
REVIEW OF THE CONSERVATION STATUS OF SMALL CETACEANS IN SOUTHERN SOUTH AMERICA



Edited by:

Rodrigo Hucke-Gaete

Contributors (in alphabetical order):

AGUAYO L., Anelio
BINGHAM, Mike
CANTO H., Jhoann
CRESPO, Enrique A.
HUCKE-GAETE, Rodrigo
LÁZARO, Marila
LESCRAUWAET V., A. Katherine
OPORTO B., Jorge A.
PINEDO, Maria Cristina
PRADERI, Ricardo
SCHIAVINI, Adrian C. M.
TORRES N., Daniel

Coordinators:

Roberto P. Schlatter V.
CMS Scientific Councillor for the Neotropics
William F. Perrin
CMS Scientific Councillor for Small Cetaceans
John P. Croxall
Deputy Chief Scientist, British Antarctic Survey
Pablo Canevari †
Technical Officer, CMS Secretariat

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1. INTRODUCTION

During the CMS Scientific Council meeting held in Bonn, Germany in November 1995, the possibilities for future regional marine mammal conservation agreements beyond those currently in place like ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas), ACCOBAMS (Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area) or contemplated *e.g.* AMMOSEA (Agreement on Marine Mammals of South-East Asia), were reviewed. One of the most needed was the Agreement on Small Cetaceans of southern South America.

In southern South American (SSA) coastal waters, one group of migratory mammals that present conservation difficulties is small cetaceans. A rich diversity of species inhabits this area (Vidal, 1993) comprising Chilean, Argentinian, Falkland Islands (Islas Malvinas), Uruguayan and Brazilian territorial waters. Given that the first four countries/territory are CMS members, it is both important and timely to evaluate the status of these marine mammals and to develop a strategy

that improves their conservation in the area.

As a first step, the present document shows the current available information* on the conservation status of small cetaceans in SSA, using available literature, technical reports, compilation of information obtained from fishermen and personal unpublished observations.

Five of the nine families of the Suborder Odontoceti will be considered in this review: Pontoporidae, Kogiidae, Phocoenidae, Ziphiidae and Delphinidae. Small cetaceans that have been recorded to occur in the area comprise 37 species (see Table 1). Seven species will be given special attention due to their current status and need for conservation; these species are: *Pontoporia blainvillei* (Franciscana dolphin), *Lagenorhynchus australis* (Peale's Dolphin), *Lagenorhynchus obscurus* (Dusky Dolphin), *Phocoena spinipinnis* (Burmeister's Porpoise), *Australophocaena dioptrica* (Spectacled Porpoise), *Cephalorhynchus commersonii* (Commerson's Dolphin), and *Cephalorhynchus eutropia* (Chilean Dolphin).

*** Note by the Publisher:**

The present review was finalized in 1998. For various reasons, however, including the sad loss of one of its coordinators, Pablo Canevari, the report could be published only in the year 2000.

2. MAJOR AREAS INVOLVED

For the aim of this review, the region considered includes the Exclusive Economic Zones (EEZ) of the temperate South Pacific coast of Chile, and temperate South Atlantic coasts of Argentina, Falkland Islands (Islas Malvinas), Uruguay and Brazil.

The Southwestern Atlantic Ocean has two different oceanic water masses to be considered. From Peninsula Valdes to the north, the Brazilian current has an important influence on the coastal marine ecosystem. This leads southern Brazil, Uruguay and Argentina to share similar conditions in which warm-temperate waters prevail. The second area is from Peninsula Valdes to the south,

in which the cold-temperate Malvinas current prevails in some coastal ecosystems. This involves the sharing of similar oceanographic patterns between Argentina and Chile. In the latter country, part of the cold Antarctic circumpolar current diverges and turns north as the Humboldt current, with relatively low salinity values near the coast due to wind-driven upwelling (from deep sea trenches), high nutrient content (mainly represented by inorganic phosphorus), which associated with low oxygen, promotes biological production (Pickard & Emery, 1990). These patterns are shared between Chile and Peru.

3. PROBLEMS FACED BY SMALL CETACEANS IN SOUTHERN SOUTH AMERICA

3.1. General overview

According to Vidal (1993), the management of renewable natural resources in developing countries has been hampered by a mix of socio-economic and political difficulties. In turn this has yielded insufficient scientific knowledge, modest environmental awareness and education, and limited commitment to conservation. He also underscored the lack of comprehensive policies and conservation strategies for small cetaceans, otters and manatees in contrast to the somewhat successful management of the commercial exploitation of baleen whales and pinnipeds. As a result several species or populations of Latin American aquatic mammals have become threatened or even endangered.

As an example, we will describe some of the problems that affect the *Pontoporia blainvillei*, which is probably the most vulnerable species of small cetacean in SSA. The main reasons for this can be summarized as follows: (1) specialized diet (mainly scienids), (2) habitat being degraded by traffic and polluted by pesticides and heavy metals, (3) mortality in gillnets all over its range of distribution, and (4) probable unsustainability of catches in some areas of its range.

Stocks of this species are shared by Argentina and Uruguay in the area of the mouth of La Plata River and by Uruguay and southern Brazil in La Barra del Chuy area¹. This indicates to us that the major problems affecting this species can only be tackled by combining efforts from each country where the species occurs. The objective of this document is to summarise these issues and give an insight into the problems shared by countries related to the conservation of small cetaceans in SSA.

3.2. Incidental catch in fisheries

The widespread use of gillnets throughout the area (except Falklands/Malvinas) in preference to other fishery gear is because of the relatively low cost and high yields. However, a disadvantage of such fishing gear is that it takes non-commercial fish species and other marine vertebrates, including marine mammals (Corcuera *et al.*, 1994; Crespo *et*

al., 1994a,b,c; Goodall *et al.*, 1994; Reyes & Oporto, 1994).

In the past, the magnitude of bycatches occurring in fishing activities was not considered great enough to threaten cetacean populations (Reeves & Leatherwood, 1994). However, in the last decade, general awareness that fisheries were an important source of population depletion for cetacean populations led to several international conferences and symposia to analyse and discuss this problem. UNEP (United Nations Environmental Programme), CPPS (Comisión Permanente del Pacifico Sur), IUCN (World Conservation Union), IWC (International Whaling Commission), CMS (Convention on the Conservation of Migratory Species of Wild Animals) and WWF (World Wide Fund for Nature) have developed programs to stimulate and support research activities and coordination between researchers and authorities of different countries with the aim of finding solutions to mitigate these conflicts.

Incidental mortality associated with fisheries is now regarded as an important potential source of population depletion of cetaceans, particularly small odontocetes, considered non-target species in some areas. It is now feared that the bycatch rates for some populations of small cetaceans may be unsustainable, and that the impacts of such catches are compounded by the habitat deterioration associated with economic development (Reeves & Leatherwood, 1996).

Fisheries that use synthetic gillnets (which replaced the traditional cotton netting and do not decay (see Appendix 1), such as drift gillnetting, bottom and drift coastal gillnets, and in some cases fisheries that use seines and mid-water trawls, as well as offshore industrial fisheries and ghostnets (driftnets that have been torn apart and float along suspended in the water column), involve the bycatch and consequent drowning of cetaceans (Corcuera *et al.*, 1994; Crespo *et al.*, 1994a,b,c; Goodall *et al.*, 1994; Reyes & Oporto, 1994).

3.3. Direct exploitation

Direct exploitation of cetaceans, particularly dolphins, has been reported several times (e.g. Aguayo, 1975a; Reyes & Oporto, 1994) and involves direct catch, selling and consumption of cetacean meat. Directed catches of small cetaceans have also been made to provide cetacean meat for

¹ Researchers from the three countries involved met in 1992, 1994, and 1997, in order to implement management actions and research activities to conserve Franciscanas in the marine ecosystem.

use as bait in crab fisheries, and this may have had an important impact in SSA populations of *L. australis*, *L. obscurus*, *C. commersonii* and *C. eutropia* (Torres *et al.*, 1979; Lesrauwaet & Gibbons, 1994). Direct catch of *L. australis* has presumably been responsible for the reduced number of sightings of this species in the Beagle Channel (Goodall *et al.*, 1994).

The direct exploitation of small cetaceans in SSA seems to be decreasing. However, fishermen occasionally take dolphins fundamentally because of their hunting nature, not necessarily for consumption or baiting purposes (Manzur & Canto, 1996). Even so, we should be aware and alert, remembering Perrin's (1989) concern in relation to Peruvian waters: "economic dislocations could well cause the fishermen to shift from smaller accidental to larger directed takes imperiling cetacean populations".

3.4. Anthropogenic alteration of marine habitats

Over the last few years, more and more important coastal habitats have been utilized for multiple purposes such as tourism, aquaculture of marine organisms, and maritime transport. Coastal areas are particularly important to society for fisheries and human populations. This creates problems because the same areas of ocean that provide food and livelihoods also endure the greatest abuse (Snelgrove, 1996). These human activities affect coastal marine mammals, generating disturbances such as marine pollution, eutrophication, competition for prey availability, and subaquatic noise increase. These factors are not currently considered in the management of coastal zones.

As an example, Sielfeld (1983) reports that groups of *C. commersonii* appear to have moved to other less man-influenced areas because of man activities with the purpose of obtaining bait and crab fishing. Another example of this is the case of the estuary of the Valdivia River, Chile (Corral Bay: 38°48'S (see Figure 1)) where a stable population of *C. eutropia* lived (Goodall *et al.*, 1988). Considerable pollutant levels are present in this area and facilities have recently been constructed in the city of Corral for wood chip exporting. Sightings of this species have diminished recently (Hucke-Gaete, pers. obs.).

Petroleum prospecting and extracting operations carried out near coastal areas could be affecting resident small cetaceans where this industry operates, and also might contribute to the disturbance of the migration pattern of whales and

other migratory species. In SSA, this industry is being developed by Chile and Argentina. Various spills and consequent distress to marine biota have occurred. Also, large-scale hydrocarbon exploration is currently taking place around the Falklands/Malvinas Islands and in adjacent waters at the eastern part of the Patagonian Shelf (Croxall², pers. comm. to R.H.-G., 1997). The consequences of these ecological disturbances remain unknown.

3.5. Indirect effects of fisheries

Fisheries activities can impact marine communities through overfishing and also through indirect effects such as habitat destruction (*e.g.* destruction of bottom habitat by trawling) and removal of other species (*e.g.* bycatch) (Snelgrove, 1996).

The indirect effects of trawl fisheries should be specially considered. This kind of fishery does not produce high rates of catch of marine mammals unlike other fisheries such as gillnetting or purse seines (Crespo *et al.*, 1994a, b, c, 1997). However, the impact over large areas is an important factor in the decline of target and/or bycatch species (Crespo *et al.*, 1998). Whenever such a fishery targets species that are important in the diet of marine mammals and/or seabirds, and the consumption of biomass by wildlife is in the same order of magnitude as that of the fishery, the indirect effects of the fishery on wildlife can be very severe (Crespo *et al.*, *op. cit.*). The southwestern Atlantic Ocean is under this kind of situation in which the catches of hake (*Merluccius hubbsi*) and squid (*Illex argentinus*) have been increasing steadily during the past decade.

In Chile and in the western sub-Antarctic Atlantic sector, interactions between *O. orca* (orca), *Physeter macrocephalus* (sperm whale) and the *Dissostichus eleginoides* (Patagonian toothfish) longlining fishery have been reported by scientific observers of CCAMLR's (Convention for the Conservation of Antarctic Marine Living Resources) (Ashford *et al.*, 1996). This issue needs to be assessed more thoroughly in each countries' EEZs because its magnitude is not known and it seems to be common from what fishermen report, at least on Chilean coasts (da Forno³, pers. comm. to R.H.-G., 1997), and solutions therefore cannot be implemented.

² British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, U.K. (john.croxall@bas.ac.uk)

³ Instituto de Zoología, Facultad de Ciencias, Universidad Austral de Chile, Casilla 567, Valdivia, Chile.

4. CONSERVATION STATUS OF SPECIES PER REGION

4.1. Categories of conservation status

Although there are eight categories considered by the new IUCN Red List (1996), only two describe the current global status for the species considered here: 'Data Deficient' (DD), and Lower Risk: Conservation Dependent (LR:CD) (for definitions please refer to Appendix 1). Some species such as *Delphinus delphis* (common dolphin), *Globicephala melas* (long-finned pilot whale), *Lagenorhynchus cruciger* (hour-glass dolphin), *Pseudorca crassidens* (false killer whale), *Peponocephala electra* (melon-headed whale), *Kogia breviceps* (pigmy sperm whale) and *K. simus* (dwarf sperm whale) have been removed from the Red List by the Cetacean Specialist Group (see Table 1). *Mesoplodon bahamondi* (Bahamonde's beaked whale) has not yet been included by the IUCN because it has recently been described (see Reyes *et al.*, 1995).

Eventhough, we have to consider that this status has been designated on a global basis, and not on a regional scale, where some stocks or populations might be on a different conservation status than those reported by IUCN in 1996 (Reeves⁴, pers. comm. to R.H.-G., 1997).

4.2. Problems and Status of species per country

4.2.1. CHILE

A. Aguayo, J. Canto, R. Hucke-Gaete, A.K. Lescrauwaet, J. Oporto and D. Torres

Of the total number of small cetacean species inhabiting the area, which are listed in Table 1, 74% live in, and/or migrate across Chilean coastal waters. The most frequent problems faced by small cetaceans in this area are incidental catch by coastal fisheries and overexploitation of coastal environments (see section 3).

Chilean authorities have demonstrated a relatively constant concern for marine mammal legal protection. In 1892, the first regulation came into force in relation to mustelid and pinniped

exploitation. Later, in 1929, Chile promulgated the 'Ley de Caza' (Hunting law), which regulated the exploitation and conservation of all Chilean marine mammals, excluding great whales. This law, continued to be effective until 1993, when the 'New Law of Hunting' came into force. This law considers all marine mammals as resources and their exploitation is regulated by the "Ley General de Pesca y Acuicultura" (General Law of Fisheries and Aquaculture) and enforced by the Subsecretaria de Pesca through regional Fisheries Service agencies (SERNAPESCA). Subsequently, in 1995 the Decree No.225 came into force establishing a 30 year prohibition on killing any marine mammal in Chile. Nevertheless, it is authorised to take live animals for exhibition, recreation or research purposes through a resolution from the Subsecretaría de Pesca.

In southern Chile (Magallanes region: 52°S-55°S (see Figure)) at least three cetacean species (*C. commersonii*, *C. eutropia*, and *L. australis*) were used as bait in crab fisheries, mainly for centolla/southern king crab (*Lithodes antarcticus*) and centollón/false king crab (*Paralomis granulosa*); nearly 98% of the total fisheries is located in the area. Presumably, *L. obscurus*, *P. spinipinnis*, *A. dioptrica* and the *L. peronii* (southern right-whale dolphin) were also taken for bait in this region (Lescrauwaet & Gibbons, 1994; Torres *et al.*, 1979). After 1979, when nets for catching crabs were outlawed and replaced with traps under the Decree No. 233 of the Ministerio de Economía, Fomento y Reconstrucción (Lescrauwaet & Gibbons, 1994), cetacean populations started to suffer from over-exploitation (Sielfeld, 1983).

Since 1990, mortality of small cetaceans in the artisanal fishing sector has declined substantially, and moreover, Chile's government has implemented several procedures to ensure conservation of small cetaceans in the Magallanes region (Covarrubias & Campodónico, 1995).

Currently, the main reasons for the decline in the use of illegal bait (such as marine mammals and seabirds) are: (1) the increase in the use of illegal fishing techniques that do not employ bait (*e.g.* diving, gillnets); (2) the use of nets to provide sources of legal bait within the fishing areas; and (3) the continuation of a diversification process that involves demersal fisheries, particularly of sea

⁴ 27 Chandler Lane, Hudson, Quebec, Canada J0P 1H0 (rreeves@accent.net).

urchins (*Loxechinus albus*) (Lescrauwaet & Canto, unpub. data).

The amount of bait officially supplied to fishermen has increased since 1994, when a solution to this problem was implemented through a joint effort between the Government of Chile and the industrial sector to reduce killing of wildlife for this purposes. No recent estimates are available for the centolla and centollón fishery effort, although it is believed to be declining since in the early 1990's. Approximately 2000 tons of bait were needed yearly to support this industry (Lescrauwaet & Gibbons, 1994), and currently (in 1996) official statistics of legal bait supplied to fishermen reached 707 tons; although the availability of the most attractive source of legal bait (offals of *D. eleginoides* and *Genypterus* spp.) had decreased in 50% that same year (from 1035 to 602 tons, respectively) (SERNAPESCA, unpub. data).

Oporto (1989) and Reyes & Oporto (1994) reported that dolphins were also used as bait in congrio/conger eel fisheries (*Genypterus blacodes*, *G. macculatus*, *G. chilensis*) on the central coast of Chile (39°23'S-40°34'S).

Another problem is the incidental mortality of dolphins in gillnet fisheries such as for corvina/sciaenids and róbalo/haddock (*Cilus montti* and *Eleginops maclovinus*, respectively) as has been reported by Aguayo (1975a), Sielfeld (1983), Perrin (1985), Capozzo & Junín (1991), and Reyes & Oporto (1994). Dolphin species affected incidentally by these fisheries are *O. orca*, *L. peronii*, *L. australis*, *L. obscurus*, *P. spinipinnis*, *C. commersonii* and *C. eutropia*, all of which live, partially or completely associated with coastal marine environments and may be exposed to continuous and unassessed population depletion. In the Magallanes region, gillnet fishing in coastal areas is mainly for subsistence, and entanglement of small cetaceans in this gear is rather uncommon (Lescrauwaet & Canto, unpub. data).

In the Juan Fernandez archipelago, negative interactions between fisheries and 'blackfish' (probably *P. crassidens* or *G. melas*) have been known to occur (Bernal⁵, pers. comm. to R.H.-G., 1994).

⁵ Instituto de Oceanología, Universidad de Valparaíso, Casilla 13-D, Valparaíso, Chile (rbernal@uv.cl)

Evidence recorded during recent studies on *C. commersonii* and *L. australis* indicate that both species may migrate freely between Argentinian and Chilean territorial waters in the Magallanes area (Guzmán *et al.*, 1996; Lescrauwaet, 1991). Also, the distribution of the population of *C. eutropia* in SSA waters should be assessed for a highly probable migration between Chilean and Argentinian waters as sightings of this species in the oriental sector of the Beagle channel suggest (Goodall, pers. comm. to A. Schiavini, 1996) and therefore could change the status of 'non-migratory' given by Reyes (1991) which has been reflected in the decision of the Scientific Council of the CMS in 1997 when including this species in APPENDIX II of the Convention.

Finally, we consider that given the habitat continuity of *C. commersonii*, *L. australis*, *P. spinipinnis* and *C. eutropia* and *L. obscurus*, throughout the Patagonian and Fuegian archipelago, conservation status and management of these species should be treated under cooperative research between Chile and Argentina on the same species.

4.2.2. ARGENTINA

E. A. Crespo and A. Schiavini

The interaction of fishing activities and other elements of the marine environment is not considered in the management plans of the national administration of fisheries, and only partially considered in regional management plans. This involves the difficulty of measuring - with the required precision - the degree of interaction between the different species of cetaceans and fisheries. Because of this lack of information, it becomes difficult to propose and include conservation measures in fisheries management plans. Initial research on marine mammal interactions with fisheries was carried out by Perez Macri & Crespo (1989), Dans *et al.* (1993), Corcuera *et al.* (1994), and Crespo *et al.* (1994a,b,c).

A good example of what should be done regionally in other countries was the development of the Patagonian Coastal Zone Management Plan (PCZMP), between 1993 and 1996. It was implemented by 'Fundación Patagonia Natural' with funding of the Global Environmental Facility (GEF) and was coordinated by the United Nations Development Programme (UNDP). The activities of the PCZMP included matters related to wildlife,

tourism, fisheries, pollution, and environmental education.

In the wildlife section, the Plan conducted surveys of marine mammals and seabirds along 3.000 km of coast. Among the marine mammals, pinnipeds like *Otaria flavescens* (southern sea lion), *Arctocephalus australis* (South American fur seal), and *Mirounga leonina* (southern elephant seal) and some species of cetaceans like *Eubalaena australis* (southern right whale), *L. obscurus* (dusky dolphin), *D. delphis* (common dolphin), *C. commersonii* (Commerson's dolphin), and *T. truncatus* (bottlenose dolphin), were censused (Dans *et al.*, 1996; Reyes *et al.*, 1996; Pedraza *et al.*, 1996; Schiavini *et al.*, 1996). Pollution was studied in *L. obscurus* and *C. commersonii* (Gil *et al.*, 1997). Interactions with fisheries was studied mainly with the *O. flavescens*, *L. obscurus* and *C. commersonii* (Crespo *et al.*, 1998 a,b; Dans *et al.*, 1997; Koen Alonso *et al.*, 1998).

The PCZMP also conducted training courses and other informal education training for technical employees of Governmental agencies related to management of natural resources and promoted public audiences in order to discuss conservation problems, in which the public community was invited to participate and discuss.

Interactions between marine mammals and fisheries have been monitored since 1989 in the Atlantic Patagonian coasts. The national fishing fleet in the area is composed of approximately 194 vessels (80% trawlers, 15% jiggers, and 5% longliners). The fleet operates year round from seven harbours between Escondida Island and Gulf of San José (80.000 nm²) (see Figure). The most important target species are: hake (*Merluccius hubbsi*), squid (*Illex argentinus*), and shrimp (*Pleoticus muelleri*), while several tons of fish bycatch are discarded (Crespo *et al.*, 1994a, b, c; in press, 1998b; Dans *et al.* 1997 a, b).

Species caught incidentally in the trawling fishery are *O. flavescens*, *L. obscurus* and *C. commersonii*. Dolphins get entangled mostly in mid-water trawls at night, while sea lions are caught in any kind of trawl. Mortality values obtained are: 70-200 *L. obscurus* (of which 70% are females) and 170-480 *O. flavescens* per year (mostly males; figure estimated to be 1-2% of the population size in the area) (Crespo *et al.* 1998a; Dans *et al.*, 1997b).

Feeding habits of top predators and composition

of fish catch and bycatch of the fishery were also studied. *L. australis* inhabiting the area prey mostly on anchovies (10-20 cm) and squid (3-18 cm), while hake was the most important prey item for *C. commersonii* (5-13 cm) and for male *O. flavescens* (10-50 cm). While at present times mortality rates seem to be low and there is not enough evidence to support competition for prey species, concern exists about the large amounts of fish discarded by the fishery, particularly hake (Crespo *et al.*, 1998a; Koen- Alonso *et al.*, 1998).

Goodall *et al.*, (1994) stated that the use of bait in centolla and centollón fisheries coming from marine mammals or seabirds is becoming less frequent because of (1) the use of slaughterhouse remains (bovine bones) to bait the traps, (2) low relative fishing effort in the Argentinian sector of the Fuegian archipelago (around 1,000 traps) and (3) high rate of maritime coastal traffic with its consequent increase in the awareness of, and care for nature by the people in the area, which has led to augmentation of patrolling and monitoring.

4.2.3 FALKLAND ISLANDS (ISLAS MALVINAS)

M. Bingham

There is no research on cetaceans around the Falkland Islands (Islas Malvinas) at present, nor any data from surveys of abundance and distribution. Existing information on species occurrence and abundance is, therefore, very limited. At least 15 species of small cetaceans have been recorded from waters around the Falkland Islands (Islas Malvinas). The two exclusively coastal species, *C. commersonii* and *L. australis*, are both widespread and abundant. *O. orca* (which are also frequently seen from shore) and *G. melas* (long-finned pilot whale; an offshore species) are the only other species regularly reported. Of the remaining species, all of which are offshore in distribution, existing records suggest that all are rare, except perhaps for *A. dioptrica* (spectacled porpoise; frequent), *L. obscurus* and *L. peronii* (southern right whale dolphins; occasional).

Potential threats to cetaceans around the Falklands (Malvinas) are commercial fisheries and hydrocarbon exploration. There are extensive commercial fisheries in Falkland Island (Islas Malvinas) waters for squid and finfish using jigging, trawling and longlining. *O. orca* is known to steal bait and also target fish species (e.g. *Dissostichus eleginoides*) from longline hooks. So

far there has been no report of incidental mortality of small cetaceans in this fishery. Jigging, being very target specific (for squid) is unlikely to catch small cetaceans. No data are available on the bycatch of small cetacean species associated with trawl fisheries in the area.

Hydrocarbon exploration around the Falklands (Malvinas) started in earnest in 1996; current research mainly involves seismic surveys, but drilling tests were expected to start in 1998. It is hoped that surveys of cetacean distribution and abundance, especially in the areas licenced for hydrocarbon exploration, will commence soon. Surveys of cetaceans on inshore areas are also needed, because the Falklands (Malvinas) may hold a substantial fraction of the world population of *C. commersonii* and *L. australis*. Both species could be very vulnerable to pollution and habitat degradation in coastal waters.

4.2.4. URUGUAY

M. Lázaro and R. Praderi

Pontoporia blainvillei (Franciscana dolphin) is one of the most frequently observed species of toothed cetacean in Uruguayan waters, although *Tursiops truncatus* (bottlenose dolphin), due to its coastal habits, is also frequently encountered. Despite this, there are no population studies currently being undertaken concerning these species.

In Uruguay there is no direct exploitation of small cetaceans, being the major problem the incidental capture of *P. blainvillei*, and in a lesser degree, of *Phocoena spinipinnis* (Burmeister's porpoise) in artisanal shark fishing nets.

More than 50 years of shark fishing in the coasts of Uruguay have caused major changes in coastal habitats. Various species of sharks (with high commercial value) are taken by fishermen, but this fishery has declined during the last 15 years. The presence of bottom trawlers that operate clandestinely in Uruguayan waters, have inflicted important modifications on sea bottom characteristics of the region, with the consequent impact on fish populations.

The effluents of rice plantation basins in Uruguay and Brazil have also affected the ecological conditions of fishing grounds. *T. truncatus* sightings have apparently diminished (R.P. and M.L. pers. obs., and pers. comm. from fishermen and local inhabitants) when comparing with previous values of sighting frequency reported by

García *et al.* (1994).

On February 1997, the Panamanian tanker San Jorge came aground on the Islas de Lobos near Punta del Este, an important fur seal (*Arctocephalus australis*) and sea lion (*Otaria flavescens*) colony site (Anon, 1999). The tanker released 5000 tonnes of oil, 100 tonnes of which are thought to have effected the Islas de Lobos directly having permeated its many sheltered coves (Anon, 1999). We have no knowledge of the direct and indirect impacts that this oil spill has or will cause to the whole coastal ecosystem nearby, specifically to cetacean populations.

Between August and September 1997, several strandings (n=46) of Fraser's dolphin (*Lagenodelphis hosei*) occurred, 36 of which took place on the coast of the Colonia department (34°30'S; 57°30'W), while the rest took place near the Canelones department (34°48'S; 55°32'W) (see Figure 1). Some samples were obtained, but the cause/s of these strandings are currently not known (de Bonis⁶, pers. comm. to M. Lázaro, 1997) (see also sub-section 4.2.5. BRAZIL).

In regard to *P. blainvillei*'s status, a high number of specimens die, caught in artisanal fishing nets annually in Uruguay, Brazil, and Argentina. In Uruguay alone, 3683 franciscanas died in the period between 1974 and 1994 (Praderi, 1994), with a maximum peak of 418 specimens in 1974 and a minimum of 23 in 1996 (Praderi, in prep.)

Economic restraints determine fishing efforts, and thus entanglement of franciscanas fluctuate when these variables change. Since 1970, and by using the specimens obtained through incidental capture, various studies have been developed regarding the species biology, anatomy (e.g. Brownell, 1989) and physiology, as well statistics on capture/mortality (e.g. Praderi *et al.*, 1989; Praderi *et al.*, 1993). Although we currently have a relatively good knowledge on the biology of the franciscana, there is a lack of information on geographic movements and population estimates.

Currently, only in the fishing village of Punta del Diablo the incidental capture is being monitored, and additional data on fishing grounds, type of nets used, etc. is being registered (Praderi, in prep.).

⁶ Instituto Nacional de Pesca (INAPE), Constituyente 1497, 5to piso, Montevideo, Uruguay.

It has been suggested that the franciscana does not reproduce freely along its whole distributional range, and therefore the whole population is subdivided into population units (see Appendix 1) or sub-populations (Pinedo, 1991b). From a management perspective, distributional patterns and migrations must be taken into account in the species' genetical diversity. Currently, this issue is under study by means of genetic markers in order to elucidate population separation between reproductive groups (Lázaro, in prep.). Given the case of confirming population segregation, management procedures should be established for each separate population considering regional impacts on *P. blainvillei*'s stocks.

Uruguay currently lacks a systematic cetacean sighting program, as well as a cetacean entanglement monitoring program centered in fishing areas along its coast. Efforts are being currently undertaken to start this activity.

4.2.5. BRAZIL

M.C. Pinedo

Eighteen species of small cetaceans have been recorded in the temperate waters of southern Brazil, Rio Grande do Sul State (29°20'S-33°45'S) (see Figure 1) (Pinedo *et al.*, 1992; Pinedo, 1994a; Zerbini & Secchi, 1996) (Table 1). Interactions with fisheries have been reported for seven of these species, and *P. blainvillei* is the most threatened (Pinedo, 1994b), for this reason, we will specify in detail the reasons for its status.

Distribution, current knowledge and status of the Franciscana

Its distribution is known to extend from Itaúna, Espírito Santo State (18°25'S) in Brazil (Moreira & Siciliano, 1991) to Río Negro Province (43°20'S) (see Figure) in Argentina (Crespo *et al.*, 1998b) (Figure 1).

Sexual maturity occurs between 2 to 4 years for both sexes and a two-year breeding cycle has been reported (Brownell, 1989). In southern Rio Grande do Sul (see Figure), calving occurs mainly in November (Pinedo *et al.*, 1989), which is the time of year where the peak of mortality in gillnets occurs. Physical maturity is attained between 4 and 8 years, for both sexes (Pinedo, 1991a). The oldest female recorded was 21 years old (Pinedo, 1994c) and the oldest male was reported to be 16 years old (Brownell, 1989).

Multivariate analysis of morphometric data has

revealed two geographical forms: a smaller form between 22°S and 27°S; and a larger form inhabiting between 32°S and 38°S (Pinedo, 1991a). The larger form occurs along southern Brazil, Uruguay and Argentina which probably belong to the same geographic population. A recent study on parasites from *P. blainvillei* of Rio Grande do Sul indicated five helminths as component species of the gastrointestinal tract of *P. blainvillei*, and recommended the use of *Hadwenius pontoporiae*, *Anisakis typica* and *Polymorphus (P.) cetaceum* as biological markers for the species. Comparison with previous parasite data on franciscanas from Uruguay and Argentina suggests a temporary stock for Argentina and another for southern Brazil and Uruguay (Andrade *et al.*, 1996). From these results, a cooperative protection involving these three countries is recommended. This will provide a more comprehensive and sound program in the future for the conservation of this species.

The status of the franciscana has changed from 'Insufficiently known' according to the IUCN (1991) Red List, to 'Data Deficient' (IUCN, 1996), a situation that reflects the little improvement made on the conservation of this species, even though Perrin *et al.* (1989) had advised that it should be classified as 'Vulnerable'.

In Brazil, based on the incidental takes along its coastal waters (Pinedo, 1994b; Siciliano, 1994), on the current knowledge of the species and on the impact of negative fishery interactions on the age structure of the southern Brazil and Uruguay population, the species will soon be included under the status of 'Vulnerable' on the *Global Plan for the Research and Conservation of Aquatic Mammals in Brazil*. This Global Plan is being prepared by a Special Working Group on Aquatic Mammals (GTEMA), created by the 'Brazilian Institute of Environment and Renewable Natural Resources' (IBAMA-Portaria 2097). Its main objective is to evaluate the status of this and other aquatic mammal species under the National List of Endangered Species (IBAMA - 1522) and the Plan for the Conservation of Cetaceans (Reeves & Leatherwood, 1994), to provide recommendations on research and protection from anthropogenic actions.

Threats

Incidental catches in gillnets and trammel nets, occurring in coastal waters of Brazil, Uruguay and Argentina are the major causes of mortality. The characteristics of these fisheries in these countries

have been summarized by Pinedo *et al.* (1989), Praderi *et al.* (1989), Crespo (1992) and Pinedo (1994b, d).

In Rio Grande do Sul most catches occur in spring, with bottom gillnets set mainly for sciaenids, of which the main target species is the white croaker (*Micropogonias furnieri*), whose population has decreased as a result of overexploitation (Pinedo, 1994b).

Along the Rio Grande do Sul coast between 1976 and 1987 and between 1992 and 1993, at least 1085 and 88 specimens, respectively, were found dead, stranded on the beach (Pinedo, 1994b). In Rio Grande do Sul and Uruguay most dead specimens are juveniles (up to 3 years old) and in southern Rio Grande do Sul relatively fewer animals less than 4 years of age were observed from 1982 to 1986, coinciding with an increase in fishing effort, when compared with takes from 1976 to 1980. If it is assumed that fishing grounds have remained the same between 1976 to 1986, the apparent change in age composition may indicate that the franciscana population structure is being affected by this coastal gillnet fishery (Pinedo, 1994c). A monitoring program of the gillnet fishing fleet of southern Rio Grande do Sul estimated that approximately 462 franciscanas were incidentally caught only during 1994 (Basso *et al.*, 1996).

Urgent action is needed for the conservation of this species. Proposals for research priorities are specified in section 5.1, of which we would like to highlight the importance of the topics concerned with: (1) abundance estimates, (2) fishery characteristics and estimate of total catches, and (3) stock identification by means of molecular

analyses, morphometry, reproduction and parasites (more than one method is recommended).

Other small cetaceans

Along the coast of Rio Grande do Sul, southern Brazil, incidental mortality of small cetaceans has also been reported for *T. truncatus*, *S. bredanensis* (rough-toothed dolphin), *D. delphis/capensis* (common dolphin/long snouted common dolphin, respectively), *S. coeruleoalba* (striped dolphin) and *G. griseus* (Risso's dolphin) in gillnets, and in longline for *G. melas* (Pinedo, 1994b; Basso *et al.*, 1996). Predation on tuna and swordfish catches by *O. orca* occur (Secchi & Vasque, 1992; Dalla-Rosa and Secchi, 1996).

In relation to the *L. hosei* specimens stranded on Uruguayan coasts (see sub-section 4.2.4. URUGUAY), Moreno *et al.* (1998) and Barreto⁷ (pers. comm. to R.H-G.) have recorded information on further strandings of this same species on the Brazilian coast, which is the first evidence of occurrence of this species in Brazil (Moreno *et al.*, 1998). A total of 16 specimens have been recorded until now, which when added to the ones found in Uruguay give a total of 62 stranded animals on the western Atlantic coast. A.S. Barreto believes that their occurrence in the area could be attributed to weather abnormalities caused by the 1997/98 El Niño event, based on preliminary results. As this species has mainly a tropical distribution, movements to 'better' foraging areas could have resulted in not being successful in more temperate waters as shown by stomach content analysis.

⁷ Laboratório de Mamíferos Marinhos, Departamento de Oceanografia-FURG, C.P.474, Rio Grande RS 96201-900, Brasil (posasb@super.furg.br).

5. RECOMMENDATIONS FOR REGIONAL ACTIONS

Species which can be recognized to be migratory under the CMS definition (see Appendix 1), possibly have a threatened status - which happens to be the case for many small cetaceans in the area. They should be considered in a regional conservation agreement by all countries involved in the distribution of that particular species. Research needs should be met by cooperative national teams of experts sharing experience and information, as has been done in the past by Argentina, Chile and Brazil.

APPENDIX I and II of the CMS were modified during the course of the Fifth Meeting of the Conference of the Parties (see CMS, 1997)**. APPENDIX I now includes only one small cetacean species: *Pontoporia blainvillei*, and of the other species listed on Table 1, the SA populations of only six of them are included in APPENDIX II (*Lagenorhynchus australis*, *L. obscurus*, *Australophocaena dioptrica*, *Phocoena spinipinnis*, *Cephalorhynchus eutropia* and *C. commersonii*). Allopatric populations of some species contemplated in the Table are included in the referred Appendix, but only considers northern hemisphere and tropical populations. Studies should be encouraged to assess and, where appropriate, include SSA small cetacean populations in the Convention.

Regional efforts should be conducted to generate population estimates of small cetaceans in SSA, because it seems a common denominator that few studies⁸ of this type have yielded accurate abundance estimations for small odontocete species in the region, and thus their IUCN conservation status remains as 'Data Deficient' for

**** Note by the publisher:**

Since this review was compiled in 1998, the 6th Meeting of the Conference of the Parties to CMS further amended the appendices, to include populations of 4 further small cetaceans to Appendix II. None of those populations however, are relevant to the SA region.

⁸ During the 7th Biennial Workshop of Specialists on Aquatic Mammals and 1st Symposium of the SOLAMAC, Viña del Mar, Chile (22-25 Oct., 1996), several researchers (mainly from Argentina, Brasil, Chile, Colombia and Peru) made an important approach to this problem, with the presentation of preliminary estimates on abundance and mortality of small cetaceans, mainly *D. delphis*, *L. obscurus*, *P. blainvillei*, and *C. commersonii*.

all the species considered here. Regional Action Plans prepared by local scientists for the Southeast Pacific⁹ and Southwest Atlantic should be implemented, and involve specialists from the countries affected.

We think that the key study to be implemented in a near future should be an ecosystem-focused research program (see section 4, Argentina), which would yield interesting and useful data on ecosystem dynamics, as described by Croxall *et al.* (1988), and Spellerberg (1995).

The implementation of inspectors (perhaps *ad honorem*) who must be authorized to enforce national regulations concerning marine mammal protection, should be assessed by each government.

5.1. High priority research and actions

1.- Fisheries interactions:

- Mathematical modelling of the effects of fishery interactions (both operational and ecological) on cetacean populations.
- Further identification of conflict areas between small cetaceans and fisheries.
- Collection of good field data on basic ecosystem interactions.
- Establishment of monitoring studies to assess the magnitude of incidental and directed mortalities of small cetaceans.
- Impact of marine mammals on fisheries, particularly artisanal fishing activities. Solutions are urgently needed, like the ones currently under experimentation in the U.S. concerning bycatch in gillnets, which are having encouraging results (see IWC, 1996).

2.- Biological studies:

- Distribution and abundance of dolphin and porpoise populations and their fluctuations.
-

⁹ In 1995, an Action Plan was designed in San José, Costa Rica involving Colombia, Chile, Ecuador, Panama, and Peru, during the Expert Meeting to analyze the Action Plan for the Conservation of Marine Mammals in the South East Pacific, included in the Action Plan for the Protection of the Marine Environment and Coastal Areas of the SouthEast Pacific (CPPS-PNUMA).

-
- Stock identity of sub-populations by means of morphological and molecular genetic studies.
 - Natural history studies: sex and age structure, age at maturity, pregnancy rate and diet to assess possible effects of fisheries on populations.
 - Possible effects of El Niño Southern Oscillation (ENSO) phenomenon over small cetacean populations in relation to their habitat and prey items.

3.- Political and private support:

- Establish a collaborative network, under the sponsorship of the CMS, among scientists of the countries involved. This network will function as a discussion forum on how to cover high priority research areas, solve specific problems, and achieve and encourage the training of young scientists (courses, exchanges, and scholarships in ongoing research programmes). To be able to implement this, we urge the establishment of a small conservation fund for meetings and

- priority short term research.
- Regional reassessment of marine mammal species' conservation status by every government in close collaboration with scientists, in order to compare this status with the one informed by IUCN, and establish a local conservation regime.
- Further the adoption of precautionary principles by each government in the administration of fishing and faunal resources.
- Involve local, regional and national authorities in workshops to make them more willing to accept different point of views in the protection of marine resources.
- Involve the private sector in the solution of conservation problems.
- Urge the creation of Protected Marine Areas (Reserves) with an effective management by each country, preferably following guidelines prepared by Kelleher & Kenchington (1991) for IUCN.

6. FINAL CONSIDERATIONS AND CONCLUSIONS

Throughout this review we have developed the main reasons for which a regional conservation agreement on small cetaceans is necessary and should be developed in southern South America. We have seen that the conservation of these species cannot be achieved in the best possible manner without international cooperation (because of shared stocks, insufficient knowledge of the biology, ecology and ecosystemic interactions of small cetaceans, different management policies in conservation policies between countries, etc.). Because of this, we consider that CMS has a very important role to play and we support its initiative in evaluating the feasibility of such an agreement.

We would like to welcome the very recent decision of Peru to become a party member of the CMS because this may have interesting projections in new agreements for the conservation of small cetaceans in the Chile-Peru or Humboldt Current system; and we would like to encourage other countries not yet part of it, to consider doing so (e.g. Brazil).

By this means, joint efforts in the conservation of small cetaceans inhabiting SSA waters, will become a real collaborative work, in which

specialists from the countries involved can have a comprehensive view of what happens to any particular species. Their conclusions, based on good quality available data, will hopefully lead each government to manage and conserve its natural resources in the best possible way. This aspect of marine mammal conservation was already recognized as important 20 years ago when the FAO ACMRR working party on marine mammals (1978) reported that: *'There is insufficient knowledge about the past and present distribution and movements of most species of marine mammals. There is urgent need, therefore, for an international programme of data collection and analysis, using standardized formats; such a programme should necessarily include provisions for exchange and pooling of data and results of analysis between scientists. International contacts concerning tagging programmes and technology are also much needed, including the exchange of results obtained from working with different groups of marine mammals'* (Vol. 1, p. 145), and as we can see now, few of these recommendations have been adopted worldwide.

7. TABLE AND FIGURE

TABLE 1: List of small cetaceans occurring in southern South American waters with regional distributional information (taken from Aguayo, 1975b; Alves Jr., 1996; Brito, 1996; Capozzo y Junin, 1991; Crovetto & Whitehead, 1994; Martin & Bingham (pers. comm. to J. P. Croxall, 1997); Martins da Silva Jr. *et al.*, 1996; Moore, 1966; Moreno *et al.* (1998); Oporto, in press; Reyes *et al.*, 1995; Sielfeld, 1983; Vidal, 1992; and Zerbini & Secchi, 1996) and current IUCN Conservation Status (to review the new Categories definitions please refer to Appendix 1).

Species	Distribution (for the scope of this review)	IUCN Conservation Status (1996)
Family Ziphiidae		
01.- <i>Berardius arnuxii</i> (Arnoux's Beaked Whale)	C-A-F-U	Lower Risk : C. D.
02.- <i>Hyperoodon planifrons</i> (Southern Bottlenose Whale)	C-A-F-U?	Lower Risk : C. D.
03.- <i>Ziphius cavirostris</i> (Cuvier's Beaked Whale)	C-A-F-U-B	Data Deficient
04.- <i>Tasmacetus shepherdi</i> (Shepherd's Beaked Whale)	C-A	Data Deficient
05.- <i>Mesoplodon densirostris</i> (Blainville's Beaked Whale)	C-A-U	Data Deficient
06.- <i>Mesoplodon layardii</i> (Strap-toothed Beaked Whale)	C-A-F-U	Data Deficient
07.- <i>Mesoplodon grayi</i> (Gray's Beaked Whale)	C-A-F-U	Data Deficient
08.- <i>Mesoplodon bahamondi</i> (Bahamonde's Beaked Whale)	C	Not listed
09.- <i>Mesoplodon hectori</i> (Hector's Beaked Whale)	C-A-F-U?-B	Data Deficient
Family Delphinidae		
10.- <i>Feresa attenuata</i> (Pygmy Killer Whale)	C?-A-U	Data Deficient
11.- <i>Pseudorca crassidens</i> (False Killer Whale)	C-A-U	Removed from the list
12.- <i>Peponocephala electra</i> (Melon-headed Whale)	B	Removed from the list
13.- <i>Orcinus orca</i> (Orca)	C-A-F-U-B	Lower Risk : C. D.
14.- <i>Globicephala melas</i> (Long-finned Pilot Whale)	C-A-F	Removed from the list
15.- <i>Globicephala macrorhynchus</i> (Short-finned Pilot Whale)	C-U-B	Lower Risk : C. D.
16.- <i>Steno bredanensis</i> (Rough-toothed Dolphin)	C-B	Data Deficient
17.- <i>Sotalia fluviatilis</i> (Tucuxi)	A-U	Data Deficient
18.- <i>Lagenorhynchus obscurus</i> (Dusky Dolphin) \ddot{I}	C-A-F?	Data Deficient
19.- <i>Lagenorhynchus cruciger</i> (Hourglass Dolphin)	C-A-F	Removed from the list
20.- <i>Lagenorhynchus australis</i> (Peale's Dolphin) \ddot{I}	C-A-F	Data Deficient
21.- <i>Lagenodelphis hosei</i> (Fraser's Dolphin)	U-B	Data Deficient
22.- <i>Delphinus delphis</i> (Common Dolphin)	C-A-F?-U-B	Removed from the list
23.- <i>Delphinus capensis</i> (Long-snouted Common Dolphin)	?	Not listed
24.- <i>Tursiops truncatus</i> (Bottlenose Dolphin)	C-A-F-U-B	Data Deficient
25.- <i>Grampus griseus</i> (Risso's Dolphin)	C-A	Data Deficient
26.- <i>Stenella attenuata</i> (Pantropical Spotted Dolphin)	A-U-B	Lower Risk : C. D.
27.- <i>Stenella frontalis</i> (Atlantic Spotted Dolphin)	U?-B	Data Deficient
28.- <i>Stenella longirostris</i> (Spinner Dolphin)	U?-B	Lower Risk : C. D.
29.- <i>Stenella clymene</i> (Clymene Dolphin)	U-B	Data Deficient
30.- <i>Stenella coeruleoalba</i> (Striped Dolphin)	C-A-U	Lower Risk : C. D.
31.- <i>Lissodelphis peronii</i> (Southern Right Whale Dolphin)	C-A-F	Data Deficient
32.- <i>Cephalorhynchus commersonii</i> (Commerson's Dolphin) \ddot{I}	C-A-F	Data Deficient
33.- <i>Cephalorhynchus eutropia</i> (Chilean Dolphin) \ddot{I}	C-A?	Data Deficient
Family Phocoenidae		
34.- <i>Australophocaena dioptica</i> (Spectacled Porpoise) \ddot{I}	C-A-F-U	Data Deficient
35.- <i>Phocoena spinipinnis</i> (Burmeister's Porpoise) \ddot{I}	C-A-U	Data Deficient
Family Pontoporidae		
36.- <i>Pontoporia blainvillei</i> (Franciscana) \ddot{I}	A-U-B	Data Deficient
Family Kogiidae		
37.- <i>Kogia breviceps</i> (Pygmy Sperm Whale)	C-A-U-B	Removed from the list
38.- <i>Kogia simus</i> (Dwarf Sperm Whale)	C-B	Removed from the list

KEY: \ddot{I} = species included in Appendix I of the CMS; \ddot{I} = species included in Appendix II of the CMS; ? = probably occurring in the area; **C-A-F-U-B** = Chile-Argentina-Falklands(Malvinas)-Uruguay-Brazil; **Lower Risk: C.D.** = Conservation Dependent.

FIGURE 1: Map of Neotropical South America showing approximate positions of various places mentioned in this review, and countries which are parties of the CMS, as well as those which have expressed intention to adhere and willing to form part in regional agreements.



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9. REFERENCES

- AGUAYO, A. 1975a. Summary of cetacean exploitation in Chile. *In*: E. Mitchell. Porpoise, Dolphin and Small Whale Fisheries of the World - Status and Problems. pp. 25-26. IUCN Monograph No.3. Morges, Switzerland.
- AGUAYO, A. 1975b. Progress report on small cetacean research in Chile. *J. Fish. Res. Board Can.*, Vol. 32(7):1123-1143.
- ALVES Jr., T.T., F.J.C. AVILA, J.A. OLIVEIRA, M.A. FURTADO-NETO, A.A. MACHADO, G.A. MACHADO & C. MONTEIRO-NETO. 1996. Registros de cetáceos para o litoral do estado do Ceará, Brasil. *In*: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1er Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 29. Viña del Mar, Chile, Oct. 1996 [Abstract].
- ANDRADE, A., M.C. PINEDO & J. PEREIRA Jr. 1996. Helmintofauna gastrointestinal de franciscana no Rio Grande do Sul, Brasil, e sua utilização com marcadores biológicos na identificação de estoques. *In*: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1er Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 59. Viña del Mar, Chile, Oct. 1996 [Abstract].
- ASHFORD, J.R., P.S. RUBILAR & A.R. MARTIN. 1996. Interactions between cetaceans and longline fishery operations around South Georgia. *Marine Mammal Science*, 12(3): 452-457.
- BASSOI, M., E.R. SECCHI, L. DALLA-ROSA, A.N. ZERBINI & D. JANA. 1996. Interactions between cetaceans and fisheries of the south and southeast Brazilian fleet. *In*: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1er Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 101. Viña del Mar, Chile, Oct. 1996 [Abstract].
- BRITO, J.L. 1996. Nuevos registros de cetáceos para las aguas de Chile Central. *In*: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1er Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 30. Viña del Mar, Chile, Oct. 1996 [Abstract].
- BROWNELL, R.L., Jr. 1989. Franciscana - *Pontoporia blainvillei* (Gervais and d'Orbigny, 1844). pp.45-7. *In*: S.H. Ridgway and R. Harrison (eds.) Vol. 4. Handbook of Marine Mammals. Academic Press, London and San Diego. 442 pp.
- CAPOZZO, H.L. & M. JUNIN (Eds.), 1991. Estado de conservación de los mamíferos marinos del Atlántico Sudoccidental. Informes y estudios del Programa Mares Regionales del PNUMA. No. 138, PNUMA.
- CMS. 1997. Proceedings of the Fifth Meeting of the Conference of the Parties. Vol. I. Geneva, 10-16 April, 1997. 189 pp.
- CORCUERA, J., F. MONZON, E.A. CRESPO, A. AGUILAR & J.A. RAGA. 1994. Interactions between marine mammals and coastal fisheries of Necochea and Claromeco (Buenos Aires Province, Argentina). Gillnets and Cetaceans: Proceedings of the Symposium and Workshop on Mortality of Cetaceans in Passive Fishing Nets and Traps. International Whaling Commission, Special Issue 15: 269-281.
- COVARRUBIAS, A. & I. CAMPODONICO. 1995. Plan de acción para la conservación de los mamíferos marinos del Pacífico Sudeste (Chile, estado de avance). Servicio Nacional de Pesca-Subsecretaría de Pesca. Chile. 20 pp.
- CRESPO, E.A. 1992. Report of the Workshop. Workshop for the Coordination of Research and Conservation of the Franciscana dolphin (*Pontoporia blainvillei*) in the southwestern Atlantic. 22-25 Sep., 1992,

Buenos Aires. Presented to UNEP (unpublished). 30 pp.

- CRESPO, E.A., J. CORCUERA & A. LOPEZ CAZORLA. 1994a. Interactions between marine mammals and fisheries in some fishing areas of the coast of Argentina. Gillnets and Cetaceans: Proceedings of the Symposium and Workshop on the Mortality of Cetaceans in Passive Fishing Nets and Traps. International Whaling Commission, Special Issue 15: 283-290.
- CRESPO, E.A., L. REYES, M. KOEN & N. GARCIA. 1994b. Interacciones entre mamíferos marinos y pesquerías en el litoral Norpatagónico. Anales 4ª Reun. Trab. Esp. Mam. Acuát. América del Sur, 12-15 Nov. 1990, Valdivia, Chile, 89-96.
- CRESPO, E.A., J. CORCUERA, F. MONZON & A. LOPEZ CAZORLA. 1994c. Interacciones entre mamíferos marinos y pesquerías artesanales en algunos puertos de la Provincia de Buenos Aires (Argentina). Anales 4ª Reun. Trab. Esp. Mam. Acuát. América del Sur, 12-15 Nov. 1990, Valdivia, Chile, 97-112.
- CRESPO, E.A., S.N. PEDRAZA, S. DANS, N. GARCIA, KOEN ALONSO, L. REYES & M. COSCARELLA. 1997a. Interacciones operacionales entre mamíferos marinos y pesquerías de arrastre en el norte y centro de Patagonia. Informes Técnicos Plan de Manejo Integrado Zona Costera Patagónica (Puerto Madryn, Argentina) N° 30 (Available through Fundación Patagonia Natural, Marcos A. Zar 760, 9120, Puerto Madryn, Chubut, Argentina).
- CRESPO, E.A., S.N. PEDRAZA, M. COSCARELLA, N.A. GARCIA, S.L. DANS, M. IÑIGUEZ, L.M. REYES, M. KOEN ALONSO, A.C.M. SCHIAVINI, & R. GONZALEZ. 1997b. Distribution of dusky dolphins (*Lagenorhynchus obscurus*) (Gray, 1828), in the southwestern Atlantic ocean with notes on the size of herds. 47th Rep. Int. Whal. Commn.: 693-697.
- CRESPO, E.A., S.N. PEDRAZA, S.L. DANS, M. KOEN ALONSO, L.M. REYES, N.A. GARCIA, M. COSCARELLA & A.C.M. SCHIAVINI. 1998a. Direct and indirect effects of the highseas fisheries on the marine mammal populations in the northern and central Patagonian coast. J. Northwest Atl. Fish. Sci., 22: 189-207.
- CRESPO, E.A., G. HARRIS & R. GONZALEZ. 1998b. Records of franciscana dolphins *Pontoporia blainvillei* close to the Peninsula Valdes (Chubut, Argentina), with notes on the distribution and group size of the species. Marine Mammal Science, MMS-C835.
- CROVETTO, A. & H. WHITEHEAD. 1994. Revisión de la fauna de mamíferos marinos en el mar presencial chileno. pp. 63-64. In: Anales de la 6ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur. Florianópolis, 24-28 de octubre de 1994 [Abstract].
- CROXALL, J.P., T.S. McCANN, P.A. PRINCE, & P. ROTHERY. 1988. Reproductive performance of seabirds and seals at South Georgia and Signy island, South Orkney islands, 1976-1987: Implications for southern Ocean Monitoring Studies. In: Antarctic Ocean and Resources Variability (ed. D. Sahrhage). pp. 261-285. Springer-Verlag, Berlin.
- DALLA-ROSA, L. & E.R. SECCHI. 1996. Killer whale, *Orcinus orca*, interactions with the tuna and swordfish longline fishery in south and southeast Brazil. In: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1º Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 61. Viña del Mar, Chile, Oct. 1996 [Abstract].
- DANS, S., E.A. CRESPO, M. KOEN ALONSO, L. REYES & N. GARCIA. 1993. Biología y ecología del delfín oscuro (*Lagenorhynchus obscurus*) en el litoral patagónico. Aspectos preliminares. Actas de las Jornadas Nacionales de Ciencias del Mar, 91:142-148.
- DANS, S.L., E.A. CRESPO, S.N. PEDRAZA, R. GONZALEZ, & N.A. GARCIA. 1996. Estructura y tendencia de los apostaderos de lobos marinos de un pelo (*Otaria flavescens*) en el norte de Patagonia. Informes Técnicos del Plan de Manejo Integrado de la Zona Costera Patagónica (Puerto Madryn, Argentina) N° 13:1-17 (Available through Fundación Patagonia Natural, Marcos A. Zar 760, 9120, Puerto

Madryn, Chubut, Argentina).

- DANS, S.L., E.A. CRESPO, S.N. PEDRAZA & M. K. ALONSO. 1997a. Notes on the reproductive biology of female dusky dolphins (*Lagenorhynchus obscurus*) off the Patagonian coast. *Marine Mammal Science*, 13(2): 302-307.
- DANS, S.L., E.A. CRESPO, N.A. GARCIA, L.M. REYES, S.N. PEDRAZA, & M. KOEN ALONSO. 1997b. Incidental mortality of patagonian dusky dolphins in mid-water trawling: retrospective effects from the early 80's. 47th Rep. Int. Whal. Commn: 699-703.
- FAO ACMRR WORKING PARTY ON MARINE MAMMALS. 1978. *In: Mammals in the Seas*, Vol. 1: p.142. FAO, Rome. 264 pp.
- FERTL, D. & S. LEATHERWOOD. 1998. Cetaceans interactions with trawls: a preliminary review. *J. Northwest Atl. Fish. Sci.*, 22: 219-248.
- GARCÍA, R., M. LÁZARO, J. LEGUISAMO, L. RODRÍGUEZ. 1994. Identificación individual de *Tursiops truncatus* en la localidad de Sta. Lucía del Este, Depto. de Canelones, Uruguay. En: *Anais da 6ta Reuniao de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul*, pag. 92. Florianópolis, Brasil, Octubre de 1994. [Abstract].
- GOODALL, R.N.P., K.S. NORRIS, A.R. GALEAZZI, J.A. OPORTO & I.S. CAMERON. 1988. On the Chilean dolphin, *Cephalorhynchus eutropia* (Gray, 1846). *Rep. Int. Whal. Commn. Special Issue 9*: 197-257.
- GOODALL, R.N.P., A.C.M. SCHIAVINI, & C. FERMANI. 1994. Net fisheries and net mortality of small cetaceans off Tierra del Fuego, Argentina. *Rep. Int. Whal. Commn, Special Issue 15*: 295-304.
- GIL, M., M.A. HARVEY, H. BELDOMENICO, S. GARCIA, M. COMMENDATORE, P. GANDINI, E. FRERE, P. YORIO, E.A. CRESPO, & J.L. ESTEVES. 1997. Contaminación por metales y plaguicidas organoclorados en organismos marinos de la zona costera patagónica. *Informes Técnicos del Plan de Manejo Integrado de la Zona Costera Patagónica GEF/PNUD/WCS/FPN* (Puerto Madryn, Argentina) N°32:1-28 (Available through Fundación Patagonia Natural, Marcos A. Zar 760, 9120, Puerto Madryn, Chubut, Argentina).
- GUZMÁN, L.F., A.K. LESCRAUWAET, & J. GIBBONS. 1996. Índice poblacional instantáneo de pequeños cetáceos en el Estrecho de Magallanes. *Informe Fondo Investigación Pesquera. Proyecto FIP N°95-27*.
- IUCN. 1996. 1996 IUCN Red List of Threatened Animals. IUCN, Gland, Switzerland.
- IWC. 1996. Annex H. Report of the sub-committee on small cetaceans. *Rep. Int. Whal. Commn. 46*:160-179.
- JEFFERSON, T.A., S. LEATHERWOOD & M.A. WEBBER. 1993. *FAO Species identification guide. Marine Mammals of the World*. Rome, FAO. 320 pp.
- KELLEHER, G. & R. KENCHINGTON. 1992. *Guidelines for Establishing Marine Protected Areas: A marine conservation and development report*. IUCN, Gland, Switzerland. vii + 79 pp. (Available from IUCN, Rue Mauverney 28, 1196 Gland, Switzerland).
- KOEN ALONSO, M., E.A. CRESPO, N.A. GARCIA, S.N. PEDRAZA, & M. COSCARELLA. 1998. Diet of dusky dolphins (*Lagenorhynchus obscurus*), in the coast of Patagonia, Argentina. *Fishery Bulletin*, 96(2):366-379.
- LEATHERWOOD, S. & R.R. REEVES. 1983. *The Sierra Club Handbook of Whales and Dolphins*. Sierra Club, San Francisco, 302 pp.
- LESCRAUWAET, A.K. 1997. Notes on the behaviour and ecology of the Peale's dolphin, *Lagenorhynchus*

australis, in the Magellan Strait, Chile. 47th Rep. Int. Whal. Commn: 747-755.

- LESCRAUWAET, A.K. & J. GIBBONS. 1994. Mortality of small cetaceans and the crab bait fishery in the Magallanes area of Chile since 1980. Rep. Int. Whal. Commn (Special Issue 15): 485-494.
- MANZUR, M.I. & J. CANTO. 1996. Situación actual de las pesquerías de centolla y centollón y la interferencia con los mamíferos marinos en la XII Región de Chile. *In*: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1º Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 62. Viña del Mar, Chile, Oct. 1996 [Abstract].
- MARTINS da SILVA Jr., J., F.J. de LIMA SILVA, J. A. PEREIRA & K. GROCH. 1996. Ocorrências de cetáceos na região oceânica entre atol das rocas, archipélago de Fernando de Norhona e penedos de São Pedro e São Paulo, Brasil. *In*: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1º Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 29. Viña del Mar, Chile, Oct. 1996 [Abstract].
- MOREIRA, L.M. & S. SICILIANO. 1991. Northward extension range for *Pontoporia blainvillei*. Ninth. Bienn. Conf. Biol. Mar. Mamm. p. 48. 5-9 Dec., 1991, Chicago, Illinois [Abstract].
- MORENO, I.B., P.H. OTT, D. DANILEWICZ, L.R. DE OLIVEIRA, G. CAON & M.B. MARTINS. 1998. Ocorrência do golfinho de Fraser (*Lagenodelphis hosei* Fraser, 1956) na costa brasileira. XXII Congresso Brasileiro de Zoologia, Recife, 08 a 13 de Fevereiro de 1998, Livros de Resumos. p. 338 [Abstract].
- MOORE, J.C. 1966. Diagnoses and distributions of beaked whales of the Genus *Mesoplodon* known from North American waters. In K.S. Norris (Ed.). Whales, dolphins and porpoises. University of California Press. Berkeley and Los Angeles. 3: 33-61.
- NORTHRIDGE, S.P. 1985. Estudio mundial de las interacciones entre los mamíferos marinos y la pesca. FAO Inf. de Pesca. 251:234 pp.
- NORTHRIDGE, S.P. 1991. Actualización del estudio mundial de las interacciones entre los mamíferos marinos y la pesca. FAO Documento Técnico de Pesca. No. 251, supl. 1. Roma, FAO. 62 pp.
- OPORTO, J.A. 1989. Marine mammal research in Chile: the Centre for the Research and Management of Marine Mammals-CIMMA. The Pilot. Newsletter of the Marine Mammal Action Plan. 4: 15-16.
- OPORTO, J.A. In Press. Manual para la identificación y estudio de los mamíferos marinos del Pacífico Sur Oriental. UNEP, Nairobi, Kenya.
- PEDRAZA, S.N., A.C.M. SCHIAVINI, E.A. CRESPO, R. GONZALEZ, & S.L. DANS. 1996. Estimación preliminar de la abundancia de algunas especies de pequeños cetáceos del Atlántico Sudoccidental. Informes Técnicos del Plan de Manejo Integrado de la Zona Costera Patagónica (Puerto Madryn, Argentina) No 17: 1-11 (Available through Fundación Patagonia Natural, Marcos A. Zar 760, 9120, Puerto Madryn, Chubut, Argentina).
- PEREZ MACRI G. & E.A. CRESPO. 1989. Survey of the franciscana dolphin (*Pontoporia blainvillei*) along the Argentine coast with a preliminary evaluation of incidental mortality in coastal fisheries. In: Biology and Conservation of the River Dolphins. Occasional papers of the IUCN Species Survival Commission (SSC) No. 3. pp:57-63. Ed. W.F. Perrin, R.L. Brownell Jr., Liu Jiankang & Zhou Kaiya.
- PERRIN, W.F. 1985. Newsletter of the Cetacean Specialist Group. No. 1: 4-5. IUCN-Species Survival Commission.
- PERRIN, W.F. 1989. Dolphins, Porpoises and Whales. An action plan for conservation of biological diversity: 1988-1992. IUCN, Gland, Switzerland.
- PERRIN, W.F., R.L. BROWNELL, Z. KAIYA & L. JIANKANG. (Eds.), 1989. Biology and conservation of the river

dolphins. Occas. Pap. IUCN SSC. N°3. IUCN, Gland, Switzerland. v+173 pp.

- PICKARD, G.L. & W.J. EMERY. 1990. Chapter 7: Circulation and water masses of the Oceans. *In: Descriptive Physical Oceanography: An Introduction*, pp.: 155-275. 5th Edition, Pergamon Press.
- PINEDO, M.C. 1991a. Development and variation of the franciscana, *Pontoporia blainvillei*. Ph.D. Thesis, University of California, Santa Cruz. 406 pp.
- PINEDO, M.C. 1991b. Development and variation of the franciscana, *Pontoporia blainvillei*. Abstracts 9th. Bienn Conf. on the Biology of Marine Mammals. Chicago, Illinois, USA: 53.
- PINEDO, M.C. 1994a. Review of small cetacean fishery interactions in southern Brazil with special reference to the franciscana, *Pontoporia blainvillei*. Rep. Int. Whal. Commn (Special Issue 15): 251-259.
- PINEDO, M.C. 1994b. Impacts of incidental mortality on age structure of *Pontoporia blainvillei* in southern Brazil and Uruguay. Rep. Int. Whal Commn (Special Issue 15): 261-264.
- PINEDO, M.C. 1994c. Report of the Workshop. Second Workshop for the Coordination of Research and Management of the franciscana. 22-23 Oct., 1994, Florianópolis. Presented to CNPq (unpub.). 16 pp.
- PINEDO, M.C., R. PRADERI & R.L. BROWNELL Jr. 1989. Review of the biology and status of the franciscana *Pontoporia blainvillei*. Occasional Papers of the IUCN Species Survival Commission (SSC) N°3: 46-51. Gland, Switzerland.
- PINEDO, M.C., F.C.W. ROSAS & M. MARMONTEL. 1992. Cetáceos e pinípedes do Brasil. Uma revisão dos registros e guia para a identificação das espécies. UNEP/Fundação Universidade do Amazonas. 213 pp.
- PINEDO, M.C. & A.S. BARRETO. 1994. A baleia bicuda de Cuvier, *Ziphius cavirostris*, no Rio Grande do Sul, Brasil. 6a Reun. Esp. Mam. Acuát. Amér. Sur: 88, 24-28 Oct. 1994, Florianópolis [Abstract].
- PRADERI, R. 1994. Análisis comparativo de estadísticas de captura y mortalidad incidental de *Pontoporia blainvillei* en Uruguay durante 20 años. 2do. Enc. Trab. Coord. Pesq. Cons. Franciscana, DT 9., Florianópolis, Brasil. Octubre 1994. [Abstract].
- PRADERI, R., V. LITTLE, J. GORGA, G. RONDINI. 1993. Pesquerías de tiburón en la costa de Uruguay. En: Informe final sobre problemas de conservación y manejo de los mamíferos marinos del Atlántico Sudoccidental en Uruguay y Argentina. UNEP, OCA/PAC, 1993.
- PRADERI, R., M.C. PINEDO & E.A. CRESPO. 1989. Conservation and management of *Pontoporia blainvillei* in Uruguay, Brazil and Argentina. In: Perrin, W.F., R.L. Brownell Jr., Z. Kaiya, L. Jiankang (eds.). Biology and Conservation of the River Dolphin. Occasional Papers of the IUCN Species Survival Commission (SSC) N°3: 52-56. Gland, Switzerland.
- REEVES, R.R. & S. LEATHERWOOD. 1994. Dolphins, Porpoises and Whales: 1994-1998 Action Plan for the Conservation of Cetaceans. IUCN, Gland, Switzerland. 92 pp.
- REEVES, R.R. & S. LEATHERWOOD. 1996. Cetacean Specialist Group Report. Species, Newsletter of the Species Survival Commission 26-27: 57-58. IUCN. June-December.
- REYES, J.C. 1991. The conservation of small cetaceans: a review. UNEP/CMS Secretariat, Bonn. 115 pp.
- REYES, J.C. & J.A. OPORTO. 1994. Gillnet fisheries and cetaceans in the Southeast Pacific. Rep. Int. Whal. Commn (Special Issue 15): 467-474.
- REYES, J.C., K. VAN WAEREBEEK, J.C. CARDENAS, & J. YAÑEZ. 1995. A new species of beaked whale, *Mesoplodon bahamondi*, of Juan Fernández islands. Bol. Mus. Nac. Hist. Nat. (Chile) 45:31-34.

-
- REYES, L.M., E.A. CRESPO, y V. SZAPKIEVICH. 1996. Distribución y abundancia de lobos marinos de un pelo (*Otaria flavescens*) en el centro y sur de Chubut, Argentina. Informes Técnicos del Plan de Manejo Integrado de la Zona Costera Patagónica (Puerto Madryn, Argentina) N° 10:1-22 (Available through Fundación Patagonia Natural, Marcos A. Zar 760, 9120, Puerto Madryn, Chubut, Argentina).
- SCHIAVINI, A.C.M., S.N. PEDRAZA, E.A. CRESPO, R. GONZALEZ, & S.L. DANS. 1996. The abundance of dusky dolphins (*Lagenorhynchus obscurus*) off central Patagonia, Argentina. Results from a pilot survey in spring 1995. Working Paper presented in the 48 Meeting of the International Whaling Commission.
- SECCHI, E.R., T. VASQUE, Jr. 1992. Avistajes y depredación causada por la orca, *Orcinus orca*, en pesquerías de palangreros en el Sur de Brasil. 5a Reun. Esp. Mam. Acát. Amér. Sur: 62, 28 Sep.- 02 Oct. 1992, Buenos Aires [Abstract].
- SICILIANO, S. 1994. Review of small cetaceans and fishery interactions in coastal waters of Brazil. Rep. Int. Whal. Commn. (Special Issue 15): 241-250.
- SIELFELD K. W. 1983. Mamíferos marinos de Chile. Ediciones de la Universidad de Chile. 199 pp.
- SNELGROVE, P. 1996. Why care about marine biodiversity?. Sea Technology, September, p.96.
- SPELLERBERG, I.F. 1995. Monitoring ecological change. Cambridge University Press. Fourth edition. 334 pp.
- TORRES, D., J. YAÑEZ & P.F. CATTAN. 1979. Mamíferos marinos de Chile: Antecedentes y situación actual. Biol. Pesq. Stgo. Chile. 11:49-81.
- TORRES, D., A. AGUAYO L., J.C. CARDENAS. 1990a. Los mamíferos marinos en aguas chilenas. Report presented to the Comisión Permanente del Pacifico Sur (CPPS). 162pp.
- TORRES, D., J.A. OPORTO, J.C. CARDENAS. 1990b. Antecedentes y proposiciones para la conservación de los mamíferos marinos en Chile. Ser. Cient. INACH 40:103-115.
- UICN. 1994. Categorías de las Listas Rojas de la UICN. Comisión de la supervivencia de Especies de la UICN. November 1994, Gland, Switzerland. 22 pp.
- VIDAL, O. 1992. Los mamíferos marinos del Océano Pacífico Sudeste (Panamá, Colombia, Ecuador, Perú y Chile): Diagnóstico regional. Informes y estudios del Programa de Mares Regionales del PNUMA. No. 142, PNUMA.
- VIDAL, O. 1993. Aquatic Mammal Conservation in Latin America: Problems and Perspectives. Conservation Biology 7(4):788-795.
- ZERBINI, A.N. & E.R. ZECCHI. 1996. Occurrence of an Hector's beaked whale, *Mesoplodon hectori* (Gray, 1871), in the subtropical Atlantic Ocean. In: Resúmenes de la 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y 1er Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos (SOLAMAC), pág. 81. Viña del Mar, Chile, Oct. 1996 [Abstract].
- ANONIMOUS. 1997. Fur seals oiled in Uruguay. Mar. Pollution Bull. 34(5): 286.

10. APPENDIX 1 (Definitions)

- C *Appendix I (CMS)*: listing of migratory species which are endangered.
- C *Appendix II (CMS)*: Appendix II shall list migratory species which have an unfavourable conservation status and which require international agreements for their conservation and management, as well as those which have a conservation status which would significantly benefit from the international co-operation that could be achieved by an international agreement.
- C *Crab fisheries*: held mainly in Southern Chile and Argentina. Small vessels use traps with a mean of 1 kg of bait per cage that is replaced every 48 to 72 hrs. In 1991 there were 40,000 crab traps operatively in use in Chile (Magallanes area). Currently in Argentina, around 1,000 traps are in use.
- C *Data Deficient*: Taxa for which information to make a sound conservation assessment is lacking (IUCN, 1996).
- C *Gillnet*: panel of netting hung vertically in the water, so called because fish of certain sizes can pass partway through the mesh but become trapped by their gills when trying to back out. These can either be anchored to the sea bed or allowed to drift. Mainly used in artisanal fisheries. Areas of negative interaction occur in nearly all SSA countries considered in this review.
- C *Gillnet oceanic fishing (driftnetting)*: gillnet panels strung together to produce a 'wall of death' 35 to 145 km long and 10 to 15 m deep. Hundreds of such nets may be set on any fishing night. This type of fishing activity has been banned outside the EEZ's of any country after December 31 of 1992 due to the establishment of an indefinite global moratorium by the United Nations General Assembly (Resolution 46/215).
- C *Lower Risk: conservation dependent (LR:c.d.)*: a taxon that when evaluated does not qualify for either other categories and is not Data Deficient. The sub-category c.d. includes taxons after which a directed conservation monitoring program is undertaken, and the ending of this program could result, in a five year period, on this taxon to be considered under an endangered or D.D. status (translation from Spanish made by the editor, taken from IUCN, 1994).
- C *Migratory species (CMS definition)*: "Migratory species" means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.
- C *Trawling fishery*: Trawl nets are towed nets consisting of a cone-shaped net with a cod-end or bag for collecting the target species. Trawls can be bottom, midwater, or surface, and are operated from one, or occasionally two, boats to take various species of fishes, squids, and crustaceans (Fertl & Leatherwood, 1998).
- C *Unit population*: Subset of a species or subspecies for which interbreeding with other subsets is sufficiently reduced so that it maintains genetic diversity (FAO ACMRR Working Party on Marine Mammals, 1978).

11. APPENDIX 2 (List of Contributors)

%Anelio Aguayo L.

*Instituto Antártico Chileno,
Departamento Científico,
Casilla 16521, Correo 9, Providencia,
Santiago, Chile.
E-mail: aaguayo@inach.cl
Fax: 56-2-2320440.*

%Mike Bingham

*Environmental Research Unit
P.O. Box 434, Stanley,
Falkland Islands
E-mail: mbingham@horizon.co.fk*

%Pablo Canevari

*UNEP/CMS Secretariat,
Martin-Luther King Str. 8, D-53175
Bonn, Germany.
E-mail: cms@cms.unep.de
Fax: (+49 228) 815 2449*

%Jhoann Canto H.

*Casilla 408, Punta Arenas, Chile.
Fax: 56-61-227446.*

%Enrique A. Crespo

*Centro Nacional Patagónico,
Universidad Nacional de la Patagonia,
Fundación Patagonia Natural,
Blvd. Brown s/n, 9120 Puerto Madryn,
Chubut, Argentina.
E-mail: kike@cenpat.edu.ar*

%John P. Croxall

*British Antarctic Survey
High Cross, Madingley Road,
Cambridge CB3 0ET, United Kingdom.
E-mail: john.croxall@bas.ac.uk
Fax: 01223-362616*

%Rodrigo Hucke-Gaete

*c/o Instituto de Zoología, Facultad de Ciencias,
Universidad Austral de Chile, Casilla 567,
Valdivia, Chile.
E-mail: rhuckeg@smtp.uach.cl
Fax: 56-63-221315*

%María L. Lázaro

*Sección Etología
Facultad de Ciencias
Tristán Narvaja 1674
11200, Montevideo, Uruguay.
E-mail: marila@genetica.edu.uy
Fax: 598-2-4009973*

%Anne Katherine Lescrauwaet V.

*Casilla 527, Punta Arenas, Chile.
Phone/Fax: 56-61-262223.*

%Jorge A. Oporto B.

*Corporación Terra Australis para la Conservación
de la Naturaleza,
Avda. Alemania 630-b, Casilla 828,
Valdivia, Chile.
Fax: 56-63-222609.*

%William F. Perrin

*Southwest Fisheries Science Center
National Marine Fisheries Service
P.O. Box 271
La Jolla, CA. USA 92038
E-mail: wperrin@sgilj.ucsd.edu
Fax: 619-546-7003*

%Maria Cristina Pinedo

*Departamento de Oceanografía,
Fundação Universidade do Rio Grande,
C.P. 474-CEP 96201-900- Rio Grande,
RS, Brazil.
E-mail: doccris@super.furg.br
Fax: +55-532-302126.*

%Ricardo Praderi

*Punta del Diablo
La Coronilla 27201
Rocha, Uruguay
Tel: -477-2118*

%Adrian C. M. Schiavini

*Centro Austral de Investigaciones
Científicas (CADIC),
CC92, (9401) Ushuaia,
Tierra del Fuego, Argentina.
E-mail: adriano@satlink.com
Fax: +54-901-30644.*

%Roberto P. Schlatter V.

*Instituto de Zoología, Facultad de Ciencias,
Universidad Austral de Chile, Casilla 567,
Valdivia, Chile.
E-mail: rschlatt@uach.cl
Fax. 56-63-221315.*

%Daniel Torres N.

*Instituto Antártico Chileno,
Departamento Científico,
Casilla 16521, Correo 9, Providencia,
Santiago, Chile.
E-mail: dtorres@inach.cl
Fax: 56-2-2320440.*