Annex K
Report of the Sub-Committee on Small Cetaceans

Members: Read (Chair), Aguilar, Allison, Atkins, Baker, Baldwin, Berggren, Bjørge, Borodin, Brownell, Childerhouse, Cipriano, Clark, E., Collins, Corkeron, Deimer, DeMaster, Diake, Donahue, Donovan, Etylina, Fulford-Gardiner, Funahashi, Gales, Garrigue, Guissamulo, Gunnlaugsson, Hedley, Hung, Iniguez, Jefferson, Karczmarski, Kasuya, Kell, Kim, Kock, Krahn, Larsen, Lens, Manzanilla Naim, Melnikov, Mikhalev, Minton, Northridge, Oosthuizen, Palka, Parra, Parsons, Peddemors, Perrin, Porter, Rambally, Read, Reeves, Reijnders, Ridoux, Rogan, Rojas-Bracho, Rosenbaum, Rowles, Sadler, Senn, Simmonds, M., Sohn, Stachowitsch, Sutaria, Suydam, Swartz, Thiele, Tregenza, Urban-Ramirez, Van Waerebeek, Vikingsson, Wade, Williams, Wilson, Zeh, Zerbini.

1. ELECTION OF CHAIR

Read was elected Chair.

2. ADOPTION OF AGENDA

The adopted Agenda is given as Appendix 1.

3. APPOINTMENT OF RAPPORTEURS

Rogan and Wilson acted as rapporteurs.

4. REVIEW OF AVAILABLE DOCUMENTS

Documents relevant to the work of the sub-committee were: SC/54/SM2-37, SC/54/O4 and SC/54/O22.

5. REVIEW OF STATUS OF HUMPBACK DOLPHINS

On several occasions in the past, the Scientific Committee has expressed concern regarding the status of humpback dolphins (genus *Sousa*). This concern has arisen from the existence of potentially unsustainable bycatches in gillnet fisheries, as well as in shark control nets in South Africa and Australia (Perrin *et al*., 1994), high levels of contaminants, and extensive habitat degradation in many areas of its range (e.g. IWC, 1999, pp.211-215). Humpback dolphins are obligate shallow water animals (Ross *et al*., 1994; Jefferson and Karczmarski, 2001) that may be particularly vulnerable to the effects of anthropogenic activities, such as commercial fisheries and habitat modification in near-shore waters. At this year's meeting, the sub-committee examined the status of this genus throughout its range.

5.1 Systematics

The taxonomy of humpback dolphins (genus *Sousa*) is confused. Recent reports have suggested the existence of from one to five species within the genus. The classification proposed by Rice (1998) identifies three species: *S. teuszii*, *S. plumbea* and *S. chinensis* in the Atlantic, Indian and Indo-Pacific Oceans, respectively. In contrast, the IWC has preferred to be conservative in the face of uncertainty and currently recognises only two species: *S. teuszii* (the Atlantic humpback dolphin) and *S. chinensis* (the Indo-Pacific humpback dolphin) (IWC, 2001b).

SC/54/SM8 addressed the taxonomy of *Sousa* in an analysis of cranial morphometrics, measured from 181 skulls from throughout most of the range of the genus. Condylobasal length varied greatly, perhaps reflecting concomitant geographical variation in body size. Tooth counts were more conservative, although specimens from West Africa had lower tooth counts than animals from other areas. A Principal Components Analysis (PCA), performed using morphometric and meristic characters from adult skulls, resulted in the calculation of three principal components. A scatterplot of the first two components did not reveal clear-cut separation of geographical forms. When polygons were drawn around specimens from West Africa, western Indian Ocean and eastern Indian/Pacific Ocean, however, it was possible to discern some evidence of separation of samples from the three areas. Specimens from West Africa did not overlap with those from the western Indian Ocean, but showed strong overlap with those from the eastern Indian and western Pacific Oceans.

This finding is in contrast to geographical variation in gross external morphology and colouration. Humpback dolphins from West Africa and the western Indian Ocean exhibit a prominent dorsal hump and are uniformly grey in colour, while those from the eastern Indian Ocean and western Pacific lack the dorsal hump and are light grey to white as adults, often with prominent darker spots. Colouration changes in early post-natal development from dark grey to light in the eastern Indian Ocean, but not in western Indian Ocean and Atlantic *Sousa*. Parra informed the sub-committee that Graham Ross was currently revising the taxonomy of this genus based on morphology and colouration patterns. The sub-committee looks forward to receiving this update.

The preliminary analysis of cranial morphology underscored the variability of this genus and emphasised the need for additional research with larger samples, but no revisions of the IWC's current taxonomy were proposed.

Peddemors presented a synopsis of a thesis on geographical variation in skull morphometrics of *Sousa* (Limpers, 1998). The analysis was based on 16 morphological features, measured from 54 specimens in the collection of the Zoological Museum of Amsterdam. The authors suggested that a cluster analysis showed clear separation of *S. teuszii* from *S. chinensis*, which was comprised of more than one group. However, it was not possible to fully evaluate this analysis, because the entire dataset was not available for examination.

SC/54/SM34 reviewed phylogenetic relationships and population structure of this genus, primarily from Southeast Asia, the coast of Oman and South Africa. A total of 110 samples were sequenced for 501bp of mtDNA control region. Additionally, a 358bp fragment of the Cytochrome B gene was amplified from a subset of samples. A maximum of 25 variable nucleotide positions, defining 27 unique haplotypes, were detected among the 110 mtDNA control region sequences. An AMOVA showed statistically significant variance among groups (southeast Asia, northern Indian Ocean, southern Indian Ocean; $\Phi_{ST} = 0.879$, $P = 0.000$). Variance among sites was also statistically significant when haplotype frequencies alone were analysed ($F_{ST} = 0.394$, $P = 0.000$). All pairwise comparisons using molecular information (Φ_{ST}) and haplotype information (F_{ST}) were highly significant ($p < 0001$) for populations with sample sizes greater than or equal to 10 (Hong Kong, Xiamen, South Africa and Oman). Maternal lineages were only shared across Hong Kong, Pearl River estuary, Taiwan and Xiamen groups. The Pearl River lineage was found in the samples from Hong Kong, Taiwan and Xiamen; three other lineages (one for each pairwise comparison) were shared between Hong Kong, Taiwan and Xiamen.

Population aggregation analysis revealed four fixed, diagnostic nucleotide characters that distinguish humpback dolphins in the Indian Ocean (Oman, South Africa, Madagascar) from those in the Pacific Ocean (southeast Asia). Two diagnostic nucleotide characters and one private maternal lineage were found among the samples from Madagascar and South Africa. There were no diagnostic characters for samples from Oman. To examine the relationships of all unique haplotypes, a phylogenetic analysis of the mtDNA control region sequences was performed. Preliminary phylogenetic analysis suggested three principal clades among the sampled populations of humpback dolphins: a monophyletic clade containing all humpback dolphins from the Pacific (southeast Asia); a clade containing only Oman humpback dolphins; and a clade containing humpback dolphins from Madagascar, South Africa and a single lineage with two individuals from Oman. Indian Ocean maternal lineages were polyphyletic with respect to the overall topology. The clade containing only Oman lineages is sister to the clade containing all lineages from southeast Asia.

The results obtained from mitochondrial DNA control region analysis of humpback dolphin populations is intriguing, but preliminary and must be interpreted with caution. Both the population genetic and phylogenetic approaches reveal strong regional structuring among the populations examined. No maternal lineage haplotypes were shared between humpback dolphins in the southern Indian Ocean, northern Indian Ocean, or Pacific Ocean. The results from population genetic analyses suggest that strong population structuring occurs in this genus, both within and across ocean basins.

Applying a phylogenetic approach to analysing the mtDNA data is complicated because it is not known if the variation observed among humpback dolphins represents inter- or intra-specific variation. However, the finding of well-supported regional clades provide operational populations for testing hypotheses about species designations. The phylogenetic results are less straightforward. Four fixed nucleotide characters differentiate all lineages sampled in the Indian Ocean from lineages in the Pacific Ocean. Yet the phylogeny shows that Indian Ocean lineages are polyphyletic, with one clade of lineages from Oman more closely related to humpback dolphins from southeast Asia, and a second lineage from Oman more closely related to lineages from the southern Indian Ocean than they are to other lineages from Oman. Therefore, the relationship between humpback dolphins in the Indian and Pacific Oceans cannot be further resolved until additional character data are included. An initial combined analysis, using both the mtDNA control region and a 358bp fragment of Cytochrome B resulted in topology identical to the mtDNA control region phylogeny. Given the ancestral polymorphism that could exist within the mtDNA sequences for analysis at the population-species level, the relationship between Pacific and Indian Ocean clades needs to be examined with additional character data from nuclear gene regions and morphology.

The lineage from Oman that forms a clade with samples from Madagascar and South Africa is comprised of two animals found stranded near Mughsayl. These are the only two samples from this region, and were obtained well south-west of the locations of other samples from Oman. The grouping of this lineage with the southern Indian Ocean lineages is well supported. Further sampling in this region of Oman, as well as in the Gulf of Aden, Horn of Africa/Somalia and the Red Sea should yield new insight into the population affiliation of these two specimens, which may be distinct from the populations of humpback dolphins in eastern Oman. With additional samples from this region and others from areas further to the east (e.g. India, Malaysia), it will be interesting to examine whether:

(1) there is continued support for an African/western Arabia clade that unites the southern Indian Ocean and some parts of the northern Indian Ocean that is separate from populations to the east;
(2) a more close evolutionary relationship exists between humpback dolphins from Oman with those from the Pacific Ocean.

The sub-committee agreed with the conclusion of the report that it would be premature to draw any firm conclusions concerning the taxonomy or systematics of humpback dolphins from these preliminary analyses. Therefore, the sub-committee recommends that the current IWC classification of two species be maintained for the time being, but recognises that this classification may require future revision. The sub-committee also recommends the use of the common name 'humpback' instead of 'hump-backed' for dolphins of this genus.

To provide a more complete systematic analysis of this genus, the sub-committee recommends the following:

(1) Expanded morphological and molecular sampling throughout the range of the genus.
(2) Representative sampling of humpback dolphins from areas in which samples have not yet been included in molecular analyses, such as Australia, India, Malaysia, Mozambique, Tanzania, the Persian Gulf, Gulf of Aden, Red Sea and West Africa.

In certain areas, such as southeast Asia, southern Africa, and the northern Indian Ocean, it may be possible to test hypotheses concerning the regional population structure of humpback dolphins. The sub-committee recommends that this work continue to be conducted, so that gene flow within and between populations can be evaluated using molecular data.

5.2 Distribution and stock structure

Humpback dolphins occur in coastal waters of the eastern Atlantic, Indian and western Pacific Oceans (Jefferson and Karczmarski, 2001). Current knowledge regarding the distribution of this genus is given in Fig. 1. The distribution presented in Fig. 1 is derived from known and verified sightings or stranding records. Therefore, gaps in the distribution should be interpreted with caution, as they may represent real distribution gaps or gaps in our current knowledge due to a lack of research effort. SC/54/SM9 reviewed the distribution of humpback dolphins in western Africa. In this region, humpback dolphins have a discontinuous distribution from Dakhla Bay (Morocco), through Banc d'Arguin (Mauritania), Saloum-Niumi (Senegal – N. Gambia), Canal do Geba-Bijagos (Guinea-Bissau) and southern Guinea. Despite ongoing research, there have been no reports of humpback dolphins along a 720km length of coastline from eastern Benin to the Ivory coast. This area appears to be unsuitable habitat. There is no information on humpback dolphins in Liberia or Sierra Leone but records exist from Cameroon and Gabon. Rosenbaum noted that *Sousa* has not been recorded during systematic surveys of the waters of Gabon in recent years. Anecdotal records suggest that the genus may also be present in northern Angola. There are no records of humpback dolphins from northern Angola to South Africa and it is believed that this represents a real distributional gap.

In South Africa, *Sousa* have been recorded as far west as False Bay, Western Cape and are distributed along the coast into the Indian Ocean, with areas of high density apparently spatially separated (SC/54/SM22, 25, 37). Humpback dolphins are present in some locations in Mozambique (SC/54/SM15, 28), Kenya (Weru, 2001) and Tanzania. *Sousa* have also been recorded along the western coast of Madagascar (SC/54/SM33), Mayotte (SC/54/H9) and from Zanzibar.

In the Arabian region, the range of humpback dolphins includes much of the Arabian Gulf, Arabian Sea, Gulf of Aden and Red Sea (SC/54/SM6, 26). There are records of *Sousa* from Somalia, the Gulf of Suez, Saudi Arabia and Yemen, but the distribution of humpback dolphins in this region is poorly known. *Sousa* form a large proportion of small cetacean strandings in Oman (SC/54/O4), but their range extends only as far north as Ra's Al Hadd. A hiatus in distribution extends as far north as Musandam. Humpback dolphins are present in the Arabian (Persian) Gulf, with records from the United Arab Emirates, Qatar, Bahrain, Saudi Arabia, Kuwait, Iraq and Iran.

Pilleri and Gihr (1972) documented the occurrence of *Sousa* in Pakistan and recent sightings confirm that humpback dolphins occur in this area (SC/54/SM35). Information on the distribution of humpback dolphins in India was derived from sightings, strandings and incidental catches (SC/54/SM35). In western India, *Sousa* is distributed more or less continuously from the Gulf of Kachchh to Kanyakumari. There are no records of humpback dolphins from Sri Lanka. There is limited information from Kanyakumari to Tamil Nadu and Andra Pradesh, but the distribution is more or less continuous from there to the Bay of Bengal and Bangladesh.

Jefferson presented information on the distribution of humpback dolphins in southeast Asia from a number of sources, including strandings, live captures, sightings and skulls found at museums and whale temples. There are

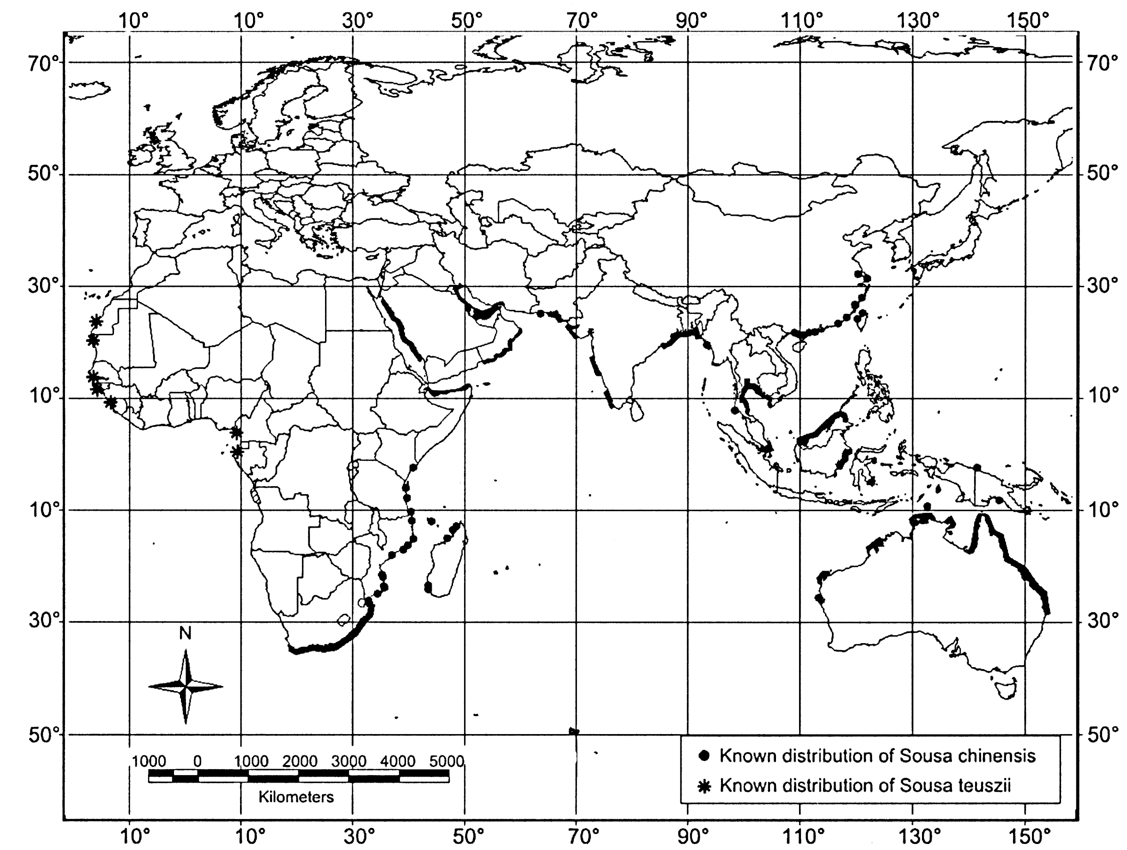

Fig. 1. Known distribution of *Sousa chinensis* and *S. teuszii*. The map depicts known occurrences only; gaps may represent a true hiatus in distribution or merely a lack of knowledge. Knowledge of the distribution of these species is fragmentary and some records may be outdated.

reports of *Sousa* from Myanmar, the Gulf of Thailand, Vietnam, Malaysia, Indonesia, Brunnei, Singapore and Papua New Guinea (Jefferson and Karczmarski, 2001). There are no records from the Maldives, Solomon Islands or East Timor. Perrin reported an absence of *Sousa* in most of the Philippines, despite many surveys. There is a record of a single stranding in the western Philippines, part of the Bornean faunal region.

SC/54/SM7 provided detailed information on the distribution of *Sousa* in China. Humpback dolphins are apparently discontinuously distributed and range from the border with Vietnam north to the mouth of the Yangtze River, and are found frequently at the mouths of major estuaries. Of these, Hong Kong and the Pearl River Estuary are the best studied. In Taiwan, there are sightings records from the west coast, but humpback dolphins are apparently absent from the east coast, where the continental shelf is narrow and habitat is unsuitable.

In Australia, humpback dolphins are distributed discontinuously from Ningaloo Reef in Western Australia to Brisbane in Queensland (SC/54/SM27). Gales reported a confirmed sighting from Shark Bay, but Berggren noted that humpback dolphins are very rare in this well-studied area. An apparent gap in distribution in the Gulf of Carpentaria and Ningaloo Reef is probably the result of a lack of survey effort. Perrin reminded the sub-committee of bycatches of humpback dolphins in a Taiwanese shark gillnet fishery, which operated in the northern Australian Exclusive Economic Zone in the 1980s (Harwood and Hembree, 1987). This fishery now operates in Indonesian waters of the Timor and Arafura Seas.

5.3 Abundance

There are few estimates of the abundance of humpback dolphins in any parts of their range. Estimates derived from line transect surveys or photographic capture-recapture methods are presented in Table 1.

Corkeron described the early stages of development of an acoustic approach to estimate density of humpback dolphins (SC/54/SM29). This approach uses a simple hydrophone and recording device to monitor the number of vocalisations. Humpback dolphin repertoires were easily distinguishable and regression equations indicate that the mean number of calls increases with school size (usually <9 individuals). Such an approach might complement traditional visual surveys to provide information on habitat utilisation and relative density, particularly in areas where such visual surveys are not feasible. The sub-committee welcomed this approach and encouraged its future development.

There was discussion about the most appropriate methods (e.g. photographic capture-recapture or line transect) to estimate abundance of humpback dolphins. A combination of methods, as employed in Hong Kong and the Pearl River Estuary (SC/54/SM7), provides information on the potential biases of each method. This may not always be possible however, due to limitations imposed by habitat, animal behaviour, or logistical reasons. As noted by Wilson, the most appropriate method to estimate abundance of this species is the one most suited for the region, population characteristics and research objectives.

In summary, there are very few estimates of abundance for humpback dolphins in any part of their range and trend data exist at only one site, Hong Kong. However, in comparison with many other small cetaceans, humpback dolphins are not very abundant in any part of their range. The discontinuous distribution of the species likely reflects the existence of pockets of suitable and available habitat, and possibly local extirpations and range reductions. The sub-committee **recommends** that abundance estimates be derived for other areas.

5.4 Seasonal movements

Seasonal movements of humpback dolphins occur in many, but not all areas of the range. These movements appear to be rather diffuse, rather than co-ordinated migrations. In Richards Bay, South Africa, a small group of dolphins appear to be resident (Durham, 1994), while others range over larger areas (SC/54/SM25). At least one photographic match has been made between individuals in Richards Bay and those in Durban, 150km away. Seasonal movements have been found in Hong Kong (SC/54/SM7); Algoa Bay, South Africa (SC/54/SM14); and in Maputo Bay, Mozambique (SC/54/SM28). In some areas, including Hong Kong and Pearl River Estuary (SC/54/SM4; Jefferson, 2000), these movements may be associated with an increase in freshwater input into estuaries during the rainy season, possibly associated with seasonal variation in food availability. Parsons summarised other information on seasonal movements of humpback dolphins from other areas (SC/54/SM4). In Kwa-Zula Natal, there is an increase in humpback dolphin bycatch in shark control nets in summer and autumn (Cockcroft, 1990) and in Hong Kong, seasonal movements and changes in abundance are linked to the hydrography of the Pearl River (SC/54/SM4; Jefferson, 2000).

5.5 Life history

There is very little information on the life history of this genus, existing data come almost exclusively from South Africa and Hong Kong (SC/54/SM22; Jefferson, 2000). Gestation lasts for approximately 12 months and calves are born at lengths of between 90-115cm. In South Africa, age at sexual maturation was estimated to be approximately 10 years in females and 13-14 years in males; limited

Table 1

Abundance estimates of humpback dolphins throughout their range.

Area	Abundance (95% CI)	Method	Reference
Kwa-Zulu Natal, S. Africa	160 – 165 (134-229)	Capture-recapture	Durham (1994)
Richard's Bay, S. Africa[1]	170 (112 – 230) 244	Capture-recapture	SC/54/SM25
Richard's Bay, S. Africa[1]	(217 – 287)	Capture-recapture	SC/54/SM25
Algoa Bay, S. Africa	466 (447 – 485)	Capture-recapture	Karczmarski *et al*. (1999)
Maputo Bay, Mozambique	105 (30 – 151)	Capture-recapture	SC/54/SM28
Hong Kong/Pearl River estuary, PRC	1,028	Line transect	Jefferson (2000)
Xiamen, PRC	80 (CV = 1.08)	Line transect	SC/54/SM7
Moreton Bay, Australia[2]	119 (81 – 166)	Capture-recapture	Corkeron *et al*. (1997)
Moreton Bay, Australia[2]	163 (108 – 251)	Capture-recapture	Corkeron *et al*. (1997)

[1] Estimated using different models; [2] Calculated in two different periods.

observations suggest a similar range for humpback dolphins in Hong Kong. There is evidence of sexual dimorphism in South Africa, with males reaching an asymptotic length of 269cm, while females reach an asymptotic length of 242cm. The oldest animals aged to date were 34 years of age in Hong Kong and 46 years in South Africa. The calving interval in South Africa was estimated to be three years. Reproduction is diffusely seasonal in both areas, with a peak of births occurring during spring and summer. In many ways, these life history parameters, although derived from limited information, are similar to those of bottlenose dolphins from the Gulf of Mexico (e.g. Wells and Scott, 1990). These similarities should allow parameterisation of demographic models for *Sousa* using surrogate data from *Tursiops*.

The sub-committee **recommended** that more work on the life history of this species be carried out in the different regions, particularly in areas where samples of stranded or bycaught specimens are available. In other areas, some of this information can be derived from longitudinal studies using photographic identification techniques. A longitudinal approach offers particular promise to improve understanding of fecundity, mortality and immigration/emigration rates, but requires a substantial (decadal) time investment by individual researchers.

5.6 Ecology

Humpback dolphins are essentially coastal animals, inhabiting estuaries, river mouths and near-shore waters where mangroves, sandbars, rocky outcroppings or reefs harbour prey (Jefferson and Karczmarski, 2001). Most sightings have been made in water depths less than 25m, although the existence of populations in adjacent areas separated by deep water suggests that individual dolphins may traverse deeper waters on occasion.

Data on feeding ecology are also limited, with most data from the stomach contents of stranded or bycaught animals from Hong Kong, Xiamen and South Africa (SC/54/SM22; Jefferson, 2000). Most prey items are small estuarine or reef fish (SC/54/SM4) and some prey species are also commercially important. In Hong Kong, very few cephalopods, holothurians or crustaceans occur in the diet, but Baldwin noted that cephalopods and crustaceans were consumed in the Arabian Sea. In Hong Kong, humpback dolphins often associate with fishing vessels, primarily demersal pair trawlers (SC/54/SM4; Jefferson, 2000). Some individual dolphins are seen repeatedly behind trawlers, but other animals rarely associate with these fishing vessels.

As noted above, there is evidence of site fidelity in some areas. Along open coastlines, site fidelity is weak, and seasonal movements may be more pronounced. In the Algoa Bay region the majority of animals are involved in long-range movement, probably approximately a few hundred kilometers along the shore (Karczmarski *et al*., 1999). Females show increased site fidelity before parturition and during the nursing period. In sheltered areas or areas protected by lagoons (for example, Maputo Bay, Mozambique; SC/54/SM14), there can be a higher degree of site fidelity, on a population/group level.

Sousa exhibit a fission–fusion society, structured to some degree by sex and age, with few long-term associations except for mother-calf pairs (SC/54/SM14). Solitary animals (perhaps males) have been seen frequently in the Eastern Cape, and may be engaged in mate searching (Karczmarski *et al*., 1999). Group size varies among sites, but in general, humpback dolphins are found in small groups of less than fifteen animals. The sub-committee agreed that the social structure may vary from region to region.

5.7 Habitat

Hung presented a detailed analysis of humpback dolphin habitat use in Hong Kong (SC/54/SM36), based on 2,460 sightings made up to March 2002. The survey area was divided into 1km grids to examine patterns of habitat use and the effect of anthropogenic activities on humpback dolphins. The sighting data have not yet been standardised for effort, but a preliminary analysis suggests that dolphins are found most frequently near Lantau Island, in an area influenced by freshwater input from the Pearl River. This shallow, estuarine area supports abundant fisheries resources that are important prey for humpback dolphins. The sub-committee welcomed this approach and encouraged further development of the habitat analysis. Future work will examine diurnal, seasonal, and inter-annual variation in the distribution of humpback dolphins, as well as the effects of other factors such as water quality and depth. In addition, overlap in the distribution of finless porpoises will be examined and a critical habitat index derived to help describe preferred habitat of these two species.

Throughout its range, *Sousa* appears to be tolerant of variation in salinity. Humpback dolphins occur predominately in high salinity areas in Mauritania and Senegal, whereas in most other areas, such as Hong Kong, they are associated with relatively low salinities and large freshwater inputs.

Mangroves, reefs and coastal lagoons are important habitat in many areas of the range of this genus, such as Mozambique (SC/54/SM15). In other areas, rocky outcrops are important habitat, such as in western Madagascar (SC/54/SM33) and Eastern Cape, South Africa (SC/54/SM15; Karczmarski *et al*., 1999). In Hong Kong, one of the most modified coastal habitats in the world, the bottom substrate is relatively uniform, but humpback dolphins often occur in shipping channels (SC/54/SM36). Although humpback dolphins are able to exist, to some degree, in the face of heavy shipping traffic, dredging, land reclamation and coastal development, the sub-committee noted that the continued presence of humpback dolphins in highly degraded habitats, such as the waters around Hong Kong, does not rule out adverse effects of habitat degradation. There is no long-term time series of relative abundance for this genus in any area of its range with which to measure the effect of such environmental degradation. In areas with patchy distribution of inshore suitable habitats (for example, west and southern/east Africa) habitat degradation can be a serious threat to *Sousa*.

5.8 Directed takes

With the exception of Madagascar, there is little evidence for intensive direct exploitation of humpback dolphins. In some areas, however, it is difficult to differentiate direct from incidental takes. In other areas, directed takes are illegal and estimation of their magnitude is difficult to quantify. For example, in Senegal and the Gambia, areas of rapid human population growth and, therefore, a high potential for cetacean consumption, Van Waerebeek noted that it is likely that some dolphins are killed regularly. This practice is illegal, however, and carcasses are often butchered at sea, or their remains buried on shore. A similar situation may exist in Mozambique. Berggren noted that dolphins used to be hunted in Menai Bay, Zanzibar, for human consumption and for bait in the long-line shark fishery. However, this hunt has in recent years (1997) been replaced by dolphin tourism.

SC/54/SM33 presented information on directed takes of humpback dolphins in Madagascar. Interviews and surveys at fishing camps made in 1999 in southern Madagascar revealed that humpback dolphins have been hunted with harpoons and taken directly in gillnets. Since gillnets were introduced in 1985, fishermen have been using nets rather than harpoons. The fishing period typically occurs between August and December and, in general, dolphin meat is sold or consumed locally. There is also some evidence of a drive fishery for small cetaceans in this region. Twenty-two humpback dolphins were reported taken in Anakao between 1985 and 1999. No bycatch was reported from this area, but 30 stranding events were reported, which may or may not have been human induced. When few dolphins are caught, the meat is shared among family members or sold to local villages. Trade into larger urban areas occurs with larger harvests. The actual magnitude of this fishery is unknown and there is insufficient information to evaluate the impact of these directed takes on affected stocks.

Small numbers of humpback dolphins have also been hunted in the Arabian Sea and Red Sea (SC/54/SM6). Recent evidence, based on observations of butchered animals in Oman and interviews with fishermen from parts of Oman suggests that this practice still occurs to some extent. Anecdotal and photographic evidence indicates that dolphins are still hunted in Oman from small, motorised boats, using hand-held harpoons. The magnitude of this directed take is unknown.

Gales and Jefferson informed the sub-committee that there are reports of live captures of humpback dolphins from the Gulf of Thailand for the oceanarium trade. At least forty-five dolphins, including *Orcaella* and *Sousa* have been captured from this region. Additional mortality post-capture is of concern.

There was also a deliberate capture of 36 humpback dolphins from Xiamen Harbour, China, from 1960-1962, by the Fisheries Research Institute, with the goal of reducing competition with fisheries, together with an attempt to determine if leather could be made from skin (SC/54/SM7). There is no evidence of any large-scale fishery for this species in Chinese waters in the past, nor is there any recent evidence of directed takes.

There have been no recent directed takes of humpback dolphins in Australia, but live captures for the Australian aquarium trade from the Queensland coast were reported from the 1960s, with one of these captured dolphins still surviving today (SC/54/SM27).

5.9 Incidental takes

Incidental takes have been recorded from almost all areas of the range of this genus. With the exception of some shark control programmes, there have been no observer programmes from which bycatch estimates could be generated. Consequently, it is difficult to evaluate the magnitude of this threat in most areas. Most evidence for bycatch comes from observations of strandings, interviews with fishermen and personal observations. In some areas, where it is illegal to possess products from small cetaceans, detection of bycatch is particularly difficult (e.g. SC/54/SM9).

Van Waerebeek presented historical references and recent observations of bycatches of humpback dolphins from West Africa (SC/54/SM9), with takes reported from a number of gear types, including octopus lines, gillnets and beach seines. Mortality from gillnets may be substantial in many areas of West Africa, although quantitative data are lacking, as elsewhere (Perrin *et al*., 1994). Fishing effort in Guinea-Biseau and Senegal have increased rapidly in recent decades (SC/54/SM9).

Humpback dolphins are taken as bycatch in shark control nets in South Africa (SC/54/SM37). A minimum of 149 dolphins have been recorded entangled in these nets, with 52% of this bycatch reported in Richards Bay, north of Durban. Current mitigation measures include the use of acoustic alarms and reduction of fishing effort. A second trial, using air-filled floats to increase the reflectivity of the net to echolocating dolphins, is to commence in May 2002.

In northern Mozambique, some humpback dolphins are taken in beach seine nets (SC/54/SM28). Humpback dolphins are used by fishermen to indicate the presence of fish in Maputo Bay. No information is available on dolphin bycatches from industrial fisheries in Mozambique. Humpback dolphins are also caught in a gillnet fishery for sharks in Madagascar (SC/54/SM34) and Berggren noted that they are also taken in drift and bottom-set gillnets in Zanzibar. Karczmarski reported that occasional incidental catches have been reported from Lamu, Kenya and bycatch is also known to occur in the trawl fishery for shrimp in India (SC/54/SM35), although levels have not been quantified.

Observations of stranded dolphins in Oman shows that a high proportion of these strandings have net marks or other physical trauma consistent with net entanglement (SC/54/O4). In this area, it is difficult to discern whether these mortalities were deliberate or the result of entanglement in fishing gear. Portions of some of these carcasses are used as shark bait.

Skeletal remains found at whale temples and museums in Vietnam provide indirect evidence of bycatch in these waters, although it is possible that some of these skulls may have been obtained from stranded animals.

In Hong Kong, information on interactions between humpback dolphins and fisheries is derived from strandings and from observations of live animals (SC/54/SM7). Bycatches of dolphins in gillnets and trawl nets are known to occur, but the magnitude of this mortality has not been estimated. Within Hong Kong harbour, there is a small-scale gillnet fleet and a large number of pair trawls. Dolphins often feed behind trawlers and there is evidence of occasional capture in these nets. Ship strikes of humpback dolphins have also been recorded in Hong Kong (SC/54/SM4).

Parra and Corkeron noted that incidental mortality of Sousa in Australian waters occurs in inshore gillnets set across creeks, rivers and shallow estuaries for barramundi (*Lates calcifer*) and threadfin salmon (*Polynemus sheridani* and *Eleutheronema tetradactylum*) (SC/54/SM27). However, there are no estimates of the magnitude of these indirect takes. Regulations to reduce the incidental take of non-target species in the gillnet fishery (e.g. net attendance rules, gear modifications) have been introduced, but surveillance and enforcement is lacking in remote areas. New policies on bycatch are being developed in Australia, which may help to reduce the incidental mortality of humpback dolphins in gillnet fisheries.

In a recent analysis of the effects of shark control nets on non-target species (Gribble *et al*., 1998), it was estimated that between 1962 and 1995, an average of 19.2 dolphins (of all species) were caught each year. This was reduced to 12.5 animals per year from 1992-1995. However, the species composition for most of the dolphins prior to 1992 is unknown. Data from the Queensland Shark Control Programme (QSCP) suggest that, on average, one humpback dolphin is taken annually in these nets. However, these incidental takes appear to be localised. Some mitigation measures are currently in place to reduce dolphin mortality in these nets and the response of humpback dolphins to acoustic alarms is currently being evaluated. The sub-committee welcomed these initiatives and **recommended** that any dolphins captured in these nets be recovered for post-mortem examination to obtain information on life history and stock structure. It would be useful if information on the bycatch of dolphins in Australian shark control nets be reported on a finer geographical scale.

Interactions between humpback dolphins and trawlers have been reported from Moreton Bay, Australia (SC/54/SM27), but the effect of these interactions has not been quantified. In the past, humpback dolphins (together with spinner and bottlenose dolphins) were caught in a Taiwanese offshore drift net fishery that operated in the Arafura and Timor Seas (Harwood and Hembree, 1987). This fishery no longer operates in Australian waters, but may still be taking humpback dolphins in Indonesia.

5.10 Other

SC/54/SM5 reviewed published literature on the potential impacts of pollutants on Indo-Pacific humpback dolphins. Although data on contaminant levels are lacking through most of the species range, such information exists for dolphins in Hong Kong. Studies on contaminant levels in sediments in Hong Kong and the Pearl River estuary have pointed to widespread organochlorine contamination in these waters, with elevated PCB and DDT concentrations. Other pollutants that may pose a risk to humpback dolphin populations include butyltins, Polynuclear Aromatic Hydrocarbons (PAHs) and sewage born pathogens (viruses and bacteria).

PCB concentrations of up to 125 parts per million (ppm) lipid weight and DDT levels of 381 ppm have been recorded from humpback dolphins in Hong Kong. The concentration of DDT to its metabolites (DDD and DDE) was high, suggesting that the animals are living close to a source of DDT. This is consistent with core sediment sample analysis which indicates the entry of organochlorines into the Pearl River system between 1992 and 1994.

The sub-committee discussed the possible health implications of these contaminants. Half of stranded animals examined in Hong Kong had PCB levels above which toxic effects might be expected (Kannan *et al*., 2000), and 44% had PCB levels above which increased levels of infectious disease were reported in UK cetaceans (Jepson *et al*., 1998). The TEQs (TCDD Toxic Equivalents) for dioxin-like PCBs from Hong Kong dolphins were nearly double the blubber TEQs recorded in seals exhibiting symptoms of organochlorine-induced immune suppression (Vos, 2000). An area of particular concern is the effect of organochlorines transferred to humpback dolphins calves from their mothers' milk. A high proportion of stranded cetaceans in Hong Kong are neonatal animals and it has been suggested that this may be linked to organochlorine contamination via lactation.

Studies of organochlorines in sediments of other areas of the habitat of humpback dolphins in China and west India demonstrate levels similar to those recorded in the Pearl River estuary. Therefore, organochlorine contamination could be an issue for the health of these populations. SC/54/SM22 reported DDT concentrations of 131 ppm and 50 ppm of PCB congener 1260 in South African humpback dolphins, the highest levels of any marine mammals sampled from that region.

Parsons suggested that the elevated concentrations of pollutants observed in tissues of humpback dolphins from Hong Kong indicate that pollution may pose a risk to the health of dolphins in this area and by virtue of similar contamination in other habitat, possibly to *Sousa* populations in other regions.

SC/54/SM16 contained new information on the incidence of epimeletic behaviour in humpback dolphins in Hong Kong. Epimeletic behaviour has been reported in a number of cetacean species, including bottlenose dolphins and killer whales. Porter noted that the incidence of this behaviour is high relative to observations from well-studied bottlenose dolphin populations in Sarasota and Shark Bay and expressed concern these observations may reflect high rates of neonatal mortality.

The coastal habitats of this genus include sandy beaches, enclosed bays and coastal lagoons, mangrove areas, sea grass meadows, rocky and coral reefs and turbid estuaries, and a number of papers dealt with the issue of habitat degradation. In particular, Hong Kong exhibits rapid rates of coastal development, including the construction of a new 1,200 hectare airport in 1998, most of which was built on reclaimed land. Unfortunately, there is no baseline data on habitat use patterns of humpback dolphins prior to construction of this airport. In addition, a fuel depot was constructed nearby and studies during construction (which involved piling) showed differences in both behaviour and habitat use of humpback dolphins.

There are very few areas within the known range of humpback dolphins where anthropogenic alteration to habitat has not occurred. Habitat degradation has been used as a factor to assess the status of this taxon in South Africa following IUCN red list categories and criteria (SC/54/SM37). On the basis of limited coastal occurrence and occupancy, combined with incidental mortality in shark control nets, and reduction in habitat, humpback dolphins are listed as 'Vulnerable' in South Africa.

5.11 Consideration of status

Humpback dolphins are listed as 'Data Deficient' by the World Conservation Union (IUCN) and are listed in Appendix 1 of the Convention on Trade of Endangered Species (Klinowska, 1991; Baillie and Groombridge, 1996). The taxonomy of humpback dolphins remains unresolved and information on this genus is fragmentary throughout almost all of its range. Humpback dolphins are long-lived, but nowhere have research programmes on these animals been in place for longer than 10 years, a small fraction of their lifespan. Baseline data on abundance, population structure, rate of increase, recruitment and mortality levels are lacking.

The primary threats to humpback dolphins are incidental mortality in fisheries, including shark control nets, habitat degradation and, in a few areas (such as Madagascar), directed catches. Levels of contaminants in tissues of humpback dolphins are very high in some areas, fuelling concern regarding the effects of these pollutants. The sub-committee was able to recognise the existence of these threats, but it was not possible to evaluate them with current information. Therefore the sub-committee **concluded** that the status of humpback dolphins is unknown, however it recognises that this genus is adversely impacted by anthropogenic changes throughout its known range.

The sub-committee **recommends** the following.

(1) Wide collaboration among *Sousa* researchers to allow resolution of the systematics and population structure within the genus.
(2) Studies over long time-scales to obtain estimates of abundance, and rates of fecundity and mortality.

(3) Surveys, and photo-identification and genetic sampling in areas where the distribution of humpback dolphins is patchy, to allow for more detailed information on distribution, ranging patterns, discontinuity or population fragmentation and stock structure.
(4) Studies of the life history, behaviour and ecology of this genus, to better understand its conservation status, ecological requirements and social structure.
(5) Further quantitative studies of habitat use, and of the degradation of habitat, especially where habitat modification has occurred.
(6) Independent observer monitoring programmes to estimate incidental mortality from bycatch and to monitor the effects of mitigation measures when they have been introduced.
(7) Evaluation of the magnitude and effects of the directed fishery for humpback dolphins in Madagascar.

6. PROGRESS ON PREVIOUS RECOMMENDATIONS

Read reminded the sub-committee of IWC Resolution 2001-13 (IWC, 2002b), which directs the Scientific Committee to continue to review progress on recommendations and resolutions relating to critically endangered stocks on a regular basis. This year, the sub-committee reviewed progress on several of these stocks.

6.1 Baiji

The baiji (*Lipotes vexillifer*) is the most endangered cetacean. Its range is restricted to the Yangtze River and its population size is probably only a few tens of animals (IWC, 2001a, p.275). Hung informed the sub-committee that recent sightings confirm the continued existence of this species in the Yangtze River. Given the critically endangered status of the baiji, in 2000 the Scientific Committee asked that the Secretary of the IWC request the Government of China to report progress on the conservation of this species to the Scientific Committee on an annual basis. Unfortunately for the second consecutive year, no new information was received from China. Therefore, the sub-committee **reiterated** its request for updated information on the status of this critically endangered species and on management efforts intended to conserve it. In particular, the sub-committee would welcome the report of a recent meeting on baiji, organised by the Government of China, for its consideration at next year's meeting.

6.2 Vaquita

The sub-committee received three papers describing research and conservation activities focused on the highly endangered vaquita (*Phocoena sinus*). SC/54/SM17 described the results of a study to investigate the distribution of the vaquita in the northern Gulf of California. Because of the potential for long-range responses of these animals to a moving survey vessel, a new method of detecting porpoises was employed. The research boat stopped at predetermined stations to listen for porpoise vocalisations, which resulted in a significantly higher rate of encounters. These investigations suggest that porpoises in the upper Gulf of California continue to inhabit a core area between Rocas Consag and San Felipe Bay. This distribution coincides with an area of intense fishing operations. Further cruises are planned and will include an oceanographic data collection component.

The upper Gulf of California is a Biosphere reserve, but also an important fishing ground for blue and brown shrimp (*Penaeus* spp.). Bycatch of vaquitas in this seasonal trawl fishery are known to occur at a low level. There are also concerns that this intense fishing effort might impact the porpoises in more subtle ways. SC/54/SM19 described a study to investigate potential impacts on vaquita distribution, using data on the distribution of vaquitas and trawlers obtained during the 1997 survey. A positive relationship was found between the occurrence of trawlers and the level of aggregation of vaquita. As more trawlers were encountered, the average time interval between sightings fell and the mean size of groups became significantly larger. Whether this change is a direct consequence of the presence of trawlers is as yet unproven, but these findings raise concerns that such spatial aggregations might lead to higher vulnerability to a single large mortality event.

Since 2000, WWF, CIRVA and Conservation International (CI) have convened a series of inclusive meetings of parties interested in the recovery of the vaquita. The main outcome was the establishment of a Working Group whose mandate is to develop a general strategy for the recovery of the vaquita. SC/54/SM18 described this strategy and current progress. The strategy consists of four elements: (1) conservation; (2) socio-economic considerations; (3) education/awareness issues; and (4) a legal framework. Among the many activities that have been carried out are a search for, and evaluation of alternative fisheries and alternative economic opportunities in the Upper Gulf. A meeting of various government departments identified a legal route to expand the boundaries of the Biosphere Reserve and declare the entire range of vaquita as an 'Area de Refugio de Fauna Silvestre'. Further research has been carried out on the distribution and habitat use of vaquita (e.g. SC/54/SM17 and 19). Furthermore, Manzanilla-Naim noted that environmental legislation directed to marine protected areas in Mexico specifies a prohibition on the use of fishing gears for which the bycatch/target species ratio within any marine protected area should be no greater than 1:1. To enforce this provision the Environment Ministry (SEMARNAT) in conjunction with the navy (SEMAR) launched an enforcement operative directed to fishing trawlers from October to the end of the 2001-2002 shrimp season. This enforcement operative will continue within the upper Gulf of California Biosphere Reserve.

The small cetacean sub-committee **commends** the joint efforts of WWF, CIRVA, Conservation International and the Government of Mexico in their development and implementation of a general strategy for the recovery of the vaquita, based largely on recommendations from CIRVA. The sub-committee looks forward to an update on the implementation of this strategy at its next meeting.

Manzanilla-Naim described two datasets on marine mammal distribution in relation to oceanographic and biological conditions in the upper Gulf of California. The first of these datasets was collected during an inter-El Niño period (1994/95) while the second during an El Niño year (1998). Manzanilla-Naim asked the committee whether there was interest in funding further analysis of these datasets to improve our understanding of the role of estuarine productivity on the foraging ecology and status of the vaquita. The committee encouraged the development of a full proposal for consideration at its next meeting and highlighted the potential value of this work to other sub-committees. The sub-committee also cautioned that there was likely to be considerable complexity in the temporal coupling of El Niño events, river flow and significant changes in prey populations of the vaquita. The sub-committee also reminded applicants that funds available for such research are extremely limited and tightly prioritised.

6.3 Harbour porpoise

The harbour porpoise (*Phocoena phocoena*) is widely distributed in shelf waters of the temperate North Atlantic and North Pacific Oceans. Although still abundant as a species, it has experienced major declines in parts of its range, including and perhaps most notably in the Baltic Sea (East of the Darss Sill). An aerial survey conducted in July 1995 estimated that 599 (CV = 0.57) porpoises were present in the Baltic Sea (Hiby and Lovell, 1996). This survey did not include Polish coastal waters, where porpoise bycatches are known to occur year-round, and where it has been suggested that an unknown, but significant part of the Baltic population might occur. To address this limitation, therefore, an acoustic and visual survey for porpoises was conducted in Polish waters during August and September 2001 and the results were reported in SC/54/SM3. A combined visual and acoustic transect survey was conducted from a sailboat travelling under power, covering a trackline of 3,300km of acoustic surveys and 377km of visual surveys. In addition, automatic recording devices (PODs) were moored in areas of suspected porpoise occurrence. Only two independent porpoise detections were made, both in the extreme western part of the survey area. These detection rates were two orders of magnitude lower than those documented in the English Channel and southern North Sea. Thus, the study confirms that harbour porpoises do occur in the Polish sector of the Baltic Sea but also that (during the study period) only low numbers were present.

At the request of the Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas (ASCOBANS), the sub-committee then considered a draft version of the ASCOBANS recovery plan for harbour porpoises in the Baltic Sea (‘Jastarnia Plan’). The plan’s intended purpose is to promote and facilitate population recovery, which in the ASCOBANS context means to at least 80% of its carrying capacity level. The draft plan was the culmination of a series of scientific initiatives and meetings over several years, in particular a workshop in Jastarnia, Poland, in January 2002 which included managers, scientists, representatives of the fishing sector and NGOs.

The sub-committee commended ASCOBANS for a valuable draft recovery plan that provides guidance for action to conserve harbour porpoises in the Baltic Sea. It strongly endorses the plan and concurs with its recommendations. Particularly with respect to the recommendation to implement a pinger programme on a short-term basis (i.e. two to three years), the sub-committee offered the following comments and suggestions:

(1) Before introducing pingers to the Baltic environment, a simple modelling exercise should be conducted to confirm that they will function there essentially as they do elsewhere. Sound propagation measurements from a series of selected sites and water depths in the Baltic would be needed for this.
(2) Cost-effectiveness and efficiency will be best served if pinger implementation is targeted on those areas/times considered most likely to have overlap between ‘high’ porpoise densities and intensive driftnet and/or bottom-set gillnet fishing (hotspots). A few of these can be identified based on available information on bycatches and fishing effort (e.g. the Swedish driftnet fishery for salmon and bottom-set gillnet fishery for cod in ICES rectangles 3958, 4059, 4159 and 4160; the Polish driftnet fishery for salmon in Puck Bay) and short-term implementation in these areas should move ahead now.
(3) To identify other hotspots will require that the recommended compilations of data on fishing effort, the timing and location of porpoise bycatches (both historical and recent) and porpoise distribution (sightings, strandings, etc.) be undertaken immediately. This work had been stressed by the ASCOBANS Baltic Discussion Group in 2001 and again in the draft recovery plan and must be given an extremely high priority.
(4) As noted in the draft recovery plan, it is essential that any pinger implementation must be accompanied by an observer programme to verify that pingers are being used properly at sea.
(5) The importance of independent on-board observation, at an appropriate sampling level, to obtain reliable data on cetacean bycatch is well documented. The sub-committee urged that despite the associated difficulties with high fishing effort and low bycatch rates, bycatch monitoring be made an integral part of any pinger implementation programme, especially in the hotspots identified above.
(6) The concern expressed in the draft recovery plan that pingers might exclude porpoises from large areas of critical habitat should be addressed before pinger use becomes widespread in the Baltic. An analysis similar to that conducted previously for the North Sea should be conducted to estimate the potential extent of habitat exclusion for the Baltic.
(7) The draft recovery plan recommended that implementation of pingers be *short-term* and therefore such implementation should be reconsidered within three years, with the expectation that pinger use will be replaced by longer-term mitigation measures at that time.
(8) The requirement in the draft recovery plan for rapid development of medium- and long-term approaches to mitigation (e.g. reduced fishing effort in ‘high-risk’ areas, conversion to fishing gear and practices that are much less likely to result in porpoise bycatch) is crucial and should not be compromised. This work should be initiated immediately and be pursued in parallel with the hotspot analyses and targeted pinger implementation efforts.

In view of the critical status of harbour porpoises in the Baltic, it is important to review the progress of the recovery plan at frequent intervals and to incorporate new information. The first review should occur within three years of the implementation of the plan.

In some respects, for example their small population size, the conservation status of harbour porpoises in the Baltic Sea is similar to that of the vaquita in the Gulf of California, and the sub-committee recalled that it had recommended against the use of pingers to reduce bycatches of vaquitas at its meeting in Grenada (IWC, 2000, pp. 242-243). The sub-committee agreed, however, that the two situations are different, in the following respects: (1) the vaquita exists in a single population restricted to the Gulf of California, while harbour porpoises in the Baltic form only one of many populations of this species in the North Atlantic; (2) pingers have been demonstrated to be effective in reducing bycatches of harbour porpoises, but have not been tested with the vaquita; (3) vaquitas are taken in a variety of artisanal fisheries, in which it would be difficult or impossible to implement pingers as an effective mitigation strategy; and (4) the vaquita exists only in Mexico, but the Baltic population of harbour porpoises occurs in the waters of seven countries. The sub-committee concluded that the two situations were indeed different and, therefore, distinct conservation approaches were called for.

On behalf of ASCOBANS, Reijnders thanked the sub-committee for its careful and constructive review of this plan.

SC/54/SM31 presented updated estimates of harbour porpoise bycatches in Danish North Sea bottom-set gillnet fisheries from 1987-2001. Two estimation methods were investigated, and each was applied to observed bycatch rates from 1992-2001. The first method used extrapolations from landings of target species and resulted in an estimated annual bycatch of from 2,867-7,566 harbour porpoises, with a mean of 5,817. This method was used by Vinther (1999) to estimate bycatches in this fishery from 1994-1998. The second, newer method used extrapolations from fleet fishing effort to address the effect of temporal changes in catch per unit effort. Estimated bycatches from this method were slightly lower, except for the years 1998-2001, and ranged from 3,887-7,366 porpoises per year, with a mean of 5,591. Both methods suggest that bycatches have been reduced in recent years due to decreases in both effort and landings, although the new method suggests a smaller reduction. Neither estimate accounted for the use of pingers in the wreck net fishery for cod, which may have reduced the bycatch in that fishery to near zero (SC/54/SM32). Larsen outlined the impacts of potential biases in these analyses, including the placement of observers on larger boats. The sub-committee welcomed these new analyses.

6.4 Survey methodology for freshwater cetaceans

At its meeting in 2000, the sub-committee recommended that scientists with appropriate analytical skills be directly involved in the design and implementation of surveys for freshwater cetaceans, so that these surveys might result in statistically robust estimates of abundance. It was also suggested that scientists familiar with quantitative techniques provide appropriate background training to field researchers on abundance estimation techniques (IWC, 2001a, p.277).

Hedley outlined the details of line-transect, strip transect and photo-identification surveys of boto (*Inia geoffrensis*) and tucuxi (*Sotalia fluviatilis*) in the Colombian Amazon. The study involved field collaboration among quantitative analysts and field researchers. The survey was carried out in March and April 2002 and presentation of results is expected at next year's meeting of the sub-committee. To facilitate wider consultation, an e-mail correspondence group has been established. The sub-committee thanked Hedley and Williams for their efforts and agreed that these activities will provide useful information to groups studying freshwater cetaceans and other species inhabiting complex environments, such as *Sousa*. The sub-committee **recommended** the continued development of these techniques.

6.5 Bycatch mitigation

An alternative to the use of pingers (acoustic alarms) is the development of alternative fishing gear that has a lower probability of entangling cetaceans. One such approach is the development of monofilament that would be more detectable to an echolocating odontocete. In SC/54/SM30, Larsen described a study to test whether gillnets made from high density monofilament (impregnated with iron oxide) catch fewer harbour porpoises. The trial was conducted in the Danish North Sea bottom-set gillnet fishery in 2000 and recorded a 20% reduction in cod catch relative to nets made from conventional materials. Eight porpoises were caught in control nets and none were taken in high-density nets, a significant reduction in bycatch. Surprisingly, acoustic testing indicated that there were no significant differences in the acoustic target strength of modified and control nets, suggesting that the reduction in bycatch was not caused by an increase in acoustic reflectivity. Neither was net colour likely to be important in reducing bycatches of porpoises. Instead it is more likely that the modified nets caught fewer porpoises (and cod) because they were stiffer than conventional nets. If this is true, modification of net stiffness offers the potential for an inexpensive means of reducing bycatch, although this benefit may be tempered by reduced catch of target species and heavier and more bulky nets. The sub-committee welcomed the results of this research and encouraged further developing and testing of these modified nets.

Use of acoustic alarms became mandatory in Danish North Sea wreck cod gillnet fisheries in August 2000. SC/54/SM32 outlined the results of an independent observer programme monitoring harbour porpoise bycatch in this fishery before and after implementation of pingers (1993-2001). Before the introduction of pingers, porpoises were observed taken in 19 of 873 sets, while after their introduction, no porpoises were observed in 129 sets in nets equipped with pingers. Thus, the introduction of pingers significantly reduced the bycatch rate in this fishery. As with other studies of bycatch, these results should be viewed with caution. While bycatch has been reduced it is unlikely to have been eliminated and habituation to the pingers remains a possibility. In addition, compliance with regulation requiring use of pingers and their proper use need to be monitored. The sub-committee welcomed these encouraging results and **recommends** continued monitoring of this fishery, including pinger use and bycatch rates.

Some results from the 'EPIC' project report were brought to the sub-committee's attention and are summarised in SC/54/ProgRep Denmark. One of the most relevant findings of this research is that pingers are still aversive to harbour porpoises even when the duration of the sounds were reduced from 256 msec to 64 msec. This finding has important implications for the design of acoustic alarms, and should allow the conservation of battery life and prolong the longevity of pingers in the field.

A growing number of studies have demonstrated the ability of acoustic alarms to reduce harbour porpoise bycatch in fishing nets, but a variety of concerns remain regarding their use. The research outlined in SC/54/SM2 was conducted to investigate two of these concerns: (1) the devices might exclude porpoises from preferred habitat; and (2) porpoises might attempt to swim through nets where malfunctioning pingers create an acoustic window. The presence and behaviour of porpoises were monitored around a simulated net, equipped with functioning and non-functioning pingers, off the coast of western Scotland. When pingers were active, the frequency of porpoise sightings was reduced significantly in an area 375m from the net and significantly fewer vocalisations were recorded in an area 500m from the net. One porpoise passed through an acoustic gap of approximately 300m, indicating that it is possible that porpoises may occasionally become entangled in nets with malfunctioning or missing pingers. The results of this work suggest that pingers may exclude porpoises from a larger area than was previously believed and warrant concern in areas with intense fishing effort. As noted previously by this sub-committee (IWC, 2000, p.240) the sound produced by many pingers might create large zones from which porpoises are excluded. It must be noted, however, that the reduction in acoustic detections within 500m of the net could represent a change in acoustic behaviour or orientation rather than exclusion.

6.6 Dall's porpoises

Read reminded the sub-committee of IWC Resolution 2001-12, which directed the Scientific Committee to complete a full assessment of the status of exploited Dall's porpoise stocks as soon as sufficient information becomes available (IWC, 2002a). In its review of the subject in 2001, the sub-committee was unable to complete this assessment, because information on takes in the Japanese hand harpoon fishery was not made available. The hand harpoon fishery for Dall's porpoises continues, but members of the Japanese delegation did not participate in the work of this sub-committee this year and no new information was made available on this topic. Therefore, the sub-committee was again unable to complete its assessment of the status of Dall's porpoise stocks.

The sub-committee noted the value of the information provided by the Government of Japan on the status of small cetaceans in previous years and was disappointed that members of the Japanese delegation did not participate in the work again this year. The sub-committee requests that the Government of Japan reconsider its position on this matter and resume the valuable contribution of Japanese scientists to the sub-committee's work on small cetaceans.

The sub-committee wished to thank the Government of the Republic of Korea for including observations of incidental takes of Dall's porpoises in its progress report (SC/54/ProgRep Korea). The sub-committee reiterated its request that the Government of Russia report bycatches of Dall's porpoises (and other small cetaceans) in its annual Progress Reports to the Scientific Committee, together with estimates of the magnitude of bycatches in other fisheries.

6.7 Other recommendations

No new information was submitted on other past recommendations.

7. OTHER

SC/54/SM10 provided the results of a monitoring project to investigate the takes of small cetaceans in coastal fisheries in Peru. Port monitoring is now hampered by recent conservation legislation outlawing the commercial use of bycaught small cetaceans. As a result, fishers now often butcher carcasses at sea and land concealed meat. Van Waerebeek and others initiated a boat-based observer scheme to document the bycatch of sea turtles, in which they observed three Burmeister's porpoises (*Phocoena spinipinnis*) taken in 10 overnight sets in artisanal bottom gillnets. In addition, evidence for a minimum of 471 small cetacean captures was documented from 1999-2001. Most striking was a continuation in the reduction of the relative proportion of dusky dolphins (*Lagenorhynchus obsurus*) taken in these fisheries (Van Waerebeek, 1994). Over a period of 15 years, dusky dolphins have fallen from 78% of the total recorded catches to only 40% on the central coast. The reasons for this significant decline are unknown.

The sub-committee **commended** the group for instituting this observer programme. This largely opportunistic port monitoring study revealed remarkably high levels of bycatch and the sub-committee **requests** that the Government of Peru submit these catch statistics of small cetaceans in their next progress report to the Commission.

The sub-committee then considered a proposal for funding from the IWC Voluntary Fund for Small Cetaceans. This proposal was to augment an application previously approved by the Commission at its 53rd Annual meeting: 'Comprehensive study of the distribution, taxonomy, genetic, natural history, pathology of common dolphins *Delphinus capensis* and *Delphinus delphis* in coastal waters of Pacific South America' (SC/52/RP1). Initiation of the study has been hampered by the need for stipends for researchers in South America. The proposal submitted to the sub-committee was to cover these costs at a level of USD $4,000. The sub-committee recognised the timely nature of this initiative given studies of this genus in other geographic areas and the potential synergy with the objectives of the Scientific Committee's Standing Working Group on Environmental Concerns. The sub-committee **supported** this proposal and requested that Van Waerebeek report initial findings to the sub-committee next year.

SC/54/O22 reported that the conservation status of 42 cetacean populations in South Africa were recently assessed, using the IUCN 2001 Red Data List criteria. Eleven populations of delphinids were considered to be 'Data Deficient' and six were classified as being of 'Least Concern'. The Indo-Pacific humpbacked dolphin (*Sousa chinensis*) was classified as 'Vulnerable' (SC/54/SM37) and the resident stock of Indian Ocean bottlenose dolphins (*Tursiops aduncus*) was considered to be 'Vulnerable' due to its limited area of occupancy, limited occurrence, nearshore habitat degradation, bycatch in the shark control nets, and existence of a single sub-population. The migratory stock of Indian Ocean bottlenose dolphins was classified as 'Endangered' due to its small population size, single population and continuing decline caused by incidental capture in shark control nets. Concern was expressed that the only cetacean endemic to the region (Heaviside's dolphin, *Cephalorhynchus heavisidii*) was classified as 'Data Deficient' and that this should be rectified as a matter of urgency, particularly given the existence of bycatches in set nets. Other identified threats to small cetaceans in South Africa included fishery interactions, and possible reduced prey base for Risso's dolphins (*Grampus griseus*) caused by fishing activities. As part of the CAMP process, recommendations included monitoring of all species, primarily through collection of stranded and bycaught animals, compilation of life history data, and population surveys. This assessment highlighted the urgent requirement for population surveys and genetic studies in South African waters.

Iñiguez briefly informed the sub-committee of progress on research and conservation of small cetaceans in Argentina. There are several groups actively working on small cetaceans in Argentinean waters. The main species studied include franciscana, Peale's dolphins, dusky dolphins, Commerson's dolphins and killer whales. In Ria Gallegos between 1999 and 2000 almost 80 Commerson's dolphins were caught in gillnets. A report of research on these catches will be submitted to the next meeting of the sub-committee.

Brownell noted that a permit for catch quotas of white whales and killer whales had been issued recently by the Russian Central Committee of Fisheries. The quotas included 1,000 white whales (for harvest) and 10 killer whales (for live capture). As in the past (IWC, 1992; 2000) the sub-committee expressed concern over such takes of small cetaceans when there is insufficient information to adequately assess the impact on the target populations. The sub-committee **recommended** that such captures be preceded by an assessment of the size of affected populations and of the impact of these removals.

Information on bycatches of small cetaceans in California drift and set gillnet fisheries in 2001 were submitted to the committee (SC/54/SM12 and SC/54/SM13). Observers accompanied approximately 25% of all trips in the drift net fishery and documented 14 takes of cetacean species. The species composition, gender and size of the bycatches in 2001 were comparable to those of previous years. The bottom-set gillnet fishery that operates in Monterey Bay was not observed during 2001 but reports of stranded animals with evidence of entanglement indicated that there is still cause for concern about the impact of this fishery on harbour porpoises.

SC/54/SM11 provided the report of a study of the potential use of pingers to reduce depredation of catches and damage to gear caused by bottlenose dolphins in a trammel net fishery in the Balearic Islands. This work was prompted in an effort to obviate the use of Acoustic Harassment Devices (AHDs) with quieter and potentially less damaging sound sources. The study did not directly compare the efficacy of these two devices, but concluded that pingers could significantly reduce dolphin depredation to catches in trammel nets.

8. TAKES OF SMALL CETACEANS

The sub-committee was not able to review its table of recent catches (Appendix 2) of small cetaceans at this year's meeting. Nevertheless, the sub-committee agreed that it was highly likely that this table would be incomplete, as it has been in previous years. To assist the sub-committee in identifying data gaps in this table, Atkins, Parra and Sutaria compiled a summary of which member countries had contributed data over the past six years. Read agreed to ask the Secretariat to request data on directed and incidental takes of small cetaceans from other contracting governments, preferably on a stock-by-stock basis.

9. WORK PLAN

The sub-committee reviewed its schedule of priority topics. Those currently held by the sub-committee (IWC, 2002c, p.332) are as follows:

(1) Systematics and population structure of *Tursiops*;
(2) Status of ziphiids in the Southern Ocean;
(3) Status of small cetaceans in the Caribbean Sea;
(4) Status of small cetaceans (*Phocoena*, *Delphinus* and *Tursiops*) in the Black Sea;
(5) Review of the status of *Pontoporia*.

The sub-committee considered the location of its meeting in 2003 (Berlin) and the current formative status of the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS). As a result the sub-committee agreed that it should review the status of small cetaceans in the Black Sea as it's priority topic for the next meeting. Read will consult with the Secretariat of ACCOBAMS to ensure that the relevant scientists from Black Sea range states are invited to attend this meeting. The committee also agreed that while it was going to restrict its review to the status of small cetaceans in the Black Sea, it would consider material from adjacent waters if it was informative to the review.

10. OTHER BUSINESS

There was no other business.

11. ADOPTION OF REPORT

The report was adopted as amended on 5 May 2001. Read thanked the rapporteurs for their hard work. On behalf of the sub-committee, Read thanked Kasuya for organising a highly successful field trip to observe finless porpoises in the Inland Sea.

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Appendix 1
AGENDA

1. Election of Chair
2. Adoption of agenda
3. Appointment of rapporteurs
4. Review of available documents
5. Review of status of humpback dolphins
   - 5.1 Systematics
   - 5.2 Distribution and stock structure
   - 5.3 Abundance
   - 5.4 Seasonal movements
   - 5.5 Life history
   - 5.6 Ecology
   - 5.7 Habitat
   - 5.8 Directed takes
   - 5.9 Incidental takes
   - 5.10 Other
   - 5.11 Consideration of status
6. Progress on previous recommendations
   - 6.1 Baiji
   - 6.2 Vaquita
   - 6.3 Harbour porpoise
   - 6.4 Survey methods for freshwater cetaceans
   - 6.5 By-catch mitigation
   - 6.6 Dall's porpoise
   - 6.7 Other recommendations
7. Other
8. Takes of small cetaceans
9. Work plan
10. Other business
11. Adoption of report

Appendix 2

SMALL CETACEAN CATCHES 1998-2001

All information was taken from National Progress reports unless otherwise stated. Catches are presented by nation, rather than ocean area, except in the case of the data submitted by the IATTC for the eastern tropical Pacific (ETP). In this case, the submitted estimated catches are not broken down by country and a summed total incidental catch for the participating countries is given. The reported catch columns include catches reported by observer programmes, from interviews with fishermen and incidental reports (e.g. stranded whales determined to have died in nets).

Please note that catches should be tabled according to the calendar year in which they were taken. All direct and incidental removals (including live captures) should be recorded but not stranded animals.

	1998					1999					2000					2001				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
Species	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est.	Rep.
Argentina																				
Dusky dolphin	-	-	15[a]	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Franciscana	-	-	-	-	-	-	-	-	-	-	-	-	49[b]	272-570[b]	-	-	-	-	-	-
Peale's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1[c]	5[c]	-	-	-	-	-	-
Commerson's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	37[d]	<168[d]	-	-	-	6[e]	-	-
Australia																				
False killer whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[h]	-	-
Bottlenose dolphin	-	-	9	-	-	-	-	9	-	-	-	-	2[a]	4[a]	-	-	-	3[d]	6[d]	-
Bottlenose dolphin sp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3[g]	-
Common dol. (?sp.)	-	-	7	-	-	-	-	8	-	-	-	-	-	-	-	-	-	2[e]	5[e]	-
Irrawaddy dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Indo-pacific humpback	-	-	2	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	2[f]	-
Spinner dolphin	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-
Short beaked comm. d.	-	-	5	-	-	-	-	8	-	-	-	-	6[b]	3[b]	-	-	-	-	-	-
Pantropical spotted d.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Unidentified dolphin	-	-	27	-	-	-	-	12	2	-	-	-	1[c]	3[c]	-	-	-	-	-	-
Unidentified cetacean	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brazil																				
Bottlenose dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1[j]	-	-	-	-	-	-	-
Franciscana	-	-	101[b]	25[c]	3[f]	-	-	17[g]	202[g]	-	-	-	55[k]	>850[k]	-	-	-	19[o]	-	-
Tucuxi	-	-	7[e]	3[d]	-	-	-	17[h]	141[h]	-	3	-	8[l]	-	-	-	-	4[p]	-	-
Atlantic spotted dol.	-	-	5[i]	-	-	-	-	-	-	-	-	-	2[m]	-	-	-	-	-	-	-
Rough-toothed dol.	-	-	-	-	-	-	-	7	150	-	-	-	-	-	-	-	-	-	-	-
Striped dolphin	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Inia geoffrensis	-	-	1	-	-	-	-	-	-	-	-	-	-	-	78[n]	-	-	-	-	-
Unidentified dolphins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified species	-	-	9[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canada																				
Narwhal	a	-	-	-	-	a	-	-	-	-	a	-	-	-	-	559[b]	-	-	-	-
White whale	a	-	-	-	-	a	-	-	-	-	a	-	-	-	-	375[c]	-	-	-	-
Chile																				
Burmeister's porpoise	-	-	1[a]	-	-	-	-	1[c]	-	-	-	-	-	-	-	-	-	-	-	-
Long-finned pilot w.	-	-	-	-	-	1[b]	-	-	-	-		-	-	-	-	-	-	-	-	-

cont...

	1998					1999					2000					2001				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
Species	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est.	Rep.
Denmark																				
Harbour porpoise	-	-	-	5,206[a]		-	-	-	4,227[a]	-	-	-	-	4,149[a]	-	-	-	-	3,887[a]	-
Unidentified species	-	-	-	+	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-
ETP																				
Bottlenose dolphin	-	-	29	29	-	-	-	9	9	-	-	-	4	4	-	-	-	-	-	-
Pantropical spotted d.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northeastern	-	-	298	298	-	-	-	358	358	-	-	-	303	303	-	-	-	-	-	-
Western-southern	-	-	341	341	-	-	-	253	253	-	-	-	428	428	-	-	-	-	-	-
Coastal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spinner dol. (? stock)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eastern	-	-	422	422	-	-	-	363	363	-	-	-	272	272	-	-	-	-	-	-
Whitebelly	-	-	249	249	-	-	-	192	192	-	-	-	262	262	-	-	-	-	-	-
Central	-	-	12	12	-	-	-	13	13	-	-	-	2	2	-	-	-	-	-	-
Striped dolphin	-	-	24	24	-	-	-	5	5	-	-	-	11	11	-	-	-	-	-	-
Common dol. (?sp.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern	-	-	261	261	-	-	-	85	85	-	-	-	56	56	-	-	-	-	-	-
Central	-	-	172	172	-	-	-	34	34	-	-	-	222	222	-	-	-	-	-	-
Southern	-	-	33	33	-	-	-	1	1	-	-	-	9	9	-	-	-	-	-	-
Rough-toothed dolphin	-	-	-	-	-	-	-	-	-	-	-	-	27	27	-	-	-	-	-	-
Risso's dolphin	-	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-
Short fined pilot w.	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Pygmy sperm whale	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unspecified dolphins	-	-	35	35	-	-	-	32	32	-	-	-	39	39	-	-	-	-	-	-
Faroes																				
Long-finned pilot w.	815[a]	-	-	-	-	608[b]	-	-	-	-	588[b]	-	-	-	-	-	-	-	-	-
Atlantic white-sided d.	438[a]	-	-	-	-	0[b]	-	-	-	-	255[b]	-	-	-	-	-	-	-	-	-
France																				
Long-finned pilot w.	-	-	1[a]	-	-	-	-	5[a]	-	-	-	-	1[a]	-	-	-	-	2[ab]	-	-
Bottlenose dolphin	-	-	7[a]	-	-	-	-	7[a]	-	-	-	-	3[a]	-	-	-	-	10[ac]	-	-
Striped dolphin	-	-	17[a]	-	-	-	-	14[a]	-	-	-	-	7[a]	-	-	-	-	11[ad]	-	-
Common dol. (?sp.)	-	-	19[a]	-	-	-	-	140[a]	-	-	-	-	193[a]	-	-	-	-	118[ae]	-	-
Risso's dolphin	-	-	2[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Harbour porpoise	-	-	1[a]	-	-	-	-	8[a]	-	-	-	-	11[a]	-	-	-	-	12[af]	-	-
Spotted dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[ag]	-	-
Unidentified dolphin	-	-	2[a]	-	-	-	-	18[a]	-	-	-	-	9[a]	-	-	-	-	-	-	-
Unid./other cetacean	-	-	-	-	-	-	-	1[a]	-	-	-	-	-	-	-	-	-	-	-	-
Germany																				
Harbour porpoise	-	-	5	-	-	-	-	3	-	-	-	-	5[a]	5[a]	-	-	-	8[b]	8[b]	-
White-beaked dolphin	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greenland																				
Narwhal	822	-	-	-	-	912[b]	-	-	-	-	a	-	-	-	-	a	-	-	-	-
White whale	746	-	-	-	-	493[b]	-	-	-	-	a	-	-	-	-	a	-	-	-	-
Harbour porpoise	2,131	-	-	-	-	1,830[b]	-	-	-	-	a	-	-	-	-	a	-	-	-	-
Long-finned pilot w.	365	-	-	-	-	115[b]	-	-	-	-	a	-	-	-	-	a	-	-	-	-

cont...

	1998					1999					2000					2001				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
Species	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est.	Rep.
Ireland																				
Common dolphin	-	-	14[b]	-	-	-	-	8[c]	-	-	-	-	3	-	-	-	-	1[d]	-	-
Harbour porpoise	-	-	2[a]	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1[d]	-	-
White-sided dolphin	-	-	1[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Striped dolphin	-	-	14	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Risso's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Italy																				
Striped dolphins	a	-	a	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphins	a	-	a	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphins	a	-	a	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Japan																				
Baird's beaked whale	54	-	-	-	-	62	-	-	-	-	62	-	-	-	-	-	-	-	-	-
Killer whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
False killer whale	45	-	-	-	3	5	-	-	-	-	8	-	-	-	-	-	-	-	-	-
Short-finned pilot	229	-	-	-	-	394	-	-	-	2	304	-	-	-	-	-	-	-	-	-
Pacific white-sided d.	-	-	1	-	-	-	-	-	-	11	1	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	245	-	-	-	21	658	-	-	-	91	1,426	-	-	-	-	-	-	-	-	-
Pantropical spotted d.	460	-	-	-	-	38	-	-	-	-	39	-	-	-	-	-	-	-	-	-
Striped dolphin	449	-	2	-	-	596	-	1	-	-	300	-	-	-	-	-	-	-	-	-
Short-beaked comm.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risso's dolphin	442	-	-	-	3	489	-	-	-	-	506	-	-	-	-	-	-	-	-	-
Dall's porpoise	11,385	-	2	-	-	14,807	-	169	-	-	16,171	-	-	-	-	-	-	-	-	-
Finless porpoise	-	-	6	-	1	-	-	1	-	-	-	-	20	-	-	-	-	-	-	-
Stejneger's beaked	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Unidentified dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified species	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Korea																				
Baird's beaked whale	-	-	-	-	-	-	-	1[ab]	-	-	-	-	-	-	-	-	-	1[b]	-	-
Pacific white-sided d.	-	-	7[bc]	-	-	-	-	3[bg]	-	-	-	-	4[bg]	-	-	-	-	41[bp]	-	-
Common dolphin	-	-	17[bd]	-	-	-	-	25[bh]	-	-	-	-	29[k]	-	-	-	-	62[br]	-	-
Risso's dolphin	-	-	7[ef]	-	-	-	-	2[be]	-	-	-	-	20[l]	-	-	-	-	25[bs]	-	-
Harbour porpoise	-	-	-	-	-	-	-	1[bg]	-	-	-	-	-	-	-	-	-	87[bt]	-	-
Finless porpoise	-	-	2[be]	-	-	-	-	14[i]	-	-	-	-	-	-	-	-	-	7[bu]	-	-
Stejneger beaked whale	-	-	-	-	-	-	-	2[j]	-	-	-	-	1[m]	-	-	-	-	-	-	-
Killer whale	-	-	-	-	-	-	-	-	-	-	-	-	1[bg]	-	-	-	-	-	-	-
False killer whale	-	-	-	-	-	-	-	-	-	-	-	-	1[bg]	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	-	-	-	-	-	12[n]	-	-	-	-	3[bv]	-	-
Dall's porpoise	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2[bw]		
Unidentified dolphin	-	-	-	-	-	-	-	-	-	-	-	-	27[o]	-	-	-	-	--	-	-
Mexico[a]																				
Vaquita	-	-	-	-	-	-	-	-	-	-	-	-	5[bd]	-	-	-	-	-	-	-
Gulf of California	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2[d]		

cont...

	1998					1999					2000					2001				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
Species	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est.	Rep.
Mexico cont.																				
Bottlenose dolphin																				
Baja California	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7[c]	-	-	-	-	-
Gulf of California	-	-	-	-	4[c]	-	-	-	-	4[c]	-	-	-	-	8[c]	-	-	1	-	15
Gulf of Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15[c]	-	-	-	-	-
Risso's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1[e]	-	-	-	-	--	-	-
Netherlands																				
Atlantic white-sided d.	-	-	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Harbour porpoise	-	-	4	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
New Zealand																				
Long-finned pilot w.	-	-	1[a]	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	3[d]	-	-
Hector's dolphin	-	-	14[b]	-	-	-	-	5[c]	-	-	-	-	10[c]	-	-	-	-	13[e]	-	-
Dusky dolphin	-	-	1	-	-	-	-	-	-	-	-	-	2	-	1	-	-	3[f]	-	-
Peru																				
Dusky dolphin	-	-	-	-	-	-	-	50[a]	-	-	-	-	12[a]	-	-	-	-	2[a]	-	-
Long-beaked comm. d.	-	-	-	-	-	-	-	48[a]	-	-	-	-	20[a]	-	-	-	-	7[a]	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	32[a]	-	-	-	-	6[a]	-	-	-	-	1[a]	-	-
Burmeister's porpoise	-	-	-	-	-	-	-	79[a]	-	-	-	-	39[a]	-	-	-	-	14[a]	-	-
Unspecified species	-	-	-	-	-	-	-	67[ab]	-	-	-	-	79[ab]	-	-	-	-	12[ab]	-	-
South Africa																				
Indian Ocean	-	-	28	-	-	-	-	41[a]	-	-	-	-	-	-	-	-	-	22	-	-
Common dolphin	-	-	7	-	-	-	-	11[a]	-	-	-	-	-	-	-	-	-	-	-	-
Long-beaked comm. d.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-
Indo-Pacific	-	-	8	-	-	-	-	8[a]	-	-	-	-	-	-	-	-	-	2	-	-
Spinner dolphin	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified dolphins	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain																				
Common dolphin	-	-	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-	4	-	-
Cuvier's beaked whale	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
False killer whale	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Harbour porpoise	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	1	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Clymene dolphin	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Spinner dolphin	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Long-finned pilot	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Short-finned pilot	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Pilot whale(?)	-	-	-	-	-	-	-	-	-	-	-	-	2[a]	-	-	-	-	-	-	-
Peale's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-

cont...

	1998					1999					2000					2001				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
Species	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est.	Rep.
Spain cont.																				
Atlantic spotted	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-
Striped dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Pygmy sperm whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
White sided dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1		
Unidentified dolphin	-	-	5	-	-	-	-	4	-	-	-	-	12	-	-	-	-	1	-	-
St Lucia																				
Short-finned pilot	-	-	-	-	-	8[a]	35[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Pygmy killer whale	-	-	-	-	-	2[a]	18[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
False killer whale	-	-	-	-	-	3[a]	12[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Melon head whale	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	-	-	-	2[b]	20[b]	-	-	-	-	-	-	-	-	-	-	-	-	-
Atlantic spotted	-	-	-	-	-	12[b]	60[b]	-	-	-	-	-	-	-	-	-	-	-	-	-
Short-snouted Spinner	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fraser’s dolphin	-	-	-	-	-	1[b]	6[b]	-	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphin	-	-	-	-	-	1[b]	10[b]	-	-	-	-	-	-	-	-	-	-	-	-	-
Striped dolphin	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sweden																				
Harbour porpoise	-	-	14	-	-	-	-	2	-	-	-	-	3[a]	-	-	-	-	-	-	-
UK																				
Striped dolphin	-	-	1[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphin(?sp.)	-	-	5[a]	-	-	-	-	4[c]	-	-	-	-	12[g]	-	-	-	-	52[i]	-	-
Harbour porpoise	-	-	33[b]	-	-	-	-	19[d]	-	-	-	-	34[h]	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	1[e]	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified Delphinid	-	-	-	-	-	-	-	1[f]	-	-	-	-	-	-	-	-	-	-	-	-
USA																				
White whale	-	366[a]	-	-	-	238[p]	-	-	-	-	240	-	-	-	-	463[t]	-	-	-	-
Killer whale	-	-	0	0	-	-	-	2[u]	4[u]	-	-	-	-	-	-	-	-	-	-	-
Atl. pilot whale	-	-	14[b]	104[b]	-	-	-	3[v]	371[v]	-	-	-	-	-	-	-	-	-	-	-
Pac. pilot w.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atl white-sided dol.	-	-	1[c]	34[c]	-	-	-	4[w]	69[w]	-	-	-	-	-	-	-	-	-	-	-
Pac. white-sided dol.	-	-	1[d]	1[d]	-	-	-	0	0	-	-	-	2[r]	5[r]	-	-	-	-	-	-
Atl. Bottlenose dol.	-	-	6[e]	66[e]	-	-		7[x]	115[x]	-	-					-	-	-	-	-
Pac. Bottlenose dol.	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-
Striped dolphin	-	-	4[f]	4[f]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pac. short-beak com d.	-	-	11[g]	53[g]	-	-	-	34[y]	191[y]	-	-	-	23[r]	75[r]	-	-	-	-	-	-
Pac. long-beak com d.	-	-	2[h]	2[h]	-	-	-	1[z]	8[z]	-	-	-	2[r]	9[r]	-	-	-	-	-	-
Atl. Com dolphin (sp.)	-	-	272[i]	272[i]	-	-	-	3[A]	195[A]	-	-	-	-	-	-	-	-	-	-	-
Pac Com dolphin (sp.)	-	-	-	-	-	-	-	2[y]	2[y]	-	-	-	3[s]	-	-	-	-	-	-	-

cont.

	1998					1999					2000					2001				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
Species	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est. total	Rep.	Rep.	Est. total	Rep.	Est.	Rep.
USA cont.																				
Spottd d. (*Stenella* sp.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern right whale d	-	-	-	-	-	-	-	3[y]	17[y]	-	-	-	11[r]	47[r]	-	-	-	-	-	-
Atl Risso's dolphin	-	-	10[j]	44[j]	-	-	-	1[B]	22[B]	-	-	-	-	-	-	-	-	-	-	-
Pacific Risso's dolphin	-	-	-	-	-	-	-	0	0	-	-	-	2[r]	7[r]	-	-	-	-	-	-
Atlantic harb porpoise	-	-	65[k]	778[k]	-	-	-	36[C]	342[C]	-	-	-	-	-	-	-	-	-	-	-
Pacific harb porpoise	-	-	1[l]	≥64[l]	-	-	-	28[D]	133[D]	-	-	-	7[r]	26[r]	-	-	-	-	-	-
Dall's porpoise	-	-	7[m]	14[m]	-	-	-	4[o]	5[o]	-	-	-	-	-	-	-	-	-	-	-
Beaked whales	-	-	11[n]	11[n]	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-
Unidentified species	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-	-	-

Argentina: In the following notes the estimated catch is given, followed by observed catch in brackets: (a) 5 caught by FV Humpback and 10 caught by FV Harengus between 2/4/98 to 13/4/98 (SC/51/SM45); (b) Buenos Aires coast - gillnet; (c) Tierra del Fuego - gillnet; (d) Figure composed as follows: <100 (34) Tierra del Fuego - gillnet + 68 (3) Ria Gallegos – gillnet; (e) pers. comm.M. Iniguez.

Australia: In the following notes the estimated catch is given, followed by observed catch in brackets: (a) Figure composed as follows: 3 (0) Gold Coast, Queensland + 0 (1) Shark net, SE Australia, New South Wales+ 1 (1) gillnet, SE Australia, New South Wales; (b) Figure composed as follows: 3 (0) Gold Coast, Queensland + ? (6) SE Australia, New South Wales; (c) Figure composed as follows: 2 (0) Gold Coast, Queensland + 1 (1) SE Australia, New South Wales; (d) Figure composed as follows: 1 (0) Sunshine Coast, Queensland + 2 (0) Gold Coast, Queensland + 1 (0) Gillnet fishery, Gulf of Carpentaria, Queensland + 1 (0) Mackay, Queensland + 0 (2) Probable entanglement SA Coastline + 0 (1) Euthanased, SA Coastline + 1 (0) Salmon farm net, Southern Australia; (e) Figure composed as follows: 3 (0) Sunshine Coast, Queensland + 2 (0) Gold Coast, Queensland + 0 (2) SE Australia (f) Figure composed as follows: 0 (1) Sunshine Coast, Queensland + 0 (1) Cairrns, Queensland; (g) Gulf of Carpentaria, Queensland; (h) SE Australia (NSW) Net entanglement.

Brazil: Note: All the information for the 1997 and 1998 catches was taken from the revised Prog.Rep. Brazil except for the 12 franciscana and 4 tucuxi caught on Northern RJ State (pers. comm. A.P. Di Beneditto and R. Ramos) 1998. The catches in 1999 and 2000 are pers. comm. Salvatore Siciliano. In the following notes the estimated catch is given, followed by the observed catch in brackets: (a) Caught in Rio de Janeiro (pers. comm. A.P. Di Beneditto and R. Ramos - UENF). (b) 17 from Southern (north RS) + 61 from Southern (south RS) + 6 from SW Atlantic + 4 from Praia Grande – S.P. State + 12 from North of RJ State. (pers. comm. A.P. Di Beneditto and R. Ramos) + 1 from northern Rio de Janeiro (pers. comm. S. Siciliano). (c) 4 from Praia Grande – S.P. State + 6 from SW Atlantic + 15 from Northern Rio Grande do Sul (d) 3 from SW Atlantic. (e) 3 from SW Atlantic + 4 from Northern RJ State (pers. comm . A.P. Di Beneditto and R. Ramos). (f) From Praia Grande – S.P. State. (g) 178 [1986-1999] (1) from Northern Rio de Janeiro + 24 [Aug. 1998 – May 2000] (10) from Central São Paulo + (3) from Northern Rio Grande do Sul + (3) from Northern Rio de Janeiro (pers. comm . A.P. Di Beneditto and R. Ramos). (h) 141 (4) from Northern Rio de Janeiro + (4) from Northern Espírito Santo + (2) from Paraíba + (7) from Northern Rio de Janeiro State (pers. comm. A.P. Di Beneditto and R. Ramos). (i) Caught in Rio de Janeiro (pers. comm. Salvatore Siciliano). (j) Caught in Central Sao Paulo – Gillnet (k) Caught in Southern Brazil – Gillnet. It is only a rough estimate based on extrapolation. For the whole fleet. Data from only nine boats from a fleet of about 140-150 (see Sechi *et al.*, 1997) (l) Figure composed as follows: 3 Direct and 3 Indirect from Cananeia Estuary, SP – Gillnet + 2 from Northern Rio de Janeiro – Gillnet (pers. comm. A.P. Di Beneditto and R. Ramos) + 3 from NE Brazil – Gillnet (m) Caught from Central Sao Paulo. (n) Caught from Central Amazon. (o) Figure composed as follows: 1Northern Rio Grande do Sul, gillnets+ 18 Northern, gillnets. (p) Northern

Canada: (a) No information; (b) Figure composed as follows: 451 High Arctic + 108 Hudson; (c) Figure from Nunavut. Figures from Northwest Territories – Beaufort Sea not available at time of report.

Chile: Figures are taken from SC/51/SM17 and are a mixture of direct and incidental catches. (a) Port Punta de Choros IV R – Carcass (II) with net marks butchered openly on wharf; meat reportedly used for human consumption. (b) Stranded (III), harpoon wounds; + witness evidence directed take; parts muscle and blubber removed. (c) Stranded with multiple cut marks and flukes severed.

Denmark: (a) SC/54/SM31 – Bycatch is overestimated, as the effect of the use of pingers has not been taken into account.

Faroes: (a) NAMMCO Annual Report 1999: Faroe Islands Progress Report 1998; (b) pers. comm. Daniel Pike, Scientific Secretary, NAMMCO; (c) no Information.

France: (a) Includes those found stranded with marks indicating that they had been most probably caught in fishing gear. Data are provided by the CRMM-La Rochelle, France; (b) Figure composed as follows: 1 Atlantic + 1 Mediterranean; (c) Figure composed as follows: 2 English Channel + 7 Atlantic + 1 Mediterranean; (d) Figure composed as follows: 7 Atlantic + 4 Mediterranean; (e) Figure composed as follows: 1 English Channel + 117 Atlantic.; (f) Figure composed as follows: 3 English Channel + 9 Atlantic; (g) Caribbean.

Germany: (a) Figure composed as follows: 3 from Schleswig-Holstein, Baltic Sea - Gillnet + 2 from Mecklenburg-Prepommerania, Baltic Sea – Gillnet; (b) Figure composed as follows: 5 from Schleswig-Holstein, Baltic Sea - Gillnet + 3 from Mecklenburg-Prepommerania, Baltic Sea – Gillnet.

Greenland: (a) No information; (b) pers. comm. Daniel Pike, Scientific Secretary, NAMMCO.

Ireland: (a) Bycatch determined from post-mortems; (b) Bycatch of 1 determined from post-mortem + 13 incidentally caught in surface gillnet; (c) Bycatch of 1 determined from post-mortem + 7 incidentally caught in surface gillnet; (d) Bycatch determined from post-mortems.

Italy: (a) Centro Studi Cetacei della Societa Italiana di Scienze Naturali 1998 and 1999 report in preparation.

Japan: (a) Northern & Southern forms.

Korea: (a) Drift gillnet; (b) East Sea; (c) Figure composed as follows: 4 set net, 2 gillnet, 1 drift gillnet; (d) Figure composed as follows: 9 set net, 7 gillnet, 1 drift gillnet; (e) Set net; (f) South Sea; (g) Gillnet; (h) Figures composed as follows: 20 Set net, 5 gillnet; (i) Figures composed as follows: 1 East Sea gillnet, 13 Yellow Sea stow net; (j) Figure composed as follows: 1 Gillnet + 1 drift gillnet; (k) Figure composed as follows: East Sea – 2 trap net + 8 purse seine + 7 gillnet + 12 set net; (l) Figure composed as follows: East Sea – 2 gillnet + 17 Set net + 1 trap net. (m) East Sea – Set net; (n) Figure composed as follows: East Sea – 1 gillnet + 1 set net + South Sea – 10 Purse seine; (o) Figure composed as follows: East Sea –1 purse seine + 18 gillnet + 3 set net + 4 trap net + South Sea – 1 set net; (p) Figure composed as follows: 21 gillnet + 14 set net + 3 trap net + 3 unidentified; (r) Figure composed as follows: 18 purse seine + 1 long line + 8 gillnet + 32 set net + 3 trap net; (s) Figure composed as follows: 4 purse seine + 5 gillnet + 4 set net + 1 long line + 2 trap net + 9 unidentified; (t) Figure composed as follows: 1 long line + 57 gillnet + 29 set net; (u) Figures composed as follows: 5 gillnet + 2 set net; (v) Figures compose as follows: 1 gillnet + 1 set net + 1 trawl; (w) Figures composed as follows: 1 gillnet + 1 set net.

Mexico: (a) See the ETP table for catches taken in the Eastern Tropical Pacific. They are not included here. (b) Captured in the Gulf of California. (c) Permits issued by SEMARNAP. The animals are being kept in captivity at recreational facilities. (d) Gillnet. (e) Pacific – Long line.

New Zealand: (a) pers. comm. R.G. Johnston; (b) South Island. From Govt observer program (covering about 10% of range of Hector's dolphin); (c) South Island # beachcast; (d) Gillnet/Trawl; (e) Figure composed as follows: Gillnet - 3 North Island, West Coast + 6 South Island, West Coast + 4 South Island, East Coast; (f) Trawl.
Peru: (a) Figures are taken from SC/54/SM10 and are a mixture of direct and incidental catches. All catches taken from Table 1 have been tabled as incidental because it is not clear which were direct and which were incidental; (b) Mostly meat samples.
South Africa: (a) pers. comm. P. Best; (b) Shark nets.
Spain: (a) Probable pilot whale – ship strike.
St Lucia: All caught in the Caribbean Sea. (a) Harpoon gun; (b) Harpoon gun/hand harpoon.
Sweden: Figure composed as follows: 1 Baltic Sea Gillnet + 2 Swedish Skagerrak Sea (1 Gillnet + 1Trawl).
UK: (a) Bycatch diagnosed at necropsy (England and Wales); (b) Figure composed of: 20 from gillnets, 12 unknown but diagnosed at necropsy, 1 reported to SWF in Shetland (2 from Scotland, 30 from England and Wales + 1 from Shetland); (c) Bycatch diagnosed at necropsy (England) (d Figure composed as follows: 9 diagnosed at necropsy (England and Wales), 4 Gillnet fisheries (England), 1 Gillnet (E. Scotland), 3 Trawl (W. Scotland), 2 diagnosed at necropsy (W. Scotland); (e) Illegal salmon net (Moray Firth); (f) Gillnet fishery (England); (g) Figure composed as follows: 10 England & Wales - Stranded/diagnosed at necropsy + 2 Celtic Sea – Observed bycatch in set net fisheries; (h) Figure composed as follows: 8 England & Wales - Stranded/diagnosed at necropsy + 12 North Sea - Observed bycatch in set net fisheries + 14 Celtic Sea - Observed bycatch in set net fisheries; (i) Pelagic trawling.
USA: The reported catch columns include catches reported by observer programs, from interviews with fishermen and incidental reports (e.g. stranded animals determined to have died in nets). There are no live captures to report. All information is taken from published USA National Marine Fisheries Service Annual Marine Mammal Stock Assessment Reports (SAR) unless otherwise indicated. Stranded animals are not included.
In the following notes the estimated catch is given, followed by observed catch in brackets. (a) K.J. Frost 1999. Harvest report: statewide summary for western Alaska beluga stocks, 1994/98. Report 99-1, Alaska Beluga Whale Committee; Cook Inlet figures - pers. comm. DeMaster. Includes 39 struck and lost (except Cook Inlet, where no data were available); (b) Figure composed as follows: 12(12) Pelagic drift gillnet + squid, mackerel, butterfish fishery 85(1) + Mid-Atlantic coastal sink gillnet 7(1); (c) Figures composed as follows: 34(1) NE multispecies sink gillnet (US Atlantic and Gulf of Mexico SAR - 2000); (d) Figures composed as follows: for 1998 1(1) WA/CA/OR groundfish trawl (US Pacific SAR - 2000); (e) Figures composed as follows: 63(3) Mid-Atlantic coastal sink gillnet(coastal bottlenose) + 3(3) pelagic drift gillnet (offshore bottlenose); (f) 4(4) Pelagic drift gillnet; (g) Figures composed as follows: 51(9) CA/OR drift gillnet + $\geq$2(2) CA large mesh set gillnet (US Pacific SAR - 2000); (h) Figures composed as follows: $\geq$2(2) CA large mesh set gillnet (US Pacific SAR - 2000); (i) Figures composed as follows: 255(255) Pelagic drift gillnet + 17(17) mackerel joint venture (US Atlantic and Gulf of Mexico SAR - 2000); (j) Figures composed as follows: 9(9) Pelagic drift gillnet + 35(1) Pelagic longline (US Atlantic and Gulf of Mexico SAR - 2000); (k) Figures composed as follows: 332(12) NE multispecies sink gillnet + 446(53) Mid-Atlantic coastal gillnet + 0(0) Pelagic drift gillnet (US Atlantic and Gulf of Mexico SAR - 2000); (l) Figures composed as follows: $\geq$1(1) Klamath River tribal salmon fishery + 63 (n/a) CA large mesh sink gillnet (as described for 1997) (US Pacific SAR - 2000); (m) Figures composed as follows: 3(2) WA/OR/CA groundfish trawl + 4(3) BSAI groundfish trawl + 3(1) Gulf of Alaska trawl + 4(1) BSAI groundfish longline (US Pacific SAR - 2000 and Alaska SAR - 2000); (n) Pelagic drift gillnet fishery (US Atlantic and Gulf of Mexico SAR - 2000); (o) SC/54/ProgRep USA – Figure composed as follows: 4(3) Alaska groundfish fisheries(trawl, longline and pot) + 1(1) Washington, Oregon and California at-sea processing groundfish trawl fishery.; (p) pers. comm. D.P. DeMaster – does not include figures for Cook Inlet; (q) Halibut/angel shark set gillnet fishery – Monterey Bay (SC/53/SM9); (r) Swordfish/thresher shark drift gillnet fishery (SC/53/SM9); (s) Set gillnet fishery – non-Monterey strata: Southern California, Ventura, Channel Is., and Morro Bay) (SC/53/SM9); (t) SC/54/ProgRep USA - Figure includes 51 struck and lost – does not include figures for Cook Inlet; (u) SC/54/ProgRep USA - Alaska groundfish fisheries (trawl, longline and pot); (v) SC/54/ProgRep USA - Figures composed as follows: 228(1) NW Atlantic – N. Atlantic bottom trawl + 49(1) NW and Mid-Atlantic – Squid, mack., butt. trawl + 94(1) Mid-Atlantic – Pelagic longline; (w) SC/54/ProgRep USA - NW Atlantic – NE multispecies sink gillnet; (x) SC/54/ProgRep USA - Figures composed as follows: 63(3) Mid-Atlantic coastal sink gillnet + 52(4) Central Florida shark gillnet; (y) SC/54/ProgRep USA - California/Oregon/Washington swordfish/thresher shark drift gillnet fishery; (z) SC/54/ProgRep USA - California swordfish/thresher shark drift gillnet fishery; (A) SC/54/ProgRep USA - Figures composed as follows: 146(2) NW Atlantic, NE multispecies sink gillnet + 49(1) NW and Mid-Atlantic, squid, mack, butt., trawl; (B) SC/54/ProgRep USA - NW and Mid –Atlantic pelagic longline (serious injury); (C) SC/54/ProgRep USA - Figures composed as follows: 270(14) NW Atlantic, NE multispecies sink gillnet + 53(3) Mid-Atlantic coastal sink gillnet + 19(19) NW and Mid-Atlantic, NMFS/NER records (gillnet); (D) SC/54/ProgRep USA - Central California angel shark/halibut and other species large mesh (>3.5") set gillnet fishery.

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U.S. Marine Mammal Stock Assessment Reports are available at the following web site: http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html