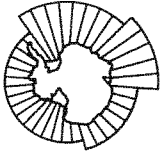


CCAMLR's Management of the Antarctic



Commission for the Conservation
of Antarctic Marine Living Resources



Commission for the Conservation of Antarctic
Marine Living Resources (CCAMLR)

CCAMLR's Management of the Antarctic

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Preface

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) is recognised as a pioneer in the development of the 'ecosystem approach' to the management of marine living resources. Management using an ecosystem approach does not concentrate solely on species fished, but also attempts to avert situations where fisheries have a significant negative impact on 'dependent and related species'. CCAMLR strives to develop management approaches which incorporate assessments of the ecosystem and its dynamics. In applying this ecosystem approach, CCAMLR has had to deal with the difficulty of describing the full complexity of marine ecosystems by focusing on key Antarctic marine species which are known to be most important in the food chain.

CCAMLR's Management of the Antarctic presents a clear and concise description of CCAMLR's diverse and complex work regarding the management of Antarctic marine living resources. It is based on *Understanding CCAMLR's Approach to Management* which was published on CCAMLR's website at <www.ccamlr.org> in 2000. Written by several prominent scientists, this latter work was edited by Dr Karl-Hermann Kock (Germany, Chair of the CCAMLR Scientific Committee 1993–1996), and details the development and application of a precautionary and ecosystem approach to the management of Antarctic marine living resources. It is recommended for further reading.

The initial draft of *CCAMLR's Management of the Antarctic* was prepared by Ms Vivienne Mawson, the scientific editor appointed by the Editorial Committee, and was finalised by Dr Denzil Miller (South Africa, CCAMLR Scientific Committee Chair 1997–2000). The cover photograph and design were provided by the Multimedia Unit at the Australian Antarctic Division.

CCAMLR's Management of the Antarctic has been produced in the official languages of CCAMLR: English, French, Russian and Spanish. It has been widely distributed to all CCAMLR Members and to many international fisheries organisations. Copies are available on request from the CCAMLR Secretariat.

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Introduction

Few humans permanently inhabit the land masses of the Southern Ocean*, and all too often their brief visits have severely impacted the animals which depend on the ocean for their survival. Since the 18th century, when humans began hunting in the Southern Ocean, many species have nearly been exterminated by commercial exploitation. A number of others have been reduced to low levels, while uncontrolled exploitation is making inroads into the remainder.

Fur seals were the first hunted and when these became scarce, elephant seals were harvested for their oil. Other seals were taken, though in smaller numbers, for dog food or by sealers searching for new stocks to exploit.

Shore-based commercial whaling began at South Georgia in 1904. With the arrival of factory vessels in the 1920s, whaling ships moved into deeper water offshore to exploit fin and other whale species found there. More than 1.5 million animals were killed by the time the League of Nations took the first steps to protect whales in the 1930s. The International Whaling Commission (IWC) was established in 1946 to regulate whaling and the exploitation of the major whale species was gradually banned in turn. The last commercial whaling season was in 1986/87, and in 1994 the IWC declared much of the Southern Ocean a whale sanctuary.

Even birds were not exempt from being hunted. In the 20th century, large numbers of penguins were killed for oil, food and fuel. The eggs of these and other bird species were also harvested.

* For the purposes of this review, the Southern Ocean is taken to be the area of application (i.e. south of about 50°S) of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).

Large-scale commercial exploitation of fish did not commence until the 1970s and soon expanded rapidly. Trawlers first targeted nototheniids, lanternfish and icefish for human consumption and fish meal. Longliners arrived in the mid-1980s to catch Patagonian toothfish (*Dissostichus eleginoides*) and, inadvertently, albatrosses and petrels drowned when trying to take bait from longline hooks. By mid-1997, some 3.2 million tonnes of finfish had been taken from the Southern Ocean.

Fishing exhibited a similar pattern to that of sealing and whaling – discovery, full-scale exploitation and rapid depletion of stocks, followed by a switch to other stocks or species. By the end of the 1980s, CCAMLR had prohibited fishing for most finfish species or had imposed strict catch limits (see below). However, high levels of illegal, unregulated and unreported (IUU) fishing for Patagonian toothfish have caused considerable international concern in recent years.

Fishing for krill (*Euphausia superba*) began in the early 1970s amidst much concern that this would impact negatively on the entire Antarctic marine ecosystem. The cause for such concern rested with krill's role as the main food item of many Antarctic whale, seal, bird and fish species (see diagram). Krill also contribute to making the seasonal pack-ice zone the most productive in Antarctica. Krill catches peaked at more than 500 000 tonnes in 1981/82 with the bulk of the catch being processed for animal feed. Krill are now largely used for aquaculture feed, bait and human consumption. After the large Soviet fleet ceased fishing in the early 1990s, the krill catch dropped dramatically. Nevertheless, an estimated 5.74 million tonnes have been taken to date. The current krill catch is slightly in excess of 100 000 tonnes per year.

A small exploratory fishery for stone crabs (*Lithodes murrayi*) was initiated in 1992/93, but this did not prove to be economically viable.

Large squid fisheries are located just north of the CCAMLR boundary. One of the target species, *Martialia hyadesi*, is also found within the CCAMLR Convention Area. The current CCAMLR catch limit for squid is 2 500 tonnes per year.

Establishment of CCAMLR

The historic pattern of Antarctic marine living resources exploitation – pulses of intensive fishing of a species, followed by its depletion and then a switch to other species – fuelled concerns on the harvesting of krill as far back as the mid-1970s. The overriding fear was that not only would recently protected whale populations fail to recover, but that other species dependent on the krill food chain would be affected by its harvesting.

Taking account of these concerns, the 1977 Antarctic Treaty Consultative Meeting commenced a series of international negotiations which resulted in the Convention on the Conservation of Antarctic Living Marine Resources (CCAMLR) being signed in 1980. The Convention entered into force in 1982 and its Secretariat is located in Hobart (Tasmania, Australia).

All Parties to CCAMLR are entitled to be Members of the Commission which oversees the implementation of the Convention. The Commission sets policy on, and regulates, activities associated with the rational utilisation and management of marine living resources in the Southern Ocean. It receives advice from its Scientific Committee (SC-CAMLR), which in turn bases this on assessments undertaken by its Working Group on Ecosystem Monitoring and Management (WG-EMM) and the Working Group on Fish Stock Assessment (WG-FSA).

The Commission currently has 24 Members. In common with other international agreements it does not impose regulations, but rather negotiates to reach agreement on issues which the Members are then obligated to implement and enforce. Until recently, all nations fishing in the Convention Area have been either Members or have acceded to the Convention (i.e. have accepted its tenets). However, non-Members have recently entered the toothfish (*Dissostichus* spp.) fishery and this has compounded CCAMLR's efforts to combat IUU fishing in the Convention Area. As a consequence, IUU fishing is now seen as one of the major challenges facing CCAMLR.

CCAMLR's mandate

Apart from seals south of 60°S and whales (which are covered by the Convention for the Conservation of Antarctic Seals and the International Convention for the Regulation of Whaling respectively), CCAMLR applies to all marine living resources between the Antarctic continent in the south and the Antarctic Polar Front in the north (at about 50°S) (see map). The Polar Front is the zone where colder, fresher waters flowing north from the Antarctic meet the warmer, saltier waters flowing south from the Atlantic, Indian and Pacific Oceans.

CCAMLR has a mandate to conserve and manage mainly high-seas areas. This mandate is carried out within the unique legal conditions attached to rights in such areas. It is also subject to the Antarctic Treaty's unique understandings on territorial sovereignty south of 60°S as well as in deference to the undisputed control exercised by certain countries over various sub-Antarctic islands and their adjacent waters.

CCAMLR cooperates with three other agreements concerned with environmental conservation and resource management in the Antarctic – particularly, Annex II to the Protocol on Environmental Protection to the Antarctic Treaty 'Conservation of Antarctic Fauna and Flora', the Convention on the Conservation of Antarctic Seals, and the International Convention for the Regulation of Whaling (which is not part of the Antarctic Treaty System and is not restricted to the Southern Ocean) (www.npolar.no/cep/cephome.htm). In addition, as many marine animals (including birds) cross the northern boundary of the Convention Area, the CCAMLR Commission cooperates with other organisations and national institutions responsible for the management and conservation of areas adjacent to the CCAMLR boundaries.

CCAMLR is concerned not only with fisheries regulation, it also strives to implement a holistic, or 'ecosystem approach' to the management of marine living resources in the Southern Ocean. Such an approach views the entire Southern Ocean as a suite of interlinked ecological systems and it is what distinguishes CCAMLR from other multilateral fisheries conventions.

CCAMLR's ecosystem approach

CCAMLR's approach to the conservation of Antarctic marine living resources is defined by Article II of the Convention:

1. The objective of this Convention is the conservation of Antarctic marine living resources.
2. For the purposes of this Convention, the term 'conservation' includes rational use.
3. Any harvesting and associated activities in the area to which this Convention applies shall be conducted in accordance with the provisions of this Convention and with the following principles of conservation:
 - (a) prevention of decrease in the size of any harvested population to levels below those which ensure its stable recruitment. For this purpose its size should not be allowed to fall below a level close to that which ensures the greatest net annual increment;
 - (b) maintenance of the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources and the restoration of depleted populations to the levels defined in sub-paragraph (a) above; and
 - (c) prevention of change(s) or minimisation of the risk of change(s) in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impact of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with the aim of making possible the sustained conservation of Antarctic marine living resources.

From these principles, two central concepts have evolved in the way in which CCAMLR has approached its management responsibilities, namely:

- (i) Management strives to follow a 'precautionary' approach. This means that CCAMLR collects the data it can, then weighs up the extent and effect of the uncertainties and gaps in such data before making a management decision. The approach aims to minimise the risk of long-term adverse effects rather than delaying decisions until all necessary data are available.
- (ii) Management also follows an 'ecosystem' approach. Ideally, this takes into account all the delicate and complex relationships between organisms (of all sizes) and physical processes (such as currents, sea temperature) that constitute the Antarctic marine ecosystem. Obviously, this is a difficult task which is compounded by the Southern Ocean's size – approximately 35 million square kilometres.

Given the inherent complexities of the ecosystem approach, it is not surprising that fisheries managers and multilateral fisheries conventions have largely ignored ecosystem concerns and have tended to concentrate instead on regulating those species being targeted by specific fisheries.

CCAMLR's ecosystem approach not only focuses on regulating fishing for certain species, it also aims to ensure that fishing does not adversely impact other species that are related to, or dependent on, the target species. For example, while krill harvesting is regulated and monitored directly, CCAMLR also endeavours to monitor the potential effect which harvesting may exert on species that either eat krill or which in turn are eaten by krill predators. CCAMLR therefore seeks to preserve the 'health' of the ecosystem by setting conservative (i.e. precautionary) krill catch limits to take account of the needs of associated species in a manner which preserves the ecological sustainability of all the species concerned.

A spinoff from CCAMLR's pioneering work on the precautionary and ecosystem approaches is now being seen as setting the standards for fisheries agencies around the world.

How CCAMLR collects its data

The data used by CCAMLR's scientific working groups are collected by:

- Members fishing in the Convention Area;
- scientific observers on Members' vessels (who collect data on the fishing operations and the catch, report on compliance and advise operators and owners); and
- scientific surveys carried out by Members' research vessels.

Since 1987, most fisheries data collection protocols and methods have been standardised to ensure that data from all sources are compatible.

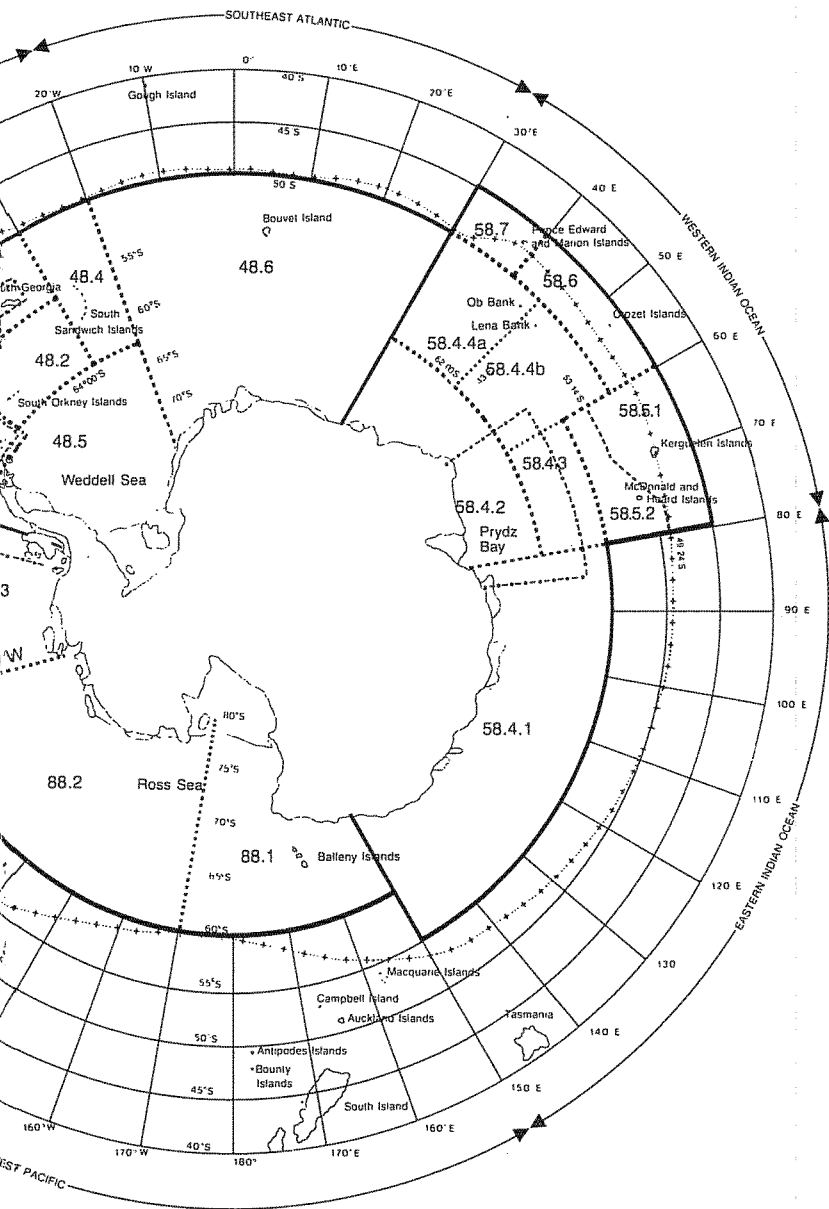
Collection of data on target species

Fisheries catch and effort data

These data are collected by CCAMLR Members and link the size of the catches to how often, and for how long, a vessel fishes (i.e. the fishing 'effort'). Such data also indicate where the vessel was fishing. The Convention Area is divided into statistical units which are thought to be biologically or environmentally distinct, and therefore to contain relatively discrete stocks of certain species. However, some species straddle the boundaries of these units. This is particularly true for krill, Patagonian toothfish, lanternfish and squid. Therefore, to fully understand the dynamics of these species, data are required from across statistical or biological boundaries, including from areas adjacent to the Convention Area.

Harvested species abundance

Fish, krill and squid abundances are estimated by Members' research vessels independently of any fishery and often by collaborative programs involving more than one Member. Two types of surveys are predominantly undertaken:



- 'Acoustic surveys' cover quite large areas. High-frequency sound is transmitted vertically into the water column and then reflected back to the ship by any objects it intercepts (the 'target'). The pattern of reflection varies with a shoal of fish reflecting differently to a swarm of krill, for example. The reflected sound is processed electronically making it possible to identify the target species and estimate its density. The latter is then scaled by area to estimate overall abundance of the species concerned.
- 'Trawl surveys' use either trawl or plankton nets to standardise what is caught by some set towing distance or time. Trawl nets tend to catch bigger animals which are part of the breeding stock. On the other hand, plankton nets tend to catch juvenile and smaller animals. After repeated survey tracks, which are usually followed in some random order, the abundances of targeted species are estimated and scaled over the entire area of interest.

Biological information

Such information relates mainly to the growth, reproduction and natural mortality of the species being harvested. It is collected on board commercial fishing vessels by their crews and by national or international observers. It is also collected by research vessels.

- Data on the age composition of harvested animals, and how fast they grow, provides key information for fisheries managers to estimate the effects of fishing on a species and/or its potential yield. In fish, age is calculated from measuring an animal and then determining the number of growth rings on its scales or otoliths (earbones). Such rings are laid down regularly throughout life, though not necessarily annually. With enough measurements, it is possible to link the age of animals in the catch with their length composition. The problem for krill is slightly different as they do not have growth rings. However, since krill born in the same year or season (cohorts) tend to grow at similar rates, cohort age is then usually determined from the length

composition of the krill in the catch. It may also be determined from other indices such as eyeball size or the chemical composition of the exoskeleton.

- Knowing the age at which an animal breeds, and also when and where it breeds, means that fishing can be regulated by ensuring that animals breed at least once before being caught so as to avoid compromising the stock's potential/reproductive yield. The reproductive state of animals in a fishery's catch, along with plankton catches, provides information on the spawning times and locations.
- Natural mortality (M)[†] is notoriously difficult to estimate in any species which is also subjected to fishing-induced mortality (F). For example, if the number of animals of a certain length decrease in any one year, it is difficult to determine the exact causes which can be naturally or fishery induced. Fisheries scientists employ a variety of estimation methods to address such problems and the resultant estimates can vary widely.

From the above, it should be obvious that considerable uncertainties surround estimates of the key biological parameters used to assess stock yield. While these cannot be ignored, CCAMLR has developed models (see below) which attempt to take such uncertainties into account in the formulation of risk-averse management action. Indeed, trying to account for potential uncertainties through conservative management action is a key feature of CCAMLR's attempts to apply the 'precautionary approach'.

Collection of data on dependent species

An integral part of CCAMLR's ecosystem approach endeavours to monitor selected species that depend on, or are related to, commercial target species and fisheries. The CCAMLR Ecosystem Monitoring Program (CEMP) aims

[†] Natural mortality (M) is a function of age and is the rate at which animals die off during the course of their lifetime. It tends to decrease during the early stages of life and to increase after middle age.

to detect and record significant changes in selected stocks of these species to distinguish between changes arising directly from harvesting from those which occur naturally as a result of physical or biological variability in the environment.

The species being monitored have been selected from:

- key prey species – these exhibit some potential for harvesting and currently include krill (*E. superba* and *E. crystallophias*), Antarctic silverfish (*Pleuragramma antarcticum*) and early life-stages of fish; and
- important predator species – these feed mainly on key prey species (at this stage particularly krill), have a wide geographical distribution, and occupy an important position in the ecosystem. They currently include Antarctic fur and crabeater seals as well as Adélie, chinstrap, gentoo and macaroni penguins, Antarctic and cape petrels, and black-browed albatross.

CEMP monitoring sites have been chosen to try to distinguish between broad-scale and local-scale changes, and to contrast differences between fished and non-fished areas.

The biological parameters being measured in CEMP species are broadly similar to those for species targeted by the fishery. However, the types of data vary for the species being monitored as an index of their dependence on the species targeted by the fishery (e.g. the duration of birds' foraging/feeding trips and the weight of birds arriving to breed etc., give some indication of how effective a population has been in its feeding on krill).

The environmental parameters monitored by CEMP include sea-ice and hydrographic conditions.

Models for stock assessment and management

In many of the deterministic models widely used by fisheries agencies for stock assessment and management, it is difficult to take explicit account of the inherent uncertainties attached to key biological parameters. The

models developed by CCAMLR attempt to incorporate some of the key effects of uncertainty into the analyses of various biological parameters and into the subsequent management advice being provided. To date, CCAMLR has taken a global lead in developing models of this kind to cope with specific uncertainties in stock assessments of both target and dependent species. Some examples include:

- (i) In its first 8 to 10 years, CCAMLR adopted a single (i.e. fishery-targeted) species approach to managing fisheries. This was consistent with many of the conventional approaches to stock management of the time, even though these had many recognised weaknesses. CCAMLR's efforts to manage multispecies fisheries and its pursuance of the ecosystem approach created a need for more realistic and complex models.
- (ii) By 1994, CCAMLR had developed a 'Krill Yield Model' (KYM) to focus better its development of precautionary catch limits for the krill fishery. The KYM was developed in a manner which aimed to:
 - (a) improve the meeting of the Convention's objectives,
 - (b) take more explicit account of uncertainty surrounding estimates of krill potential yield, and
 - (c) applied clear, pre-agreed decisions rules to guide management decisions.An important output parameter of the KYM is g , which is intended to take into account variability in the life history characteristics (such as growth and mortality) of different krill stocks. This factor is then used in conjunction with a biomass estimate (B_0) to obtain a precautionary catch limit consistent with pre-agreed decision rules. Such rules seek to maintain the spawning success of the stock concerned as well as its potential to meet predator food needs. The factor g is estimated in two stages and is currently fixed at 0.11. The output of the KYM will be refined as new data reduce the uncertainties associated with the estimation parameters. An important initiative in this regard aims to update the available estimates of B_0 , especially in the west Atlantic.

- (iii) The 'General Yield Model' (GYM) follows a similar approach to the KYM and has been predominantly developed for finfish fisheries. Estimates of either current or pre-exploitation biomass, together with estimates of their uncertainties, are used. Recruitment fluctuations and uncertainty in biological parameters are also taken into account. The GYM enables CCAMLR to predict the effects of different levels of catch, even in the absence of direct estimates of abundance for entire stock(s). Precautionary catch limits can then be calculated.
- (iv) The 'Foraging–Fishery Model' (FFM) attempts to formalise the description of functional relationships between krill and its predators. Since areas of highest krill-fishing activity are often close to the breeding locations of krill-eating birds and seals, broad areal estimates of krill biomass do not necessarily indicate the availability of krill to predators near the latter's breeding colonies. Consequently, CCAMLR is developing the FFM to assess interactions, as well as the potential overlap (in both space and time) between the fishery and predators foraging for krill.

The multispecies models which CCAMLR is developing have no precedent. While in their simplified form the models do not require assessment of a large number of parameter values; the need to derive an estimate of the attached levels of uncertainty complicates their application considerably. Along with a growing database, such models have contributed greatly to CCAMLR's development of a strategic and practical approach to describing the potential interactions between fisheries, harvested species and other dependent species.

Management decision rules

Management options are identified from the various model outputs. These are objectively selected to obtain catch limit(s) most congruent with the objectives of Article II of the Convention. As we have seen through application of the KYM, decision rules facilitate the taking of decisions in the setting, removing or varying of management measures taking into

account assessments of harvested resource status, as well as the uncertainties attached thereto. Following the KYM, CCAMLR has also developed decision rules for the Patagonian toothfish fishery. It has also initiated strategic modelling aimed at setting scientific priorities in addition to developing and evaluating management options.

CCAMLR's ecosystem approach in practice

Impact of Fishing

CCAMLR has tackled a number of substantial problems relating to the direct effects of fishing on various components of the Antarctic marine ecosystem.

Incidental seabird mortality in longline fisheries (IMALF)

Longliners fishing for Patagonian toothfish set some 5 000 to 15 000 baited hooks during each set. These act as deadly lures for albatrosses and white-chinned petrels with thousands of birds being drowned when they are hooked and/or entangled trying to take the bait.

In 1989, CCAMLR took its first steps to minimise this 'incidental mortality'. Vessels deploying longlines in the Convention Area now use various methods to reduce this catch. For example, longlines are set at night, offal is not thrown overboard during setting and streamer lines (or 'scare' devices) are deployed to minimise potentially damaging interactions between foraging seabirds and longlines. The opening of the toothfish season has also been moved to a time when fewer birds are likely to be in the Convention Area or proximal to fishing vessels. As one of their designated functions, scientific observers serving on board all Members' longline vessels in the Convention Area monitor and record any deaths of seabirds during longlining. A notable success has been the observation that night-time setting alone has reduced albatross deaths by about 80% over the past three years. Despite these successes, CCAMLR estimates that in excess of 100 000 birds may have been caught by illegal and unregulated

vessels fishing in the Convention Area between 1997 and 1999. In addition, many Antarctic seabirds are taken by longliners operating outside the Convention Area.

CCAMLR has publicised the IMALF tragedy widely. At its urging, other agencies (including the Food and Agricultural Organisation of the United Nations), fisheries commissions and organisations have taken similar steps to protect Antarctic seabirds feeding and/or wintering in areas outside the Convention Area. The problem of IUU fishing impacts on seabird populations of interest to CCAMLR has yet to be resolved despite positive efforts to bring such fishing under control.

Effects of trawling

Up to the end of the 1980s, most vessels fishing for finfish in the Convention Area were trawlers. Heavy trawling gear is known to scrape and plough up the seabed which not only stirs up the sediments but also destroys animals living on the sea floor. Although such impacts on the fragile and slow growing communities of the Southern Ocean have not been assessed, they are likely to be significant locally and long lasting.

Coupled with these concerns, and in order to protect key portions of the stocks concerned, CCAMLR has banned bottom trawling for mackerel icefish (*Champsocephalus gunnari*) around South Georgia as well as for a number of demersal fish that are taken only by bottom trawling.

Entanglement in marine debris

In 1990, CCAMLR's Scientific Committee reported that fishing net fragments and plastic packaging bands were impacting on Antarctic fur seal populations at South Georgia. CCAMLR promptly intensified its campaign to promote compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and disseminated substantial information on the potential ecological damage likely to be associated with marine debris in the Convention Area

(www.imo.org). A key facet of this initiative was to improve awareness of the issue amongst vessel operators. It was also recommended that if fishers had to jettison debris, care should be taken to eliminate plastic waste and to ensure that the potential for any impact by the debris associated with fishing is minimised (e.g. by ensuring that any plastic packaging material capable of forming loops is cut). Although CCAMLR continues to monitor the overall levels of marine debris in the Southern Ocean, these are still too high. It is also doubtful whether vessels engaged in IUU fishing comply fully with either MARPOL or CCAMLR requirements. CCAMLR Members report annually on both the incidence of marine debris encountered in the Convention Area and their impact, including entanglements, on marine mammals and seabirds.

Impact of fishing on non-target species

Bottom trawling

Bottom trawls do not discriminate between target and non-target species, catching whatever the trawl encounters. Therefore, the abundances of species NOT targeted by a fishery (i.e. the 'by-catch') are likely to be affected. In the mid-1980s, for example, several by-catch fish species in the trawl fisheries around South Georgia and the South Orkney Islands were unintentionally overfished.

CCAMLR's management approach requires it to take account of the effects of fishing on non-target species. In many cases, this has meant that total allowable catches (TAC) for target species are linked to allowable by-catch. A fishery may thus be closed when it reaches the TAC level for the by-catch of a particular species, even if the TAC for the target species has not been reached.

CCAMLR has directly prohibited fishing when the risk to by-catch species is thought to be too great, as was the case with the mackerel icefish fishery around the South Orkney Islands. Fishing for this particular species has been confined to the use of midwater trawls only, as the potential for by-catch is lower.

Midwater trawling for krill

Midwater trawling for krill does not distinguish between species and in addition to krill, the fine-mesh nets being used catch fish larvae and juveniles. To ascertain whether such catches exhibit any potential to affect the fish stocks concerned, scientific observers on board krill trawlers now collect data on by-catch. Initial results suggest that there are large spatial and seasonal differences in the occurrence of juvenile fish in the krill catch which make it difficult to objectively assess the extent of the problem. CCAMLR Members are now intensifying their collection of information so that CCAMLR can be in a better position to assess more precisely where/when fish are most vulnerable to by-catch by the krill fishery and to identify an appropriate course of action.

Impact of fisheries on target species

New and exploratory fisheries

In an ideal world, fisheries managers should collect all the information required to develop the sustainable and scientifically defensible management of a new stock before commercial fishing is allowed. Comparisons can then be made of the status of the stock before and after fishing begins, with management action being adjusted accordingly on the basis of some desired status for the exploited stock. In the real world, new fisheries are often exploited – even overexploited – well before the necessary information is available or even collected. CCAMLR's precautionary approach attempts to balance these two realities in a way which strives to minimise the risks of irreversible changes in the status of targeted stock.

CCAMLR recognises that fisheries need to be managed from the time they start and has thereby developed conservation measures to be followed before any new fishery commences. In CCAMLR terms, a 'new' fishery is one for a species and/or on a ground that has not previously been fished. It is also an established fishery where there is an intention to use a new fishing technique. There is a requirement at the 'new' fishery stage to collect information on the target as well as dependent species, and the

catch or effort (or both) may be limited. In CCAMLR parlance, a new fishery lasts for one year unless no catch is taken at which time it retains its classification.

In the second year, the fishery becomes an 'exploratory' fishery. Both CCAMLR's conservative approach and data collection requirements continue to allow for a full assessment of the fishery and stock(s) to be developed. A data collection plan must be followed and a research and fishery operation plan produced. All such plans are reviewed each year by the Scientific Committee. The crab and squid fisheries around South Georgia are being managed in this way.

Most recently, CCAMLR has instituted a requirement that exploratory toothfish fisheries follow clearly defined experimental fishing plans. This approach strives to maximise the data collection potential of fishing vessels while ensuring that unacceptable damage is not inflicted on stocks for which key management data are missing. Therefore fishing vessels are required to undertake some research on stock distribution and abundance as part of their development of either new or exploratory fisheries. This requirement applies to both toothfish and crabs.

Similar regulatory criteria are being developed for reopening fisheries that have lapsed or been closed.

Illegal, unregulated and unreported fishing

As already indicated, the problem of IUU fishing on toothfish is continuing to vex CCAMLR's application of the 'precautionary approach'. The reason for this is that IUU fishing has resulted in substantial toothfish catches and these are well above the best scientific estimates of the aggregate global limit for the species in the Convention Area, particularly in the Indian Ocean. Furthermore, the continued lack of information from IUU fisheries severely complicates CCAMLR's efforts to determine future toothfish stock trends in certain areas. Together, these factors contribute to uncertainty surrounding the status of such stocks and also indicate that their future sustainability is likely to be compromised.

CCAMLR has responded to the management challenge posed by IUU fishing by developing an integrated policy of conservation measures. This serves to increase the gathering of essential data and improve compliance with catch limits. Relevant measures include improved data- recording procedures, the promotion of closer cooperation between CCAMLR Parties and non-Parties, the need for Flag States to authorise their vessels to fish in the Convention Area and a process to monitor the international toothfish trade (see below).

Conclusion

CCAMLR's management of the marine resources and systems for which it is responsible has had to be innovative and dynamic. It has had to take account of high levels of uncertainty in a way which strives to ensure that the Convention's objectives are met in a manner which is practical and achievable. The recently agreed Catch Documentation Scheme (CDS) for toothfish illustrates the latter well. This scheme aims to: (i) monitor the international toothfish trade (ii) identify the origins of toothfish imports or exports, (iii) determine whether toothfish catches have been made in accordance with CCAMLR conservation measures, and (iv) gather catch data for the scientific evaluation of toothfish stocks.

The toothfish CDS has added a new dimension to CCAMLR's precautionary approach as it forces fishers to become accountable for their actions through having to justify their rights to fish in a manner consistent with responsible management of the resource concerned. In an age of increasing globalisation, CCAMLR stands to be judged well as an organisation which promotes responsible fishing and which serves to preserve the fragile ecological balances characteristic of the Southern Ocean.



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