2,500m (Weir, 2007; 2010). This species is rarely landed in Ghana (SC/62/SM10).

The IUCN Red list status of the species is Data Deficient. Given the scarcity of information, the sub-committee was not in the position of evaluating its status in the region.

6.15 Killer whale (*Orcinus orca*)
6.15.1 Taxonomy and population structure
Collins reported that killer whales observed off Angola, Gabon and São Tomé were similar in external appearance. They lacked a defined dorsal cape, but had a variable pale grey 'saddle' behind the dorsal fin. Their appearance is consistent with the Type A 'nominate' killer whale form described by Pitman and Ensor (2003).

6.15.2 Abundance and distribution
Weir *et al*. (2010) summarised published records from northwest Africa including the Cape Verde Islands and from Namibia and South Africa in the southern hemisphere. They cited reports from Liberia, the Côte d'Ivoire, Ghana, Annobón Island (Equatorial Guinea) and Gabon. Weir *et al*. (2010) provided records of 31 additional confirmed sightings from Angola, Gabon and São Tomé, and a single record from Cameroon. de Boer (2010a) provided an additional record of killer whales in the offshore waters of Gabon. Most sightings have been recorded since 2001 corresponding with the onset of dedicated survey work in the region.

Bamy *et al*. (2010) found no confirmed records from the stretch of coast from southern Senegal (Casamance) to Liberia. Although they considered killer whales to be

widespread in coastal and offshore areas of the eastern Atlantic, they also noted that these whales were not common in any particular area. Bamy *et al*. (2010) questioned whether killer whales venture into the shallow waters of Guinea-Bissau, Guinea and Sierra Leone.

6.15.3 Life history and ecology, including habitat
The mean best estimate of killer whale group size off West Africa was 5.56 animals (range=1–17, SD=3.48, *n*=32). The mean group size was similar between regions, comprising 4.9 animals (SD=3.23, *n*=18) in Angola, 6.0 animals (SD=5.16, *n*=7) in Gabon and 6.2 animals (SD=1.33, *n*=6) in São Tomé (Weir *et al.*, 2010).

The month of the sighting was available for 33 of the West African records. The seasonal distribution of sightings indicates a probable year-round occurrence of killer whales within the region. Analysis of the combined dataset reveals that killer whales off West Africa inhabited waters from 10-2,609m, and may therefore be considered as widespread (Weir *et al.*, 2010).

Matches of dorsal fin photos resulted in the identification of 33 individuals in Angola, Gabon and São Tomé. No between-site matches were made and no within-site resightings were recorded in Angolan or Gabonese waters. Between year within site matches were made in Sao Tomé. The absence of definite matches of individual whales between the three study areas is considered inconclusive given the small sample size and poor quality of many images (Weir *et al.*, 2010).

Many of the killer whale groups recorded off West Africa were observed travelling with steady surfacing sequences. However, about one-third (*n*=12) of the records involved observations of killer whale in (direct or indirect) association with other cetacean species. Five encounters were considered antagonistic in nature, involving humpback whales and sperm whales. The latter included an attack observed in Angola and a stranded neonate with tooth rakes on the tail flukes that were consistent with known scarring patterns from killer whales. Two additional observations included aggressive encounters between killer whales and fish prey. These involved a shark and an ocean sunfish (Weir *et al.*, 2010). The 17.3% incidence of presumed killer whale scarring on humpback whale flukes photographed off Gabon is evidence of regular interaction between these species, although some of this scarring likely occurs in the Antarctic feeding areas where agonistic encounters between the species are also reported (Pitman and Ensor, 2003). The absence of killer whale sightings in deep water off Angola during the peak period of sperm whale occurrence between March and May suggests that sperm whales are not the primary targets of killer whales in the area.

6.15.4 Directed takes
No information was presented indicating recent intentional takes.

6.15.5 Incidental takes
One killer whale was identified as bycatch in Ghana between 1998 and 2000 (SC/62/SM8).

6.15.6 Other
Nine dedicated and two anecdotal killer whale sightings reported from seismic vessels off Angola occurred only when the airguns were either off, or were active at very low volume (during either an airgun test or a soft start). It is therefore possible that killer whales avoided the survey vessel during periods of active airgun use (Weir, 2007).

6.15.7 Conclusions and consideration of status
Killer whales may be considered a regular component of the cetacean community off Angola and in the Gulf of Guinea. However, more survey work is required throughout the region to clarify their status and biology off tropical West Africa (Weir *et al.*, 2010).

The IUCN Red list status of the species is Data Deficient.

6.16 Long-finned pilot whale (*Globicephala melas*) and short-finned pilot whale (*Globicephala macrorhynchus*)

6.16.1 Taxonomy and population structure
It is assumed that most records of pilot whales from the Gulf of Guinea to Angola relate to *G. macrorhynchus* and that the species is continuously distributed along the west coast of Africa, although it seems to be replaced off the coast of Namibia and South Africa by *G. melas* (Bamy *et al*., 2010; Weir, 2007).

No data is available on population structure. Information is available from Strait of Gibraltar that could be compared with future sampling from other areas of West Africa.

6.16.2 Abundance and distribution
G. macrorhynchus is present in Ghana (information from bycatch, SC/62/SM10), Côte d'Ivoire, Gabon, Sao Tomé and Príncipe and Angola (information from sightings) (Bamy *et al*., 2010; de Boer, 2010a; Picanço *et al*., 2009; Weir, 2007; 2010). Sightings by fishermen around St Helena remain unconfirmed, and records off Guinea have been considered valid based on photographs (Bamy *et al*., 2010). It is commonly reported in waters of Togo (SC/62/SM11) and Nigeria (SC/62/SM12), and suspected to occur along the entire West African coast (Weir, 2010). It is also present in Cape Verde Islands (Brito, pers. comm.).

There is no data on abundance. Encounter rates are of 0.11 animals/100min off northern Angola (Weir, 2007) and 0.27 animals/100km off Gabon (de Boer, 2010a).

6.16.3 Life history and ecology, including habitat
Pilot whales appear to be present all the year round seaward of the shelf edge (mean depth=2,014m, SD=606.9) in groups of 4-200 (mean=37.2 individuals, SD=56), frequently in association with bottlenose dolphins (Weir, 2007; 2010).

Ritter and Cañadas mentioned that this association with bottlenose dolphins is also commonly observed off the Canaries and southern Spain respectively. On a number of occasions the dolphins have been seen to behave aggressively towards the pilot whales, especially pilot whale calves, something also observed in the Strait of Gibraltar according to Gallego. Ritter noted that this aggressive behaviour has not been reported in the Canaries. He also pointed out that the Canaries has a year-round resident population of pilot whales and that similar resident populations may exist elsewhere along the West African coast and around the offshore islands.

6.16.4 Directed takes
No data available.

6.16.5 Incidental takes
Twenty animals positively identified as *Globicephala macrorhynchus* (through photographs) have been reported bycaught in the artisanal fishing ports of Dixcove, Axim and Apam in Ghana since 1995, representing 9.4% of total identified cetaceans reported bycaught. It seems that most captured cetaceans of all species are used either for human consumption or as bait for shark fisheries (SC/62/SM10).

6.16.6 Conclusions and consideration of status
Pilot whales may be relatively common along most of the West African coast. The IUCN Red list status of these two species is Data Deficient.

6.17 Dwarf sperm whale (*Kogia simus*) and pygmy sperm whale (*Kogia breviceps*)

No information was available on taxonomy, population structure, abundance and directed takes.

The dwarf sperm whale has been reported to occur off Ghana and Angola (Weir, 2010). The pygmy sperm whale has been documented only from temperate areas, i.e. northwest Africa and Namibia. The large number of records suggests the species is fairly common off the Canary Islands but there are fewer records elsewhere: 1 in Madeira, 2 in Mauritania and 2 strandings (4 individuals in total) in Senegal. There is only one record of a pygmy sperm whale in Guinea, an adult landed by artisanal fishermen south of Conakry which was butchered and locally consumed in 2002 (Bamy *et al*., 2010).

Off Angola, the dwarf sperm whale seems to occur year-round in waters over depths of 1,290-2,009m and sightings comprised small groups of one to three animals (Weir, 2007; 2010). The dwarf sperm whale has been reported as caught in Ghana, representing 3.1% of total landings (SC/62/SM10).

The IUCN Red list status of these two species is Data Deficient. Given the scarcity of information, the sub-committee was not in a position to evaluate status in the region.

6.18 Cuvier's beaked whale (*Ziphius cavirostris*) and other ziphiids

Cuvier's beaked whales are present in Mauritania (stranding; Vély, pers. comm.), Ghana (information from bycatch; SC/62/SM10) and Angola (two sightings at sea; Weir, 2007; 2010). Two other ziphiids are likely to occur off Angola, Blainville's (*M. densirostris*) and Gervais' (*M. europaeus*) beaked whales. There was a sighting of three unidentified mesoplodont whales off Angola in 1966 and seven sightings of unidentified ziphiids off Angola between 2003 and 2006, including at least one of *Mesoplodon* sp. and another likely *Z. cavirostris*. A specimen of *M. europaeus* was found stranded on the Angola-Namibia border in 1997 (Weir, 2007; 2010). Most sightings occurred offshore from the Congo River mouth. Two sightings were reported off Gabon (Weir, 2010) and ziphiids are reported to occur in Nigeria (SC/62/SM12). A specimen of *M. europaeus* stranded in Mauritania in 1992 (Robineau and Vely, 1993).

There is no data on abundance. Encounter rates are of 0.006 animals/100min for *Z. cavirostris* and 0.01 animals/100min for unidentified beaked whales off northern Angola (Weir, 2007). Sightings of ziphiids off Angola were composed of 1-3 animals in deep oceanic waters (mean depth = 1,984m, SD = 376.9; Weir, 2007; 2010). One animal (positively identified through photographs) in the port of Axim in Ghana was reported bycaught in artisanal fisheries in 1994, none since (SC/62/SM10).

The IUCN Red list status of the species is Least Concern.

6.19 Recommendations

6.19.1 General recommendations
The sub-committee acknowledged that the failure to manage industrial fisheries sustainably has often caused coastal artisanal and subsistence fisheries to suffer and, in turn, has led local people to seek alternative resources for consumption, including cetaceans.

Given the observed threats and the existing knowledge, the Committee made the following general **recommendations** applicable to all small cetacean species in west and northwestern Africa.

- The tallying of cetacean landings be implemented as standard procedure for fisheries observers at the national level, including the collection of photographic material, recognising that small cetaceans are a *de facto* exploited marine living resource and therefore need to be monitored on a permanent basis.
- The implementation of an intensive biological sampling programme based on fresh carcasses, collecting data on morphological variation, reproduction, growth, feeding, stock identification, genetics, migratory habits, etc. of cetacean species.
- The use of platforms of opportunity to collect data on distribution, relative abundance and behaviour of cetaceans.
- Further assessment of the links between declining fish catches and increasing takes of small cetaceans in West Africa.

The sub-committee recognised that, at least in three of the west African countries, Ghana, Togo and Guinea, from which local experts were able to attend the meeting or send detailed working documents, the ongoing activities represent excellent examples of how the first two of these recommendations could be realised. At the same time, the sub-committee acknowledged the contributions already being made by scientists in Nigeria and Benin and recognised that there is a great need for capacity building and financial support before such programmes can be implemented. The same is true for São Tomé and Príncipe where the status of small cetacean populations has not been fully assessed and for the Cape Verde Islands where no study of small cetaceans has ever been conducted. Thus, the need for capacity building and the implementation of local monitoring programmes in both of these archipelagos was also acknowledged. With regard to the third recommendation, the sub-committee noted and commended the published work by Weir (2007) and de Boer (2010a; 2010b), much of which was based on data from platforms of opportunity (e.g. seismic survey vessels, oceanographic research vessels). Again, these were seen as excellent examples of how this recommendation can be realised in more areas. It is important to recognise that data obtained from operating seismic vessels is likely to be influenced by the evasive behaviour of cetaceans in response to the airgun noise; nevertheless, important information can be gained on species occurrence in otherwise unsurveyed areas as long as observer data are made public and published.

In conclusion, the Committee **recommended** international collaboration for funding and capacity building to support programmes for monitoring, management and conservation of coastal marine living resources in this region.

6.19.2 Atlantic humpback dolphins
Concern was raised by the sub-committee about the vulnerability of Atlantic humpback dolphins throughout their known range, noting their very near-shore distribution, apparently high site fidelity, limited movements and susceptibility to bycatch and hunting which could lead to local extirpation (SC/62/SM6, SC/62/SM9). It is likely that local extirpation has already occurred in some areas. Although much remains unknown about distribution and the extent to which it has changed over time as a result of human activities (e.g. bycatch, habitat degradation), current

understanding is that there are regional pockets of relatively high density, such as in Senegal-The Gambia-Guinea-Bissau-Guinea-Sierra Leone, Gabon-Congo or Cameroon-Angola-Namibia.

The sub-committee **recommended** the following items for further conservation and research action for Atlantic humpback dolphins. These include due consideration of recommendations provided by the sub-committee at the 54th meeting of the IWC (IWC, 2002b) and the CMS regional action plan for the conservation of West African small cetaceans[1].

(1) Coordinated data collection should be facilitated in order to improve knowledge of the abundance, distribution and conservation status of *S. teuszii* throughout its known range. Specifically:
   (a) estimates of abundance and distribution are urgently required (including where feasible photo-id);
   (b) tissue samples should be obtained at every opportunity from stranded or bycaught Atlantic humpback dolphins. These need to be appropriately preserved and provided to scientists for genetic analyses investigating population structure;
   (c) critical habitats should be identified, including areas of high density and regular occurrence ('hotspots') and migratory pathways (if such exist), as candidates for focused conservation effort; and
   (d) overviews of existing knowledge, national species lists, specimen collections, research centres and protected areas should be compiled.
(2) Identify and mitigate known and potential threats to *S. teuszii*, particularly entanglement in fishing gear, directed take and anthropogenic noise. Specifically this should include:
   (a) improving the understanding of the causes, levels and impacts of bycatch on *S. teuszii*;
   (b) assessment of the causes, level and intensity of directed small cetacean takes;
   (c) efforts should be made to minimise the ecological impacts of fisheries on, and direct takes of, *S. teuszii* through the implementation of explicit fisheries management measures; and
   (d) ensure that all littoral developments and activities take into account their potential for having negative effects on small cetaceans and the environment.
(3) The designation and management of national and transboundary Marine Protected Areas that include *S. teuszii* habitat based on scientific data and broad stakeholder involvement should be encouraged.

The sub-committee also specifically **recommended** that regional or sub-regional research projects be conducted and management plans developed to conserve the populations of Atlantic humpback dolphins in particular areas. One of these is off Flamingos, Angola (Weir, 2009). Other important areas are along the coasts of Gabon-Congo and Senegal-The Gambia-Guinea-Bissau-Guinea-Sierra Leone where the humpback dolphin population(s) may be transboundary and where bycatch is a serious concern. Another is Mauritania where humpback dolphins were observed regularly in Banc d'Arguin National Park and environs over many years but may have declined recently (Van Waerebeek and Perrin, 2007). The sub-committee **strongly encouraged** scientists in the range states to submit collaborative proposals for funding so that transboundary problems can be addressed in a comprehensive way. In the case of Banc d'Arguin, Vély emphasised the benefits of collaborating with the staff of this National Park who have long-term monitoring data, local support resources and a mandate to monitor and protect the park's living resources. A similar situation exists in Gabon-Congo, where there is interest by national park staff to support conservation of Atlantic humpback dolphins.

In view of the growing concern (e.g. summarised in SC/62/SM6) that the Atlantic humpback dolphin faces some of the same threats that led to the extinction of the baiji and caused the vaquita to become critically endangered, the sub-committee **recommended** that IUCN reassess *S. teuszii* in the light of new information as it may qualify for a more threatened category than Vulnerable.

[1]Plan for Action for the Conservation of Small Cetaceans of Western Africa and Macaronesia, ratified in 2008 by West African member nations of CMS.

7. REPORT ON THE INTERSESSIONAL WORKING GROUP ON CLIMATE CHANGE

Simmonds summarised the ongoing plans for an IWC Workshop on the effects of climate change on small cetaceans. The Workshop plan (10-12 invited participants meeting for three days) was agreed by the Scientific Committee last year and funding was promised by a number of nations and NGOs during the 2009 Commission meeting. However, the Workshop was not held in the last intersessional period as the final funding was only confirmed late in the year. The steering group and convener (Simmonds) are now finalising plans for the Workshop which will probably be held in Vienna in November 2010 (see Appendix 2). Further details can be found in the report of the Scientific Committee from last year. Membership of the steering group remains open. The steering group has identified the following focal topics: restricted habitats, range changes and the Arctic region. During discussion it was suggested that pathogens should also be discussed and skin diseases could be used as a tool. The sub-committee **reconfirmed** its support for the meeting and several suggestions for suitable participants were made. The sub-committee will receive a full report of this meeting at the next Annual Meeting in 2011.

8. PROGRESS ON PREVIOUS RECOMMENDATIONS

IWC Resolution 2001-13 (IWC, 2002a) directs the Scientific Committee to review progress on previous recommendations relating to critically endangered stocks of cetaceans on a regular basis and the sub-committee noted that its previous recommendations stand until new information is received and considered.

8.1 Vaquita

The sub-committee reviewed new information on the critically endangered vaquita (*Phocoena sinus*). SC/62/SM3 reported on a survey in the Upper Gulf of California that was conducted in October-November 2008 in a joint effort between the governments of Mexico and the US. The primary objective was to test alternative acoustic detection technology as a means of monitoring trends in vaquita abundance. The NOAA research vessel *David Starr Jordan* was the main platform and visual effort was conducted under the same sampling protocol applied to estimate vaquita abundance in 1997, and the same areas were covered as in that survey. In 1997 the shallow areas were covered by a shallow-draft boat using visual sampling methods. In 2008 those areas were covered by a sailboat using an acoustic detector (Rainbow Click system with a 2-element oil-filled

hydrophone array). Total abundance (based on both acoustic and visual data) was estimated as 250 animals (95% CI 110-564). The estimate for waters inside the vaquita refuge was 123 (95% CI 64-239). The total estimate for 1997 had been 567 (95% CI 177-1,073). Using a Bayesian approach, there was a 90.6% credibility that the population declined over the 11 years from 1997 to 2008. The same analysis using only the visual survey effort (as the stratum was the same in 1997 and 2008) resulted in a 99.9% credibility of decline. This finding is supported by the evidence that the overall distribution of the vaquita population did not change between the two surveys, indicating that the apparent decline was not an artefact of a distributional shift. Approximately half of the population appears to be present inside the vaquita refuge area at any time, with individuals moving freely into and out of the refuge. Hence, they are at risk of interaction with fishing operations when outside of the refuge, and this means that protection from bycatch is only partial.

The sub-committee thanked Jaramillo-Legorreta for bringing these results to the meeting and commended the hard work of the many scientists and others who raised the necessary funds and participated in the surveys and analyses.

There was discussion regarding the adequacy of the current refuge area. Jaramillo-Legorreta stressed that because fishermen consider waters inside the refuge to be a prime shrimping area, fishing activity is very intensive immediately outside its borders. The buy out programme begun by the Mexican government in 2007 has reduced the fishing effort by about 40% but over 600 boats (*pangas*) are still fishing and those fishermen who remain active are strongly committed and unlikely to accept the buy-out offers from the government. This makes it crucial to develop alternative fishing methods that do not involve the risk of vaquita bycatch. However, Jaramillo-Legorreta stated that development of such alternatives has proven extremely difficult and thus far, no method has been found that compares with gillnetting in terms of the ease and efficiency of capturing a certain quantity of shrimp.

The Mexican government made a commitment to reduce the vaquita bycatch to zero within three years starting in 2008. There is no data to confirm that the bycatch rate has been reduced. A reduction can only be inferred from the reduction in fishing effort. Jaramillo-Legorreta noted that a vaquita had been received by officials from the Department of Environment and Natural Resources and turned over to scientists to investigate cause of death, etc., within the last few weeks. He also indicated that because of the regulatory situation, fishermen generally no longer report and deliver bycaught vaquitas to authorities. Perrin noted that because of the small population size, bycatch is a rare event and an individual fisherman may only rarely, or never, even see a vaquita. This makes the implementation of regulations particularly challenging.

SC/62/SM5 reported an assessment of trends in vaquita abundance based on acoustic monitoring. A workshop took place in 2009 with the objective of developing a scheme to detect a decline of 10% per year within three years or 5% within five years, or to detect a 4% increase within five years. Data gathered during the 2008 survey were analysed and the C-POD was selected as the most reliable technology for achieving the objective. The workshop attempted to determine the sample size required to reduce sampling variance to the level of natural variability in the abundance estimates. Using simulation methods, it was established that natural variation is around 3.3% (CV). According to the variance obtained with the data gathered by C-PODs, it was estimated that an effort of 4,900 sampling days would be required. This requirement could be met by deploying 49 C-PODs for 100 days per year or 100 C-PODs for 49 days per year. The final agreed design involved 62 sampling sites inside the vaquita refuge where the probability of losing detectors is considered relatively low because fishing is not allowed there. Currently, implementation is in the phase of designing mooring systems and running a pilot test. It is anticipated that the scheme will be in operation by the end of this year (2010). The project is already funded, but provision must be made to ensure that the necessary resources for maintaining the detector network and for managing and analysing the data are in place for future years as this is by necessity a long-term programme. Jaramillo-Legorreta acknowledged the financial support provided to this work by a number of agencies and organisations in addition to the Mexican government: Cousteau Society, Ocean Foundation, US Marine Mammal Commission and International Fund for Animal Welfare.

Again, the sub-committee thanked Jaramillo-Legorreta for this update on the acoustic monitoring efforts and commended those involved for their hard work and commitment to the cause of saving the vaquita.

During discussion, Jaramillo-Legorreta clarified that although only 50 C-PODS are being considered in the sampling design, 62 C-PODs are going to be deployed so that even if some are lost or damaged, at least 50 will remain in place. Regarding costs of maintenance, these were expected to be low once all of the equipment has been purchased and deployed. Cipriano suggested and the sub-committee **agreed** that it would be useful to document (in working papers or publications) all of the costs of the vaquita conservation and monitoring efforts for future reference.

The Committee **remained gravely concerned** about the fate of the vaquita and it **reiterates** its previous recommendation (IWC, 2010, p.324) that, if extinction is to be avoided, all gillnets should be removed from the upper part of the Gulf of California. The Committee further **recommended** to intensify development and testing of alternative fishing gear (e.g. through a smart-gear competition) that fishermen can use in place of entangle gears. It also strongly **encouraged** Mexico to continue and intensify its efforts to conserve the vaquita.

8.2 Harbour porpoise

No primary papers on harbour porpoises were presented to the sub-committee at this meeting.

Bjørge reported that data from three years of bycatch monitoring in Norwegian waters were available but it had not been possible to prepare the information for presentation in time for the meeting. Bjørge also mentioned that a joint workshop of ASCOBANS/ECS recommended a revision of EU regulation 812/2004 on monitoring and mitigation of bycatch in gillnet fisheries. The present regulation does not include small vessels of less than 15m length, and this has significant implications for bycatch as a large number of small vessels operate without needing to adhere to the EU regulations. The sub-committee **recommended** that the EU regulation should be reviewed.

Ritter summarised available information on numbers of harbour porpoises reported bycaught in German fisheries and numbers found stranded on beaches of the German North Sea and Baltic from 2003 to 2009. Reported bycatch numbers are relatively low but the true levels are likely much higher given that at least 50% of the strandings are of animals that died in fishing gear. An increasing trend

in bycatch is suspected. As last year, the sub-committee **expressed concern** about the ongoing evidence of large-scale bycatch in this region and noted, in particular, that the harbour porpoise population in the Baltic proper is red listed as Critically Endangered. Therefore it is important to obtain better information on both the scale of incidental mortality and the stock affinities of the affected porpoises.

Attention was drawn to the vulnerability of the recently identified and isolated Iberian population of harbour porpoises. The Committee **recommended** further study of this population.

8.3 Franciscana

The franciscana (*Pontoporia blainvillei*) is endemic to the eastern coasts of Brazil, Uruguay and Argentina and inhabits coastal waters from *ca* 18°25'S to *ca* 41°10'S. The species is regarded as one of the most threatened small cetaceans in South America due to high bycatch levels as well as increasing habitat degradation throughout its range and it is red-listed as Vulnerable by IUCN (see *http://www.iucn.org*). Four management stocks (known as Franciscana Management Areas or FMAs) have been defined: three in Brazil (FMA I-III), one extending into Uruguay (FMA III) and one in Argentina (FMA IV) (Secchi *et al.*, 2003). The conservation status of the franciscana is of concern due to high levels of incidental mortality in fisheries as well as habitat degradation.

SC/62/SM7 presented information on distribution and provided the first estimate of abundance of franciscanas in FMA II from aerial surveys conducted in December 2008 and January 2009 between the Brazilian states of Santa Catarina (~30°S) and Rio de Janeiro (23°S). A design-based approach was used to sample coastal (coastline to 30m isobath) and offshore (30-50m isobaths) strata along the range of the species and mark-recapture distance sampling methods (MRDS) were used to estimate abundance. Survey sampling also included an area believed to correspond to a hiatus in the distribution between FMA I and FMA II. A total of 60 franciscana groups (157 individuals) were seen in the coastal stratum. No sightings were recorded in the offshore stratum and in the hiatus area, but sampling in the former was limited due to consistently poor weather conditions. Average group size was 2.7 (SE=0.17). Abundance corrected for perception and availability bias was estimated to range between 8,000 and 9,000 individuals (CVs=0.32-0.35). Possible sources of bias in these estimates include underestimation of group size from the aircraft, poor survey coverage in the offshore stratum and the use of franciscana diving parameters estimated from data collected outside of FMA II in the estimation of availability bias. Current estimates of incidental mortality in FMA II correspond to 3.3-6.2% of the estimated population size presented here, suggesting high, likely unsustainable bycatch. Other sources of unaccounted-for mortality are not well known and require monitoring to better assess the chances of long-term survival of franciscanas inhabiting southeastern and southern Brazil.

The sub-committee **noted** that this paper addressed recommendations from previous years (IWC, 2005, p.309). In particular, the aerial surveys were conducted in an area for which no abundance studies had been carried out. In addition, the surveys incorporated a double observer method to produce a correction for perception bias in the estimation of franciscana detection probability. The sub-committee concluded that the estimates of abundance in this study were likely negatively biased because of limited coverage of the offshore stratum and because estimates of group size from aircraft have consistently been smaller than the estimates of group size made from boats and land observation sites in the same region.

With regard to the aerial surveys in FMA II, the sub-committee commended Zerbini and his co-workers for their excellent work and **recommended** that further studies be carried out to:

(1) improve estimates of visibility bias;
(2) evaluate potential biases in the estimation of group sizes; and
(3) estimate franciscana diving parameters in areas where such information is not available.

The sub-committee also **recommended** that franciscana bycatch be estimated in areas for which bycatch estimates are currently unavailable and that assessments be carried out of other possible threat factors such as underwater noise, chemical pollution from coastal development and industrial and human waste discharge, oil and gas exploration activities and vessel traffic.

In introducing Mendez *et al*. (2010), Rosenbaum briefly summarised previous analyses that complement the genetic results on genetic population structure in Brazil (Secchi *et al.*, 1998) and in Brazil, Uruguay and southern Buenos Aires province, Argentina (Lázaro *et al.*, 2004). Mendez *et al.* (2008) analysed mtDNA of specimens from Brazil (n=14), Uruguay (n=38) and Argentina (n=138), by reanalysing previously published data and contributing new samples collected in different localities in Northern, Central and Southern Buenos Aires in Argentina (n=135).

Based on mtDNA data, Secchi *et al.* (1998) proposed the existence of at least two Brazilian populations and Lazaro *et al.* (2004) suggested an additional population in Uruguay and a second one in southern Argentina. Mendez *et al.* (2008) suggested that there was substructure in Argentina, with a northern Argentina population in the Samborombon Bay area and a southern population around Claromecó in southern Buenos Aires (the samples previously analysed by Lazaro).

Mendez *et al*. (2010) analysed mtDNA and nuclear data from 12 microsatellite loci from an expanded dataset consisting of 275 franciscana samples from Argentina. Using a combination of frequency-based, likelihood and Bayesian approaches, they found support for the previous suggestion of fine-scaled population structure within Argentina, with at least three population groupings: Northern Buenos Aires, Eastern Buenos Aires and Southern Buenos Aires. Such population structure patterns were concordant with significant environmental heterogeneity. By evaluating ten years of spatially explicit remote sensing oceanographic data covering the entire southern distribution of the franciscana, environmental breaks were detected that were spatially concordant with the observed genetic structure.

Mendez *et al*. (2010) stressed that considering all franciscana genetic analyses to date, there is strong evidence for the existence of at least three populations in Brazil (FMAs I, II and III), one in Uruguay (FMA III) and three in Argentina (FMA IV). Rosenbaum speculated that these populations may be locally adapted to distinct environmental conditions and therefore that the protection of local habitat in its current state, with consideration for potentially changing environmental conditions, is necessary for conservation of the local populations and in turn the species.

The sub-committee welcomed the new information and **encouraged** the continuation of research and conservation efforts for franciscanas in Argentina, particularly in light of

the high bycatch rates. The sub-committee **recommended** that the possibility of further population sub-structure within the other FMAs be investigated.

8.4 Narwhal

In its report last year (IWC, 2010, p.325), the sub-committee noted that new estimates of narwhal abundance had recently become available. In the intersessional period the results of aerial surveys in Canada indicating total abundance greater than 60,000 narwhals were published (Richard *et al.*, 2010). Also, the NAMMCO Scientific Committee considered the new estimates from Greenland in its management advice given in April 2009 (IWC/62/4). At its 2009 meeting the NAMMCO Council (NAMMCO, 2010, pp.96-97) considered the new information on narwhal abundance and revised its management advice accordingly. The 2005 NAMMCO assessment had concluded that narwhals in West Greenland were highly depleted and that annual sustainable harvest levels would be as low as 15-75 animals. However, population modelling with the new survey data from 2007 and 2008 indicated that overall abundance was at 51% (95% CI: 27-79%) of carrying capacity, with a 2009 modelled abundance of 12,000 (95% CI: 6,200-26,000), and NAMMCO concluded that its management objectives would be met at 70% probability with annual total removals of 310 (West Greenland) and 85 (East Greenland).

The sub-committee thanked Acquarone for providing this information on behalf of NAMMCO and encouraged the maintenance of closer links between the NAMMCO and IWC Secretariats in regard to the sharing of information, e.g. catch data. The suggestion was also made and discussed that a joint special meeting or workshop on monodontids (involving IWC, NAMMCO, Canada-Greenland Joint Commission on Narwhal and Beluga) should be considered in the near future, assuming that a data availability agreement could be established in advance. Acquarone advised that the next meeting of the NAMMCO Scientific Committee and JCNB scientific working group would probably be in early 2012, leaving adequate time to explore the potential of a joint meeting/workshop. The sub-committee **agreed** that an e-mail working group convened by Bjørge would follow up this possibility during the intersessional period and report back at the next meeting.

Some uncertainty was expressed about whether monodontids are a high priority of the sub-committee at this time particularly in view of the recent narwhal abundance estimates. However, Reeves noted that the Greenland and Canadian High Arctic narwhal stocks are not the only monodontids of concern. There are numerous exploited stocks of belugas in Canada, Alaska and Russia and of narwhals in Hudson Bay/Hudson Strait (Canada) as well as unexploited but small stocks of belugas in Cook Inlet (Alaska) and the St Lawrence River (Canada). Also, the potential for significant changes in sea ice regimes to affect monodontid distribution, ecology and numbers has been widely acknowledged.

8.5 Irrawaddy dolphin

The freshwater population of Irrawaddy dolphins (*Orcaella brevirostris*) in the Mekong River is red-listed by IUCN as Critically Endangered (Smith and Beasley, 2004).

SC/62/WW4 reported on dolphin-watching tourism in the Mekong where photo-identification studies indicate dolphins exhibit high site fidelity to particular deep-water pool areas that are very limited in size (1-2km^2). The population, which according to Bejder has low genetic diversity based on preliminary analyses by M. Kreutzen, has a high mortality rate with 46 carcasses (54% classified as 'newborns') recovered from 2003-05. The cause of the high rate of newborn mortality in particular remains unknown. Dolphin-watching began in two areas in the early 1990s and it has remained unmanaged and unregulated. These two areas contain some of the most important habitat for the dolphin population in the Mekong River, which is now thought to number fewer than 100 individuals. Initially, at both locations, dolphin watching was land-based, with a few rowboats occasionally used to take tourists into the pools to view the animals. This later expanded to involve approximately 15 motorised boats by the early 2000s and more than 20 in recent years.

Bejder noted that there is currently no information on what effects the 20+ tour boats operating at the pools might be having on the behaviour and ecology of the dolphins. SC/62/WW4 recalled that *'[t]here is compelling evidence that the fitness of individual odontocetes repeatedly exposed to whale-watching vessel traffic can be compromised and that this can lead to population level effects*' (IWC, 2006a, p.47) and argued that an adaptive, precautionary approach is essential to managing tourism that targets small, closed, resident communities of cetaceans such as in this case. SC/62/WW4 recommended a range of management interventions, all aimed at decreasing the exposure of dolphins to dolphin-watching vessels. It was argued that for this Critically Endangered population, a 'no vessel-based dolphin tourism' policy is desirable, given that there are high sighting rates within deep pools and that this should facilitate sustainable land-based tourism.

Reeves summarised information received from Gordon Congdon of WWF-Cambodia concerning the current situation in the Mekong as follows.

In 2008 the World Wide Fund for Nature (WWF) Cambodia and the Cambodian Department of Fisheries estimated that the population of Mekong dolphins was about 70 based on a photographic mark-recapture analysis. This estimate did not include a correction for the percentage of unidentifiable individuals, predominantly calves and juveniles. Data from surveys in 2009 and 2010 are still being analysed and an updated population estimate is expected to be available in a few months. The as yet unpublished estimate of 70 is substantially lower than a 2004 estimate of 95 identifiable individuals by Isabel Beasley. Mortality records indicate that at least 92 dolphins, approximately 63% of them classified as calves, have died in the period 2003-2009. In 2010 at least four animals (2 of them calves) had died as of the end of May. The causes of the high mortality are not entirely clear. It is known that some animals have died in gillnets, but there may be other unidentified causes of mortality as well. At a meeting convened by WWF-Cambodia in Phnom Penh in October 2009, an invited group of international experts (R.R. Reeves, R.L. Brownell, Brian Smith, Frances Gulland, Wang Ding, Sam Turvey, Leigh Barrett) concluded that most of the mortality of dolphins in the Mekong was likely due to entanglement in fishing gear and that conservation efforts should focus on the elimination of gillnets in the core habitat for dolphins in the 200km stretch of the Mekong between Kratie town and the Lao border.

Congdon further reported that in Cambodia the conservation of dolphins in the Mekong is primarily the responsibility of the Commission on Dolphin Conservation and Ecotourism Development (Dolphin Commission) which was established in February 2006 by the Cambodian Royal

Government out of concern about the high dolphin mortality rate and interest in the development of 'ecotourism' in Cambodia. Despite substantial efforts by the Dolphin Commission, the mortality rate remains high and the population apparently is continuing to decline. Dolphin conservation efforts in Cambodia have been hindered by inadequate funding for the Dolphin Commission and the lack of regulations that could help to reduce or eliminate the use of gillnets. There is also a need for much better cooperation among the Dolphin Commission, the Fisheries Administration, and WWF. WWF and the Fisheries Administration are currently working to develop protected areas and other regulatory tools to protect dolphins. WWF and local NGOs are also working with local communities to reduce gillnet use and to develop alternative livelihoods in order to reduce fishing pressure in core dolphin habitat. Efforts are also underway to develop transboundary agreements between the governments of Cambodia and Laos to protect dolphins that inhabit the Cheuteal Pool on the Lao-Cambodia border. The population of Irrawaddy dolphins in the Mekong is at a critically low level. It will take a strong and concerted effort on the part of the Cambodian government and all other stakeholders to prevent the extirpation of this population. It is imperative that all responsible parties, especially the Dolphin Commission, the Fisheries Administration, the Lao government and WWF collaborate closely to reduce all causes of mortality so this population can stabilise and recover.

There was some discussion of the heavy scarring on the bodies of Mekong dolphins and the fact that this is not consistent with what is observed in at least some other parts of the species' range (e.g. the Ayeyarwady River in Myanmar). This subject deserves closer study as it is unclear whether such scarring is a 'natural' feature of this population or somehow related to human activities.

The sub-committee **expressed grave concern** about the rapid and unexplained decline of this riverine population. It **commended** the efforts by Cambodian government agencies and WWF-Cambodia to diagnose the cause(s) of this decline, and **strongly recommended** that every effort be made to stop and reverse the decline, e.g. by immediately eliminating or greatly reducing the amount of entangling gear in the pool areas used most intensively by the dolphins and by taking immediate steps to reduce the exposure of the dolphins to tour-boat traffic.

8.6 Other

SC/62/SM2 was an update of Amaral *et al*. (2009), the goal of which is to revise the model of worldwide population structure of common dolphins, genus *Delphinus,* using a multilocus approach. The study presented in SC/62/SM2 included more samples from additional oceanic regions in the mitochondrial DNA dataset and used several nuclear molecular markers. The samples included short-beaked animals from populations in the North Atlantic, northeast (NE) Pacific, southwest Pacific and southeast Indian Ocean; long-beaked animals from populations in the NE Pacific and South Atlantic and animals of the *tropicalis* form from the western Indian Ocean. The main findings were that the long-beaked population in the NE Pacific is highly differentiated from all other populations based on both nuclear and mitochondrial markers. These results reinforce the conclusion from the 2009 meeting of this sub-committee that a taxonomic revision of the long-beaked populations is needed. Regarding the short-beaked populations, the differentiation between populations occurring in different oceans is even higher that suggested in Amaral *et al*. (2009). As would be expected, levels of gene flow were higher within the same ocean. Future analyses will include estimations of migration rates between the different populations and estimations of divergence times. This study also highlighted the difficulty of obtaining informative molecular markers other than mitochondrial DNA and microsatellites, due to the low overall level of polymorphism in the nuclear genome of common dolphins.

When asked if she had been able to determine whether *D. cf. tropicalis* (the long-beaked form in the northern Indian Ocean) was closer to the long-beaked form in the SE Atlantic or to that in the NE Pacific, Amaral stated that she had been able to extract only mtDNA from the *tropicalis* specimens and that analyses of microsatellite markers would be required to resolve this question.

The sub-committee thanked Amaral for this update and **encouraged** the continuation of her global study of the genus. It also **recommended** that efforts should be made to obtain samples from oceanic regions where both short-beaked and long-beaked forms occur, as is the case in West Africa and the SE Pacific.

9. OTHER INFORMATION PRESENTED

SC/62/BC6 was a preliminary global review of operational interactions between odontocetes and the longline fishing industry and potential approaches to mitigation. This is a global problem involving two types of risk, on one hand that the odontocete populations will decline because of bycatch mortality and on the other hand that the longline fisheries will become economically unviable because of catch depredation. Therefore mitigation strategies are needed to ensure the sustainability of both the odontocete populations and the longline fisheries. Bycatch of odontocetes occurs globally in many longline fisheries and involves at least 13 species. Of the few cases reported, bycatch ranged between 0.002 and 0.231 individuals caught per set. The inadequacy of life history and population data makes it difficult to assess sustainability of the bycatch in most cases.

Considerable effort has been devoted to solving the depredation problem and potential solutions have included acoustic and physical tools. Acoustic approaches to mitigation have proven problematic but recent trials using physical depredation mitigation devices (PDMDs) have yielded promising results. The experience of fishermen and their enthusiasm to be involved in developing mitigation tools should not be underestimated. Governments, research institutions, fisheries and funding bodies associated with this problem are encouraged to participate and invest in international collaborations that focus on finding globally applicable solutions.

During discussion Reeves and Bjørge noted that longline fisheries for halibut and Greenland halibut in the northern North Atlantic have increasingly experienced problems with depredation of catches by northern bottlenose whales (*Hyperoodon ampullatus*). When asked if any evidence had been found of odontocetes taking bait from the longlines, Childerhouse stated that although cetaceans are often blamed for bait stealing, fish could also (or instead) be responsible in some cases.

The sub-committee thanked Childerhouse for bringing this widespread and possibly growing problem to its attention.

Panigada presented information regarding the current and ongoing commitment of the Italian government (Ministry of the Environment) to conduct systematic

abundance surveys of small cetaceans in Italian waters, including the Pelagos Sanctuary. Such monitoring is among the priority actions mentioned in the Sanctuary Management Plan and by ACCOBAMS and the Specially Protected Areas and Biodiversity Protocol under the Barcelona Convention. Two aerial surveys were conducted within the borders of the Pelagos Sanctuary in winter (the first time the full Sanctuary area has been covered) and summer 2009 and one in the Ionian Sea and Gulf of Taranto in May 2010, providing winter and summer abundance estimates for striped dolphins. The distribution data from the surveys strongly suggest that the Sanctuary does not cover the full population ranges of striped dolphins. Among the preliminary conclusions from the survey data are that:

(1) there is substantial variation in the density and abundance of striped dolphins between the winter and summer seasons, with higher numbers using the Sanctuary area during the summer months, when human activities (and their potential impacts) are at their maximum levels; and
(2) these density and distribution data will serve as a valuable baseline for the proposed ACCOBAMS basin-wide survey and help guide further development of a long-term monitoring programme.

Plans are in place for further surveys in the summer of 2010 covering the northern and central Tyrrhenian Sea, the Pelagos Sanctuary and the Sea of Sardinia.

Fortuna informed the sub-committee that another aerial survey financed by the Italian Government (Ministry of Agriculture, Food and Forestry and Ministry of the Environment) would cover the entire Adriatic Sea. This survey will take place next July and August and results will be presented at the next meeting of this sub-committee. The initiative is also supported by ACCOBAMS and it represents an opportunity to train local scientists from Albania, Italy, Croatia, Montenegro and Slovenia. She also emphasised that all of these efforts were possible owing to the initial technical support of the IWC Scientific Committee.

Štrbenac reported that a basin-wide survey of cetaceans in the Mediterranean and Black Seas remains one of ACCOBAMS's highest priorities. Activities are underway to start such a survey in the next three years (2011-13).

The sub-committee welcomed the new information and supported continuation of such efforts in the Mediterranean Sea and adjacent areas. The sub-committee specifically **endorsed**, as it had in the past, implementation of the ACCOBAMS basin-wide survey as soon as possible.

Flores advised the sub-committee of a workshop on common bottlenose dolphins in the southwestern Atlantic held in April 2010 in Rio Grande, Brazil. He noted that the final report of this workshop will be available later this year and that selected papers and working group reports will be published in the *Latin American Journal of Aquatic Mammals*.

Parsons mentioned two upcoming meetings to be held by the Society for Conservation Biology: the Second International Marine Conservation Congress (14-18 May 2011, Victoria, British Columbia, Canada) and the First International Marine Conservation 'Think Tank' (November/December 2011, Christchurch, New Zealand) which have workshop, symposium and focus group themes that may be of interest to sub-committee members (for example they may focus on small isolated populations)[2].

[2]See *http://www.conbio.org/MARINE* for details.

10. TAKES OF SMALL CETACEANS

At the last meeting, the sub-committee discussed various problems associated with the compilation of data on takes of small cetaceans including both direct catches and bycatch (IWC, 2010, pp.326-8). It recommended a series of changes in how the data should be compiled, reported and interpreted. The process of setting up a system for electronic submission of this data directly by national representatives is still ongoing. The information retrieved by the Secretariat from national progress reports was reviewed (see Annex O). Data on bycatch of small cetaceans is presented in national progress reports.

The sub-committee **reiterated** the importance of having this information submitted and **encouraged** all countries to do so.

The observer from NAMMCO advised that catch data from member countries are routinely published on their website *http://www.nammco.no*. This includes Greenland's catches of narwhals and belugas but does not include the catches of these species in Canada, the US and Russia.

Kasuya pointed out that in ten documents presented at this meeting, there was information from 12 West African countries indicating human consumption of cetaceans, exchange of cetacean meat in markets or direct capture of cetaceans (see Table 1, p.273). Concern was expressed about this situation, mainly because once cetaceans are used as food or are sold in markets, targeted hunting is likely to develop.

Kaufman presented information on a study by C. Castro and P. Rosero on small cetacean interactions with fishing gear in Machalilla National Park, Ecuador. This study analysed information obtained from 185 fishing trips (52 boats using gillnets, 125 purse-seine vessels and 6 with longline hook) off Puerto Lopez, Salango Machalilla from April-September 2009. Scientific observers logged 3,788.65 hours with the fishermen. All bycatches involved gillnets (trammel nets) with 5-inch mesh eye. Four species of cetaceans were caught incidentally in July, two common bottlenose dolphins (28.57%), a dwarf sperm whale (14.28%), two Risso's dolphins (28.57%) and two pantropical spotted dolphins (28.57%). The mortality rate was 0.07 dolphins/day in July and 0.18 dolphins/day in August. Over 400 fishermen participated in training and educational workshops related to reduction of bycatch and conservation of cetaceans.

In discussion, Kaufman explained that Machalilla National Park has a large marine component encompassing Isla de la Plata and much of the fishing occurs within park boundaries. Also, he noted that the apparent increase in bycatch rates at Puerto Lopez (0.07 dolphins/day in this study compared with that reported by Félix and Samaniego (1994special issuepart 1) in 1993) was probably due to both better reporting and increased fishing effort. The sub-committee thanked Kaufman for bringing this information and **expressed concern** about the implications of the documented bycatch. It would be valuable to have clearer information on the scale of the fisheries involved and therefore the implied magnitude of the cetacean bycatch. The sub-committee looked forward to a more detailed report next year.

11. ANY OTHER BUSINESS

11.1 Voluntary fund for small cetacean conservation research

Gales brought to the sub-committee's attention a proposed mechanism and procedure for allocating project support for high priority conservation projects (e.g. improving status

of threatened species, capacity building) from the IWC Small Cetacean Research Fund. The IWC Small Cetacean Research Fund is intended to support high priority research that demonstrably links to improving conservation outcomes for small cetaceans globally, particularly those that are threatened or especially vulnerable to human activities. Preference for funding will be based on a determination of need, the quality of the research application and the demonstration of links between research and conservation outcomes. Proposals that demonstrate a capacity building legacy will be viewed favourably.

The IWC Small Cetacean Research Fund, which was substantially increased through an Aus$500,000 voluntary donation from the Government of Australia, will be used to fund approved research. In order to maximise the number of projects supported by the fund, and hence enhance conservation outcomes for small cetaceans, any single proposal will be limited to a maximum of US$50,000. Other IWC member governments will also be encouraged to provide additional voluntary donations to the fund to further support small cetacean research.

A funding application form will be developed and made available via the IWC Secretariat. Applications for funding should be received by the Secretariat at least 60 days prior to the start of the annual meeting of the Scientific Committee. A Small Cetacean Research Fund Review Group will be appointed by the Convenor of this sub-committee and that group will conduct a review of project proposals according to an agreed scoring process that takes account of the objectives of the research fund. The group will rank the proposals and make recommendations for funding to the sub-committee. The group may suggest improvements to proposals where appropriate and can solicit the assistance of other researchers in the review process if necessary.

The Small Cetacean Research Fund Review Group will present the recommended projects and budgets to the sub-committee for its consideration (and potential revision). Approved proposals will be added to the Scientific Committee budget as a specific request to the Small Cetacean Research Fund (i.e. outside the normal Scientific Committee research budget). This final budget request will then form part of the Report of the Scientific Committee. The Secretariat will organise contracts for the successful projects.

The sub-committee emphasised the importance of ensuring that proposal review and project selection are based solely on the criteria and priorities as agreed by the sub-committee and its Small Cetacean Research Fund Review Group. Also, the sub-committee **agreed** on the importance of ensuring that, in addition to a call for proposals via a circular from the IWC Secretariat to all members of the Scientific Committee, a broader announcement mechanism is desirable (the Society for Marine Mammalogy website was suggested as a potentially suitable avenue). In addition, it is important to consider the need for adequate lead time with the call for proposals to allow them to be delivered on time as per the procedures outlined above.

The sub-committee also emphasised the importance of building the Fund by obtaining donations from additional sources. Gales emphasised that the contribution by Australia was not recurrent but rather a one-time donation. Therefore as projects are supported, the size of the Fund will diminish unless more donors come forward. It also noted that good outcomes from the research that is funded should encourage more countries to contribute.

The Committee **expressed** its gratitude to the Government of Australia for its generous contribution to the Voluntary Fund for Small Cetacean Conservation Research, which will make a significant difference to the Fund's ability to pursue its conservation priorities.

Fortuna reminded participants that several countries were already providing funds specifically to support the attendance of invited participants at Scientific Committee meetings (e.g. scientists from West Africa at this year's meeting). This need will continue to exist. In some cases the grants to researchers may include support for them to attend Scientific Committee meetings and present their results. Gales clarified that the Small Cetacean Research Fund is to be managed by this sub-committee and if an application shows that attendance to one or more meetings is likely to lead to conservation action, such attendance would be considered a valid use of the funds.

11.2 Project proposal for the voluntary fund for small cetacean conservation research

Zerbini presented a proposal (see Appendix 3) for funding by the Small Cetacean Conservation Research Fund entitled 'Threatened Franciscanas: Improving Estimates of Abundance to Guide Conservation Actions'. Other researchers directly involved would be Eduardo Secchi, Daniel Danilewicz, Artur Andriolo and Paulo Flores. In addition Zerbini expressed his intention to collaborate closely with other researchers in South America who have been working on this species.

The proposed work is directly linked to previous recommendations of this sub-committee, beginning in 2004 when a review of the status of the franciscana was its priority topic (IWC, 2004, pp.307-12; 2006b, p.314), and the proposal also responds directly to recommendations made at the present meeting based on consideration of SC/62/SM7 (see above). There was strong support in the sub-committee for the proposal, based on the following considerations:

- the franciscana is threatened by a variety of human activities in the region, particularly artisanal fishing;
- the proposal addresses a clear conservation need as expressed in sub-committee recommendations;
- more robust estimates of franciscana abundance (along with improved, more nearly complete estimates of bycatch as well as assessments of other threat factors) are needed to assess the status of populations and develop appropriate mitigation efforts; and
- the proponents have a strong track record (e.g. as reflected in the quality of the work described in SC/62/SM7).

The sub-committee therefore **recommends** that the proposal be funded by the Small Cetacean Conservation Research Fund and also that a full report on the results be provided for consideration at a future meeting.

12. WORK PLAN

The sub-committee reviewed its schedule of priority topics which currently includes:

(1) systematics and population structure of *Tursiops*;
(2) status of ziphiids worldwide; and
(3) fishery depredation by small cetaceans.

After a brief discussion, the sub-committee **agreed** that the priority topic for the next Annual Meeting would be the status of Ziphiidae (beaked and bottlenose whales) worldwide.

The systematics and population structure of *Tursiops* has been on the sub-committee's list of topics to consider for many years. It was noted that there is probably still not

much available information from some areas where the genus occurs. This was ascertained in a workshop recently held in October 2009 at the 18th Biennial Conference of the Society for Marine Mammalogy in Quebec, which focused on the creation of a consortium to investigate the taxonomic status of bottlenose dolphins in the Indian Ocean and adjacent waters. A similar scenario probably exists in other oceanic regions (e.g. South Atlantic); therefore the sub-committee decided to further postpone the discussion of this subject as a priority topic.

Although some support was expressed for fishery depredation as a priority topic, it was agreed that further thought should be given to the scope of such a review (e.g. mitigation only, documentation only, or a combination of both) and to how it should be organised (e.g. involvement of specialists in fishing gear and operations). One possibility was that it could be the subject of a pre-meeting Workshop, similar to the Workshop on Bycatch Mitigation just prior to the 2000 meeting of the sub-committee (IWC, 2001). In such a case, it might be decided to include all species and not just small cetaceans (e.g. sperm whales).

Flores drew the sub-committee's attention to the wealth of recent information on the Guiana dolphin (*Sotalia guianensis*) (since 2002, >150 peer-reviewed articles, 42 book chapters, a proceedings volume containing 22 papers, numerous academic theses and dissertations) and noted that the current National Action Plan for the Conservation of Aquatic Mammals of Brazil recognises the Guiana dolphin as a species. He offered a number of reasons for considering a review of the species as a priority topic at a future sub-committee meeting. These included:

- available estimates indicate that most populations are small except for one in southeastern Brazil;
- the 'population' or 'management unit' off southeastern Brazil has no mtDNA genetic diversity;
- there is strong evidence of genetic population structuring, with six to eight 'management units' proposed for the Brazil coast;
- some populations have individuals with high levels of residency, strong site fidelity, small home ranges, restricted daily movements and low genetic diversity;
- contaminant levels appear high in areas of low abundance;
- incidental catches occur throughout the range of Guiana dolphins but catch rates are known for only a few locations;
- direct takes have been recorded in some areas off North Brazil and in other range states; and
- boat traffic has immediate and short-term to medium-term effects on Guiana dolphin behavioural reactions based on five studies conducted.

During discussion, Perrin clarified that the IUCN Red List programme will soon publish separate assessments of the Guiana dolphin and the tucuxi, both of which are considered Data Deficient.

The sub-committee thanked Flores for providing this information on Guiana dolphins and looked forward to reviewing relevant studies at future meetings. However it was noted that the species had been reviewed quite recently as part of the review of small cetaceans in the Caribbean Sea and western tropical Atlantic (IWC, 2007) and suggested that it be considered as a possible secondary topic at a meeting in the near future but not as the priority topic next year.

As mentioned a number of times in this year's sub-committee report, there is increasing evidence of directed takes of small cetaceans for human use within local small-scale fisheries in some areas of Africa, Asia and South America. Some of these takes are related to decreases in fishing incomes, suggesting that cetaceans are serving as some type of substitute for other resources that are becoming scarcer in relation to demands for human consumption (so-called 'marine bushmeat'), bait for fisheries or income generation (including the sale of stranded or bycaught animals). Noting the status of global fisheries, and that this problem may originate at least in part from the effects of industrial fisheries on traditional fisheries, the sub-committee considered that an integrated view was warranted. It is reasonable to suspect a relationship between dwindling fish stocks (whether as a result of overfishing, habitat degradation or climate change) and the increased incidence of directed hunts of cetaceans.

The sub-committee **agreed** to add this issue as a potential future priority topic, depending on the results of an initial global review and assessment by an intersessional e-mail working group. Ritter agreed to convene this group, to collate information and report back at the next Annual Meeting.

13. ADOPTION OF REPORT

The report was adopted at 16:27 on 7 June 2010.

REFERENCES

Amaral, A.R., Beheregaray, L.B., Sequeira, M., Robertson, K.M., Coelho, M.M. and Möller, L.M. 2009. Worldwide phylogeography of the genus *Delphinus* revisited. Paper SC/61/SM11 presented to the IWC Scientific Committee, June 2009, Madeira, Portugal (unpublished). 12pp. [Paper available from the Office of this Journal].

Anon. 1953. Limits of Oceans and Seas. *International Hydrographic Organisation Special Publications* 23. International Hydrographic Bureau, Monaco.

Anon. 2008. Draft action plan for the conservation of small cetaceans of western Africa and Macaronesia - Rev.1. UNEP/CMS-WATCH II-Doc.4-Rev.1.

Bamy, I.L., van Waerebeek, K., Bah, S.S., Dia, M., Kaba, B., Keita, N. and Konate, S. 2010. Species occurence of cetaceans in Guinea, including humpback whales with southern hemisphere seasonality. *Marine Biodiversity Records* 3(e48): 10pp. Published online.

Brashares, J.S., Arcese, P., Sam, M.K., Coppolillo, P.B., Sinclair, A.R.E. and Balmford, A. 2004. Bushmeat hunting, wildlife declines, and fish supply in West Africa. *Science* 306: 1180-83.

Cadenat, J. 1956. A propos de cachalot. *Notes Afr.* 71: 82-92. [In French].

Cadenat, J. 1957. Observations de cetaces, sireniens, cheloniens et sauriens en 1955-1956. *Bulletin de l'IFAN* 19A: 1358-75. [In French].

Cadenat, J. 1959. Rapport sur les petits cetaces ouest-africains. Resultats des recherches entreprises sur ses animaux jusqu'au mois de mars 1959. *Bulletin de l'IFAN* 21A: 1367-409. [In French].

Clapham, P. and van Waerebeek, K. 2007. Bushmeat and bycatch: the sum of the parts. *Mol. Ecol. Notes* 16: 2607-09.

De Boer, M.N. 2010a. Cetacean distribution and relative abundance in offshore Gabonese waters. *JMBA*: In press.

De Boer, M.N. 2010b. First record of an anomalously white rough-toothed dolphin (*Steno bredanensis*) off West Africa including notes on rough-toothed dolphin surface behaviour. *Biodiversity Records* In press: 14pp.

Félix, F. and Samaniego, J. 1994. Incidental catches of small cetaceans in the artisanal fisheries of Ecuador. *Rep. int. Whal. Commn (special issue)* 15: 475-80.

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

Flores, P.A.C. 2008. Occurrence of Franciscana (*Pontoporia blainvillei*) in Bahia Norte, Southern Brazil. *LAJAM* 7(1-2).

Hardman-Mountford, N.J., Richardson, A.J., Agenbag, J.J., Hagen, E., Nykjaer, L., Shillington, F.A. and Villacastin, C. 2003. Ocean climate of the south east Atlantic observed from satellite data and wind models. *Prog. Oceanogr.* 59: 181-221.

Hazevoet, C.J. and 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). *Contrib. Zool.* 69(3): 197-211.

Heyning, J.E. and Perrin, W.F. 1994. Two forms of common dolphins (genus *Delphinus*) from the eastern North Pacific: evidence for two species. *Contrib. Sci. Los Angel.* 442: 1-35.

International Whaling Commission. 2001. Report of the Scientific Committee, Annex L. Report of the Workshop on Bycatch Mitigation Measures in Static Fisheries. *J. Cetacean Res. Manage. (Suppl.)* 3:292-96.
International Whaling Commission. 2002a. Chair's Report of the 53rd Annual Meeting. Annex C. Resolutions Adopted During the 53rd Annual Meeting. Resolution 2001-13. Resolution on small cetaceans. *Ann. Rep. Int. Whaling Comm.* 2001:60.
International Whaling Commission. 2002b. Report of the Scientific Committee. Annex K. Report of the Standing Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage. (Suppl.)* 4:325-38.
International Whaling Commission. 2003. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on whalewatching. *J. Cetacean Res. Manage. (Suppl.)* 5:382-91.
International Whaling Commission. 2004. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage. (Suppl.)* 6:315-34.
International Whaling Commission. 2005. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage. (Suppl.)* 7:307-17.
International Whaling Commission. 2006a. Report of the Scientific Committee. *J. Cetacean Res. Manage. (Suppl.)* 8:1-65.
International Whaling Commission. 2006b. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage. (Suppl.)* 8:221-40.
International Whaling Commission. 2007. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage. (Suppl.)* 9:297-325.
International Whaling Commission. 2010. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage (Suppl.)* 11(2):306-31.
Jefferson, T.A., Curry, B.E., Leatherwood, S.E. and Powell, J.A. 1997. Dolphins and porpoises of West Africa: a review of records. *Mammalia* 61(1): 87-108.
Jefferson, T.A. and Van Waerebeek, K. 2004. Geographic variation in skull morphology of humpback dolphins (genus *Sousa*). *Aquat. Mamm.* 30(1): 3-17.
Lázaro, M., Lessa, E.P. and Hamilton, H. 2004. Geographic genetic structure in the franciscana dolphin. *Mar. Mammal Sci.* 20(2): 201-14.
Mendez, M., Rosenbaum, H.C. and Bordino, P. 2008. Conservation genetics of the franciscana dolphin in northern Argentina: population structure, by-catch impacts, and management implications. *Conserv. Genet.* 9(2): 419-35.
Mendez, M., Rosenbaum, H.C., Subramaniam, A., Yackulic, C. and Bordino, P. 2010. Isolation by environmental distance in mobile marine species: molecular ecology of franciscana dolphins at their southern range. *Mol. Ecol.*: 17pp.
Moore, J.E., T.M., C. and R.L., L. 2010. An interview-based approach to assess marine mammal and sea turtle captures in artisanal fisheries. *Biol. Cons.* 143: 795-805.
Murphy, P.F., Van Waerebeek, K. and Jallow, A.O. 1997. Cetaceans in Gambian coastal waters. Paper SC/49/SM11 presented to the IWC Scientific Committee, September 1997, Bournemouth (unpublished). 8pp. [Available from the Office of this Journal].
NAMMCO. 2010. *Annual Report 2009*. North Atlantic Marine Mammal Commission, Tromso, Norway. 529pp.
Nieri, M., Grau, E., Lamarche, B. and Aguilar, A. 1999. Mass mortality of Atlantic spotted dolphins (*Stenella frontalis*) caused by a fishing interaction in Mauritania. *Mar. Mammal Sci.* 15(3): 847-53. [In Notes].
Notarbartolo-di-Sciara, G., Politi, E., Bayed, A., Beaubrun, P.C. and Knowlton, A. 1998. A winter cetacean survey off southern Morocco, with a special emphasis on right whales. *Rep. int. Whal. Commn* 48: 547-50.
Perrin, W.F. 2002. *Stenella frontalis*. *Mamm. Species* 702: 1-6.
Picanço, C., Carvalho, I. and Brito, C. 2009. Occurrence and distribution of cetaceans in São Tomé and Príncipe tropical archipelago and their relation to environmental variables. *J. Mar. Biol. Assoc. UK* 89(5): 1071-76.
Pitman, R.L. and Ensor, P. 2003. Three forms of killer whales (*Orcinus orca*) in Antarctic waters. *J. Cetacean Res. Manage.* 5(2): 131-39.
Reeves, R.R., Smith, B.D., Crespo, E.A. and Notarbartolo di Sciara, G. 2003. *Dolphins, Whales and Porpoises - 2002-2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group, Gland and Cambridge. xi+139pp.
Reiner, F., Dos Santos, M.E. and Wenzel, F.W. 1996. Cetaceans of the Cape Verde archipelago. *Mar. Mammal Sci.* 12(3): 434-43.
Richard, P.R., Laake, J.L., Hobbs, R.C., Heide-Jørgensen, M.P., Asselin, N.C. and Cleator, H. 2010. Baffin Bay narwhal population distribution and numbers: aerial surveys in the Canadian High Arctic, 2002-04. *Arctic* 63(1): 85-99.
Robineau, D. and Vely, M. 1993. Stranding of a specimen of Gervais' beaked whale (*Mesoplodon europaeus*) on the coast of West Africa (Mauritania). *Mar. Mammal Sci.* 9(4): 438-40.
Robineau, D. and Vely, M. 1997. Donnees preliminaires (faille corporelle, craniometrie) sur le grand dauphin (*Tursiops truncatus*) des cotes d'Afrique du nord-ouest (Mauritanie, Senegal). *Mammalia* 61: 443-48. [In French].
Robineau, D. and Vely, M. 1998. Les cetaces des cotes de Mauritanie (Afrique du nord-ouest). Particularites et variations spatio-temporelles de repartition: role des facteurs oceanographiques. *Rev. Ecol. Terre Vie* 53: 123-52. [In French].
Santos, M.C.O, Oshima, J.E.F. and Da Silva, E. 2009. Sightings of Franciscana dolphins (*Pontoporia blainvillei*): the discovery of a population in the Parangua estuarine complex, southern Brazil. *Brazilian Journal of Oceanography* 57(1): 57-63.
Secchi, E.R., Danilewicz, D. and Ott, P.H. 2003. Applying the phylogeographic concept to identify franciscana dolphin stocks: implications to meet management objectives. *J. Cetacean Res. Manage.* 5(1): 61-68.
Secchi, E.R., Wang, J.Y., Murray, B.W., Rocha-Campos, C.C. and White, B.N. 1998. Population differentiation in the franciscana *Pontoporia blainvillei* from two geographic locations in Brazil as determined from mitochondrial DNA control region sequences. *Can. J. Zool.* 76: 1,622-7.
Smit, V., Ritter, F., Ernert, A. and Strueh, N. 2010. Habitat partitioning by cetaceans in a multi-species ecosystem around the oceanic island of La Gomera (Canary Islands). Poster presented to the ECS Annual Conference, Stralsund, Germany, 22-24 March 2010.
Smith, B.D. and Beasley, I. 2004. *Orcaella brevirostris* (Mekong River sub-population). *In*: IUCN (eds). *IUCN Red List of threatened species version 2009.1*.
Tavares, M., Moreno, I.B., Siciliano, S., Rodriguez, D., De O. Santos, M.C., Lailson-Brito Jr, J. and Fabian, M.E. 2010. Biogeography of common dolphins (genus *Delphinus*) in the southwestern Atlantic Ocean. *Mammal Rev.* 40(1): 40-64.
Tchibozo, S. and van Waerebeek, K. 2007. La baleine a bosse et le lamantin d'Afrique, des potentielles resources de tourisme de la nature au Benin. Abstract, Convention on Migratory Species meeting WATCH, Adeje, Tenerife, Spain, 16-20 Octover 2007. [In French].
Van Waerebeek, K., Bamy, I.L., Jiddou, A.M., Sequeira, M., Diop, M., Ofori-Danson, P.K., Tchibozo, S. and Campredon, P. 2008a. Indeterminate status of West African populations of inshore common bottlenose dolphins *Tursiops truncatus* cautions against opportunistic live-capture schemes. Report to the Fondation Internationale du Banc d'Arguin. [*www.lafiba.com*].
Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. and Bamy, I.L. 2004. Distribution, status and biology of the Atlantic humpback dolphin, *Souza teuszii* (Kükenthal, 1892). *Aquat. Mamm.* 30(1): 56-83.
van Waerebeek, K. and 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., Diallo, M., Djiba, A., Ndiaye, P. and Ndiaye, E. 1997. Cetacean research in Senegal 1995-97; an overview. Paper SC/49/SM10 presented to the IWC Scientific Committee, September 1997, Bournemouth (unpublished). 10pp. [Paper available from the Office of this Journal].
van Waerebeek, K., Hazevoet, C.J., Lopez-Suarez, P., Simao Delgado Rodriguez, M. and Gatt, G. 2008b. Preliminary findings on the mass strandings of melon-headed whales *Peponocephala electra* in Boavista Island in November 2007, with notes on other cetaceans from the Cape Verde Islands. Technical Report to the Fondation Internationale du Banc d'Arguin (FIBA). 9pp. [Unpublished, obtainable from *www.lafiba.com*].
Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P.F., Jallow, A.O., Camara, A., Ndiaye, P. and Tous, P.T. 2000. *A Survey of the Conservation Status of Cetaceans in Senegal, The Gambia and Guinea-Bissau*. UNEP/CMS Secretariat, Bonn, Germany. 80pp.
Van Waerebeek, K. and Perrin, W.F. 2007. Conservation status of the Atlantic humpback dolphin, a compromised future? CMS Scientific Council Document CMS/ScC14/Doc.6, Bonn, Germany, 14-17 March 2007, 10pp.
Vidal, M., Servidio, A., Tejedor, M., Arbelo, M., Brederlau, B., Neves, S., Perex-Gil, M., Urquiola, E., Perez, G.E. and Fernandez, A. 2009. Cetaceans and conservation in the Canary Islands. Abstracts of the 18th Biennial Conference on the Biology of Marine Mammals, Quebec City, 12-16 October 2009. p.153.
Weir, C.R. 2006. First confirmed records of Clymene dolphin *Stenella clymene* (Gray, 1850) from Angola and Congo, south-east Atlantic Ocean. *African Zoology* 41(2): 297-300.

Weir, C.R. 2007. Occurrence and distribution of cetaceans off northern Angola, 2004/05. *J. Cetacean Res. Manage* 9(3): 225-39.
Weir, C.R. 2009. Distribution, behaviour and photo-identification of Atlantic humpback dolphins *Sousa teuszii* off Flamingos, Angola. *African Journal of Marine Science* 31(3): 319-31.
Weir, C.R. 2010. A review of cetacean occurrence in West African waters from the Gulf of Guinea to Angola. *Mammal Rev.* 40(1): 2-39.
Weir, C.R., Collins, T., Carvalho, I. and Rosenbaum, H. In Press. Killer whales (*Orcinus orca*) in Angolan and Gulf of Guinea waters, tropical West Africa. *J. Mar. Biol. Assoc. UK*.
Weir, C.R., Collins, T., Carvalho, I. and Rosenbaum, H.C. 2010. Killer whales (*Orcinus orca*) in Angolan and Gulf of Guinea waters, tropical West Africa. *J. Mar. Biol. Assoc. UK* 90: 1601-11.
Weir, C.R., Debrah, J., Ofori-Danson, P.K., Pierpoint, C. and van Waerebeek, K. 2008. Records of Fraser's dolphin *Lagenodelphis hosei* (Fraser 1956) from the Gulf of Guinea and Angola. *Afr. J. Mar. Sci.* 30(2): 241-46.

Appendix 1

AGENDA

1. Opening remarks
2. Election of Chair
3. Adoption of Agenda
4. Appointment of rapporteurs
5. Review of available documents
6. Review status of small cetaceans of northeastern Africa and the eastern tropical Atlantic
   - 6.1 Harbour porpoise (*Phocoena phocoena*)
   - 6.2 Rough-toothed dolphin (*Steno bredanensis*)
   - 6.3 Atlantic humpback dolphin (*Sousa teuszii*)
   - 6.4 Risso's dolphin (*Grampus griseus*)
   - 6.5 Common bottlenose dolphin (*Tursiops truncatus*)
   - 6.6 Atlantic spotted dolphin (*Stenella frontalis*) and pantropical spotted dolphin (*Stenella attenuata*)
   - 6.7 Spinner dolphin (*Stenella longirostris*)
   - 6.8 Clymene dolphin (*Stenella clymene*)
   - 6.9 Short-beaked common dolphin (*Delphinus delphis*) and long-beaked common dolphin (*Delphinus capensis*)
   - 6.10 Striped dolphin (*Stenella coeruleoalba*)
   - 6.11 Fraser's dolphin (*Lagenodelphis hosei*)
   - 6.12 Melon-headed whale (*Peponocephala electra*)
   - 6.13 Pygmy killer whale (*Feresa attenuata*)
   - 6.14 False killer whale (*Pseudorca crassidens*)
   - 6.15 Killer whale (*Orcinus orca*)
   - 6.16 Long-finned pilot whale (*Globicephala melas*) and short-finned pilot whale (*Globicephala macrorhynchus*)
   - 6.17 Dwarf sperm whale (*Kogia simus*) and pygmy sperm whale (*Kogia breviceps*)
   - 6.18 Cuvier's beaked whale (*Ziphius cavirostris*) and other Ziphiidae
7. Report on the intersessional working group on climate change
8. Progress on previous recommendations
   - 8.1 Vaquita
   - 8.2 Harbour porpoise
   - 8.3 Franciscana
   - 8.4 Narwhal
   - 8.5 Irrawaddy dolphin
   - 8.6 Other
9. Other presented information
10. Takes of small cetaceans
11. Summary of recommendations
12. Other business
13. Work plan
14. Adoption of Report

Appendix 2

DRAFT AGENDA FOR THE SMALL CETACEANS AND CLIMATE CHANGE WORKSHOP

1. Introductory items
   1.1 Appointment of the Chair
   1.2 Appointment of Rapporteurs
   1.3 Identification of relevant information available to the meeting (considerable collating of information will be done ahead of the meeting)
2. Objectives of Workshop
   2.1 Review and amend as appropriate
3. Overview of existing research and hypotheses
   3.1 Review report of IWC Second Workshop on Climate Change (CC2)
   3.2 Consider hypotheses considered at CC2
   3.3 Consider other relevant information, including recently published reviews
   3.4 Key presentations
      • Arctic
      • Restricted habitats (including sea mounts, atolls, reefs, environmental discontinuities, estuaries and riverine systems)
      • Range changes
   3.5 Other topics
      • Populations at the edge of their range (e.g. Scottish bottlenose dolphins)
      • Implications of sea-level rise
      • Critically endangered small cetaceans – the vaquita and the river dolphins
4. Identification of key aspects
   4.1 Key studies
   4.2 Key species, populations and areas
   4.3 Opportunities for future research
5. Recommendations
   5.1 Further research
   5.2 Conservation implications and responses
   5.3 Other

Appendix 3

PROJECT PROPOSAL FOR THE VOLUNTARY FUND FOR SMALL CEATCEAN CONSERVATION RESEARCH

TITLE

Threatened Franciscanas: Improving Estimates of Abundance to Guide Conservation Actions

BRIEF DESCRIPTION OF PROJECT

The franciscana (*Pontoporia blainvillei*) is endemic of the eastern coast of South America between Brazil (18°25'S) and Argentina (41°10'S). The species is regarded as the most threatened small cetacean in South America due to high, possibly unsustainable, bycatch levels as well as increasing habitat degradation throughout its range (Secchi *et al.*, 2003) and is listed as Vulnerable by the IUCN Red List of Threatened Species (see *http://www.cmsdata.iucn.org/downloads/cetacean_table_for_website.pdf*).

Aerial surveys have been conducted through most of the species range as they are considered the most reliable method for estimating abundance of franciscanas; see SC/62/SM7 (Crespo *et al.*, 2010; Danilewicz, In press; Secchi *et al.*, 2001). However, such estimates can be biased due to difficulties in group size estimation and lack of appropriate correction factors for availability bias. Previous studies have shown that franciscana groups seen from planes are 2-4 times smaller than those seen from still or slow moving platforms; see SC/62/SM7 (Bordino *et al.*, 1999; Crespo *et al.*, 2010; Secchi *et al.*, 2001), suggesting that biases in estimates of abundance from underestimation of group size can be substantial. In addition, estimates of diving parameters used in franciscana aerial surveys are available only for a small, possibly isolated (Mendez *et al.*, 2008), population in Anegada Bay, Argentina. If diving parameters of franciscanas in this bay differ from other areas, additional bias may occur for estimates computed for other parts of the franciscana range.

The objective of this proposal is to compute correction factors to improve abundance estimates of franciscana dolphins. Boat and aerial surveys will be carried out in Babitonga Bay, southern Brazil. There are a number of advantages in conducting this study there. First, this is a place where franciscanas predictably occur in relatively large densities throughout the year (Cremer and Simoes-Lopes, 2008). Second, group sizes seen in Babitonga Bay - mean=7, range=1-22 individuals (Cremer and Simoes-Lopes, 2005) - are believed to be representative of those seen through most of the range of the species (e.g. Crespo *et al.*, 1998; Flores, 2008). Finally, the bay is relatively protected and therefore provides good weather conditions (e.g. relatively calm waters) for sighting surveys from both types of platforms.

Independent estimates of mean group sizes and their associated uncertainty will be obtained from the boat and the airplane and a correction factor will be calculated. In addition, diving parameters of franciscanas (notably, average times submerged and at the surface) will be computed to obtain an estimate of availability bias different from that computed with diving data from franciscanas in Argentina. Finally, experiments will be conducted to estimate the time an object is available for the observer in the airplane, a quantity needed for estimating availability bias. These parameters will then be used in the estimation of this correction factor as proposed by Barlow *et al.* (1988).

In discussion of document SC/62/SM7 during the 2010 Scientific Committee meeting, the Small Cetaceans Sub-Committee made the following recommendations to improve estimates of abundance: (1) improve estimates of visibility bias; (2) evaluate potential biases in the estimation of group sizes; and (3) estimate franciscana diving parameters in areas where such information is not available. The objectives of this proposal directly address these recommendations.

The proposed research will lead to improved estimates of abundance of franciscanas and will provide a basis to evaluate the long-term viability of various franciscana populations. Such efforts can be used by local governments and international organizations to establish or prioritise management strategies for the species (e.g. mitigation of bycatch and other human impacts). Assessing the status of the franciscana has been a long-term recommendation of various bodies, including the governments of the franciscana range states, the IUCN (Reeves *et al.*, 2003) and the IWC Scientific Committee (IWC, 2005). Results of this study can be also used to increase awareness of the franciscana issues within educational and conservation contexts.

This study will also provide the opportunity for new scientists to participate in field work and therefore will contribute to local capacity building. Finally, the proponents will seek advice from scientists from other countries with experience in aerial surveys and therefore will enhance international collaboration.

TIMETABLE

Surveys will be conducted in the austral summer 2010/11 and results will be reported at the next IWC Scientific Committee.

RESEARCHERS' NAMES AND AFFILIATIONS

- Alexandre Zerbini (National Marine Mammal Laboratory, Alaska Fisheries Science Center, Seattle, WA, USA and Instituto Aqualie, Rio de Janeiro, RJ, Brazil).
- Eduardo Secchi (Universidade Federal do Rio Grande, Rio Grande, RS, Brazil).
- Daniel Danilewicz (Instituto Aqualie, Rio de Janeiro, RJ, Brazil; Grupo de Estudos de Mamíferos Aquáticos do Rio Grande do Sul – GEMARS, Porto Alegre, RS, Brazil).
- Artur Andriolo (Universidade Federal de Juiz de Fora, Juiz de Fora, MG, Brazil and Instituto Aqualie, Rio de Janeiro, RJ, Brazil).
- Paulo André Flores (Instituto Chico Mendes para a Conservacao da Biodiversidade, Florianopolis, SC, Brazil).

ESTIMATED TOTAL COST WITH BREAKDOWN AS NEEDED

Aircraft charter: 14hs @ £1,040 = £14,560

Fuel for skiff 300 litres @ £1.05 = £315

Room and board: 4 scientists for 5 days @ £42/day = £840

Supplies = £1,380

Total = £17,095

REFERENCES

Barlow, J., Oliver, C.W., Jackson, T.D. and Taylor, B.L. 1988. Harbor porpoise, *Phocoena phocoena*, abundance estimation for California, Oregon, and Washington: II. Aerial surveys. *Fish. Bull.* 86(3): 433-44.

Bordino, P., Thompson, G. and Iñíguez, M. 1999. Ecology and behaviour of the franciscana (*Pontoporia blainvillei*) in Bahía Anegada, Argentina. *J. Cetacean Res. Manage.* 1(2): 213-22.

Cremer, M.J. and Simoes-Lopes, P. 2005. The occurrence of *Pontoporia blainvillei* (Gervais and d'Orbigny) (Cetacea, Pontoporiidae) in an estuarine area in southern Brazil. *Rev. Bras. Zool.* 22(3): 717-23.

Cremer, M.J. and Simoes-Lopes, P. 2008. Distribution, abundance and density estimates of franciscanas, *Pontoporia blainvillei* (Cetacea, Pontoporiidae) in Babitonga Bay, southern Brazil. *Rev. Bras. Zool.* 25: 397-402.

Crespo, E.A., Harris, G. and González, R. 1998. Group size and distributional range of the franciscana, *Pontoporia blainvillei*. *Mar. Mammal Sci.* 14(4): 845-49.

Crespo, E.A., Pedraza, S.N., Grandi, M.F., Dans, S.L. and Garaffo, G.V. 2010. Abundance and distribution of endangered franciscana dolphins in Argentine waters and conservation implication. *Mar. Mammal Sci.* 26: 17-35.

Danilewicz, D. In press. Abundance estimation for a threatened population of franciscana dolphins in southern Brazil: uncertainties and conservation considerations. *J. Mar. Biol. Assoc. UK*.

Flores, P.A.C. 2008. Occurrence of Franciscana (*Pontoporia blainvillei*) in Bahia Norte, Southern Brazil. *LAJAM* 7(1-2).

International Whaling Commission. 2005. Report of the Scientific Committee. Annex L. Report of the Sub-Committee on Small Cetaceans. *J. Cetacean Res. Manage. (Suppl.)* 7:307-17.

Mendez, M., Rosenbaum, H.C. and Bordino, P. 2008. Conservation genetics of the franciscana dolphin in northern Argentina: population structure, by-catch impacts, and management implications. *Conserv. Genet.* 9(2): 419-35.

Reeves, R.R., Smith, B.D., Crespo, E.A. and Notarbartolo di Sciara, G. 2003. *Dolphins, Whales and Porpoises - 2002-2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group, Gland and Cambridge. xi+139pp.

Secchi, E.R., Danilewicz, D. and Ott, P.H. 2003. Applying the phylogeographic concept to identify franciscana dolphin stocks: implications to meet management objectives. *J. Cetacean Res. Manage.* 5(1): 61-68.

Secchi, E.R., Ott, P.H., Crespo, E.A., Kinas, P.G., Pedraza, S.N. and Bordino, P. 2001. A first estimate of franciscana (*Pontoporia blainvillei*) abundance off southern Brazil. *J. Cetacean Res. Manage.* 3(1): 95-100.