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International implementation of the ecosystem approach to achieve the conservation of Antarctic marine living resources

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this phase was to interpret the ecosystem objectives of the Convention in population and ecosystem

THE CCAMLR CONVENTION

The Convention on the Conservation of Antarctic Marine Living Resources (1980)² (hereafter referred to as the Convention) applies to the area south of the Antarctic Polar Front (formerly known as the Antarctic Convergence). Within this zone, CCAMLR endeavours to enable rational use of marine species, excluding whales and seals, while ensuring principles of conservation are maintained. These principles aim to ensure the maintenance of stable recruitment in target species, the maintenance of the ecology of the system, particularly in relation to predators of those target species, and that the ecosystem effects of fishing must be reversible over a fixed period. These principles are contained in paragraph 3 of Article II of the Convention, such that:

- 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 shall not be allowed to fall below a level close to that which ensures the greatest net

these measures when they become Parties to the Convention. Non-binding but agreed principles are often embodied in resolutions. Decisions are made by consensus.

CCAMLR now comprises 24 members and 9 parties; a member is a Party that is active in harvesting or research, contributes financially to CCAMLR and has voting rights. CCAMLR receives advice from a Scientific Committee (SC-CAMLR) and a Standing Committees on Implementation and Compliance, and Administration and Finance. A Working Group on Developing Approaches to Conservation (1987-1990) began the task of interpreting the Convention's objectives and providing mechanisms for making ecosystem-oriented decisions rather than concentrating on individual species. Working groups of the Scientific Committee include Fish Stock Assessment (WG-FSA), Ecosystem Monitoring and Management (formerly the Working Groups on Krill and on the CCAMLR Ecosystem Monitoring Program) and Incidental Mortality Arising from Fishing (currently part of WG-FSA).

THE EARLY YEARS: REACTIVE MANAGEMENT

In the first instance, CCAMLR only reacted to the need for conservation measures once there was demonstrable proof, i.e. consensus in the Scientific Committee, that those measures were needed. This approach was recognised to fail in the late 1980s-early 1990s following difficulties in curbing fishing activities until stocks were obviously depleted.

During this period, the management of finfisheries relied on then existing standard methods for stock assessment and yield predictions based on the principles of the time regarding maximum sustainable yield. Most attention was given to the status of marbled rockcod around South Georgia.

Committee?' Uncertainties arose from natural variation in stock abundance and large statistical errors in stock assessment, uncertainty in estimates of model parameters, incomplete historical catch records and imprecise submission of recent data.

Over the last decade, there have been a number of investigations into explicit objectives for predators of krill, largely determined by the amount of krill needed to be left to sustain the productivity of predators in the long term. The SC-CAMLR has identified that productivity of predators needs to be considered over the life time of the predators as the dependence of predators on krill may vary from one year to the next as well as between locations in the Southern Ocean.

SC-CAMLR is currently in the process of specifying objectives for the krill fishery in small-scale management units in the southwest Atlantic. In originally establishing the precautionary catch limit for krill, CCAMLR agreed to the smaller scale subdivision of Area 48 to accommodate the specific needs of krill predators. This recognised that land-based predator colonies, or other populations of krill predators dependent on small-scale areas of krill, might be impacted if the entire catch for Area 48 was taken out of a single small area. In 2002, CCAMLR agreed to a system of small-scale management units that would provide an ecological foundation for such a subdivision, thereby

This approach shows the utility of simulation methods for undertaking assessments and for evaluating whether harvest strategies, in this case catch limits for krill, are likely to meet the objectives of the Convention.

INCORPORATING MONITORING AND FEEDBACKS INTO MANAGEMENT DECISIONS

CCAMLR has adopted a number of strategies for acquiring the data and information necessary for conserving the Antarctic marine ecosystem. In terms of targetted species, CCAMLR routinely receives fishery-independent survey and other research data from Members to assist with assessments of krill, toothfish and mackerel icefish. In addition, SC-CAMLR coordinated a multinational survey of krill stocks in the southwest Atlantic in 2000 to assist with setting catch limits for that region¹¹. Other research programs are undertaken through the fisheries activities themselves, as specified in conservation measures, including mark-recapture (tagging) programs and the collection of fisheries related data. In the case of the latter, these are coordinated and undertaken by the CCAMLR Observer Program, which has a 100% coverage of finfish fishing vessels. This program has been found to be essential in providing necessary data for assessments on target and by-catch species, including by-catch of seabirds and elasmobranchs (primarily skates and rays). The observer program remains to be applied to the krill fleet.

An important development early in CCAMLR was the establishment of the CCAMLR Ecosystem Monitoring Program (CEMP), which aims to monitor, using agreed methods, important land-based predators of krill in order to detect the effects of the krill fishery on the ecosystem ¹². Several parameters are monitored for each predator species. The temporal and geographic scales over which these parameters are expected to integrate changes in the status of the ecosystem varies from several weeks and local (reflecting the duration of foraging trips: chick diets and growth) to annual/semi-annual, and region-wide (the weight of birds arriving to breed, breeding success, population size). Aspects of sea-ice and hydrographic conditions are monitored because of their importance in governing the distribution, abundance, movements and recruitment of krill as well as the distribution, winter survival and timing and access to breeding colonies of its predators.

Field work and data acquisition are carried out voluntarily by member states. Data collected are submitted to the CCAMLR Secretariat, which generates summaries of trends in the monitored parameters, including the identification of anomalous years. Currently, there is no formal mechanism for including these data in a feedback management procedure for krill. The CEMP is

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¹¹ Trathan et al. (2001) The CCAMLR-2000 krill synoptic survey: a description of the rationale and design. CCAMLR Science 8:1-24

¹² Agnew, D. (1997). Review: the CCAMLR Ecosystem Monitoring Programme. Antarctic Science, 9: 235-242.

currently under review with the aim of refining and including its outputs in such a management procedure. One of the challenges facing CEMP is to have sufficient spatial coverage to monitor the impacts of fishing at relevant spatial scales and for predators feeding in areas where fishing may be concentrated¹³.

The SC-CAMLR has embarked on evaluating feedback management procedures for krill¹⁴. To do this, it is using ecosystem models in the evaluation framework¹⁵. This process will explore how the conservation of krill stocks and their predatore conserved under differing scenarios, given different approaches to field monitoring. In the first instance, these models are being used to provide advice on subdividing the krill catch limit for the southwest Atlantic¹⁶.

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management units. In addition, vessels are required to "move on" from areas where by-catch catch rates are higher than acceptable levels. This aims to avoid localised depletion of by-catch species. Catch limits and move-on rules are generally applied across all by-catch finfish species.

CONSERVATION

To date, CCAMLR has focussed its attention on managing fisheries within the Convention area. However, it has broadened its focus in recent years to consider the conservation of biodiversity within the Convention area. In 2005, the SC-CAMLR organised a workshop on marine protected areas and will hold a workshop on bioregionalisation probably in 2007 to further consider these issues²¹. A longer standing conservation issue has been an increasing recognition that successful conservation of seabirds requires coordinated management across a number of fora. As described above, CCAMLR has largely controlled the impacts of legitimate fishing operations on seabirds through eliminating fishing practices that are detrimental to seabird populations. However, Antarctic and Southern Ocean seabirds are still being killed at alarmingly high rates by IUU fishing operations within the CCAMLR area, which do not implement the CCAMLR mitigation and avoidance measures, and in fishing operations outside of the CCAMLR area. In order for these seabirds to be conserved, a coordinated effort across many jurisdictions will be required. CCAMLR has demonstrated a number of suitable methods for reducing and eliminating seabird by-catch. In the absence of other methods, it would be useful to have the CCAMLR methods adopted across the relevant jurisdictions.

COMPLIANCE AND ENFORCEMENT

From the late 1990s, CCAMLR has endeavoured to eliminate illegal, unreported and unregulated (IUU) fishing by elaborating and implementing a wide range of innovative compliance and enforcement measures, such as a catch documentation scheme for toothfish, a centralised vessel monitoring system, lists of vessels engaged in IUU fishing in the CCAMLR Area, and several Port and Flag State controls. Further work is needed to harness wider international support amongst non-Parties for such measures and to develop an internationally-capable enforcement capacity, including a robust boarding and inspection regime.

²¹ SC-CAMLR (2005) Report of the Twenty Fourth Meeting of the Scientific Committee. CCAMLR, Hobart.

¹²

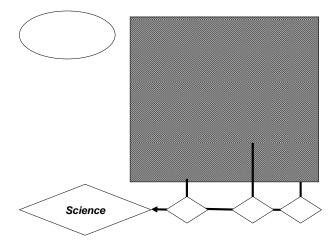
CCAMLR AS A MANAGEMENT SYSTEM

The developments described above have almost completed an internationally coordinated management system from data acquisition, assessments, harvest controls and compliance and enforcement (Figure 1). CCAMLR is continuing this work using expertise in international policy, law and diplomacy, science, technology, economics, compliance and enforcement (Figure 2).

Figure 1: Components of a marine management system, such as CCAMLR (this example is for fisheries but could be modified to reflect other activities).

Figure 2: Work required in CCAMLR to establish regulated fisheries in a complete management system.

Expertise required for the different elements in Figure 1 are indicated in the respective symbols. Italicised text represents areas that need attention within the CCAMLR framework (smaller text requires more attention). This includes consideration of economic issues governing investment and the maintained value of fisheries into the future, the need for improved forms of regulation, compliance and enforcement, including methods for managing activities outside the Convention area that impact on CCAMLR values (indicated by difference in shading of Status), and further scientific research to underpin ecosystem-based management procedures and the precautionary approach.



CONCLUDING