Annex I
Report of the Standing Sub-Committee on Small Cetaceans

Members: Martin (Chair), Albert, Baker, Baldwin, Berggren, Borchers, Brownell, Buckland, Chen, Childerhouse, Clarke, DeMaster, Donahue, Donovan, Ensor, Fabbri, Findlay, George, Goto, Gunnlaugsson, Hakamada, Hammond, Hatanaka, Hiby, Kasuya, Kato, Kawachi, Kawahara, Kim, Kock, Lawrence, Lens, Melnikov, Miyashita, Moronuki, Nishiwaki, Notarbartolo di Sciara, Øien, Okamoto, Palka, Pastene, Peréz Cortés, Perrin, Pinedo, Read, Reeves, Reijnders, Robineau, Rogan, Rojas-Bracho, Senn, Simmonds, Slooten, Smith, Sweeney, Tanakura, Thiele, Van Waerebeek, Von Bismarck, Wade, Walters, Yagi, Yamamura, Zhu.

1. ELECTION OF CHAIRMAN

Martin was elected as Chairman.

2. ADOPTION OF AGENDA

The agenda was adopted unamended and is given as Appendix 1.

3. APPOINTMENT OF RAPPORTEURS

Read, Reeves and Simmonds acted as Rapporteurs.

4. REVIEW OF AVAILABLE DOCUMENTS

Documents relevant to the work of the sub-committee were SC/50/SM1-12; SC/50/O4-5; Van Waerebeek *et al.* (in press); Kemper and Gibbs (1998); Gordon *et al.* (1998); and SC/50/ProgReps.

5. REVIEW OF SMALL CETACEANS IN THE INDIAN OCEAN AND RED SEA, WITH SPECIAL REFERENCE TO THE MIDDLE EAST

Discussion at this meeting was limited to the northwestern part of the Indian Ocean, and in particular to the waters bordering the Arabian Peninsula. As a way of ordering the discussion, the group arbitrarily defined three zones within this region:

(1) the shallow, semi-enclosed Arabian (Persian) Gulf;
(2) the Arabian Sea including the Gulfs of Oman and Aden; and
(3) the Red Sea.

The Red Sea and Gulf of Aden were considered to a limited extent at the previous sub-committee meeting which had focused on Africa.

Two review papers formed the basis for discussion. SC/50/SM6 summarised relevant information from the literature, direct observations by the authors, and two databases – one maintained at the Oman Natural History Museum since 1988 and the other by the Emirates Natural History Group in Abu Dhabi since 1995. SC/50/SM1 provided a review of cetaceans in the Arabian Gulf with emphasis on the Saudi Arabian coastline. Interest in cetaceans is relatively new in this region, and most records refer to observations made within the past 2-3 decades. Previous compilations by Leatherwood (1986), de Silva (1987) and Robineau and Fiquet (1996), and papers contained in Leatherwood and Donovan (1991), were used as background by the authors of SC/50/SM1 and SC/50/SM6. It should also be noted that two recent popular books are available, one on cetaceans of Oman (Baldwin and Salm, 1994) and one on cetaceans of the United Arab Emirates (Baldwin, 1995).

Although it was not formally reviewed by the sub-committee, a paper by Ballance and Pitman (in press) contains valuable new data on cetaceans of the pelagic western tropical Indian Ocean, including the Gulf of Oman and a portion of the Arabian Sea coast of Oman. SC/50/SM6 included references to the sightings off Oman by Ballance and Pitman (in press).

The amount and quality of data on small cetaceans in the Middle East region are very strongly biased towards the few areas where competent researchers have spent time. Coastal waters of Oman have been relatively well studied by Baldwin and colleagues, while Robineau conducted surveys of a portion of the Saudi sector of the Arabian Gulf coast following the 1991 Gulf War. Otherwise, little is known about the cetacean fauna of the northern (Iran) side of the Arabian Gulf, the Arabian Sea coast of Yemen or the Gulf of Aden and Red Sea.

The sub-committee expressed its gratitude to the authors of SC/50/SM6, in particular, for their hard work in compiling, organising and presenting a thorough synthesis of data on small cetaceans in the northwestern Indian Ocean.

5.1 Arabian (Persian) Gulf

The Arabian Gulf is connected to the Gulf of Oman by the Strait of Hormuz. Most of the water flowing into the Arabian Gulf enters on the north side of the Strait. Circulation is poor with a turnover time of about 3-5 years for water entering the Gulf (SC/50/SM1). Average depth is only 35m. The high salinity, high turbidity and pronounced seasonal flux in water temperature make the Gulf a 'naturally stressful environment' for cetaceans and other fauna (SC/50/SM1).

Seven species of small cetaceans have been documented in the Gulf, including the false killer whale (*Pseudorca crassidens*), Indo-Pacific humpbacked dolphin (*Sousa chinensis*), pantropical spotted dolphin (*Stenella attenuata*), spinner dolphin (*Stenella longirostris*), common dolphin (*Delphinus* cf. *tropicalis*), bottlenose dolphin (*Tursiops* cf.

aduncus) and finless porpoise (*Neophocaena phocaenoides*). In addition, there are unconfirmed records of the killer whale (*Orcinus orca*), short-finned pilot whale (*Globicephala macrorhynchus*) and Risso's dolphin (*Grampus griseus*). Baldwin questioned the records for the latter two species noting that they are generally regarded as deep-water animals and that inexperienced observers might easily confuse pilot whales with false killer whales. Inability to track records to original sources made it impossible to evaluate them.

Only three species can be considered common in the Gulf. *Delphinus* were the most frequently encountered and most abundant cetaceans in Robineau's surveys off the Saudi coast. All *Delphinus* specimens observed at sea and examined in museum collections have been long-beaked forms. *Delphinus* were not sighted by Baldwin during 60 days of small-boat surveys in Gulf waters of the United Arab Emirates between March and July 1995, nor have they ever been reported alive in the UAE sector of the Gulf. These results, when compared to those of Robineau in Saudi waters, suggest that the high densities observed in the latter area are not representative for the entire Gulf. Humpbacked dolphins appear to be widely distributed throughout the Gulf, albeit mainly in waters less than 30m deep. Baldwin pointed out that there is a hiatus in records of this species in the Gulf of Oman, suggesting that the Arabian Gulf population is a separate stock. Bottlenose dolphins, all considered to be *aduncus*-type animals, are relatively abundant in the Arabian Gulf. A fourth species, the finless porpoise, is of major concern because of its limited distribution, vulnerability to bycatch and likely susceptibility to disturbance from coastal development, land reclamation, vessel traffic, etc. It seems to occur in the Gulf in low abundance. The finding of a newborn porpoise off the Saudi coast indicates that calving occurs in the Gulf.

The three other species definitely recorded from the Gulf – *Pseudorca crassidens* (5-6 records), *Stenella attenuata* (1-2 records) and *Stenella longirostris* (2-3 records) – are probably rare.

5.2 Arabian Sea, including Gulf of Oman and Gulf of Aden

This region is obviously much larger and more diverse than the Arabian Gulf. The shelf off northern Oman is generally more than 50km wide; water in the central part of the Gulf of Oman is more than 1,000m deep, and in some areas more than 3,000m deep. From Ra's al Hadd southwestwards, the shelf is narrow, and a strong seasonal upwelling supports kelp communities and extensive fisheries. Off the central coast of Oman, leeward of Masirah Island and south to Shuwaymiyah, the shelf is relatively wide (~20-50km), compared to other areas, such as Ra's al Hadd itself and near Salalah where water depths exceed 1,000m 5-10km from shore. There is some evidence (SC/50/CAWS21) to suggest that the seasonal upwelling, which brings elevated nutrient levels to coastal and offshore waters in this region, can maintain fisheries throughout the year (i.e. unseasonal upwelling events do occur).

Ballance and Pitman (1998) describe the cetacean community of the pelagic western tropical Indian Ocean, based primarily on observations from their dedicated sightings survey from March to July 1995. The list of species observed during their survey is similar to that given in SC/50/SM6 based mainly on opportunistic research from small boats and beach surveys. In Omani waters of the Gulf of Oman and the Arabian Sea, the following species have been confirmed (SC/50/SM6): dwarf sperm whale (*Kogia simus*), Cuvier's beaked whale (*Ziphius cavirostris*), melon-headed whale (*Peponocephala electra*), false killer whale, killer whale, rough-toothed dolphin (*Steno bredanensis*), Risso's dolphin, Indo-Pacific humpbacked dolphin, *Delphinus* sp., bottlenose dolphins (reportedly two forms), pantropical spotted dolphin, striped dolphin (*Stenella coeruleoalba*) and spinner dolphin. Species tentatively identified for Omani waters, but that need confirmation (SC/50/SM6), include the pygmy killer whale (*Feresa attenuata*) and *Globicephala* sp. Both have been reported elsewhere in the western tropical Indian Ocean, including off Somalia and Socotra Island (Ballance and Pitman, 1998), and Brownell reported sightings near the Maldive Islands southeast of India in early April 1998.

The occurrence of *P. electra* is only confirmed on the basis of Van Waerebeek *et al.*'s (in press) identification of a calvaria found on the Khuria Maria Islands (now called Juzor al Halaaniyaat) that had been reported by Gallagher (1991) as *Tursiops* sp. Although Ballance and Pitman (1998) saw two small groups of rough-toothed dolphins off the central coast of Oman in July 1995, the only other record of that species in the region is a calvaria from Ra's al Madrakah, Oman (19ºN, 57º50.5'E), also tentatively identified by P.J.H. van Bree (Gallagher, 1991) as *Tursiops* sp. and later identified as *Steno* by Van Waerebeek *et al.* (in press).

No records of pilot whales could be confirmed from coastal waters of the Arabian Peninsula (SC/50/SM6). Museum specimens from Oman previously listed as ?*Globicephala macrorhynchus* (Gallagher, 1991) were identified by Van Waerebeek as *Pseudorca crassidens* although the identity of one is still under study (Van Waerebeek, pers. comm.). Sightings of pilot whales were made east of Socotra Island by Ballance and Pitman (1998), near the Maldives by Brownell (pers. comm.) and off Djibouti (Robineau and Rose, 1984).

The complete lack of records of *Neophocaena* in Omani waters and west is of considerable interest. It appears that the Arabian Gulf and Iran coastal waters constitute the westernmost limits of the species' distribution.

The most frequently encountered species in Omani coastal waters are *Delphinus* sp., *Tursiops* sp., *Sousa chinensis* and *Stenella longirostris* (SC/50/SM6).

Common dolphins are widely distributed and abundant in the northwestern Indian Ocean (SC/50/SM6). They often occur in large groups (>100 individuals), sometimes in mixed schools with *S. longirostris*. It is of interest that all of the sightings of *Delphinus* made by Ballance and Pitman (1998) in 9,784 linear km of survey effort were off Oman between latitudes 18º28'N and 23ºN. This was in spite of the fact that only 13.1% of the total surveyed distance was in these waters (SC/50/SM6). All of the common dolphins observed by Ballance and Pitman (1998) were very long-beaked and judged to be the '*tropicalis*' form; they had a *delphis*-type colour pattern. Van Waerebeek noted that the skulls of some animals from Omani coastal waters appeared more *capensis*-like than those in the Arabian Gulf. He pointed out that about 18 specimens are available for study in the Oman Natural History Museum. Perrin noted that the most recent genetic results indicate that the *tropicalis* form may be a taxon distinct from the *delphis* and *capensis* forms.

Bottlenose dolphins, understood to include at least *Tursiops* c.f. *aduncus* and possibly also *T. truncatus*, are relatively abundant in Omani waters (SC/50/SM6). Group sizes near shore tend to be in the tens of individuals, while much larger groups (up to 750 individuals) have been reported offshore (Ballance and Pitman, 1998). LeDuc and Curry (1996) have shown from cytochrome B genetic analysis that the nominal species *Tursiops aduncus* is a separate species from *T. truncatus* and that they are not even sister taxa. Collection of tissues for DNA analyses is especially encouraged to help resolve questions as to which species are present in the Indian Ocean. Baldwin noted that there is considerable specimen material (skulls) available for study in the Oman Natural History Museum.

Pseudorca crassidens are reported relatively often in offshore waters of the Gulf of Oman, sometimes in association with yellowfin tuna (*Thunnus albacares*). There is evidence from direct observations and from stomach contents that false killer whales prey on yellowfin tuna in this region (SC/50/SM6). Observations of a live-stranded calf, juveniles at sea and a possible birth in the Gulf of Oman indicate that the species may be resident.

The Indo-Pacific humpbacked dolphin is a coastal, shallow water species. As mentioned above, there is a gap in records between the Strait of Hormuz and Ra's al Hadd. To the south and west of the latter, the distribution may be continuous along the coast all the way to the Gulf of Aden and Red Sea (SC/50/SM6). If the populations in the Arabian Gulf and along the Arabian Sea coast to the west and south are indeed separate, it is unclear whether this separation is natural or the result of human activities (SC/50/SM6). Baldwin noted that the group sizes off Oman are, at times, considerably larger than reported group sizes for this genus anywhere else in its range.

The spinner dolphin is widely distributed in the Gulf of Oman and along the Arabian Sea coast of Oman and southwards into Yemen (SC/50/SM3; SC/50/SM6). Groups of hundreds to several thousand animals are seen regularly travelling parallel to shore in the Gulf of Oman approximately 2-6km offshore. SC/50/SM3 describes the skeletal and external morphology of eight spinner dolphins and summarises distribution and ecology of the species in the Gulf of Oman and northern Arabian Sea. All the spinner dolphins from Oman have a falcate dorsal fin. One large individual, observed from underwater, was seen to have a ventral keel, but otherwise ventral keels have not been observed on spinners in this region. The body sizes of three physically mature males were smaller than those of animals from any other known stock of spinner dolphins except the dwarf-form stocks from Thailand and Australia. Two colour morphs have been observed in Omani waters, the most common being the typical tripartite pattern similar to that of the subspecies *S. l. longirostris*. A smaller morph has a dark dorsal overlay that obscures most of the tripartite pattern, and it has a pinkish or white ventral field and supragenital patch. Perrin pointed out that his ongoing studies of spinner dolphins worldwide leads him to expect much complex variation in size and morphology across the species' pantropical range. The authors of SC/50/SM3 urged that the spinner dolphins of the northern Arabian Sea be viewed, at least provisionally, as a discrete population, pending a more extensive investigation.

5.3 Red Sea

At the previous meeting it was noted that at least eight species of small cetacean are known to inhabit the Red Sea (IWC, 1998), of which the Indo-Pacific humpbacked dolphin, the bottlenose dolphin (*aduncus* form and and other larger form in the Gulf of Suez) and the pantropical spotted dolphin are the most common. Spinner dolphins, rough-toothed dolphins, Risso's dolphins, killer whales and false killer whales are also present. No new data from the Red Sea were made available to the sub-committee at the present meeting.

5.4 Conservation problems

Several concerns have arisen in regard to the conservation status of small cetaceans in the region. There is a dearth of information about fisheries in the Arabian Gulf even though a substantial amount of fishing is known to occur. Robineau noted that fishing has expanded rapidly in recent decades (Esseen, 1996). Also, of seven stranded animals that he examined on Abu Ali Island, Saudi Arabia, in 1993, two were definitely killed in fishing gear (a common dolphin caught in an inter-tidal barrier trap and a bottlenose dolphin caught on a longline) but two more were probably bycaught. Robineau regards incidental takes as a major threat to cetacean populations in the Gulf.

Fishing with gillnets is practised throughout the region. Although bycatch is not systematically reported, it certainly occurs (SC/50/SM1; SC/50/SM6; Siddeek and Baldwin, 1996; Baldwin and Cockcroft, 1997). In the UAE and Oman, the taking of cetaceans is illegal so fishermen may cover up any catches, whether accidental or deliberate. The occasional discovery and reporting of butchered cetacean carcasses indicates that some use is made of the meat and/or blubber, but little is known about the nature or scale of such practices.

Baldwin pointed out that most of the islands off the coast of Abu Dhabi are privately owned and that, as a result, fishing is banned in waters surrounding these islands. This situation may create a mechanism by which at least some areas could be managed to reduce or eliminate bycatch.

The rich fishing grounds along the Oman coast, especially from Ra's al Hadd southwestwards, supports a large fishing industry. Offshore handlining, nearshore gillnetting and beach seining are common activities in the Muscat area. There is an offshore net fishery targeting sharks and other pelagics (e.g. kingfish, tuna), and trawlers and longline vessels from Korea and Taiwan also operate in Omani waters. The offshore net fishery involves the use of large (30-60ft) vessels as the primary platforms. Large-mesh nets up to 1km long are set between dhows (traditional fishing vessels). Fishing intensity is greatest from Masirah Island south to the Yemen border. Baldwin noted that a relatively large number of cetacean strandings occur on or near Masirah Island, possibly linked to fishery activities.

Effects of pollution are another major concern in this region. The poor circulation in the Arabian Gulf, particularly, means that contaminants remain concentrated there for long periods (SC/50/SM1). Not only has the Gulf experienced two very large-scale oil spills in recent years (Nowruz in 1983 and the Gulf War in 1991), but it is also estimated that some 1.5 million tonnes of oil are released into the Gulf each decade as a result of normal oil production and transport (Michel *et al.*, 1986). In 1983 after the Nowruz spill, at least 38 dugongs, 33 cetaceans and thousands of fish were found dead, but no direct link was established between the oil spill and these mortalities. The 1991 spill in the northwestern Arabian Gulf was the largest in history. Between January and May that year 600,000 to 1,000,000 tonnes of crude oil were intentionally released, covering some 500km of coastline between southern Kuwait and Abu Ali Island, Saudi Arabia. A large die-off of marine mammals occurred, including at least 57 bottlenose dolphins, 13 humpbacked dolphins, one finless porpoise and seven unidentified animals. Robineau noted that, according to a report by Preen (1991), no obvious direct relationship between the oil spill and the die-off could be established. A confounding factor was that carcasses were found 120-250km south of where the oil slick stopped. However, Robineau noted that the latter area is a natural collection site and the animals observed appeared to have been dead for 4-6 weeks, so could have originated from the polluted area. One year after the beginning of the Gulf War oil spill, Robineau and colleagues were unable to find any evidence of abnormal cetacean mortality in the two bays of the Jubail Marine Sanctuary, Saudi Arabia. Furthermore, a small population of humpbacked dolphins was discovered in this previously heavily polluted area.

Robineau also called attention to a large die-off in the Gulf in 1986. In this event at least seven dead dugongs and some 520 dead cetaceans (including *Tursiops* sp. and *Sousa, Delphinus* and *Neophocaena*) were observed on the beaches of Qatar, Saudi Arabia, Bahrain, Iran, Kuwait and the UAE (Anon., 1986; Preen, 1991). Some 4-8,000 dead fish and 36 dead turtles were also reported. The cause of this mass mortality was never established, and its scale is likely to have been underestimated because intensive beach surveys were not conducted throughout the region. A red tide event might have been involved, but in the absence of detailed necropsies and tissue analyses, no possibility can be ruled out.

The sub-committee stressed that detailed studies are needed to elucidate the primary cause(s) of the observed die-offs. Those should include investigations of the rôle of bio-toxins, diseases and pollution with respect to both direct impacts on the cetaceans and indirect effects via their food-chain. Particularly relevant are pathological studies of cetaceans, focussing on the chronic toxicity of e.g. poly-aromatic hydrocarbons (PAHs), to assess the general health state of cetaceans in that area with respect to oil contamination.

A third concern, in addition to bycatch and pollution, is directed hunting. Data summarised in SC/50/SM6 indicate a long history of human consumption of dolphin products in Oman. Recent observations of butchered animals on beaches (including common, bottlenose, spinner and humpbacked dolphins in Oman) shows that there is still some demand for cetacean products in the region. In addition to human consumption of the meat, use of dolphin carcasses as shark bait has been reported from Masirah Island by Salm *et al.* (1993). Anecdotal reports indicate that some directed hunting continues in Oman despite its illegality (SC/50/SM6).

A final, more generalised concern is that habitat degradation and loss may have already had a substantial impact on coastal cetaceans in the region. For example, there are references to declining abundance of *Sousa* in the Arabian Gulf, and the finless porpoise is thought to be rare in the Gulf. Both of these species could be affected by coastal development (e.g. land reclamation, dredging, intensive motor vessel traffic). The rapid, continuing modernisation and industrialisation of the Gulf and Arabian Peninsula are themselves cause for concern about possible impacts on coastal marine resources generally.

5.5 Recommendations for further study

(1) The sub-committee noted that available information on small cetaceans in the region comes almost entirely from opportunistic work by individual scientists. In addition, several systematic surveys have been conducted in portions of the Arabian Gulf, prompted by concern about the immediate impacts of large oil spills. However, no formal abundance estimate is available for any population of small cetaceans in the region. In the light of concerns about bycatch and the possible effects on cetacean populations of pollution and other forms of habitat degradation and loss, the sub-committee **recommends** that governments initiate studies of stock identity and field surveys for stock assessment. Initially, these should focus on coastal populations of humpbacked, bottlenose and common dolphins. The possibility of using data from systematic aerial surveys of dugongs (past and future) to obtain estimates of bottlenose and/or humpbacked dolphin abundance should be investigated.

(2) The sub-committee agreed that the few records of cetacean bycatch in fisheries probably substantially under-represent actual bycatch levels. Everywhere else in the world where gillnet fishing occurs and cetaceans are present, there is some bycatch, and virtually all species of cetaceans are susceptible (Perrin *et al.*, 1994). The sub-committee **recommends** that credible programmes be established to monitor the species and numbers of cetaceans caught. Self-reporting is not adequate, so observer programmes will be necessary. Information on fisheries techniques and effort should also be obtained to enable evaluation of results of bycatch studies.

(3) The sub-committee commended Robineau, Gallagher, Van Waerebeek, Baldwin and other colleagues for their efforts to salvage and deposit specimens in museum collections. Papers submitted to the meeting demonstrated the usefulness of such efforts in providing basic knowledge about what species occur in the region. The sub-committee **recommends** that further work on specimen collection and curation be supported by appropriate governmental and non-governmental agencies. This should include the establishment of networks to detect, record, examine and collect biological samples from stranded cetaceans on a systematic basis. One value of such networks is that they provide measures of background stranding frequency. An understanding of background frequency is often necessary for judging when a mass mortality, or die-off, is underway. Specimen collection should be understood to include biopsies and other tissue samples for genetic analyses of population structure and pollutant assays (see following recommendation).

(4) The sub-committee noted that waters of the Arabian Gulf are highly polluted by oil, and also that at least three recent die-offs of cetaceans and other animals (1983, 1986, 1991) have been documented. The causes of these die-offs were not adequately investigated and therefore remain uncertain, although two were coincident with major oil spills. If one were looking for an area in which to study one or more populations of cetaceans that are chronically exposed to hydrocarbon contaminants, the Gulf would be an appropriate site to choose. It became clear from discussions that little or no work had been done to measure contaminant burdens of cetaceans in the Gulf or elsewhere in the Middle East. The sub-committee **recommends** that such studies be carried out.

(5) The sub-committee wished to draw particular attention to the need for detailed studies of the conservation status of humpbacked dolphins and finless porpoises in the Middle East and **recommends** that such studies be carried out. Continuation and expansion of studies of the systematics of spinner, bottlenose and humpbacked dolphins are also strongly encouraged. For these and

other studies the sub-committee emphasised the importance of training and involving local scientists from range states in the region.

6. FURTHER CONSIDERATION OF THE CRITERIA FOR ASSESSING THE STATUS OF HARBOUR PORPOISE POPULATIONS

At its 1997 meeting the sub-committee had agreed that no one algorithm for assessing the conservation status of small cetacean populations was likely to be appropriate in all circumstances. It also recognised that simulation studies, taking into account uncertainty in stock identity, would likely provide a way forward in resolving the question of which algorithms might best be used on a case by case basis. Because insufficient resources were available to the sub-committee during its annual meetings to develop this approach, a group had been set up under Bravington to work intersessionally and report back in 1998. At this meeting it was reported that Bravington's group had made limited progress, due largely to time constraints, but that a final summary report was expected by August 1998.

The sub-committee then considered a report from ASCOBANS (SC/50/SM12). This was pertinent to the discussions under this priority topic because it set out the conservation objectives of ASCOBANS, the multi-lateral agreement with conservation responsibilities for small cetaceans in the North and Baltic Seas. The aim of ASCOBANS was stated as 'to restore and/or maintain biological stocks of small cetaceans at the level they would reach when there is the lowest possible anthropogenic influence', and its interim conservation objective is 'to restore populations to, or maintain them at, 80% or more of the carrying capacity' (SC/50/SM12).

Last year the sub-committee had noted that its work would be facilitated if more specific conservation objectives were identified by ASCOBANS. The sub-committee therefore welcomed SC/50/SM12, which states such objectives, and noted that they provide a focus for this sub-committee to furnish scientific assistance regarding the conservation status of harbour porpoises in this region. Reijnders, in his capacity as Chair of ASCOBANS' Advisory Committee, indicated that liaison between that Committee and the IWC Scientific Committee would be welcomed, and that a formal proposal for scientific cooperation would be submitted to the Scientific Committee at this meeting. The sub-committee agreed that such collaboration would further its own work and that the most appropriate way to further this collaboration was for a joint ASCOBANS/IWC working group to be established. The sub-committee also agreed that it was important for its work to continue pending the formal establishment of this group. To facilitate this, a Working Group of this sub-committee was established under the Convenorship of Read, with the intention that this would form the IWC element of the joint working group, with a membership of Read, Berggren, Buckland, DeMaster, Donovan, Hammond, Martin, Palka, Reijnders, Rogan and Wade. The Convenor of this group was empowered to add others to this list as necessary. The Working Group's terms of reference were as follows:

> 'The working group should provide scientific assistance to the Advisory Committee of ASCOBANS on issues relating to assessment of the status of harbour porpoises in the North Sea and adjacent waters. This assistance should include: generating plausible hypotheses regarding population structure; providing information on life history parameters, abundance and trends in abundance; identifying methodology to estimate bycatch levels; identifying demographic models to assess the status of populations in the North Sea and adjacent waters. The Working Group should report on its progress at the 1999 meeting of the Scientific Committee.'

It was agreed that the Joint Working Group should meet intersessionally, but that the work of sub-committee members should be started as soon as possible by e-mail. Financial support for a meeting would not be sought from existing IWC funds, but members of the sub-committee indicated that other sources of support may be available. It was proposed that the meeting should occur in February 1999, allowing the completion of project BY-CARE which includes an investigation of harbour porpoise population structure in the North Atlantic.

In response to the ASCOBANS document, the sub-committee noted that several scientific approaches could be used to allow ASCOBANS to achieve its conservation objectives. Wade noted that he could provide a published example of one such method; this method is outlined in Appendix 2.

Okamoto noted that the ASCOBANS conservation objectives were not necessarily shared by non-ASCOBANS members. He also noted that in some areas harbour porpoises are subject to directed takes under completely different conservation philosophies, as mentioned in the 1996 report of this sub-committee.

7. REVIEW OF OTHER PRESENTED INFORMATION

7.1 White whales

Melnikov presented information on the distribution and seasonal movements of white whales in the Chukchi and northern Bering Seas (SC/50/SM4). Observations of white whales have been made from shore and whaleboats in this region since 1990. These observations have allowed conclusions to be drawn, for the first time, regarding the year-round distribution of this species in the waters around the Chukotka Peninsula.

In winter months (January-February), white whales are found in leads, broken pack ice, polynyas and wind-driven open water along the southern and eastern coasts of the Chukotka Peninsula, from Cape Dezhnev to the Anadirskiy Gulf. In April there is a steady northward movement of white whales out of the Anadirskiy Gulf, although the timing of these movements depends on ice conditions. By May, white whales are observed moving northward through the Bering Strait; this migration continues until June, considerably later than movements along the coast of Alaska. During the summer, white whales are largely absent from the coastal waters of the western Bering and southern Chukchi Seas. Melnikov suggested that the summer range of this species might lie near the ice edge of the northern Chukchi and East Siberian Seas. In autumn, white whales migrate south past Koluchin Bay, although the exact route and the timing of these movements are highly dependent on ice conditions. The animals appear to move southward in a broad front from the ice-edge towards shore, then along the shore in the direction of the Bering Strait. Some animals move south to St Lawrence Island and others move along the eastern coast of the Chukotka Peninsula and into the Anadirskiy Gulf.

Martin thanked Melnikov for his presentation of this new information and noted that the sub-committee would consider these findings again when it reviewed the status of white whales in a future meeting. Reeves asked whether white whales were hunted in the waters around the Chukotka Peninsula. Melnikov responded that small numbers were taken and offered to obtain more detailed information on the number of whales taken by native hunters for the next meeting.

7.2 Harbour porpoises

Berggren introduced SC/50/SM7, concerning porpoise bycatch in the Baltic region. He noted that although the trend data were not quantitative, porpoises appeared to have significantly declined across the whole region. However, some data are available on population structure and morphological and genetic studies have found differences between animals in the Skagerrak-Kattegat Seas and the Baltic. Similarly, there are differences between porpoises from the Belt and North Seas; between animals from the Kiel-Mecklenburg Bights and the North Sea and between those in the Skagerrak-Kattegat Seas and the west coast of Norway. Some abundance estimates are available, as are some minimum estimates of bycatch. In SC/50/SM7, Berggren *et al.* calculated mortality limits for the various areas and determined that, for the Baltic Sea at least, even minimum bycatches exceeded the calculated mortality limit. It was noted that very few data on bycatches were available from this region and that the situation was likely to be even worse than indicated in SC/50/SM7.

Kock introduced SC/50/SM8, which described the objectives and outline of methodology to be followed in a study of potential anthropogenic threats to harbour porpoises in waters near the German island of Sylt in the North Sea. The study is designed to determine what level of protection is required to allow the coexistence of harbour porpoises and diverse human activities in this area. In response to questions, Kock noted that collection of data on fishing effort would be an important component of the study and would include catch and effort data from commercial fisheries and information on recreational gillnet fisheries. Reijnders noted that an important component of such a study would be a determination of whether human activities caused them to abandon important habitat. Population counts would not necessarily detect such an effect, as the disturbed animals might be replaced by naïve ones. Kock noted that it is difficult to conduct behavioural studies with this species, primarily because of the problems in identifying individuals in the field.

The sub-committee also noted SC/50/SM11, which described a comparison of contaminant loads and pathology of harbour porpoises from the Baltic Sea, the North Sea and western Greenland. Porpoises from the three areas could be separated by principal component analysis of organochlorine contaminant loads, supporting previous evaluations of population structure of this species in the North Atlantic.

7.3 Franciscana

Pinedo described the use of parasites as biological tags in a study of stock structure in franciscanas (*Pontoporia blainvillei*) from southern Brazil, with information from Uruguay (Aznar *et al.*, 1995) and northern Argentina (SC/50/SM10). The prevalence of four gastrointestinal parasites in samples of franciscanas from southern Brazil and Uruguay differed significantly from those from Argentina. Pinedo concluded that the different prevalence of these biological markers indicated that franciscanas in these two regions could, at least during Spring, be considered separate ecological stocks. Unfortunately, it was not possible to stratify the sample of franciscanas by age to determine whether ontogenetic variation in parasite loads might exist, because age information was not available for the Uruguayan or Argentinian samples. Pinedo emphasised the value of using these biological tags as a tool to assist in defining ecological stocks. Kasuya underscored the importance of knowledge regarding the residency time of these gastrointestinal parasites in their hosts, as this factor could also influence the results of such geographical comparisons.

7.4 Other

Estimates of bycatches of small cetaceans in two California gillnet fisheries were described in SC/50/SM2 and SC/50/SM5. Perrin briefly reviewed the contents of these two papers for the sub-committee. In the driftnet fishery for swordfish and sharks, 692 sets were observed (approximately 27% of total fishing effort), in which 41 small cetaceans were taken. The species included long- and short-beaked common dolphins, northern right whale dolphins, Pacific white-sided dolphins, Risso's dolphins, Dall's porpoises and short-finned pilot whales. No direct observations were made of the set net fishery for halibut and angel sharks, so mortality was estimated using data on bycatch rate obtained in previous years. Of particular interest to the sub-committee were the results of an experiment to test the effectiveness of acoustic alarms in the driftnet fishery. The observed rate of entanglement in driftnets with acoustic alarms (0.028 small cetaceans per set) was significantly lower than the corresponding value for nets without alarms (0.11). Wade noted that the success of this experiment had resulted in the mandatory use of acoustic alarms in this fishery, in addition to other mitigation strategies. Reeves commented that this was the first successful demonstration of the use of acoustic alarms for species other than harbour porpoises, although Rogan noted that a reduction was not observed for all species. The sub-committee looked forward to reviewing the results of this experiment in more detail at a future meeting.

Entanglements of bottlenose dolphins and common dolphins in anti-predator nets situated around tuna mariculture operations in Australia were described in Kemper and Gibbs (1998). It is likely that these small cetaceans are attracted to tuna mariculture operations because of the abundant prey around the cages. This is a relatively new source of anthropogenic mortality for small cetaceans.

Hiby reviewed the potential uses of passive acoustic techniques in surveys of small cetaceans, as described in Gordon *et al.* (1998). Previous reports have described the preliminary development of this technique (Chappell *et al.*, 1996), which has now been improved. The equipment consists of a single high frequency hydrophone, towed behind a survey vessel. Porpoise clicks, which are narrow band pulses centred around 130kHz, are detected automatically or recorded by an operator. Hiby noted that this approach could be used alone or as an adjunct to human observers using visual survey techniques. Limitations to this approach include the difficulty of estimating distance and bearing to porpoise groups and determining how many animals are present in a group. Some of these problems (resolving distance and bearing) may be partially resolved by the use of multiple hydrophones in a towed array.

One particularly promising application of this technology is the use of acoustic monitoring to make primary detections of porpoises in conjunction with a tracker team using visual techniques. Members of the sub-committee noted that it may be difficult to match groups identified using acoustic/visual techniques and variation in click production due to environmental conditions, time of day and behavioural state still needs to be addressed. Despite these limitations, the sub-committee agreed that this approach holds considerable promise, particularly for small cetaceans that are found in low densities. Palka offered to test refinements of this system in surveys of harbour porpoises to be conducted in the Gulf of Maine during 1999.

Another application of the use of passive acoustic techniques in surveys of small cetaceans was described in SC/50/SM9. Notarbartolo di Sciara briefly reviewed this use of these techniques in surveys of striped dolphins conducted in the Ligurian Sea between 1994 and 1996. Hydrophone arrays were towed behind survey vessels and one-minute recordings were made at regular intervals. The location of each monitoring station was recorded, as were environmental conditions at each station. Analysis of these data incorporated wind speed, Beaufort sea state and time of day as covariates. In general, striped dolphins were found throughout the Ligurian Sea, although densities increased in offshore waters. Detection rate dropped with increasing wind speed and sea state and increased at night, suggesting that striped dolphins may be more active at night than during the day.

The sub-committee also received two documents on the distribution of small cetaceans. In SC/50/O4, Mignucci-Giannoni *et al.* reviewed stranding records of cetaceans in the waters of Puerto Rico and the US Virgin islands. Between 1867 and 1995, 129 stranding records were recorded, representing 16 species of small cetaceans. In SC/50/O5, records of cetaceans along the coast of southeastern Brazil were reviewed. Sixteen species of small cetaceans are known from this area through observations at sea, strandings and other records.

8. TAKES OF SMALL CETACEANS IN 1997

The sub-committee reviewed a draft of Appendix 3, the summary of small cetaceans taken in directed fisheries or as bycatch in commercial fisheries. Perrin noted that direct takes of Dall's porpoise in Japanese waters had increased from 12,396 in 1995 to 18,540 in 1997 and asked whether this increase represented a trend of increased harvest. Okamoto responded that the annual quota of Dall's porpoises in Japan had been set at 17,700 and that this quota had remained unchanged. As explained in SC/50/ProgRep Japan, however, the Japanese Fisheries Agency (FAJ) changed the quota period for Dall's porpoise fisheries in 1996. Thus, although statistics in Appendix 3 cover the period from 1 January to 31 December 1997, catches made during this period fall into two periods for the reporting purposes of the FAJ. Catches of Dall's porpoises made between 1 August 1996 and 31 July 1997, for example, were 16,723 (SC/50/ProgRep Japan). Thus, the apparent increase in the harvest of Dall's porpoise in Japanese waters represents a combination of changes in the quota period and inter-annual variation in catch levels.

Brownell asked whether there was any information on the magnitude of catches of Dall's porpoises and other cetaceans in the Japanese drift net fishery operating inside the Exclusive Economic Zone of Russia. Okamoto responded that, at present, no data were available on the number of cetaceans taken in this fishery. The sub-committee encouraged the government of Russia to provide information on the size of bycatches in this fishery.

The sub-committee then discussed, in general terms, the adequacy of the information contained in Appendix 3. Several members noted that the summary was incomplete and both direct and indirect takes of small cetaceans were known to occur in several countries but were not included in this table. Perrin suggested that the table note situations where catches occur, but no quantitative information exists on their magnitude, and that member countries not contributing information to this table be encouraged to do so. The sub-committee agreed, and **recommends** that the Scientific Committee again urges member nations to provide information on bycatch and directed catches.

9. PROGRESS ON PREVIOUS YEAR'S RECOMMENDATIONS

Rojas-Bracho reviewed progress made towards assessment of the conservation status of vaquita in the Upper Gulf of California. The International Committee for the Recovery of the Vaquita will reconvene in October 1998, at which time it will consider the following topics: a temporal assessment of the unusual age structure of samples from bycatches; a spatial analysis of bycatches, incorporating age, sex, date and the geographical boundaries of regulatory areas; a description of fishing grounds and perhaps fishing effort; a review of the most recent estimates of abundance; and initial formulation of a recovery plan, incorporating socio-economic factors.

10. FUTURE PRIORITIES AND DIRECTIONS

In response to a request from the Chairman of the Scientific Committee related to item 6 on the Scientific Committee Agenda, the sub-committee reviewed the way in which it conducts its work, its objectives and priorities. After a wide-ranging discussion, the sub-committee agreed that the current process of setting priority topics for discussion was fundamentally sound. Thus, the sub-committee will continue to identify priority topics that generally involve the assessment of conservation status of particular taxa, where such assessments are useful and appropriate. These topics may focus on methodology for assessing conservation status, on a geographical region, on one or more species, or on a subject matter with relevance to many species (such as interactions with a type of fishery). The topics should be chosen on the basis of one or more stated criteria, for example: (a) recent research progress in a given field, (b) particular concern about conservation status due to levels of directed takes, bycatch or mass mortalities, or (c) the geographical location of the meeting. Once decided, priority topics should not be changed unless there were sound scientific or logistical reasons for such a change. The sub-committee considered that the manner in which it conducts its work was appropriate and should be continued, including proposing priority topics up to three years in advance. However, occasional intersessional meetings may offer a more effective way of dealing with some areas of work and reducing the current backlog.

The sub-committee then reviewed the priority topics for meetings in 1999 and beyond. After considerable discussion, it was agreed to maintain the two priority items identified last year for the 1999 meeting: status of white whales and narwhals, and recent advances in bycatch mitigation measures (specifically acoustic deterrents). The sub-committee proposed a new priority topic for discussion at its meeting in 2000 – a review of the status of freshwater cetaceans (boto, baiji, Indus and Ganges susus, tucuxi and freshwater populations of the Irrawaddy dolphin and finless porpoise), noting that comparison with marine populations of the latter two species may be of value. The sub-committee

Table 1
Priority topics.

Year	Topic	Justification
1999	Status of white whales and narwhals	Magnitude of directed takes; evidence of decline in exploited population; availability of new research results
	Bycatch mitigation measures (acoustic deterrents)	Large amount of new research results
2000	Status of freshwater cetaceans	Poor conservation status and continuing threats
	Bycatch mitigation measures	Large amount of new research results
2001+	Status of Dall's porpoises	Continuing catches; lack of recent assessment
	Systematics and population structure of *Tursiops*	Large amount of new research results
	Status of ziphiids in the Southern Ocean	Lack of previous assessment
	Status of small cetaceans in the Caribbean Sea	Lack of previous assessment; continuing catches and bycatches

agreed to delete the global review of the genus *Lissodelphis* from its list of priority topics for discussion in 2001and beyond, as the primary threat to this taxon (entanglement in high seas driftnets) has been greatly reduced. A review of the status of small cetaceans in the Caribbean region was agreed upon as a replacement priority topic. The schedule for priority topics is given in Table 1.

11. PUBLICATION OF DOCUMENTS

Martin advised the sub-committee that little progress had been made in arranging the publication of a volume incorporating papers on the status of small cetaceans in African coastal waters presented at last year's meeting. It is possible that these papers could be incorporated into the new journal format being considered for IWC publications, either as a special issue or as individual papers. Van Waerebeek remarked that the Secretariat of the Convention on Migratory Species was also considering publication of a special volume that might serve as a repository for these papers.

12. ANY OTHER BUSINESS

There was no other business.

13. ADOPTION OF REPORT

The report was adopted as amended.

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Appendix 1

AGENDA

1. Election of Chairman
2. Adoption of Agenda
3. Appointment of Rapporteurs
4. Review of available documents
5. Review of small cetaceans in the Indian Ocean and Red Sea, with special reference to the Middle East
6. Further consideration of the criteria for assessing the status of harbour porpoise populations
7. Review of other presented information on small cetaceans
8. Takes of small cetaceans in 1997
9. Progress on previous year's recommendations
10. Future priorities and directions
11. Publication of documents
12. Any other business
13. Adoption of Report

Appendix 2

A METHOD FOR ASSESSING THE STATUS OF SMALL CETACEANS RELATIVE TO A CONSERVATION OBJECTIVE OF RESTORING POPULATIONS TO, OR MAINTAINING THEM AT, 80% OR MORE OF THE CARRYING CAPACITY

Paul R. Wade

Paper SC/50/SM12 describes a conservation objective for small cetaceans in the Baltic and North Seas that is 'to restore populations to, or maintain them at, 80% or more of the carrying capacity.' Here it is pointed out that a method exists for calculating a level of anthropogenic mortality to accomplish such an objective (Wade, 1998). This method uses a simulation approach that takes explicit account of uncertainty in estimates of abundance and anthropogenic mortality. The approach is similar to the calculation of the Potential Biological Removal (PBR) level used in the US for assessing the status of marine mammals, and is also similar to the approach used to calculate a mortality limit in SC/50/SM7. Wade (1998) applied the same simulation approach to conservation objectives other than the US goal, one of which is described here. Specifically, a conservation goal (or objective) was described as the:

Carrying-capacity goal - allow a population to recover to, or remain at or above, a specified fraction of its carrying capacity.

A criterion was described for calculating a mortality limit that would identify a level of anthropogenic mortality under which a population should achieve the conservation objective described above:

Carrying-capacity criterion - identify a level of anthropogenic mortality such that a population will recover to, or stay above, a specified percentage of its carrying capacity (K) with 95% probability, as estimated in simulations. This was called 'ML_K', for a mortality limit to achieve a specified percentage of K.

ML_K was calculated as:

$$ML_K = N_{20\%} \cdot \tfrac{1}{2} R_{Max} \cdot F_R,$$

where $N_{20\%}$ is the 20th percentile of an estimate of abundance (assuming log-normal error), R_{Max} is the maximum estimated net productivity rate of the stock, and F_R is a factor that is determined by the conservation goal. In the absence of a population specific estimate for R_{Max}, a default value of 0.04 was recommended by Wade (1998) for odontocetes.

Fig. 8 in Wade (1998) contains results that allow the selection of a value of F_R and indicate a value of 0.4 would achieve a conservation goal of 80%K. The exact value of F_R depends upon the precision, or coeffecient of variation (CV), of the available estimates of abundance and anthropogenic mortality. The value of 0.4 was found to work for a broad range (0.2-0.8) of CVs of the abundance estimate, combined with a mortality CV of 0.3. The value might differ slightly from 0.4 if the actual CVs were far outside this range. Software is available from the author for calculating the value of F_R for any specific combination of CVs.

Wade (1998) discusses potential biases in information on abundance, mortality, R_{Max}, and other parameters, and suggests that where such potential biases are not corrected for, a precautionary approach would be to further reduce the mortality limit. Wade (1998) recommended halving the value of F_R, as this was also shown in simulations to account for plausible levels of potential bias (discussed in the appendix to Wade, 1998). Therefore, in some situations, it might be appropriate to reduce a value such as 0.4 to 0.2 if potential biases exist and a precautionary approach is desired.

To use this method for assessing the status of small cetaceans relative to this conservation goal, knowledge is required of population structure. Obviously, uncertainty often exists in knowledge of the population structure of small cetaceans. However, Perrin and Brownell (1994) concluded that complex population sub-structure has often been found when sufficient data have been available. Identifying plausible stock divisions is important, as Taylor (1996) showed that if two true stocks are incorrectly identified as one stock, the conservation goal may not be achieved if anthropogenic mortality is concentrated in the region of just one of the stocks.

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Appendix 3

SMALL CETACEAN CATCHES 1994-1997

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). Catches are tabled according to the calendar year in which they were taken. All direct and incidental removals (including live captures) are recorded, but not stranded animals.

	1994					1995					1996					1997				
	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. total	Rep.
Argentina																				
Franciscana	-	-	-	+[a]	-	-	-	-	+[a]	-	-	-	-	-	-	-	-	-	-	-
Dusky dolphin	-	-	-	86-136[c]	-	-	-	-	50-100[e]	-	-	-	-	-	-	-	-	-	-	-
Commerson's dolphin	-	-	28[d]	10[b]	-	-	-	91[b]	20[f]	-	-	-	-	-	-	-	-	-	-	-
Peale's dolphin	-	-	3[b]	-	-	-	-	1[b]	-	-	-	-	-	-	-	-	-	-	-	-
Australia																				
Bottlenose dolphin	-	-	11	-	-	-	-	7	-	-	-	-	3	-	-	-	-	14	-	-
Common dolphin (?sp.)	-	-	8	-	-	-	-	1	-	-	1	-	6	-	-	-	-	7	-	-
Irrawaddy dolphin	-	-	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	-	-	-
Indo-Pacific humpback d.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-
Spinner dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
Unidentified dolphin	-	-	11-14	-	-	-	-	18-26	-	-	-	-	12	-	-	-	-	1	-	-
Brazil																				
Killer whale	-	-	-	-	1[f]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
False killer whale	-	-	-	-	-	-	-	-	-	1[f]	-	-	1[v]	-	-	-	-	-	-	-
Spinner dolphin	-	-	1-3[p]	-	-	-	-	1[q]	-	-	-	-	-	-	-	-	-	-	-	-
Dwarf sperm whale	-	-	1[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	1[a]	-	-	-	-	-	-	-	-	-	1[v]	-	-	-	-	1[s]	-	-
Common dolphin	-	-	3[b]	-	-	-	-	1[g]	-	-	-	-	1[v]	-	-	-	-	1[v]	-	-
Franciscana	-	-	205[c]	157-283[o]	-	-	-	133[h]		-	-		33	413-624	-	-	-	58	-	-
Tucuxi	-	-	33[d]	-	-	2[i]	-	43[j]	-	-	2	-	27	-	-	1	-	80[t]	20-25[u]	-
Spotted dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Atlantic spotted dolphin	-	-	-	-	-	-	-	1[k]	-	-	-	-	1[v]	-	-	-	-	2[s]	-	-
Pantropical spotted d.	-	-	-	-	-	-	-	1[m]	-	-	-	-	-	-	-	-	-	-	-	-
Risso's dolphin	-	-	-	-	-	-	-	1[g]	-	-	-	-	-	-	-	-	-	-	-	-
Rough-toothed dolphins	-	-	-	-	-	-	-	2[l]	-	-	-	-	2	-	-	-	-	2	-	-
Inia geoffrensis	-	-	-	-	-	4[t]	-	22[i]	-	-	11	-	3	-	-	-	-	-	-	-
Burmeister's porpoise	-	-	1[f]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified dolphins	-	-	1[e]	-	-	-	-	5[n]	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified species	-	-	10[v]	-	-	-	-	7[v]	-	-	-	-	18[v]	-	-	-	-	11[v]	-	-
Canada																				
Narwhal	a	-	-	-	-	a	-	-	-	-	a	-	-	-	-	a	-	-	-	-
White whale	a	-	-	-	-	a	-	-	-	-	a	-	-	-	-	a	-	-	-	-
Harbour porpoise	-	-	18[b]	80-120[c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dall's porpoise	-	-	-	-	-	-	-	1[d]	-	-	-	-	-	-	-	-	-	-	-	-
Long-finned pilot whale	-	-	3[e]	-	-	-	-	9[e]	-	-	-	-	6[e]	-	-	-	-	15[f]	-	-
Atlantic white-sided d.	-	-	-	-	-	-	-	-	-	-	-	-	1[e]	-	-	-	-	-	-	-

cont..

Table 1 continued.

	1994					1995					1996					1997				
	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. total	Rep.
Unidentified dolphin	-	-	1[e]	-	-	-	-	-	-	-	-	-	2[e]	-	-	-	-	-	-	-
Unid./other cetacean	-	-	2[e]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Denmark																				
Harbour porpoise	-	-	-	4,449[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecuador																				
Bottlenose dolphin	-	-	1[a]	227[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ETP																				
Pacific white-sided d.	-	-	16[a]	d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	13[a]	d	-	-	-	48[b]	48[b]	-	-	-	11[c]	11[c]	-	-	-	10[e]	10[e]	-
Pantropical spotted d.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northeastern	-	-	-	935[a]	-	-	-	952[b]	952[b]	-	-	-	818[c]	818[c]	-	-	-	721[c]	721[c]	-
Western-southern	-	-	-	1,226[a]	-	-	-	859[b]	859[b]	-	-	-	545[c]	545[c]	-	-	-	1,044[c]	1,044[c]	-
Coastal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spinner dolphin (? Stock)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eastern	-	-	-	743[a]	-	-	-	654[b]	654[b]	-	-	-	450[c]	450[c]	-	-	-	391[c]	391[c]	-
Whitebelly	-	-	-	619[a]	-	-	-	445[b]	445[b]	-	-	-	447[c]	447[c]	-	-	-	498[e]	498[e]	-
Central	-	-	11[a]	d	-	-	-	17[b]	17[b]	-	-	-	11[c]	11[c]	-	-	-	-	-	-
Striped dolphin	-	-	11[a]	d	-	-	-	34[b]	34[b]	-	-	-	5[c]	5[c]	-	-	-	80[e]	80[e]	-
Common dolphin (?sp.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern	-	-	-	101[a]	-	-	-	9[b]	9[b]	-	-	-	77[c]	77[c]	-	-	-	9[e]	9[e]	-
Central	-	-	-	151[a]	-	-	-	192[b]	192[b]	-	-	-	51[c]	51[c]	-	-	-	114[e]	114[e]	-
Southern	-	-	-	-	-	-	-	-	-	-	-	-	30[c]	30[c]	-	-	-	58[e]	58[e]	-
Melon headed whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rough-toothed dolphin	-	-	-	-	-	-	-	2[b]	2[b]	-	-	-	-	-	-	-	-	20[e]	20[e]	-
Risso's dolphin	-	-	-	-	-	-	-	1[b]	1[b]	-	-	-	-	-	-	-	-	-	-	-
Whitebelly dolphins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Short fined pilot whales	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5[e]	5[e]	-
Unspecified dolphins	-	-	237[a]	321	-	-	-	61[b]	61[b]	-	-	-	102[c]	102[c]	-	-	-	55[e]	55[e]	-
Faroes																				
Long-finned pilot whale	1,201[a]	-	-	-	-	228[b]	-	-	-	-	1,524[c]	-	-	-	-	-	-	-	-	-
Atlantic white-sided d.	258[a]	-	-	-	-	151[b]	-	-	-	-	152[c]	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	8[a]	-	-	-	-	-	-	-	-	-	21[c]	-	-	-	-	-	-	-	-	-
Harbour porpoise	-	-	-	-	-	-	-	-	-	-	3[c]	-	-	-	-	-	-	-	-	-
France																				
Long-finned pilot whale	-	-	2	a	-	-	-	2[b]	-	-	-	-	2[bc]	-	-	-	-	3[b]	-	-
White-beaked dolphin	-	-	1	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	5	a	-	-	-	4[b]	-	-	-	-	1[bc]	-	-	-	-	4[b]	-	-
Striped dolphin	-	-	1	a	-	-	-	1[b]	-	-	-	-	7[bc]	-	-	-	-	11[b]	-	-
Common dolphin (?sp.)	-	-	9	a	-	-	-	9[b]	-	-	-	-	15[bc]	-	-	-	-	182[b]	-	-
Risso's dolphin	-	-	2	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuvier's beaked whale	-	-	1	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common porpoise	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8[b]	-	-
Unidentified dolphin	-	-	36	a	-	-	-	2[b]	-	-	-	-	5[bc]	-	-	-	-	72[b]	-	-
Unid./other cetacean	-	-	1	a	-	-	-	-	-	-	-	-	1[bc]	-	-	-	-	-	-	-

cont...

Table 1 continued.

	1994					1995					1996					1997				
	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. total	Rep.
Germany																				
Harbour porpoise	-	-	18	-	-	-	-	8	-	-	-	-	6	-	-	-	-	4	-	-
Long-finned pilot whale	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-
Greenland																				
Narwhal	847[a]	-	-	-	-	461[b]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White whale	488[a]	-	-	-	-	606[b]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Harbour porpoise	1,716[a]	-	-	-	-	1,135[b]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland																				
Common dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4[b]	-	-
Harbour porpoise	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2[a]	-	-
White-sided dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[a]		
Japan																				
Baird's beaked whale	54	-	-	-	-	54	-	-	-	-	54	-	-	-	-	54	-	-	-	-
Killer whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	5
False killer whale	-	-	-	-	-	43	-	-	-	6	35	-	-	-	5	28	-	-	-	15
Short-finned pilot whale[a]	196	-	-	-	-	238	-	1	-	1	482	-	-	-	2	347	-	-	-	-
Pacific white-sided d.	-	-	-	-	6	-	-	-	-	2	-	-	2	-	19	-	-	-	-	-
Bottlenose dolphin	310	-	-	-	52	890	-	-	-	85	280	-	-	-	34	299	-	-	-	53
Pantropical spotted d.	449	-	-	-	-	105	-	-	-	-	67	-	-	-	-	23	-	-	-	-
Striped dolphin	535	-	3	-	10	537	-	80	-	2	303	-	-	-	-	602	-	-	-	-
Short-beaked common d.	-	-	1	-	-	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-
Northern right whale d.	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Risso's dolphin	312	-	-	-	-	405	-	7	-	-	369	-	5	-	3	228	-	14	-	-
Dall's porpoise	15,947	-	4	-	-	12,396	-	-	-	-	16,100	-	2	-	-	18,540	-	1	-	-
Finless porpoise	-	-	5	-	-	-	-	7	-	-	-	-	3	-	-	-	-	1	-	-
Unidentified dolphin	-	-	6	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified species	-	-	3	-	-	-	-	-	-	-	-	-	4	-	-	-	-	3	-	-
Korea																				
Baird's beaked whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[af]	-	-
Short-finned pilot whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2[ag]	-	-
Pacific white-sided d.	-	-	-	-	-	-	-	-	-	-	-	-	32[ab]	-	-	-	-	2[ah]	-	-
Common dolphin	-	-	-	-	-	-	-	-	-	-	-	-	13[ac]	-	-	-	-	71[ai]	-	-
Risso's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	45[ad]	-	-	-	-	2[j]	-	-
Harbour porpoise	-	-	-	-	-	-	-	-	-	-	-	-	1[ae]	-	-	-	-	-	-	-
Mexico[a]																				
Vaquita	-	-	-	-	-	-	-	0[c]	-	-	-	-	-	-	-	-	-	1[c]	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	-	-	12[b]	-	-	-	-	12[d]	-	-	-	-	10[d]
Netherlands																				
Long-finned pilot whale	-	-	15	-	-	-	-	-	-	-	-	-	16	-	-	-	-	1	-	-
Atlantic white-sided d.	-	-	90	-	-	-	-	10	-	-	-	-	27	-	-	-	-	43	-	-
Bottlenose dolphin	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphin (?sp.)	-	-	9	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Harbour porpoise	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	4	-	-
Unidentified dolphins	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-

cont...

Table 1 continued.

Species	1994					1995					1996					1997				
	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live	Direct		Indirect		Live
	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. total	Rep.
New Zealand																				
Long-finned pilot whale	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	1	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphin (?sp.)	-	-	9[a]	-	-	-	-	-	-	-	-	-	2[b]	-	-	-	-	4	-	-
Hector's dolphin	-	-	8[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Killer whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dusky dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1[b]	-	-	-	-	1	-	-
Gray's beaked whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified dolphin	-	-	2[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Peru																				
Dusky dolphin	-	-	668[a]	1,272[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	37[a]	42[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-beaked common d.	-	-	120[a]	45[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burmeister's porpoise	-	-	185[a]	224[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unspecified species	-	-	6[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Africa																				
Bottlenose dolphin	-	-	48[a]	-	-	-	-	59[c]	-	-	-	-	62[a]	-	-	-	-	50[fg]	-	-
Common dolphin (?sp.)	-	-	115[a]	-	-	-	-	26[d]	-	-	-	-	32[a]	-	-	-	-	90[fg]	-	-
Indo-Pacific humpback d.	-	-	2[a]	-	-	-	-	9[a]	-	-	-	-	4[c]	-	-	-	-	7[fg]	-	-
Heaviside's dolphin	-	-	-	-	-	-	-	1[b]	-	-	-	-	-	-	-	-	-	2[fh]	-	-
Risso's dolphin	-	-	-	-	-	-	-	-	-	-	-	-	1[a]	-	-	-	-	-	-	-
Unidentified dolphins	-	-	-	-	-	-	-	-	-	-	-	-	1[a]	-	-	-	-	-	-	-
Spain																				
Striped dolphin	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common dolphin (?sp.)	-	-	16	-	-	-	-	1	-	-	-	-	3	-	-	-	-	3	-	-
Long-finned pilot whale	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuvier's beaked whale	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
False killer whale	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Harbour porpoise	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Unidentified dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
Sweden																				
Harbour porpoise	-	-	25	-	-	-	-	11[a]	53[a]	-	-	-	17[b]	113[c]	-	-	-	8[d]	-	-
UK																				
White-beaked dolphin	-	-	1	-	-	-	-	2[b]	-	-	-	-	-	-	-	-	-	-	-	-
Striped dolphin	-	-	1	-	-	-	-	29[a]	104[h]	-	-	-	-	-	-	-	-	-	-	-
Common dolphin (?sp.)	-	-	9[d]	54[i]	-	-	-	19[f]	61[h]	-	-	-	-	-	-	-	-	6[b]	-	-
Risso's dolphin	-	-	-	-	-	-	-	1[c]	-	-	-	-	2[c]	-	-	-	-	-	-	-
Harbour porpoise	-	-	23[c]	740[g]	-	-	-	19[b]	-	-	-	-	11[j]	-	-	-	-	41[k]	-	-
White-sided dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2[c]	-	-
Bottlenose dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[c]	-	-

cont..

Table 1 continued.

	1994					1995					1996					1997				
	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. total	Rep.
USA																				
Baird's beaked whale	-	-	1	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White whale	-	294-300+[a]	-	-	-	-	225-227[v]	-	-	-	-	395-452[w]	-	-	-	-	303-332[x]	-	-	-
Killer whale	-	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-	-	-	-
Dwarf sperm whale	-	-	-	-	-	-	-	1[g]	1[g]	-	-	-	-	-	-	-	-	-	-	-
Long-finned pilot whale	-	-	18[h]	22[h]	-	-	-	21[h]	31[h]	-	-	-	-	-	-	-	-	-	-	-
Short-finned pilot whale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[y]	6[y]	-
Pacific white-sided d.	-	-	3	17	-	-	-	1	6	-	-	-	3[u]	25[u]	-	-	-	3[y]	11[y]	-
Atlantic white-sided d.	-	-	12[q]	422[q]	-	-	-	2[r]	80[r]	-	-	-	-	-	-	-	-	-	-	-
Bottlenose dolphin	-	-	16[m]	17[m]	-	-	-	14[n]	22[n]	-	-	-	-	-	-	-	-	-	-	-
Pantropical spotted d.	-	-	28[u]	29[u]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Striped dolphin	-	-	13	19	-	-	-	2[k]	2[k]	-	-	-	-	-	-	-	-	-	-	-
Short-beaked common d.	-	-	26	146	-	-	-	36	231	-	-	-	27[u]	319[u]	-	-	-	18[y]	90[y]	-
Long-beaked common d.	-	-	1	6	-	-	-	6	39	-	-	-	1[u]	12[u]	-	-	-	4[y]	24[y]	-
Common dolphin (?sp.)	-	-	159[i]	257[i]	-	-	-	89[j]	231[j]	-	-	-	-	-	-	-	-	3[y]	11[y]	-
Northern right whale d.	-	-	7	39	-	-	-	15	58	-	-	-	5[u]	27[u]	-	-	-	5[y]	25[y]	-
Risso's dolphin	-	-	2[o]	8[o]	-	-	-	12[p]	47[p]	-	-	-	-	-	-	-	-	3[y]	8[y]	-
Harbour porpoise	-	-	105[b]	2,129[b]	-	-	-	69[f]	1,434[f]	-	-	-	-	-	-	-	-	-	38[z]	-
Dall's porpoise	-	-	9[c]	22[c]	-	-	-	41	131	-	-	-	2[u]	24[u]	-	-	-	4[y]	17[y]	-
Cuvier's beaked whale	-	-	6	34	-	-	-	6	32	-	-	-	-	-	-	-	-	-	-	-
Unidentified dolphins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified species	-	-	7[s]	22[s]	-	-	-	9[t]	9[t]	-	-	-	-	-	-	-	-	-	-	-

Argentina: (a) SC/46/SM25 estimate, Southern Buenos Aires province. Not monitored in 1994 or 1995 but the estimated effort and catch are probably similar to 1993. (b) Shore-based robalo nets in Tierra del Fuego (Goodall, unpub.). (c) 36 estimated catch in midwater trawling fishery off Patagonia (SC/48/SM22) + 50-100 from other trawls off Patagonia (Crespo, Unpub.). (d) 18 from shore-based robalo nets in Tierra del Fuego (Goodall, unpub.) + 10 from midwater trawls off Patagonia (Crespo, unpub.). (e) 0 estimated catch in midwater trawling fishery off Patagonia (SC/48/SM22) + 50-100 from other trawls off Patagonia (Crespo, unpub.). (f) 20 from shore-based robalo nets in Tierra del Fuego (Goodall, unpub.) + 0 from midwater trawls off Patagonia (Crespo, unpub.).

Brazil: Note: All the information for the 1995 catches was taken from the revised Prog.Rep. Brazil except for the 44 strandings of franciscana in Southern Brazil (pers. commn. M.C.Pinedo). (a) Paraná. (b) 2 killed in southern oceanic fleet gillnets (Secchi *et al.* unpub. data) + 1 caught in Rio Grande do Sul State coast (E. Secchi, pers. commn.). (c) 58 from southern Rio Grande do Sul + 39 from northern Rio Grande do Sul + 2 from Rio de Janeiro + 9 from Paraná + 97 by coastal gillnet boats in Rio Grande do Sul, southern coast (about 25% of fleet) (SC/48/SM12). (d) 13 from Paraná + 16 from Santa Catarina + 4 caught in northern Rio de Janeiro. (e) Caught in nets from Sepetiba Bay, Rio de Janeiro (SC/46/SM10). (f) Caught in a monofilament longline set for tuna and swordfish fisheries in southeastern and southern Brazil (Secchi and Dalla Rosa, unpub. data). (g) Caught in Rio Grande do Sul State coast (E.Secchi, pers. commn.). (h) 10 from Rio Grande port by about 20% of the total coastal gillnet fleet + 4 caught in gillnets set for gadids and sciaenids from northern Rio Grande (May 1995 - April 1996) + 40 caught in gillnets in northern Rio Grande (May 1995 - April 1996) + 1 caught in fishing nets in Pontal do Sul, Paraná + 22 caught in Rio de Janeiro + 12 caught in Cabo de Santa Marta, Santa Catarina State (4 observed + 8 reported by fishermen) + 44 strandings from a long-term monitoring programme in southern Brazil, assumed to be caught in gillnets (M.C. Pinedo). (i) Caught in the Mamirauá system. (j) 8 caught in fishing nets in Pontal do Sul, Paraná + 9 caught in Rio de Janeiro + 2 strandings, 1 with net marks and another with knife cuts + 8 taken in fishing nets + 16 in the Mamirauá system. (k) Stranded with net marks on the body. (l) Taken in fishing nets. (m) Caught in Cabo de Santa Marta, Santa Catarina State. (n) 4 from Rio de Janeiro + 1. (o) Estimate 220-283 Poisson model, 157-230 Geometric model and 199-267 non-parametric model using data of animals caught in coastal gillnets set for sciaenids (78 animals caught from 37 fishing boats taken from a total fleet of about 145 vessels (SC/49/SM37). (p) Taken off the coast of Cabo Frio. (q) Taken off the coast of Rio Grande do Sul (SC/49/SM7). (r) Dalla Rosa (unpub. data). (s) Captured by boats operating from Ubatuba (SC/49/SM7). (t) Northeast 7, Southern/SC 6, Southern/PR 16, Southeast/BA 3, Amazon 36, Rio de Janeiro (UENF) 12. (u) Southern/SC. (v) Caught in Rio de Janeiro (UENF).

Canada: (a) No information. (b) Figure composed of 1 killed in chum salmon gillnet (SC/47/O 6) + 17 killed in Bay of Fundy herring weirs (SC/47/SM18). (c) E.A. Trippel 1995. Harbour porpoise bycatch in the Bay of Fundy gillnet fishery. Project summary, Fisheries and Oceans, Canada, 4pp. (d) SC/48/O 2. (e) SC/49/O 5. (f) Incidentally bycaught in bottom trawls off Nova Scotia. (Hooker, S.K., Baird, R.W. and Showell, M.A., unpub.).

Denmark: (a) Bycatch in turbot and cod fisheries (preliminary estimates).

Ecuador: (a) SC/47/SM38.

ETP: (a) SC/47/SM1. The following catches are included: Mexico 1,472 dolphins (unspecified) (SC/47/ProgRep Mexico), USA 68 pantropical spotted dolphins + 38 spinner dolphins (SC/47/SM4). (b) SC/48/SM4. (c) SC/49/SM4. (d) Included in unspecified dolphins. (e) Background Paper 6, 61[st] meeting of the IATTC, June 10-12, 1998 - Tuna-Dolphin Investigations.

Faroes: (a) NAMMCO Annual Report 1995: Faroe Islands Progress Report 1994. (b) NAMMCO Annual Report 1996: Faroe Islands Progress Report 1995. (c) NAMMCO Annual Report 1997: Faroe Islands Progress Report1996.

France: (a) No information on the tuna driftnet fishery in 1994. (b) Includes those found stranded with marks indicating that they had been most probably caught in fishing gear. (c) pers. commn. A. Collet.
Greenland: (a) NAMMCO Annual Report 1996: Greenland Prog Rep 1994. (b) NAMMCO Annual Report 1997: Greenland Prog Rep 1995.
Ireland: (a) Bycatch determined from post-mortems. (b) Bycatch of 3 determined from post-mortems + 1 incidentally caught in a pelagic trawl.
Japan: (a) Northern and Southern forms.
Korea: (a) Kyeong-Buk area. (b) 19 coastal drift gillnet, 9 set-net, 3 coastal trap, 1 coastal gillnet. (c) 10 set-net, 3 coastal drift gillnet. (d) 44 set-net, 1 Offshore angling. (e) Set-net. (f) Coastal drift gillnet. (g) Drift gillnet. (h) 1 coastal trap, 1 coastal gillnet. (i) 48 set-net, 9 coastal trap, 8 coastal drift gillnet, 3 offshore drift gillnet, 1 coastal gillnet, 1 drift gillnet, 1 coastal longline. (j) Kyeong-Nam area 1 set-net, Kang-Won area 1 gillnet.
Mexico: (a) See catches taken in the Eastern Tropical Pacific. They are not included here. (b) Permits issued by SEMARNAP. The animals are being kept in captivity at recreational facilities. (c) Two out of three main fishing towns in the Upper Gulf of California (Puerto Peñasco, Sonora and San Felipe, Baja California) were monitored during December, observing 122 gillnet settings. Fishing activities in the Upper Gulf of California were not monitored during other months. There were no other reports from other field researchers working in the area. (d) The animals were live captured at locations in the Gulf of California under permits issued by SEMARNAP. They are being kept in captivity at recreational facilities. (e) Captured in the Gulf of California.
New Zealand: (a) Catch taken during the period April 1994 - March 1995. (b) Pers. commn. M. Donoghue.
Peru: (a) SC/47/SM38. Mixed incidental and directed. Catches are for the period Jan. - Aug. 1994 from Cerro Azul and from shorter surveys throughout the year at 16 other ports and are composed as follows (estimated catch is given first, followed by the observed catch in brackets: dusky dolphin, 1,272 (597) caught in gillnet fishery off Cerro Azul, (71) from 16 other ports; bottlenose dolphin, 42 (17) caught in gillnet fishery off Cerro Azul, (20) from 16 other ports; long beaked common dolphin, 45 (17) caught in gillnet fishery off Cerro Azul, (103) from 16 other ports; Burmeister's porpoise, 224 (91) caught in gillnet fishery off Cerro Azul, (94) from 16 other ports; Unspecified species, from 16 ports other than Cerro Azul.
South Africa: (a) Annual catch of small cetaceans in shark nets (SC/49/SM34). (b) Fishery-related mortalities (excluding live-fishery) (SC/49/SM34). 57 in shark nets + 2 fishery-related mortalities (SC/49/SM34). (c) Figure composed as follows: 25 in shark nets + 1 fishery-related mortality (SC/49/SM34). (d) Figures composed as follows: 3 in shark nets + 1 fishery-related mortality (SC/49/SM34). (e) pers. commn. P. Best. (g) Caught in shark nets. (h) Died in research trawl.
Sweden: (a) SC/48/SM25 bycatch in the Swedish codfish gillnet fishery in ICES Area 4456. Reported catch taken during a total of 95 observer days at sea. (b) The bycatch observer schemes reported 6 harbour porpoises in the Skagerrak Sea and 8 in the Kattegat Sea . An additional 3 animals were collected in the Skagerrak Sea from the driftnet fishery during the satellite telemetry study. (c) Estimate for bycatch in the Swedish Skaggerak Sea cod fish gillnet fishery based on observer scheme data. (d) Two bycaught in Skagerrak Sea mackeral driftnets + 5 bycaught in Skagerrak Sea bottom set gillnets + 1 bycaught in Baltic Sea bottom set gillnet.
UK: (a) Bycatch from Biscay driftnets. (b) Bycatch determined from strandings post-mortems (England and Wales). (c) Bycatch determined from strandings post-mortems (Scotland). (d) 1 observed bycatch from Celtic Sea gillnets + 8 determined from strandings post-mortems (England and Wales). (e) 2 observed bycatch from Celtic Sea gillnets + 21 determined from strandings post-mortems (England and Wales). (f) 17 observed bycatch from Biscay driftnets + 2 determined from strandings post-mortems (England and Wales). (g) From observer programme 1992-1994 and average fishing effort over 1993-94. Estimate of bycatch for a 12 month period between 1993 and 1994. (h) Estimate of bycatch from Biscay driftnets. From observation of 28% of effort for Biscay driftnets only (observed bycatch 17). (i) Estimate of bycatch from Celtic Sea gillnets (observed bycatch 1). (j) 3 from bottom set gillnets + 8 determined from strandings post-mortems (7 from England and Wales + 1 from Scotland). (k) 25 from bottom set gillnets + 16 determined from strandings post-mortems (12 from England and Wales + 4 from Scotland).
USA: Figures for the years 1994-1996 were compiled by Janeen Quintal (except for the white whale figures which were taken from SC/50/ProgRepUSA). 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 unless otherwise indicated. Stranded animals are not included.
The 1997 information was taken from National Progress reports unless otherwise stated.
In the following notes the estimated catch is given, followed by observed catch in brackets
(a) Includes 18+ struck and lost (SC/50/ProgRepUSA). (b) Figure composed as follows: 2100(99) in new England groundfish sink gillnet + 14(1) in California halibut set gillnet + 15(1) in Puget Sound, Washington sockeye salmon drift gillnet. (c) Figure composed as follows: 11(2) in California drift gillnet + (2) in Washington/Oregon/California whiting trawl fishery + 11(5) in Alaska groundfish trawl fishery and Bering Sea/Aleutian Is. (BSA) groundfish trawl and longline fisheries. (d) Including 84 struck and lost. SC/49/ProgRepUSA (e) Including 94-148 struck and lost. SC/49/ProgRepUSA. (f) 1400(43) in New England sink gillnet + 14(0) in California halibut set gillnet + 20(20) in N. Washington marine set gillnet + (6) in Mid-Atlantic coast sink gillnet. (g) New England pelagic drift gillnet. (h) May include some short-finned pilot whales; Atlantic swordfish gillnet and pair trawl fisheries. (i) Figure composed as follows: 163(142) in New England pelagic drift gillnet + 94(17) in California shark/swordfish drift gillnet. (j) Figure composed as follows: 83(82) in New England pelagic drift gillnet + 6(3) in New England pelagic pair trawl + 142(3) in N. Atlantic bottom trawl + (1) in Mid-Atlantic coastal gillnet. (k) New England pelagic drift gillnet. (l) 6(1) in California shark/swordfish drift gillnet + 7(3) in Alaska BSA groundfish trawl and longline fisheries. (m) 13(12) in New England pelagic drift gillnet + 4(3) in New England pelagic pair trawl + (1) in Mid-Atlantic coastal sink gillnet. (n) 5(5) in New England pelagic drift gillnet + 17(9) in New England pelagic pair trawl. (o) 2(1) in New England pelagic drift gillnet + 6 (1) in California shark/swordfish drift gillnet. (p) 4(4) in New England pelagic drift gillnet + 4(2) in New England pelagic pair trawl + 39(6) in California shark/swordfish dirft gillnet. (q) 240(10) in New England groundfish sink gillnet + 182 (2) in N. Atlantic bottom trawl. (r) 80(2) in New England groundfish sink gillnet. (s) 5(4) in New England pelagic drift gillnet + 17(3) in California shark/swordfish drift gillnet. (t) New England pelagic drift gillnet. (u) SC/49/SM2. California swordfish/shark drift gillnet fishery. (v) Includes 38 struck and lost (SC/50/ProgRepUSA). (w) Includes 91-140 struck and lost + 304-312 landed (SC/50/ProgRepUSA). (x) Includes 82-99 struck and lost + 221-233 landed (SC/50/ProgRepUSA). (y) California drift gillnet. SC/50/SM2. (z) California halibut/angel shark set-net. This fishery has not been observed since July of 1994; consequently estimates of harbour porpoise were based on observations during the period Jul. 1990-Jul. 1994. Using mean-per-unit estimation, an estimated 38 harbour porpoise were killed in this fishery during 3,215 effort days in 1997.