

Antarctic Marine Living Resources - exploitation and its management in the Southern Ocean

KARL-HERMANN KOCK

*Institut für Seefischerei, BFA für Fischerei, Palmaille 9, D-22767 Hamburg, Germany
karl-hermann.kock@ish.bfa-fisch.de*

Abstract: Man's activities have impacted on the Southern Ocean ecosystem for more than 200 years. The exploitation of Southern Ocean resources has followed the same pattern as in other parts of the World Ocean with exploitation starting at the highest trophic levels when seals and whales were taken in the 19th and 20th centuries. After serious over-exploitation of these groups attention moved down the food web to begin exploitation of fish and krill from the late 1960s onwards. The establishment of international management regimes for whales (International Whaling Convention) in 1948 and the remaining marine resources (Convention for the Conservation of Antarctic Marine Living Resources) in 1982 were based on different perceptions of management, the former only considering management by species whilst the latter adopted management at an ecosystem level. These fundamentally different approaches, together with major political interference, have resulted in very different outcomes for management. The Scientific Committee of the IWC developed a sustainable management system, the Revised Management Procedure, in the first half of the 1990s which, however, is still awaiting inclusion into an overall management regime, the Revised Management Scheme, and its acceptance by the Commission. The IWC is now paralysed by political agendas that have nothing to do with scientific management. In contrast, after an early period of slow progress, CCAMLR has improved its performance substantially from the beginning of the 1990s onwards and is now hailed worldwide for its ecosystem approach to sustainable management.

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Introduction

Man's activities in the Southern Ocean have exploited marine living resources for more than 200 years in all three major Antarctic marine ecosystems:

the oceanic realm where mostly cetaceans, lanternfish (Myctophidae) and to a smaller extent krill was harvested (Kock 1992, de la Mare 1997)

the seasonal pack-ice zone where seals (Bonner & Laws 1964), cetaceans (de la Mare 1997), fish and krill (Kock 1992, Ichii 2000, Nicol & Foster 2003) were taken, and

the high-Antarctic zone where cetaceans and fish (primarily the Antarctic silverfish *Pleuragramma antarcticum*, *Trematomus* spp. and icefish) were exploited (Kock 1992).

Five international agreements have been developed in the past 60 years to regulate exploitation and to protect marine life in the Southern Ocean (in brackets year when the convention came into force):

The International Whaling Convention (IWC) (1948)

The Antarctic Treaty (AT) (1961)

The Convention for the Conservation of Antarctic

Seals (CCAS) (1978)

The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) (1982), and

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) (2004) under the Convention on the Protection of Migratory Species of Wild Animals (CMS).

CCAMLR covers the area of the Southern Ocean and its northern boundary approximates to the Antarctic Polar Front. The CCAMLR area is subdivided into statistical areas, subareas and divisions (Fig. 1). The IWC operates worldwide but here I restrict myself to IWC decisions with respect to whales in the Southern Ocean. In this paper I

briefly outline the history of exploitation in the Southern Ocean,

consider the basis on which the two major international legal instruments for management of marine resources, the IWC and CCAMLR, were developed,

assess the pressure under which they operate and their degree of success, and

look into the future of the two conventions given the present political climate.

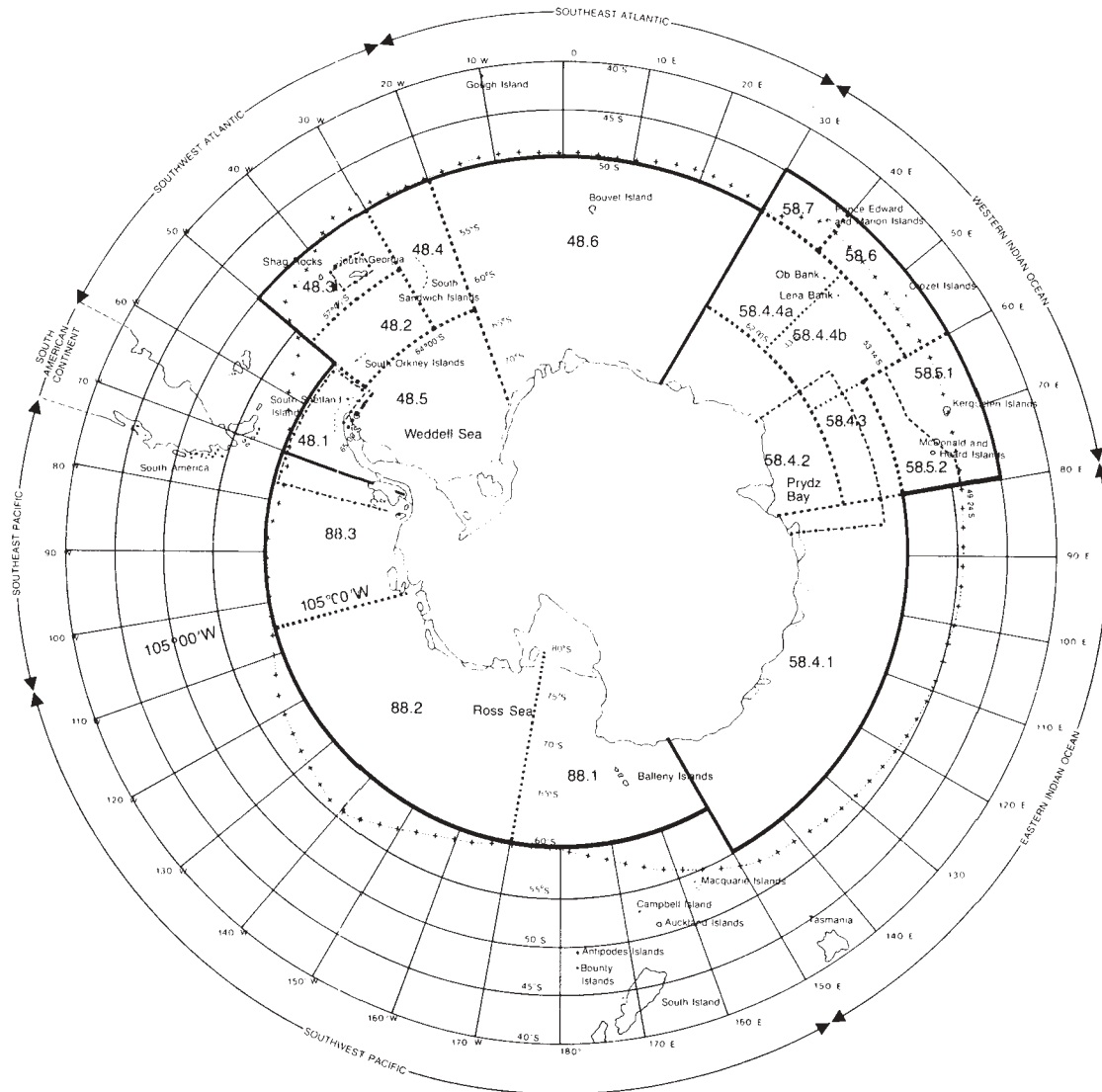


Fig. 1. The area of the 'Convention of the Conservation of Antarctic Marine Living Resources (CCAMLR) with its statistical areas, subareas and divisions.

The history of exploitation in the Southern Ocean

Sealing

Exploitation of Antarctic fur seals (*Arctocephalus gazella* and *A. tropicalis*) had begun at South Georgia around 1786, soon after James Cook's account of his visit to the island was published, and soon spread over most of the Southern Ocean. Within a few decades millions of seals had been taken. By 1830, the indiscriminate killing had either exterminated the seal colonies or had reduced them to such small fractions of their original sizes that it was no longer economically viable to hunt them (Clark 1887, Allen 1899, Bonner 1982). The Falkland Islands Government declared them a protected species in the earlier part of the 20th century but it was not until the mid 20th century that the recovery of the populations began on South Georgia, with

the population spreading southwards as it became larger. In 1964 the fur seals were declared Specially Protected Species by the Antarctic Treaty and were only delisted in 2006 when their estimated population exceeded 4 million, a total almost certainly higher than prior to the start of fur seal hunting more than 200 years ago (SCAR 2006).

The exploitation of a second seal species, elephant seals (*Mirounga leonina*), started at the end of the 18th/beginning of the 19th century as an ancillary activity to fur seal exploitation. Elephant seal blubber contains a very high proportion (84%) of oil of high quality which was in demand by industry in the 18th, 19th and early 20th centuries. Elephant seals soon became the backbone of the sealing industry. Their hunt, however, was less profitable than fur seals. By 1880, the species was almost exterminated in South America, at South Georgia, Iles Kerguelen, Heard Island and Macquarie Island (Carrick &

Ingham 1960).

Elephant seal numbers at South Georgia recovered by the early 20th century. In order to prevent a recurrence of the indiscriminate killing the Falkland Island Government introduced a Seal Fisheries Ordinance thus putting the industry on a controlled basis (Laws 1953, 1960). From 1909 until 1964 the Compañía Argentina de Pesca at Grytviken (one of the South Georgia whaling stations) held the licence which, after 1955, was based on a sustainable culling plan (Laws 1960). This ensured that the population of elephant seals at South Georgia in 1951 was similar to that in the mid-1990s. Over the course of 56 years 260 000 elephant seals were taken (Laws 1994). It is not known how many elephant seals were taken in the 150 years of elephant seal hunting at the island but it was probably in excess of 1 million of both sexes (Laws 1960).

Small numbers of elephant seals were taken in other places, particularly Iles Kerguelen where 12 000 seals were taken between 1958 and 1964 (Pascal 1979). In contrast to the population at South Georgia other populations, such as those in the Indian Ocean, have either fluctuated around a mean or declined steadily over the last 50 years (van Aarde 1980, Laws 1994).

True Antarctic seals (crabeater, Weddell, Ross and leopard seals) were exploited during a German sealing expedition in 1873/74 to the area west of the Antarctic Peninsula (Krause & Rack 2006). Scottish and Norwegian whaling expeditions in the Antarctic Peninsula region between 1892 and 1895 also took 13 223 seal skins and 1100 tons of seal oil (Headland 1989). 752 leopard seals (*Hydrurga leptonyx*) and 97 Weddell seals (*Leptonychotes weddellii*) were taken up to 1926 during the whaling operations on South Georgia (Laws 1960). True Antarctic seals (principally crabeater seals, *Lobodon carcinophagus*) were also killed in small numbers to be used as dog food at scientific stations until the early 1980s.

The possible threat of renewed exploitation of Antarctic seals, especially by Norway after they mounted a pilot sealing expedition in 1964 (Øritsland 1970, 1977), persuaded the Antarctic Treaty Parties that specific protection was needed for them. The 'Convention for the Conservation of Antarctic Seals' (CCAS) was agreed in 1972 and came into force six years later. In its Annex, the Convention specifies that up to 175 000 crabeater seals, 12 000 leopard seals and 5000 Weddell seals can be taken. The Soviet Union took some 4000 seals (mostly crabeater seals) with two vessels during a hunting expedition from December 1986 to February 1987 in the eastern D'Urville Sea and around the Balleny Islands (Anon 1987, Dzhamanov 1990, Vagin & Shust 1990). No further catches have been reported.

Penguins and other birds

Penguins, such as king penguins (*Aptenodytes patagonicus*)

and royal penguins (*Eudyptes schlegeli*), were exploited in large numbers for their oil on some sub-Antarctic islands in the 19th century (Cumpston 1968) as well as to fuel the boilers for extracting elephant seal oil. Although exact numbers killed are unknown this exploitation led to substantial declines in the number of penguins and the extinction of whole colonies on some sub-Antarctic islands, such as Macquarie Island (Cumpston 1968). Furthermore, their eggs, and eggs of albatrosses and larger petrels were collected in large quantities up to the 1950s for food at the whaling and scientific stations on South Georgia and elsewhere in the Scotia Arc region (Cott 1953).

Whaling

The large number of whales in the Southern Ocean had not escaped notice and after several unsuccessful whaling attempts by Norwegian and Scottish whalers in the first half of the 1890s a shore based whaling station was opened at Grytviken on South Georgia in December 1904. Whaling in the Southern Ocean, initially mostly on humpback whales (*Megaptera novaeangliae*), became a profitable enterprise within a few years with Norway and the United Kingdom as the leading whaling nations until the mid-1930s (Hart 2001). Japan entered commercial whaling shortly before World War I. In the first two decades, whaling was either conducted from shore stations which had been established on a number of sub-Antarctic islands or floating whaling factories which were moored in sheltered bays and fjords of islands where whales could be safely flensed alongside vessels. In 1924, the stern ramp and a few years later the whale claw were introduced to whaling factories. Whaling soon became pelagic and spread over most of the Southern Ocean. The first peak in catches was reached in 1930/31 when more than 40 000 whales were taken and the whale oil market collapsed for one season. First agreements on the protection of whales were reached under the auspices of League of Nations in the 1930s, protecting, among others, southern right whales and females having calves (Tønnessen & Johnsen 1982).

Whaling almost stopped during World War II but was soon resumed after peace was agreed. The International Whaling Convention (IWC), signed in 1946, came into force in 1948. Humpback and blue whales (*Balaenoptera musculus*) were largely depleted and first fin whales (*B. physalus*) and later sei whales (*B. borealis*) became the principal species for the whaling industry. Blue whales and humpback whales were protected from 1963 onwards. Whaling collapsed economically in the 1960s and the UK, Norway and the Netherlands sold their whaling fleets (Gulland 1976, Gambell 1977, Elliott 1979). The Soviet Union and Japan remained the only two whaling nations after this, taking primarily minke whales (*B. bonaerensis*) from 1972 onwards. The IWC agreed on a moratorium of commercial whaling in 1982 which came into force in the

Southern Ocean after the 1985/86 pelagic season (Andresen 1989).

Finfishing and krill exploitation

The Soviet Union commenced fishing in the Southern Ocean on an exploratory scale between the early and the mid-1960s (Kock 1992). Finfishing on a commercial scale was first undertaken around South Georgia and Iles Kerguelen in 1969/70 and 1970/71 respectively. The populations of marbled notothenia (*Notothenia rossii*), mackerel icefish (*Champsocephalus gunnari*) and grey notothenia (*Lepidonotothen squamifrons*) (at Iles Kerguelen) were soon heavily depleted.

Fishing spread over most shelf areas of the Atlantic and Indian Ocean sectors of the Southern Ocean from 1977/78 onwards and reached the coastline of the Antarctic continent by the end 1970s. However, population sizes of these more southerly target fish species were either small, such as in some *Trematomus* species, or fish were difficult to process (*Pleuragramma antarcticum*). The fishery never went beyond an exploratory stage (Kock 1992).

The character of the fishery, which had been a trawl fishery until then, changed at the beginning of the 1990s. The Soviet Union had started a longline fishery for Patagonian toothfish at South Georgia in 1985/86. The fishery was taken over by Chile and Argentina at the beginning of the 1990s. French vessels around Iles Kerguelen changed from trawling to longlining. Longlining became the most important and lucrative fishing method (Kock 1992). Longlining expanded into the Ross Sea to catch Antarctic toothfish (*Dissostichus mawsoni*) from 1998 onwards (Hanchet *et al.* 2005).

Krill (*Euphausia superba*) exploitation began in 1973/74 with again the Soviet Union as the main fishing nation. Annual catches reached 400–500 000 tonnes by the beginning of the 1980s. They were mostly taken in the Atlantic Ocean, with some in the Indian Ocean until the early 1990s. Soviet fishing activities almost ceased after the Soviet Union fell apart. Catches declined to around 100 000 tonnes in 1993/94 (Ichii 2000). They remained at that level until 2006/07 (SC-CAMLR 2005).

Japan became the most important krill fishing nation from the early 1990s until recently and took 55–65 000 tonnes annually for the last 10 years (Ichii 2000). New countries, such as the USA, South Korea, Vanuatu and Norway have recently entered the fishery (SC-CAMLR 2005) and Japan's importance has declined.

The development of the two major conventions - the IWC and CCAMLR

The IWC and CCAMLR were established in different historical periods of exploitation and management and have been subject to different geopolitical manipulations. The

market for one type of resource (whales) is now negligible whilst markets for resources covered by CCAMLR, such as toothfish and krill, are expanding and difficult to police across the extent of the Southern Ocean. The drivers for management are also different. The membership of IWC is almost three times larger than that of CCAMLR although the key countries involved in each of the two conventions are similar. This has always to be kept in mind when the successes and failures of the two conventions are considered.

IWC and its failure to manage for sustainability

The first move to control whale catches in the Southern Ocean arose under the League of Nations in the 1930s when commercial whaling had already been underway for three decades. The International Whaling Convention, which came into force in 1948, grew out of a need by the major whaling nations, the UK and Norway, to control whaling by other nations so that it did not undermine the profitability of the established companies. The politicians at that time were only too happy to agree to this commercial basis for decision making and in the first 10–12 years of its existence the Scientific Committee was not expected to provide advice on how many whales could be taken.

The International Whaling Convention was flawed from the start as its remit was determined by the politics of the existing commercial exploitation. The voting system adopted was unusual with important matters, such as the adoption of a whale sanctuary or the declaration of a moratorium on commercial whaling requiring a 75% majority vote of the Commission, whilst annual catch quotas could be agreed by simple majority.

The IWC had little quantitative information on the abundance of whale populations in the late 1940s. Setting catch quotas on a species by species or stock by stock basis was the only available scientific approach. However, even this system was not used by the IWC until the early 1970s. Instead, the IWC used the system of 'blue whale units' (BWUs) (1 BWU: 1 blue whale = 2 fin whales = 2½ humpback whales = 6 sei whales) on whale catches (Gulland 1976, Gambell 1977).

The choice of the BWU as a management tool, the fact that there was no limitation on new countries or new companies entering the whaling business, competition and disagreement between the whaling nations, a focus on short-term economic interests instead of a long-term sustainable yield, and the common property nature of whales combined with their long reproductive cycle all led to the demise of the whale stocks (Andresen 1989). Whilst most whaling nations at least attempted to abide by the limits set by the IWC some, such as the Soviet Union and Panama (the whaling fleet of the Greek Aristotle Onassis), did not and submitted falsified statistics to the IWC (Yablokov 1994, Barthelmess *et al.* 1997). Under pressure,

Onassis sold his whaling fleet in 1956. The Soviets continued misreporting their catch until 1972 (Yablokov 1994).

Blue and humpback whales were at very low levels at the beginning of the 1960s. They were fully protected from 1963 onwards (but were still taken illegally by Soviet whaling fleets). Fin whales were exploited far in excess of the sustainable yield and were soon also in need of much reduced catches or even full protection. The failure of the IWC with respect to the protection of fin whales led to the first great crisis in the history of the IWC whilst at the same time, public concern about the fate of whale populations grew (Gulland 1976, Elliot 1979).

The system of setting quotas based on BWU's was abandoned in the late 1960s in favour of species quotas (Gulland 1976). The implementation of the International Observer Scheme in 1972 to remove suspicions that the regulations were not being obeyed, and shorter and shorter whaling periods to protect the dwindling stocks, were all actions too little and too late to prevent the demise of the large whales (Gulland 1976).

Initially, the IWC consisted of a club of whalers who primarily wanted to defend their commercial interests. As public interest in whaling grew, with the activities of NGOs such as Greenpeace exposing the failures of the IWC to protect whales, new nations, whose only interest was conservation, joined the IWC. As one of the major consequences, a moratorium on commercial whaling was adopted in 1982 and came into force in 1986 (Andresen 1989). Four nations (with Japan and Norway among them) voted initially against the moratorium. Whilst Norway maintained its objections and, according to the rules, is not therefore bound by the moratorium, Japan was forced by the USA to agree to the moratorium in order not to be expelled from fishing in the US 200 nm EEZ.

By the time the moratorium entered into force commercial whaling had, within 80 years, reduced all whale populations, with the exception of a few Bryde's whale populations and the two minke whale species, to small fractions of their initial sizes. The IWC had failed to meet the primary objective of its Convention, i.e. to obtain a long-term sustainable yield from the whale populations in the Southern Ocean, as set out in the preamble of the International Whaling Convention in 1946 (IWC 1946). At best, the IWC was able to prolong whaling for a number of years by introducing catch quotas (to which some members did not abide) and was able to establish a moratorium on commercial whaling only when most whale stocks were exhausted.

The Scientific Committee of the IWC developed a third management procedure for harvesting baleen whales, the 'Revised Management Procedure' (RMP) between 1987 and 1993. The RMP adopted by the Commission in 1994 had a tuning level of 72% of the initial stock size and could be applied to all baleen whale stocks which were above a

protection level of 54% (IWC 1995). The RMP was hailed as a conservative and safe approach to harvest of a marine resource in a sustainable manner. For a short period the IWC seemed to have abandoned its old policies and shortcomings and to be rapidly evolving into an organization seriously concerned with the protection of whales and the orderly development of the whaling industry.

However, in 1987 Japan started 'scientific whaling' taking $300 \pm 10\%$ initially (and later $400 \pm 10\%$) minke whales in whaling areas III, IV, V, and VI of the Southern Ocean. Scientific whaling is legal under the rules of the IWC, having been initially introduced to allow killing of a limited number of whales from a protected species or populations in one or two seasons (Gambell 1999). Japan used this loophole to further their ongoing interest in commercial whaling.

Despite the fact that the development of the RMP and its adoption by the Commission in 1994 was a major step forward towards the protection and rational use of whales the RMP was to be embedded into a larger 'Revised Management Scheme' (RMS) incorporating *inter alia* a System of Inspection and Observation. The adoption of an RMS was considered by many members of the IWC as a prerequisite to re-starting commercial whaling. However, an RMS had yet to be developed.

Meanwhile, the 'pro' and 'anti-whaling' factions in the IWC became more and more polarized with the annual meetings of the Commission becoming battlefields of mostly procedural matters in the second half of the 1990s. Little progress was made towards the development of an RMS (e.g. IWC 1998, 1999). The pressure by certain member nations of the IWC increased to remove the moratorium for certain stocks of whales before the Comprehensive Assessment (CA) of Whale Stocks was completed. The completion of the CA, which was initially to be finalized by the Scientific Committee in the early 1990s, was further and further delayed and still awaits completion for most species after the annual meeting in 2006.

In 1999, Japan introduced a revision to its earlier draft of an observation and inspection scheme in order to finalize the text of the RMS quickly and so allow a resumption of whaling. At the same time, Japan failed to receive the necessary majority at the 2000 (COP11) CITES Meeting to de-list certain whale species and populations, removing their statutory protection so that commercial whaling could be quickly resumed.

By the start of the 21st century the political agendas had left the Commission almost in a deadlocked position with very little progress towards the completion of an RMS (IWC 2000, 2001, 2002, 2003). With competing proposals failing to get the necessary three-quarters majority vote at present the work of the RMS Working Group continues under new 'terms of reference' with little progress (IWC 2006).

The success of CCAMLR

CCAMLR grew out of the SCAR BIOMASS Program in the 1970s and the recognition that major exploitation of krill would be permanently damaging to the Antarctic ecosystems. Given the growing recognition to put multi-species and ecosystem considerations into the context of sustainable use of marine living resources (Holt & Talbot 1978) ecosystem management seemed possible as a basis for management decisions for the krill and fish stocks of the Southern Ocean.

CCAMLR began almost 35 years after the IWC was signed, in a different political and resource climate. When launched in 1980 CCAMLR reflected, in its Article II/3, the growing perception that fisheries should be managed in an ecosystem context. Article II/3 of the Convention thus tries to:

balance conservation with the needs for sustainable use,

provide protection for dependent and related species and aims to restore depleted populations and/or stocks to previous levels, and

avoid changes that are potentially irreversible within two or three decades (Croxall & Nicol 2004).

In contrast to the IWC, decision taking in CCAMLR is based on consensus, which slows down the rate of progress but encourages compromise.

CCAMLR came into force in 1982 when commercial fishing had already been underway for at least 13 years and almost 1 million tonnes of finfish had been removed from the Southern Ocean. Some fish stocks were heavily depleted and in need of protection (Kock *et al.* in press). In the first years, CCAMLR consisted of a minority of fishing nations and a majority of nations whose prime interest was conservation, in direct contrast to the establishment of the IWC.

Krill catches, even when they reached 400–500 000 tonnes in the 1980s, were small compared to the estimated biomass of 35.8 million tonnes in the Atlantic Ocean sector alone derived from the international FIBEX survey in 1980/81 (Trathan *et al.* 1995). However, since krill predators compete with the fishery, CCAMLR launched the CCAMLR Ecosystem Monitoring Program (CEMP) in the second half of the 1980s (SC-CAMLR 1985) to monitor potential indirect impacts of krill fishing on a number of dependent species, with fur seals and several penguin species among them, and assure itself that it was meeting its ecosystem management objectives.

Despite its ecosystem approach the initial paucity of data forced CCAMLR to follow the typical single-species approach of other fisheries conventions world wide for the first 8–10 years. Until the end of the 1980s, CCAMLR had not been particularly successful in regulating finfishing and

halting the decline of fish stocks. The first conservation measure to encapsulate the ecosystem approach was adopted in 1990 when all finfishing in CCAMLR Subareas 48.1 (South Shetland Islands and Antarctic Peninsula) and 48.2 (South Orkney Islands) was prohibited (CCAMLR 1990).

CCAMLR was able to improve its performance considerably in the next ten years by:

developing a model to estimate the level of safe krill harvest which was later extended to regulate toothfish fisheries

developing a 'catch certification scheme' to attempt to control illegal catch and trade of toothfish (illegal, unreported and unregulated fishing (IUU))

reducing bycatch of seabirds in longline fisheries in some areas, such as South Georgia, substantially

regulating the development of new and exploratory fisheries (Constable *et al.* 2000, Miller *et al.* 2004, Anon 2005, Kock *et al.* in press)

The future of the two conventions

The IWC is continuously failing to meet its objectives of the conservation of whale stocks and an orderly development of the whaling industry because of the opposing political and emotional agendas that dominate the IWC. In principle, it should be possible to conduct commercial whaling of a number of minke whale stocks both in the northern and the southern hemisphere using the RMP. However, given the public opinion in the western hemisphere is largely opposed to whaling and the poor past record of some IWC members in sticking to quotas set it is unlikely that commercial whaling will recommence under the auspices of the IWC before a fully fledged RMS system is in place.

Even after ten years of work the Commission of the IWC has not been able to complete the RMS. The rather general nature of the present Terms of Reference for the RMS Group makes it questionable that major issues preventing the RMS from completion will be resolved in the near future. In 2005, Japan increased the catch quota from 400 to 850 ($\pm 10\%$) minke whales, 50 fin whales and 50 humpback whales in Areas III, IV, V, and VI although no comprehensive assessment was completed for humpback and fin whales. There was no scientific evidence (with the exception of a disputed working document presenting the results from Japanese sighting surveys) that any of the populations of humpback whales had increased to more than 54% of their initial size.

It is difficult to predict what the fate of the IWC will be if the RMS will not be completed soon. Japan is likely to increase 'catches under special scientific permit' in order to undermine the IWC management of whale stocks, and the increasing number of new adherents to IWC who support

the Japanese efforts and act in receipt of Japanese aid underlines the political nature of the activities. The importance of the IWC as the body for regulating whaling worldwide is likely to decline. Regional bodies, such as the 'Agreement on the Conservation of Small Cetaceans in the Baltic and the North Sea' (ASCOBANS) under CMS, may extend their remit to large cetaceans and the 'North Atlantic Marine Mammals Commission' (NAMMCO) may gain more importance in regulating the exploitation of whales, especially as the use of regional bodies to oversee whaling activities of coastal states is not without precedent (Gulland 1999).

One of the major differences between the IWC and CCAMLR is that the Scientific Committee of CCAMLR had a strong position in the Commission right from its establishment, with scientific findings strongly influencing the decisions of the Commission. CCAMLR has made major progress in understanding both the interactions between krill and some of its main predators, and the changes which have taken place in the Southern Ocean food web since the start of the CCAMLR Ecosystem Monitoring Program in 1985. The Scientific Committee of CCAMLR makes considerable efforts to develop modelling of whole ecosystems in order to underpin future management decisions. Climate change and its possible impact on marine biota in the Southern Ocean, particularly in its northern parts, are further issues of recent concern to CCAMLR. Various changes in ecosystem functioning in the Southern Ocean have occurred over the last decades: krill biomass around South Georgia appears to have declined over the last two decades (Reid & Croxall 2001, Reid *et al.* 2005); the decline of mackerel icefish in the peripheral parts of the Southern Ocean cannot be explained by the effects of fishing alone; ENSO and a general warming trend may have affected the peripheral parts of the Southern Ocean more than was thought (Kock & Everson 2003). Bio-prospecting with respect to krill and its potential to serve as a basis, for example for pharmaceuticals, is another challenge CCAMLR may soon face.

Other important issues for the future are:

Anti-IUU capacity and initiatives, inspection and surveillance capabilities, High Seas enforcement capabilities and work in closer collaboration with other Regional Fisheries Management Organizations, closer links to other elements of the Antarctic Treaty System (e.g. SCAR, CEP), effort limitation and catch allocation in fisheries, and the maintenance and possible broadening of the ecosystem approach, (e.g. CCAMLR 2005, Kock *et al.* in press). CCAMLR also needs to consider ways to achieve broader conservation objectives for the Southern Ocean including:

the establishment of marine protected areas

the call from the UN to take action on destructive fishing practices, and

the link between CEMP monitoring and the decision making process.

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