

The CCAMLR Ecosystem Approach to the Management of Marine Harvesting

by

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DECLARATION

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ABSTRACT

The conservation processes known collectively as the 'ecosystem approach' to the management of ocean harvesting were initiated by the Convention on the Conservation of Antarctic Marine Resources (CCAMLR).

The expectation of large-scale harvesting in the Southern Ocean of a major prey species, Antarctic krill, prompted the inclusion in the CCAMLR Convention of mechanisms to regulate harvesting such that the needs of species within the Southern Ocean ecosystem were taken into account as well as those of harvesters. Signed in 1980, it is often claimed that CCAMLR was the first conservation-centred convention. It has set a pattern for benign harvesting practices worldwide.

The CCAMLR model of fishery management is critically examined in this study in order to determine whether and in what ways it is useful in the living resource management of the Southern Ocean and possibly in other regimes in the world. The question of whether it has been successful or not is a complex one that cannot be answered simply by 'yes' or 'no'. The question is therefore divided into several sub-questions, which are addressed in eight chapters.

Legal, political and biological aspects of marine harvesting in the Southern Ocean are identified. Pre-existing international law relating to the Southern Ocean is examined to ascertain attitudes to conservation of species and ecosystems. It is argued that attitudes of the Antarctic Treaty parties towards the conservation of the Antarctic regions and their biota facilitated the development of ecosystem paradigms and enabled them to conclude a convention.

The three central chapters of the thesis analyse the implementation of the ecosystem standard. This was a slow and difficult process, beset as it was with lack of information, political dissent between parties within the Antarctic Treaty and pressures from outside. Work was undertaken to enhance the knowledge of Southern Ocean ecosystems to lend validity to advice used in making decisions on harvesting levels. It was difficult to keep pace with concurrent changes in harvesting patterns. Nonetheless, progress made in implementation of ecosystem standards in the Southern Ocean began gradually to influence ocean harvesting regimes elsewhere in the world.

It is argued that changes in international law concerning state responsibility on the high seas will be required before ecosystem approaches to living resource management can become fully effective. Several alternative schemas for ocean management combining ecosystem considerations and enforcement methods are therefore proposed. The inseparable dual aims of these will be to ensure a reliable supply of protein for human use while maintaining or restoring as far as possible the integrity of ocean ecosystems.

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There are lots of good fish in the sea!

(Gilbert 1885)

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ACRONYMS AND ABBREVIATIONS

| | |
|--------------------|--|
| AAT | Australian Antarctic Territory |
| Agreement SFS&HMFS | Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks |
| APIS | Antarctic Pack Ice Seals (SCAR) |
| ASOC | Antarctic and Southern Ocean Coalition |
| ATCM | Antarctic Treaty Consultative Meeting |
| ATCP | Antarctic Treaty Consultative Party |
| BAS | British Antarctic Survey |
| BAT | British Antarctic Territory |
| BIOMASS | Biological Investigation of Marine Antarctic Systems and Stocks |
| BWU | Blue Whale Unit |
| CBD | Convention on Biological Diversity |
| CCAMLR Convention | Convention on the Conservation of Antarctic Marine Living Resources |
| CCAMLR Commission | Commission for the Conservation of Antarctic Marine Living Resources |
| CCAMLR | The CCAMLR regime |
| CCAS | Convention on the Conservation of Antarctic Seals |
| CCSBT | Convention on the Conservation of Southern Bluefin Tuna |
| CEMP | CCAMLR Ecosystem Monitoring Program |
| CFP | Common Fisheries Policy (EU) |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| CPD | Critical Period Distance |
| CRAMRA | Convention on the Regulation of Antarctic Mineral Resource Activities |
| DWF | Distant Water Fisheries |
| EEC | European Economic Community (now EU) |
| EEZ | Exclusive Economic Zone |
| ERS | Ecologically Related Species (in CCSBT) |
| EU | European Union (formerly EEC) |
| FAO | Food and Agriculture Organization of the United Nations |
| FFA | South Pacific Forum Fisheries Agency |
| FIBEX | First International BIOMASS Experiment |
| FIDS | Falkland Islands Dependency Survey |
| FOE | Friends of the Earth |
| GESAMP | Group of Experts on the Scientific Aspects of Marine Environmental Protection |
| GOSEAC | Group of Specialists on Environmental Affairs and Conservation (SCAR) |
| ICCAT | Convention for the Conservation of Atlantic Tunas |
| ICES | International Council for the Exploration of the Seas |
| ICRW | International Convention for the Regulation of Whaling |
| ICSU | International Council of Scientific Unions |
| IGY | International Geophysical Year |
| IMO | International Maritime organization |
| IOC | Intergovernmental Oceanographic Commission |
| ISR | Integrated Study Region (in CEMP) |

| | |
|-----------------|---|
| IUCN | International Union for the Conservation of Nature and Natural Resources; also World Conservation Union |
| IWC | International Whaling Commission. |
| LOSC | Law of the Sea Convention |
| Madrid Protocol | Protocol on Environmental Protection to the Antarctic Treaty |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| MMC | Marine Mammal Commission (US) |
| MMPA | Marine Mammal Protection Act (US) |
| MSY | Maximum Sustainable Yield |
| n.m. | nautical mile (1.852 km) |
| NAFO | Northwest Atlantic Fisheries Organization |
| NGO | Nongovernmental Organization |
| Ramsar | Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 |
| Rec. ATCM | Recommendation of Antarctic Treaty Consultative Meeting |
| SCAR | Scientific Committee on Antarctic Research |
| SC-CAMLR | CCAMLR Scientific Committee |
| SCOI | Standing Committee on Observation and Inspection (CCAMLR) |
| SCOR | Scientific Committee on Oceanic Research |
| SIBEX | Second International BIOMASS Experiment |
| UK | United Kingdom of Great Britain and Northern Ireland |
| UN | United Nations |
| UNCED | United Nations Conference on Environment and Development |
| UNCLOS III | United Nations Third Conference on the Law of the Sea |
| UNDP | United Nations Development Program |
| UNEP | United Nations Environment Program |
| UNGA | United Nations General Assembly |
| USA | United States of America |
| USSR | Union of Soviet Socialist Republics |
| VMS | Vessel Monitoring System |
| WG-CEMP | Working Group on CCAMLR Ecosystem Monitoring Program (CCAMLR) |
| WG-DAC | Working Group on Development of Approaches to Conservation (CCAMLR) |
| WG-EMM | Working Group on Ecosystem Monitoring and Management (CCAMLR) |
| WG-FSA | Working Group on Fish Stock Assessment (CCAMLR) |
| WG-IMALF | Ad Hoc Working Group on Incidental Mortality Associated with Longline Fishing (CCAMLR) |
| WG-Krill | Working Group on Krill (CCAMLR) |
| WWF | Worldwide Fund for Nature International |

A note on designations of CCAMLR meetings and documents.

CCAMLR meetings are identified thus:

| | |
|-------------------------------|-----------------------------|
| Commission meetings | CCAMLR-Roman numeral year |
| Scientific Committee meetings | SC-CAMLR-Roman numeral year |

Reports emanating from meetings of either body are designated the same way, with the addition of paragraph numbers § or page numbers as appropriate.

INTRODUCTION

The stormy waters of the circumpolar Southern Ocean are once more the focus of intense harvesting activities¹. Significant amounts of Antarctic krill were caught during the 1980s and this fishery ranked amongst the principal species caught worldwide (FAO)². Currently there is great commercial interest in Southern Ocean finfish. Attempts to contain the activities of harvesters within legal constraints have met with mixed success.

Approaches to harvesting not previously attempted in other parts of the world's oceans were pioneered in the Southern Ocean by a new regime, administered by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR Commission), based on the Convention on the Conservation of Antarctic Marine Living Resources of 1980 (CAMLRL Convention). This thesis addresses the origins, functions and operation of the CCAMLR regime, which equates wise use of resources with their long-term conservation. The set of ideas that was formulated before and during the negotiations that resulted in the CCAMLR regime and were written into its Convention became known as the 'ecosystem approach'³ or the 'ecosystem standard'.

SIGNIFICANCE OF THE STUDY

This study is important, because managers who have charge of troubled fisheries around the world are canvassing new ways to conserve the resources for present and future use. Some are looking to precautionary and ecosystem approaches as an addition or alternative to traditional means of managing ocean harvesting and this is occurring through the example of the use of such approaches within CCAMLR.

AIMS OF THE STUDY

The study seeks to identify the ways in which the adoption of an ecosystem approach to harvesting influenced some aspects of the conservation of Southern Ocean marine ecosystems.

OUTLINE OF THE PROBLEM AND PHILOSOPHICAL CONSIDERATIONS

The question of whether the ecosystem approach has proved viable in CCAMLR is a multi-level question that cannot be answered simply by 'yes' or 'no'. It is not the purpose of this study to argue for or against the 'effectiveness' and 'legitimacy' of the CCAMLR regime, as this has been done in Stokke and Vidas (1996). Rather, it will examine the role of the ecosystem approach in achieving the stated objectives of the CAMLR Convention.

Importantly, it is necessary to ask if the ecosystem approach has actually helped in achieving the Convention's objectives, or whether these have been achieved by other means that are independent of the ecosystem approach. A theoretical framework for discussion is described below.

Regime theory and historical explanation

A regime is 'a mode or system of rule or government' (Macquarie Dictionary 1987). A definition agreed upon by political theorists is as follows:

Regimes are social institutions composed of agreed-upon principles, norms, rules and decision-making procedures that govern the interactions of actors in specific issue areas, in specifiable activities or sets of activities. (Osherenko and Young 1993: 1)⁴

Most writings on regime formation stress sets of norms and principles; such can be labelled by the Kuhnian term, 'paradigm'. Kuhn (1962), in discussing scientific revolutions defined 'paradigm' as a set of ideas sufficiently unprecedented to attract an enduring group of adherents, and at the same time sufficiently open-ended to leave problems for practitioners to solve (Kuhn 1962: 10). By this definition, the ecosystem approach is a paradigm and therefore this term will be used in the study. Kuhn (1962: 11) maintained that paradigms shared by a community are an

aid to the focussing of the efforts of that community towards a desired goal.

The Kuhn model is very much like some of the later theories of regime formation, as identified by Osherenko and Young (1993: 18-20). Their template that most closely fits the case of CCAMLR and the role of the ecosystem approach is a combination of knowledge-based hypotheses, which assert that important determinants of regime formation include:

Shared perceptions, beliefs, and understandings of causal mechanisms among the relevant parties...including epistemic communities...For a regime to form, some mechanism...arises to link the members of this group.

and contextual factors:

National and world circumstances and events seemingly unrelated to the issue area under consideration...play a major role in determining if and when international cooperation to address a particular problem or issue area occurs and in shaping the content of any regime that forms.

(Young and Osherenko 1993: 265-266)⁵.

Such factors are identified in the study. Hall (1994) examined the role of leadership in the negotiations leading to the Antarctic Treaty. Leadership was an important factor in the CCAMLR negotiations also. Osherenko and Young also identify leadership as a facet of institutional bargaining that can take several forms. There are two that closely fit the CCAMLR model. They are *entrepreneurial leaders* and *intellectual leaders*. This study identifies the contributions of outstanding individuals in the realization of the ecosystem approach in the Convention and in the regime based upon it.

While it is tempting to put all the complex events that contributed to the formation and development of the CCAMLR regime under a convenient regime theory label, unfortunately there is not one that fully satisfies the needs of this thesis. As Strange (1982) remarked, regime theory does not adequately explain the dynamics of the interactions, formal and informal, between the players nor shifts in attitude over time. Moreover, every regime is a unique product of its own time and circumstances, and unpredictable changes in those circumstances can take place. While regime theory does help in placing the regime in relation to other

regimes and members, it is not dynamic enough to explain those changes. Moreover, since the CCAMLR regime is predicated on and perpetuated through science, it seems appropriate to use the Kuhnian model, while recognising its relationship to Young's template of hypotheses discussed above, as the theoretical underpinning of this study.

The Kuhnian model of historical explanations as expanded by Wise (1980) is used by this researcher for the purpose of studying CCAMLR and its operations. It consists of breaking the fundamental problems addressed by this study into a number of associated questions, including:

1. • Are there characteristics of the Southern Ocean that make it particularly suitable for trying out new methods of harvesting management?
2. • What was the role of the 'ecosystem approach' paradigm in establishing a system of harvesting management for the Southern Ocean?
3. • How has implementation of the ecosystem approach proceeded?
4. • Has the ecosystem approach as originally conceived undergone heuristic changes?
5. • Has the ecosystem approach actually helped in achieving the Convention's objectives?
6. • What other factors have helped or hindered the achievement of the Convention's objectives?
7. • Has the example set by its implementation influenced ocean harvesting regimes elsewhere in the world?
8. • Are ecosystem approaches appropriate in situations where 'illegal' harvesting is occurring?
9. • How can ecosystem approaches be used in conjunction with enforcement mechanisms to prevent or ameliorate ecosystem deterioration due to human action?

The study shows that acceptance of ecosystem approaches as a basis for action in the international arena was influenced by numerous factors. The special regard for Antarctic regions, generated through centuries of exploration, more recent scientific expeditions and the evolution of the Antarctic Treaty Regime was one such factor. Sovereignty in the Southern Ocean, expressed through territorial claims, was another. Of great importance was the perception during the 1970s that Southern Ocean waters could answer the needs of a perceived protein deficiency in human nutrition, particularly through the harvesting of Antarctic krill. It

is not be possible to investigate in equal depth all the facets of the complex problems that beset marine harvesting management in the Southern Ocean. In particular, in spite of their importance, economic factors are largely omitted.

The ecosystem concept

A contraction of *ecological system*⁶, the term *ecosystem* was coined by Tansley, who defined it as:

... a system in which the organisms and inorganic factors are in a relatively stable dynamic equilibrium.

(Tansley 1935).

By combining the idea of ecology with that of a system, Tansley created a useful conceptual framework for the study of organisms in relation to their environment, applicable to all situations, including marine. The word occurs in daily parlance without further definition, and the meaning most often implied by the contexts within which it is used is that given by the Macquarie dictionary:

Ecosystem: a community of organisms, interacting with one another, plus the environment in which they live and with which they also interact.

This definition is well suited to the purpose of this study.

Preservation versus conservation

It is necessary here to distinguish between the meanings of these terms as they are employed in this study:

Preservation is defined as the saving of natural resources from human consumption, thus precluding their use.

Conservation, means the saving of natural resources for human consumption and hence includes their use.

STRUCTURE OF THE THESIS

The study examines the questions listed above in eight chapters, structured as follows.

Chapter 1 is a brief introduction to the area of the study. It describes the physical and biological characteristics of the Southern Ocean and summarises harvesting that took place there prior to 1980.

Chapter 2 begins with an outline of the Antarctic Treaty System, including a discussion of the Agreed Measures and the moves to regulate sealing. The influential Scientific Committee for Antarctic Research (SCAR) set up the BIOMASS program, which advanced the knowledge of Antarctic marine ecosystems. Preparations by the Antarctic Treaty Consultative Parties to negotiate a living resources treaty are analysed.

Chapter 3 is devoted to the CCAMLR negotiations of 1978-1980. In the introduction to the chapter, an analysis is made of the attitudes of Antarctic treaty parties towards matters pertaining to the Southern Ocean at the time. This is followed by a detailed account of the negotiations, which illustrates the fine balance between the concerns of harvesting and conservation-oriented parties. Ideas on the ecosystem approach appeared in first negotiating session and in first drafts of what was to become Article II of the convention.

The position of the boundary of the Convention area was a crucial issue, combining ecological and political considerations. Parties raised arguments for and against extending it beyond 60°S. Problems of sovereignty north of 60°S complicated negotiations, overcome by informal intersessional negotiations. The Convention on the Conservation of Antarctic Marine Living Resources (CAMLR Convention) was signed in 1980, but included in its text no definition of the ecosystem approach or how to implement it.

Chapter 4 describes how CCAMLR dealt with the ecosystem approach in its first years. Inadequate Rules of Procedure precluded a timely start to the work of the Scientific Committee and the first attempt at converting theory into practice was hampered by incomplete and incompatible data. Depleted fish stocks forced the Scientific Committee to set conservation measures while the dynamics of Southern Ocean ecosystems were little

understood. Slow progress towards implementing the ecosystem objectives of the Convention was achieved in the first years of CCAMLR's operations, prompting criticism from members and commentators.

Chapter 5 analyses attempts at implementing the ecosystem approach through the CCAMLR Ecosystem Monitoring Program (CEMP). Set up as a multi-national program, CEMP took up some of the work begun under BIOMASS. The chapter questions whether CEMP advanced the implementation of ecosystem approach, and assesses its usefulness as a tool for management.

Chapter 6 examines the ecosystem approach in the wider context of the world arena. It discusses how international political, legal and economic changes affected CCAMLR's implementation of the ecosystem approach.

In chapter 7 it is shown that the example set by CCAMLR managing of marine harvesting using ecosystem approaches is being imitated, at least in theory, by other bodies with interests in marine harvesting. There is little evidence of deep understanding by these bodies of the implications of such approaches.

Chapter 8 chapter refers back to questions posed at the beginning of the study regarding the role of ecosystem approaches in harvesting regimes of the Southern Ocean. It then proposes some alternative schemas for marine living resources management where problems of illegal fishing and overfishing in the Southern Ocean are addressed. The last part of the chapter discusses these schemas and concludes the study.

METHODS AND INFORMATION SOURCES

The methodology adopted in this study is that of historical analysis based on grounded theory, which is an adaptation of Kuhn's analysis of scientific revolutions as discussed above.

Several techniques have been applied. Primary and secondary sources have been analysed to discern the origins, development and penetration of ecosystem concepts. A large number of international treaties on marine harvesting have been studied to understand the legal background.

As the management of living resources is a process in which political, legal, economic and scientific factors interact, the study is of necessity an

interdisciplinary one. Additional information is provided in the appendices to expand on matters whose inclusion in the text would interrupt the flow of argument.

Primary sources

1. **Original source documents** relating to the CCAMLR negotiations were examined and analysed for evidence of the importance of ecosystem ideas. The documents included annotated negotiating documents and personal diaries. Although it was possible to view briefing documents, these were not available for quotation.

2. **Interviews** Some of the persons who took part in the negotiations were interviewed, as were many scientists and diplomats who played important roles in the CCAMLR Commission after its establishment. In the one-on-one interviews, structured questions were put to the respondent. The respondents were also encouraged to extemporise outside the framework of questions. For chapter 5, the comments of practicing scientists were elicited.

3. **Practical work** A summer season was spent at a CCAMLR research site to gain practical experience of the kind of field work required to fulfil CCAMLR's brief.

4. **Meetings of the CCAMLR Commission and Scientific Committee** were observed in order to improve understanding of the internal workings of the regime at the diplomatic level.

Secondary sources

1. CCAMLR publications

The published reports of CCAMLR meetings, CCAMLR journals and handbooks provided much background information; the Statistical Bulletins were an especially rich source.

2. Published literature about CCAMLR

Journal articles, newspaper reports and books dealing with CCAMLR were consulted.

THE PLACE OF THIS WORK IN CCAMLR LITERATURE

It is vital to place this study in the context of the literature that has been written about CCAMLR. Much of the writing dates from the early years of CCAMLR's operations and this is reviewed in chapter 4.

From its early days, CCAMLR members themselves were given to reflection and examination of CCAMLR's evolving conservation philosophy. A thinktank was set up by the Commission in 1986 to develop conservation strategies. Some of the writings which emanated from that group are alluded to in chapter 4 and 5.

Most of the analyses published to date are limited. With few exceptions, they have not penetrated the informal manoeuvring and other processes involved in gaining the acceptance of the ecosystem approach in the text of the convention. Most do not deeply consider the nexus between science and politics, evinced by the actions of the CCAMLR regime, as this thesis set out to do; thus it contains some original material. Few of the commentators on CCAMLR have grappled at length or in depth with the crucial issue of ecosystem approaches in regulatory regimes. This thesis attempts a more comprehensive and detailed analysis.

LIMITATIONS ON THE STUDY AND TIME FRAME

There were some limitations on the study. It was not possible to travel overseas to interview some of the key players in the negotiations. While some were contacted by mail or electronic means, this proved to be not as productive as face-to-face encounters.

The thesis generally deals with events up to the end of 1995. However, harvesting in some parts of the Southern Ocean increased during the course of this study. Some of this harvesting was not sanctioned under the CCAMLR regime. While this expansion was not wholly unexpected and mostly fitted into the thesis framework, it was necessary to include some postscripts to bring matters up to date.

1 THE SOUTHERN OCEAN

INTRODUCTION

This chapter focuses on the Southern Ocean. A brief description of the Southern Ocean and its ecosystems is given in the first section to elucidate the problems of management. The second section traces the history of harvesting in the Southern Ocean. Attempts at regulation up to the time of the commencement of the CCAMLR negotiations, including the role of the International Whaling Commission, are treated here. The third part shows how one source of ecosystem ideas subsequently embraced by CCAMLR resulted from research carried out by the Food and Agriculture Organization of the United Nations in the Southern Ocean.

1.1 DESCRIPTION OF THE AREA

The area in which CCAMLR operates is part of the Southern Ocean, which is composed of the southern part of three major oceans: the Pacific, Atlantic and Indian oceans, as shown in the map in the frontispiece. The Antarctic continent forms the southern boundary of the Southern Ocean but its northern boundary is not precisely defined and is generally taken to be more or less south of 40°S⁷. Many of the issues discussed are related to the uses of this vaguely defined area and there would appear to be no virtue in being more precise than other authors.

The shape of the Southern Ocean is annular, with the Antarctic continent as the central land mass as illustrated in figure 1a. The southern tips of three continents intrude upon it; these and a scattering of islands form focal points for local hydrographic effects, as do suboceanic features. There is a narrowing of the Southern Ocean between the Antarctic Peninsula and South America. No other significant terrestrial features impede the Southern Ocean's major wind and current systems, which are thus circumpolar. There is marked coriolus effect due to the earth's rotation.

No permanent human settlements exist within several thousand kilometres of the Antarctic continent⁸, other than Punta Arenas in Chile and Ushuaia in Argentina (AAD 1996). There are scientific research sites on the Antarctic continent and on some of the islands in the Southern Ocean. Thus all the vessels taking part in Southern Ocean harvesting come from distant ports and are carrying out Distant Water Fishing (DWF).

1.1.1 Antarctic Polar Front

The Antarctic Polar Front (or Antarctic Convergence, its now superseded name) is a major oceanographic and biological boundary. It is a relatively narrow ring of water, about 50 km wide, where the cold Antarctic water slides under the somewhat warmer subtropical water (figure 1b). The temperature difference is about 3 C° (Smith and Treguér 1994: 16). Some authors determine the position of the Polar Front by the latitude where a belt of minimum salinity is produced at 200 meters depth (Jacques and Fukuchi 1994: 64-5). The position of the Polar Front zone is variable but it is generally between 50°S and 60°S. Although many organisms do not venture north of the Polar Front, its effects are relatively shallow - to around 300-500 meters depth- and there are some species that traverse it at lower depths. The Polar Front or Antarctic Convergence is important, as its average position was chosen as the boundary for the CCAMLR area of competence.

1.1.2 Current systems in the Southern Ocean

There are two important circumpolar currents which affect the upper layers of the Southern Ocean. The largest of these, the Antarctic Circumpolar Current or West Wind Drift, flows more less continuously in the northern part of the ocean close to the Polar Front. Closer to the continent the more discontinuous East Wind Drift also gives rise to major gyres and smaller local eddy systems. Figures 2a and 2b illustrate the major currents and the Antarctic Polar Front.

The oceanographic properties of the Southern Ocean have been and are being intensely studied. The relevance of these studies to the living resources cannot be overemphasised, since organisms can be confined to zones with particular characteristics of temperature and salinity.

1.1.3 Ice in the Southern Ocean

The coast of Antarctica is surrounded by sea ice for much of the year. The maximum extent of the sea ice, covering some 20 million square kilometres, is reached yearly in September-October; the minimum, about 4 million square kilometres, in February-March (Figure 1c). Associated with the sea ice cover is a seasonal increase in plant biomass in Southern Ocean ecosystems. The sea ice is not an unbroken sheet: leads and polynyas allow exchange of gases and provide access for animals.

1.1.4 Weather systems in the Southern Ocean

The Southern Ocean is the 'most hostile marine environment in the world' (Campbell and Mognard 1994: 421). As there is little significant impediment to air flow, winds over the Southern Ocean can reach high velocities resulting in large ocean waves⁹. High average wave heights - over 5 meters - can occur particularly between the latitudes of 45°S to 60°S in the Indian Ocean sector and in part of the Eastern Pacific sector (Campbell and Mognard 1994: 426). Katabatic winds flowing from the ice cap have coastal effects which may extend out to about 100 kilometres and interact with offshore cyclonic systems (Bromwich and Parish in press).

1.1.5 Biological zonation of the Southern Ocean

Taken as a whole, the Southern Ocean is a region of low biological productivity. The apparent anomaly of the very high biomass of seabirds and marine mammals characteristic of the Southern Ocean is explained by very high phytoplankton and zooplankton productivity in certain areas and at certain times of the year. Concentrations of high productivity are associated with the sea ice edge, with regions of upwelling or current-borne nutrient-bearing water, and with local submarine features such as continental shelves.

Three major ecological zones, each with its own assemblage of organisms, are distinguishable in the Southern Ocean:

- the ice-free zone
- the seasonal pack-ice zone
- the permanent-ice or high-Antarctic zone

The ice-free zone - the main oceanic community - is characterised by the presence of salps¹⁰ (Nishikawa, Naganobu et al. 1995); copepods¹¹ (Hosie 1994), and euphausiid crustaceans¹², smaller and less abundant than Antarctic krill (Kock 1992: 5; Fischer and Hureau 1985: 71-87). Finfish are generally not abundant except in nutrient-rich areas discussed above (Fischer and Hureau 1985: xxi-xxiii).

In the pack-ice zone, which is ice-covered in winter and spring, is found the highest concentrations of a large species of euphausiid, the only one of commercial interest: Antarctic krill¹³. This is also presumably the zone of highest primary production¹⁴, with high concentrations of phytoplankton¹⁵ (Hempel 1987).

The shallow neritic zone¹⁶, adjacent to the continent, is ice-covered for most or all of the year. This has another species of euphausiid, Ice krill¹⁷, again smaller and less abundant than Antarctic krill, as well as the pelagic Antarctic silverfish¹⁸ (Fischer and Hureau 1985: 71-87; Hempel 1987). Figure 1d depicts zonation adjacent to part of the Australian Antarctic Territory.

1.1.6 Bathymetry of the Southern Ocean

The floor of the Southern Ocean has great variations in depth which are still being elucidated, although some areas are known in good detail (AAD 1996). The island groups and the continent are surrounded by shelf areas and there are also banks and chasms which promote upwelling of nutrients and hence provide for local concentrations of biota. These features can be the focus of harvesting operations and reference to them is made in chapter 6 and elsewhere in this study.

Figure 1a
Major Southern Ocean surface current systems and fronts (not to scale)

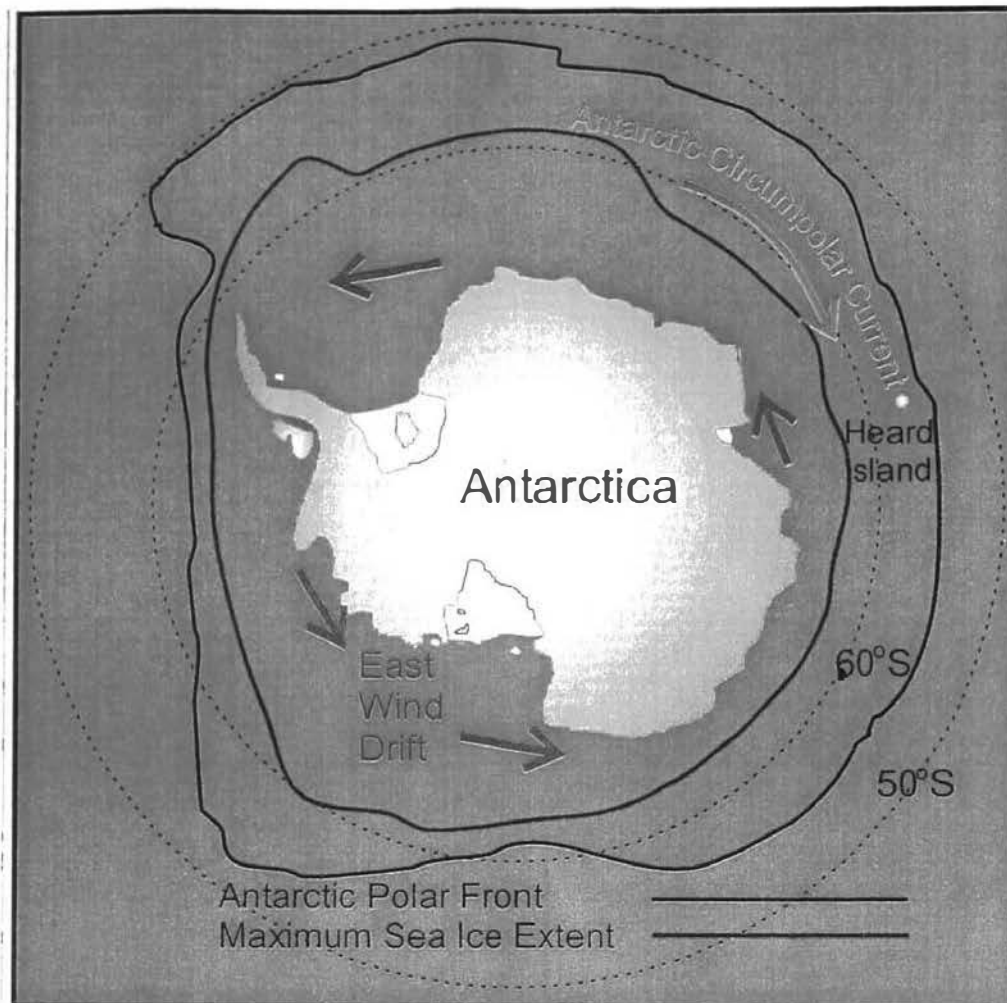
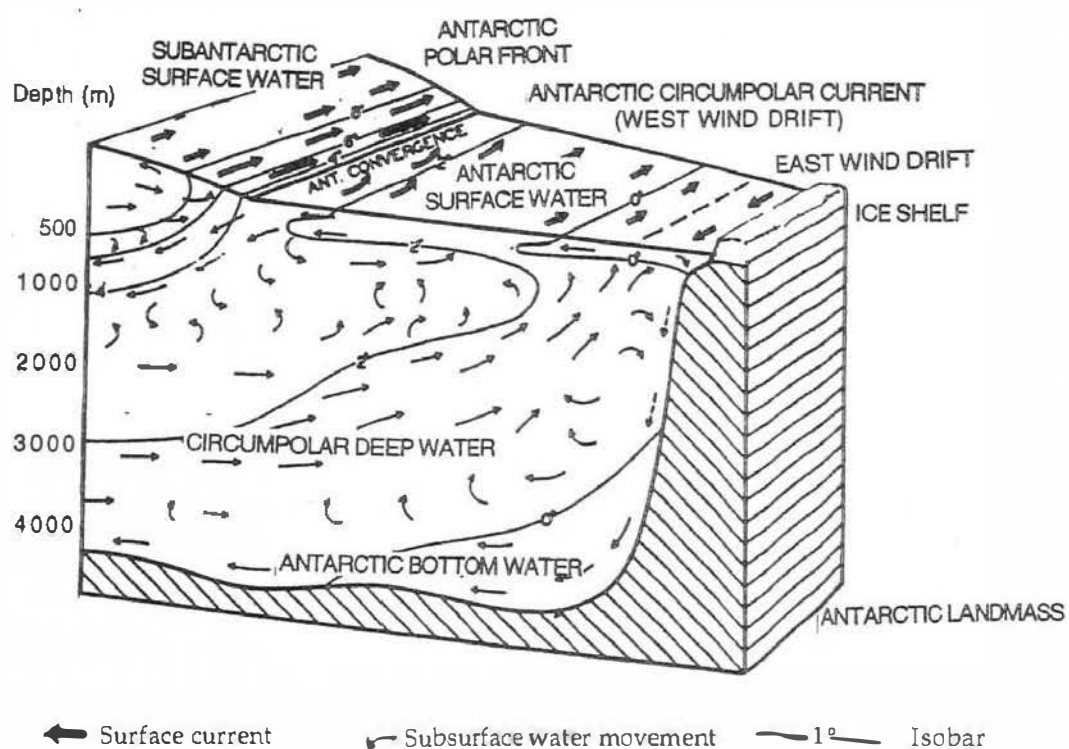


Figure 1b
Water masses, currents and temperature distributions in the Southern Ocean (adapted from Sverdrup et al 1942) (not to scale)



harvests and the distribution of seal populations in the Southern Ocean during the peak sealing eras is far from comprehensive.

After discovery of a new sealing ground, intensive and escalating harvesting would ensue, followed by a collapse in the local population of available animals. The sealers would then move onto the next unexploited ground. James Weddell, himself a sealer, estimated that 320,000 seals were taken from the Southern Ocean between 1821 and 1822. His observations of sealing practices in 1822-25 led him to recognise that this level of exploitation could not continue indefinitely:

The system of extermination was practiced...whenever a seal reached the beach,...he was immediately killed and his skin taken; and by this means, by the end of the second year the animals became nearly extinct: the young having lost their mothers when only 3 or 4 days old of course all died...
(Weddell 1827: 142)

Weddell postulated that a 'law similar to that which restrains fishermen in the size of the mesh of their net' would conserve the populations so that they could yield large annual crops of skins over many years (Weddell 1827: 141). In fact, fur seals were almost exterminated on all the accessible islands.

Species of Southern Ocean seals other than fur seals were not exploited to any comparable extent. There was an industry²⁵ based on harvesting elephant seals which were prized for their oil-rich blubber. They were hunted to near-extinction on Kerguelen and South Georgia, but by 1964 elephant sealing at South Georgia had ceased (Miller 1991: 323, Fischer and Hureau: 454).

The first seal harvests in the world to be regulated were in fact in the Northern Hemisphere, by way of the North Pacific Fur Seal Convention of 1911 (Pribilof Convention). International legislation to protect Southern Ocean seals was not passed until the Antarctic Treaty Consultative Parties made recommendations regarding the seal harvest, following this in 1972 with the Convention on the Conservation of Antarctic Seals, discussed in the next chapter.

1.2.2 Whales

By the early 1830s fur seal populations were so severely depleted that many sealers turned to whaling in addition to sealing (Roberts 1958). Commercial whale species hunted in the Antarctic comprised one species of toothed whale - the sperm whale or cachalot²⁶ - and five baleen whale species²⁷. ²⁸The invention of the explosive harpoon²⁹, the entry of steamships into whaling and other innovations of the nineteenth century made possible the modern era of Antarctic whaling (McVay 1974: 372). This was initiated in 1892 with Norwegian and British reconnaissance expeditions and the establishment of the first whaling station at Grytviken, South Georgia by an Argentine-Norwegian expedition. (Tonnessen and Johnsen 1982: 171).

The first attempt at conserving the whale stocks in the Southern Ocean was made by the British Government acting through the Falkland Islands Dependencies government which at that time also administered South Georgia. From 1906 it leased land for whaling stations and issued licences, thus exercising a measure of control (Headland 1989: 2360). The first Norwegian floating factory began operating out of King George Island in 1905 (Roberts 1958a).

Pelagic whaling in the Antarctic increased in the post-World War I period, aided by many technological developments. The most important of these, introduced in 1925 was the slipway (McVay 1974: 372). This enabled carcasses to be hauled aboard factory ships for on-board processing, thus making the ships independent of shore stations and hence less open to scrutiny (Cushing 1988: 153).

The first attempts to regulate whaling internationally had been made in the late 1920s and early 1930s. The 1931 League of Nations Convention for the Regulation of Whaling in Geneva introduced the Blue Whale Unit (BWU)³⁰ for establishing limits on the quantities of whale harvested. This was based on the average amount of oil that could be obtained from a blue whale - about 110 barrels- thus:

- 1 BWU = 1 blue whale
- = 2 fin whales
- = 2 and a half humpback whales
- = 6 sei whales

The BWU took no account of populations of whales, but encouraged instead the harvesting of the largest and therefore most profitable species, since fewer individual catches needed to be made.

The BWU was adopted during 1932-36 and:

...bedevilled the effectiveness of conservatory regulation during the next 40 years because the International Whaling Commission also adopted it for quota setting for 25 years from its establishment

(Birnie 1985: 120)

Government control was not accepted by whaling countries, who placed themselves under voluntary quotas. The result was a huge overproduction of oil in the early 1930s, and this, coupled with the world-wide economic depression, caused the bottom to fall out of the whale oil market (McHugh 1974: 308). The clearly unsatisfactory 1931 agreement was followed in 1937 by the London International Agreement for the Regulation of Whaling and several subsequent protocols. Despite the attempts at regulation,

It is probable that in the 1930s so much in excess of the maximum sustainable yield³¹ of Antarctic whale stocks was taken that even at that time they were dealt a blow from which they have never recovered.

(Tonnessen and Johnsen 1982: 453)

Little harvesting of marine living resources occurred in the Southern Ocean during the 1939-1945 world war. Some whaling vessels had been pressed into the war effort and many of the floating factory ships were sunk. In 1944 a meeting of the Antarctic whaling nations was held in Washington at which a catch limit of 16,000 BWUs per annum was decided³².

The International Convention for the Regulation of Whaling and the International Whaling Commission.

Fifteen states negotiated the International Convention for the Regulation of Whaling (ICRW) in Washington in 1946; the ICRW was ratified in 1948, when the International Whaling Commission (IWC) was established. The ICRW applies to 'all waters in which whaling is prosecuted' and hence also to the Southern Ocean adjacent to Antarctica.

Prompted by a worldwide demand for whale oil³³, whaling had begun again soon after peace was negotiated:

In 1945-50 it looked as if the whole world wanted to go whaling. (Tonnessen and Johnsen 1982: 521)

IWC held its first meeting in 1949. In spite of its stated aspirations and the imposition of increasingly stringent restrictions, Antarctic whale stocks continued to decline. The larger whales were harvested almost to extinction.

In the face of demands that BWU limits be reduced, Slijper, a Dutch whale biologist whose views in favour of maximum whale harvesting dominated the IWC for 20 years (McVay 1974: 373), contended that:

...all the arguments are still based on very little evidence, and that whalers can and will restrict their activities only on the most incontrovertible of arguments...Only biological research can supply the answer, and whaling circles have everything to gain from it.

(Slijper 1962: 415)

To supply such evidence, in 1961 the IWC appointed a Committee of Three (later four) Scientists³⁴ to investigate problems of whaling regulation. (It is noteworthy that the scientist who completed the Committee of Four was Gulland, who later played an important part in CCAMLR). The report of the Four Scientists was presented in 1964; it recommended abolishing the blue whale unit (BWU) and basing allocations on stocks, but its advice was not heeded even though the BWU was based on arithmetic, not biology and "repudiates rational management" (McVay 1974: 374). The BWU was finally abolished in 1972 (Wallace 1993a: 1478). By this time, there remained only two major whaling nations, Japan and the USSR, most of the others having ceased due to depletion of whale stocks and the discovery of effective whale oil substitutes, such as jojoba.

The so-called New Management Procedure³⁵ was introduced by the IWC in 1975. This still adhered to the Maximum Sustainable Yield principle, but at the same time moves were being made to protect certain whale species and areas from whaling. The New Management Procedure

proved to be difficult to implement and was eventually replaced³⁶ (Gambell 1993, Cooke 1995).

Ecosystem ideas did not dominate IWC's reports at the time of the CCAMLR negotiations. However, since krill formed the food source for most Antarctic whales, there was naturally an interest in the negotiations on the part of the IWC (Horwood 1978). At the IWC meeting in 1980, a resolution to: 'consider the implications for whales of management regimes for other marine resources' was passed, in which was recognised:

...that certain marine resources in the Southern Ocean, especially krill, are food species of whales and that exploitation of these resources may affect the demography of whale stocks that is as yet largely unknown,
...that the recovery and maintenance of depleted baleen whale stocks in the Southern Ocean may depend on the adequate supplies of food species,
...the complexity of the marine ecosystem in the Southern Ocean, the necessity to maintain that ecosystem in a healthy condition...

(IWC 1980)

The resolution recommended that the attendance of an IWC observer at the final CCAMLR conference be proposed. All krill harvesters in the Southern Ocean were urged to submit relevant data to the FAO, SCAR and the IWC. It further advocated that the effects be assessed of the exploitation of harvesting of other resources in the Southern Ocean on baleen whale stocks in the region (IWC 1980).

Through the 1970s the IWC was becoming increasingly aware of ecosystem issues in whale harvesting. At this stage, while the IWC was belatedly trying to protect a resource which had almost disappeared, its concern indicated a change of focus from exploitation to conservation.

The ICRW provided for the appointment of inspectors on whaling vessels and at whaling stations (ICRW 1946b, Article IX, Schedule §1). These inspectors were to be appointed by and paid for by the flag state operating the vessel or station. Thus the onus was on the harvesters to regulate their own industry, a procedure that may have tempted unscrupulous operators or states to contravene regulations. IWC did not institute a scheme of international, as distinct from flag state, observers until 1971. These were often arranged by bilateral or trilateral agreements

among whaling states, and while imperfect, Lyster (1985: 32) thought the scheme gave some:

...international oversight of whaling operations and some degree of confidence in the accuracy of reports submitted by whaling States.

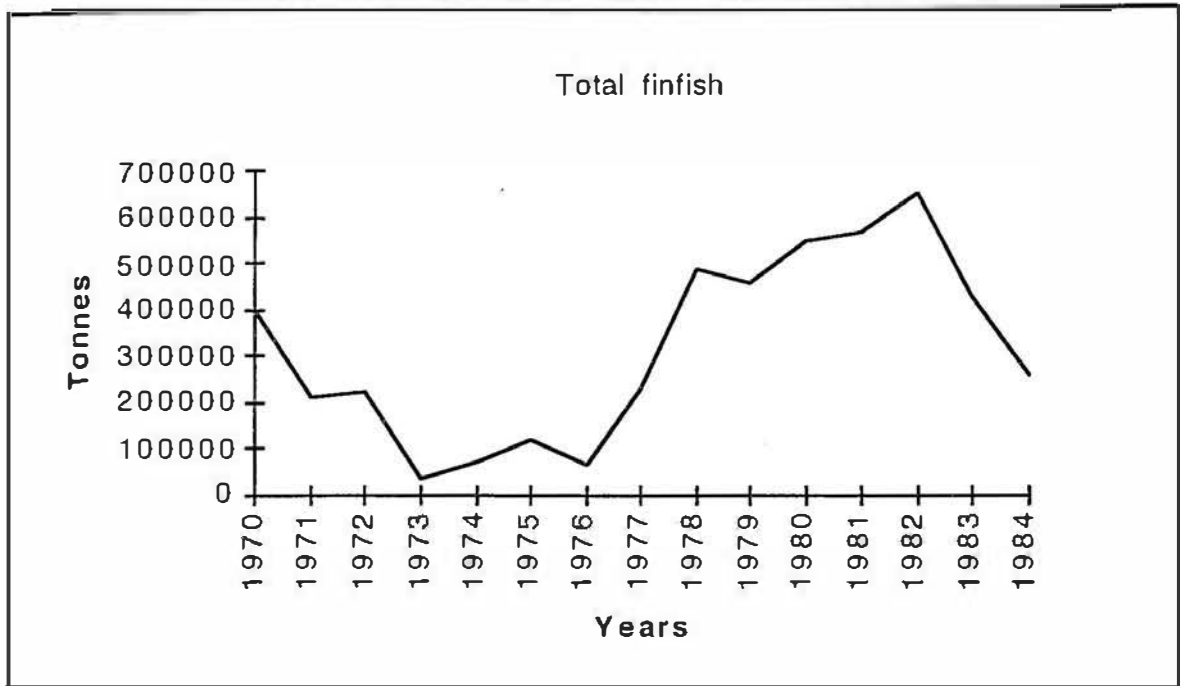
Recent revelations to the IWC Scientific Committee (Zemsky et al 1994, 1995) and in the scientific press (Yablokov 1994), regarding grossly underreported catches somewhat undermine this confidence³⁷.

In the following chapters, frequent allusions are made to the close links between the concerns of the IWC and CCAMLR, as both organizations were involved in the governance of Southern Ocean ecosystems. Closer interorganizational cooperation brought about by these shared concerns is to be expected, and is discussed in the final chapters.

1.2.3 Finfish

Small quantities of finfish had been caught in the Southern Ocean by overwintering sealing parties to supplement their diet of seal meat since the beginning of seal harvesting. Most Southern Ocean finfish thus far fished are found on the shelf areas around islands and off the continent³⁸. An exploratory fishery for finfish was begun by the USSR in the 1960s and fullscale fishing was under way by the early 1970s. The main participants in the fishery beside the USSR were Poland, the German Democratic Republic and Bulgaria. Harvesting was concentrated around South Georgia and the South Shetlands in the Atlantic portion of the Southern Ocean, and around Kerguelen in the Indian Ocean sector. Accurate statistics on the fisheries were not readily available because the fisheries were included in FAO statistical areas 41 and 51 and the apparent catch for the Southern Ocean was nil (Everson 1977: 103). It is dubious, also, whether the fish species caught were always correctly identified. While absolute reliance thus cannot be placed on such data as exist, it was clear that substantial quantities of finfish, in the order of 100-200,000 tonnes in some years, had been removed prior to regulation (CCAMLR 1990a; Fischer and Hureau 1985). Estimates are still being revised as information is released. Figure 1e gives an approximation of finfish catches prior to regulation.

Figure 1e
Finfish catches in the Southern Ocean in 1970-1984.

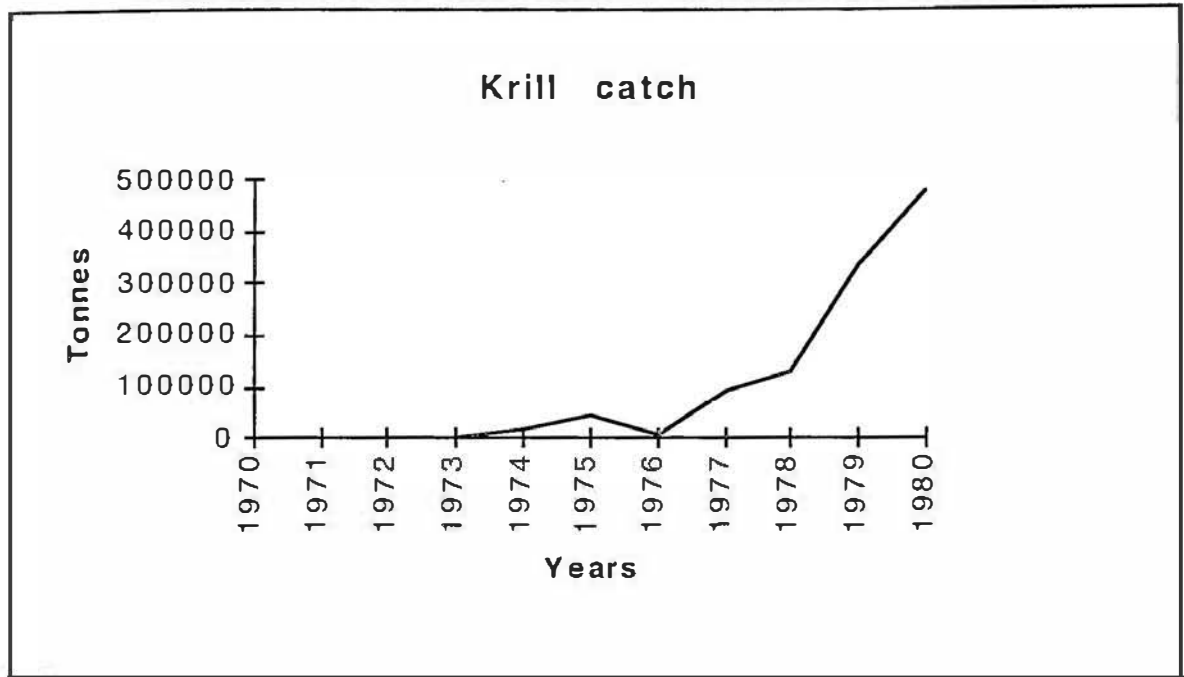


(Compiled from CCAMLR Statistical Bulletin 1990a,b, 1991, 1992, 1993, 1994)

1.2.4 Krill

Krill was caught experimentally from a Soviet whale-catcher in 1960-1. From this, the USSR quickly developed a krill fishery, which was flourishing by the time of the 1968 SCAR Symposium on Antarctic Biology. At this meeting the USSR delegates, who included the respected scientist Moiseev, showed a film that depicted a sophisticated vessel, with onboard krill processing facilities, operating in the Southern Ocean. Thus was the wider Antarctic community made aware that a krill fishery had begun (Kerry pers. comm.). This fishery continued to grow: by the end of the 1970s the catches exceeded 300,000 tonnes, as depicted in figure 1f.

Figure 1f
Estimated nominal krill catch in Southern Ocean 1970-1980



(Compiled from CCAMLR Statistical Bulletin 1990a,b)³⁹

Krill 'surplus'

The 270 million tons of krill on which the Antarctic whales fed in their heyday would be more than enough to supply the annual requirements of the entire U.S. population.

(Pequegnat 1958)

There was a prevalent belief that as baleen whales, the major predators of krill, were being fished down, that there must perforce be many tons of spare krill in the Southern Ocean that could be utilised by humans. The hypothesis of the krill surplus, first mooted by Mackintosh (1970), was never tested, nor was a related one that krill predators other than large whales were increasing in numbers and it is difficult to know how this might be done. No direct correlation has been proven, as fluctuations in population sizes or cohort size can seldom be ascribed to one single factor. However, calculations were made, based on production and on the estimated krill consumption of whales, to arrive at estimates of the total krill biomass and the possible amounts of krill available for harvest. These estimates varied from 50 millions (Gulland 1970: 220) to 150 million tons per annum (Mackintosh 1973: 139) or even as high as 7000 million tons (Moiseev 1970).

Krill as a product

Many authors have postulated that krill or protein-rich products derived from it might be utilised to assuage human dietary protein deficiencies, especially in developing countries (Idyll 1978, Pequegnat 1958, Lubimova, Naumov and Lagunov 1973, Earthscan 1977; Grantham 1977; Kaylor and Learson 1983). Grantham (1977) stated that, at 13% wet weight of protein, comprising 8.5% true protein, 2.5% free amino acids and other compounds, krill was one of the richest sources of animal protein.

Harvesting and processing of krill proved to have problems. Locating swarms of krill of sufficient size for harvesting was facilitated by increasingly sensitive echo sounding equipment. However, large hauls of krill such as are caught by midwater trawling are difficult to process rapidly. Krill spoil within hours of being caught: enzymes from the animals' digestive system invade the other tissues of their bodies, causing their breakdown and making them unfit for human consumption. Moreover some of the animals are damaged by such harvesting methods, hastening spoilage (Kaylor and Learson 1983: 6; Eddie 1977: 20).

It has proved difficult and expensive to produce palatable krill products for human consumption. Krill exoskeletons contain fluoride, at levels that are toxic to humans. Furthermore, unless exoskeletons are removed from krill bodies soon after death, fluoride enters the soft tissues. The USA Food and Drug Administration Act (1967) set an upper limit of 100 mg/kg fluoride in products for human consumption. Extracted and freeze-dried krill meat exceeds this level by a factor of seven, while the whole animal exceeds it 24 times (Soevik and Braekkan 1979).

Krill peeling devices have been developed, but there was a high degree of wastage and the products were not attractive. Experiments were made using krill in additives to the feed of farm animals, including chickens, pigs, and mink, but krill meal exceeds the EU fluoride limit by a factor of four. The high fluoride content of krill presents no bar to its use in aquaculture to feed more desirable and marketable table fish, and this has been its major commercial destiny in recent years (Nicol 1989; Nicol, pers. comm.). Animals that are predators of krill in the Southern Ocean are tolerant of the fluoride in krill; it accumulates harmlessly in their skeletons (Nicol pers. comm.).

Future developments in krill utilization include the possible use of the chitin-rich exoskeletons and protein products derived from the controlled proteolytic breakdown of krill tissues. A pigment, astaxanthin, contained in the exoskeleton could enhance the use of krill as a feed in aquaculture because the pigment improves the colour of the flesh of the cultured fish (Budzinski, Bykowski et al. 1985, Grantham 1977, Kaylor and Learson 1983, Nicol, pers. comm.).

Krill as part of the Southern Ocean ecosystem

It should be noted that considerations of krill as a product for human use take no account of its value as a key component of its normal ecosystem. This was of major concern to the Antarctic Treaty partners and was an important factor in stimulating the push for a regulatory regime for the Southern Ocean based on ecosystem principles, as demonstrated in chapter 2.

1.2.5 Other species

Little harvest of squid, crabs and sharks had taken place prior to 1980. Penguins had been exploited for oil on some subantarctic islands in the early twentieth century. Seaweeds, while potentially valuable, had not been harvested.

1.3 FAO RESEARCH INTO HARVESTABLE RESOURCES OF THE SOUTHERN OCEAN

By the early 1970s the world faced a protein shortage in human nutrition prompting an interest in thus far untapped sources in the Southern Ocean (Idyll 1978, FAO 1975; FAO 1977). Because the FAO has responsibility for food resources globally, especially for developing countries with protein needs, its interest in the Southern Ocean intensified. As fisheries for 'conventional' species began to decline, the FAO directed its attention to the possibility of developing unconventional fisheries such as Southern Ocean krill (Mitchell and Tinker 1980: 83-85; FAO 1974, 1975, 1977a,b).

At its conference in November 1975 FAO set out to investigate Antarctic krill (Mitchell and Tinker 1980b). FAO noted the competence of the Antarctic Treaty in all matters regarding the ecosystem of the Antarctic and agreed that it would coordinate its activities with Antarctic Treaty powers (Zegers 1978; Mitchell and Tinker 1980: 83-85).

1.3.1 Southern Ocean Fisheries Survey Program

In 1976 the United Nations Development Program (UNDP) initiated the preparatory phase of a Southern Ocean Fisheries Survey program to be carried out by the FAO. For the purposes of the survey, the Southern Ocean was defined as south of latitude 45°S. The objectives of the program were to:

improve the knowledge of the nature, magnitude and distribution of the living resources of the Southern Ocean, with a view to their rational utilization

(Mitchell and Tinker 1980: 83-85).

The survey was to gather existing information about the resources, and to evaluate the state of their exploitation and utilization, while a system was to be instituted for gathering information, including statistics, about the resources. (Holliman in foreword to Eddie 1977: i).

This survey resulted in three reviews, two specifically on krill (Eddie 1977, Grantham 1977) and one on the living resources of the Southern Ocean in general (Everson 1977).

Everson wrote that whenever the potential of a new resource was recognised, several very important questions immediately arose:

1. Where does the resource occur?
2. How can it be found and caught?
3. How much can be taken?
4. What marketable products can be produced and where can they be marketed?

(Everson 1977: 1)

Everson initially considered each of the resources by itself, and then in relation to other components of the ecosystem, one of his aims being to point to those research areas where more information was needed for 'wise management' of resources in the Southern Ocean. Everson (1977: 127) asserted that the fragmentary state of knowledge of the links between components of the ecosystem made quantitative predictions based on modelling unreliable at that time. He suggested that ecosystem studies would be more helpful in elucidating trophic relationships and in predicting, for example, possible effects of a large-scale krill harvest. The discussions in this report foreshadow some of the later deliberations in the Scientific Committee of CCAMLR, in many of which Everson took part; he was also involved in SCAR and BIOMASS.

Although the FAO Southern Ocean Survey was stated to be a preparatory study, the three reports were not followed up by further work. Shapley (1985: 150-1), reported that the FAO had originally planned a 10-year program to investigate Antarctic krill, with a budget of US\$45 million and possibly using Soviet ships. Antarctic Treaty partners, Chile and Argentina, whose Exclusive Economic Zones lay within or were close to the proposed study area, sent notes verbales to the organisers of the Survey. Australia and the United Kingdom corresponded with the project leader requesting that special regard be given to the rights and obligations of the Antarctic Treaty powers (Mitchell and Tinker 1980: 83). These rights had, however, already been acknowledged by the FAO (1975) and there was no intention of encroaching on areas under state jurisdiction unless invited (FAO 1977a).

Roberts (1978) viewed this FAO project with severe misgivings:

...it seems to take no account of the political realities, or of the disturbance which it can cause to the Antarctic Treaty system
(Roberts 1978: 114)

However, Quigg absolved the Treaty nations from the implied charge of aborting the FAO project: FAO officials themselves doubted that the project as proposed by UNDP was appropriate and it 'fell of its own weight' (Quigg 1983: 278 note). UNDP may not in any case have been able to finance such an expensive program. (Everson pers. comm.). The result was the more modest program described above, costing US\$202,500 (Mitchell and Tinker 1980: 83-85). FAO stated in 1978 that the project had been completed, and that FAO intended to contribute, through its Advisory Committee on Marine Resources Research, to the BIOMASS program, along with the Intergovernmental Oceanographic Commission (IOC)⁴⁰, IWC and IUCN⁴¹ (FAO 1978).

FAO continued to discuss matters of fisheries management in parallel with the CCAMLR negotiations. In a report of a Working Party on the scientific basis of determining management measures it cautioned:

... if an ecosystem approach to management was instituted for fisheries, decisions would have to be made taking into account the interactions between the important biotic constituents of the ecosystem.
(Dawson 1980)

At the meeting where the CAMLR Convention was finalised the FAO was represented by an observer.

1.3.2 FAO-defined boundaries in the Southern Ocean

The FAO statistical area in the Southern Ocean was not clearly defined until shortly before CCAMLR came into being. This led to later problems with regard to the gathering and collating of fish stock data, since it was not certain where the information, such as it was, had been gathered. IWC had its own areas for setting quotas based on whaling patterns; these did not coincide with those of the FAO. Everson (1977: 134) wrote:

At the time that these [FAO] areas were delimited there was virtually no fishing activity in the Southern Ocean, with the results that the northern limits of the Antarctic fishing areas were arbitrarily decided...the recent increase...has raised certain problems in interpreting catch statistics in some of these 'overlapping' areas.

In 1976, the FAO, acting on recommendations from its Southern Ocean program and advice from SCAR, moved the boundaries of the statistical areas north (FAO 1977) to coincide approximately with the Antarctic Polar Front, because this represented a fairly clearcut northern boundary to the 'fishable resources' (Everson 1977: 133-4; Everson, pers. comm.). With minor, albeit significant, changes this later became the boundary of the CCAMLR area.

Discussion

It is clear from the foregoing that the management of harvesting of the Southern Ocean, where such management existed, had not been focussed on the well-being or conservation of the ecosystems of the area. While the IWC made attempts at halting the misuse of the whale resources, its organizational structure and rules made effective conservation difficult. The FAO, though not a regulatory body, may have played a role in preparing the ground for CCAMLR by its investigations in the Southern Ocean. The clearer identification of the northern boundary of the Southern Ocean FAO statistical area with the Antarctic Polar Front may have facilitated the acceptance of this as the boundary of the CCAMLR area of competence.

We have discussed in this chapter some of the background to and the attempts at regulation of harvesting in the Southern Ocean. Almost completely independently of those attempts, a de facto system of regulation began to evolve as part of the Antarctic Treaty System. This is treated in the following chapter.

2 THE ANTARCTIC TREATY SYSTEM AND ITS ROLE IN CONSERVATION

INTRODUCTION

The Antarctic Treaty System, a term coined by Guyer in the early 1970s⁴², consists of the community of Antarctic Treaty parties as well as the various agreements, measures and associations that have developed around the Antarctic Treaty area and the geographic region of the Southern Ocean. It is characterised by a strong tradition that incorporates ecological awareness expressed in the Antarctic Treaty itself and by various measures put in place by the Antarctic Treaty Consultative Parties (ATCPs).

The 1964 Agreed Measures and the 1972 Convention for the Conservation of Antarctic Seals (CCAS), adopted the Antarctic Treaty parties, affected living resource management in the Southern Ocean. Ecosystem ideas were developed within the Scientific Committee on Antarctic Research (SCAR) and the research programs that arose from those ideas, most importantly, Biological Investigations of Marine Antarctic Systems and Stocks, (BIOMASS).

This chapter analyses some of the influences brought to bear by the then existing components of the Antarctic Treaty System upon the prenegotiations for the forthcoming marine living resources convention. The role of the Scientific Committee for Antarctic Research (SCAR), mentioned in passing, is treated more fully in a separate section. Analysis is made of the recommendations that led directly to the convening of the Second Special Antarctic Treaty Consultative Meeting of which the Convention for the Conservation of Antarctic Marine Living Resources was the result. The texts of the Antarctic Treaty, the Agreed Measures, the Convention on the Conservation of Antarctic Seals and Recommendation-IX-2 are given in the Appendix.

During the 1960s and 70s there was a paradigm shift regarding environmental issues in the wider world⁴³ that to some extent prepared the ground for the negotiation of a living resources treaty for Antarctic

waters. Within the Antarctic Treaty System, however, there had already developed a sense of responsibility towards ecosystems, as shall be demonstrated below.

2.1 ANTARCTIC TREATY AND THE ANTARCTIC TREATY AREA: SOVEREIGNTY AND CLAIMS

The Antarctic Treaty was concluded in 1959 and came into force in 1961. Its main stated purpose was the continuation of the peaceful scientific use of Antarctica as initiated by the participating nations of the International Geophysical Year (IGY) of 1957/8. The Antarctic Treaty regime qua regime has been described and analysed by many authors, inter alia, (Hall 1994; Triggs 1987; Joyner 1988; Heap, 1994) and it is not necessary to treat it in great depth here.

Conservation of the Antarctic environment became a major focus for the Antarctic Treaty Consultative Parties. This was already evident in earlier provisions made under the Antarctic Treaty for living resources. The Convention on the Conservation of Antarctic Marine Living Resources of which they were the architects was most clearly to reflect their conservationist stance.

The area of competence of the Antarctic Treaty and the rights of states within it are described in its Article VI:

Antarctic Treaty, Article VI

The provisions of the present Treaty shall apply to the area south of 60° South Latitude, including all ice shelves, but nothing in the present Treaty shall prejudice or in any way affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within that area.(emphasis added)

The rights of States in the high seas included the right to fish, as laid down in Article 2 of the 1958 Geneva Convention on the High Seas. However, the Antarctic Treaty's Article IX §1(f) included provision for the recommendation of measures regarding 'preservation and conservation of living resources in Antarctica'.

Much of the Antarctic landmass was the subject of territorial claims, some of them overlapping, by some of the participants in the IGY. While the claimants mutually recognised each other's claims, these claims were not recognised by all the states that became signatories to the Antarctic Treaty. The claimant or nonclaimant status of the parties at the time of signing of the Antarctic Treaty is given in Table 2b.

Table 2b
Original signatories to Antarctic Treaty

| Claimant | Nonclaimant |
|-----------------|--------------------|
| Argentina | Belgium |
| Australia | Japan |
| Chile | South Africa |
| France | USA |
| New Zealand | USSR |
| Norway | |
| United Kingdom | |

The problem of territorial claims was neatly set aside by the Antarctic Treaty in the wording of its Article IV:

Antarctic Treaty Article IV

1. Nothing contained in the present Treaty shall be interpreted as:-

(a) a renunciation by any Contracting Party of previously asserted rights of or claims to territorial sovereignty in Antarctica;

(b) a renunciation or diminution by any Contracting Party of any basis of claim to territorial sovereignty in Antarctica which it may have whether as a result of its activities or those of its nationals in Antarctica, or otherwise;

(c) prejudicing the position of any Contracting Party as regards its recognition or non-recognition of any other State's right of or claim or basis of claim to territorial sovereignty in Antarctica.

2. No acts or activities taking place while the present Treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica.

No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force.

Any states that became ATCPs after the Antarctic Treaty entered into force were thus prevented from staking claims. As will be seen, the effective 'freezing' of sovereignty, enshrined in AT Article IV, was adopted by the CAMLR Convention. Another significant point is that the most of the claim boundaries extended to 60°S, with the exception of Norway⁴⁴. Furthermore, north of 60°S the United Kingdom had claimed ocean territory around South Georgia and the South Sandwich Islands.

Articles IV and VI of the Antarctic Treaty were the first manifestation of the 'bifocal' approach that was to be used with such effect during the CCAMLR negotiations. Bifocalism allowed parties to recognise or not recognise one another's claims as they chose, and thus ingeniously circumvented the whole question of sovereignty while maintaining the status quo.

The significance of territorial claims for a marine resource treaty lay in the possibility of sovereignty extending from the land in to ocean areas. This became an issue during the early negotiations as a result of concurrent international law developments. Some claimant states clearly regarded themselves as having the rights of coastal states⁴⁵. Further mention is made of sovereignty over marine areas when discussing the various national players in chapter 3.

At each Antarctic Treaty Consultative Meeting, matters concerning conservation of flora and fauna were on the agenda and were the subject of a number of recommendations. At the first Consultative Meeting in 1961 the urgent need for measures to protect the living resources of the Treaty area was recorded in Rec.ATCM-I-8-Conservation of flora and fauna. It was suggested that interim measures be implemented along the lines of recommendations made by SCAR (SCAR, 1960). The Second Consultative Meeting looked to the early establishment of such measures (Rec.ATCM-II-2-Conservation of flora and fauna). Accordingly, the Agreed Measures for the Conservation of Antarctic Fauna and Flora and supplementary recommendations were drawn up at the Third Meeting of the Antarctic Treaty Consultative Parties in 1964.

2.2 AGREED MEASURES FOR THE CONSERVATION OF ANTARCTIC FLORA AND FAUNA

The 1964 Agreed Measures for the Conservation of Antarctic Fauna and Flora, which were annexed to Rec.ATCM III- 8, are the first formal regulations laid down to put into effect the strongly conservationist stand of the ATCPs at that time: they placed quite stringent constraints on human activities in Antarctica. The Agreed Measures constitute what has been described as a 'mini-treaty' under the Antarctic Treaty (Heap, 1994, Section 2.3 Introductory note). Unlike normal treaties, however, the Agreed Measures were not open to accession by parties outside the Antarctic Treaty, but merely required approval from all ATCPs to become effective.

Approval was dependent on the enactment of enabling legislation by each of the Treaty partners, where this was required. This presented few problems for claimant states, since legal regimes already existed within their domestic legislature for their claimed territories. For some nonclaimants, it was difficult, either politically or constitutionally, to place constraints on their citizens 'beyond national boundaries in an area which did not belong to anyone'(Quigg 1983: 160). We should note here that the Agreed Measures did not in fact become effective until late 1982 when all parties had registered their approval⁴⁶. This was after CCAMLR had been ratified. Until then, compliance with the Agreed Measures was voluntary.

Native mammals and birds, but no other marine organisms, were given mention in the Agreed Measures. Ecosystems are not mentioned as such, but the longer term 'natural ecological system' is used four times:

Agreed Measures Article VI [Protection of native fauna]

4. Participating Governments shall limit the issue of such permits so as to ensure as far as possible that:
 - a. no more native mammals or birds are killed or taken in any year than can normally be replaced by natural reproduction in the following breeding season;
 - b. the variety of species and the balance of the natural ecological systems existing within the Treaty Area are maintained.
- and
7. A permit may be issued under this Article with respect to a Specially Protected Species, provided that:
 - a. it is issued for a compelling scientific purpose, and
 - b. the actions permitted thereunder will not jeopardize the existing natural ecological system or the survival of that species.

Agreed Measures Article VIII: [Specially Protected Areas]

1. The areas of outstanding scientific interest listed in Annex B shall be designated 'Specially Protected Area' and shall be accorded special protection by the Participating Governments in order to preserve their unique natural ecological system.
4. A permit shall have effect within a Specially Protected Area provided that:
...the actions permitted thereunder will not jeopardize the natural ecological system existing in that Area.
(emphasis added)

ATCPs were bound to act so as to safeguard these 'natural ecological systems' and to ensure that their balance was maintained. The Agreed Measures allowed for the provision of special protection for some species and areas. Twenty Specially Protected Areas were eventually added to Annex B of the Agreed Measures.

The Agreed Measures applied only to the Antarctic Treaty area, i.e. south of 60°S, including all ice shelves (Agreed Measures Article I§1). As provided for in the Antarctic Treaty itself, the rights of states with regard to the high seas were not addressed, meaning that fishing by both Treaty and non-Treaty parties could continue unhindered in the area of the Southern Ocean covered by the Antarctic Treaty and Article I§2 of the Agreed Measures. This interpretation is supported by the fact that at the

same meeting at which the Agreed Measures were drawn up, voluntary regulation of pelagic sealing and the taking of fauna on pack ice south of 60°S was recommended (Rec.ATCM-III-XI-3). Such recommendations would have been redundant had the Agreed Measures covered these matters. Bush points out that the only other textual indication that the ocean was included in the Agreed Measures is its Article VII§3, applying to the alleviation of pollution of waters adjacent to the coast and ice shelves (Bush, 1982a, p147).

Even though the Agreed Measures extended to 60°S, only five marine Sites of Special Scientific Interest (SSSI) had been set aside by 1994 (SSSI 26, 27, 28, 35, 36). Of these, only the last two, Bransfield Strait and East Dalman Bay, are specifically entitled Marine SSSIs. A difficulty may have been the perennial one of high seas freedoms as expressed in Article VI of the Antarctic Treaty⁴⁷.

We can agree with Elliott (1994: 66) when she asserts that a major flaw of the Agreed Measures was the lack of a central permit issuing authority, so that it was impossible to assess the cumulative effect of human activity on biota. Furthermore, as they did not come into force until 1982, parties had followed interim guidelines. We can see, therefore, that there was no consistent approach to the conservation of marine ecosystems under the Agreed Measures. Attempting to assess their efficacy is thus a difficult task, as there are no baselines against which to make such assessments.

The Agreed Measures were subsumed by the much more comprehensive Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) concluded in 1991⁴⁸. The significance of this addition to the Antarctic Treaty System to the Southern Ocean regime consists in part of the provision for the designation of protected marine areas, which will be dealt with in chapter 6.

Recommendations that supplemented the Agreed Measures were passed at the 1964 and subsequent meetings, ensuring at least partial protection of living resources prior to the Agreed Measures coming into force.

They included:

Rec.ATCM-III-9; Rec.ATCM-IV-20 Interim Guidelines for the conservation of fauna and flora

Rec.ATCM-III-10 SCAR interest in fauna and flora

Rec.ATCM-III-11 Pelagic sealing and the taking of fauna on pack ice

Rec.ATCM-IV-15-17 Specially protected species (incorporated in text of Agreed Measures)

Rec.ATCM-IV-Cooperation/implementing Article VI of Agreed Measures

Rec.ATCM-VI-9 Data and conservation of fauna and flora

It can be seen, therefore, that the approach to conservation of marine biota in the Agreed Measures and subsequent measures was piecemeal, although the importance of ecosystems was recognised.

2.3 CONVENTION ON THE CONSERVATION OF ANTARCTIC SEALS (CCAS)

Under Agreed Measures Article VII-Harmful interference, seals were protected from disturbance by human activities. At ATCM-IV in 1966, the ATCPs added two Specially Protected Species to Annex A of the Agreed Measures: Fur seals (*Arctocephalus* spp) and Ross seals, *Ommatophoca rossi*. (ATCM-IV-15-17).

Interim guidelines for the conduct of pelagic sealing, and formal expression of SCAR's concern over pelagic sealing were further steps taken to enhance the conservation of Antarctic ecosystems. Rec .ATCM-III-11-Pelagic sealing and the taking of fauna on the pack ice enjoined the parties to 'ensure that the natural ecological system is not seriously disturbed'. Rec.ATCM-IV-21-Interim guide lines for the voluntary regulation of Antarctic pelagic sealing, while focussing on the maximum sustainable yield of the seal harvest, provided that if any ATCP thought that harvesting was disturbing the 'ecological system' in a locality, that party could convene an urgent meeting of the ATCPs to discuss the matter.

A report in 1970 of a Norwegian sealing expedition that had taken place in 1964 (Øritsland 1970) alerted the ATCPs to the fact that seals were inadequately protected by existing measures. This realization spurred along the drawing up of regulations for sealing (Bonner 1990)⁴⁹.

The Convention on the Conservation of Antarctic Seals (CCAS) was signed in 1972, but did not come into force until 1978 after the seventh required ratification, coincidentally during the first session of the CCAMLR negotiations.

The ecosystem (in the longer form of the term, ecological system) is mentioned several times in the text of the seals convention, but the

major thrust of this convention is to regulate sealing, as described in its Preamble:

Convention on the Conservation of Antarctic Seals

Recognizing the general concern about the vulnerability of Antarctic seals to commercial exploitation and the consequent need for effective conservation measures;

Recognizing that the stocks of Antarctic seals are an important living resource in the marine environment which requires an international agreement for its effective conservation;

Recognizing that this resource should not be depleted by over-exploitation, and hence that any harvesting should be regulated so as not to exceed the levels of the optimum sustainable yield;

Recognizing that in order to improve scientific knowledge and so place exploitation on a rational basis, every effort should be made both to encourage biological and other research on Antarctic seal populations and to gain information from such research and from the statistics of future sealing operations, so that further suitable regulations may be formulated;

Noting that the Scientific Committee on Antarctic Research of the International Council of Scientific Unions (SCAR) is willing to carry out the tasks requested of it in this Convention;

Desiring to promote and achieve the objectives of protection, scientific study and rational use of Antarctic seals, and to maintain a satisfactory balance within the ecological system...
(emphasis added)

Clearly CCAS was still wedded to the idea of sustainable yields, although the slightly ambiguous term 'optimum' is used in place of 'maximum'. It has to be asked for whose benefit the yield was 'optimum' - the harvesters or the seals.

Elsewhere in CCAS, the ecological system is always mentioned in conjunction with the possible effect that harvesting might have upon it, eg. in CCAS Article 5 §4b, Article 6 §3.

SCAR was assigned an important role in CCAS. SCAR was invited to report to the ATCPs when the harvesting of any species of seal in the Convention area was having a significantly harmful effect on the total stocks of such species or on the ecological system in any particular locality

(CCAS, Article 5§4b). No quantitative indication of 'significantly harmful' was supplied, other than seal quotas.

Species covered by CCAS were⁵⁰:

- Southern elephant seal
- Leopard seal
- Weddell seal
- Crabeater seal
- Ross seal
- Southern fur seals

Like the Antarctic Treaty and the Agreed Measures, CCAS also applied to the area south of 60°S but the conservation interests of the ATCPs were extended to areas that the AT and the Agreed Measures had designated high seas. Some of the seal species covered under CCAS range well north of the Antarctic Treaty area; this circumstance was covered by Article 5§7 of CCAS:

Notwithstanding the provisions of paragraph (1) of Article 1 the Contracting Parties shall, in accordance with their internal law, report to each other and to SCAR, for consideration, statistics relating to the Antarctic seals listed in paragraph (2) of Article 1 which have been killed or captured by their nationals and vessels under their respective flags in the area of floating sea ice north of 60° South Latitude.

(CCAS 1972) (emphasis added)

This, the first timid venturing north of the Antarctic Treaty area by the ATCPs, we shall see was later followed up more boldly in the delineation of the boundary of the CCAMLR area.

CCAS did not prohibit the harvesting of seals. Its aim included the rational use of the resource, as outlined in the Preamble. Harvesting procedures were to be humane and conditions of harvesting were listed in the Annex to the Convention. They included open and closed seasons and the designation of areas where sealing was prohibited. Three species were protected from harvesting: in addition to the Ross and fur seals already covered under the Agreed Measures, the Southern elephant seal was also not to be harvested.

Although the Convention for the Conservation of Antarctic Seals was limited to six species it is evident that in it were foreshadowed some of the ideas that later formed major paradigms of CCAMLR. Roberts regarded CCAS 'as an initial attempt to start harnessing the problems of Southern Ocean fisheries' (Roberts 1978: 113).

Importantly, CCAS was the first treaty to make provision for the management and conservation of a resource before harvesting of that resource had commenced or recommenced. Species of seal were covered that had not previously been harvested in commercial quantities⁵¹, but whose harvest was not prohibited under CCAS. As it had not been in force prior to the commencement of the negotiations for CCAMLR, the assessment of its efficacy to that date is difficult⁵².

2.4 OTHER PROVISIONS FOR ANTARCTIC MARINE LIVING RESOURCES UNDER THE ANTARCTIC TREATY

Marine living resources continued to be debated in Antarctic Treaty meetings after CCAS was drawn up. Rec.ATCM-VIII-10-Antarctic Marine Living Resources recommended that intensive studies be made of the significant concentrations of the living resources, especially of their biology, distribution, biomass and population dynamics and ecology (Treaty 1975). Rec.ATCM-IX-5-Man's impact on the Antarctic environment (§1: 1) stated:

The Consultative Parties recognize their prime responsibility for the protection of the Antarctic environment from all forms of harmful human interference.

Slightly reworded, this later became Article V §2 of the CAMLR Convention.

The increasing concern expressed about Antarctic ecosystems in ATCMs culminated in Rec.ATCM-IX-2 of 1977. Due to its importance it is treated separately below.

2.4.1 Recommendation ATCM-IX-2- Antarctic Marine Living Resources

Rec.ATCM-IX-2-Antarctic Marine Living Resources was germane to the directions that the negotiations for a proposed regime would take. It set in motion the negotiations that would result in the CAMLR Convention and is referred to in its Preamble. Rec.ATCM-IX-2 resulted from the report of a meeting of the Working Group on Marine Living Resources (chaired by New Zealand Representative John McArthur) and its Working Committee (chaired by Australia's Keith Brennan) that was held 21 September - 6 October 1977. It was tabled at the 9th Antarctic Treaty Consultative Meeting held in London in 1977. Some of the terminology used in Rec.ATCM-IX-2 was included in the CAMLR Convention.

The Parties recognised:

the urgency of ensuring that these resources are protected by the establishment of sound conservation measures which will prevent over-fishing and protect the integrity of the Antarctic ecosystem
(Rec.ATCM-IX-2 Preamble).

Thus they recommended that a regime with a wide brief be established, that would:

provide for the effective conservation of the marine living resources of the Antarctic ecosystem as a whole
(Rec.ATCM-IX-2 Part III§2d.3)

However,

...the regime should not apply to species already regulated pursuant to existing international agreements but should take into account the relationship of such species to those species covered by the regime.
(Rec.ATCM-IX-2 Part III§2d.6)

These 'existing international agreements' presumably refer to the ICRW and CCAS.

There were 3 recommendations in Rec.ATCM-IX-2, headed:

I Scientific Research

II Interim guidelines for the conservation of Antarctic marine living resources

III Establishment of a definitive conservation regime.

Rec.ATCM-IX-2, while hortatory on the subject of conservation, nevertheless deliberately pulled back from suggesting strong measures that would help to conserve Antarctic ecosystems. The Report of the Working Group on Marine Living Resources included the understanding of the Group that:

...the word 'conservation' as used in the draft Recommendation includes rational use, in the sense that harvesting would not be prohibited...
(ATCM-IX-§10)

The above definition of conservation will be found again in the CAMLR Convention Article 3.2.

Importantly, the understanding of the Working Group was that:

the word 'resources' was not limited to commercially exploitable species
(ATCM-IX-§10)

Instead, it applied to all species inhabiting the Southern Ocean (Bush 1982a: 349). This notion was followed up in the later Convention. The report of the Working Group and Rec.ATCM-IX-2 refrained from putting controversial issues on the agenda; to have done so might well have made impossible even the commencement of negotiations for a living resources regime.

Most significantly in view of recent events in the Southern Ocean, (ATCM-IX-§10) also specified that

the regime would exclude catch allocation and other economic regulation of harvesting.

This latter proviso was to have serious consequences, as explained in chapters 6 and 7.

2.5 SCAR, BIOMASS AND ASSOCIATED BODIES

The CCAMLR negotiations were heavily influenced by the activities and contributions of the Scientific Committee on Antarctic Research (SCAR) and its various programs, in particular that on Biological Investigation of Antarctic Systems and Stocks (BIOMASS).

2.5.1 Scientific Committee on Antarctic Research (SCAR)

At first named the Special Committee on Antarctic Research, SCAR was set up in 1957 as a committee of the International Council of Scientific Unions (ICSU). It first met in 1958, when its task was to coordinate the continuation of the scientific work carried out in Antarctica during the International Geophysical Year (IGY) of 1957-8. After 1961 it became the Scientific Committee on Antarctic Research and its headquarters were established in Cambridge at the Scott Polar Research Institute. SCAR's relationship with the Antarctic Treaty system was never precisely defined, but it has acted throughout as an apolitical scientific advisory body to nations and organizations performing research in Antarctica. SCAR guidelines state, in part:

Guidelines for the conduct of SCAR affairs

3. SCAR will abstain from involvement in political and juridical matters, including the formulation of management measures for exploitable resources, except where SCAR accepts an invitation for specific advice. However, in formulating its scientific programs SCAR will take note of the need for the acquisition of the scientific knowledge necessary for the judicious management of the resources of the region.
4. SCAR may provide scientific and technological advice to the Antarctic Treaty Consultative Meetings, or' to other international organisations (both governmental and non-governmental).
5. SCAR will keep under review scientific matters pertaining to the integrity of the Antarctic environment, including the conservation of its terrestrial and marine ecosystems.

(Heap 1994: 259)

At the Third SCAR Symposium on Antarctic Biology, management of Antarctic marine living resources came under discussion (Gulland 1977) and Laws raised the question of the 'krill surplus' along with the role of vertebrates in Antarctic marine ecosystems (Laws, 1977).

2.5.2 Biological Investigations Of Marine Antarctic Systems And Stocks (BIOMASS)

Under the auspices of SCAR, the First International Conference on Living Resources of the Southern Ocean was held at Woods Hole, Massachusetts in August 1976. Recommendations from this meeting resulted in a proposal for a ten-year study of Antarctic living resources. This program was BIOMASS: Biological Investigation Of Marine Antarctic Systems and Stocks.

The principle objective of the BIOMASS program was:

to gain a deeper understanding of the structure and dynamic functioning of the Antarctic marine ecosystem as a basis for the future management of potential living resources

(BIOMASS 1977: 5)

The primary focus was on krill, which was considered the key herbivore of the Southern Ocean. It was recognised, however, that other marine studies were required and it was hoped that as BIOMASS evolved it would attract the attention of scientists to those studies.

The Scientific Committee on Oceanographic research (SCOR) worked in close association with SCAR and formed with it the Group of Specialists on the Living Resources of the Southern Ocean, also called SCOR WG 54; this was to act as the planning group for BIOMASS. The Intergovernmental Oceanographic Commission (IOC) was to coordinate the international coordination of BIOMASS and the International Association of Biological Oceanography (IABO) was expected to be another partner. Many of the terms of reference for SCOR WG 54 under which BIOMASS was set up find echoes in the papers and work of the later Scientific Committee of CCAMLR and its working groups. This is scarcely surprising in view of the involvement in CCAMLR's setting up of some of the same people who were members of SCOR WG 54 and other relevant SCAR groups.

Under BIOMASS, several extensive surveys of krill in the Southern Ocean were organised, the results of which would prove of fundamental importance to CCAMLR. They were the First International BIOMASS Experiment (FIBEX) and the Second International BIOMASS Experiment (SIBEX).

FIBEX was held in 1980-81. Thirteen ships conducted a synoptic survey of krill stocks, using hydroacoustic methods in four main study areas.

The questions FIBEX addressed were:

- How much krill is there in the Antarctic?
- How much of the total krill stocks occurs in swarms?
- What is the structure of krill swarms?

(El-Sayed 1994: 7)

SIBEX, was held in various stages over 1983-85. It built on FIBEX, aiming to gain a fuller understanding of the dynamics of that part of the Southern Ocean ecosystem that was dominated by krill. In particular, it sought to:

...obtain a broad picture of krill-swarm distribution in relation to the prevailing mesoscale environmental features particularly the advance and retreat of the sea-ice

(El-Sayed 1994: 7)

It was hoped that the study of ecosystem processes would enable information to be gained regarding krill recruitment, growth and mortality rates. It also conducted fish studies, particularly of those stocks perceived to be in need of management (El-Sayed 1986, 1994). After FIBEX and SIBEX, BIOMASS conducted no more field studies, but extensive cruises conducted under CCAMLR and national programs continued and expanded research into marine ecosystems.

The relationship between SCAR and CCAMLR as it developed in the years after the establishment of CCAMLR is treated in later chapters. Here we are concerned with the influence of ideas flowing out of SCAR and its associated bodies prior to the negotiations for the new Convention. Many of the scientists involved in the work of SCAR and BIOMASS were also on delegations taking part in the CCAMLR negotiations and there was thus a ready transference of ideas.

2.6 ATTITUDES OF ATCPs TOWARDS CONSERVATION AND SOVEREIGNTY

Before beginning the analysis of the negotiations which is the subject of the following chapter, it is important to review the attitudes brought to the table by the stakeholders. These differed markedly from one another, thus further pointing up the importance of a unifying set of ideas in bringing about a successful outcome.

Political considerations, the logistics and economics of harvesting and concern for Southern Ocean ecosystems influenced the attitudes of the various stakeholders in the CCAMLR negotiations, although not all these stakeholders were able to take formal part. The contribution of national players was determined by their political and commercial interests in the Southern Ocean. There were nations that were actively harvesting finfish and krill, some were whaling while others were more oriented towards conservation of the living resources. Political considerations, in particular questions of sovereignty, interdicted with every aspect of the negotiations.

All the negotiating parties at SSCATM-1 were original signatories of the Antarctic Treaty, excepting Poland. All were or had been actively engaged in scientific research in the Antarctic. As a rule, claimants recognised one another's Antarctic claims, providing these did not overlap, while nonclaimants recognised no claims. The states that had claimed Antarctic territory had matters of sovereignty to consider.

The Antarctic Treaty Consultative Parties can be divided for the purposes of discussion into several groups. Most of the nations that had little or no commercial interest in the Southern Ocean took strongly conservationist stances on matters affecting ecosystems. The Eastern European nations, most of which were still under communist rule, were harvesting and their interests veered more towards maintenance of stocks of target species. The two Southern American nations were in dispute over territorial matters with each other and also with the United Kingdom. Chile and Argentina were the two Southern Cone⁵³ countries involved in the negotiations for the CAMLR Convention. Since many of the activities of the United Kingdom in the South Atlantic and Antarctica were in the area south of South America, there were interactions among the three nations that had implications for the negotiations.

Argentina and Chile considered the Antarctic Peninsula, some of the islands around the Southern tip of the South American continent and the adjacent waters as a part of their national geography. Chile claimed territory in the Antarctic Peninsula area in 1940. Like Norway, it did not declare a northern boundary to its territory, but in Chile's case this was because it already considered that part of Antarctica as national territory and therefore contiguous with the more northern section of Chile (Child 1988:197).

2.6.1 Claimant states and Southern Cone issues: Argentina, Chile and the United Kingdom

The Beagle Channel

At the time of the CCAMLR negotiations, Chile and Argentina were in dispute over the Beagle Channel, which is one of the three seaways giving access between the South Pacific and South Atlantic Oceans, the other two being the Magellan Strait and Drake Passage. The problem centred on three small islands (Picton, Nueva and Lennox) at the eastern end of the channel. Although these islands had supposedly been under Chilean sovereignty for about a century, they were now causing problems because of the possible extension of maritime zones to 200 nautical miles. If such an extension were applied to the ocean adjacent to the islands, Chile's economic zone would stretch well into the Atlantic, interfering with Argentina's access to its Antarctic bases. An award in Chile's favour had been made in 1977, but Argentina declined to accept this. Papal mediation began in late 1978 (Pittman 1988: 36-38; AFAR 1978). The matter remained unresolved during the CCAMLR negotiations. Later developments and their effects are treated in chapter 6.

The United Kingdom, Argentina and the Falkland/Malvinas islands problem

British explorers, sealers and whalers had visited the Southern Ocean since the mid-1700s, and had claimed territory, including the Falkland Islands in the South Atlantic in 1765. Although north of 60°S and thus not part of the Antarctic Treaty region, the Falklands form part of Antarctic geopolitics because of the connection between British aspirations in the South Atlantic and Antarctica. The position of the islands, moreover, is strategic in relation to the passages between the South Atlantic and the South Pacific oceans. Argentina's counterclaims to

sovereignty over the Falkland Islands, which they called the Malvinas, date back to the Spanish title of 1766 which Argentina inherited. The islands were settled by British colonists, against Argentine protests, in 1833 and governed by the United Kingdom from the beginning of the twentieth century (Beck 1994). Letters Patent to constitute the Falkland Islands Dependencies were issued by the United Kingdom in 1908 and 1917. The Falkland Islands Dependencies Survey (FIDS), set up in 1944, extended southwards: South Georgia, the South Sandwich Islands and their outlying islands as well as the United Kingdom's Antarctic operations, were administered under FIDS until 1962 (Beck 1994). All three island groups are also claimed by Argentina (Anon. 1946; Anon. 1948). Disputes between the two nations had arisen numerous times prior to the outbreak of overt hostilities in 1982.

2.6.2 Other claimant states: Australia, France, New Zealand, Norway

Australia had always taken pride in its Antarctic connection which had begun in the late nineteenth century and was carried forward with distinction by Mawson. As a claimant since 1933 to the largest area of Antarctica (42%) it had performed also the longest Antarctic coastline. Australia began land-based Antarctic research in 1947 and had maintained continental bases since the early 1950s.

In 1979 it declared an Australian Fishing Zone around all its territories, including Heard Island and Macdonald Islands (later to be included in CCAMLR area) and also around its Antarctic territory (Bush 1982 v.2: 202-3). This potentially provocative act was muted a month later by the Antarctic waters being 'excepted' (Bush 1982 v.2: 208-9) which meant, in effect, that the zoning did not apply there.

Oddly, Australia had not yet ratified CCAS. This delay was probably due to internal political pressures and not indicative of its national views on conservation, as Australia had officially ceased commercial whaling in 1979 at the time that its Fishing Zone was proclaimed. As a nonwhaling nation, Australia was able to take a strongly conservationist stance at the negotiations.

Although only a small-to-medium power, Australia played an important role in Antarctic Treaty meetings and took an active part in SCAR and

other Antarctic activities. Antarctica was one area of world politics where it could take a place at the table on an equal footing with major powers. There was a strong wish to have the headquarters of the coming regime based in Australia, and Hobart was actively promoted as its possible home (Hodgman, pers. comm.).

By means that are not historically transparent, France claimed Terre Adelie in 1924, its territory later forming a narrow wedge between the two segments of Australia's much larger claims. France's Antarctic ventures began with explorations in the 1770s, when it declared sovereignty over several archipelagos in the Southern Ocean: Iles Kerguelen, Iles Crozets and Iles Amsterdam and St Paul. Several of these island groups were to figure largely in the CCAMLR negotiations, and the manner in which the diplomatic difficulties about these was settled has had repercussions up to the present. France had passed laws regulating fishing around its Southern territories prior to the CCAMLR negotiations. A decree establishing an economic zone around France's Southern lands was passed just days before the CCAMLR negotiations began in 1978 (Bush 1982 v.2: 586-8; Smith 1986: 164-5). The decree did not specifically mention the seas off Terre Adelie and it has never been explicitly stated whether an EEZ exists there.

New Zealand acquired its Antarctic Territory in the Ross Dependency via the United Kingdom in 1923. New Zealand's close proximity to the Antarctic means that the EEZ (declared in 1978) generated around its southernmost islands almost touches the CCAMLR area. Unlike Australia, New Zealand chose not to declare any kind of zone adjacent to its Antarctic coastline, considering it inappropriate to do so in view of the ongoing negotiations for a living marine resource agreement, but has retained the option of declaring such a zone (New Zealand Government 1994). It continues to act as the supply base for many Antarctic expeditions apart from its own.

Norwegians were sealing and whaling in the Southern Ocean since the beginning of the nineteenth century, discovering and claiming Bouvet Island. Norway claimed Dronning Maud Land in 1939, but because precise definitions of its northerly and southerly limits would have created political difficulties in the Arctic, these remain undefined. Claims are shown on the map in the Appendix.

2.6.3 Nonclaimant fishing nations: Japan

A private expedition led by the explorer Shirase visited the Antarctic in 1911. Japan had been whaling in the Antarctic and elsewhere before World War II. Most of its whaling fleet had been destroyed during the war, but it resumed whaling as soon as it was logistically and politically possible afterwards, at first under the supervision of the Supreme Command Allied Powers (Australia 1947). Scientific research was conducted during Japan's whaling operations, which were still continuing during the CCAMLR negotiations, as was Japan's fishing for finfish and krill.

Japan is a country poor in agricultural land and therefore has to rely on the ocean for animal protein. From the early twentieth century it developed a distant water fishing fleet; this expanded post-1950 (Cushing 1988: 236-244). Japan also purchases large amounts of fish from other nations. It was one of the few industrialised whaling nations that used whale meat as human food (Francis 1991: 209; Ellis 1992: 405-430 *passim*), and it had also developed krill products suitable for human consumption (Earthscan 1977: 21).

2.6.4 Nonclaimant fishing nations: Eastern Bloc nations

A Pole, Arctowski, had taken part in the *Belgica* expedition, but Poland had not had its own program during the IGY (it contributed to the Soviet program), so was debarred from the negotiations for the Antarctic Treaty (Shapley 1985: 79). Poland only achieved consultative status in 1977 and commenced fishing in the area for krill and finfish in that year. As a member of the communist bloc, Poland's economy, like that of the Soviet Union was not driven primarily by market forces.

The USSR had been active in early exploration but had not made any claims in Antarctica. Krill fishing in the Southern Ocean was pioneered by the Soviets in the 1960s and they had gone some way towards making palatable products for human consumption from krill (Burukovskiy 1967). Finfishing was also initiated by the Soviets; they had removed considerable though possibly inaccurately reported amounts of fish from the Southern Ocean. The Soviet Union had continued whaling in the Antarctic even after it became uneconomic (Tonnessen and Johnsen 1982:

634), and, as has subsequently emerged, grossly underreported catches (Yablokov 1994; Zemsky et al 1995, 1996).

The Soviet economy was run on quite different lines from most of those prevailing in the world at that time. There was not a profit motive, but a need to fulfil quotas set by the government.

Special case: Germany

Germany was invited to the third session of the CCAMLR negotiations in its former dual incarnation as the German Democratic Republic and the Federal Republic of Germany. The German Democratic Republic acceded to the Antarctic Treaty in 1974 but did not have consultative status. However, it had been fishing in the Southern Ocean since 1977 (CCAMLR Statistical Bulletin 1990a: 14).

2.6.5 Nonclaimant nonfishing nations: USA, Belgium, South Africa

The United States of America had been active in the Antarctic for several centuries. The exploits of its explorers were of comparable status to those of the other nations named here, but its sealing and whaling expeditions had helped to deplete the mammal populations of the Southern Ocean. It had never made claims to Antarctic territory, and had made its reasons clear by means of the 1924 Hughes doctrine⁵⁴. There had been numerous quasi-military and scientific expeditions. By the 1970s the United States was becoming active in the protection of marine mammals and ecosystems; their stance in the IWC also reflected this.

The first treaty in which recognition of the interaction of organisms within ecosystems was explicitly manifested was the United States Marine Mammal Protection Act of 1972⁵⁵. The government introduced amendments to USA fisheries acts act to deal punitively with states that had transgressed international agreements, specifically IWC regulations⁵⁶.

Before the first CCAMLR negotiations the United States government had sponsored a number of studies on ways of managing harvesting in the Southern Ocean. The reports of some of these studies were made available to the negotiators (USA 1978; Bengtson 1978). The United States was interested in trying to keep intact the krill stocks of the Southern

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Ocean, not for human food but because in the future krill might provide a major industrial source of chitin (Bakus 1978; Walker pers. comm.).

Belgium was, like Australia, a smallish power that had long historical and scientific connections with Antarctica, commencing with the *Belgica* expedition under Gerlache in 1897-9. During the IGY it had carried out Antarctic research at its King Baudouin Base on Dronning Maud Land; this base was later used for several joint expeditions with the Netherlands.

Prior to and during the CCAMLR negotiations South Africa as a nation was a virtual pariah on the world stage, due to general abhorrence of its Apartheid regime. This was shown, for example, by the 32nd session of the United Nations General Assembly in 1977, where fifteen resolutions had been adopted against Apartheid (UNGA 1978). In 1977 also there had been a Declaration of the United Nations Conference on Apartheid. The Antarctic arena was one of the few in the world where South Africa could still be treated as equals (Hodgman, Miller, pers. comm.). Rowland (1988: 30) asserted that there is a 'solid tradition...of not allowing working relations within the Treaty to be affected by political differences.'

A summary of the status of the parties at the beginning of the negotiations is given in table 2c.

Table 2c
Status of Antarctic Treaty Consultative Parties 1978

| State | Claimant/ Nonclaimant | EEZ or other maritime zone | Harvesting F=finfish K=krill |
|----------------|---|---------------------------------------|------------------------------------|
| Argentina | Claimant Overlaps Chile and UK claims | EEZ | |
| Australia | Claimant | Fishing zone, EEZ | |
| Belgium | Nonclaimant | | |
| Chile | Claimant Overlaps UK and Argentine claims | EEZ | K |
| France | Claimant Terre Adelie | EEZ around subantarctic islands | |
| Japan | Nonclaimant | | F, K |
| New Zealand | Claimant Ross Dependency; | | |
| Norway | Claimant Bouvet Island Dronning Maud Land | EEZ around Bouvet Island | |
| Poland | Nonclaimant | | F; K |
| South Africa | Nonclaimant | EEZ around subantarctic islands | |
| USSR | Nonclaimant | | F; K |
| United Kingdom | Claimant Overlaps Chile, Argentine claims | | |
| USA | Nonclaimant | | |

(Information about harvesting activities pre-1980 from CCAMLR
Statistical Bulletin 1990a.)

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Status of Antarctic Treaty Consultative Parties 1978

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| Argentina | Claimant Overlaps Chile and UK claims | EEZ | |
| Australia | Claimant | Fishing zone, EEZ | |
| Belgium | Nonclaimant | | |
| Chile | Claimant Overlaps UK and Argentine claims | EEZ | K |
| France | Claimant Terre Adelie | EEZ around subantarctic islands | |
| Japan | Nonclaimant | | F, K |
| New Zealand | Claimant Ross Dependency; | | |
| Norway | Claimant Bouvet Island Dronning Maud Land | EEZ around Bouvet Island | |
| Poland | Nonclaimant | | F; K |
| South Africa | Nonclaimant | EEZ around subantarctic islands | |
| USSR | Nonclaimant | | F; K |
| United Kingdom | Claimant Overlaps Chile, Argentine claims | | |
| USA | Nonclaimant | | |

(Information about harvesting activities pre-1980 from CCAMLR
Statistical Bulletin 1990a.)

FINAL COMMENTS

It is possible that without the Antarctic Treaty different interests may never have come together to agree on a convention on marine living resources in the Southern Ocean. Most importantly, the Antarctic Treaty provided a model for addressing claims to sovereignty. According to Gulland (1985) it also prescribed a form of membership that should ensure a workable commission; this included restricting membership to those states with 'serious interest' in the Antarctic. He contrasted this with experiences in the IWC, whose broad membership is not always conducive to finding a workable solution. Gulland believed that unless there was a reasonable spread of interests among the membership of a conservation body, there is potential for confrontation. In the IWC the balance had moved from economic to extreme conservation interests, in favour of banning commercial whaling.

He considered that IWC conflicts had carried over into the negotiations for CCAMLR, because the negotiators were by and large the same small group of people. Moreover, the states still whaling were also those who wanted to fish for finfish and krill, and they would not have wished for a carbon-copy of the IWC, that was being increasingly dominated by those wishing to halt harvesting⁵⁷. Thus, it was due to the existence of the Antarctic Treaty that the harvesting states would even consider negotiating another conservation convention.

Aside from the above considerations, we can see the importance of the epistemic community as exemplified by the cross-membership of IWC and Antarctic Treaty parties. Scientists engaged in related fields of research often know each other, meet or correspond frequently and work on projects together regardless of individual scientists' nationality or political persuasion. While this cooperation is typical of scientists generally, it is even more marked in Antarctic scientific circles, because of the special nature of Antarctica and the Southern Ocean. Antarctic camaraderie, engendered perforce by the area's remoteness and extreme climatic conditions, was enhanced by the cooperative ideals attained during the International Geophysical Year of 1957-8 and enshrined in the Antarctic Treaty.

We have seen in this chapter that in the 1970s the Antarctic Treaty System, partly through outside influences, was becoming increasingly conscious of the need to protect marine living resources. Significant

external factors included the interest shown by FAO and other United Nations instruments in the Southern Ocean, as well as IWC's new, more biologically based management procedures. The ongoing Law of the Sea negotiations provided a further spur. The issue of mineral exploitation was broached at the same Antarctic Treaty meeting that put in train the CCAMLR negotiations (Rec.ATCM-IX-1-Antarctic mineral resources).

We have shown the growth of ecosystem ideas within the Antarctic Treaty System and the concern over possible harm to the living systems of the Southern Ocean. We can argue that in the light of this concern and of the external factors that we have identified, it was imperative that the ATCPs demonstrate their competence in managing resources. Chapter 3 will show how the negotiation of a workable living resources convention that embodied the strongly conservationist stance of most of the Parties was achieved.

Table 2d summarises important events in the evolution of environmental consciousness and in the governance of the Southern Ocean.

Table 2d
Significant Antarctic and world developments 1957-1980

| Year | Antarctic events | World events |
|---------|---|---|
| 1957/58 | International Geophysical Year in Antarctica SCAR founded | The space age begins with the launch of Sputnik by the USSR |
| 1959/61 | Antarctic Treaty signed/ratified ATCMI Canberra | |
| 1962 | ATCM II Buenos Aires | Rachel Carson's Silent Spring published |
| 1964 | ATCM III Brussels Agreed Measures for Flora and Fauna | Four Scientists report to IWC, recommend abolition of BWU |
| 1965 | | IWC ends blue whale harvest |
| 1966 | ATCM IV Santiago | |
| 1968-70 | ATCM V Paris USSR develops krill fishery in Southern Ocean | Anti-Vietnam War protests based in part on environmental grounds |
| 1970 | ATCM VI Tokyo | •UN Declaration of principles governing the sea-bed and ocean floor •Greenpeace founded ⁵⁸ |
| 1971 | | •RAMSAR ⁵⁹ signed |
| 1972 | ATCM VII Wellington Convention for the Conservation of Antarctic Seals (CCAS) signed | •IWC observers scheme begins •Stockholm ⁶⁰ Declaration singles out IWC, advises 10-year moratorium on whaling. •Marine Mammal Protection Act (USA) •Cod wars in North Atlantic •London Dumping Convention ⁶¹ signed •Lake Pedder flooding accelerates development of environmental movement in Australia |
| 1973 | | •Law of the Sea Third conference begins •Cod wars in North Atlantic •CITES ⁶² signed •MARPOL ⁶³ signed •OPEC oil crisis |
| 1974 | | •New International Economic Order Resolution passed in UN •Law of the Sea Third conference continues |
| 1975 | ATCM VIII Oslo Rec.ATCM VIII-2 Antarctic marine living resources | Greenpeace Save the Whale campaigns begin IWC New Management Procedure Law of the Sea Third conference continues |
| 1976 | BIOMASS workshop; FAO/UNDP Southern Ocean survey commences | |
| 1977 | ATCM IX London Rec.ATCM IX-2 CCAMLR negotiations planned BIOMASS initiated by SCAR | Greenpeace Save the Whale campaigns continue |
| 1978 | CCAMLR negotiations Canberra; Buenos Aires CCAS comes into force | Law of the Sea Third conference continues |
| 1979 | ATCM X Washington Informal CCAMLR meetings | Indian Ocean Whaling sanctuary proclaimed USSR invades Afghanistan |
| 1980 | CCAMLR negotiations conclude CAMLR Convention signed FIBEX survey held | |

3 THE CCAMLR NEGOTIATIONS

INTRODUCTION

This chapter deals with the actual negotiations: the meetings, official and informal, which ended in the signing of the CAMLR Convention. The ways in which ecosystem ideas from various participants were accommodated with opposing views will be traced.

The negotiations are described in some detail to illustrate the development of the conservation focus. Contributions to the negotiations of major national players and individuals are identified and their input assessed. Finally, there is an analysis of the Convention as agreed to in 1980. Article II of the final convention is dealt with in detail, tracing the evolution of the ecosystem idea back through the draft treaties and amendments adopted during the negotiations.

In the previous chapter, the attitudes brought to the negotiating table by the participants were reviewed. It is shown in this chapter that the laudable conservation ideals of the ATCPs, detailed in Rec.ATCM-IX-2, were inevitably diluted and reshaped by Realpolitik, but were nevertheless germane in bringing about a result.

3.1 OVERVIEW OF THE NEGOTIATIONS

Australia offered to host a meeting to negotiate a living marine resource treaty in Canberra in 1978. While the participants at ATCM-IX optimistically foresaw the conclusion of a treaty by the end of that year, this was not to be: it took more than two years before agreement was achieved. In the scale of international negotiations, this was reasonably expeditious.⁶⁴

The Second Special Antarctic Consultative Meeting (SSATCM) at which formal negotiations took place was held in three sessions:

- | | |
|-------------|--------------------------------------|
| 1. Canberra | 27 February-16 March 1978 (SSATCM-1) |
|-------------|--------------------------------------|

2. Buenos Aires 17-28 July 1978 (SSATCM-2)
3. Canberra 5-6 May 1980 (SSATCM-3)

A diplomatic conference to finalise the negotiations and to prepare the CAMLR Convention for signing was held immediately after SSATCM-3. There were also a number of informal intersessional meetings, notably involving Australia and the United States. These were reported on by Barnes (1982), and will be referred to in their proper chronological sequence.

3.1.1 Questions of sovereignty

As the ecosystem idea evolved during SSATCM-1 it became obvious that questions of sovereignty were going to become important, since some parties desired that the new convention would have a boundary based on an oceanographic and biological transition zone (the Antarctic Convergence or Polar Front) rather than the northern boundary of the Antarctic Treaty area, latitude 60°S. This proved to be a stumbling block, since north of 60°S and south of the Convergence there lay islands whose national sovereignty was undisputed. Further complications lay in the fact that some of the islands were claimed by several states. Sovereignty issues were compounded by the matter of fishing grounds. As islands and their associated continental shelves as well as banks and seamounts offer habitats for fish, harvesting is likely to occur in their vicinity. The ocean around some of the islands had already been declared as exclusive economic zones or fishing zones by sovereign states as allowed for by the emerging Law of the Sea (Kwiatkowska 1994a; Kwiatkowska 1994b; Kwiatkowska 1995)⁶⁵. Thus, if these zones were to be excluded from the negotiations, the area of high seas left for harvesting might not be productive of harvestable species.

The islands in question were:

- Bouvetøya (Norway)
- Prince Edward Islands (South Africa)
- South Georgia; South Sandwich Islands (United Kingdom/Argentina)
- Heard Island and McDonald Islands (Australia)
- Ile Amsterdam; Ile Saint Paul; Iles Crozet; Iles Kerguelen (France)

Macquarie Island is an Australian island administered as part of the state of Tasmania. Although in approximately the same latitude as Kerguelen, it lies north of the Polar Front and its inclusion under CCAMLR was never seriously considered (Walker pers. comm., Kerry pers. comm.).

At each of the three sessions all thirteen Antarctic Treaty Consultative Parties were represented: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, Poland, South Africa, United Kingdom, United States of America (USA) and the Soviet Union (USSR).

At SSATCM-3 they were joined by representatives of the (then) two Germanies, the European Economic Community and several international organizations.

It must be noted here that several interested parties were not invited to take part in the negotiations. They included South Korea, which had been fishing in the Southern Ocean but was not an ATCP, and the Netherlands, which had acceded to the Treaty in 1967 and had wished to take part. This point is revisited later in this chapter.

3.2 FIRST SESSION CANBERRA 27 February - 16 March 1978 (SSATCM-1)

3.2.1 Introductory remarks

The brief for the meeting was to elaborate:

...a draft definitive regime for the conservation of Antarctic marine living resources taking into account all the points listed in [ATCM]

Recommendation. IX-2, Section III.

(Heap 1994: 173)

Over ninety delegates met in the Australian capital, Canberra. The meeting was opened by the Australian Minister for Foreign Affairs and the first session was open to the public. An Australian diplomat, J. R. Rowland, was elected to the chair.

Delegations contained differing proportions of diplomats, military, fisheries, national Antarctic department representatives as well as scientists, which possibly reflected the type of interest each government had in the treaty to be negotiated. As we have seen, some states, among them Chile, Argentina and Australia were concerned with asserting their Antarctic territorial claims. These states also had military and diplomatic representatives, compared with those whose expressed aims leaned towards conservation, where there was a higher proportion of scientists among the delegates. A total of seven fishery experts attended. Some of these had worked previously for the FAO and the IWC. Many of the representatives were also involved in Law of the Sea negotiations. Table 3b summarises the main affiliations of delegates at the three sessions.

Table 3b

| Affiliation | Defence | Fisheries/ Primary Industry | Diplomat/Foreign Affairs/Law | Scientist/ Antarctic specialist | Total |
|-------------|---------|-----------------------------------|---------------------------------|---------------------------------------|-------|
| SSATCM-1 | 7 | 21 | 52 | 17 | 93 |
| SSATCM-2 | 14 | 15 | 55 | 16 | 102 |
| SSATCM-3 | 7 | 17 | 40 | 12 | 82 |

These figures are of course approximate, since the distinction between Antarctic specialists and diplomats is not always clear. Furthermore, Antarctic matters are handled by governments under various ministries. The significance of these affiliations is modified further when one considers that the second session was held in Buenos Aires and the Argentine delegation at this session contained the most military personnel. What is perhaps more significant is that by the third and final formal session, at least the Australian delegation contained fewer high-ranking officials than the earlier sessions. This possibly indicated the lessening importance of a threat to sovereignty as perceived by the Australian government; fishing had not commenced in Australia's 'excepted waters'.

At each session, heads of delegations made a formal statement to the meeting which indicated or hinted at the intentions of the parties and their attitudes towards conservation and sovereignty. The opening statements, although couched in diplomatic language, clearly reflected the variety of expectations from the negotiations and formed a useful departure point for the negotiations. Most of the speeches were given in English, with the exception of France, Chile, Argentina and USSR. Comments on the opening statements and documents submitted are given in sections 3.3.4 and 3.3.5.

3.2.2 The concept of the ecosystem approach explained

It will be recalled that Recommendation ATCM IX-2 was to be the starting point for the negotiations. However, the first talks clearly revealed that many of the delegates did not have even a basic understanding of the meaning of the ecosystem ideas embodied in the exhortation that the new convention would:

provide for the effective conservation of the marine living resources of the Antarctic ecosystem as a whole
(Rec.ATCM-IX-2 Part III§2d.3)

Realising this lack of understanding and encouraged by Ambassador Zegers of Chile, Dr Richard Laws, an experienced Antarctic biologist on the British delegation, invited many of the delegates together early in second week of the meeting and gave a two-hour exposition and slide

show on Southern Ocean ecosystems⁶⁶. (Barnes 1982; Kerry, Barnes, Hofman, Laws, Heap, Zegers pers. comm.). After Laws' intervention there was never any doubt in the view of most participants that the boundary of the area covered by the new Convention should be the Antarctic Convergence (Polar Front), i.e. north of the Antarctic Treaty boundary of 60°S. (Hofman, Barnes, Heap pers. comm.). Exceptions are discussed below in section 3.3.4.

3.2.3 A convention under construction: the draft conventions and working documents presented at SSATCM-1

At the Extended Preparatory Meeting of the Antarctic Consultative Parties in late July 1977, it was suggested that draft proposals for an Antarctic marine living resources convention be prepared by delegates. In fact, Australia had brought an outline draft to that meeting and passed it around informally to feel out ways of balancing the interests of the parties (Walker pers. comm.).

Although the first meeting took place not long after the conclusion of the ATCM-IX in September-October 1977, by the end of the first week eight of the delegates had tabled draft treaties drawn up by their governments. One submission by Chile, classed by that country as a Working Paper, was treated by the Chairman as a draft convention.

Table 3d
ATCPs who presented draft treaties at SSATCM-1

| Negotiating party | Language |
|--------------------------|-------------------------|
| Argentina | Spanish |
| Australia | English |
| Chile | Spanish (working paper) |
| France | French |
| Japan | English |
| Poland | English |
| South Africa | English |
| US | English |
| USSR | Russian and English |

UK submitted a proposal for the main elements for the structure of the convention. Belgium, New Zealand and Norway did not submit proposals.

Since each draft or proposal was arrived at independently, their format and sequence of ideas were for the most part incompatible. There were however sufficient major ideas to allow some kind of comparison.

3.2.4 Dominant ideas of the draft conventions and supporting documents: first emergence of the ecosystem approach

Many of the delegates were concerned with matters of sovereignty and the maintenance of the Antarctic Treaty as well as conservation and other issues related to the living resources. Main concerns of negotiating parties as revealed by opening statements, draft treaties, other tabled documentation or other sources from the first session are set out below. This discussion concentrates on matters pertaining to the conservation and use of the living resources as expressed in the draft conventions and the supporting documents as tabled by parties. Some phrases and expressions that eventually found their way into the final convention are identified. We should note here that the first mention of the phrase 'ecosystem approach' occurred in the opening statement of the leader of the United States delegation.

Most of the draft conventions recognised the competence of the International Whaling Commission and the Convention on the Conservation of Antarctic Seals, so this will not be mentioned unless there is an exception. When proposing measures, most of the drafts used fairly standard language typical of pre-existing fisheries agreements.

Many of the drafts recognised that the range of the organisms of the large marine ecosystem of the Antarctic extended north beyond 60°S. Where a boundary was suggested this was usually the Polar Front (Antarctic Convergence) as discussed in chapter 1. The various proposed boundaries are summarised in table 3e.

Table 3e

| National player | Suggested Area of Competence |
|-----------------|---|
| Argentina | South of 60°S and beyond |
| Australia | South of 60°S and beyond |
| Chile | South of 60°S with provision for extension northward |
| France | South of 60°S and area between 60°-50°S not subject to coastal state jurisdiction |
| Japan | South of 60°S and beyond |
| Poland | South of 60°S and beyond |
| South Africa | South of 60°S |
| USSR | South of 60°S |
| USA | Antarctic marine ecosystem south of Antarctic Convergence |

3.2.5 Draft conventions, opening statements and other contributions by national players.

Argentina

In its opening statement, Argentina reiterated its position on sovereignty and stressed its close proximity to the Antarctic (ANT/SCM/27). The preamble of its draft convention states the importance of safeguarding the environment and the ecosystem of the seas surrounding Antarctica and awareness of the delicate nature of the organisms and their biological interrelationships (ANT/SCM/6).

In its commentary on the draft convention submitted by the Argentine government, (ANT/SCM/6/ADD 1), it stressed that all living organisms forming part of the food chain of the region, where organisms included fish and marine animals, plants and birds, should be included in the conservation regime being negotiated⁶⁷. It reiterated the Argentine position that the living resources regime was not to be a precedent for a minerals regime. An explanatory paper tabled later (ANT/SCM/6 ADD 2) stated that the delegation's main purpose was 'the preservation of the Antarctic marine ecosystem as a whole'. It cited public opinion as being characterised by an 'increasingly active and urgent awareness of which may require us tomorrow to render an account of the decisions we take today.' Therefore scientific research was emphasised in its draft convention in the hope that 'standards of conservation' would be attained allowing rational use of the marine living resources.

The regime should recognise explicitly the prime and unshareable responsibilities of the Antarctic Treaty partners towards conservation in the Antarctic treaty area.

Argentina wanted the political balance under the Antarctic Treaty not to be weakened; they had not surrendered sovereignty over 'their' Antarctic region but merely voluntarily limited its exercise.

Argentina had proclaimed a 200 n.m. EEZ around all the territory under its sovereignty in 1966, and any activities within it are subject to Argentine law; this circumstance had to be accommodated. Establishment of a scientific committee, whose work should underpin any conservation measures implemented by the regime, was considered vitally important (ANT/SCM/6 ADD 2).

Australia

Brennan, leader of the Australian Delegation, said in the opening statement that the parties were about to negotiate the most ambitious living resources regime, which was not confined to the continent, like the Agreed Measures or a single group of species, like the Seals Convention, must take into account the inter-dependence of many of the Antarctic marine organisms. The parties, he said, must safeguard the whole Antarctic ecosystem, and a primary task was to build up a sound scientific knowledge base on which to found a conservation regime. Its ambit would include areas north of 60°S and legitimate interests of countries outside the Antarctic Treaty had to be provided for (ANT/SCM/26). The Australian Minister for Foreign Affairs also made a statement, in which he iterated Australia's long association with Antarctica through exploration and science and through its position in the Southern Hemisphere. As fishing had already commenced the constructive involvement of other countries within and outside the Antarctic Treaty framework must be sought. It needs to be shown, he said, that an instrument derived from expanding scientific research can be adapted to expanding economic exploitation and that the international cooperation can also be expanded. He recognised differing attitudes to sovereignty but

...given determination and goodwill we can rise to these challenges and construct new models of agreements, building on the basis of what has been achieved in nineteen years of cooperation under the Antarctic Treaty. (ANT/SCM/22).

In the commentary of Australia's delegation on its draft proposal, a parallel was drawn between the ATCPs concern for the conservation of the terrestrial environment and the intention of the embryo convention to concern itself with the marine ecosystem (ANT/SCM/-AUS 1978d). Australia also commented that there had not been sufficient time to prepare anything but a preliminary draft and thus was not bound by the draft submitted.

Australia's draft, in its Art 1, proposed that the scope of the new convention go beyond that of the Antarctic Treaty, to include 'the living organisms which form part of the ecosystem of those seas'. The functions of the commission to be established included adopting measures that would ensure the conservation of Antarctic marine living resources. The harvesting of species should be:

...in keeping with the preservation of the marine ecosystem as a whole...and...not have a detrimental effect on other species dependent or linked to the food chain.

(SSATCM/1/3).

Australia made repeated reference to the Informal Composite Negotiating Text (ICNT)⁶⁸ of the Law of the Sea Conference and noted that the convention being negotiated was, like Article 61 of ICNT, concerned with conservation and management (ANT/SCM/3/ADDI:3).

Australia acknowledged that while the new convention was not identical in function with the Northwest Atlantic Fisheries Convention of 1949, nor the NEAFC 1952, nor with the Convention for the High Seas Fisheries of the North Pacific Ocean, it felt that there was sufficient common ground to use organisational provisions of those treaties as a guide (ANT/SCM/3/ADDI:5).

Belgium

No opening statement or supporting documents from Belgium are reported.

Chile

The Chilean Ambassador in the opening statement noted the continuity of Antarctic tradition:

Once again we meet in Canberra, where the first Antarctic Treaty Consultative Meeting was held, in circumstances of similar historical importance.

Exploitation of Antarctic resources has 'serious problems for the ecological reserve we call Antarctica', he said. The delicate political and legal balance of the Antarctic Treaty must be preserved, but:

Our first regard must be to preserve and protect the Antarctic ecosystem, with due regard for the ecosystems linked with it.

The authority of the Antarctic Treaty must be recognised, as at the FAO conference in 1975 [where the Antarctic Treaty's authority was acknowledged].

Non-parties to the Antarctic Treaty must conform to the objective of protecting the ecosystem. The new regime should emanate from the Antarctic Treaty and be elaborated by the Consultative Parties.

The Antarctic problem must not be internationalized piecemeal; the Antarctic treaty system must adapt and encourage dialogue between parties with a legitimate interest in Antarctica. States should be encouraged to accede to the Antarctic Treaty rather than Antarctic Treaty partners moving outside of it. Article IV [of the Antarctic treaty] safeguards the rights and claims of some while not prejudicing the position of nonclaimants.

Chile, he stressed, was an original signatory of the Antarctic Treaty, it is adjacent to Antarctica, it is active and present and has undisputed sovereignty in parts of the area (ANT/SCM/25).

Chile had not prepared a draft convention prior to the meeting, but, based on the discussions, tabled a working paper (ANT/SCM/9) whose contents were taken into account by the chairman's drafting committee. This paper broached topics which Chile deemed not to have been covered in the drafts. It made the point that no conservation regime could be laid down without reference to the norms already laid down under the Antarctic Treaty system. Reiterating the opening statement that the convention should be drawn up within the Antarctic Treaty framework, it suggested

that the system should be expanded to include new members, making it more relevant. The principles of the Antarctic Treaty's Article IV must be upheld in the new convention, which should not have competence outside the treaty area. In papers tabled 10 days later, (ANT/SCM/15, ANT/SCM/16), conservation measures were suggested by Chile, which included establishment of various grades of reserves, regulation of fishing zones, gear, and harvesting.

France

France's opening statement suggested that debates should be around these basic themes:

- Form of the regime,
- Area of application of the regime,
- Organs to be set up within the framework of regime: organization, operation, functions...,
- Links between the regime and the Antarctic Treaty,
- Role of Consultative Parties in the implementation of the regime
- Entry into force of the regime, accession, settlement of disputes

The preamble of the draft convention submitted by France recognised the vital importance of the ecosystem of the seas around Antarctica and the need to prevent overexploitation of the flora and fauna. France uses the term 'flora and fauna' in place of 'living resources'. This was a source of some confusion, since the two terms are not identical in meaning (Kerry, pers. comm., Hureau pers. comm.).

As one of the powers that has undisputed sovereign territory in the Southern Ocean, France's draft treaty was much concerned with coastal state issues and overlaps in competence with the new regime and other pre-existing regimes. It should apply north of 60°S but only to those waters outside coastal states' jurisdiction⁶⁹.

Japan

Japan's opening statement expressed the desire that the new regime established as soon as possible in such a way that rational use of the resources is 'effectively harmonised with the requirement of environmental preservation.'

A draft convention should apply to states with an active interest in conservation of resources and which have carried out research and harvesting.

As well as the Consultative parties, a diplomatic conference to adopt the convention should be attended by those states that are engaged in harvesting and research in order to secure their cooperation. Japan recognises neither territorial claims nor fishery zones (ANT/SCM/21).

The preamble of Japan's draft convention acknowledged the need for scientific research on Antarctic marine living resources, with conservation measures based on scientific evidence to prevent overexploitation. The convention should apply south of 60°S and north of that only insofar as is needed for effective conservation, without prejudice to the rights of coastal states; it should not apply to resources already covered under other international agreements. (ANT/SCM/8)

New Zealand

The delegate in his opening statement stressed that both Australia and New Zealand are intimate neighbours of Antarctica. They are connected with it through history and the early explorers, through shared geology, through climate and environment of both countries being directly affected by Antarctica, and by the ocean. The New Zealand Exclusive Economic Zone extended its jurisdiction almost to 60°S. Species in New Zealand waters and the Ross Sea migrate freely back and forth. This 'close proximity and interlocking ecosystem' motivated New Zealand's desire for a conservation regime. He cited New Zealand's stance, favouring scientifically-based whale stock conservation measures in the International Whaling Commission meetings. Being conscious of economic reality, he allowed that fishing should continue for the present, but warned that it was possible that the resource could be fully utilised and that conflict could arise between distant water fishing nations and coastal states.

He noted the anomaly that conservation obligations were placed upon Antarctic Treaty parties, while other nations outside that treaty are currently harvesting in the Southern Ocean (ANT/SCM/19).

Norway

Norway's opening statement identified krill as one of the major untapped protein sources. Before large-scale catch-efforts begin, the possible effects of such harvesting on krill stocks and other species should be investigated to determine the size of the resources and how much can safely be harvested.

All fishable stocks in the Southern Ocean ecosystem, except whales and seals, should be protected by a convention. This should be open to parties other than the Antarctic treaty parties, who should be invited to take part in its establishment or they might well refrain from acceding to it. The convention should provide a wide spectrum of regulatory measures and allow international inspection. Data gathering should be a high priority of the new regime (ANT/SCM/20).

Poland

The opening statement, in similar wording to that of the USSR, stated that Antarctic Treaty System worked fruitfully and proved that close cooperation between interested states can give solutions to complex international problems. The Consultative Parties have a special responsibility for the Antarctic environment, A convention should be drafted to set up a definitive conservation regime. Questions requiring answers included the geographic scope of the convention, how the conservation of marine living resources and their rational utilization could be ensured, what functions and composition the commission should have, the system of that body taking decisions and recommendations, and who would be party to such a convention. Poland considered that there was no other region more sensitive than Antarctica in its natural conditions and ecological balance (ANT/SCM/32).

Poland's draft convention stated that it should apply to all waters south of 60°S and 'beyond that latitude, waters where organisms of the Antarctic are present'. All living marine resources in the area except those covered by the International Whaling Commission and the Convention on the Conservation of Antarctic Seals should be covered. Reflecting its interests in fisheries, Poland's draft recommended regulatory measures. It even suggested introducing fish and other organisms to improve and increase the living marine resources. The ecosystem is not mentioned (ANT/SCM/10).

South Africa

By the adoption of Recommendation IX-2, the opening statement asserted, the Consultative Parties had shown the world their concern and responsibility over Antarctica and the seas around it. To retain the initiative the deadline should be met, at the same time ensuring that measures were put in place well ahead of the start of exploitation of

marine living resources. The positive steps towards a conservation regime were welcome because of South Africa's proximity to Antarctica, and because the regime will strengthen the Antarctic Treaty regime and bear witness to the peaceful international cooperation in that part of the world (ANT/SCM/24).

The overexploitation of Antarctic marine living resources covered by the convention should be prevented. The convention must ensure that harvesting of:

target species do not adversely affect the health of dependent or related species,' and 'is conducted in accordance with maintenance of the integrity of the Antarctic marine ecosystem as a whole.

(ANT/SCM/4).

United Kingdom

In the opening statement, it was noted as a very good augury that the Convention for the Conservation of Antarctic Seals would enter into force during the meeting⁷⁰ as that convention was the first step and set a useful precedent as a separate instrument which states can join without acceding to the Antarctic Treaty. However the Seals Convention was incorrectly viewed as a harvesting and exploitation agreement, whereas it is a conservation agreement. It was hoped that the new treaty would not be similarly misunderstood.

The task before the parties was more difficult than that faced by those who drew up the Seals Convention, because the new convention concerned the total Antarctic marine environment. This was a new departure and its success would depend on:

...knowledge of the dynamics of the ecosystem as a whole and on knowledge of all species, both as predators and prey, whether or not they are exploited.

Initial limits to exploitation should be low. A protein producing industry should be a reliable long-term resource and not exploited beyond sustainable levels. The aim of the United Kingdom government was therefore to set up an effective regime for the conservation of the Antarctic marine ecosystem as a whole over the long term, to create this regime by a separate convention and to ensure that both the regime and

the Convention shall be acceptable to the international community (ANT/SCM/33).

A proposal was presented by the United Kingdom in which it identified what it regarded as the main elements of the convention. These included an obligation to limit harvesting operations, such that risks deriving from 'dynamic properties of the ecosystem' and 'inaccuracies in scientific assessments' were taken into account.

The United Kingdom also presented a definition of the term 'conservation' (ANT/SCM/INF/6) that was, interestingly, based on the report of the Workshops that gave rise to the New Principles⁷¹.

United States of America

The opening statement praised the negotiations because they offered the chance to resolve a problem while still manageable and at the same time strengthen the Antarctic Treaty. The main features of the new convention should assure the protection of the Antarctic ecosystem and the conservation of its components. Therefore, it was essential to adopt

...a conservation standard based on an ecosystem approach
(emphasis added)

This should establish an obligation to prevent the depletion of populations of Antarctic marine living resources below the levels which produce the greatest net annual increment and which would ensure that no irreversible or long term changes occur in the structure and species composition of the Antarctic marine ecosystem. Such an approach would allow this and future generations to reap the maximum benefits from these resources. This echoes the wording of the New Principles⁷².

The regime should have the authority to set conservation measures and require that parties meet the conservation standard and measures. It should provide the data to make conservation decisions. An international observer system should be put in place to ensure compliance and help gather information. The scientific committee should give independent advice based on ecological and biological considerations alone. All those engaged in harvesting or scientific research in the Antarctic marine ecosystem should participate in the regime (ANT/SCM/28).

These ideas were further developed in the USA's draft convention (ANT/SCM/11), whose opening sentence reads:

Recognising the importance of the Antarctic marine ecosystem

Its preamble then outlined the threats to the Antarctic marine ecosystem and the importance of preserving a full range of conservation options by maintaining the structure of the ecosystem and the relationship of its component species. It defined the Antarctic marine ecosystem as the marine areas south of the Antarctic Convergence and the relationships between the organisms and their physical environment. The whole of the draft was strongly conservationist in tone, with ecosystems frequently mentioned. Its wording reflects the spirit of the New Principles already mentioned above. For example, the draft advocates prevention of:

irreversible or long-term changes in the structure and species of the Antarctic marine ecosystem

This is like New Principles 1:

The ecosystem should be maintained in a desirable state such that...risk of irreversible change or long-term adverse effects as a result of use is minimised.

(Holt and Talbot 1978: 14)

In its concern for the protection of ecosystems, the USA draft convention resembles the Marine Mammal Protection Act.

USSR

The opening statement acknowledged that the Antarctic Treaty had created favourable conditions for broad cooperation among states in that part of the world. It cited the Agreed Measures and the Convention for the Conservation of Antarctic Seals and other decisions made in the Consultative meetings as evidence that solutions to complex problems could be found (ANT/SCM/29).

The draft presented by the Soviet Union resembled a straightforward fishing convention. It is paraphrased here at some length to show how diametrically opposite were its views to some of the more conservation-

oriented states. In the preamble to its draft convention emphasis was laid on 'conservation and orderly utilization' of living resources such that maximum allowable catch was not exceeded. It advocated that 'reasonable international measures for their conservation' should be elaborated.

The Convention should apply only to the Antarctic Treaty area and should preserve the sovereignty provisions prevailing there (ANT/SCM/7 Art 4). It defined 'living resources' as finfish, molluscs, crustaceans, and other species, but not birds (ANT/SCM/7 Art 5.2). A commission should be established with that would facilitate study of Antarctic marine living resources and examine stock status evidence submitted by Scientific Committee. It should adopt recommendations which may provide for determination of allowable fishing gear, of fish on board vessels, landed, displayed or sold. It should establish open and closed harvesting seasons and areas and aim towards improvement, maintenance and restoration of status of Antarctic marine living resources. The commission should decide on subareas and boundaries, recommend total allowable catch quotas and draw the attention of both states party and not party to the convention to matters concerning its vessels and their activities in the convention area (ANT/SCM/7 Art. 7).

A Scientific Committee should be established whose functions include the collection and analysis of information regarding Antarctic marine living resources and making recommendations for national and international programs of relevant research. It should prepare stock status reports and inform the Commission of all cases where:

the harvesting of any species has reached a level at which its reproduction may become seriously threatened
(ANT/SCM/7 Art. 10.4)

Final Comments on opening statements, draft conventions and supporting documents.

The opening statements are interesting in that, aside from the USSR, they mostly played down the issue of harvesting and its regulation. If mentioned at all it was in very coy terms. Most parties appeared convinced that they were aiming to achieve a conservation regime that would strengthen the grip of the Antarctic Treaty System in the Treaty area. Some were more concerned over sovereignty issues and presumably

for that reason several opted for confining the competence of the new treaty to the area that had already been administered under the Antarctic Treaty for the previous 17 years, namely south of 60°S.

In most of the statements and documents a consciousness was evident of the need to look after the ecosystem, which was then viewed as simple and fragile. The first mention of the phrase 'ecosystem approach', it will be recalled, occurred in the opening statement of the leader of the United States delegation.

The views of the parties were more explicitly expressed in the draft treaties and working documents, where vexatious issues could be presented in more straightforward ways than was possible in an address⁷³.

3.2.6 The Comparative Table and the Chairman's draft

A number members of the Australian delegation under the direction of Australians Keith Brennan, John Rowland and Hugh Wyndham performed the work of collating the collection of disparate documents described above. There was one group concentrating on the scientific principles and another doing the actual drafting. It was achieved by the very practical method of physically cutting each proposal into paragraphs or clauses and attempting to match these up according to their content where this was possible. This took place over several nights, each new draft being available for presentation by Rowland the following morning. Although there was much discussion on the sidelines and some tensions, on the whole the atmosphere was cooperative and friendly. Working at their tables at the Academy of Science, the drafters would receive late-night visits from other delegates to see how they were progressing. The result of this cut-and-paste exercise was a massive comparative table, set out in columns under the names of originating nations (Rowland, Kerry, Lilburn, Burmester, Moncur, Harrison, Walker, pers. comm.)⁷⁴.

At the Heads of Delegations meeting, the representative of the USSR, presented a masterly summary in point form of the dominant ideas of the various draft conventions:

Outlines of the Convention for the Conservation of Antarctic Marine Living Resources

- I. Preamble
 - II. General provisions
 - 1. Basic principles:
 - a) obligation to cooperate with each other;
 - b) non-discrimination with regard to third countries
 - c) scientific basis for conservation measures
 - d) obligation of the Contracting Parties to seek compliance with the Convention on the part of third countries.
 - 2. Various kinds of information to be submitted to the Commission and the Scientific Committee.
 - 3. Financial matters
 - III. The area in which the Convention shall operate
 - IV. Definition of Antarctic marine living resources
 - V. Article IV of the Antarctic Treaty
 - VI. The Commission
 - a) Membership
 - b) Functions
 - c) Procedure of decision making
 - VII. The Scientific Committee
 - a) Membership
 - b) Functions
 - c) Procedure of decision making
 - VIII. Secretariat
 - IX. Cooperation with other international organizations
 - X. Concluding articles:
 - a) Parties to the Convention
 - b) Accession procedure
 - c) Entry into force
 - d) Dispute settlement
 - e) Amendments
 - f) Withdrawal from the Convention
 - g) Depository
- (ANT/SCM/inf).

This useful summary formed the framework for the 'Chairman's draft' that delegates were able to take back to their governments (Heap pers. comm.). It also dispels the idea that the attitude of the USSR was totally negative.

3.2.7 The ecosystem approach appears in drafts of Article II

Article II of the Chairman's revised draft read:

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 or 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 depletion of any harvested species or populations to levels below those which produce the greatest net increment in population numbers or biomass;
 - b) Maintenance of the balance of the Antarctic marine ecosystem by taking into account the relationships of harvested species with dependent and related species and the restoration of species or populations depleted below levels defined in subparagraph a);
 - c) Prevention of changes in the Antarctic marine ecosystem which are not potentially reversible over a few decades taking account of uncertainties in knowledge both of the direct and indirect impact of harvesting and associated activities on the marine Antarctic ecosystem and of the effects of environmental changes.

(Ant/SCM/17/REV.2)

Here is the ecosystem standard spelled out in full, virtually as it appeared in the final Convention, with minor changes as discussed below. It drew heavily on the USA draft Articles II and III, and the South African draft Article XIII.

3.2.8 The boundary of the Convention area

This was a matter of great importance. As already been pointed out, many of the organisms subject to harvest at that time, and the ecosystems of which they formed a component, were found predominantly south of the

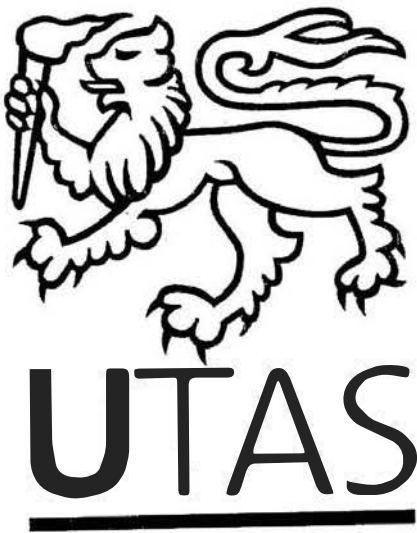
Antarctic Convergence or Polar Front, making this a more appropriate boundary than the 60°S line of latitude which forms the outer limit of the Antarctic Treaty area. However, as discussed in chapter 2, the location of the Polar Front is neither regular nor fixed. In the western part of the Southern Ocean it tended to be close to 60°S, while in the eastern half it could be encountered as far north as 50°S. Furthermore, as explained in chapter 2, its position changes somewhat from season to season and from year to year. It would have been most impractical to move the boundary of the convention area every year, so an average position for the Polar Front was eventually decided upon.

The first line drawn during the meeting coincided with the northern boundaries of FAO Statistical Areas 48, 58 and 88 as they had been delineated in 1977 (FAO 1977). Between 50°W and 60°W, there was a step-wise line in the boundary from 60° to 55° to 50°S on the FAO map. This came close to Burdwood Bank which is near the Falkland/Malvinas Islands and intersected the Argentine EEZ. Clearly this boundary was not politically satisfactory. Accordingly, the northern boundary of the convention area between 50°W and 60°W was revised so that it passed through deep water well south of Burdwood Bank⁷⁵ and clear of Argentina's domestic EEZ, but also south of the average position of the Polar Front. This matter is revisited in chapter 7. However, as has already been discussed, the boundary could in any case only be an approximation of the Polar Front. It was important that agreement on this point be achieved - that the boundary would contain a larger proportion of Southern Ocean than would be enclosed by the 60°S line.

3.2.9 Summing up SSATCM-1

Consensus on the ecosystem approach was not achieved painlessly. There was a divide between fishing nations - led by the USSR and Japan, and the conservation-oriented nations, led by the USA and Australia. The latter favoured an ecologically cautious approach, which although cast in different terms was much like the precautionary approach of today. Even then, some did not think the draft convention took the notion of species interaction far enough. The fishers, on the other hand, favoured a less cautious approach. 'Conceptually, we were trying to look at a whole ecosystem, while the fishers concentrated on single species'. (Walker, pers. comm.).

In spite of the anxieties of fishing nations, agreement had been reached on almost all substantial points by the end of this session. Certainly the conservation standards that were to form the backbone of the convention appeared to have been accepted in principle by all parties. A sticking point that should not have been unexpected, as it was several times flagged during the session, was the matter of the French subantarctic islands. Instead of quickly completing an agreed text, the parties had to continue to negotiate for several more years. A second session was organised to take place in Buenos Aires.



3.3 SECOND SESSION BUENOS AIRES 17-28 JULY 1978 **(SSATCM-2)**

3.4.1 Opening statements at SSATCM-2

Most of the opening statements largely reiterated what was said at SSATCM-1. Several are cited below.

The meeting was opened by Vice-Admiral Montes, Minister of Foreign Affairs and Worship of Argentina. In his address, he asserted Argentina's Antarctic destiny, for 'geographical and geopolitical reasons that cannot be gainsaid', including Argentina's continuity with the Antarctic peninsula and the latter's similarity to the Andes.

Historically, Argentina's presence in Antarctica dated back to the second decade of the 19th century, when Criollo seal hunters, using Buenos Aires as their home port, sailed to the South Shetlands. Since secrecy surrounded these voyages they went unrecorded and the islands were claimed as discoveries by other travellers. Montes also cited the 'indisputable' historical fact of Argentina's occupation of a station in the South Orkneys since 22 February 1904 and that it was the only nation with an Antarctic base for over 40 years. Montes further mentioned the concept of the convention serving to preserve one of the most important protein reserves in the world although he later appears to use the term conservation synonymously with preservation.

The head of the Argentine delegation, Lopez, also stressed the sovereignty issue and the importance of keeping the ideas embodied in Article 4 of the Antarctic Treaty as part of the new regime.

Lopez cited Argentine legislation governing the preservation of the marine ecosystem under Argentine jurisdiction. He suggested the setting aside of a 'reserve area' adjacent to the entire Antarctic coast to protect breeding areas.

Other important statements included that by the Head of the United Kingdom delegation, which showed that appreciation of the complexity task facing the parties had advanced even in the short time between SSATCM-1 and -2. He said:

Our task is extremely difficult, because in London [ATCM-IX 1977], they told us that it was our duty to reach a convention that would cover the balance of the entire ecosystem of the area. Other conventions that might be

paralleled to this one have concerned themselves with the fate of the species of the region, but we are interested in the balance of all the species of the region. Such a task has never before been undertaken.
(SSATCM/2/Doc./T.A./6, 1978)

The USSR delegate thought the new Convention should underpin the international regime established by the Antarctic Treaty, under which Antarctica was to be used for peaceful purposes. His delegation was confident the spirit of cooperation characteristic of Antarctic Treaty meetings would facilitate proceedings in this meeting. He stated that stocks of Antarctic marine living resources had been shown to be substantial, and stressed the need for a Convention which 'would provide a sound, strictly scientific basis for the utilization of Antarctic marine living resources.'

3.4.2 Article II revisions at SSATCM-2

The ecosystem standard laid down in Article II of the first Chairman's Draft was discussed in an informal group chaired by Laws, who had so persuasively gained initial acceptance of ecosystem ideas at the first session. Moiseev of the USSR, a veteran scientist of international repute, persuaded others on his delegation of the necessity of accepting the ecosystem standard in recognition of the central role of krill in Southern Ocean trophic relationships (Barnes 1982: 252).

By the end of SSATCM-2, delegates had agreed on a new version of Article II, shown below. §1 and §2 of Article II were unchanged.

(The changes from the first Chairman's Draft are underlined; deleted words are shown thus {}).

3. Any harvesting or 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 {depletion} decrease in the size of any of any harvested {species or} populations 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 {produce} the greatest net annual increment {in population numbers or biomass};

b) Maintenance of the {balance of the Antarctic marine ecosystem by taking into account the} ecological relationships between {of} harvested, {species with} dependent and related populations of Antarctic marine living resources {species} and the restoration of {species or populations} depleted populations {below} to the levels defined in subparagraph a);

and

c) Prevention of changes or minimization of the risk of changes in the {Antarctic} marine ecosystem which are not potentially reversible over two or three {a few} decades taking into account the state of available {of uncertainties in} knowledge {both} of the direct and indirect impact of harvesting {and associated activities}, the effect of the introduction of alien species, the effect of associated activities on the marine Antarctic ecosystem and of the effects of environmental changes with the aim of making possible the sustained conservation of Antarctic marine living resources.

The effect of the changes to Article II was to streamline its wording and elaborate some of the prescriptions regarding ecosystems. It is difficult to understand why 'two or three' was substituted for 'a few' decades, since this is no more precise and begs the question of the starting point from which to measure the time.

3.4.3 Achievements of SSATCM-2

The documents and personal recollections of participants in SSATCM-2 (Rowland pers. comm. Kerry, pers. comm.) reveal that the general tone of this meeting was very different from that of the first session. The chairman's draft that had been produced at the end of that session was pulled apart in the Buenos Aires meeting and minutely amended; about 40 changes were suggested so that the draft began to lack internal cohesion.

A number of obstacles arose at this meeting. Acceptance of the ecosystem standard and reconciliation of ecosystem considerations with sovereignty issues proved difficult.

No new draft was produced, but the chairman nominated 7 documents for study by governments, as shown in table 3f.

Table 3f
Amending documents at SSATCM/2

| Topic of document | ATCP | Reference |
|--|-------------|------------------|
| System of observation and inspection | | WP/14-rev.1 |
| Shared resources in areas adjacent to the area to which the convention would apply | | WP/16-rev.3 |
| Interim arrangements for observation and inspection | | WP/17-rev.1 |
| Conservation measures | | WP/19-rev.1 |
| Article II Revisions | | WP/20-rev.1 |
| Financial matters | | WP/21-rev.1 |
| Supply of information | | WP/22-rev.1 |

The item on shared resources was important, in respect of ongoing negotiations on the Law of the Sea, and future negotiations on Straddling Fish Stocks, discussed in chapter 7.

French Subantarctic islands

Difficulties arose over the French subantarctic islands. This problem was flagged at the first session when the draft convention submitted by France strongly pushed for the exclusion of sovereign coastal state's maritime zones from the area of competence of the regime being negotiated. An amendment by France to the draft convention (SSATCM/2 1978) reinforced the notion of sole responsibility of coastal states, as did a statement presented to the meeting by the French delegation (SSATCM/2 1978). Since the negotiations had been heading towards extending the competence of the proposed Convention to include the Antarctic marine ecosystem as far north as the Antarctic Convergence (Polar Front), we may regard it as a step backward to exclude a large part of this - the area around the Crozet and Kerguelen archipelagoes - from its jurisdiction. We may argue that this aspect was of less concern to the French than the possible erosion of their sovereignty.

3.4 INFORMAL MEETINGS

3.4.1 Washington Meeting 1, September 1978

That the lack of progress at the Buenos Aires meeting was frustrating to many of the negotiating parties was clear (Rowland, pers. comm., Kerry pers. comm., Barnes 1982). Another meeting was convened soon afterwards to overcome the impasses revealed at Buenos Aires. This meeting was held in conjunction with the resumed Law of the Sea negotiations in Washington, D.C. in September 1978. No official record of it exists, but it was extensively reported on by Barnes (1982). An amended draft treaty, nicknamed the Washington Draft, was produced at the end of this meeting and published in an international journal (Anon. 1979c). This draft was presented virtually intact at the final session of the SSATCM in 1980.

Article II, paragraph 3 of the Washington Draft stated:

- 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 subparagraph a); and
- c) Prevention of changes or minimization of the risk of changes 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.

(Anon. 1979c)

Thus it was identical with the Buenos Aires draft of Article II and this was also the version finally adopted in the Convention.

3.4.2 Berne Meeting 9-13 March 1979

The Australian Ambassador to Switzerland, Keith Brennan, called together a further meeting in Berne. (Barnes 1982). This informal meeting, whose purpose was to discuss the Washington Draft and to set a venue and date for the final conference was attended by all 13 parties. The difficulties regarding the rights of France in its exclusive economic zone around the Kerguelen and Crozet islands again proved a stumbling block (Barnes 1982: 255-6).

3.4.3 Washington Meeting 2, September-October 1979

Several informal negotiating sessions, held in conjunction with the Tenth Antarctic Treaty Consultative Meeting (ATCM-X) in Washington D.C in 1979, were again largely devoted to solving the impasse regarding the French subantarctic islands. A form of words for an annex to be attached to but not part of the final Convention was sought but not agreed to by all the parties so was not included in the meeting report of ATCM-X (Barnes 1982). However, this annex was presented to the Chairman of SSATCM-3 and was later appended to the Convention.

At the ATCM-X, the Australian government took the opportunity to promote Hobart as the headquarters for the commission to be formed after the convention was agreed upon (McGaurr, pers. comm.). A glossy brochure (Brownlow 1979) produced on behalf of the government of Tasmania was distributed to delegates to the Washington meeting and sent to other nations with Antarctic interests (Anon. 1979a; Anon. 1979b).

3.5 THIRD SESSION CANBERRA, 5-7, 7-20 MAY 1980 **(SSATCM-3)**

This, the third formal negotiating session, consisted of two parts. The purpose of the first part, held 5-7 May, was to prepare draft rules of procedure and a draft agenda for the Diplomatic Conference that would follow on 7-20 May.

There were still difficulties to solve in finalising a convention to which all could agree. These difficulties included the wording of the convention where it dealt with ecosystem matters, but were also concerned with matters of procedure and protocol.

3.5.1 Changes in representation

This last formal session differed from the preceding two in that non-parties to the Antarctic Treaty were invited to the diplomatic Conference following the preparatory meeting, namely the German Democratic Republic and the Federal Republic of Germany. Both had demonstrated an interest in fishing in the area.

Australia recommended extending invitations to two other nations but these were barred by the USSR; the consensus rule meant that there was no debate on the matter. The two excluded were the Netherlands, although it had conducted research in Antarctica and was a signatory to the Antarctic Treaty, and the Republic of Korea which had commenced harvesting krill in 1979 (CCAMLR 1990a), but had not yet signed the Treaty (Barnes 1982).

The United States solicited but did not obtain support for accreditation as an observer of the Antarctic and Southern Ocean Coalition (ASOC)⁷⁶, which represented about 100 nongovernment environmental groups, including Greenpeace and Friends of the Earth⁷⁷.

Despite their exclusion, a number of members of ASOC and other environmental groups were in attendance outside the meeting, lobbying and talking with delegates. A newsletter, ECO, produced by Friends of the Earth and Greenpeace and funded from nongovernment sources was made available to delegates. ECO appeared frequently, providing a running commentary on the proceedings. ECO suggested that the Netherlands was not invited to SSATCM-3 so as to mask the exclusion of

the Republic of Korea, whose presence might have been embarrassing to the USSR (ECO 1980).

The European Economic Community (EEC), as the European Union was then known, attended SSATCM-3 although the EEC included several of the nations that were participating in the negotiations in their own right. It had observer status only but was given wide privileges compared with other bodies attending in an observer capacity. Such privileges included participation in budgetary decisions (Australia 1981:14). Although the EEC was debarred from becoming an original signatory, the right of a 'regional economic integration organization' to accede to the convention was written into the convention text (CAMLRL Convention Article XXVIII§2; XXIX§2).

Intergovernmental organizations: the Food and Agriculture Organization (FAO), the Intergovernmental Oceanographic Commission (IOC), the International Union for the Conservation of Nature, (IUCN), the International Whaling Commission (IWC), the Scientific Committee for Antarctic Research (SCAR) and the Scientific Committee for Oceanic Research (SCOR), were invited to attend the Diplomatic Conference as observers. However, the delegates to SSATCM-3 were given limited opportunity to benefit from the expertise brought by the organizations named, since the latter were excluded from all except plenary sessions. There was also a change in the internal composition of delegations by the third session. Some governments, having followed the previous negotiations, may have decided that their emphasis was not so much on sovereignty but more on resource issues and altered the orientation of representatives accordingly, resulting in a lower proportion of defence and a higher representation of scientific and fisheries experts.

3.5.2. Final attempts to shift the ecosystem focus of the CAMLR Convention.

The USSR made ten attempts to alter the draft Convention at the last meeting. In particular, it again pushed for the boundary of the Convention area to coincide with that of the Antarctic Treaty area, i.e. south of 60°S only. This was in contradiction to the wishes of other parties as already explained, since such a boundary took no account of biological considerations but was based on prior political agreements, namely the area of competence of the Antarctic Treaty (SSATCM-3, CAMLR/47, 1980).

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The USSR attempted to amend Article II to read:

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 of Antarctic marine living resources.
3. For the purposes of the rational use of Antarctic marine living resources and of maintaining their stocks at levels enabling the maximum permitted catch to be taken, the Contracting Parties shall proceed on the basis of the fullest scientific information at their disposal.
4. When deciding upon the amount of the maximum permitted catch of any population, the Contracting Parties shall have regard to the effect on species associated with the exploited species.

SSATCM-3, CAMLR/44, 1980) (emphasis added)

This revision reflected the Soviet attitude to harvesting and conservation. It will be recalled that the draft treaty presented by the USSR at SSATCM-1 excluded organisms that had no commercial value, so that the mention of associated species in §4 above perhaps represents a slight softening in attitude. The amendment was not adopted. USSR wanted to expunge mention of claims from Article IV, retaining only its first paragraph.

The USSR further suggested many textual amendments; the main thrust of these was to remove references to the marine ecosystem and substitute the term 'marine living resources'. These proposed changes were consistent with the USSR's already declared interests in harvesting. If these amendments had been passed, the Convention would be a much less conservation-oriented document than it is and the claims issue, so carefully circumvented, could have been re-opened. Why the USSR did not push for these amendments earlier is difficult to understand. Possibly it saw within the draft document possibilities for avoiding inconvenient compliance, thus proving that governments do not deliberately engage in conduct contrary to their interest unless this can be remedied subsequently or turned to their advantage.

The annex elaborated at the second informal Washington consultations to deal with the matter of the French islands was presented with an explanatory note requesting that the chairman of SSATCM-3 read it to the Diplomatic Conference. The annex was accepted without further argument and was added to the text of the convention as an attachment, entitled the Chairman's Statement. The momentum of SSATCM-3 carried through the remainder of the draft as presented at the beginning of the meeting, almost unamended.

3.5.3 Diplomatic Conference on the Conservation of Antarctic Marine Living Resources held Canberra, Australian Capital Territory 7-20 May 1980

The preparatory stage of SSATCM-3 was followed immediately by an international diplomatic conference, whose purpose was the adoption of the final act for the conservation of Antarctic marine living resources. There was debate on the clarity of Article II. The United Kingdom suggested inserting another sentence into Article II§3a, aimed at the prevention of decrease in the abundance of a harvested population which would have adversely affected the stable recruitment of species dependent on it. (SSATCM-3, CAMLR/59). Acceptance of this would have removed the apparent contradiction in that paragraph, discussed further below. Australia made an interpretive statement on Article II, asserting that:

Article II read as a whole, ensured that in the harvesting of species subject to substantial natural predation consideration must be given to the effects of such harvesting on their natural predators.
(Australia 1981: 16).

This was accepted by the delegates and no amendments were made to Article II.

Interim measures

Concern had been expressed over uncontrolled harvesting in the interval between the signing of the Convention and its eventual ratification. Some states, including Chile and USA, wanted to set interim measures but others, notably fishing states but also Australia, thought such measures would delay the Convention's coming into force. A compromise solution was reached by incorporating into the final act the following exhortations to parties entitled to membership:

1. To take all possible steps to bring the Convention on the Conservation of Antarctic Marine Living Resources as soon as possible;

2. To show the greatest possible care and concern, bearing in mind the principles and objectives of Article II of the Convention, in any harvesting of Antarctic marine living resources in the period prior to entry in force of the Convention...

(Australia 1981 Final Act).

Thus, at least on paper, the conservation standards set out in Article II were operative from the moment of signing of the Convention.

Headquarters of Commission

The Australian government, conscious of its role in the development of and the importance of rapid implementation of the convention, again proposed that the commission's headquarters should be in Australia.

Hobart, the headquarters for Australia's Antarctic activities, was regarded a natural choice. Heads of Delegations were flown to Tasmania to inspect Hobart's facilities and were entertained royally for a weekend during the negotiations to convince them of Hobart's suitability (Mercury 1980). This stratagem succeeded: Australia's proposal was accepted (Australia 1981: 18-19, Hodgman, pers. comm., Lowe, pers. comm.; Kerry pers. comm.). Negotiations for establishing the headquarters in Hobart were set in train.

3.6 CONVENTION ON THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES (CAML R CONVENTION)

CCAMLR broke new ground. It was a resource management convention which reconciled seemingly incompatible aims: conservation, risk aversion and precaution. How this was achieved was examined in the first portions of this chapter. In this section the Convention itself will be examined to find how its wording reflects the intentions of the negotiating parties and what guidelines it provides for putting its provisions into place. The full text of the CAMLR Convention is reproduced in Appendix A. Below is a summary.

Preamble While the Convention does not have a Preamble labelled as such, the words preceding its first article serve that purpose. Preambles are introductions to legal documents which sum up the major ideas on which they are based and their thrust is thus indicative of the underlying philosophy. Some preambles of conventional fishing agreements as well as conservation treaties then in existence point up the major divergence represented by CCAMLR⁷⁸. The preamble of the CAMLR Convention notes the concerns of its Contracting Parties for the Antarctic marine ecosystem and the importance of conserving its living resources.

Article I sets out clearly the dual purpose of the CAMLR Convention. Its scope, definitions of terms and area of competence defining the ecosystem purpose of the CAMLR Convention is stated. The area south of the stylised line representing the Antarctic Convergence or Polar Front approximates the FAO divisions as they had been determined in 1978, but this is not acknowledged in the CAMLR Convention.

Article II is the centrepiece of the CAMLR Convention and its implications form the core of this study. It states the objectives of the CAMLR Convention to be the conservation of Antarctic marine living resources, and unequivocally includes rational use as part of conservation. The three sections of its paragraph 3 present a progression of conservation principles, discussed more fully elsewhere in this study. There are several problematic clauses in Article II. They are the requirement in paragraph 3a that the size of harvested populations should not fall below a level close to that which ensured the greatest net increment. There was an attempt to overcome this difficulty at SSATCM-3, noted earlier. As it stands, this clause is an apparent self-contradiction

and neglects the interrelatedness of predators and prey. Clearly it is not possible to maximise harvests of both, since changing the population size of one affects that of the other. Where you have interdependent species, they cannot all exist at maximum levels. This was the flaw also in Bentham's dictum: 'the greatest good for the greatest number'(Hardin 1968; Neumann and Morgenstern 1944). Given the concerns of the parties with the effects of the krill harvest on its predators, including the much-diminished Antarctic whale stocks, we may think that this is a strange oversight.

Paragraph 3b requires parties to maintain ecological relationships between populations, be they target species, species dependent on those target species, or species harvested along with the target species because they are in the same place. This truly laudable ideal falls down because it harks back to Paragraph 3a, which is logically flawed.

Paragraph 3c sets a very difficult task, in that any changes that occur in the marine ecosystem as a result of harvesting should be potentially reversible in 2-3 decades. Ecosystems are notoriously dynamic, so the requirement of reversing to a previous state leaves open the question of how one chooses that state. No directions are supplied as to how this is to be done, nor why it should take place in the time frame of 2-3 decades.

As noted earlier, Article II was intended to be read in its entirety.

Article III binds the parties to the Antarctic Treaty, whether or not they have acceded to the Treaty. This was a portmanteau clause, no doubt intended to obviate reopening arguments over sovereignty.

Article IV is an echo and an expansion of Article IV of the Antarctic Treaty, which, it will be recalled, leaves the question of sovereignty south of 60°S unresolved. It also refers to Article VI of the Antarctic Treaty, which deals with the high seas rights of states. However, it does not explicitly state those rights.

It is noteworthy that the issue of coastal state jurisdiction that was a major topic of the concurrent Law of the Sea negotiations was sidestepped in the CAMLR Convention by referring to Article IV and VI of the Antarctic Treaty.

Article V again harks back to the Antarctic Treaty, requiring parties to recognise the obligations of the Antarctic Treaty and its provisions with regard to conservation of Antarctic flora and fauna, notably the Agreed Measures; oddly enough these were then not yet in force.

Article VI recognises the rights and responsibilities of the International Whaling Commission, which has competence in the CCAMLR area for regulating commercial whaling, and of the Convention for the Conservation of Antarctic Seals. This article overcomes the difficulties caused by the CCAMLR area partially or wholly overlapping the areas of competence of these two pre-existing regimes as provided for under the Vienna Convention on the Law of Treaties, Article 30⁷⁹.

Article VII deals with the setting up of the Commission.

Article VIII sets the Commission in place as a body with legal personality and outlines its purpose and its relation with its host country.

Article IX describes in greater detail the duties and functions of the Commission.

Article X provides for the accession to the Convention by states not party to it.

Article XI is interesting in that it predates the ideas contained in the 1995 United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks, by providing for uniform management where a maritime boundary divides stocks between several management areas.

Article XII deals with the consensus voting mechanism.

Article XIII establishes the site of the headquarters at Hobart, Tasmania.

Article XIV establishes the Scientific Committee.

Article XV sets out the duties of the Scientific Committee.

Article XVI provides that the Scientific Committee shall adopt its own rules of procedure, which later proved difficult.

Article XVII provides for the appointment of an Executive Secretary.

Article XVIII specifies that the official languages shall be English, French, Spanish and Russian, as they are for the Antarctic Treaty.

Article XIX outlines the Commission's financial regulations.

Article XX establishes the duties and obligations of the parties in regard to the scientific information required regarding harvesting and adherence to conservation measures to ensure the proper functioning of the Scientific Committee and the Commission.

Article XXI obligates each party to comply with the conservation measures adopted by the Commission.

Article XXII obligates parties to report to the Commission contraventions to the provisions of the Convention.

Article XXIII specifies cooperation with relevant international intergovernmental and nongovernmental organizations.

Article XXIV provides for the establishment of a system of inspection and observation, no particular system being specified.

Article XXV deals with resolution of conflict.

Article XXVI covers signature of the Convention by states participating in the conference.

Article XXVII provides for ratification, acceptance, or approval of the Convention by signatory states.

Article XXVIII provides for entry into force of the Convention for states or regional economic integration organizations that have acceded to it.

Article XXIX allows accession by states or regional economic integration organizations interested in scientific research or harvesting of marine living resources covered by the Convention.

Article XXX provides for amendment of the Convention.

Article XXXI specifies procedures for withdrawal from the Convention.

Article XXXII sets out the duties of the Depositary.

Article XXXIII deals with the Convention's deposition, certification and registration.

There is an Annex providing for an Arbitral Tribunal.

Chairman's statement

A Statement by the Chairman is appended to the Convention. This deals with the matter of the sovereign French subantarctic islands and by extension to all the islands north of 60°S and within the CCAMLR area that are under national jurisdiction. The Statement forms part of the CAMLR Convention (as provided for under the Vienna Convention on the Law of Treaties Article 31§2a).

3.6.1 Comments on the Convention on the Conservation of Antarctic Marine Living Resources

The 'bifocal' approach

The subject matter of the Chairman's Statement had proved a sticking point throughout the negotiations, as discussed above. Nonetheless, as Rowland (pers. comm.), explained, it allowed an 'out' for claimants and nonclaimants alike by its formulation:

- Claimants could read it in one way: its provisions applied south of 60°S
- Nonclaimants could read it in another way, as applying north of 60°S

This was a manifestation of the so-called 'bifocal approach' that allowed the negotiations to proceed to a successful conclusion. Thus the problems of sovereignty were once more able to be shelved.

Kerry (pers. comm.) and Hofman (pers. comm.) differ from Rowland's view. They asserted that the Chairman's Statement relates to EEZs emanating from areas of undisputed sovereignty and has nothing to do with Antarctic claims.

Members vs acceding parties

There is some confusion, perhaps deliberate or more likely accidental, between the duties of full members and of contracting or acceding parties. Members are contracting parties who have acceded to the Convention, who have undertaken to abide by conservation measures passed by the Commission and who are engaged in harvesting or scientific research in the CCAMLR region. Members are required to contribute financially to the operation of the Commission.

Contracting parties who have acceded to the Convention but have not applied for membership appear, *prima facie*, not to be bound by conservation measures: only members appear to be so bound (CCAMLR Convention Article IX§6). This appears odd, since under the Vienna Law of Treaties Article 3§2(b) such measures are an integral part of a treaty and all who accede to it must of necessity also accede to such measures.

Other features of the Convention

The document that was finally agreed to and signed on 20 May 1980 departed in a number of significant ways from resource management treaties then in force outside the Antarctic.

As we saw in chapters 1 and 2, most resource management until CCAMLR had concentrated on obtaining the maximum sustainable yield of one or several species or on the harvestable resources of a particular area, and were concerned with conservation only insofar as this meant the continued existence, and thus the continued availability for harvesting, of target species. The pre-existing International Convention for the Regulation of Whaling, the Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries, the Convention on Fishing and Conservation of the Living Resources of the High Seas and the International Convention for the Conservation of Atlantic Tunas are examples of this kind of agreement.

There were also a number of treaties in force that dealt with conservation, as distinct from utilization, of various kinds of flora and fauna. The main thrust of these was the preservation or very strict conservation of the living resources in question. (It will be recalled that preservation, unlike conservation, does not permit any use of the resource for commercial purposes). Examples of the latter are the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)⁸⁰ and the Agreement on the Conservation of Polar Bears⁸¹.

It is interesting to compare the negotiations for the CAMLR Convention with those for the 1992 Framework Convention on Climate Change. These latter took place in under very different conditions from those of CCAMLR. In the first place, while the CCAMLR negotiations initially had only 13 participating state parties, the climate change negotiations were attended by delegates from 156 nations. It is difficult to imagine this latter number of delegates working out a draft convention by the cut-and-paste method as described in section 3.2.6.

In addition, while the Antarctic epistemic community constituting the CCAMLR negotiators quickly came to recognise ecosystem principles as a central theme, things were not so clearcut for the climate change negotiations. There was, and still is, no general agreement on the role of 'greenhouse' gases in altering climate.

Importantly, the Southern Ocean fishery at the time of negotiation was small and on a world scale generated little income. Altering whole national economies to accommodate climate change however, involves

incalculably large amounts of money. This contextual factor alone makes comparisons between the two sets of negotiations problematical.

Other contextual factors were also different. Politically, CCAMLR was negotiated in the shadow of the Cold War; the climate change convention came about in a much freer world. Another point is that by 1992, the philosophy of CCAMLR that had earlier appeared so innovative was almost part of mainstream thinking, especially at the United Nations Conference on the Environment and Development (where the climate negotiations treaty was signed). We shall re-examine this latter facet in chapter 7. However, the informal negotiations, coffee break and corridor diplomacy described in Mintzner (1994) seem to be a characteristic shared by negotiators brought together for whatever purpose.

First published comments on CCAMLR

One of the first papers to emerge after the signing of the Convention was by Barnes (1982). This was a comprehensive summary of the actual negotiations in which he participated on behalf of the United States. Barnes was an attorney attached to the Washington-based Center for Law and Social Policy and later represented ASOC in Antarctic Treaty meetings. He used documents tabled during the proceedings at formal and informal negotiating sessions and drew upon his knowledge of events that were not recorded. His article uses the terms 'ecosystem standard' and 'conservation standard' interchangeably. Barnes attributes CCAMLR's conservation standard to principles evolved by the Marine Mammal Commission, but notes that input from IUCN was ignored.

Barnes was not sanguine about the eventual success of the new regime. Although it represented 'an advance regarding responsible exploitation of Antarctic marine living resources' and contained 'important new ecological principles in international law', widely differing views existed among the Contracting Parties on the application of the ecosystem standard to the real world of fishing. Barnes wrote:

Certainly the Convention is far from ideal: it does not elevate the value of long-term conservation above that of short-term exploitation, does not require exploitation to be based on a full scientific understanding of the ecosystem and does not provide a sound inspection and enforcement system. (Barnes 1982: 260).

According to Barnes, a major flaw was that measures proposed in the Convention did not set national quotas for catch and effort, although the power to do so was not precluded. (In fact, they were precluded by Rec. ATCM.IX-2; see chapter 2.4.1). He predicted that the lack of such explicit measures would lead to overcapitalization of fisheries. Furthermore, the requirement for consensus meant that any single state could block a proposed conservation measure (Barnes: 263-4).

Regarding the boundary of the proposed Convention area, he noted that it did not conform exactly to the Antarctic Convergence but followed a boundary delineated by FAO. (Possibly Barnes was not aware that this boundary had been redrawn, as was discussed in chapter 1.3.2β). He concluded that:

In order to protect national interests, no agreement could be reached on a clearly viable and sound decision-making framework to implement the landmark ecosystem conservation standard...participating countries were unwilling to yield sovereignty or real control...By attempting to obtain additional recognition of their power in Antarctica...the Antarctic Treaty parties run the risk of alienating many nations.

(Barnes: 274).

Barnes admitted serious reservations about the bifocal approach developed to overcome issues of sovereignty, since it led to a document that lacked 'clearly understood and agreed standards of conduct' (Barnes: 274). However, as is discussed in this study, it is quite likely that bifocalism provided the mechanism that allowed the adoption of the ecosystem approach in an area beyond that of the Antarctic Treaty. Barnes advocated a different style of regime for the governance of the Southern Ocean; this will be referred to in chapter 8.

CONCLUDING REMARKS

Earlier in this chapter some political problems regarding sovereignty in the Antarctic and the Southern Ocean were identified. We saw that national attitudes, discussed in section 3.1, were further borne out by the tone and content of submissions made by delegations at the negotiations. Careful diplomatic phraseology can effectively hide deep-rooted disagreements but some of these had been revealed during the negotiations. We saw that early agreement among most of the parties on an ecosystem focus in the proposed convention was not diluted by attempts to assert sovereign control or maximise harvesting. Although some of the negotiators may have been less than delighted with the outcome, the Convention was signed by all parties. Ratification was swift and the Convention was to enter into force less than two years after signing, confounding those who had thought it might take up to five years.

Then came the real business of putting the CAMLR Convention and its innovative ecosystem approach into practice. The ways in which this was accomplished and the evolution of the ecosystem philosophy is elaborated in chapters 4, 5 and 6.

4 THEORY INTO PRACTICE: HOW CCAMLR DEALT WITH THE ECOSYSTEM APPROACH

...the ecosystem approach to conservation can now be tried in circumstances where the demands of the industry are significantly below the yield capacity of the stocks.

(Edwards and Heap 1981)

CCAMLR is a philosopher-scientists' convention. It is certainly not a convention for fisheries managers. Its objectives cannot be faulted, but it is not at all clear how it can be made to operate in practice.

(Bonner 1987: 145).

INTRODUCTION

In chapter 3, we identified Article II as embodying the conservation standard of the Convention on the Conservation of Antarctic Marine Living Resources. It will be recalled that paragraph 3 of this article bound the parties to the goals paraphrased below:

Article II§3: Summary

Harvesting in the Convention area shall be conducted in accordance with the following principles of conservation:

- a) harvested populations must not fall to levels below those which ensure its stable recruitment and its greatest net annual increment
- b) ecological relationships between harvested, dependent and related populations of Antarctic marine living resources must be maintained, and depleted populations must be restored to the levels defined above
- c) changes in the marine ecosystem which are not potentially reversible over two or three decades must be prevented or minimised, while sustainably conserving Antarctic marine living resources.

In the previous chapter, a reductionist analysis was made of Article II. Unlike the Law of the Sea and other contemporary treaties, the CAMLR Convention was an 'skeleton' convention⁸², in the sense that it did not spell out in detail all the requirements that parties to it had to adhere to. Thus there was much room for interpretation. This was of course very much a continuation of the *modus operandi* of the Antarctic Treaty System.

The documents that the negotiators had available to them included briefing documents from their own governments and reports or opinions from other organizations. From these, it appears fairly clear that the parties knew what it was that they were attempting but shelved possible difficulties through vagueness of definition and the bifocal approach.

While various attempts had been made during the negotiations to reach a definition of the term 'conservation', the convention itself had evaded the inclusion of a definition⁸³. Thus the onus was very much on the parties to set the parameters within which they were to attain the goal of an ecosystem approach that was expected of them by the wider community. This was to prove very difficult.

Article II §3a was a restatement of the aim found in other, non-ecosystem oriented fisheries agreements, in that it required maximum recruitment. The use of the phrase sustainable yield is avoided but nonetheless the sense is clear. As pointed out in chapter 3, however, when read alone, the paragraph conceals an anomaly, namely the simultaneous maximization of recruitment of species that are in a predator-prey relationship.

Leaving aside this question of possible ambiguity, this chapter traces the first steps in the realization of the ecosystem approach through the establishment of the CCAMLR Commission, the Scientific Committee and working groups. These steps fall roughly into sections along the lines of Article II§3a, b and c as paraphrased above.

In some ways, the CCAMLR regime had to be invented: there was no other harvesting management body in the world sufficiently like the proposed new organization on which it could model itself. Absent example, the role of the conservation paradigm of the Convention was crucial in guiding the actions of the parties, as is explained.

4.1 THE ESTABLISHMENT OF THE COMMISSION

Although Hobart had been chosen as the headquarters for the commission once it was established, no official action could be taken until the CAMLR Convention was ratified. However, some organizational matters were dealt with before ratification occurred.

4.1.1 Preparatory meeting

A Preparatory Meeting of the signatories to the Convention took place in Hobart in September 1981 to develop the Headquarters Agreement, evaluate staff requirements, draw up rules of procedure and financial regulations. The purpose of the meeting was to expedite 'machinery matters' so that the Commission, once established, could make an early start on its work, said the Australian Minister for Science. This was an opportunity, he said, for the Antarctic Treaty System to demonstrate that it was equal to the task of setting up a workable regime for the rational use of Antarctic resources.

The IWC observer contributed significantly to the Preparatory Meeting; this will be referred to again in chapter 7.

4.1.2 Ratification of the CAMLR Convention and the start-up of the Commission

The CAMLR Convention came into force on 7 April 1982, the required number of instruments of ratification having been lodged less than two years after the Convention had been signed. The speedy ratification of the Convention proved wrong those parties who had advocated the putting in place of interim conservation measures to bridge the expected longer time gap between signing and ratification. As pointed out by the Australian minister for Science at the 1981 Preparatory Meeting, the rapid acceptance of the Convention possibly pointed to the willingness of the members to deal with the urgent problems of resource management. The Commission headquarters was duly established in Hobart in 1982, as provided for in the Convention and organised in the previous year.

Executive Secretary

Dr Darryl Powell, an Australian scientist, was appointed as the Commission's first Executive Secretary, a post he was to hold for 10 years⁸⁴. Powell had been involved in Antarctic matters on behalf of the Australian government since 1972. He attended Antarctic Treaty meetings between 1977-1981 and the negotiations for the CAMLR Convention. At the time of his appointment, he was in charge of the Research Branch of the Antarctic desk in the Australian government. The proposal for his appointment was put forward by Keith Brennan, who convinced the parties of Powell's suitability. The position was not advertised nor did anyone oppose Powell's appointment. Since CCAMLR was the first international body ever to be based in Australia, the new Executive Secretary had no local mentor or example to follow (Powell pers. comm.).

Early CCAMLR Commission Meetings

The haste with which the CCAMLR negotiations had been concluded had left many matters hanging, in spite of attempts having been made to deal with these at the Preparatory Meeting in 1981. The first meeting of the Commission, which took place May-June 1982, was almost entirely taken up with debate on matters that had nothing to do with conservation of Southern Ocean ecosystems. One vexing issue was the position of the European Economic Community in decision-making. It was solved by a 'musical chairs' arrangement contrived by the Executive Secretary (Powell pers. comm.), by which participating states would take turns in voting.

The rules of procedure for the Scientific Committee proved particularly difficult, and its first meeting had to proceed under temporary rules.

An important point of contention had been raised in plenary. Some members, notably the USSR, Germany and Poland, took the view that advice could be provided by the Scientific Committee only in the form of recommendations adopted by consensus. Most other members believed that the Scientific Committee should report all views when there was no consensus on the advice. According to Hofman (pers. comm.), this was a very serious issue, as providing advice only in the form of recommendations reached by consensus meant that each member could control the scientific advice provided to the Commission. The Commission could then not have been held accountable for decisions that were inconsistent with the views of the majority of the Scientific committee. In Hofman's opinion, if this position had prevailed, CCAMLR would have been a meaningless agreement.

The Heads of Delegation at a late-night meeting at the beginning of the second round of meetings in 1983 reportedly sat in silence for 'a bone-chilling half-hour' (Heap pers. comm.), deliberating on this issue of Consensus voting in the Scientific Committee before a breakthrough and a compromise position was reached⁸⁵.

4.2 ESTABLISHMENT OF THE SCIENTIFIC COMMITTEE AND ITS EARLY OPERATIONS

The Scientific Committee was established under the Convention as a consultative body of the Commission. Article XIV detailed its duties and defined its relationship with the Commission:

CAMLR Convention ARTICLE XV

1. The Scientific Committee shall provide a forum for consultation and co-operation concerning the collection, study and exchange of information with respect to the marine living resources to which this Convention applies. It shall encourage and promote co-operation in the field of scientific research in order to extend knowledge of the marine living resources of the Antarctic marine ecosystem.
2. The Scientific Committee shall conduct such activities as the Commission may direct in pursuance of the objective of this Convention and shall:
 - (a) establish criteria and methods to be used for determinations concerning the conservation measures referred to in Article IX of this Convention;
 - (b) regularly assess the status and trends of the populations of Antarctic marine living resources;
 - (c) analyse data concerning the direct and indirect effects of harvesting on the populations of Antarctic marine living resources;
 - (d) assess the effects of proposed changes in the methods or levels of harvesting and proposed conservation measures;
 - (e) transmit assessments, analyses, reports and recommendations to the Commission as requested or on its own initiative regarding measures and research to implement the objective of this Convention;
 - (f) formulate proposals for the conduct of international and national programs of research into Antarctic marine living resources.
3. In carrying out its functions, the Scientific Committee shall have regard to the work of other relevant technical and scientific organizations and to the scientific activities conducted within the framework of the Antarctic Treaty.

Each member of the Commission was automatically a member of the Scientific Committee and could appoint to it suitably qualified representatives. Its prescribed *modus operandi*, as outlined in Article XIV

of the CAMLR Convention, included the holding of meetings as often as necessary to fulfil its tasks, and the seeking of advice from scientists and experts as needed.

The Scientific Committee, like the Commission, was faced with a two-pronged problem: that of safeguarding the legitimate interests of current and potential harvesters while addressing the equally valid concerns of the non-harvesting and conservationist nations. While the CAMLR Convention does not require the Scientific Committee to formulate advice to the Commission in socio-economic terms, there was nonetheless an apparent conflict. This could in theory be resolved by steering a complex middle course that aspired to the ideal of the ecosystem approach. No nation that had signed the Convention could now pull back from that ideal, however reluctant their acquiescence to its inclusion had been.

During the two years since the signing of the CAMLR Convention, harvesting in the Southern Ocean had continued to increase and there was a compelling need to limit further depletion of stocks. Possible solutions of the various problems were constrained by political concerns regarding sovereignty in the Antarctic, the realities of the Cold War, concerns over the voting rights of the European Economic Community and South American geopolitics as well as the dearth of a knowledge foundation on which to base decisions.

The elation evident from the successful conclusion and ratification of the CAMLR Convention quickly dissipated as the members of the Scientific Committee gathered for the first time in Hobart 7-11 June 1982, in conjunction with the first Commission meeting which had begun on 25 May. Fishing in the designated CCAMLR area was continuing. The largest krill catch ever- 528200 tonnes (93% of which was caught by USSR)⁸⁶ - was made in 1982, the year the CCAMLR Commission was set up⁸⁷. Large catches of finfish in the early 1980s were followed by the collapse of the finfish fishery around South Georgia. This was the climate in which the new Commission and its Scientific Committee had to act.

4.2.1 Early meetings of the Scientific Committee

It was essential that rules of procedure for the Scientific Committee were put in place expeditiously. Without workable rules it could not get down to business. An obstacle to agreement included the insistence of some nations to have Scientific Committee decisions on scientific matters made subject to consensus.

First meeting of the Scientific Committee 1982

The first meeting of the Scientific Committee in 1982 was held under temporary rules of procedure. Its official business was taken up by discussion of those rules and other administrative matters.

Informal discussions were conducted on the future work of the Scientific Committee. A report of these discussions was attached to its official report but it was agreed to be an informal document with no official status (SC-CAMLR-II 1983 §11). By concentrating on housekeeping matters, regulation of the fishery could be delayed, which may have suited the fishing nations. Certainly the conservation-oriented states were conscious of the magnitude and complexity of the tasks facing the Scientific Committee. Some were impatient to begin work (Heap, Chittleborough pers. comm.)⁸⁸.

The informal discussions recognised the overwhelming need for data. It was realised at the same time that valuable research, for example, FIBEX, had already been done in the Southern Ocean by many different groups and nations. Information resulting from commercial and experimental harvesting operations also existed. It now fell to the Scientific Committee to bring all this information together to begin to implement the ecosystem approach as prescribed by the Convention. To this end, all member countries were sent a questionnaire regarding data held.

Second meeting of the Scientific Committee 1983

Although most of the discussions at the first Scientific Committee meeting were unofficial, the meeting in the following year, 1983, was labelled its second meeting. This lent some official status to the first meeting and to its outcomes.

The Scientific Committee was able to commence its work at this second meeting, its Rules of Procedure having been negotiated intersessionally

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Although most of the discussions at the first Scientific Committee meeting were unofficial, the meeting in the following year, 1983, was labelled its second meeting. This lent some official status to the first meeting and to its outcomes.

The Scientific Committee was able to commence its work at this second meeting, its Rules of Procedure having been negotiated intersessionally

(in a small group meeting of Scientific Committee following the 'bone-chilling' session described in section 4.1.2) and approved by the Commission. The crucial matter of decision making had been resolved by adopting the same rules as laid down for the Commission under Article XII of the Convention, with the proviso that dissenting opinions were to be laid before the Commission alongside the consensus view (SC-CAMLR-II Annex 5). The Commission was obliged by Article XII of the Convention to take decisions on substantive matters by consensus, and the Scientific Committee also adopted this style. This was familiar procedure to the contracting parties: under the Antarctic Treaty's Article IX, all decisions relating to 'measures in furtherance of the principles and objectives of the Treaty' must be agreed to by all parties, although the word consensus is not used. However, consensus had become the accepted *modus operandi* among the Antarctic Treaty parties, and we should not be surprised that some should wish to perpetuate this in CCAMLR.

A significant addition to Rule 21 of the Commission's own Rules of Procedure stated:

The Commission shall take full account of the Reports of the Scientific Committee
(CCAMLR 1982+ 1984 edition).

We shall allude to this proviso later in this chapter under Working Group on Fish Stock Assessment (WG-FSA).

At this second meeting the Scientific Committee listed a number of topics it wanted addressed by ad hoc working groups in the future. These were:

Assessment of Antarctic fish stocks: It was pointed out that much work had been done and reported by BIOMASS in its Report Series No 12.

Krill: A BIOMASS resource review was in progress and the Committee decided to wait for its report.

Dependent and related species: Other organizations, such as the IWC, BIOMASS Working Party on Bird Ecology, the SCAR Group of Specialists on Seals, were carrying out work on aspects of this topic. The Committee decided to direct lists of specific questions to these organizations (CCAMLR and Secretariat 1983 Annex 10), along with a paper on indirect effects of harvesting (USA 1984) on detecting changes using indicator

species (Bengtson 1984b) and marine interactions (Bengtson and Laws 1984c).

Data collection and handling, a most important part of the Committee's work, was handed over to an ad hoc Working Group that was to meet in 1984. Its terms of reference included the assessment of finfish and krill populations and the development of a data base. A task with high priority was the collection of data obtained from scientific cruises and from fisheries, particularly those causing concern because of possible overfishing (SC-CAMLR-II Annex 9). This working group is discussed in greater detail below.

An ecosystem approach to management was felt to be of primary importance to the Committee's central function. However, since so little was known of the ecosystems of the Southern Ocean, delegates felt it was too early to set up a formal working group on 'ecosystem management' (SC-CAMLR-II 1983 §65). The matter was placed on the agenda for the following year and papers from Members and observer organizations were to be solicited (SC-CAMLR-II 1983 §67).

A paper by Australian scientist Chittleborough, labelled by him as a 'thought-starter', created a ripple by arguing that the ecosystem could not be managed effectively if only krill were harvested. He suggested a number of options for the simultaneous harvesting of krill, crabeater seals and minke whales to aid the recovery of the depleted large baleen whale populations, in obedience to Article II§3(b). This was not a popular concept at the time⁸⁹, and his paper was not officially accepted (Chittleborough pers. comm.). A modified version (Australia 1984) appeared later.

Thus at the end of the second meeting, an Ad Hoc Working Group on Data Collection and Handling had been set up and much had been planned but nothing had been done in a practical sense. This was to change in the following year.

Third Scientific Committee meeting 1984

At this meeting the first real action was taken. CCAMLR was under international scrutiny and there had been some comment on the seeming unwillingness of the Commission to act⁹⁰. Now, however, political events pushed the Commission and the Scientific Committee into action.

These events included the ongoing negotiations on a minerals convention, questions in the United Nations about the Antarctic (Gardham, 1985: 309; UN 1983a; UN 1983b; UN 1983c), the aftermath of the 1982 military conflict between Argentina and the United Kingdom in the Falkland/Malvinas Islands and continuing heavy exploitation of Antarctic marine living resources. This is discussed more fully below and in the chapter on WG-CEMP.

There was much debate on interpretations of the objectives as laid down in Article II of the Convention under the umbrella heading of 'ecosystem management'. Gulland, attending the meeting as observer on behalf of FAO, averred that a good understanding of the dynamics of the important species was fundamental. However, he cautioned that the Convention did not call upon the Commission to manage the *entire* ecosystem, since this would clearly be impracticable. Others put forward schemes of experimental fishing and modelling to study ecosystem interactions (SC-CAMLR-III 1984 §9.15-17). These issues were reserved for later action.

The Scientific Committee had passed on its concern over the depletion of *Notothenia rossi* to the Commission, and advised the Commission to request that *N.rossii* not be targetted. The Commission, for its part, merely passed on this request for statistical area 48.3, but did not formalise it into a conservation measure. However, the Commission did set the first two Conservation Measures of CCAMLR's history. Modest in their scope, the measures were:

Conservation Measure 1/III Closure of Waters Adjacent to South Georgia
This measure prohibited fishing for purposes other than scientific within the zone of 12 nautical miles around South Georgia. Its purpose was to protect the nearshore fish breeding grounds near South Georgia. The USSR had since 1980 voluntarily imposed similar restrictions on its fleet (CCAMLR-III 1984 §41).

Conservation Measure 2/III Mesh Size

This set mesh size restrictions for pelagic and bottom trawl nets in directed fisheries for ⁹¹Marbled rockcod and three other species of rockcod, as well as for Mackerel Icefish and Patagonian toothfish. It was aimed at preventing catching of undersize fish from stocks of already depleted species, especially of rockcod. Note, however, that Patagonian toothfish was not yet a major target species. The wording of the measure did not

specify a particular area; thus it held for the entire Convention area. Again, the USSR had already applied mesh size restrictions near Kerguelen since 1980.

These were timid attempts at control. One can surmise that the Scientific Committee was not ready to advise more draconian measures, such as closing larger areas and declaring zero total allowable catch (TAC)⁹² for threatened stocks.

Other decisive action included the formation of two ad hoc working groups. They were:

Ad hoc Working Group on Ecosystem Monitoring

Ad hoc Working Group on Fish Stock Assessment

Thus more was achieved in the third meetings of the Commission and the Scientific Committee than in the previous two. The first phase of achieving the Convention's conservation objective was under way (Powell, pers. comm.). The next phase was to take place through the development of working groups; these are discussed in sections 4.3 - 4.4.

CCAMLR meetings after 1984

The subsequent meetings of the Commission and the Scientific Committee handled an increasing volume of complex issues some of which are dealt with in this and subsequent chapters. The tools that the Scientific Committee had to work with included working groups and the development of these forms the remainder of this chapter and chapter 5.

4.3 THE CCAMLR SCIENTIFIC COMMITTEE AND WORKING GROUPS: AN OVERVIEW

Under Article XVI of the Convention, the Scientific Committee is empowered to establish subsidiary groups to help it in its work. We saw that in the first two meetings the setting up of such groups was felt to be premature and that the Committee preferred to proceed in an ad hoc manner and develop its program of work until it was able to clarify its needs (SC-CAMLR-II§89). All working groups were initially established as ad hoc groups. Some were later made into standing working groups of the Scientific Committee with formal Terms of Reference (TOR). Other working groups survived for only short times until they completed a set task or their functions were subsumed by other groups.

Gulland had distinguished between top-down (or multi species), and bottom-up (or single species) approaches. As a fish stock assessment specialist, he favoured bottom-up approaches for the purposes of providing meaningful management advice. His thesis was that while the top-down approach yielded much information about interrelationships within an ecosystem, this sort of information was not very useful in formulating management advice (Gulland 1984).

Using Gulland's outline, the Working Groups subsequently established by the Scientific Committee could be roughly split into:

- Those which attempted to tackle the ecosystem problem with a 'top-down' analytical approach;
- Those which addressed problems of individual stocks: the 'bottom-up' approach.
- Those which combined bottom-up and top-down approaches: the 'holistic' groups

We shall adopt these classifications in our discussion. The working groups, both ad hoc and formal, established or taken over by the Scientific Committee are summarised in table 4a.

Table 4a CCAMLR Working Groups

| Title of Group/main business/acronym | Year Created as Ad Hoc group | Formalized TOR/ NF* | Disbanded/ Changed | Approach |
|--|------------------------------|---------------------|--|----------|
| Data Collection and Handling | 1983 | NF | 1984 | BU/TD |
| Fish Stock Assessment WG-FSA | 1984 | 1987 | | BU |
| Krill Research Priorities | 1984 | NF | | BU |
| Krill Catch per unit effort ⁹³ WG-KCPUE | 1985 | NF | | BU |
| CCAMLR Ecosystem Monitoring Program WG-CEMP | 1984 | 1985 | Merged with WG-Krill 1995 to form WG-EMM | TD |
| Krill WG-Krill | 1987 | 1988 | Merged with WG-CEMP 1995 to form WG-EMM | BU |
| Working Group for the Development of Approaches to Conservation (N.B. set up in Commission) WG-DAC | 1986 | 1986 | Disbanded 1991 | TD |
| Ad Hoc Working Group on Incidental Mortality Arising from Longline Fishing WG-IMALF | 1993 | 1994 | Work taken over by WG-FSA | TD/BU |
| Working Group on Ecosystem Monitoring and Management WG-EMM | 1994 | 1994 | Merger of WG-CEMP and Krill first mtg 1995 | TD/BU |

Explanation of abbreviations:

NF= never formalised

TD = top-down

BU = bottom-up

TD/BU = holistic

4.3.1 The role of the 'bottom-up working' groups in protecting the ecosystem

In this section, the working groups concerned with the problems of managing the fisheries in the CCAMLR area are dealt with. The living resources were steadily being removed while the Commission waited to receive more data. By the time the Commission got around to implementing its 'ecosystem approach' the ecosystem might well have been altered beyond recovery. This would have been in contravention of CCAMLR's own conservation standards as laid down in Article II. Thus

the Commission began to impose fishing restrictions of increasing stringency, on the advice of its Scientific Committee which was based on the work done by its subgroups. These are dealt with in chronological order to illustrate the development of ecosystem approaches.

Setting the scene: Ad hoc Working Group on Data Collection and Handling 1983-84

In response to the urgent need for information identified at the first Scientific Committee meeting, the second meeting set up this ad hoc working group. Its terms of reference gave it a wide brief:

Ad hoc Working Group on Data Collection and Handling

1. To consider the kinds and amount of data required for assessing the state of fish and krill resources.
2. To take into account the experience and programs of already existing international and national data base operations (e.g. ICES, IWC, NAFO) or those developing (BIOMASS) in order to develop the required data base most efficiently and compatibly.
3. To consider as the first priority the data needed from the fishing operations, including associated scouting and exploratory operations. The scientific cruise data which provide the biological information necessary for assessment of state of the resources should also be considered.
4. To consider the need for 1983/84 fishery data and advise on the most appropriate format and timing for such data to the Secretariat.
5. To consider the longer term routine data needs to allow assessment of stocks that are of particular concern; consider the means of obtaining the required data from member countries, and advise on the steps to develop the format of the data base which CCAMLR maintains.
6. To advise on actions and work programs, including processing requirements, necessary for the effective operation of the data base and assessment activities.
7. To identify the gaps in key data, drawing attention [of the Scientific Committee] to needs for planning to gather data on such aspects.

(SC-CAMLR-II-1983 Annex 9)

Returned questionnaires that had been sent to fishing nations, fisheries scientists and biologists, together with log books and inventories (SC-CAMLR-II 1983 Annex 6, 7 and 8) from several members formed the basis of the knowledge pool that was discussed at its intersessional meeting in June 1984 at Woods Hole, USA. This meeting had been set three objectives:

Objective 1: to consider the types of assessments required to determine and monitor stocks of fish and krill;

Objective 2: to consider and provide advice on fishing data needed for stock assessments;

Objective 3: to outline steps to develop system of reporting, processing and presenting data.

A comprehensive report was provided at SC-CAMLR-III later that year (SC-CAMLR-III Annex 4, 5 and 6). The chairman of the ad hoc group remarked that objective 1 was hampered by lack of biological knowledge. He stressed the importance of analysing data available on past fisheries. The boundaries of statistical areas as set out for collecting data were also discussed. The existing areas were deemed too large for accurate reporting. A new southern boundary was suggested for Subarea 48.1, subdivisions for Area 88 and further subdivisions for Subarea 58.4 (see map of CCAMLR area in the frontispiece). The boundary refinements were submitted to FAO for incorporation in its system of STATLANT⁹⁴ reporting (SC-CAMLR-III 1984 Annex 6, §72-77).

The group did not continue as a separate entity after 1984; its work was to be taken up as appropriate by other groups (SC-CAMLR-III 1984 §6.36). While it was never formalised, the Ad hoc Working Group on Data Collection and Handling was nevertheless crucial in laying the foundations for the subsequent work of the Scientific Committee and the working groups that followed it.

4.3.2 Working Group on Krill (WG-Krill)

Although Antarctic krill (*Euphausia superba*) is not mentioned specifically in the CAMLR Convention, concern about its harvesting and the effects of that harvest on other living resources underlay the negotiations. Some authors and NGOs referred to CCAMLR as the 'Krill Convention' (Shapley, 1985; Mitchell 1980); their expectation was clearly that regulation of the krill harvest was to be a priority. Why then did the 'Krill Commission' take so long to get a krill working group underway? Hofman (pers. comm.) suggests that regulation of the finfish fishery and the development of means to give effect to Article II§3b were seen as more important.

The first few meetings of the Commission and the Scientific Committee did indeed deal with krill, under the heading of krill resources. Simulation studies of krill CPUE were conducted, stock assessments were made and krill biology was studied intensively. It will be recalled that the two BIOMASS surveys⁹⁵ that had concluded in 1985 had focussed primarily on krill population dynamics and ecosystem relationships. The results of the BIOMASS surveys and of a krill CPUE simulation study (SC-CAMLR-VI-1987 §4.34) reported as SC-CAMLR-VI-1987/BG/22 and SC-CAMLR-VI-1987/BG/38 were of tremendous importance to the work of the Scientific Committee. However, by 1987 it was obliged to recognise that the diverse suite of krill studies being carried out under its aegis required coordination (SC-CAMLR-VI 1987 §4.28). Accordingly the Scientific Committee set up an ad hoc Working Group on Krill (SC-CAMLR-VI 1987 §4.29-30) and this was formalised in the following year (SC-CAMLR-VII 1988 §2.25)⁹⁶ with acknowledgment that there was 'urgent need' for it to start its work (SC-CAMLR-VII 1988 §2.28). The Working Group on Krill (WG-Krill) has met yearly since 1989.

WG-Krill's terms of reference dealt mostly with its eponymous single species. Despite this, there was a strong emphasis on ecosystem considerations, refined and focussed in the formal brief for the Working Group. There was provision for its liaison with WG-CEMP, an association that was to become closer over time. Working Group Krill Terms of Reference (TOR), ad hoc and formal, are tabled below.

Working Group Krill WG-Krill

| Ad Hoc WG-Krill TOR 1987 | Formal WG-Krill TOR 1988 |
|--|--|
| <ul style="list-style-type: none"> • review and evaluate the results of recent studies on krill population structure, abundance estimation and stock separation • review and evaluate the results of krill growth and age determination studies • review and evaluate estimates of reproductive and mortality rates in krill • review and evaluate the results of studies on behaviour, distribution and reproduction in relation to krill swarming and dispersal • review and evaluate existing data on the size, distribution and composition of catches of krill • report to the Scientific Committee on the results of the Group's activities and as appropriate, recommend actions to be taken by the Committee with respect to krill stock assessment and ecosystem monitoring | <ul style="list-style-type: none"> • review and evaluate methods and techniques for estimating krill abundance, taking note of the effects of patchiness and the influences of the physical environment • review and evaluate information concerning the size, distribution and composition of commercial krill catches, including likely future trends in these catches • liaise with the Working Group for the CCAMLR Ecosystem Monitoring Program for assessing any impact of changes in krill abundance and distribution on dependent and related species • evaluate the impact on krill stocks and krill fisheries of current and future patterns of harvesting, including changes brought about through management action, in order that the Committee may formulate appropriate scientific advice on krill to the Commission • report to the Scientific Committee on information and data required from commercial krill catches |

(SC-CAMLR-VI 1987) § 4.30

(SC-CAMLR-VII 1988) § 2.26

Even though the necessary information to set krill harvesting limits had been available since 1987, it was not until 1991 that a precautionary limit was set for krill harvesting in Area 48.3. This delay seems inexplicable, in view of the conservation focus of the Convention and its emphasis on the interrelationships of species. Nicol postulated that action was made possible by improved mechanisms for the transmission of scientific advice from the working groups by way of the Scientific Committee to the Commission (Nicol 1991). This improvement was made possible, in part, by the work of WG-DAC, discussed later in this chapter.

4.3.3 Working Group on Fish Stock Assessment

At its third meeting, the Scientific Committee had before it documents to show that some finfish stocks had been overfished prior to and in the first few years of CCAMLR's existence (SC-CAMLR-III 1984 §7.6). Before the Commission had acted, some nations were already observing regulatory controls. The Soviet Union had since 1980 set minimum mesh sizes for several species, and refrained from harvesting within 12 miles of South Georgia. France had had regulations in place in its EEZ around Kerguelen from 1978 onwards (SC-CAMLR-III 1984, §7.18-23).

We saw above that in 1984 the Scientific Committee had put in place Conservation Measures to try to prevent further depletion of the threatened stocks that had been identified. These measures were quite modest and reflected those already enacted by the USSR.

Set up as an ad hoc working group in the same year, the Working Group on Fish Stock Assessment was not given formal terms of reference until 1987. Although it remained an ad hoc group for three years, from its inception the Fish Stock Assessment group supplied management advice that the Commission used in setting Conservation Measures for fish stocks.

Most of the early measures were directed towards severely depleted stocks of single species. Since fishing for the depleted species had virtually ceased because it was no longer profitable to do so, setting of Conservation Measures for those species did not meet with opposition.

From 1984, the Fish Stock Assessment group played an important role in CCAMLR. Its initial terms of reference simply required that it identify heavily fished stocks in need of conservation, and indicate options for Conservation Measures for those stocks (SC-CAMLR-III 1984 §7.7). These were elaborated in 1987 when the Working Group was formally established:

Working Group on Fish Stock Assessment

| | |
|--|---|
| <p>Ad Hoc FSA TOR 1984</p> <p>-to identify those fish stocks which appeared to be heavily fished and for which conservation might be necessary</p> <p>-to indicate the options for Conservation Measures in respect of these stocks</p> | <p>Formal FSA TOR 1987</p> <p>a) Apply and develop methodologies for fish stock assessment, including:</p> <p>(i) procedures for monitoring fish stock abundance and population structure</p> <p>(ii) protocols for the collection and analysis of fishery-related data including the relevant operations of the CCAMLR data base</p> <p>(iii) analytical procedures for the estimation and projection of fish stock population trajectories</p> <p>b) Review and conduct assessments of the status and potential yield of fish stocks in the Convention area</p> <p>c) Evaluate the actual and potential impact on fish stocks and fisheries of past, present and future management actions</p> |
|--|---|

(SC-CAMLR-IV 1985) § 7.7

(SC-CAMLR-VI 1987) § 5.71

At the meeting formalising the Fish Stock Assessment workgroup, the Scientific Committee remarked that it was difficult to provide management advice to the Commission in the absence of a clear policy regarding fishing. The newly formed WG-FSA suggested possible policy decisions, with alternatives ranging from moderate to stringent. They are summarised in table 4b.

Table 4b
Possible Policy Decisions

General policies:

| | |
|-------------------------|--|
| Reactive management | Act only when problems arise |
| Anticipatory management | Act before problems arise |
| Experimental management | Set measures that enable more to be learned about the system |

Specific policies

Ensure fishing mortality less than that giving maximum yield per recruit
Ensure spawning stock does not fall below a specified level
Ensure that fishing mortality is less than replacement level

Strategies

Set Total Allowable Catch (TAC) equal to 90% of MSY
Set a sequence of TACs, modified from year to year
Set a limit on fishing effort

(Adapted from SC-CAMLR-VI 1987 §5.35)

The Commission reacted to these suggestions by reaffirming that important aspects of its management policy were achieved by controlling the amount of fishing as well as the age of the fish at first capture (CCAMLR-VI 1987 §59).

Although hampered by incomplete data, WG-FSA rendered advice to the Scientific Committee for passing on to the Commission. It was difficult for WG-FSA to contribute to the realization of the ecosystem standard; part of the reason for this was the differing attitudes between harvesters and non-harvesters. Harvesters were ready to counter possible moves to restrict or halt fisheries on the grounds of insufficient data. Advice given by WG-FSA and endorsed by the Scientific Committee was being ignored in the Commission, as explained below.

No data, no fish⁹⁷

As early as 1984, the Scientific Committee had complained that data on finfish catches, if they were received at all, were neither adequate nor timely. Thus stock assessments, essential for setting TACs, could not be made. When measures were passed, some members complained that these were based on insufficient scientific evidence. Since some of those that complained were also withholding data, their complaints would appear as somewhat hypocritical.

Reacting to this perceived neglect of the work of WG-FSA, the Convenor, Kock, appended a personal statement to the Commission Report in 1989. He pointed out that the work of WG-FSA was guided by questions put to the Scientific Committee by the Commission and by the responsibilities of the participating scientists in the light of Article II. He cautioned that the advice given was not always unequivocal, but that while the Scientific Committee usually accepted the advice given by the Working Group the Commission was discrediting and even ignoring it. The excuse was that there was insufficient scientific evidence, but no guidance was given what level of certainty was required for the advice to be accepted (CCAMLR-VIII 1989 Annex F).

In 1990, Kock again noted that the proposals put forward from 1984 onwards for more stringent measures for the regulation of finfishing were not being adhered to because fishing nations maintained that scientific advice was inadequate. There was a dearth of data on which to base assessments that meant that only 14 of the 32 stocks of finfish then being harvested were able to be assessed. CCAMLR's credibility was being questioned because such Conservation Measures as had thus far been passed were inadequate and did not allow the regeneration of stocks as required by the Convention. The Convenor outlined ways in which data collection and assessments could be improved. These included cooperation in the conduct of surveys and analysis of results, increased surveys to estimate stock biomass, pre-recruit surveys, improved catch and effort statistics, information on the amount of discards and fish products. He advocated that data be gathered from all species being harvested commercially as well as from exploratory fisheries.

He sounded a cautionary note: there are still great uncertainties in fish stock assessment, common to all fisheries, even if all this sort of

information were available. In the case of the Southern Ocean, further uncertainty relates to the lack of information on its fisheries which is due to the isolation and enormous size of the area and the fact that it is under international governance (SC-CAMLR-IX 1990: 232-243).

Assessment of WG-FSA

It can be argued that WG-FSA, through its very pragmatic approach to management, has thus far helped to prevent excessive perturbation of the Antarctic ecosystems and thus is implicitly implementing the ecosystem approach. Its later decisions indeed show a consciousness of this, for example through Conservation Measure 29/X discussed below under WG-IMALF.

WG-FSA has the difficult task of reconciling two opposing points of view on how fisheries ought to be managed. The fishing nations regarded regulation as neither necessary nor justified until a problem was identified, and the burden of identifying such problems did not rest with them, but with the non-fishing nations. The non-fishing nations, on the other hand, thought that fishing nations should provide the information needed to set TACs that were compatible with the aims of Article II.

As of 1995, WG-FSA is the only CCAMLR Working Group other than the new WG-EMM. The aims and *modus operandi* of WG-FSA are sufficiently divergent from those of WG-EMM to make a merger between those two groups a less than useful proposition. The two groups interact closely and the differences in their approaches probably ensure a more rounded - or holistic - assessment of the Southern Ocean ecosystem than each would be able to achieve acting independently.

An area where WG-FSA has been less than successful is in anticipating and reacting quickly to new or rapidly escalating directed fisheries, an example being the fishery on *D. eleginoides*, discussed in chapter 6. This is in spite of the fact that Conservation Measure 31/X provides that members intending to start new fisheries in the Convention Area notify the Commission at least three months before the next meeting of the Commission. Moreover, under Conservation Measure 65/XII, new fisheries are regarded as exploratory fisheries until there is sufficient information to determine TACs that are compatible with the requirements of Article II, and that the fishery be conducted so as to obtain the data required.

4.4 THE ROLE OF THE TOP-DOWN AND THE 'HOLISTIC' WORKING GROUPS IN PROMOTING THE ECOSYSTEM STANDARD

There were soon concerns both within CCAMLR and outside it that the ecosystem approach was being subordinated to purely practical, short-term measures and to political expediency (Howard 1989; ECO 1985).

The Australian delegation at the 1985 Commission meeting commented on what it considered the divergence of the Commission from the 'unique ecosystem approach on which the Convention was based' and proposed an agenda item for the next meeting to deal with this matter (CCAMLR IV 1985 §42). Accordingly, the Australian delegation submitted a paper on the development of a conservation strategy for Antarctic marine living resources in which it was advocated that conservation measures should be used to implement Article II of the Convention and to advise the Commission on the likely effects on harvested species of alternative conservation and harvesting strategies (CCAMLR-V 1986 Doc. 11).

4.4.1 Critical self-examination: the Working Group on the Development of Approaches to Conservation of Antarctic Marine Living Resources (WG-DAC)

Australia's initiative eventually resulted in the setting up of an ad hoc working group by the Commission (not the Scientific Committee), the Working Group for the Development of a Conservation Strategy for Antarctic Marine Living Resources (WG-CSD), later renamed Working Group for the Development of Approaches to Conservation of Antarctic Marine Living Resources (WG-DAC).

WG-DAC acted as a kind of scientific and political think-tank which tried to clarify some of the concepts in Article II. Its first formal meeting, attended by most members, took place in 1988 and the report for this (WG-DAC-88) was appended as an addendum to the Commission's report of that year.

Working Group on Development of Approaches to Conservation

| Ad Hoc WG-CSD TOR 1986 (renamed DAC) | Formal WG-DAC TOR 1987 |
|--|---|
| <p>To establish a working group to be convened by Australia to carry forward the development of possible conservation approaches for achieving the objectives of the Convention, as set out in Article II, by the application of the Conservation Measures specified in Article IX</p> | <ol style="list-style-type: none"> 1. To develop a common understanding as to the management implications of Article II of the Convention 2. To develop possible conservation approaches for achieving the objectives of Article II by means contained in Article IX 3. To select and apply performance criteria for assessing each approach 4. To identify, for preferred approaches, specific short and long-term goals consistent with the objectives of the Convention 5. To formulate the framework of a strategy for managing activities in order to achieve these goals 6. To report to the Commission recommending appropriate action |
| (CCAMLR-V 1986) § 64 | (CCAMLR-VI 1987) § 106 |

WG-DAC met yearly until 1991, when it was formally disbanded on the grounds that its work had become an 'integral part of the work of the Scientific Committee' (CCAMLR-X 1991 §6.21-22). Bush (pers. comm.), an Australian commentator, regards WG-DAC as the most important working group of that time, as it forced members to reflect on issues underlying its actions.

Some of the salient issues addressed by WG-DAC were:

Definition of 'rational use'

We recall that this term is not defined in the CAMLR Convention, which merely states that rational use is part of conservation, which is likewise left undefined in Article II §2. WG-DAC-1988 defined 'rational use' as the harvesting of resources on a sustainable basis, conducted so as to ensure that the highest possible long-term yield can be taken from a resource,

subject to Article II's conservation principles (CCAMLR-VII 1988 Addendum: 7).

Other objectives of Article II

WG-DAC-88 stated that not all the objectives set out in Article II 3a-c could be met simultaneously, but that conservation strategies involved compromises between objectives. This particularly applied to the requirement that populations be maintained at levels which ensured the greatest net annual increment (GNAI), which for dependent species varies with the level of exploitation of prey species. In the simplest conditions, where all factors are constant other than the rate of exploitation, GNAI is the same as MSY (Gulland 1987)⁹⁸.

Decision rules

Another useful outcome of WG-DAC that has helped the Commission toward setting precautionary limits on fisheries was setting forth of decision rules.

A paper submitted by Australia stated that decision rules are a fundamental part of a rational conservation strategy, and that well-specified decision rules facilitate consensus decision-making in the Commission. A decision rule designates what action is to be taken for an assessment of the state of the stocks within a management unit before the assessment is made. It was stressed that there must be some 'objective basis' for the measurement of stocks. (WG-CSD-87/6: 9-10). The 'objective basis' in the CCAMLR context is of course conservation. Decision rules have become a useful device for managing the Antarctic fisheries. The following example shows how precautionary limits for the krill fishery were set using decision rules based on a computer model of krill yield. The problem revolved around choosing a value for the proportion of the estimated pre-exploitation biomass of krill.

Decision rule 1

Set the value such that the probability of the biomass dropping below 20% of its pre-exploitation level = 10% for a harvesting period of 20 years;

Decision rule 2

Set the value such that the probability of the krill escapement is 75% of its pre-exploitation level;

Decision rule 3

Choose the lower of the two values to calculate krill yield.

The above rules aim to ensure that the demands of both the fishery and dependent species are met. Since land-based predators have limited ranges during feeding, catch quotas need to be set over appropriate subareas, based on the needs of those predators. The subquotas contribute to the aggregate total catch limit over an entire statistical area. (Compiled from (SC-CAMLR-XIII 1994, §5.37-45)

One may well question here how a number is arrived at for the pre-exploitation biomass of krill, given the extreme variations in krill biomass estimates discussed in chapter 2. Indeed, several delegates at CCAMLR-XIV in 1995 wanted to set the limit for Statistical Area 48 at a considerably higher level, based on recalculations of FIBEX data and surveys conducted in that area.⁹⁹

That aside, adoption of the concept of decision rules was an important step forward in fulfilling CCAMLR's brief. The rules provided a reasoned framework for organizing and coordinating information from different sources and thus providing clear advice to the Commission on which to base its decisions. It is evident from the above example that appropriate decision rules encourage erring on the side of the conservative - a basic tenet of precautionary management as discussed in chapters 6 and 7.

The relationship between the Commission and the Scientific Committee

WG-DAC considered the nature of scientific advice from the Scientific Committee on which the Commission might be expected to act. It had been noted, for example, by the Convenor of WG-FSA, that the Commission appeared to be selective in the scientific advice it accepted for making decisions (CCAMLR-VIII 1989: 99). The Commission is committed to act upon the 'best scientific advice' but uncertainty had been created as to what would constitute this. WG-DAC proposed that the Commission might find it easier to meet its obligation to act on the Scientific Committee's advice if the latter were 'presented in such a way as to make clear the Commission's options in relation to management policy, but to leave no doubt about the validity of the evidence' (CCAMLR-IX 1990: 115).

The Commission accepted that the Scientific Committee was to be regarded as the best source of scientific evidence (CCAMLR-IX 1990 §7.6). This was a major outcome of WG-DAC

Final words on WG-DAC

By conducting what might be termed an internal audit of CCAMLR, WG-DAC generated ideas of direct relevance to some of the other working groups. While WG-DAC served a useful purpose in refocussing members' thoughts on CCAMLR's basic aims, it did not run any practical programs. By 1991 it was considered that WG-DAC's conservation approaches had become 'an integral part of the work of the Scientific Committee' and thus the group was discontinued (CCAMLR-X 1991 p17-18).

WG-DAC revisited?

Notwithstanding the success of WG-DAC in clarifying some issues, at the Commission meeting in 1995 members again found it necessary to focus on basic CCAMLR precepts. Concerns over these were initially voiced by the head of the Chilean delegation¹⁰⁰. Several members endorsed placing an item on the agenda of the next meeting in which CCAMLR's aims as laid out in the convention were once again to be measured against its performance. It remains to be seen whether this initiative heralds a return of a group like WG-DAC.

4.4.2 Working Group for the CCAMLR Ecosystem Monitoring Program WG-CEMP: introductory remarks

Of all the working groups that used a combination of bottom-up and top-down approaches, WG-CEMP was the most daring and innovative. It began in 1985 and continues in a modified form under the banner of WG-EMM. Because of its importance in the development of ecosystem approaches in the CCAMLR regime it will be treated with in depth in chapter 5.

4.4.3 Ad Hoc Working Group on Incidental Mortality Associated with Longline Fishing (IMALF)

The problem of bycatch in fisheries was a concern of the Scientific Committee from its earliest days. Such incidental mortality was a prime example of non-target species - associated or dependent - being affected by harvesting operations, which, if it resulted in population declines of those species, would be in direct contravention of Article II §3(c). The bycatch of young fish in the krill fishery was identified in SC-CAMLR-IV 1985 §4.26-28, but was not felt to be a problem: commercial operations

avoided catching krill with a high admixture of other species since this created processing difficulties.

Debris resulting from the discarding of packaging at sea was causing some marine mammal and seabird deaths. Annex V of MARPOL deals with disposal of plastics and other synthetic materials, including nets, from vessels; most members had ratified this annex and were urged to comply with it (CCAMLR-VIII 1989 §32-35). A moratorium on driftnet fishing passed in the United Nations General Assembly was reflected in CCAMLR Resolution 7/IX¹⁰¹.

Some albatross populations were reportedly being dangerously depleted as a result of longline methods of harvesting of tuna. That such incidental mortality was occurring in the CCAMLR area was disputed by some members, notably USSR, who noted that the longlining for Patagonian toothfish differed from that for tuna. However, the Commission to put in place Conservation Measure 29/X in 1991, based on work by Brothers (1991). This Conservation Measure was expanded and refined yearly. Its aim was to minimise incidental mortality of seabirds during longline fishing. An Appendix to the measure specified streamer line configurations whose purpose was to discourage birds from taking bait off longline hooks. Subsequently, Greenpeace reported bird mortality due to longline fishing for Patagonian toothfish near South Georgia (Dalziell and De Poorter 1993).

The Scientific Committee set up an ad hoc Working Group on Incidental Mortality Associated with Longline Fishing (WG-IMALF) which met in Hobart in 1994 under the chairmanship of Dr Moreno of Chile. WG-IMALF's terms of reference included a review of mitigating methods, taking experience inside and outside the Convention area into consideration (SC-CAMLR-XII §10.19). The report included a table summarising incidence of bird bycatch in the areas adjacent to and within the Convention area.

Incidental mortality was a topic on which conservation- and harvesting-oriented members could agree. The harvesters were motivated to avoid loss of hooks and bait or sustaining other gear damage through incidental mortality, and the non-harvesters were able to press forward the ecosystem approach with little difficulty. The work of WG-IMALF was subsequently taken up by WG-FSA, and continues under that banner.

IMALF provides another link between FSA and WG-EMM, as it aims at the prevention of changes due to harvesting as laid down in Article II §3(c) of the CAMLR Convention.

As many species of albatross breed inside the CAMLR Convention area but are caught on longlines deployed for harvesting tuna outside the area (Brothers 1991), IMALF was significant from a political viewpoint also. IMALF is of significance to the work of the Ecologically Related Species (ERS) group of the Commission for the Conservation of Bluefin Tuna (CCSBT), whose area of competence is adjacent and slightly overlaps that of CCAMLR (see section on CCSBT in chapter 6). This represents an expansion of CCAMLR's influence outside its area of competence. This expansion was evident at an international workshop on albatrosses and their interaction with fisheries, held in Hobart in 1995. CCAMLR contributed to this workshop and the report paraphrases CCAMLR Conservation Measure 29/XV (Alexander, K., R. Robertson et al. 1997: 41).

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4.5 COMMENTATORS' WRITINGS ON CCAMLR'S EARLY PERFORMANCE

Edwards and Heap (1981), United Kingdom participants in the negotiations, were more optimistic than Barnes, whose comments were noted in chapter 3. The interdependence of the species, they wrote, was a factor equally important to obtaining maximum sustainable yield. The interpretation placed by the parties on Article II of the Convention boded well for the future work of the Commission.

Some other early writing was not so optimistic. Boczek (1983) stated - erroneously - that man's impact on the Antarctic environment had thus far been negligible. Claiming to act in the interests of mankind, the 'coterie' of Antarctic Treaty Consultative Parties had enacted a number of environmental regulations, he wrote. They had cynically placed high priority on environmental considerations in order to maintain and strengthen its monopoly on Antarctic matters. Boczek was, however, willing to concede that:

CCAMLR, designed primarily to protect krill...stands out as a progressive piece of international conservationist legislation.
(Boczek 1983: 396)

He saw as a weakness the lack of legal binding of third parties, and advised that such should be encouraged to join CCAMLR if they were intending to carry out fishing or research in the area. One wonders why he stressed this, since it is written into the CAMLR Convention.

An experienced negotiator on behalf of the Chilean government in the Law of the Sea conference and in CCAMLR, Zegers (1983) regarded the ecosystem approach as part of the basis for the recognition by FAO of the authority of the Antarctic Treaty parties to protect the Antarctic ecosystem.

As the Commission was becoming established and after it had held its first meetings, its lack of action immediately to halt perceived overfishing and begin to implement its ecosystem standards was noted by some commentators as apparent failure. The ECO newsletter was particularly strident in its criticism. Produced by a coalition of environmental

organizations, ECO provided running commentary during CCAMLR meetings and was given to attending delegates. Sample comments include: 'Get on with it!' (ECO 1982); 'The crisis of credibility deepens' (ECO 1984); 'Antarctic fisheries: the collapse is complete' (ECO 1985).

Brown and Mannheim (1984) also deplored the lack of action, then endeavoured to show that ecosystem conservation was not an idea exclusive to CCAMLR, but owed a debt to the International Whaling Commission and the Marine Mammal Protection Act of the United States. Both of those, they wrote, require greatest net annual increment levels that hark back to some previous historical population size as a reference point. They gave a lucid analysis of the basic theories underlying resource management, and concluded that the principles of the CAMLR Convention's Article II should be read as complementary guides to action. They advocated various measures to aid implementation, such as identifying management indicator species and depleted species and sampling them periodically. After two meetings, they concluded, the stage was set for the CCAMLR Commission establishing a precedent of prudent use.

Gardham (1985) analysed the CCAMLR negotiations, remarking that the Treaty parties were aware that any indecision and prevarication on their part would threaten their position in the world forum. She found that it was unsurprising that the Commission's progress in conservation and management was slow, given its inexperience in regard to the ecosystem approach.

A participant in CCAMLR meetings on behalf of the USA, Sherman (1986) formulated the concept of Large Marine Ecosystems (LME) as management units. This concept is closely related to the ecosystem approach as pioneered by CCAMLR. It will be referred to in chapter 8.

Scully, like Sherman a CCAMLR participant on the USA delegation, also became involved in LME advocacy. He wrote that the concept of a large marine ecosystem requiring integrated management is 'the clear basis of defining the area of CCAMLR', and relates this to the CCAMLR boundary and CCAMLR's Article II (Scully, Brown et al. 1986: 28). He wrote a number of short but lucid articles on CCAMLR, not cited here, gradually becoming more optimistic of its success.

Hofman (1984), another United States delegate, was affiliated to the Marine Mammal Commission and has written that the ecosystem approach originated there and in the draft regime tabled by the USA at SSATCM-1 (Hofman 1988). He described the CAMLR Convention, tracing its origins and listing problems that might be encountered in the implementation of the ecosystem standard. He foresaw problems with the consensus method of voting with regard to conservation measures (Hofman 1984).

In a comparative study of international wildlife legislation, Lyster (1985) gave a generally favourable review of CCAMLR. He praised it for being concluded before heavy harvesting (in apparent ignorance that this was already occurring) and lauded the ecosystem approach imposed on its members. However, he found that the early signs were not promising: after three meetings, no catch limits had yet been set and only little progress had been made towards fulfilling the CAMLR Convention's objectives. He held out some hope that:

Antarctic fish stocks will not be over-exploited in the same way as other fisheries have been, and, indeed, that they will not even be exploited to an extent that will adversely affect other Antarctic species, notably the large baleen whales.

(Lyster 1985: 176)

Howard (1989) gave a mostly negative report in a comprehensive review of the CCAMLR regime's first five years. He felt CCAMLR had had sufficient time to begin to implement its ecosystem approach, but CCAMLR had not thus far 'approached conservation from the perspective of maintaining the whole ecosystem'. Howard maintained that members saw CCAMLR's conservation objectives of secondary importance to national interests, and nonfishing members had passively allowed CCAMLR to subside into an ordinary fishing agreement. Howard held out little hope for the successful implementation of CCAMLR. He thought it left the ecosystem inadequately protected.

Gulland, a fish population dynamicist who had a wide perspective on living resource management, deserves special mention here. His involvement with the IWC and FAO is noted in this study, as are the numerous contributions to CCAMLR literature in which he elucidated some of the complex questions that arose prior to and following attempts

at implementing the CAMLR Convention. However, as has been seen, he tended to lean towards conventional fisheries management.

Nicol is a scientist working primarily on krill; he is still active in WG-EMM. He published a number of articles critical of CCAMLR's slowness to act in the matter of setting catch limits for krill, and thus failing to protect Southern Ocean ecosystems. An acrimonious exchange in polar literature resulted, whose cause evaporated after limits were set by the CCAMLR Commission (Nicol 1991; Nicol 1992; Croxall, Everson et al. 1992). Nicol's later writings display greater optimism regarding ecosystem management. They are referred to in later chapters.

Puissochet (1991) praised CCAMLR moderately for its ecosystem approach, but thought that the main purpose of the CAMLR Convention was to be 'another stone in the Antarctic edifice' and thus bolster the Antarctic Treaty System. Judged by measures thus far passed, he saw CCAMLR as not very effective, although he allowed that overexploitation was avoided.

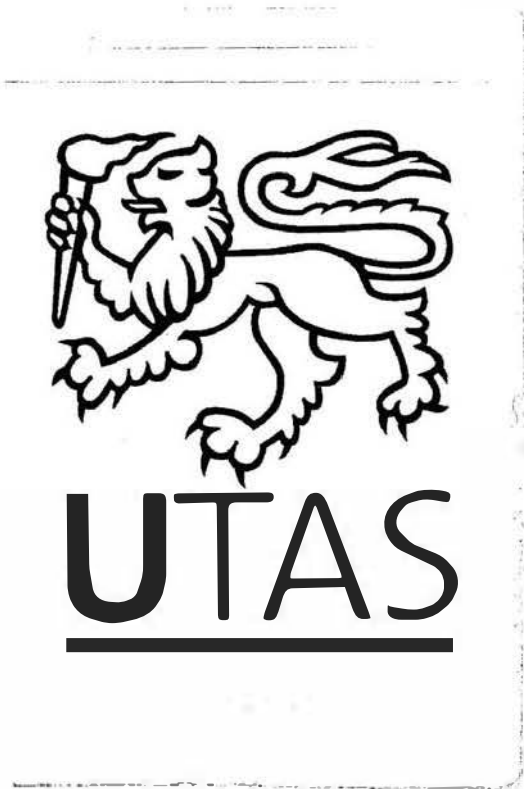
Several theses were written about CCAMLR during this period. Kingham (1990) queried whether the regime could survive, given that at the time of writing no measures had been passed to protect krill. Page (1991) was also critical of CCAMLR, maintaining that it was ruled by politics and not by genuine concern for ecosystems.

Joyner (1992) gave a reasoned account of CCAMLR. It is doubly unique, he wrote, in that

it applies to multiple living resources and its jurisdiction is fixed by the
extent of the resources themselves
(Joyner 1992: 230)

Like Barnes and Boczek, Joyner was of the opinion that its greatest deficiency and that of the ecosystem approach is that the onus is placed upon nonfishing nations to prove that rational use is harmful to the ecosystem. Joyner contended that the burden of proof should lie with the harvesting nations.

From the above, it can easily be seen that the majority of commentators on CCAMLR's early years were at best equivocal on its performance thus far. As we have seen however, by 1985 there was a framework for research into Southern Ocean ecosystems. A solid scientific background was being built up through the work of the Scientific Committee and its working groups, ably supported by the CCAMLR Secretariat. The main reasons for criticism appear to be the lack of far-reaching conservation measures, but as we shall see in chapter 6, this would be remedied at least in part. Comments on the years post-1990 are covered in chapter 6 and 7.



CONCLUDING REMARKS

It is appropriate here to assess the interactions between the major bodies established under the CAMLR Convention. This is not a simple equation comprising 'the science in politics and the politics in science'. There are many other subtle factors in play, some of which have already been alluded to.

CCAMLR Commission, Scientific Committee and Working Groups

Some of the members were content to let the scientists on their delegation take part in the deliberations of the Scientific Committee without or with a minimum of political constraints. Other parties insisted on some diplomatic representation (Heap pers. comm.).

There is no discernible east - west, or English - non English divide here. It is not unexpected that when the meetings are being held in conjunction in the same building that some political 'interference' occurs. Delegates are usually briefed by their governments on issues that are likely to be raised and are advised of the preferred responses to likely questions or scenarios. Thus a scientist is never entirely at liberty to express his or her personal point of view. However, Heap's impression is that the scientific advice that the Committee offers to the Commission is 'less politically biased than in other similar arrangements' (Heap pers. comm.).

A caveat must be expressed here. Heap's view may be contrasted with that of Chittleborough (pers. comm.) who thought that the Australian Government:

...never really grasped the importance of having an independent Scientific Committee if the Commission was to receive soundly based scientific advice on management options¹⁰².

He allowed, however, that the other scientists were also obliged to follow their own national political agendas, thus underlining what we averred above. A few early participants¹⁰³ ceased coming to CCAMLR meetings because they felt disillusioned about the penetration of politics into the workings of the Scientific Committee.

Whatever their earlier perceptions, a number of former delegates returned after long absence; it was instructive to hear their views on changes that have taken place in the CCAMLR regime. Some of these are treated in chapter 6.

The meetings of the Working Groups are normally attended only by appropriately qualified experts and at these fora scientists can speak more freely. The reports of the Working Group's meetings are discussed in the Scientific Committee before any advice is passed on to the Commission.

CCAMLR Secretariat

The role of the Secretariat deserves mention here. From the first this was the inconspicuous powerhouse backing up the increasingly complex and voluminous work of the Scientific Committee and its working groups. Headed by the Executive Secretary who is supported by scientists, mathematicians, computer managers, and secretarial staff, the importance of the Secretariat must not be underestimated. The Secretariat serves as a contact point through which intersessional correspondence between members takes place.

An impressive CCAMLR database channels and collates data received from members. The Secretariat also receives data from members who are harvesting. When TAC is reached for a species, the harvesting is halted. This function will be referred to again when discussing vessel monitoring in chapters 6-8.

Its publications include meeting documents, reports, scientific papers, statistical bulletins, newsletters and specially produced brochures and books; many of these are listed in the bibliography. It organises meetings, providing simultaneous interpretation and translation in the four official languages. At the time of meetings it provides friendly and efficient support for delegates and organises formal and informal social occasions which help to strengthen the personal links between members.

Thus the role of the Secretariat in implementing the intentions of the CAMLR Convention is crucial; this is demonstrated by reference to its activities throughout this study¹⁰⁴.

Article II underpins the Commission and the Scientific Committee

Article II continues to be regarded by members as the cornerstone of the CCAMLR approach and as a rationale for the actions of the Commission and the Scientific Committee.

We have shown that the demands of Article II §3a are being quite well served by the two main working groups - WG-EMM and the ongoing WG-FSA. These provided management advice to the Commission to set measures that allowed conservative catch rates. Although at times these measures were less stringent than some members of the Scientific Committee had advocated, the Conservation Measures began to reflect consciousness of a need to protect ecosystems. Chapter 6 provides further comment on this matter.

WG-IMALF looked at dependent species as demanded by Article II§3c. WG-DAC forced the Commission to re-examine the aims of the Convention, especially as they are set out in Article II.

This chapter set out to show how implementation of the ecosystem approach was begun by the CCAMLR regime. Thus far, we have shown that by 1985 the CCAMLR conservation philosophy, while imperfectly transcending politics, had at least allowed a workable organization to be set up. This organization, by the actions of the Scientific Committee and its Working Groups, through the medium of the Secretariat and the decisions of the Commission was indeed beginning to protect Southern Ocean ecosystems.

One of the workgroups established under the Scientific Committee, the Working Group on the CCAMLR Ecosystem Monitoring Program, was set up to identify and promote research to enable the requirements of Article II§3b and 3c to be put into practice. How this came about and the extent to which it succeeded is the subject of the next chapter.

5 THE HEART OF THE MATTER: THE CCAMLR ECOSYSTEM MONITORING PROGRAM

To see the penguin out at sea,
And watch how he behaves,
Would prove that penguins cannot be
And never shall be slaves.
You haven't got a notion
How penguins brave the ocean,
And laugh with scorn at waves.
(Lindsay 1918: 40)

INTRODUCTION

The preamble to the CAMLR Convention contains a clear mandate to carry out international programs of research to provide scientific information, alongside that gained from traditionally managed harvesting. It states in part:

Considering that it is essential to increase knowledge of the Antarctic marine ecosystem and its components so as to be able to base decisions on harvesting on sound scientific information;

Believing that the conservation of Antarctic marine living resources calls for international cooperation with due regard for the provisions of the Antarctic Treaty and with the active involvement of all States engaged in research or harvesting activities in Antarctic waters;

Recognising...that it is desirable to establish suitable machinery for recommending, promoting, deciding upon and co-ordinating the measures and scientific studies needed to ensure the conservation of Antarctic marine living organisms.

(CAMLR Convention 1980)

As explained in chapter 3, the Convention has as its objective the provision of a framework for the orderly harvesting of the living resources of the Southern Ocean, taking into account the conservation

standards as set out in Article II. Chapter 4 showed that the ecosystem approach was attempted through application of Article II§3a.

The Working Group on Development of Approaches to Conservation (WG-DAC), between 1986 and 1991 had teased out some of the theoretical basis of CCAMLR's conservation standard in resource management - the ecosystem approach. The short-lived ad hoc Working Group on Incidental Mortality Associated with Longline Fishing (WG-IMALF) which as we saw in chapter 4 was concerned with adverse bycatch effects of harvesting operations, was preceded by another group that attempted to put into practice the requirements of Article II §3b and c:

(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 subparagraph (a) above; and

(c) prevention of changes or minimization of the risk of changes 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.

(CCAMLR Convention 1980 Article II)

Implementation of these objectives proved difficult given the dearth of scientific information identified at early CCAMLR meetings. A priority of the new CCAMLR Commission, then, was to create an administrative framework for coordinating ongoing and new programs of research that could yield information to help achieve the conservation goals of the Convention. Chapter 4 described the first steps in this process. In this chapter the focus will be on the CCAMLR Ecosystem Monitoring Program Working Group (WG-CEMP) and its role in furthering the conservation standard.

5.1 SCIENTIFIC RESEARCH IN SOUTHERN OCEAN ECOSYSTEMS BEFORE CCAMLR

CEMP was not by any means the first or only program to promote research into biological aspects of the Southern Ocean. Prior to the setting up of CCAMLR, information had been gathered by scientists on voyages of exploration, on whaling vessels and on other 'ships of opportunity' from Cook's time onwards. The voyages of HMS *Challenger* (1872-6)¹⁰⁵ yielded much information, as did those of the *Valdivia* (1898-99)¹⁰⁶, *Belgica*¹⁰⁷ (1897-9) and *Gauss* (1901-1903)¹⁰⁸.

The *Discovery* expeditions (Walton 1987: 28-31)¹⁰⁹, financed by whaling revenues, took place between 1925 and 1951. Beside investigating whales, (Mackintosh 1929; 1943) research in many other aspects of Southern Ocean ecosystems was conducted (Walton 1987: 28-31). Importantly, the distribution and biology of Antarctic krill were investigated and reported on by Marr (1962); this study is very widely quoted¹¹⁰.

As discussed in chapter 2, the Food and Agriculture Organization of the United Nations had conducted a program of research on the Southern Ocean in the 1970s¹¹¹. BIOMASS, the SCAR-sponsored program of investigations discussed in chapter 2, had begun during the time that CCAMLR was being negotiated and continued until the mid-1980s.

Thus there was a vast volume of information already gathered before CCAMLR began, some data sets going back many years, but the interpretation and collation of that data to form a coherent information base about Southern Ocean ecosystems was not far advanced. The early management decisions made by the CCAMLR Commission were based on catch statistics, not on wider information regarding ecosystems. The Working Group on the CCAMLR Ecosystem Monitoring Program (WG-CEMP) was to begin to fill this information gap.

5.1.1 Ecosystem research via harvesting operations

Much information on marine ecosystems is obtained from catch data generated by commercial harvesting operations and reported to regulatory bodies. It could be argued that there is therefore no need to

spend money on further scientific research. However, information obtainable from fisheries is selective and difficult to interpret. We can see some of the reasons for this:

- most harvesting concentrates on single or a small number of species, thus no information is obtained about species which predate harvested species;
- harvesting concentrates on certain size or year classes in a population and cannot therefore tell us much about the rest of that population;
- bycatch species of commercial interest may be recorded, but those of non-commercial interest may not;
- most harvesting operations are not designed as scientific experiments to test a hypothesis, and results may be difficult to interpret;
- harvesting takes place where there are commercial quantities of organisms to be harvested, so there is no opportunity to study other ecosystems where those organisms are less abundant;
- for commercial reasons, data obtained from harvesting is often incomplete or vague regarding geographic location.

This is not to say that information obtained from harvesting operations lacks value, but research programs to complement and supplement that information are required to supply a more complete picture of Antarctic marine ecosystems.¹¹² This was initially addressed by CCAMLR through the establishment of a monitoring program, and later through close interaction between that program and the fish stock assessment and krill working groups, described in this chapter. Some remarks on monitoring precede discussion of the monitoring program.

5.2 MONITORING

Monitoring is a term that comes from Latin *monitio* - a warning or reminding. One of its meanings given by the Macquarie Dictionary: to check, observe, or record the operation of [a thing] without interfering with that operation, fits nicely with current opinion. This defines 'proper' monitoring as surveillance together with:

1. Assessment of changes against a standard or target.
2. Gathering of data such that the reasons for changes are apparent.
3. Clear understanding of the objectives of the program.

(Adapted from Furness et al. 1993: 5).

The standard against which changes may be determined could be some natural norm often established from historical records; thus long data series are valuable in monitoring. Alternatively, the standard could be a target of some management action, e.g. the recovery of some species following a perturbation. Changes due to natural causes must be distinguishable from those caused by human action. Thus, at the most basic level, knowledge of natural fluctuations in the variable being measured is needed.

A need to know what is going on is not a sufficiently clearly defined objective. It is important to identify precise objectives and then select key indicators that can be measured such that 'environmental noise' can be cut through to provide clear indications of changes, if any. Objectives should, on the other hand, not be too rigidly defined lest old problems are revisited or new problems are missed (Furness et al. 1993: 5-7).

Underwood (1989) wrote that monitoring is useful as an adjunct to experimental and interactive studies of stresses.

5.2.1 Biomonitoring

Biological monitoring, also called biomonitoring, uses the reactions of living organisms to indicate changes in the environment. Such organisms are often referred to as biological indicators. Biomonitoring is one of a range of accepted tools in detecting contaminants and in charting

the influence of human actions on ecosystems¹¹³. Other monitoring schemes use physical factors to chart changes; monitoring of living and nonliving components of ecosystems are often carried out in conjunction. Population studies and long-term surveillance of organisms form part of the suite of tools of scientists carrying out environmental monitoring (GESAMP 1995; McIntyre 1992; Furness, Greenwood and Jarvis 1993: 22-3)¹¹⁴.

5.2.2 Use of indicator species

This is a subset of biomonitoring. A limited number of species of organisms is studied intensely, using attributes of those organisms that are susceptible to the changes that it is wished to monitor.

A basic challenge of the ecosystem approach to managing and conserving Antarctic marine living resources is obtaining current information on changes and trends within the system...the use of indicator species has been suggested as a method to indirectly monitor ecological interactions (Bengtson 1984b: 51).

Using indicator species for detecting changes was not totally new: seabirds have been used for centuries to indicate the presence of desirable target fish species and as pointers to changes in weather. However, using animals to make *quantitative* scientific assessments of ecosystems had not been done on a major scale prior to CEMP, still less had any fishery body attempted to use information from a monitoring program to make management decisions about a fishery.

Suggestions about indicator species had been made by the SCAR Subcommittee on Bird Biology in 1978. It recommended that censuses should be made of certain key species¹¹⁵ at Antarctic and subantarctic sites and that multidisciplinary programs be instituted to investigate diet, food consumption and energetics of seabirds (SCAR 1978: 44-5). Its Subcommittee on Biological Monitoring reported at the same meeting and recommended the monitoring of known krill predators (SCAR 1978: 47.)¹¹⁶

We need to mention here studies performed in temperate latitudes, some of which began soon after CEMP was started. The ten-year South African program conducted in the Benguela upwelling system off the Atlantic

coast of Africa studied trophic interactions (Adams et al. 1992; Hilborn 1992; Shelton 1992; Wickens, Japp et al. 1992).

The Barents Sea has also been the focus of multispecies studies, involving several different target species that interact (Eikeland 1993; Bogstad and Gjosaeter 1994; Hamre 1994; Ulltang 1995).

ICES held a symposium on multispecies assessment in 1989 (Gulland 1989)] and has ongoing programs that study species interactions (Pope 1991) and ICES Internet homepage.

The CCAMLR Ecosystem Monitoring Program was begun in 1984, before the results of these studies were known. At its inception, most fisheries were still being managed as stocks of single species; this was also true of CCAMLR's own fishery management during its first few years. The concept of multispecies fisheries management was in its infancy; there was no precedent for taking the ecosystem into account in a high seas context (May 1979: 267, 273). The program was to introduce and test new methods in biomonitoring in the Antarctic and Southern Ocean.

5.2.3 Costs of monitoring programs

It is difficult to perform a cost-benefit exercise on monitoring if it cannot be accurately shown what the consequences are of taking alternative courses of action. This is of course a problem that modelling can address to a degree. Various scenarios can be played out before action is taken in the field. However, modelling requires data obtained from field observations, and one method to obtain such data is through monitoring. Costing monitoring programs depends on how science programs are funded; these vary considerably from state to state (Costalunga 1997). It could be argued that the user-pays principle should apply, i.e. that the potential perturber of an ecosystem should fund research into the possible effect of that perturbation, but this has not been taken up in CCAMLR.

5.3 CCAMLR ECOSYSTEM MONITORING PROGRAM (CEMP)

CEMP was initiated at the 1984 CCAMLR Scientific Committee meeting, the same meeting at which the first conservation measures were passed. The impetus for setting up the group had come from the second Scientific Committee meeting (SC-CAMLR-II 1983 §65; 67) and from member nations, in particular USA and Australia. In May 1985 an ad hoc Working Group for Ecosystem Monitoring met in Seattle. This ad hoc group was raised to a Working Group with formal terms of reference in September 1985. The CCAMLR Working Group for Ecosystem Monitoring (WG-CEMP) has since met annually, except 1988; its last meeting as an independent group was in 1994. It was thus in operation longer than any of the other working groups.

At each meeting of WG-CEMP, the agenda, though broad, centred on the devising and implementing ways of monitoring variables associated with selected predators of Antarctic krill (*Euphausia superba*). CEMP was the first program in the world to monitor parts of a marine ecosystem on so extensive a scale. CEMP began as a modest enterprise but evolved into a very large and, for participating nations, expensive program¹¹⁷. It has involved larger numbers of scientific and technical personnel than any other program under CCAMLR.

Like its parent body, the CCAMLR Scientific Committee, WG-CEMP has gone through two distinct phases. Until 1990, apart from some very interesting scientific results which added to the knowledge base on Antarctic marine ecosystems, little had come out of it which could be translated into management advice. After 1990, developments within the Scientific Committee and the Commission accelerated; bolder and more far-reaching decisions on conservation were taken. It was also realised that the aims of the WG-Krill (described in Chapter 4) and WG-CEMP were increasingly converging. The first joint meeting of the two groups was held in 1992 and in 1994 they merged to form the Working Group on Ecosystem Monitoring and Management (WG-EMM). As part of WG-EMM, CEMP continues to coordinate the efforts of many member nations at a number of sites in the CCAMLR region.

5.4 POLITICO-ECONOMIC FACTORS IN FORMATION OF WG-CEMP

Since the negotiation and signing of the CAMLR Convention in 1980, changes had occurred in the global political situation whose effects were being felt in the Antarctic Treaty system. The infant CCAMLR Commission had not been in existence long enough to establish itself in world opinion as an independent body responsibly managing a resource, but was apparently still regarded as very much a junior partner in the Antarctic Treaty System. In spite of the fact that the only real avenue of cooperation between the Antarctic Treaty and CCAMLR was through SCAR, in the eyes of the world in 1984 CCAMLR's image and that of the rest of the ATS were closely linked. At that time Antarctica was very much in the spotlight of world attention; some reasons for this are outlined.

- Antarctica was perceived by many to be 'mankind's last remaining treasure house other than deep sea resources' to which nations other than those involved in the 'Antarctic Club' ought to have access. Krill was seen as an important food source for the 'protein poor world'. (Rowland pers. comm., Zegers, pers. comm.).
- There was a strong push to internationalise Antarctica on the grounds that it formed part of the common heritage of mankind; mineral as well as living resources were of concern (Hamzah 1987: 16-17).
- The Antarctic Treaty system was under threat from outside through initiatives by Malaysia¹¹⁸ and other states in the United Nations. The 1984 CCAMLR meetings, at which a number of landmark decisions were made, took place after the Thirty Eighth Session of the United Nations General Assembly in 1983 where 'the question of Antarctica' was on its agenda and addressed by numerous members. At the time CCAMLR was ratified, non-treaty nations regarded the Antarctic Treaty system as still very much an exclusive society reflecting the membership and ethos of the Antarctic Treaty Consultative Parties (ATCPs) which resisted overtures from outsiders (Hamzah 1987: 13-4). The notion of exclusivity was further strengthened by the perception that ATS members were privileged Western nations (Hamzah 1997: 250-256)¹¹⁹. Another cause for discontent within the United Nations Treaty was the refusal of ATS to exclude South Africa on the grounds of its Apartheid regime¹²⁰.

- The USSR had begun krill fishing in the 1960s (Burukovskiy 1967) and in 1981-82 had harvested a total of over a million tons of krill (CCAMLR 1990b)¹²¹. It had developed techniques for onboard processing and a domestic market for krill products. It was possible that it would not like to have so lucrative an industry curtailed. (Implications of the Soviet and other non-Western regimes on CCAMLR are discussed in chapter 3). Japan had begun krill harvesting in the mid-1970s (CCAMLR 1990a).
- Finfishing in the Southern Ocean reached an all-time high in the years since the signing of the Convention (CCAMLR 1990b)¹²². No measures had yet been put in place to conserve stocks that were perceived as having been overfished.
- Nongovernmental environmental organizations were focussing public attention on what they regarded as CCAMLR's reluctance to take action (ECO 1984, ECO 1984), (ECO, 1985).
- A war had been fought in 1982 between two CCAMLR members (Argentina and the United Kingdom) over the Falkland/Malvinas Islands, which had implications, inter alia, for resource management in the Southern Ocean (Pittman 1988: 41).
- Chile and Argentina had for many years been in dispute over the Beagle Channel, as we discussed in chapter 3. The matter was finally resolved¹²³ in late 1984. The aftermath of this dispute also had implications for Antarctic politics and resources (Anon. 1978; Anon. 1984; Pittman 1988: 41).
- The negotiations for the Law of the Sea had been completed with its signing in December 1982. Many nations had already put in place 200 nautical mile maritime zones, increasing harvesting pressure on the diminishing areas of high seas. The largest remaining area of high seas was in the Southern Ocean.
- Negotiations for a possible Antarctic mineral resource regime had begun in 1982; five meetings had been held by 1985 and Antarctic resources were very much in the news.

- The SCAR-sponsored BIOMASS program was drawing to a close, having completed its much-publicised coordinated international surveys (FIBEX, SIBEX) of the Southern Ocean. There was a need to follow up its work, build on it and take new directions.
- The International Whaling Commission had declared in 1982 that it would implement a moratorium on commercial whaling from 1986. This focussed attention on the record of the Antarctic Treaty system performance in conservation matters in the Southern Ocean.

It can be seen that there was ample reason for the Antarctic Treaty Consultative Parties and its associated organizations to feel under some pressure to be seen to be doing significant work in the Antarctic and the Southern Ocean. In particular, there was a need to demonstrate the strong conservation stance of the newest component of the Antarctic Treaty System. Would the work to be undertaken under the aegis of WG-CEMP ease the pressure on the Antarctic Treaty System?

5.5 NEGOTIATING AND DESIGNING CEMP

5.5.1 Prenegotiations for an ecosystem monitoring scheme

The idea of setting up an 'Ecosystem Management' workgroup was raised at the second Scientific Committee meeting in 1983, as noted in chapter 4. At that time it was thought to be premature due to 'lack of knowledge on Southern Ocean ecosystem(s)' (SC-CAMLR-II 1983 §64-69). To begin to overcome this lack, lists of questions on dependent and related species were submitted by the Scientific Committee to the SCAR Group of Specialists on Seals and to the BIOMASS Working Party on Bird Ecology (SC-CAMLR-II, 1983 §59; Annex 10). The purpose of the questions was to obtain opinions on which species might be suitable as indicators of changes in the Antarctic marine ecosystem by harvesting.

The United States delegation had several representatives who were aware of the possibilities of living resource management in an ecosystem context as exemplified by the 1972 US Marine Mammal Protection Act. Papers on the topic of ecosystem monitoring had been tabled previously by United States delegates (Green-Hammond 1983; USA 1984).

At the third meeting of the Scientific Committee it was decided to form an ad hoc Working Group on Ecosystem Monitoring under the convenorship of Australian Dr Knowles Kerry. The United States offered to host a meeting of the ad hoc group at the National Marine Mammal Laboratory in Seattle in 1985 (SC-CAMLR-III 1984 §9.29).

5.5.2 Meeting of Ad Hoc Working Group on Ecosystem Monitoring, Seattle, 6-11 May 1985 (Seattle meeting)

Of the CCAMLR members who were harvesting in the Southern Ocean at the time, only Japan attended the Seattle meeting. Fishing nations not represented at the meeting were Poland, Germany (Democratic Republic), USSR, France and Chile. Although the Republic of Korea had carried out fishing in the CCAMLR area, it did not become a member of CCAMLR until late in 1985, after the Seattle meeting. Thus there was an anomalous situation where the nonharvesting nations were in a position to make decisions that might affect the harvesting nations. The reasons for the

non-attendance of a number of members whose interests were at stake can only be speculated upon, but may simply have been because they were unable to obtain visas to enter the US in time for the meeting¹²⁴. Most of the delegates to the Seattle meeting came from English-speaking nations. The USA, being the host nation, was well represented; the SCAR and IWC representatives were also from the USA.

In contrast to meetings of the Commission, there was a preponderance of scientists over diplomats at the Seattle meeting, indicating that the proposed program was perceived as scientific rather than political in orientation.

Absence from the Seattle meeting may have suited the USSR scientists quite well. They were able to sit back and comment on the deliberations without having to take part in the arguments; the framework for comment and criticism had been created with no effort on their part. A paper setting out the USSR views on monitoring will be discussed later in this chapter.

Agenda for the Seattle meeting

The agenda for the Seattle meeting had been set at SC-CAMLR-III, as follows:

DRAFT AGENDA

AD HOC WORKING GROUP ON ECOSYSTEM MONITORING

Meeting 6-11 May 1985

National Marine Mammal Laboratory

National Marine Fisheries Service

Seattle, Washington USA

1. Review the objectives of ecosystem monitoring.
2. Review the responses to the CCAMLR Scientific Committee of the SCAR Group of Specialists on Seals and the BIOMASS Working Party on Bird Ecology.
3. Review the life history characteristics and parameters of dependent and related species likely to be useful to ecosystem monitoring studies.
4. Identify dependent and related species which have the greatest potential to function as indicators of the possible effects of krill harvesting.
5. Consider the types of studies necessary to establish baseline data and to evaluate natural variation in biological and environmental variables.
6. Describe sampling and data collection procedures required to detect effects of fisheries activities on components of the ecosystem.
7. Consider experiments to be undertaken in collaboration with fisheries activities.
8. Evaluate potential sites and areas for ecosystem monitoring programs.
9. Formulate and recommend specific actions for planning and implementing multi-national ecosystem monitoring programs.
10. Other items.
11. Adoption of report.

(SC-CAMLR-III 1984 Annex 9)

That this agenda attempted to cover an enormous field in a short time, was recognised by the convenor, who wrote to the prospective participants in December 1984 advocating the preparation of working papers regarding potentially suitable areas prior to the meeting. He included a revised draft agenda that comprised a more focused approach and a greater emphasis on detecting the effects of krill harvesting on krill

predators. The convenor's letter provoked 9 replies which mostly supported the revised draft agenda. (Ad hoc WG-CEMP Seattle 1985 unpublished). Some of the respondents' suggestions were later taken up, such as inviting SCAR and BIOMASS representatives to the Seattle meeting to discuss the answers to previously submitted CCAMLR questions. Although the original draft agenda was adopted at the Seattle meeting (SC-CAMLR-IV 1985 Annex 7 §5), ideas that were part of the convenor's letter or which were generated as a result of it underlay the Seattle deliberations as already alluded to above.

5.5.3 Objectives and terms of reference of CEMP

The convenor had stated in his letter of 21 December 1984 that the objective of ecosystem monitoring in relation to the Antarctic marine ecosystem was :

to detect and record significant changes in critical components of the ecosystem, to serve as a basis for the conservation of Antarctic Resources. The monitoring system should be designed to distinguish between changes due to the harvesting of commercial species and changes due to environmental variability, both physical and biological.

· (Kerry 1984) (emphasis added)

These words appeared verbatim (except for the insertion of the words 'marine living' between Antarctic and resources) as the Objectives of Ecosystem Monitoring in the report to the Scientific Committee as the ad hoc group's definition of ecosystem monitoring (SC-CAMLR-IV, Annex 7, p 171 §11). Slightly amended in 1987, these were the objectives that underpinned CEMP's activities from 1985:

CEMP objectives

- to detect and record significant changes in critical components of the ecosystem, to serve as a basis for the conservation of Antarctic marine living resources;
- to distinguish between changes due to the harvesting of commercial species and changes due to environmental variability, both physical and biological. (SC-CAMLR-VI 1987: 112).

At the 1984 Scientific Committee meeting, terms of reference (TOR) for the ad hoc working group had been laid down. After the meeting of the ad hoc group, the Working Group for the CCAMLR Ecosystem Monitoring Program was formally established by the Scientific Committee in 1985 under amended TOR.

Working Group on the CCAMLR Ecosystem Monitoring Program Terms of Reference

| Ad Hoc TORWG-CEMP 1984 | Formal TOR WG-CEMP 1985 |
|--|---|
| <p>a) Review the objectives of ecosystem monitoring and review the life history characteristics of indicator species that are potentially suitable for monitoring studies, bearing in mind potential relationships between selected indicator species and harvested resources (especially krill)</p> <p>b) Consider sampling and data collection procedures, including the collection of baseline data, required to detect any effect of fishery activities on components of the Antarctic ecosystem</p> <p>c) Describe the types of studies that would be necessary to evaluate natural variation of relevant variables</p> <p>d) Evaluate and recommend potential monitoring sites and areas</p> <p>e) Consider the utility, feasibility, and design of controlled experiments undertaken in collaboration with fisheries activities to test hypotheses concerning cause/effect relationships and the possible effects of different methods and intensities of fisheries activities on components of the Antarctic marine ecosystem</p> <p>f) Formulate and recommend specific actions for planning and implementing ecosystem monitoring programs to establish data baselines, monitor indicator species and undertake controlled experiments</p> | <p>1. To plan, recommend, coordinate and ensure the continuity of a multi-nation CCAMLR ecosystem monitoring program within the convention area</p> <p>2. To identify and recommend research including theoretical investigations to facilitate design and evaluation of the recommended ecosystem monitoring program</p> <p>3. To develop and recommend methods for the collection and storage and analysis of data including data formats for submission to CCAMLR</p> <p>4. To facilitate the analysis of data, their interpretation, and to identify the management implications</p> <p>5. To report progress to each meeting of the Scientific Committee with recommendations for further work</p> |
| (SC-CAMLR-V 1986) §9.27 | (SC-CAMLR-IV 1985) §7.14 |

The later TOR focus on action rather than reflection. This was perhaps a pity, as will be discussed. Experimentation is mentioned twice in the ad hoc terms of reference and also in the draft agenda, but not at all in those

of the formally set up group. The group appeared to be confining its proposed activities to what was feasible, rather than what it might do at some uncertain time in the future.

Background information and papers

From the first, WG-CEMP served as a focus for the reporting of ecosystem research. Some of this fell outside the relatively narrow guidelines CEMP set for itself. Prior to Seattle, papers on monitoring and ecosystem management had been presented at Scientific Committee meetings; these were summarized by Sabourenkov (1984). Background documents tabled at Seattle included reports of CCAMLR Scientific Committee meetings, SCAR and BIOMASS reports and papers by participating members. Some are discussed below.

Miller (Miller 1985), asserted that rational management as required by CAMLR Convention Article II implied the ability to predict the effect of perturbations. Extrapolating from the findings of a study of South African terrestrial grasslands, he defined monitoring as:

Maintenance of regular surveillance to test the null hypothesis of no change in predefined properties of an ecosystem which is vulnerable to impact, the nature, timing, location and extent is not necessarily known.

Indeed, one can argue that if the causes and magnitude of change were known there is no need to carry out the study. Underwood (1989) also made this point.

Miller proposed further refining the definition of monitoring for Antarctic marine ecosystems:

The detection and recording of changes in critical components of the ecosystem to provide a basis for the conservation and rational management of marine living resources.

Miller advocated the use of models to study ecosystem interactions, as did many other scientists e.g. Green-Hammond et al. (1984) Green-Hammond (1983), Sissenwine (1984), Beddington and De la Mare (1985) and Butterworth (1984).

The responses of the SCAR Group of Specialists on Seals and the BIOMASS Working Party on Bird and on Bird Ecology to the questions posed by the CCAMLR Scientific Committee (CCAMLR and Secretariat 1984) were discussed in small groups.

Outcomes of the Seattle meeting

The delegates proposed a monitoring program based on the following criteria:

- to consider those attributes of predators most suitable for the immediate development of field programs and those requiring directed research aimed at this evaluation;
- to consider the kind of information on predator-prey interactions most relevant to establishing correlations between changes in predator parameters and those in prey availability; and for distinguishing between natural variations in prey availability and those induced by harvesting.

(SC-CAMLR-IV 1985: 184).

There was no question of whether such a program should be set up in the first place: this was not the brief of the ad hoc group. The task given to it by the Scientific Committee was to consider the best ways of structuring a monitoring program.

5.6 CHOOSING INDICATOR SPECIES.

The ad hoc working group had decided ecosystem monitoring consisted of two facets:

1. Monitoring of parameters of predator indicator species

e.g. Seals, seabirds, whales

2. Monitoring of parameters of prey indicator species

e.g. Krill, fish, squid

(SC-CAMLR IV 1985 Annex 7 §15).

The ad hoc working group divided into two subgroups composed of specialists to consider the choice of indicator species. The Sub-Group on Seabirds, Pinnipeds, and Cetaceans discussed candidate predator species, while the Sub-Group on Krill, Fish and Squid deliberated on suitable prey species.

Suitability of species depended on a number of factors, many of which were matters of practicality rather than of science. Plainly it would be pointless to use species which were difficult or impossible of access to researchers, keeping in mind the difficulties of the terrain and weather. This precluded many predators, for example, large whales, from being of immediate or eventual use as indicator species.

It made sense, furthermore, to use those species about which there was already some biological or demographic knowledge so that the committee would be saved at least some background work.

Another factor influencing choice of predators was their numerical strength. It would have contravened the spirit of the Convention to use a rare or endangered species which might be adversely affected by monitoring, although no such species had been identified.

5.6.1 Predator species

It would be prohibitively costly, if not impossible, Green-Hammond et al. (1984) warned:

... to assess and monitor each species and population that might be affected by krill harvesting...one of the tasks...will be to determine and design programs for monitoring those species, populations, or population characteristics that most likely will be affected in detectable ways by exploitation of *E. superba*. (emphasis added)

The primary concern in 1984 was with possible effects of the krill fishery on predators for which krill formed a major dietary component. It followed that the principal criterion for selection as indicator predator species was that they were krill feeders at least during times when monitoring and fishing were feasible (i.e. in summer). Thus animals which fed in the Southern Ocean but whose diets consisted of species other than the chosen prey indicator species or were of unknown composition were not included as predator candidates. Elephant seals¹²⁵ were therefore omitted. Similarly, Emperor penguins¹²⁶ were excluded, since it was then thought their principal item of diet was squid and fish. (Subsequent studies by Robertson (1995: 46) and (Kirkwood and Robertson 1997) have shown that krill also forms a significant part of the diet of Emperor penguins and therefore their possible use as indicator species should be reconsidered).

Qualities by which the ad hoc working group determined the suitability of predator species are listed in table 5a.

Table 5a
SELECTION CRITERIA FOR PREDATOR INDICATOR SPECIES

To qualify as an indicator species, a predator had to:

- be a specialist predator on critical prey components, principally krill
- have wide geographic distribution
- be of importance in the ecosystem numerically and in biomass
- be feasible to study: i.e. easy to approach, handle, observe
- have its general biology known
- have baseline data available at one or more sites

(Adapted from SC-CAMLR-IV 1985 Annex 7: 173).

This is the initial list of animals which were deemed to satisfy the above criteria:

Crabeater seal
Antarctic fur seal
Adélie penguin
Chinstrap penguin
Macaroni penguin
Minke whale¹²⁷

Minke whales were considered to be of lower priority (SC-CAMLR Annex 7 1985 §20) and information received from the IWC, 1986 #1057] threw some doubt on their suitability as predator indicator species, because of time scales involved. Changes might not be detectable in time to make meaningful management decisions.

The predator species finally chosen are shown in table 5b.

Table 5b
PREDATOR SPECIES CURRENTLY BEING MONITORED ¹²⁸

| PENGUINS | FLYING BIRDS | SEALS |
|-----------|------------------------|--------------------|
| Adélie | Black-browed albatross | Antarctic Fur Seal |
| Chinstrap | Cape Petrel * | Crabeater Seal* |
| Macaroni | Antarctic Petrel* | |
| Gentoo | | |

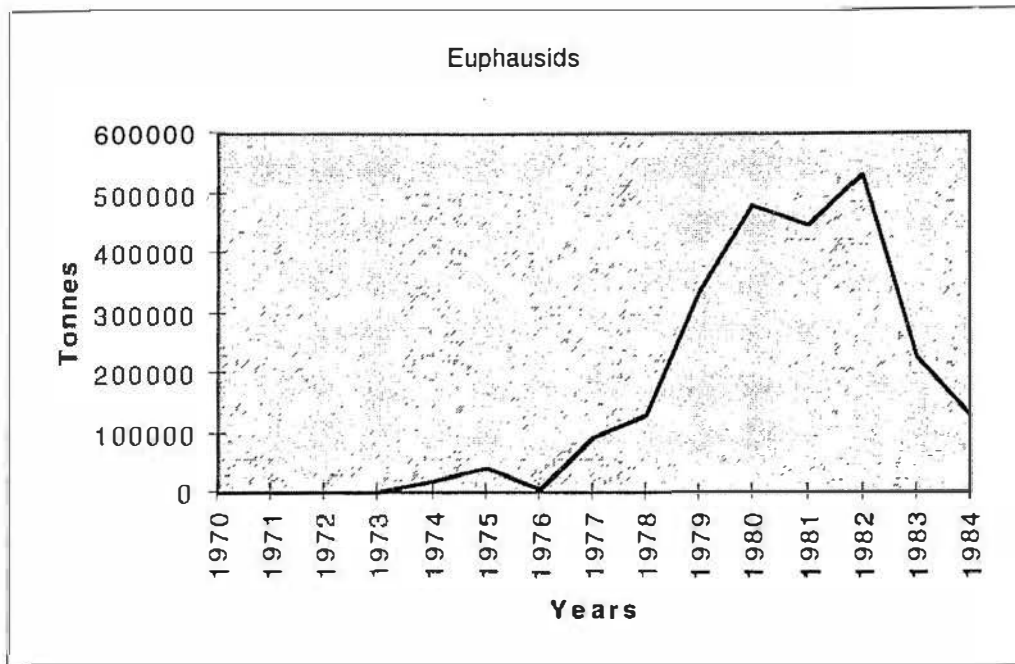
(Compiled from CEMP Standard Methods 1994)

* Standard Methods for monitoring these species have not yet been published.

5.6.2 Prey indicator species

At the time when CEMP was being set up Antarctic krill (*Euphausia superba*) was still considered to be the key organism of the Southern Ocean ecosystem; it was also being harvested in relatively large amounts (see figure 5a). Thus it followed that it was chosen as the primary prey species.

Figure 5a
Krill harvest in the Southern Ocean



(Compiled from CCAMLR Statistical Bulletin 1990a,b)

Bycatch species of the krill fishery, namely the smaller euphausiid, *Euphausia crystallorophius*, the Antarctic silverfish, *Pleuragramma antarcticum*, and larval stages of that and other fish were therefore also included as prey indicator species 'of most immediate and direct relevance with respect to the predator species identified.' (SC-CAMLR 1985 Annex 7 §19).

Other species of zooplankton were not chosen as key prey indicator species, since they were not of commercial interest nor were thought to occur in such large numbers as krill¹²⁹. Thus the monitoring framework was kept relatively simple. It is noteworthy that target species of finfish were not at that stage considered as prey or predator species for monitoring. This point will be revisited.

5.7 CEMP SITES: INTEGRATED STUDY REGIONS, NETWORK SITES AND PROGRAMS OF DIRECTED RESEARCH

The enormous task that the ad hoc working group faced became apparent when they set themselves to choose appropriate sites to carry out monitoring and research. Sabourenkov's summary showed general agreement among the authors that it was not feasible to study the Southern Ocean ecosystem as a whole. It was further recognised that, while the ecosystem was perceived as relatively simple and characterised by short food chains, there were a number of semi-discrete or discrete subsystems within the overall ecosystem, although their extent, location and boundaries were not known (Sabourenkov 1984).

Scientific Committee members had already distinguished 3 zones in the Southern Ocean:

1. The open water
 2. The pack ice area
 3. The permanent-ice or high-Antarctic zone
- (SC-CAMLR-III 1984: 30) (refer also to figure 1d)

The ad hoc CEMP working group recognised that studies should be made of communities of organisms living within these zones at different sites within the CCAMLR area. Sites were evaluated for their suitability as follows:

- The need for geographical coverage of the Convention area
- Presence of critical components of the ecosystem
- Influence of specific predators
- Proximity to prey
- Presence of species that could be monitored
- Presence or absence of fishing operations nearby
- Logistics
- Availability of baseline data
- Presence of discrete regions or ecotypes with respect to physical/biological attributes

(Adapted from SC-CAMLR Annex 7 §30).

The meaning of the last criterion seems somewhat obscure. It probably means that there should be a variety of such attributes at different sites, although the context seems to suggest they should be at the same site.

Some sites lent themselves particularly well to integrated studies, where interactions between predator and prey could be monitored closely in open water, in the pack-ice zone and ashore. It was decided to set up coordinated directed studies in sites widely separated from one another to study these communities. Krill harvesting and krill surveys had occurred in various areas, indicating the presence of food for predators in those areas and hence their suitability for more intense study. Intense whaling had taken place in former times near South Georgia, an indication of krill concentrations (Mackintosh 1965: 53; Mackintosh 1970).

5.7.1 Integrated Study Regions

These various factors led to the choice of these integrated study regions (ISR) representing three differing latitudes where representative predator-prey interactions could be studied:

Table 5c
Integrated Study Regions

| Integrated Study Region (ISR) | Representative predator-prey interactions | Latitude-Longitude | Sovereignty/ Claimant |
|--------------------------------------|--|---------------------------|------------------------------|
| PRYDZ BAY REGION | High latitude | 58-68°S; 55-85°E | Australia |
| ANTARCTIC PENINSULA REGION | Intermediate latitude | 60-68°S; 54-75°W | Argentina, Chile, UK |
| SOUTH GEORGIA REGION | Lower latitude | 53-56°S; 35-40°W | Argentina, UK |

(Compiled from SC-CAMLR-IV 1985 Annex 7 §34; unpublished CEMP papers).

5.7.2 Network sites

It was further decided to set up a network of sites, both land-based¹³⁰ and in the pack-ice¹³¹ around the CCAMLR area so that information about the various ecosystems could be collected and collated. By 1995 CEMP studies were being carried out and reported on by these members: Argentina, Australia, Chile, France, Germany, Italy, Japan, New Zealand, Norway, South Africa, Sweden, UK and USA. (SC-CAMLR-XIV 1995 Annex 4).

5.7.3 Directed research and sites

To add to understanding of ecosystem interactions, several sites, listed in table 5d were identified where specific research questions could be addressed.

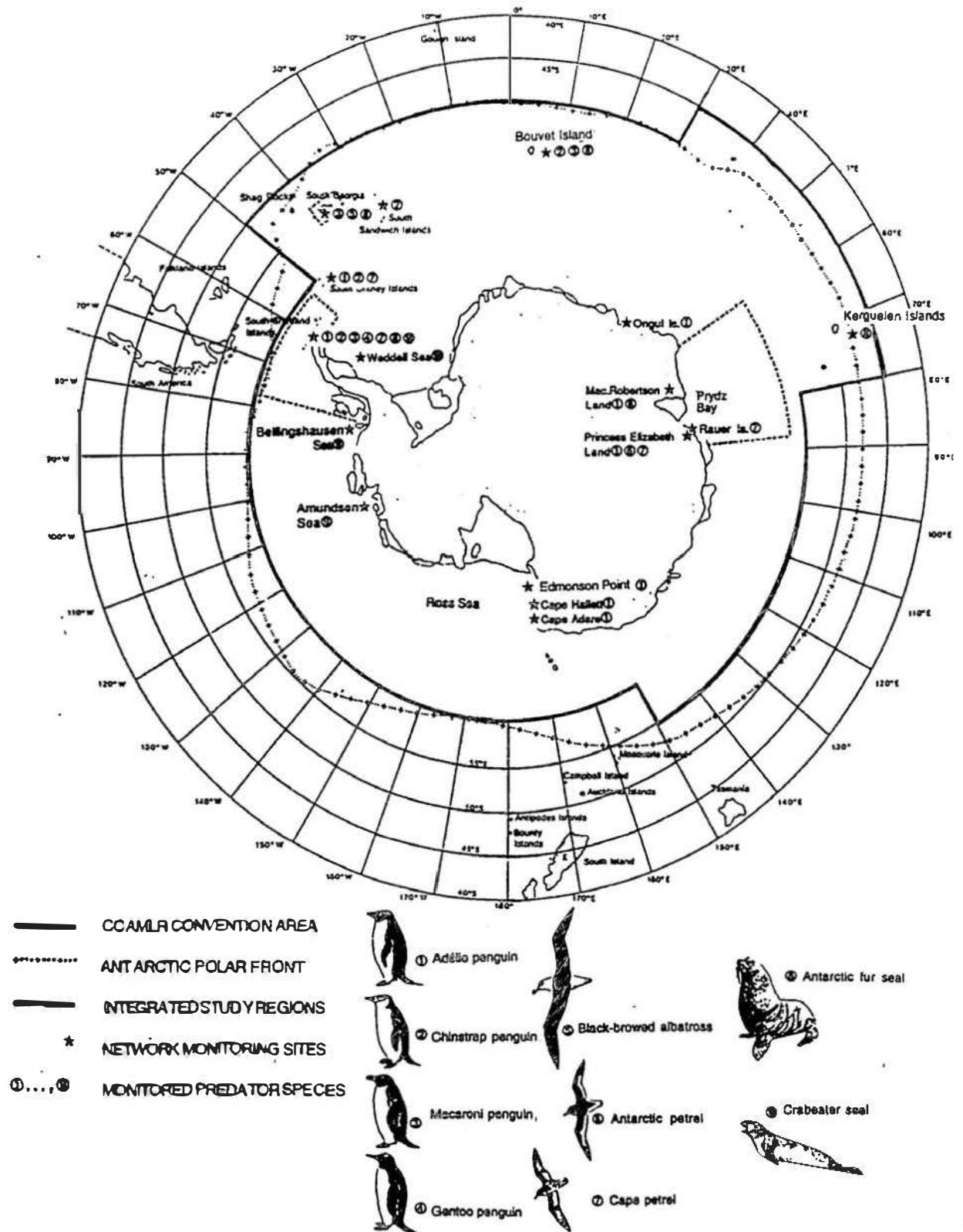
Table 5d
Directed research and sites

| | Cape Hallett/ Cape Adare | Southern Ross Sea | Southern Weddell Sea | Bellingshausen/ Amundsen Seas |
|-----------------------------------|---|---|---|--|
| Directed research questions | Prey switching of penguins at boundary zone | Interactions between Pleuragramma, E. crystallorophias and Adélie penguins, crabeater seals, minke whales | Interactions between Pleuragramma, E. crystallorophias and Adélie penguins, crabeater seals; Stock segregation of crabeater seals | Crabeater seal censuses, stock segregation |

(Compiled from SC-CAMLR-IV 1985 Annex 7 §37).

The various sites and species studied under CEMP are shown in figure 5b.

Figure 5b
Map of CEMP study sites
(Adapted from CCAMLR Ecosystem Monitoring Program 1991)



5.8 CEMP PARAMETERS AND STANDARD METHODS

Once it had been decided which predators were the most suitable for monitoring, the question of which variable characteristics - parameters - were to be monitored to yield the required information arose. The most important desirable characteristic was that a parameter be sufficiently sensitive to show significant changes within a suitable time frame - 5-10 years was suggested. Sample size was another crucial factor - clearly a parameter that yielded reliable information with a relatively small sample of predators was to be preferred over those that required huge numbers. Suitability of parameters also related to the choice of predators and was closely bound up with the feasibility and practicability of ways of collecting that information. Furthermore, since there were already in existence sets of data covering long time spans for a number of predator species and sites, it made sense to make use of these in deciding upon parameters and methods to measure them. Much of the debate at the first several WG-CEMP meetings centred on such questions.

5.8.1 Standard Methods for monitoring of predator species

To make valid comparisons between measured parameters of populations of selected organisms at different study sites in the Southern Ocean, protocols needed to be established which ensured that data were gathered and reported in standard and comparable ways. The interpretation and mathematical analysis of the data also required standardization. It would be difficult or impossible to interpret information within the CEMP framework that was not gathered using strict CEMP guidelines.

The Convenor of WG-CEMP with two other scientists devised prototype Standard Methods for monitoring parameters for some of the chosen vertebrate krill predators: three species of penguins and one seal species. These were printed as part of the SC-CAMLR report of 1987 (SC-CAMLR-VI 1987): 153-184). A separately published edition appeared the following year (Woehler, Kerry et al. 1988). The Standard Methods drew heavily on procedures devised by the BIOMASS program (BIOMASS 1982), suggestions from the SCAR Group of Specialists on Seals and the Subcommittee on Bird Biology, other published studies and personal input from Antarctic scientists.

These first Standard Methods were based on what Everson (1995: 4) called traditional 'pencil and notebook methods' which relied on counting, weighing and recording the chronology of processes in the populations of predator species. Some of these labour-intensive activities would lend themselves admirably to automation; devices were later designed for those purposes (Kerry, Clarke et al. 1993).

A seminar, held by the IOC and CCAMLR jointly in 1987 dealt with Southern Ocean variability, particularly in relation to krill. Croxall, McCann et al. (1988) presented a study of seal and seabird performance and the implications for monitoring programs. They averred that interpretation of interannual variability would be viable only if a network of monitoring sites was set up in areas that were fished and in nonfished control areas. They recommended that simultaneous monitoring of several species should be carried out and several parameters for each species should be monitored. Physical environmental factors should be monitored and long-term demographic studies should be carried out concurrently with the other work (Croxall, McCann et al. 1988).

Some of these recommendations were incorporated in the second edition of the Standard Methods published in 1991. This comprised revisions and refinements whose purpose was 'the simplification of the requirements and to remove ambiguities'. An additional method whose purpose was to monitor the breeding chronology of penguins was included (Method A9). A first set of protocols for the monitoring of Black-browed albatross and for environmental parameters was also published. In 1992 the Standard Methods were republished in loose-leaf format to facilitate updating as methods were added or revised.

Data submission and calculation of indices

The Standard Methods include standardised forms for data submission. An appendix by the Secretariat details methods for calculation and comparison of CEMP indices using a computer program. The CEMP indices summarised the information obtained from the program and their purpose was to make recommendations to the Scientific Committee. All Standard Methods emphasised that procedures should be carried with minimum disturbance of the animals, since this would detract from the

validity of the results. That excessive interference would also contravene the CCAMLR conservation ethic was implicit.

The Standard Methods do not discuss in detail the relevance of the parameters being measured to advice to be furnished to the Scientific Committee, nor does it explain how the ecosystem standard is being observed, other than by implication¹³². Thus a scientist coming into the program without background knowledge of the CCAMLR philosophy cannot obtain this from the Standard Methods alone. This was overcome in part by references and background reading suggestions given at the end of some individual Standard Methods.

Standard Methods sheets

For those predator species for which Standard Methods have been devised, each parameter is detailed in a separate method. A typical Standard Method sheet features:

SPECIES: the name of the indicator species

PARAMETERS: simple statement of what is being measured

ASSOCIATED PARAMETERS: parameters related to that which is being measured

AIM: a restatement in greater detail of the parameter being measured .

DATA COLLECTION:

GENERAL PROCEDURE: sets out in cookbook form step-by-step instructions e.g. size of sample, frequency of observations, what to record.

MANDATORY DATA: basic minimum data to be recorded.

HIGHLY DESIRABLE DATA: additional data which help in interpretation of observations

PROBLEMS TO BE CONSIDERED: practical tips on minimising error e.g, due to equipment failure, human interference

DATA PROCESSING AND ANALYSIS gives detailed instructions on how the data obtained should be analysed.

INTERPRETATION OF RESULTS: the meaning of the results obtained from processing the raw data.

REFERENCES

BACKGROUND PAPERS

5.8.2 Standard Methods in use in 1995

Penguins

Penguin species monitored are Adélie, Gentoo, Chinstrap, and Macaroni, but Adélie penguins are the only species to which all methods in current use are applicable, as indicated in the table below.

| Method | Species | Parameter | Sites |
|--------|---|--|---|
| A1 | Adélie (A) Chinstrap (C) Macaroni (M) | Adult weight on first arrival at colony | Prydz Bay (A) S. Orkney (A, C) S. Georgia (M) S. Shetland (A, C) |
| A2 | Adélie Chinstrap | Duration first incubation shift of both members of breeding pair | Prydz Bay (A) S. Orkney (A, C) |
| A3 | Adélie , Chinstrap Gentoo (G) Macaroni | Breeding population size | Prydz Bay (A) S. Orkney (A, C) S. Georgia (G, M) S. Shetland (A, C, G, M) |
| A4 | Adélie , Chinstrap Gentoo Macaroni | Annual survival | Prydz Bay (A) S. Orkney (A, C) S. Georgia (M, C, G) S. Shetland (A, C, G, M) |
| A5 | Adélie Chinstrap Macaroni | Duration of foraging trips | Prydz Bay (A) S. Orkney (A, C) S. Georgia (M, C, G) S. Shetland (A, C, G, M) |
| A6 | Adélie Chinstrap Gentoo Macaroni | Breeding success | Prydz Bay (A) S. Orkney (A, C) S. Georgia (M, C, G) |
| A7 | Adélie Chinstrap, Gentoo Macaroni | Chick weight at fledging | Prydz Bay (A) S. Orkney (A, C) S. Georgia (M, C, G) S. Shetland (A, C, G, M) |
| A8 | Adélie Chinstrap Macaroni | Chick diet | |
| A9 | Adélie Chinstrap Gentoo Macaroni | Breeding chronology | Prydz Bay (A) S. Orkney (A, C) S. Georgia (M, C, G) |

5.8.3 Standard Methods considered in detail

Where possible, the views of field scientists were ascertained for this section.

A: Penguins

With a few exceptions, the Methods do not appear to give any insight into the performance of the penguins beyond the current season: performance in following seasons cannot be predicted. Exceptions are Methods A3 and A4, which, when applied over the long term, could allow interannual comparisons and trends to be related to environmental factors. Fledging success may give clues to the possible increase or decrease of the breeding population in succeeding seasons. The main limiting factor to breeding success appears to be the availability of food during the chick rearing period, particularly the guard phase, when chicks are young. The distance adult birds have to travel appears to be critical also during this phase (Clarke pers. comm.).

Most field scientists contacted agree that the Standard Methods are effective in obtaining the information needed for the chosen parameters. They feel more emphasis needs to be placed on obtaining weather and climate data, particularly sea ice extent and distribution, as well as the locations of polynyas. Clarke (pers. comm.) states:

We need to gain a better understanding of how the whole ecosystem works: how ice, currents, winds and weather interact with the krill population density, distribution and breeding, and how all this affects the penguins. We also need to investigate what things other than food availability affect penguin breeding success: snow cover on nest sites, ice extent, disease so that the effects of these can be differentiated from the effects of krill availability. A tall order!

A1 Adult weight on arrival at colony

This parameter aimed at obtaining the mean weight of adult birds at their first arrival after winter. The date of arrival is of importance. If this is the same every year, this means that the cycle is governed by some external signal, for example, hours of daylight. If the date varies but penguins arrive at the same average weight from year to year, it means that there is possibly a minimum body condition which the birds need to attain before

breeding can commence. It would be valuable if individual birds could be identified and their weight and dates of arrival mapped over a number of years. The method further specifies that data should be analysed separately for males and females, as their weights as well as patterns of behaviour can vary according to gender. Times of arrival and body condition may yield qualitative information about food availability and the distance between the colony and open water but definite conclusions cannot be drawn without further information. The size of birds is also influenced by the gender and age of birds.

It is difficult to see how this parameter can give information specific enough to yield management advice; it needs to be viewed in the context of other variables. It gives an indication of the state of the marine environment in the area where the birds overwinter - late arrivals may suggest a paucity of food or unfavourable conditions for obtaining it. The first edition of this method required capturing and manual weighing of large numbers of birds in the study colony at frequent intervals over the arrival period.

A2 Duration of first incubation shift

This method records the time spent incubating eggs by each member of a breeding pair. It is an indirect indicator of food availability, as a readily available food supply to the feeding bird would possibly result in a more timely relief of the incubating bird. The condition of the birds prior to breeding and their experience as breeders affect the time spent foraging. In years of adequate food supply, most of the birds undertaking the first incubation shift of about 13 days are male, the slightly shorter second shift being predominantly carried out by the female birds. This division of duties in Adélie appears less clear during years of low food availability or in the season after a major catastrophic event, such as a cohort failure (Gardner pers. comm.).

A3 Breeding population size

Fluctuations in the numbers of birds attending a colony each year can indicate a number of changes, not all of them associated with food availability. It is useful in giving a broad picture of the survival trends of the colony in comparison with other colonies under study.

A4 Age-specific annual survival and recruitment

This is a complex demographic parameter. It relies on being able to identify individual birds nests and following their progress over successive years. It also monitors young birds (recruits) on joining the colony. Winter food supply is a crucial factor.

A5 Duration of foraging trips

This parameter is dependent not only on food availability but the time and distance required to travel to obtain that food. Where telemetric devices have been used to track the birds, it is possible to correlate these tracks with locations of krill fishery, indicating a possible conflict (Kerry, Clarke et al. 1995). It is a useful parameter as trip duration is related to prey location, especially if large amounts of data can be gathered using automated devices.

A6 Breeding success

Interannual variations in breeding success at a colony can give much indirect information on environmental conditions over winter, food availability integrated over the year and general health of the birds.

A7 Chick weight at fledging

This parameter again is a combination of a number of factors. It is affected by prey availability, distance of prey from the colony and the parents' breeding experience. It is assumed that lighter chicks have a reduced chance of survival over winter.

A8 Chick diet

This is ascertained by catching breeding birds as they return from foraging trips and inducing them to regurgitate their stomach contents using lavage¹³³ before they reach their chicks to feed them. The stomach contents are subsequently analysed and food species are identified. Where this procedure is carried out in conjunction with satellite tracking of birds, a very rough estimate can be made of prey location. The lavaging procedure can be distressing to birds, although it does not appear to discourage them from returning to the colony¹³⁴. Occasionally birds die from it. A more benign method, for which procedures have not yet been worked out, would be to obtain samples of faeces for analysis (Lawless, Clarke pers. comm.). Clarke further suggests that weight gain data obtained automatically, combined with partial lavaging (two flushes) will

give diet composition and an estimate of mass of food consumed with less stress on the birds than complete flushing.

Where birds are feeding predominantly on krill, there is good correlation between weight gain and stomach contents mass. If the diet is mostly fish, much is lost in the sieving procedure and thus there is underestimation of food eaten (Clarke pers. comm.).

A further point to note is that A8 requires chick diet at the creche stage only. Clarke is of the opinion that it is probably just as important to monitor chick diet during the guard stage as it may differ from that of the creche phase. Chicks are more liable to starve during the guard phase (Clarke pers. comm.). This method clearly requires further study.

A9 Breeding chronology

This provides basic information necessary for the sensible application of some of the other methods, namely A1, A3, A6 and A7. Like Method A8, it is invasive to individual birds, requiring marking of their bodies. Frequent visits to nests to ascertain presence of eggs or chicks can result in egg losses, increased predation by skuas and nest desertions. Nests nearby are likewise disturbed by the visits of personnel. Over the longer term, a gradual shift away from formerly monitored nests to new nest sites elsewhere in colonies has been observed. Young birds are also discouraged from entering the colony by too obvious human presence. These effects are noted in the Method, but the only advice that it gives to scientists is to 'walk slowly'. Revision of this method is needed to overcome or minimise these problems.

B Flying birds

| Method Number | Species Black-browed albatross (BBA) | Parameter | Sites at which method is in use, species being monitored |
|---------------|---|--------------------------------|--|
| B1 | BBA | Breeding population size | South Georgia |
| B2 | BBA | Breeding success | South Georgia |
| B3 | BBA | Annual survival Recruitment | South Georgia |

Black-browed albatross is the only species of flying bird currently being monitored. The methods as they stand require a large amount of researcher-bird interaction, except where alternatives are provided. An

additional point to note in this regard is that the long-term study of Black-browed albatross on Bird Island, South Georgia, is the one on which this Standard Method is based. The birds at this site have been habituated over many years to human presence. It would be dangerous to extrapolate this method to sites where this was not the case: human interference might cause significant changes in the birds' behaviour which might obscure the effects of other changes.

B1 Breeding population size

This method depends on counting nest sites inhabited by breeding pairs during or after egg-laying. Its importance lies in comparisons of yearly performance; large changes in dates or rates of laying or of population size may point to changes in pre-breeding condition. This latter is an indication of food availability during the nonbreeding months. There is a long data set available for Black-browed albatross at several sites at South Georgia and the South Orkney islands and scientists are directed to this study. The method provides alternative procedures: one requires researchers to visit nests frequently to ascertain the numbers of eggs laid. The other requires a count of nests with incubating birds.

B2 Breeding success

The method comments that breeding success is probably the most useful index to use for the purposes of interannual comparisons. As with method B1, one alternative procedure requires researchers to visit nests frequently to ascertain the numbers of eggs laid and chicks hatched. The other requires a census of surviving chicks.

B3 Age-specific survival and recruitment

This method requires daily visits to the 200-500 nests under study and ringing of chicks prior to fledging.

C Seals

Only one species of seal, the Antarctic fur seal (*Arctocephalus gazella*) had being studied under CEMP by 1995. This species breeds on subantarctic islands, thus the breeding period is the only time that study is feasible, with consequent disturbance to cows and pups.

| Method Number | Species Antarctic fur seal (AFS) | Parameter | Sites at which method is in use, species being monitored |
|---------------|-------------------------------------|--|--|
| C1 | AFS | Duration of cow foraging/ attendance cycle | South Georgia South Shetland |
| C2 | AFS | Pup growth | South Georgia South Shetland |

C1 Duration of cow foraging/attendance cycles

Long foraging trips and short attendance periods indicate low availability of food to the cows. There is no method for ascertaining the composition of their diet nor for tracking of foraging trips. The method requires attaching radio transmitters to cows to observe attendance periods, or by paint-marking and tagging cows. It is also advised that pups be weighed, sexed and marked.

C2 Pup growth

Two procedures are offered. Both require capture of pups, sexing them on first capture and weighing them at intervals. Their growth indicates the amount of food obtained from their lactating mothers, which in turn is influenced by the kind, amount and quality of food available to them.

Draft environmental parameters

While environmental parameters are deemed to have a direct effect on predators, methods for monitoring them have not yet been fully developed. Draft methods were included as an appendix with the 1992 version of the Standard Methods. Members who collect data using the draft methods were asked to archive these pending subsequent analysis.

| Method Number | Parameter | Comments | Sites at which method is in use |
|---------------|---|--|---------------------------------|
| F1 | Sea ice cover viewed from CEMP site | Monitors sea ice cover beginning 2-3 weeks prior to arrival of adult birds/seals | |
| F2 | Sea ice within Integrated Study Regions | | |
| F3 | Local weather during study period | Synoptic temperature, precipitation, pressure, wind speed and direction | |
| F4 | Snow cover at CEMP site | Depth and extent of snow cover | |

(CCAMLR 1991-)

Appendices to the Standard Methods

The Standard Methods for environmental parameters are followed by several appendices giving additional information or instructions. These include directions for determining the gender of penguins, since this is an important factor in several of the parameters, including arrival weight and age-specific annual survival and recruitment. Instructions on data reporting are supplied. There are maps of the CCAMLR area and the integrated study areas as well as lists of CEMP sites and the parameters being studied at the sites. Data submission forms are followed by detailed description of the methods used by the Secretariat to calculate CEMP indices. The latest appendix gave recommendations on lavaging of penguins as an adjunct to Standard Method A8.

The latest edition of the Standard Methods thus constitutes a useful if brief compendium of directions for collecting data for CEMP. It is aimed at scientists working in the field, who supplement the Methods with their

own more detailed work directions. At every CEMP meeting the methods have been reviewed; they are frequently revised, updated and expanded.

5.8.4 Methods for monitoring of prey species

Methods for monitoring of prey species took longer to develop than those for predators. As we saw in chapter 4, the Working Group on Krill (WG-Krill) was not formally established until 1988 and its first meeting was in 1989. WG-Krill was given the task of producing Standard Methods for the technical aspects of prey surveys (SC-CAMLR-VII 1988) §5.40 iii). Interim guidelines for krill surveys were produced in 1989 (SC-CAMLR-VIII 1989) §100). A subgroup was formed within WG-Krill which took CEMP requirements into consideration in designing krill survey techniques (SC-CAMLR-X 1991) Appendix D). The methods for prey species did not form part of CEMP Standard Methods, as they were the responsibility of WG-Krill.

5.8.5 Final discussion of the Standard Methods and Parameters

Some of the Standard Methods have been criticised on the grounds of unnecessary interference with animals. Penguin Method A8 in particular has come in for unfavourable comment by field biologists. This method requires that, every five days during the chick creche period, five adults be caught on arrival from a foraging trip and be induced to disgorge the contents of their stomachs by stomach lavage. This results in a total of about 30 birds being thus treated during a season. Australian scientists also lavaged birds whose chicks were in the guard stage prior to creching. Care was taken that no single bird was lavaged more than once per season. While research has proved that the chicks of nests where one parent has been lavaged fare no worse than control nests, there is some concern that the procedure may harm birds due to internal damage. Procedures were designed to minimise such damage (Clarke and Kerry 1994).

Another matter for concern is the performance of birds when they are carrying attached instruments. Even though such packages are being designed in smaller sizes and with hydrodynamic shapes, they may still interfere with the normal movements of animal. Using a small sample of birds, Clarke and Kerry (1994) noted that foraging trips of birds carrying instruments were not significantly longer than those not carrying

instruments (Clarke and Kerry 1994 although other workers, for example Wilson, Coria et al. (1989) did detect such an effect. Clarke agrees that instrument attachment during the incubation period does prolong foraging time and that during chick rearing some birds fail to return. Most, however, return within a 'normal' time frame. When food is in plentiful supply, instrument attachment is tolerated much better (Clarke pers. comm.).

The most important concern is the disturbance caused to animals by human interference *per se*¹³⁵. Personal observation has shown that humans walking through penguin colonies can scare birds off their nests, exposing chicks or eggs to possible predation or exclusion from the nest. Handling parents near nests can cause similar disturbance. Chicks can be injured or killed when being caught and weighed. Recruitment of young birds to the colony can be affected also. Giese (1996) found nest checking for scientific purposes reduced hatching success and survival rates of chicks in study colonies.

To harvest or not to harvest - can Standard Methods help to decide?

In order to decide whether to fish or not to harvest a particular species it is pertinent to ask:

1. What species are dependent on the target species for food?
2. How much of the diet of the dependent species consists of the target species and associated bycatch?
3. Do the foraging ranges of the dependent species overlap the fishery in time and space?
4. Are the prey species targetted by the fishery at the same life stage as those that are the preferred food of the dependent species?
5. How much of the prey species can safely be removed before dependent species are affected?
6. Does the fishery have effects on the prey species that may alter its accessibility to the dependent species under study? Are there fishing methods that are more or less conducive to prey disturbance that may affect feeding by predators even if overall prey abundance is not affected?

None of the current standard methods addresses these questions specifically. Little work has so far been done on the possible differences in size and life stage of prey ingested by predators compared to what is available to them, although such questions are currently being addressed.

Work on foraging ranges and feeding habits has been carried out using instruments attached to animals as described above, but protocols have not yet been formalised for these procedures.

Likewise, the effects of disease on the interpretation of results has not been extensively studied. A Standard Method for collecting tissue samples from animals for laboratory analysis to discern possible pathogens is being developed by Australian scientists.

Indices and critical period distance

The Standard Methods do not yield the kinds of data that can be used directly to give management advice. However, by 1992 there was enough data for the CCAMLR Data Manager to begin to present his calculations of CEMP indices and trends for penguins, flying birds and seals^{136, 137}. These have not been widely publicised: not all CEMP participants were willing to disclose data, most probably on the grounds of commercial confidentiality. Indices led to the development of the concept of critical period-distance (CPD), a first approximation at creating an advisory formula for protecting predators when their prey is being targetted by commercial harvesting. It was set at 100 km from breeding sites and from December to March inclusive (SC-CAMLR-XIV 1995 §5.18). Krill catches in the CPD were taken to indicate overlap between the fishery and predator foraging ranges. Overlaps between the CPD and the krill fishery were calculated by the data manager using historical data supplied by members (SC-CAMLR-XIV 1995 Annex 4 §5.88-5.91). The CPD concept was later refined, since it proved inappropriate in some situations. The newer model, called foraging-fishery overlap (FFO) is more sensitive to the location of predator colonies in relation to the fishery and 'provides a more meaningful description of overlap conditions' (Agnew and Phegan 1995: 103). Kerry (pers. comm.) points out that neither FFO nor CPD can be taken to indicate competition for resources.

Parameters and their role in generating management advice

The efficacy of parameters in yielding management advice was questioned from the beginning of the CEMP. For example, direct correlation between the composition of the stomach contents of a penguin and the quantity and distribution of krill in the foraging area would only be possible if one were able to sample the water in that area at the same time. If krill targetted by the fishery and by penguins are not at the same life stage or size, some kind of converting formula would have to be applied to make a valid extrapolation from the stomach contents to

the state of the ecosystem with respect to the prey species. The matter is complicated by the fact that not enough is known about the ways in which krill swarms are affected by trawling. There is no clear evidence on whether penguins feed in the centre of swarms, on individual krill at the periphery or on dispersed swarms. It may be that not only the physical removal of large quantities of krill but also changes in configuration of the swarms caused by harvesting activities affect availability to predators.

Croxall (1989) classed predator parameters thus:

| Data relevance -> | HIGH RELEVANCE | LOW RELEVANCE |
|--------------------------------------|---|--|
| Accuracy/sensitivity of data | | |
| Accurate and detectable | Foraging trip duration; Offspring growth rate; Weight at independence (fledging or weaning) | Adult weight |
| No accurate data; large variation | Diet; Breeding success | Demographic variables; Breeding population size |
| Insensitive to environmental change | Clutch size; Incubation shift duration; Onshore attendance in fur seals | |

However, while Croxall was able to identify problems with the kinds of parameters that were being monitored, he was not able to offer alternatives nor suggest how information gained could be put to use.

Everson (1995) classified the various protocols as follows, beginning with the most sensitive:

Highly sensitive to change

A5, C1, C2

Broad brush parameter integrating other parameters and large area/amount of time

A3, A6, A9, B1, B2, B3

Integrated over large area/amount of time

A1, A2

The remaining parameters, A4, A7, and A8 were affected, he wrote, by availability of prey and other factors such as weather and parental experience. Weather conditions, water mass movements and circulation for which data were collected had not been integrated into the monitoring program (Everson 1995).

Thus we can see that there is scope for revising, refining and improving the Standard Methods. However, this may be difficult, since drastic changes would destroy the comparability of data over time periods. Moreover, practices have been established and money spent on infrastructure so that it may be cheaper though not very useful to go on using outmoded methods. However, some useful techniques have been developed.

5.8.6 Developments in monitoring methodology

To minimise intensive handling required by several of the Standard Methods, automation was clearly desirable, as had been recognised and encouraged since the first CEMP meeting. In addition, it was virtually impossible to monitor some highly desirable parameters, such as at-sea behaviour, without telemetry and the means of automatic recording of data.

Automatic weighing and recording devices

Two separate systems employing automatic weighing platforms for use with penguins were simultaneously developed by French and by Australian scientists in the early 1990s. The systems were trialled at subantarctic Crozet Island and at Bechervaise Island near the Australian Antarctic station of Mawson (Le Maho et al 1993; Kerry, Clarke and Else 1993).

Since it is necessary in some cases to identify individual penguins, implanted electronic tags were employed. Thus birds were registered along with their weight each time they crossed in or out of the colony over the weighbridge. Electronic tagging is superior to banding as a means of identifying animals, since the latter often causes injury and affects performance (Culik, Wilson, and Bannasch 1993; Hindell 1996). However, implanted tags suffer the disadvantage of not being visible externally, so that if researchers need to identify a particular bird in the colony they have to approach close enough to enable the tag to be read with a handheld device, with consequent disturbance to the animals.

There is also the possibility that the tag will move away from the site of implementation¹³⁸. Given these reservations, the advent of automation has resulted in the easing of much of the time-consuming labour-intensive drudgery of manually recording the large number of observations required for many of the methods. Thus researchers need to spend less time in close proximity to the animals. Given the harsh conditions of Antarctic field work and the possible effect of these on the accuracy of field workers' observations, automation reduces the chances of human error.

Satellite tracking

Satellite tracking of animals, using devices attached to their bodies was introduced to determine the paths and duration of foraging trips (Kerry 1995; USA 1993). The size streamlining and efficiency of these devices underwent marked advances, in part spurred along by suggestions from CEMP scientists. Time depth recorders for tracking dive patterns were also developed, as were instruments to determine feeding strategies.

Energetics

Experiments to study animal energetics using radioactive isotopes have been in use in biology since the 1960s and have been employed by CCAMLR scientists (eg. Robertson and Newgrain 1992).

All these developments added to the efficiency of aspects of the monitoring program. However, to date no protocols have been developed for any of these techniques. A revision of the Standard Methods, planned for 1996/7, will incorporate the use of instruments such as satellite tracking devices and time depth recorders, their methods of attachment and removal.

5.8.7 Case study: Adélie penguin chick deaths Bechervaise Island

Monitoring of Adelie penguin at the CEMP site on Bechervaise Island near Mawson, Australian Antarctic Territory has been carried out every Austral summer since 1990-91. The colony usually comprises about 1800 breeding pairs, with chick fledging numbers ranging from 1100-1700 per annum. In the 1994-95 breeding season there was a catastrophic crash of the chick population, such that no chicks fledged for that site (Gardner,

pers. comm.). Survival of chicks at neighbouring islands and at Davis, (Australian Antarctic Territory some 600 km from Mawson) was also poor, although none of the other sites experienced the total mortality displayed at Mawson (Kerry, Clarke et al. 1995).

Scientists noted the absence of food in the stomachs of birds returning from foraging trips. Data from penguins carrying satellite tracking instruments showed that foraging trips were of longer average duration and distance than those in previous seasons; even the longest trips yielded little or no food. Post mortem examination of the chicks revealed that they had died of starvation. There was no evidence of disease.

The deaths have been ascribed to the absence of krill and other food species within the foraging range of the penguins comprising the Bechervaise colony and nearby colonies, affecting about 100 km of coastline near Mawson. Absence of krill could not be blamed on krill fishing, since none had been carried out in the area for the preceding five years.

Researchers noted that, unlike previous years when the coast was ice-free from around 1 January onwards, in 1994-95 the ice persisted throughout the breeding season. There were no visible polynyas and the distance to the ice edge was estimated to be 30 km. However, no contemporaneous satellite images of the coastal ice were available to the researchers in the field. Records of current flows or other oceanographic data which might have influenced krill flux in the area at the crucial time were similarly unavailable. No sampling of the waters at the ice edge or within the foraging range of the penguins was carried out to find out if there was krill present and, if so, in what concentrations.

The experience of scientists studying the chick mortality at Bechervaise points up some of the practical shortcomings of the CEMP program. Results yielded by Standard Methods in use at the site in previous years had given no indication of the impending mortality in 1994-95 (Gardner pers. comm.), although it is difficult to know what type of indicator could have predicted this event. Scientists were limited in the conclusions that could be drawn from the event: they deduced that absence of krill, from whatever cause, affects chick survival.

5.9 PRACTICAL ACHIEVEMENTS OF CEMP

Over the ten years of its activity as an independent working group, CEMP achieved remarkable results. CEMP elucidated the breeding biology of the penguin species studied. It correlated foraging ranges of predators with near-concurrent krill fisheries. Automated weighing and recording equipment to minimise handling of live subjects were pioneered and refined under CEMP. Satellite tracking gave further insight into movements of birds and seals. CEMP has thus added measurably to the knowledge base of important parts of the Southern Ocean ecosystem; this may be its most significant achievement.

In 1992 the Secretariat first published some CEMP indices, calculated from data summaries input by participant nations. These were helpful in setting precautionary limits on the krill fishery.

5.9.1 Recommendations to the Scientific Committee

The report to the Scientific Committee of the 1994 CEMP meeting stated:

CEMP was being increasingly recognised as being at the forefront of approaches to managing marine living resources. He (the Convener) congratulated the scientists who had contributed to the development of CEMP over the last 10 years, and stated his hope that as CEMP enters a new phase of its implementation, it would continue to advance the innovative ecosystem perspective being pioneered within CCAMLR.

(SC-CAMLR-XIII 1994: 327).

However, CEMP had not yet made recommendations to the Scientific Committee which that body could transmit to the Commission as direct management advice. This must be contrasted with the performances of the Working Group on Fish Stock Assessment and the variously named Krill working groups, dealt with elsewhere in this study.

A summary of recommendations made by WG-CEMP to the Scientific Committee is given below:

Table 5d
Recommendations made by CEMP to Scientific Committee

| | |
|------|--|
| 1985 | None |
| 1986 | None |
| 1987 | Members should start programs monitoring predator parameters at integrated study and associated network sites Detailed research should be directed to other potentially useful parameters Land based sites should be protected No meeting needed in 1988 (SC-CAMLR-VI, p52-3) |
| 1988 | No meeting; WG-CEMP to meet in 1989; registration and protection of CEMP sites (SC-CAMLR-VII, p37) |
| 1989 | Protection of CEMP sites; Data submission by 30 Sept; retrospective data to be submitted as soon as possible. WG-CEMP should meet in 1990 in association with WG-Krill |
| 1990 | Change data submission from 30 Sept to 30 June; definitions of depletion provided in conjunction with WG-DAC; estimation of krill consumption by seabirds made; information brochure; CEMP meeting in 1991; management plans for 3 CEMP monitoring sites; encourage more CCAMLR members to become involved in CEMP |
| 1991 | Encourage more CCAMLR members to become involved in CEMP highly desirable to implement a conservation measure to provide protection to predators in 48.1 and 48.2 where krill fishing was occurring until more data available; Naganobu felt no scientific evidence of effect of fishery on seal and penguin colonies; review of data on myctophids in predator diets showed potential competition between fishery and predators; progress made in estimates of krill consumption; CEMP meeting in 1992; draft man plan approved for Seal Islands |
| 1992 | Incorporation of CEMP information in management advice (SC-CAMLR-XI, §6.11 p61); acquisition of sea ice data; new ed Standard Methods; support for SCAR ice seal program (APIS); CEMP meeting in 1993 |
| 1993 | A newsletter describing CEMP results and conclusions; that draft Management Plan for Cape Sheriff and San Telmo be considered; members maintain national registers of electronic tags and banding data; funds for at-sea behaviour study; Members submit predator data; SO-GLOBEC; close coordination between APIS and CEMP |
| 1994 | Members not yet active in CEMP encouraged to do so; revision of CEMP Standard Methods; hold workshop on at-sea behaviour of marine mammals and birds in 1995; investigate contrast in marine environment related to predator performance in Subareas 48.1, 2, and 3. |

(Compiled from SC-CAMLR IV-XIII)

The table shows that the recommendations are for the most part to do with 'housekeeping' matters, pleas for greater participation by Members and protection of CEMP sites. The only recommendation which could be construed as management advice was that predators should be protected in krill fishing areas. However, as pointed out elsewhere, the krill TAC was set at a precautionary level as an indirect consequence of CEMP indices calculated by the Secretariat.

5.9.2 Scientific output as measured by papers from CEMP meetings and activities

At each of the CEMP meetings papers were tabled by participants. Some of these were of only marginal relevance to the program and may have been brought along to impress other nations. Thus only a proportion of the papers tabled were ever published in the Selected Scientific Papers or its successor, CCAMLR Science. Some of the papers tabled were reports prepared for government departments under contract; others had appeared or would appear in other journals or as conference papers. Some papers appeared in edited form several years after the meeting at which they had been tabled, so a direct correlation is not possible. It is interesting that the section in the Table of Contents of the 1990 volume Selected Scientific Papers previously labelled Ecosystem Monitoring had become Species Interactions and Conservation in 1991, and included papers other than straight CEMP documents. This may reflect the growing convergence of the aims of the Working Groups.

5.9.3 Critiques of CEMP

ECO

Comments on and criticisms of CEMP began at its inception. The coalition of nongovernmental groups that published newsheets - ECO - during CCAMLR meetings criticised both the ideas behind CEMP and the ways in which it was to be implemented. ECO (1985a) recommended that fishing should be carried out only within the overall framework of a research program covering the whole ecosystem and that such programs should be funded from a levy on fishing quotas. ECO (1985e) expressed that the priority should be monitoring, not research¹³⁹. It further stated that establishing indicator species would take too long for the concept to be useful from a management point of view.

Greenpeace

A review of CEMP methods was commissioned jointly by the United Nations Environment Program (UNEP) and Greenpeace (Kayes and Arden-Clarke 1988). This very comprehensive document warns:

It would appear to be very ambitious of the CEMP Working Group to embrace so whole-heartedly and without formal reservation the objective of distinguishing between natural and harvesting-induced changes in krill

abundance - when any reasonable assessment of the probabilities of achieving such an objective would demand great caution (Kayes and Arden-Clarke 1988: 37).

CEMP's objectives, it points out, have not been defined sufficiently clearly to allow a monitoring program to be designed. The review questions whether the focus of the program is on providing indices of krill stocks or to safeguard krill- dependent predators.

USSR

As already mentioned, a statement from the USSR (USSR 1985), commenting on some aspects of the fledgling program had appeared after the Seattle meeting, which it had not attended. The statement drew on the report of that meeting.

The USSR statement commented on the sparse knowledge of the Antarctic ecosystem and the impossibility of monitoring it as a whole. It endorsed the ad hoc committee's aims of monitoring predator-prey interactions by studying indicator species and harvested species, but cautioned that this was only one aspect of an ecosystem's vital elements and were insufficient to undertake ecosystem monitoring:

It would appear difficult to study, within relatively short time-frames, the key parameters of all components of the community in its extremely wide-ranging biotype...the urgent nature of the aims of the Convention...compels scientists to resort to a generally not quite correct method of studying the ecosystem by selecting indicator species from among krill consumers and considering only individual sites...

would need to be provided for selecting...any particular indicator species, major krill consumer or monitoring site on the basis of major established ecological principles.

(USSR 1985)

The statement then refers to *Fundamentals of ecology*, by Odum, a classic text on ecology. The page number given for the source of information (730) does not occur in the English-language version of this book (Odum 1971), which has only 574 pages, nor do the principles cited correspond to headings given in that book. It is probable that it is the Russian language text which is being referred to but this is not stated. (Odum 1971: 138-9 deal with 'ecological indicators', although not in the terms used in the

statement.). The USSR statement advised restricting integrated study areas to two widely-separated areas: Prydz Bay area and the Bellingshausen/Amundsen Sea area, because of concentrations of krill there.

Sites of special interest for directed research were not favoured by the USSR, because they did not meet the objectives for ecosystem monitoring. They would be expensive to run and results could not be extrapolated to other sites; thus the scientific basis for their selection was not clear to the USSR because the sites differed considerably. Research on land-based sites bore no relation to problems of the marine ecosystem, but was dictated by the location of national stations. It appeared more appropriate to the USSR to undertake marine research in a range of waters around Antarctica.

The statement was acknowledged without comment in SC-CAMLR-IV1985 §7.12.

As noted earlier in this chapter, the USSR had a great deal of criticism to offer but no responsibility for outcomes. It was not itself willing or able to make a significant contribution to CEMP research. This became increasingly unlikely with the demise of the Soviet Union which began in the late 1980s. Antarctic programs were not a high priority during this period of change.

All that aside, some of the above comments, particularly those regarding the location of research sites were valid, as experience proved. At the same time, it illustrates the fine line between a genuine wish on the part of the USSR to conserve Southern Ocean ecosystems and its politico-economic considerations.

Other criticism from CCAMLR members

After CEMP had been in existence for about 3 years, CCAMLR members themselves began to question whether the program was ever going to yield any useful management information (Kerry, pers. comm.). Croxall's remarks were alluded to above (Croxall 1989). Its objectives were discussed and clarified to some extent in WG-DAC.

5.10 WORKING GROUP ECOSYSTEM MONITORING AND MANAGEMENT (WG-EMM)

We noted in 5.3 that converging interests led to several joint meetings between WG-Krill and WG-CEMP. In 1994, a joint meeting between the two groups had decided that in view of the difficulties encountered in using combinations of data for formulating management advice, predator population status, trends, reproductive performance, demography could by themselves be used to formulate recommendations for the krill fishery (SC-CAMLR-XIII 1994 Annex 7 §5.31).

While the joint report conceded that:

With respect to integrating predator, prey, environmental and fishery indices into ecosystem assessments and, ultimately, the formulation of management advice, the Scientific Committee acknowledged progress reported by both WG-CEMP and WG-Krill.
(SC-CAMLR-XIII 1994 Annex 7 §5.27)

However, the report of the 1994 meeting of the Scientific Committee betrays a certain impatience with the apparent inability of CEMP by itself to deliver management advice. It noted that CEMP had not undertaken the formulation of objectives for cause/effect experiments, as had been requested (SC-CAMLR-XIII §7.35). The Scientific Committee foresaw no diminution of the difficulties of developing assessments based on combinations of those data. It suggested:

...that to improve the development of an ecosystem-based management approach, it is necessary to improve current understanding of both the structure and dynamic functioning, including temporal and spatial variability, of the Antarctic marine ecosystem.
(SC-CAMLR-XIII 1994 §7.31)

From the foregoing, we can see that a merger between WG-Krill and WG-CEMP was inevitable. The Scientific Committee at its 1994 meeting accordingly announced:

...in order to integrate better the work currently being undertaken by WG-Krill and WG-CEMP, these two Working Groups should be combined into a single group under one convener. The new Working Group will be called the 'Working Group for Ecosystem Monitoring and Management' (WG-EMM). (SC-CAMLR-XIII 1994 §7.40)

The convenor of the new group was the United Kingdom scientist, Dr Inigo Everson, some of whose work is described elsewhere in this study. He was also the second chairman of the Scientific Committee.

The terms of reference of the new working group were agreed upon at the same meeting. It is interesting to compare the depth and comprehensiveness of these new terms of reference with those formulated for WG-CEMP in 1985. Obviously ten years of work by members has added much to the scientific knowledge base of CCAMLR, allowing it to announce its ecosystem perspective with confidence.

Terms of reference

Working Group on Ecosystem Monitoring and Management WG-EMM

- (i) undertake assessments of the status of krill;
 - (ii) undertake assessments of the status and trends of dependent and related populations including the identification of information required to evaluate predator/prey/fisheries interactions and their relationships to environmental features;
 - (iii) undertake assessments of environmental features and trends which may influence the abundance and distribution of harvested, dependent, related and/or depleted populations;
 - (iv) identify, recommend and coordinate research necessary to obtain information on predator/prey/fisheries interactions, particularly those involving harvested, dependent, related and/or depleted populations;
 - (v) liaise with WG-FSA on matters related to stock assessment;
 - (vi) develop further, coordinate the implementation of, and ensure continuity in the CCAMLR Ecosystem Monitoring Program (CEMP); and
 - (v i i) taking into account the assessments and research carried out under the terms of reference (i) to (v) above, to develop management advice on the status of the Antarctic marine ecosystem and for the management of krill fisheries in full accordance with Convention Article II
- (SC-CAMLR-XIII 1994 §7.41)

The introduction to WG-EMM's term of reference invokes Article II of the Convention, recalling that this requires the conservation of harvested populations, maintenance of ecological relationships between harvested, dependent and related populations, restoration of depleted populations and minimisation of the risk of irreversible changes in the Antarctic marine ecosystem (SC-CAMLR-XIII 1994 7.41).

The Scientific Committee considered that pursuing these terms of reference would require, inter alia, that WG-EMM:

- (a) develop assessment methods, including survey methods for predators and prey, and standard methods for monitoring dependent and related species together with environmental conditions;
- (b) continue efforts aimed at utilising the best available technology and at developing standard methods for the collection, recording, reporting and analysis of biological, environmental, fishery and other data pertinent to fulfilling the terms of reference;
- (c) develop models for predator and prey populations, their direct interaction with each other, and their potential interactions with fisheries and the environment;
- (d) coordinate relevant research activities; and
- (e) develop and evaluate approaches to managing krill fisheries, taking account of current and future patterns of harvesting.

(SC-CAMLR-XIII 1994 §7.41).

The Scientific Committee made a number of suggestions regarding priority activities to be undertaken by WG-EMM. These included further work on the determination of krill flux in Statistical Area 48, especially in relation to predators and with consideration of temporal as well as spatial variation (SC-CAMLR-XIII 1994 Annex 7 §4.7). Options for decision rules for the calculation of appropriate levels, distribution and timing of krill harvesting should be considered (SC-CAMLR-XIII 1994 Annex 7 §4.33) as well as further work on the functional relationship between predators and prey, especially involving further determination of the parameters for and formulation of the Butterworth/Thomson model (SC-CAMLR-XIII 1994 Annex 7 §4.25-4.30). It was recommended that further evaluation of the significance of localised interactions between krill harvesting and krill-dependent predators should be made and that the links between prey, predator and environmental data within the scope of the CEMP Program should be reviewed (SC-CAMLR-XIII 1994 §7.42).

That the marriage of the two Working Groups heralds a new phase in linking ecosystem information to the management of harvesting in the ecosystem context is demonstrated by the proposed program of ongoing work of the amalgamated group, which shows the streamlining effected by the merger:

- (i) evaluation of proposals for new CEMP methods;
 - (ii) evaluation of new statistics and methods of analysis of CEMP data;
 - (iii) evaluation of any new proposals for CEMP site protection;
 - (iv) development of standard methods for measurement of foraging performance of predators;
 - (v) continuation of the analysis of krill flux;
 - (vi) estimation of krill biomass and evaluation of acoustic methods,
 - (vii) continuation of work on yield and functional relationship models.
- (Adapted from SC-CAMLR-XIII 1994 §7.43).

5.10.1 New directions for CEMP under the umbrella of WG-EMM

Under the heading Scope of CEMP, the Scientific Committee in 1994 reviewed the appropriateness of CEMP's focus on krill in the light of changed fishing patterns in the Southern Ocean. Some work on predators of species other than krill was already in progress but as it did not then fit into the aegis of CEMP it had not received wide attention. This included work done on blue-eyed shags and their prey by Argentine scientists, discussed below, on myctophids in the diet of penguins and petrels at several subantarctic islands, and Antarctic silverfish already studied as a CEMP prey species, in the diets of seals and penguins (SC-CAMLR-XIII 1994 §9.1-9.6).

CEMP was designed primarily to monitor certain predators of krill, because at the time of CEMP's inception this was the target species of greatest concern. Since then, harvesting of krill has dwindled, for technical and economic as well as political reasons we have described. The amount harvested has not so far approached the precautionary catch limits set, although this of course may change as new markets are developed for krill and products based upon it. Instead, fisheries have developed for certain finfish - principally Patagonian toothfish and a myctophid species,¹⁴⁰ as well as crabs and squid. CEMP has not put in place monitoring procedures for any finfish as prey other than fish larvae and

young of Antarctic silverfish even though the fishery for Patagonian toothfish has been expanding since 1990. Thus CEMP has lagged behind and kept to an outdated view of the realities of harvesting in the CCAMLR area. However, the Convenor of the 1996 WG-EMM meeting noted in his Executive Summary:

...it may be necessary to extend the scope of CEMP and WG-EMM to deal with fisheries for species such as myctophids and squid in view of their importance in the ecosystem.

Methods to monitor predators of prey other than krill needed to be developed as the krill fishery declined in importance and finfish harvests increased. An example of this type of study is given below. It was agreed that it would be valuable to study predators of fish, but that such studies should not detract from CEMP work already underway. By 1995, WG-EMM was ready to recommend to the Scientific Committee the advisability of structured studies on fish, particularly harvestable species, and their predators in conjunction with WG-FSA (SC-CAMLR-XIV 1995 §7.118).

Blue-eyed shags as predator indicator species

Since the 1990/91 season Argentine scientists have carried out studies on the diet of Blue-eyed shag, ¹⁴¹in the South Shetland islands (Casaux and Barrera-Oro 1993; Casaux and Barrera-Oro 1993; Casaux, Favero et al. 1994). The Blue-eyed shag is a generalised predator. It is the only species of Antarctic flying bird that feeds primarily on benthic fish for which it dives to the sea floor near shore (Barrera-Oro and Casaux 1996). The fish identified in its diet agree proportionally with samples taken by trammel nets in the area (Casaux pers. comm.).

Research on Blue-eyed shags involves minimal researcher involvement with the animals, since regurgitated stomach pellets or casts can be collected without causing disturbance to the birds. There is virtually no need for stomach lavage such as is used in penguin research.

In 1995 a method was laid before WG-EMM for the analysis of Blue-eyed shag stomach pellets (Casaux and Barrera-Oro 1995) and papers detailing the work on the species were presented (Casaux, Favero et al 1995; Casaux, Barrera-Oro et al 1995; Coria, Favero et al 1995). Results reported in 1996

suggested that some previously important finfish species remain at low levels at the South Shetland Islands (Casaux and Barrero-Oro 1996).

Methods for calculating correction factors were also presented to the 1995 WG-EMM meeting (Doc. WG-EMM 95/83). The accuracy of these factors was tested during 1995/96 and 1996/97 and found to give satisfactory results (Casaux pers. comm.). There is good correlation between the diet of the birds, the composition of the pellets and the food available in the water where they were feeding.

It is expected that a new CEMP Standard Method, using Blue-eyed shags as an indicator species and based on the Argentine scientists' procedures will be proposed to WG-EMM¹⁴². Acceptance of this new method by WG-EMM will represent an important step forward for the work of CEMP and result in a broadening of its research focus. Thus research on this species may help to indicate the state of the inshore fish populations. This aspect has not been extensively studied under CEMP, which, as we have seen, has concentrated on krill-centric ecosystems. Further methods to monitor predators of prey other than krill need to be developed as the krill fishery has declined in importance and finfish harvests are increasing.

Monitoring of other species

Now that Emperor penguins have been shown to feed on krill, perhaps programs will be developed to study them in the CEMP context.

Data from Japanese scientific whaling on Minke whales is available and has been studied by WG-Krill (Kawamura 1994).

As noted above, members have suggested widening the CEMP brief from the relatively narrow krill-based food web to include fish predators such as blue-eyed shags. With the rapid growth of the fishery on Patagonian toothfish it would behove CEMP to initiate a program of research on the trophic interactions of this species, but this has not yet occurred¹⁴³. CEMP studies on Patagonian toothfish would no doubt benefit from close cooperation with WG-FSA, which has already done substantial work on assessment of this species and on its biology (SC-CAMLR-XIV 1995: 273-277¹⁴⁴)

CEMP and the precautionary approach

It would appear that it would be useful to continue CEMP without the constraining requirement that it yield hard and fast management advice. The precautionary approach, which is partly synonymous with CCAMLR's ecosystem approach as discussed in chapters 6 and 7, is increasingly accepted as a basic tenet of living resource management. Thus where CEMP can show that certain activities are likely to harm part of an ecosystem, this evidence can be used to justify precautionary measures.

CEMP as a means of carrying out environmental impact studies and transfer of CEMP methods

The work carried out under CEMP falls within the types of studies that determine environmental impacts of proposed procedures. Such studies are required under the Madrid Protocol, and there is no reason other than cost why CEMP-type monitoring studies cannot be carried out prior to setting up, for example, a harvesting or tourism operation. Before and After Impact studies, often used in EIAs, are merely variants on some CEMP methods.

Exporting of CEMP methods and technology to sites away from Antarctica is already occurring, notably in a project involving the trophic relationships of Little Blue Penguin at Phillip Island, Victoria, Australia. Other fisheries management authorities or advisory bodies could be encouraged to tap into CEMP's experience and adapt its methods to monitor marine ecosystems in other parts of the world. This theme will be developed in chapter 6.

Climate change studies

Another area in which methods developed by CEMP might be able to further scientific knowledge is the study of climate change. Living organisms are very sensitive indicators of environmental change, as shown by Furness, Greenwood and Jarvis (1993), Montevecchi (1993) and Furness and Greenwood (1993). The long data series being developed by CEMP will be of increasing value in mapping such changes, particularly in conjunction with work being done by the IWC and by programs such as Southern Ocean - Global Ocean Ecosystem (SO-GLOBEC) and the SCAR Antarctic Pack Ice Seals study (APIS).

CONCLUDING REMARKS

CEMP represents an amalgam of the differing views of the participants: members were divided into nations which had fishing interests in the Southern Ocean, those who were primarily concerned with conservation and the control of fishing and those which did not have strong opinions either way. The fishing nations did not want their access restricted to what is still regarded as a valuable but largely untapped resource, namely the krill fishery. Those who wished to control the fishery wanted to achieve this by conventional means directed at the target species.

The ecosystem approach was seen by some as diversionary in this situation (Kerry pers. comm.). We can argue that nations agreed to the setting up of CEMP because it may have suited their various purposes, possibly in the following ways:

- a) Those who wanted to control fishing were sent off on a diversionary data trail, doing 'busy work'. While money and expertise were being diverted to CEMP, other working groups, whose work might have proved more pertinent in assessment of stocks of resources and yield information which might restrict harvesting, could not get underway. For example, the ad hoc Working Group on Data Collection and Handling which had been set up in 1983 might have been put off their task of obtaining fishery statistics which might have provided ammunition to the Scientific Committee for recommending fishing restrictions.
- b) The onus was placed on the conservation-minded nations rather than the fishing nations to prove that a fishery or a particular level of fishing would affect the ecosystem.
- c) A possible use under the CEMP for legitimate scientific whaling, allowing a loophole for whaling nations (for example, Japan) to continue whaling even though an international ban on commercial whaling took effect in 1986. This could have been a reason to suggest the use of minke whales as a monitoring species at Seattle.
- d) Setting up a monitoring program instead of, say, a fish stock assessment committee could also be regarded as a technique to put off the time when fishing nations could be called to account.

Some credence is given to these ideas by the fact that CEMP's birth was suspiciously easy compared with that of several Working Groups being developed in parallel. As we saw in chapter 4, the Working Group on Fish Stock Assessment (WG-FSA) began as an ad hoc group in 1984. A

Krill CPUE group was also started in 1984, but neither of them were formalised as working groups for some years. It is noteworthy that FSA started to dispense management advice to the Commission via the Scientific Committee while its status was still that of an ad hoc group. The Krill Working Group, formalised in 1988, recommended precautionary measures for krill harvesting in 1991.

e) Another view may be that CEMP was the only way that the Scientific Committee could devise to try to comply with Article II§3b and c. The fact that CEMP has not yielded much management advice may mean either that fishing has little effect on predators, or that CEMP is simply not capable of delivering such advice. The lack of widespread participation in the program by members may be a reflection of the level of funding available for research as well as - or instead of - lack of confidence in the program.

CEMP has changed direction since its formation from being solely concerned with krill and its predators to a providing a focus for a wider study of Antarctic ecosystems. While this may be in line with CCAMLR's ecosystem approach, the usefulness of CEMP has to be questioned.

To do this, we have to recall the original objectives of ecosystem monitoring:

- to detect and record significant changes in critical components of the ecosystem, to serve as a basis for the conservation of Antarctic marine living resources;
- to distinguish between changes due to the harvesting of commercial species and changes due to environmental variability, both physical and biological.

CEMP has certainly achieved success in the first half of the first objective. There is an impressive collection of information now held by the Secretariat and dispersed in the wider scientific community. Collation of predator indices submitted by participants has enabled the Secretariat to show variations over the long term (CCAMLR 1993). The Secretariat collates and archives sea ice data¹⁴⁵.

Some progress has been made in the second. Examples include evidence of the foraging range of Adélie penguins overlapping with the krill fishery in space although not in time, near Mawson, Australian Antarctic Territory, (Kerry, Clarke et al. 1992) and overlap near the South Shetland Islands (Ichii, Naganobu et al. 1993). South African scientists used modelling techniques to investigate the effects of krill fishing on predators (Butterworth and Thomson 1993). A relationship between variations of the ice edge and krill was reported in a paper presented to the 1993 joint meeting of WG-Krill and WG-CEMP (Naganobu and Kawaguchi 1993).

As noted, to date CEMP has not given any direct advice to the Commission regarding fisheries management. It is to be hoped that the next few years will see more clearcut management advice emanating from the new group. We may harbour a niggling suspicion that WG-CEMP was absorbed into WG-EMM, ostensibly as an equal partner with WG-Krill, but actually to hide its dismal failure as a tool for management. (but see comments in §d above).

CEMP, like its parent, the CCAMLR Scientific Committee, is a political as well as a scientific institution and delegates have an obligation to fulfil the political needs of their nations. Political factors influenced its beginning, but science has dominated the program within the political boundaries of the Convention. The existence of the program has helped scientists from some nations to obtain funds from their governments for running national programs associated with CEMP.

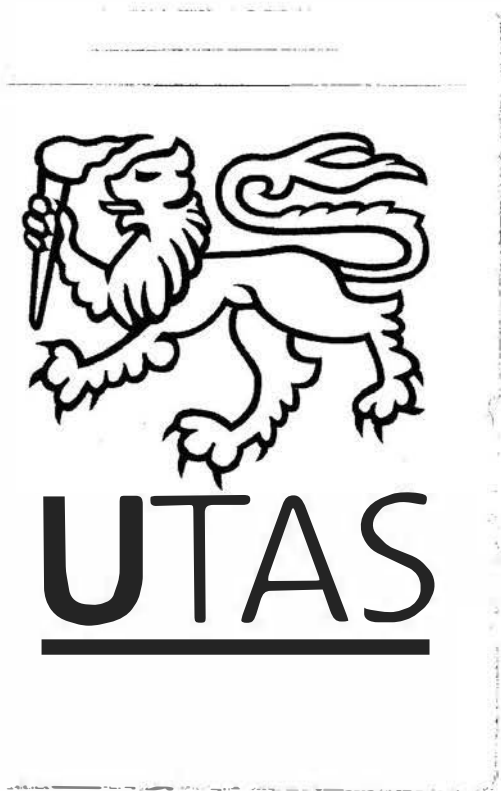
Like CCAMLR itself, CEMP was begun with high ideals. The intent was to set up a multinational program of monitoring. However, less than half of the membership has become involved in CEMP studies. CEMP research is summarised in Appendix C. The input of data has also been less than expected. These concerns are reflected in table 5d.

Nonetheless there is a large volume of research being done by those nations participating. There is some replication¹⁴⁶ which may not be scientifically justified. Some of the research could probably be scaled down or rationalised.

All these reservations aside, however, CEMP helped to establish the credentials of CCAMLR regarding 'ecosystem management', thus

indirectly shoring up the reputation of the Antarctic Treaty System as a responsible conservationist body. Whether it will experience resurgence or submergence within WG-EMM remains to be seen.

Other factors that influenced the implementation of CCAMLR's ecosystem approach are addressed in the following chapter.



6 FACTORS IN THE IMPLEMENTATION OF CCAMLR'S ECOSYSTEM APPROACH

Since its establishment, the world has changed, issues and concerns have changed. Antarctica may be frozen, CCAMLR must not.
(Delegation of Brazil CCAMLR-XIV 1995 §15.13)

INTRODUCTION

Previous chapters have shown how an ecosystem standard was formulated and laid down in Article II of the Convention, and described some first steps towards its implementation. In section 6.1 of this chapter, we study the process of implementation through conservation measures. We look more closely at several fisheries in section 6.2.

Section 6.3 asks whether and how the ecosystem standard has been subsumed by political, economic or other considerations. These matters are closely intertwined, as is explained. It is argued that increased participation in the Antarctic Treaty System overall and increases in the membership of the CCAMLR Commission since its establishment have resulted in shifts in the balance of political and economic interests. It is suggested that these in turn changed the conservation focus of CCAMLR.

We describe the repercussions felt by the CCAMLR regime from the failure of the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA) and the significance of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol).

The effects on CCAMLR operations of the Falkland/Malvinas conflict and the Beagle Channel problem are analysed, as are major political upheavals such as the ending of the Cold War and the demise of the Apartheid regime in South Africa. Relationships with the United Nations and its agencies are re-examined in this section and in chapter 7.

Section 6.4 introduces the problem of illegal fishing in the Southern Ocean. The concluding remarks include reflections on CCAMLR's dual nature as a conservation regime that is also a regulatory body.

6.1 ENFORCING THE IMPLEMENTATION OF THE ECOSYSTEM STANDARD

Non-parties to a convention cannot be compelled to obey its tenets. However, parties that have ratified a convention are bound to follow it, including any changes or additions that are negotiated subsequent to ratification.

6.1.1 Conservation Measures

It is laid down in the CAMLR Convention that the Commission is empowered to pass regulations, which, reflecting its stated aim, are termed conservation measures. We saw in chapter 4 that the first of these were put in place in 1984.

Many of the CCAMLR Conservation Measures resembled straightforward fishing regulations: setting mesh sizes, restricting or prohibiting access to fishing grounds, setting total allowable catches for individual or groups of target species. These essentially obeyed Article II §3a. Other measures attempted to observe the complex requirements of Article II §3b and c; these latter began to predominate as the Commission firmed in its conservation purposes over time.

Conservation measures include:

- Straightforward fisheries management regulations e.g. setting TAC for specific species in specific areas, governing net mesh size, effort, open and closed seasons and areas;
- Regulations governing experimental, new and exploratory fisheries
- Measures aimed directly at conserving elements of the ecosystem, such as those governing seabird bycatch
- Regulations for protecting CEMP sites

Some of the measures for selected species in some areas were discussed in the section on WG-FSA and WG-Krill in chapter 4. Measures not directly

connected to regulation of harvests but aimed at conserving or protecting elements of the ecosystem are more explicit expressions of the Commission's wish to implement Article II as a whole. The first measure not directed towards a target species was Conservation Measure 29/IX, passed in 1990¹⁴⁷. This was aimed at minimising bird bycatch and was renewed and updated annually. It can also be argued, though, that the setting of low catch limits on target species that are also prey species - precautionary catch limits - satisfies all the conservation requirements of Article II.

Some Conservation Measures were in place for limited time periods only, and others have been revised, refined and updated. The measures passed annually were few in number to begin with and were published as part of the volume of basic documents. In 1988 the Commission began to publish Conservation Measures currently in force as a separate document. This was so that they could be used in conjunction with the evolving scheme of observation and inspection, described below.

After 1988, the number of conservation measures passed annually increased, reflecting the Commission's growing confidence in placing limits on members' activities. Enforcing the measures is a different issue; it is dealt with in the section 6.1.3.

There is a summary in the Appendix of all the Conservation Measures and Resolutions adopted by the Commission from 1984-1996.

6.1.2 Resolutions

Some Conservation Measures were foreshadowed by Resolutions, formulated to give interim, further or continuing effect to the Conservation Measures. Resolutions are generally couched in more hortatory language than Conservation Measures and their legal standing is probably not as binding. We should note here that the term 'precautionary measure', now an accepted phrase in resource management, is first mentioned in the explanatory text of Res. 2/IV of 1985.

6.1.3 System of Observation and Inspection (SCOI)

The Convention recognised that putting conservation measures in place was by itself insufficient to protect the Southern Ocean ecosystems. To ensure compliance with the measures, and to give effect to CCAMLR Convention Article XXIV (CCAMLR 1980), a system of observation and inspection was implemented in 1987 (CCAMLR-VI 1987 §99)¹⁴⁸. A Working Group chaired by the United States used the provisions of Article XXIV as a basis to formulate terms of reference for such a system.

A Standing Committee on Observation and Inspection (SCOI) was established by the Commission in 1988 (CCAMLR-VII 1988 §123-131). The first task of SCOI was to fulfil the recommendation of the Working Group that the terms 'inspector' and 'observer' be clarified; they are used interchangeably in Article XXIV.

SCOI was a big step forward in CCAMLR's development. It allowed for prosecution and imposition of sanctions on offenders who violated conservation measures (CCAMLR-VII 1988 Annex H). SCOI has met every year since its inception.

Its success in policing the conservation measures is difficult to gauge. Prosecutions have been mounted by a number of nations under its provisos, for example, Chile initiated six court cases in 1992/93 over CCAMLR infringements (CCAMLR-XIV 1995 Annex 5 §1.35). Vessel monitoring systems are discussed later in this chapter.

Handbooks for inspectors and observers

A handbook for inspectors was first produced in 1989. It included the text of the CCAMLR Observation and Inspection System which set out the duties and obligations of inspectors, observers and personnel of vessels subject to boarding by observers and inspectors.

6.2 CASE STUDIES: HAS CCAMLR CONSERVED THESE SPECIES?

In this section, an attempt will be made to discern whether actions on the part of CCAMLR were able to prevent depletion, as defined in Article II, of some harvested species:

- a. Marbled Rockcod *Notothenia rossi*
- b. Mackerel Icefish *Champsocephalus gunnari*
- c. Patagonian toothfish *Dissostichus eleginoides*

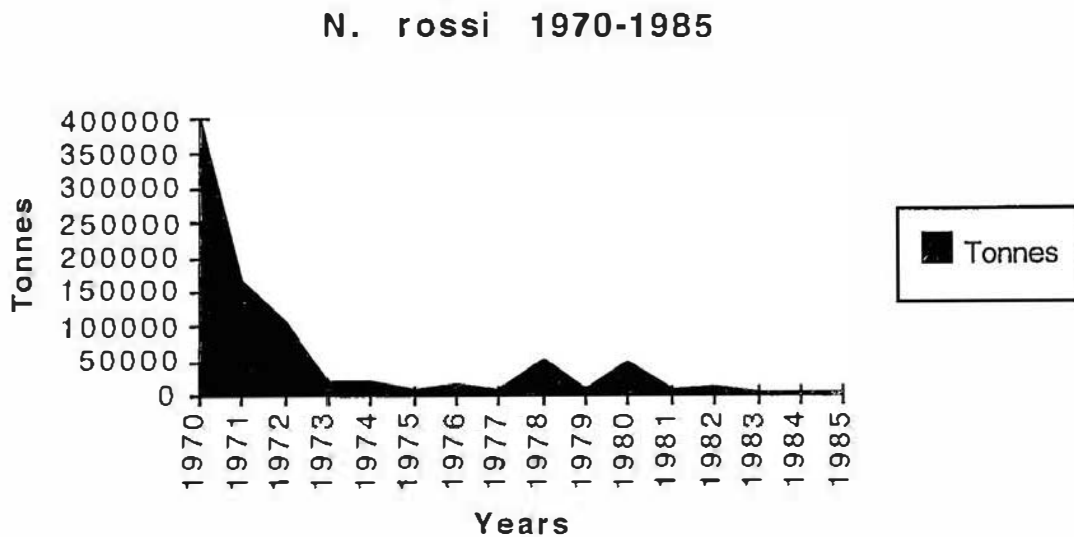
6.2.1 Marbled Rockcod *Notothenia rossi*

Very high catches of fish labelled as Marbled Rockcod were reportedly made off South Georgia in the early 1970s, but there was a sharp decline in the harvest in the following few years, as shown in figure 6a. The catch figures for the early 1970s have been called into question, as this kind of severe crash is rarely reported from fisheries anywhere else in the world. As fish identification was inaccurate at that time, several species probably constituted this large catch, but were lumped together as Marbled Rockcod (Kock 1992: 219; SC-CAMLR-XIV 1995 Annex 5 §5.118). Moreover, the data may have included fish caught in the Kerguelen as well as the South Georgia region (Agnew 1995; Agnew pers. comm.).

The stocks of the putative Marbled Rockcod have never recovered (Agnew 1995; Agnew pers. comm.). This failure in recovery cannot be laid at the door of CCAMLR, which acted as soon as it was possible to do so and up to the time of writing the stocks were protected under CCAMLR Conservation Measures and under French regulations.

Figure 6a

Catches of 'Notothenia rossi' in the Southern Ocean, 1970-1985



(Compiled from CCAMLR Statistical Bulletins 1990a,b, 1991, 1992, 1993, 1994, 1995)

6.2.2 Mackerel Icefish *Champsocephalus gunnari*

Mackerel Icefish has been caught since the beginning of commercial harvesting. The fish mature at around 3 years of age, reproduce once, then die. It used to be a yearly fishery around Kerguelen, but a three-year pattern of high harvests of the species that may have been triggered by fishing, began in the 1970s, with successive peaks declining in size. This pattern of strong cohorts may represent a perturbation that has stabilised (Agnew pers. comm.) although this is not clear (Kock 1992: 240-1). The three-year cycle is not apparent around South Georgia. Regulation in the form of a TAC has been in place for the species since 1978/9 in the Kerguelen EEZ and since 1988/9 around South Georgia. In 1995, moves were made to re-open the fishery, and after much debate a small commercial catch was allowed to aid in collecting stock data. The Scientific Committee reiterated the desirability of developing a long-term plan for this fishery in Subarea 48.3 (SC-CAMLR-XIV 1995 §4.71).

In 1995 WG-FSA was given data by the former Soviet Union on its fishery for Mackerel Icefish in Subarea 58.5 in the 1970s, before the French and Australian EEZs were declared. The Soviet data differed markedly from that in the Statistical Bulletin: they were only 65% of the total catches reported in the Bulletin. It had been assumed that all the reported catch came from Statistical Division 58.5.1, near Kerguelen. However, the new data revealed that almost a third came from Division 58.5.2, near Heard Island (SC-CAMLR-XIV §5.141-142; §5.178).

Significantly, the data revealed that the three-year pattern already existed in this period: large catches were made in 1971/2 from the 1970 cohort. In 1974/5 and 1977/78 the 1973 and 1976 cohorts were exploited. Mainly young fish were taken. Mackerel Icefish has not subsequently been found in large numbers on the banks of the Heard Island shelf, possibly due to 'heavy exploitation before 1978, especially of young age classes' (SC-CAMLR-XIV 1995 Annex 5 §5.143-145).

As more data are made available from the former USSR it is to be hoped that a clearer picture will emerge of the population dynamics of Mackerel Icefish. A revision of the Statistical Bulletin for the period 1970-1979 will be required when data have been verified.

6.2.3 Patagonian toothfish *Dissostichus eleginoides*

The Patagonian toothfish and its relative, the Antarctic toothfish,¹⁴⁹ are two of the largest finfish species in the Southern Ocean. At present there is no directed fishery for Antarctic toothfish, although exploratory fishing for this species is contemplated¹⁵⁰.

Patagonian toothfish has been caught in small quantities, sometimes as a bycatch, since the beginning of finfish harvesting in the CCAMLR area. It also occurs outside the CCAMLR area: on the Patagonian shelf, around the Falkland Islands and around Macquarie Island. The question of whether these are separate stocks is not clear. Patagonian toothfish is found at depths between 70 to 1500 metres (Fischer and Hureau 1985: 339) and has been caught at 3000 metres (SC-CAMLR-XIV 1995 Annex 5 §4.9).

Obviously the species is not entirely confined to the area bound by the Antarctic Polar Front, whose influence, as we have seen, does not extend much deeper than 500 metres. The bathymetry of the Southern Ocean

suggests there is a strong possibility that there are large stocks of Patagonian toothfish yet to be discovered both inside and outside the Convention area.

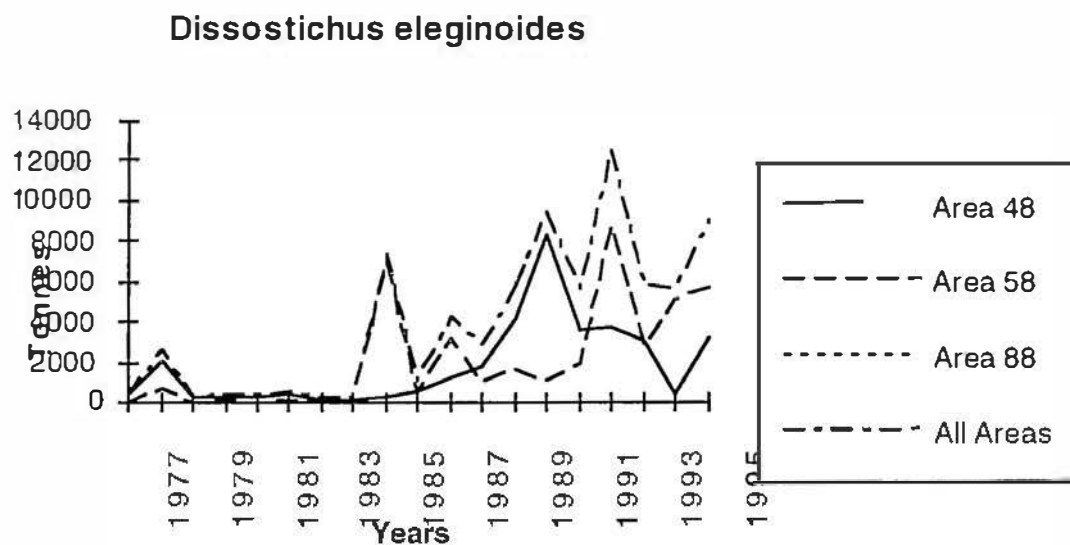
In the 1991/2 season the amount of Patagonian toothfish caught increased more than two-fold over the previous season (SC-CAMLR-XIV Annex 5 §5.10) (see figure 6b). In addition to trawling, longlining was employed from 1988/89, bringing with it the possibility of seabird bycatch. CCAMLR appeared not to have anticipated the sudden interest in the fishery, since no valid stock assessment on the species had been carried out. TAC levels were set but in the next few seasons the catch dropped back.

CCAMLR was able to obtain figures for quantities of Patagonian toothfish caught in Subarea 48.3 that were not recorded as part of the 'official' catch (SC-CAMLR-XIV 1995 Annex 5 §5.11); these are compared with the TAC as illustrated in figure 6c. It can be seen that the amount of 'extra' catch was equal to the official catch and hence the total catch in 1995 was almost double that of the TAC. This raises the question of the efficacy of setting TACs at all. It was rumoured that some of the vessels catching Patagonian toothfish above the TAC belonged to member states, albeit reflagged as though belonging to nonmember states. Such practices will be dealt with in the section on enforcement.

A special meeting, the Workshop on Methods for the Assessment of *Dissostichus eleginoides* (WS-MAD) was held in conjunction with the WG-FSA meeting in 1995. The biology, demography, abundance of Patagonian toothfish and the discrepancy between reported and true catches of the species were discussed. Previously used assessment methods were re-evaluated. The workshop made recommendations to the WG-FSA and these were passed on to the Scientific Committee (SC-CAMLR-XIV Annex 5 §4.1-4.4; Appendix E).

Figures 6c and 6d illustrate some characteristics of the toothfish harvest.

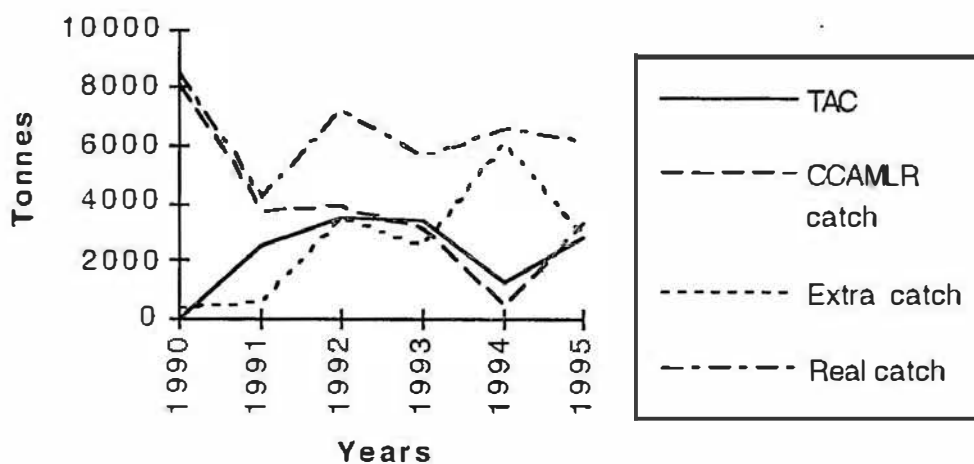
Figure 6b
Catch history of Patagonian toothfish in the CCAMLR area



Note: No recorded catch in Area 88 to date.

Figure 6c
Harvest of Patagonian toothfish in CCAMLR Subarea 48.3

D. eleginoides Subarea 48.3



Limits were placed on the fishery for the 1995/6 season in Areas 48.3, 48.4 and 58.5.2 and reporting frameworks were put in place. The French government set quotas for the Kerguelen and Crozet areas, and South Africa also set limits for the Prince Edward islands, all within the CCAMLR area.

At the time of writing, the fishery appears to be following a typical boom-and-bust cycle, with CCAMLR seemingly almost powerless to do anything about enforcing its regulations¹⁵¹. In the view of some members, illegal fishing placed the credibility of CCAMLR at stake (CCAMLR-XIV Annex 5 §2.47).

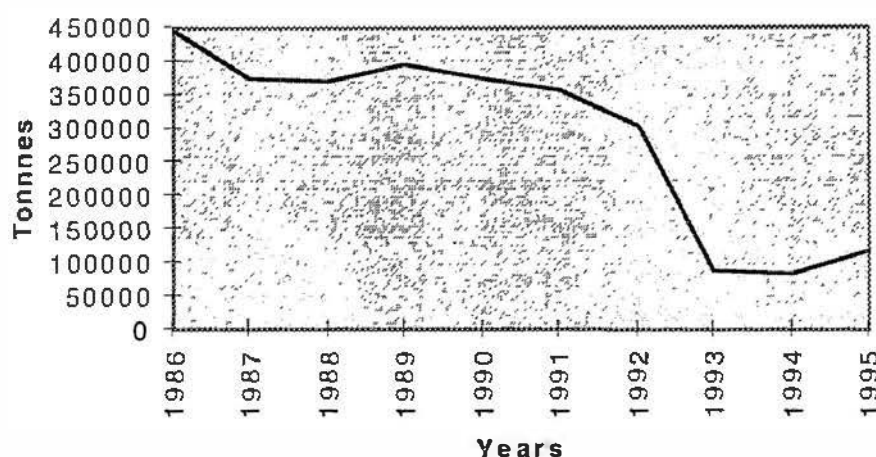
The effect on the ecosystem of the removal of a top predator, which itself is also predated by sperm whales and possibly by elephant seals, has not been studied to any degree. Nor is much known of the biology of Patagonian toothfish: its diet, the age at which it reaches sexual maturity, its spawning patterns, its migratory habits, the depths at which it forages and so on, although studies are proceeding. It would appear that CCAMLR's Article II §3 has been grossly violated¹⁵².

In this instance, then, CCAMLR has failed to enforce its ecosystem standard even though it put in place Conservation Measures regarding new and exploratory fisheries of Patagonian toothfish which set a low precautionary TAC initially. It has been unable to do anything about the illegal or unreported fishing. Illegal fishing is dealt with at greater length in Section 6.4. The power of international organizations to enforce regulations is discussed in chapters 7 and 8.

6.2.4 Krill fishery revisited.

The cessation of the Cold War and the division of the former USSR into several states had an almost immediate effect on the krill harvest¹⁵³. The average 3-400000 tonnes that had been caught per annum in the late 1980s and early 1990s (most of it by the former Soviet Union) dropped to less than 90000 tonnes in 1993 and 1994 (see figure 6d). A slight rise was shown in subsequent years as the various former components of the Soviet Union joined the fishery in their own right.

Figure 6d
Krill harvest in CCAMLR area 1986-1995



(Compiled from CCAMLR Statistical Bulletin 1991-1996)

The slight pause in harvesting and the precautionary catch limits already imposed may serve to prevent gross misuse and alteration of the krill-based ecosystems of the Southern Ocean. Chapter 5 outlined the continuing work on critical period-distance and its refinements in regard to krill and its predators.

We saw in chapter 2 that the main market for Antarctic krill to date has not been as a direct source of human food protein, but as feed for use in the aquaculture industry. This is further borne out by a workshop on krill harvesting held in Vancouver in late 1995, which indicated that the increasing world demand for euphausiids for this purpose may lead to a greater demand for Antarctic krill (SC-CAMLR-XV §11.25). There is also the possibility that world demand for biodegradable polymers will open a market for krill chitin (Nicol pers. comm.).

6.3 POLITICAL DEVELOPMENTS AND THEIR EFFECTS ON CCAMLR'S IMPLEMENTATION

6.3.1 CRAMRA and the Madrid Protocol

The successful conclusion of the negotiations that led to the establishment of CCAMLR gave rise to expectations that a convention to govern the exploitation of Antarctic minerals could likewise be achieved. Negotiations for a minerals convention began in June 1982 and continued until 1988, when the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA) was concluded.

After the conclusion of the CRAMRA negotiations, the governments of France and Australia notified the other ATCPs that they would not ratify CRAMRA, but proposed an alternative agreement that would place a ban on mining and ensure greater protection for the Antarctic environment. Since CRAMRA required ratification by all ATCPs, this meant it could not come into force. Recognising this, at the 15th Antarctic Treaty Consultative Meeting in October 1989 the other ATCPs agreed to consider proposals for comprehensive protection of the Antarctic environment.

In 1991, the 11th Special Antarctic Treaty Consultative Meeting, held in Madrid, concluded a Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) which placed a 50-year moratorium on mineral exploitation of Antarctica. The Madrid Protocol put stringent environmental measures in place, some of which impinged on CCAMLR, as discussed below.

The Madrid Protocol is much concerned with 'protection of the Antarctic environment and dependent and associated ecosystems' which are mentioned in its Preamble and in almost every article. While the Madrid Protocol applies south of 60°S and thus does not cover all the CCAMLR area, its preamble reaffirms 'the conservation principles of the Convention on the Conservation of Antarctic Marine Living Resources'. In view of this it is significant that Article 8 of the Madrid Protocol provides that:

...due consideration be given to the need to avoid detrimental effects on dependent and associated ecosystems outside the Antarctic Treaty area.
(emphasis added)

This may be indirect recognition of CCAMLR's ecosystem approach.

There is provision in its Article 3 for the designation of areas, including marine areas as Antarctic Special Protected Area (ASPA) or Antarctic Specially Managed Areas (ASMA). Management plans for such proposed areas can be submitted by any party, including the CCAMLR Commission acting as a legal entity. Moreover, no marine area can be designated as a Specially Protected or Managed Area without approval from CCAMLR (Madrid Protocol Annex V Article 6§2).

Brazil and Poland proposed the establishment of the first Specially Managed Area at Admiralty Bay, King George Island, where there are ongoing CEMP studies, under Madrid Protocol Annex V and CCAMLR (CCAMLR-XIV 1995 §10.13-17).

CCAMLR members were concerned at the applicability of a possible liability annex ¹⁵⁴to the Madrid Protocol extending to vessels fishing in the CCAMLR area. The general view was that matters regulated by CCAMLR should not involve liability, but that 'activities or events associated with harvesting' might do so (CCAMLR-XIV-p. 153).

At the time of writing, the Madrid Protocol is not yet in force, although most ATCPs have already ratified it¹⁵⁵.

6.3.2 Changes in membership of the Antarctic Treaty System and CCAMLR

The number of consultative parties to the Antarctic Treaty¹⁵⁶ has doubled to 26 since the CAMLR Convention was signed in 1980. This apparent wider membership was due in part to several former single parties gaining independence and joining as individual states (see below). Although interests within the Antarctic Treaty System have shifted and its relations with the international community are less confrontational than in the 1980s, the perception of a closed society still strongly persists. Within CCAMLR itself, eight more nations have become full members, bringing the membership to 23. Six further states have acceded to the

CAMLR Convention¹⁵⁷. By world standards, the membership of both CCAMLR and the Antarctic Treaty are of medium size when compared with globally-applicable organizations such as the 49-member IWC¹⁵⁸, Ramsar¹⁵⁹ with 93 and CITES¹⁶⁰ with 138 members.

Following the breakup of the Soviet Union, Russia and the Ukraine each became members in their own right. A single membership for Germany replaced those of the former German Democratic Republic and the Federal Republic of Germany following their unification in 1990. A significant Asian fishing nation, Korea, became a member in 1985.

Peru, Bulgaria, Greece, the Netherlands and Finland have also acceded to the Convention but are not yet members of the Commission. The effect of this widening of membership has shifted the balance of interests somewhat. There are now more Southern Cone states, which may affect dealings in that sensitive area. An update on Southern Cone relations is given in this chapter. Some of the new members are also part of the European Union, which we know is a member in its own right. Table 6a shows the composition of CCAMLR in 1996 and some of the affiliations of the parties. A table of CCAMLR parties and their status is at Appendix D.

Table 6a
CCAMLR Contracting Parties 1996

| Original signatories | Members since establishment | Acceding states (nonmembers) |
|---|--|--|
| Argentina (SC) Australia Belgium (EU) Chile (SC) France (EU) German Democratic Republic Germany, Federal Republic of Japan New Zealand Norway (EU) Poland South Africa Soviet Union United Kingdom (EU) United States | EEC (now EU) Spain ((EU) Sweden (EU) Korea India Brazil (SC) Italy (EU) Russia (former USSR) Ukraine (former USSR) Uruguay (SC) | Canada Peru (SC) Bulgaria Greece (EU) Netherlands (EU) Finland (EU) |

EU = European Union SC= Southern Cone

6.3.3. Changes in commentators' perceptions of CCAMLR

Writings about CCAMLR took on a more optimistic tone after 1990, although some were still looking backward. In chapter 4, we alluded to people who had returned to attend CCAMLR meetings after long absences. One of these was Scully, who, while initially uncertain of the regime, became increasingly convinced that it was becoming successful (Scully 1992). He now thinks that CCAMLR can lead on issues such as bird bycatch associated with longline fisheries (Scully pers. comm.). Zegers¹⁶¹ made a return appearance in 1995. Always an advocate of the ecosystem approach (we recall the description of his role in chapter 3), he reinforced this in a quite moving statement in which he advocated focussing members' attention once again on the real purpose of the CCAMLR regime (CCAMLR-XIV 1995 §15.1). He was supported by Argentina (CCAMLR-XIV 1995 §15.2) and Brazil. However, he also broached the topic of differential application of CCAMLR regulations brought about by the Chairman's statement; this matter is dealt with later in this chapter.

In a study of Antarctic environmental regimes, Elliott (1994) wrote about the CCAMLR negotiations:

The marine resources issue was the one which changed the dynamics of the Antarctic Treaty regime through the participation...of environmental NGOs. (Elliott 1994: 89).

The CAMLR Convention is a 'flawed conservation agreement', she averred (Elliott 1994: 97), as measures have mostly not been adopted until stocks were depleted 'negating the precautionary approach which the consultative parties argue characterises the Convention' (Elliott 1994: 98). CCAMLR demonstrates, she argued, that it is difficult to negotiate agreements once exploitation of living resources has begun.

Revisiting CCAMLR 10 years on, Heap (1991) wrote that there is no simple answer to the question 'Has CCAMLR worked?', a statement with which we concur unreservedly.. While he noted as advances such developments as ecosystem monitoring, he felt that CCAMLR could work better if rules were put in place before fishing activity began¹⁶².

Kock, who has been involved in CCAMLR matters from the early 1980s, has advocated a common management regime for the Southern Ocean

based on an ecosystem approach and closer collaboration between the three bodies which apply to the harvesting of living resources. He has written many articles and a comprehensive book about the fish resources of the Southern Ocean. Significantly from the point of view of the present study, he wrote:

The ecosystem approach, albeit a very ambitious one and far from being fully developed, could serve as a model, or at least as an important first step, in the development of a management regime of straddling stocks and highly migratory stocks in the high seas...

(Kock 1994: 19).

The study by edited by Stokke and Vidas (1996) is referred to in the Introduction. In this, Stokke (1996: 151-120) suggested that CCAMLR's major achievement was to develop a compliance system which was decoupled from questions of sovereignty. He asserted that the political force of the ecosystem principle has been strengthened over recent years, an assertion that this study tends to support.

In the same study, Davis (1996: 233-245) wrote of CCAMLR's legitimacy as a regime, which he considered to be validated because it is consistent with the Antarctic Treaty System and also because it is accepted to a high degree in the wider global community as responsible for Antarctic marine living resources. While moderate in praise of the regime, he inferred that the regime is derivative rather than innovative (see quote at head of chapter 7). As we shall see in chapter 7, however, CCAMLR is actually one of the components or even one of the driving forces of a new environmental order.

6.3.4 CCAMLR as part of the Antarctic Treaty System and the United Nations

CCAMLR, as part of the Antarctic Treaty System, was treated as such by the United Nations General Assembly. Some non-Antarctic Treaty nations were concerned that the presumed wealth of Antarctica was to be kept among a small number of privileged parties. There had been powerful and vociferous expressions of such concerns in various fora, particularly those dominated by developing nations. The Group of 77, which spoke for the developing nations, caused the General Assembly of

the United Nations to place the Question of Antarctica on its agenda in 1983 and every year from then on until 1994¹⁶³.

Political changes within member states have affected relations of the Antarctic Treaty System with the United Nations. The demise of the Apartheid regime of South Africa took away some of the incentive to pursue the 'Question of Antarctica'. The last mention in the General Assembly of the South African Apartheid regime in the context of the 'Question of Antarctica' occurred in 1991.

While it might have been expected that such profound changes within South Africa would affect its relations with CCAMLR, this has not in fact been the case. Precisely because the Antarctic arena was one where South Africa was still accepted, it had established itself as a strong and active member of CCAMLR, and this has continued in the post-Apartheid years¹⁶⁴.

The Food and Agriculture Organization of the United Nations (FAO), whose interest in Southern Ocean resources was chronicled in chapter 2, continued to interact with CCAMLR and this is discussed in the following chapter. The Law of the Sea and its effects are also treated there.

As well as national observers, attendance by observers from intergovernmental bodies has increased; the next chapter examines possible effects of this increase. Nongovernment organizations still do not play a large official part in CCAMLR, as described in the following section.

6.3.5 Environmental organizations, semi or nongovernmental

The influence of environmental organizations on the shaping of public opinion and the CCAMLR negotiations and operations was noted in chapters 3 and 5. Interest groups such as the International Institute for Environment and Development continued to publish books and articles critical of aspects of the Antarctic regime, for example, Mitchell (1983). There are still only two environmental organizations that are regularly invited to send observers to CCAMLR meetings: the Antarctic and Southern Ocean Coalition (ASOC) and the International Union for the Conservation of Nature (IUCN) and they are only barely tolerated by some delegations. This lack of tolerance may be due to the experience of

some CCAMLR members of hostile nongovernment organisations (NGOs) in IWC, where, moreover, the number of environmental groups attending meetings can approach 100. The observers in CCAMLR generally make formal statements and are sometimes asked to respond to questions by members through the chairman. Some national delegations include members of non-government organizations. This is important, as observers cannot formally initiate action nor vote in CCAMLR.

Observer's statements are not necessarily pleasing to all the members of CCAMLR. For example, Argentina and Chile took offence at the opinion offered by the IUCN representative in 1995 in regard to the question of CCAMLR being a fishery regulatory body (CCAMLR-XIV §11.10) and remarked that 'some observers had exceeded their role and were interfering in political matters'(CCAMLR-XIV 1995 §11.11).

In 1980, IUCN published a World Conservation Strategy (IUCN 1980) in which Antarctic resources were mentioned as being 'vulnerable'. IUCN's contribution to the implementation of CCAMLR's ecosystem approach came about through its cooperative project with SCAR on conservation areas in the Antarctic (SCAR/IUCN 1985).

ASOC now consists of close to 200 environmental groups, including Friends of the Earth and Greenpeace. Its application to attend SSATCM-3 in an observer capacity at Canberra in 1980 had been denied, and it had reapplied in 1983 at the request of members, as had Greenpeace. The Executive Secretary wrote to request information from both organizations on their possible contribution to CCAMLR's work. ASOC's wide membership led the Commission to deal only with this organization from 1984, and not with Greenpeace, since Greenpeace was a member organization of ASOC. (CCAMLR-V 1986 §51). (Some members later included Greenpeace affiliates in their delegations).

The Commission required assurance that ASOC and its constituent organizations subscribed to the 'principles and objectives' of Article II, then a two-way channel for 'informed communication' between the Commission and ASOC could be established (CCAMLR-III 1984, §54-61). At the 1987 Commission meeting members regretted that no decision had been made, in view of the contribution that an umbrella nongovernment organization would be able to make. The matter was finally resolved in 1988 when an invitation was issued to ASOC after it had given certain

assurances to the Commission regarding conditions of attendance and confidentiality (CCAMLR-VII 1988 §153). This was not a standing invitation, however; it needed to be renewed annually. ASOC's response indicated its commitment to the principles embodied in Article II and described Antarctic research being carried out by some of its members (ECO 1988).

ASOC was required to obey Rule of Procedure no. 34, which specifies that observers may submit information documents but these are not considered as Commission documents unless the Commission so decides. Under Rule 33 the ASOC observer was permitted to make a statement to the meetings of the Commission and the Scientific Committee if no-one objected. As a matter of practice the statements have been reflected in meeting reports.

How ASOC has contributed to the realising of CCAMLR's ecosystem aims is difficult to gauge. During the CCAMLR negotiations and at the subsequent meetings of the Commission and the Scientific Committee ASOC personnel lobbied delegates. A newssheet, *ECO*, commenting on the progress of negotiations and action taken at meetings was published at irregular intervals and made available to delegates. ASOC alerted Members to studies on incidental mortality associated with driftnet fishing (CCAMLR-IX 1990, §5.8), and to the dangers of ozone depletion to Southern Ocean ecosystems (SC-CAMLR-XII/BG/25, CCAMLR-XI 1992, §11.7). Some of its contributions were not published as CCAMLR documents and were distributed as ASOC 'non-papers'. ASOC undoubtedly played a role in influencing the positions of some members on certain issues.

The role of Greenpeace deserves separate mention here. While, as mentioned, it is a member organization of ASOC and some national members have Greenpeace affiliates on their delegations, Greenpeace has not been invited to send observers to CCAMLR meetings in its own right. However, as pointed out in chapter 2, Greenpeace has played a major role in Antarctic resource politics, particularly in whaling. In chapter 5 we noted its commissioned review of CEMP.

The organization built a base in Antarctica in 1986-87¹⁶⁵ and maintained it for a season, conducting research on conservation of the Antarctic

environment by carrying out inspections of other bases. It has consistently campaigned for Antarctica to be declared a world park.

Greenpeace attempted to alert the Antarctic community to bird bycatch in the fishery for Patagonian toothfish near South Georgia, Subarea 48.3 (Dalziell and De Poorter 1993). It will be recalled, however, that CCAMLR had already passed Conservation Measure 29/X in 1991 in its first attempt to ameliorate the bird bycatch problem.

Greenpeace continues to play an important role as self-appointed guardian of environmental matters in Antarctica. Currently it is campaigning against the fishery for 'endangered' Southern bluefin tuna in the Southern Ocean and its attendant bycatch problems¹⁶⁶.

6.3.6 Other observers

Acceding states

Several states whose membership of CCAMLR has progressed only as far as acceding to the Convention send observers on an irregular basis. Such observers can play no direct role in decision-making of either the Scientific Committee or the Commission, and may not attend meetings of subcommittees. Some are invited as experts to Working Group meetings. The monetary cost of membership - \$70,000 Aust. per annum - to a state that is conducting neither fishing operations nor substantial scientific research is probably not commensurate with any benefits they may derive from membership¹⁶⁷.

Intergovernmental organizations

These are treated in the next chapter.

6.3.7 The Southern Cone revisited

Problems arising from areas of claimed sovereignty formed an uneasy background to the CCAMLR negotiations. Further developments since in the Southern Cone region south of the continent of South America have affected the work of the Commission and possibly presented impediments to the implementation of the ecosystem approach.

Beagle Channel

The Beagle Channel had been a source of contention between Argentina and Chile for many years, as described in chapter 3. Argentina had gone to

war with the United Kingdom over the Falkland/Malvinas islands in 1982, but Chile had maintained a neutral position. However, the Argentine show of force may have encouraged Chile to seek a peaceful solution to the Beagle Channel problem (Morris 1987). The dispute was settled in 1984, after Papal mediation, when the two countries signed a Treaty of Peace and Friendship (1984 Treaty) (Anon. 1946; Anon. 1948; Anon. 1977; Anon. 1978; Child 1988). The 1984 Treaty allowed Chile to retain possession of the three disputed Beagle Channel islands, together with a small territorial sea; however the Chilean EEZ around the islands was truncated both towards the east and the south. The effect of this truncation was that Chile's EEZ did not encroach upon the South Atlantic ocean nor interfere with Argentina's access to its claimed Antarctic territories.

Morris (1987) argues that the 1984 Treaty helped produce an entente between Chile and Argentina but that it did nothing to solve the overlapping Antarctic claims of the United Kingdom, Argentina and Chile.

Other Southern Cone states - Brazil, Uruguay and Peru have become members or acceding states of CCAMLR since 1980; in CCAMLR meetings Southern Cone states tend to be supportive of one another, as evidenced in meeting reports.

Falkland/Malvinas Conflict and its aftermath

Argentina and the United Kingdom went to war over the Falkland/Malvinas islands on 2 April 1982, five days before the CAMLR Convention entered into force. The United Kingdom regained control over the islands on 14 June in that year, but dispute over the sovereignty of the group continued. Agreement could not be reached over harvesting in the areas where both claimed sovereignty, since diplomatic relations between the protagonists had been interrupted. Significantly for CCAMLR, South Georgia and the rich fishing grounds surrounding it was one of the disputed areas.

Hitherto administered as one (the Falkland Island Dependencies), in 1985 the Falklands/Malvinas administration was split off from that of South Georgia, the South Shetlands, Shag Rocks and the British Antarctic Territories (Beck 1994). A direct consequence of the Falklands/Malvinas conflict was a great increase in the funding of scientific projects in the Antarctic territories claimed by the British (Beck 1984). The United

Kingdom declared a 150 n.m. fishery conservation zone around the Falkland/Malvinas in 1986 (Kwiatkowska 1994a: 229), adjacent to the Argentine EEZ.

The restoration of diplomatic relations with the United Kingdom resulted in the issue of a joint statement on sovereignty at Madrid in 1989 and 1990 (Freestone 1991). This in turn enabled negotiations on conservation of the fisheries, culminating in a UK/Argentina Joint Statement on the Conservation of Fisheries around the Falkland/Malvinas in which both parties reiterated their position on sovereignty on all the disputed areas (Anon. 1990).

South Georgia

In 1993 the United Kingdom proclaimed a Maritime Zone and an ordinance for managing the fishery off South Georgia and the South Sandwich Islands that provided, inter alia, for the collection of licence fees from harvesters. Surprisingly, there was no immediate reaction to these potentially provocative proclamations. Indeed, a joint declaration was signed between Argentina and the United Kingdom in 1995, in which both again reiterated their positions regarding sovereignty over the Falklands/Malvinas, South Georgia and the South Sandwich Islands (UK/Argentina 1995).

A large amount of illegal and unreported fishing was taking place around South Georgia (CCAMLR-XIV 1995 Annex 5: SCOI Report) (see also section on Patagonian toothfish earlier in this chapter). Some of the illegal fishing in this 'pirates' paradise' (Pearce 1996) was purportedly by reflagged¹⁶⁸ Argentine vessels; this was possibly intended as a gesture of covert defiance towards the British. Argentina remarked that due to its geographical proximity to the Convention area its vessels often crossed Subarea 48.3 and were not necessarily fishing in those waters. UK retorted that the Maritime Zone was not adjacent to other fishing grounds. During 1996 correspondence between Argentina and Chile on the one hand and the United Kingdom on the other took place via the CCAMLR Secretariat on the matter of sovereignty around South Georgia and the South Sandwich Islands. The matter was referred to repeatedly during the 1996 CCAMLR meetings (Moore, pers. comm.).

Is this dispute between Argentina and the United Kingdom any of CCAMLR's business, and what is its impact on managing fisheries in an

ecosystem context? If members are contravening CCAMLR Conservation Measures in the course of their disagreement, then it is impacting on CCAMLR's ecosystem standards and is thus clearly in its realm. Furthermore, the United Kingdom is apparently, but understandably, reluctant to apprehend Argentine vessels (Pearce 1996). Thus the system of inspection and observation established under CCAMLR is partially inoperative in this crucial area. Therefore, on these grounds the problem is of concern to CCAMLR. It is difficult to see how CCAMLR can help overcome the impasse other than by moral suasion. Unfortunately, the area is north of 60°S and is thus not subject to the Antarctic Treaty's Article IV, under which claims are frozen¹⁶⁹.

6.3.8 The Chairman's Statement and its effects on the ecosystem approach

It will be recalled that there are a number of islands of undisputed sovereignty in the CCAMLR area north of 60°S which are effectively covered by the Chairman's Statement attached to the Convention:

...regarding the application of the Convention on the Conservation of Antarctic Marine Living Resources ... to waters adjacent to other islands within the area to which this Convention applies over which the existence of State sovereignty is recognized by all Contracting Parties.
(emphasis added)

The underlined section is ambiguous, possibly on purpose, because it allows the interpretation that it is the existence of sovereignty but not necessarily the actual sovereignty of a particular state that is recognised. That sovereignty over the same area could be claimed by more than one state is not ruled out by this passage and it could be used to argue in favour of the UK's proclamations and setting of harvesting conditions and collecting fees within the proclaimed areas. On the other hand, if the passage is taken to mean that only one State's sovereignty is recognised by all parties, it throws the whole matter of South Georgia and hence the status of its surrounding waters into doubt.

Chile, supported by Argentina, has several times made reference in Commission meetings to the existence of a double set of rules prevailing in some areas: those promulgated by CCAMLR and those laid down by a presumptive coastal state (CCAMLR-XIV 1995)§7.10 and 15.1). The

coexistence of several regimes for harvesting management has led to conflicts over boarding and inspection procedures as laid down by CCAMLR. The legality of the Chairman's statement, attached to the CAMLR Convention, has been called into question by several of the Members, who contend that it is not part of the Convention (CCAMLR-XIV§15.1; 15.2). However, as explained in Chapter 3, under the Vienna Law of Treaties the Chairman's Statement is indeed of the same legal standing as the Convention itself.

One possible solution suggests itself: that CCAMLR provisions prevail in all of the CCAMLR area irrespective of sovereignty. Whether France or other members with sovereignty over subantarctic islands would countenance such a change, which effectively negates the Chairman's Statement, is open to doubt. In any case, the Chairman's Statement, incorporating an approach to sovereignty that is open to interpretation enabled France to sign the Convention. Without it, CCAMLR might not have come into existence (Rowland per. comm.).

6.3.9 Sovereignty problems in using vessel monitoring as a tool for policing regulatory measures

There has been debate in CCAMLR for several years over the advisability of obligating vessels fishing in the area to have compulsorily installed Vessel Monitoring Systems (VMS). There is disagreement over their efficacy and the authority under international law of CCAMLR to require their installation. Perceptions of sovereignty and the freedom of the high seas are invoked to present a barrier to the mandatory use of VMS. Such systems allow the monitoring of vessels carrying VMS equipment via satellite telemetry. Activities of vessels - whether they are simply traversing an area or displaying stop and start motions suggestive of harvesting - can sometimes be differentiated. The national territories of Argentina and Chile are in close proximity to the Antarctic and their EEZs adjoin the CCAMLR area. Out of respect for the Antarctic Treaty, they have chosen not to exert sovereignty over EEZs generated by their Antarctic territories but to allow free passage through them¹⁷⁰. Argentina and Chile object to the use of VMS as proposed by several CCAMLR members. The requirement that vessels notify their intention to approach the CCAMLR area or to navigate through it is, in their opinion, not compatible with international law pertaining to the high seas. SCOI was unable to reach agreement on VMS (CCAMLR-XV 1996-SCOI §2.30-2.67).

6.4 ILLEGAL FISHING

A major problem that has arisen in the CCAMLR area is the proliferation of illegal fishing¹⁷¹ or fishing outside the Conservation Measures. As described above, the fishery for Patagonian toothfish suddenly emerged as a new bonanza as lucrative markets opened up for this tablefish in Asia, Europe and possibly the USA. While little is known of the movement patterns of the fish, it has been found around certain submarine features associated with high food production, often close to islands. With the release in 1994 of bathymetric data regarding the Southern Ocean, the areas likely to yield high harvests are easily identified (see figure 6e at the conclusion of this chapter). From 1995 the waters around many of the subantarctic islands in the CCAMLR area that are under national sovereignty have been invaded by large numbers of fishing vessels. The closure of the waters around South Georgia and the South Sandwich islands under the ordinances proclaimed by the United Kingdom in 1993 may have had the inadvertent effect of fishing vessels deserting that area to look for less policed waters elsewhere. Another cause may be the overcapacity of the European fishing fleet and the restrictions on fishing in the Northern Hemisphere, so that the fishing companies need to look to the Southern Ocean.

Some of the vessels are licensed to fish in the area, but many are not. Of the unlicensed vessels, some are flying 'flags of convenience' although reportedly owned by CCAMLR members (Murdoch 1997); some are from non-member states.

What powers does CCAMLR have in the face of this crisis?

Advocating ecosystem approaches or establishing precautionary catch limits without meaningful enforcement is apparently of no avail in stemming the profit motive of fishing companies, since even CCAMLR members are reportedly contravening conservation measures.

Very large amounts of toothfish are being caught in the waters around South Africa's Prince Edward Islands, the Crozet and Kerguelen Peninsulas, and the Heard Island group. Some of these vessels employ trawl nets with mesh sizes that allow capture of fish below spawning size. Others are using longlines, a method that has potential for substantial bird bycatches

Thus far, the 'Magic Pudding'¹⁷² syndrome: the optimistic expectation that there will always be further species to exploit as each species follows the previously exploited species into a state of depletion has proved correct. Once the catch per unit effort for toothfish falls from its initial high as the previously unharvested populations are fished down, the number of vessels fishing the target species will undoubtedly decrease. It is to be hoped that this will occur before the spawning stock is dangerously overfished. Another hope is that some parts of the Southern Ocean are unreachable by present techniques; such refugia will allow the fish populations a chance to recover.

Although the CAMLR Convention provides that non-members fishing in the Convention area are made aware of regulations covering harvesting in the Convention area, their adherence to those regulations cannot be enforced under international law. Increased presence of member vessels in the area might act as a deterrent,¹⁷³ but as we saw above, CCAMLR only has 23 members, not all of whom are carrying out harvesting or research in the Convention area. Thus coverage by member vessels going about their business in the Southern Ocean is not likely to have much effect on illegal harvesters.

Illegal marine harvesting is not confined to the CCAMLR area. Disputes over such matters have occurred in other parts of the world: the impoundment in 1995 of a Spanish fishing vessel by the Canadian government being only one of such. Iceland and the United Kingdom engaged in 'cod wars' and campaigns against illegal whaling began in the 1970s. Solutions are suggested in chapter 8.

CONCLUDING REMARKS

The dual nature of the CCAMLR regime

The answer to the question of whether CCAMLR is a conservation regime or a harvesting regime must surely be clear at this stage. CCAMLR is both; it manages harvesting by means of setting conservation measures. Thus it takes due note of the needs of fishing operations and of the nonhuman components of the Southern Ocean ecosystems. There is no logical inconsistency in this: CCAMLR in effect factors in human harvesters as if they are predators within those ecosystems - as indeed they are.

How is CCAMLR performing?

It would appear at this stage that the success of CCAMLR in conserving the stocks of living resources and protecting the Southern Ocean marine ecosystem is like the curate's egg - good in parts. In the case of some single species it has not been able to return them to their apparent former abundance. However, as we have seen this is in part an artefact of insufficient and inadequate reporting that prevented realistic stock assessments to be made. Moreover, it will be recalled that CCAMLR did not begin with a clean slate: a situation of overharvesting existed before it was able to begin to regulate.

Importantly, precautionary catch limits¹⁷⁴ have been set for Antarctic krill in anticipation of an expected increase in interest in harvesting this species, while due regard has been paid to needs of predators in setting the regulations.

The Southern Ocean is certainly well covered by regulations but their enforcement on third parties depends on political action by CCAMLR members. This aspect is further discussed in chapter 8.

Have political considerations swamped the ecosystem approach?

This chapter has shown that the complex business of interpreting and applying the standards laid down in the CAMLR Convention Article II has been subsumed in part by political considerations. Of concern is the inability of CCAMLR members, individually and collectively, to prevent their nationals and third parties to ignore conservation measures to maximise profit. Nonetheless, CCAMLR is still the world leader in

matters of harvesting under the constraints of its ecosystem approach. Although only a relatively small player on the world stage and although the Southern Ocean harvest is less than 1% of the world's total tonnages of nominal catch per annum, other regulatory bodies and marine research organizations have looked to CCAMLR as a model. The Southern Ocean has to some extent proved a laboratory for testing ecosystem approaches that might or might not have applicability elsewhere. The question of the penetration of the CCAMLR philosophy is addressed in the next chapter.

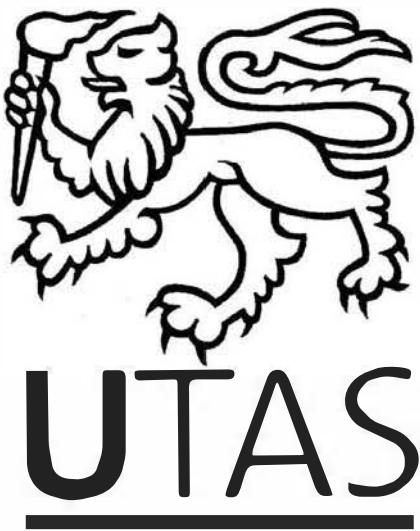
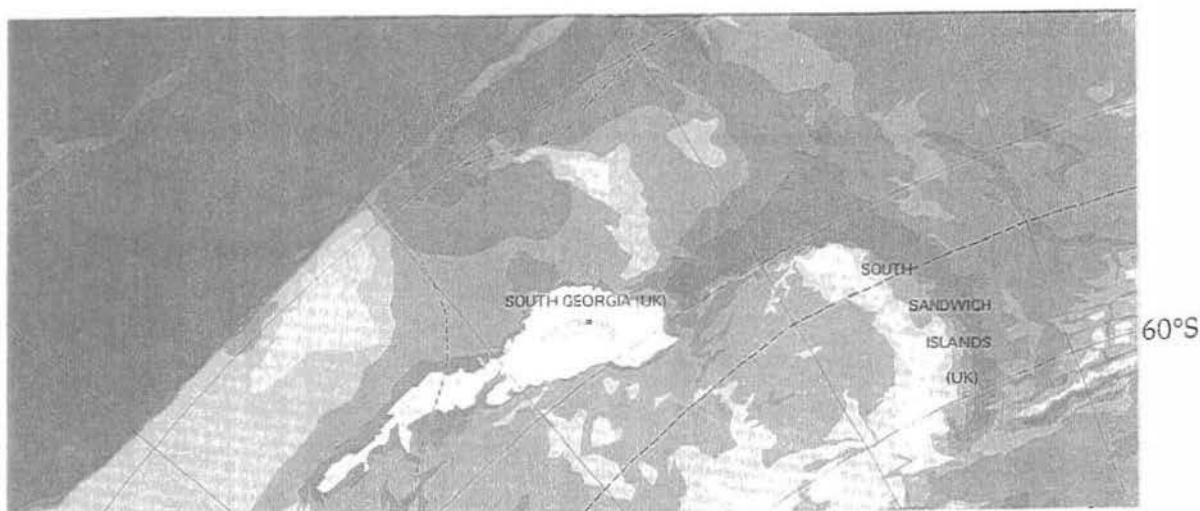
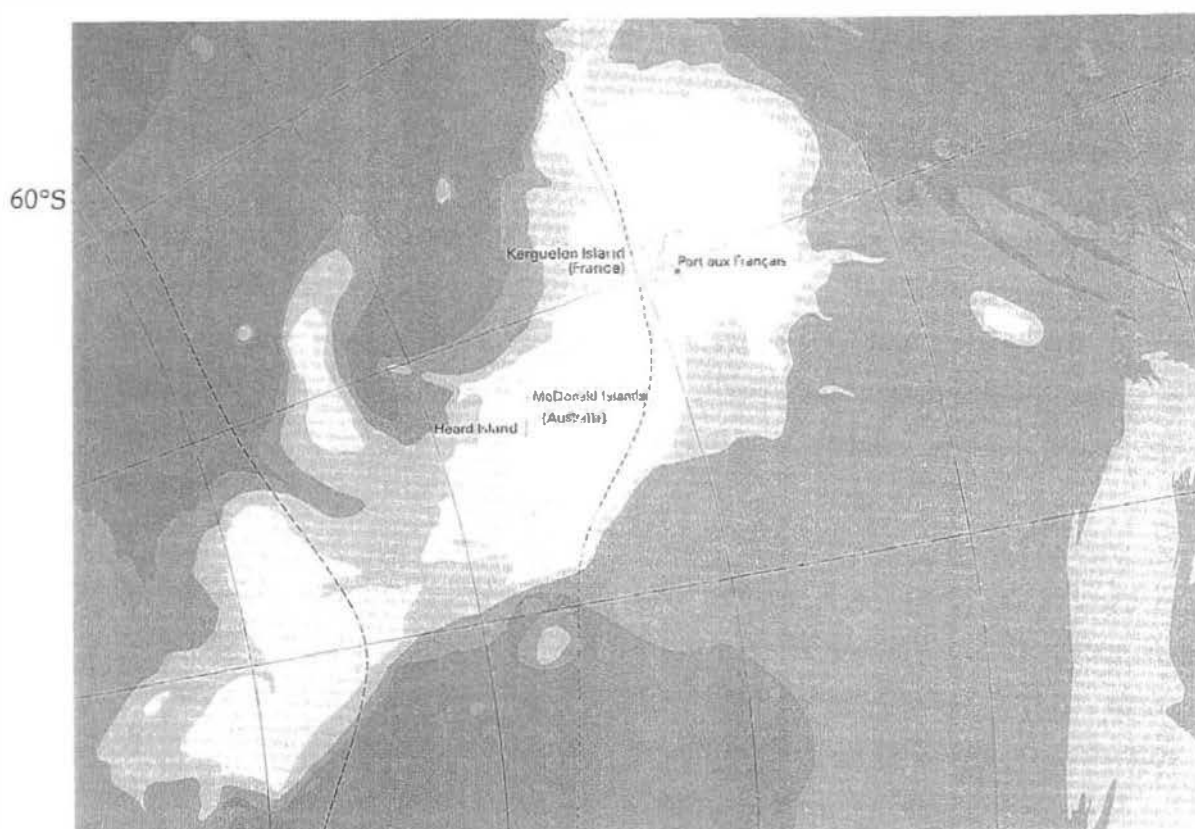


Figure 6e
Bathymetry of parts of the Southern Ocean where illegal fishing has allegedly occurred (adapted from AAD 1996)

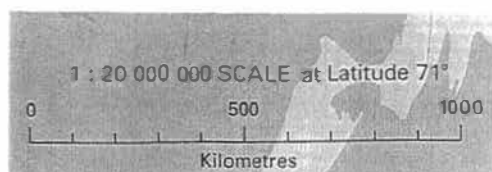


6e.1 South Georgia-South Sandwich Islands area
(Includes parts of CCAMLR Statistical Subareas 48.3 and 48.4)



6e.2 Kerguelen-Heard Island McDonald Islands area
(Includes parts of CCAMLR Statistical Subareas 58.5.1 and 58.5.2)

Legend



Antarctic Polar Front



7 DISSEMINATION OF CCAMLR'S ECOSYSTEM PHILOSOPHY: IMITATION THE SINCEREST FORM OF FLATTERY

INTRODUCTION

...the future of CCAMLR may rest not so much on the capacity and willingness of Commission members to adjust to new circumstances, but rather the manner in which CCAMLR is inadvertently drawn into the emergence of a new international environmental order, as well as a global strategic and economic order.

(Davis 1996: 244) (emphasis added)

It is the purpose of this chapter to show that CCAMLR is by no means being drawn passively into a new international environmental order. Rather, the reverse is argued to be the case: the philosophy promulgated by CCAMLR has been espoused by other harvesting regimes, as noted in the Introduction to this study. This chapter traces the penetration of ecosystem approaches in some organizations. Those that are chosen for study are related to CCAMLR by reasons of overlap, proximity or similarity of interests. In particular, some developments in living marine resource management in the Northern hemisphere are analysed in the context of ecosystem approaches.

Many of the world's major fisheries, managed for maximum return, are no longer economically viable and have to be subsidised by governments. Some of the stocks are fully fished or overfished (Kemf, Sutton and Wilson 1996: 1; FAO 1995). This has prompted regulators to consider alternative approaches to management, including ecosystem and precautionary approaches. Problems besetting fisheries are often caused by overcapacity of the fleets, leading to too many ships chasing too few fish, as is poignantly described by Emerson (1994). Some of these excess ships may be part of the rogue fleet currently fishing illegally in the Southern Ocean¹⁷⁵. One might well enquire which marine ecosystems we should be protecting; the whole question is an intractable one that could well be termed a 'wicked problem'¹⁷⁶. We examine whether it can realistically be addressed by an ecosystem approach.

Large-scale whaling ceased world-wide in the 1980s, many stocks of whales having been severely depleted. International developments important for living marine resource management in the Southern Ocean and on the wider stage include the declaration of sanctuaries for whaling. It is fitting to compare CCAMLR with the International Whaling Commission, since whales form part of the Southern Ocean ecosystem.

A new regulatory body whose competence in the Southern Ocean partially overlaps that of CCAMLR, the Commission for the Conservation of Southern Bluefin Tuna, is examined to discern whether it has incorporated any lessons learned from CCAMLR.

The chapter also discusses the effects and ramifications of the ratification of the Law of the Sea Convention in 1994, with particular reference to issues of straddling stocks in the CCAMLR region. The interactions of other United Nations initiatives with the CCAMLR regime are also examined.

7.1 CCAMLR'S INTERACTIONS WITH OTHER ORGANIZATIONS

CCAMLR's charter includes the obligation to cooperate and share data with other organizations, some of which are named in the Convention:

CAMLR Convention ARTICLE XXIII

1. The Commission and the Scientific Committee shall co-operate with the Antarctic Treaty Consultative Parties on matters falling within the competence of the latter.
2. The Commission and the Scientific Committee shall co-operate, as appropriate, with the Food and Agriculture Organisation of the United Nations and with other Specialised Agencies.
3. The Commission and the Scientific Committee shall seek to develop co-operative working relationships, as appropriate, with inter-governmental and nongovernmental organizations which could contribute to their work, including the Scientific Committee on Antarctic Research, the Scientific Committee on Oceanic Research and the International Whaling Commission.
4. The Commission may enter into agreements with the organizations referred to in this Article and with other organizations as may be appropriate. The Commission and the Scientific Committee may invite such organizations to send observers to their meetings and to meetings of their subsidiary bodies. (emphasis added)

Some organizations have been invited regularly to attend CCAMLR meetings and reciprocal arrangements are in place for attendance at meetings of relevance. As well as those organizations which are formally represented at CCAMLR meetings, there are some national delegates who regularly attend CCAMLR meetings and also attend other international meetings on behalf of their state, so that there is further cross-membership. At the first meetings, six non-state bodies were invited as observers. For the 1995 meeting, the Commission invited participation by 13 non-state bodies, although not all attended. CCAMLR maintains reciprocal arrangements to send observers to almost all the international organizations shown in table 7c.

The epistemic community of scientists that existed before CCAMLR is thus being steadily extended. Some scientists have developed marked negotiatory skills and may be properly dubbed 'scientist-diplomats'. Examples of these include Dr Knowles Kerry and Dr William de la Mare of Australia, Dr David Agnew, former Data Manager of the CCAMLR Secretariat, Dr Denzil Miller of South Africa, Dr John Croxall and Dr Inigo Everson of the United Kingdom, Taro Ichii of Japan and many more.

Cross-fertilization of ideas occurs at many levels. This is evinced in changes in the operation of some of these organizations and the formation of new instruments which incorporate some of the CCAMLR ideology, although this is not always acknowledged.

Organizations with which CCAMLR interacts formally and informally can be classified as follows:

| | | |
|--|--|--|
| International marine living resources regulatory organisations | Organizations engaged in Southern Ocean, Antarctic or related research | Environmental organizations, semi or nongovernmental |
|--|--|--|

The most important are shown in tables 7a-7g.

The organizations shown in table 7a were listed in SC-CAMLR-XIII, Appendix E, p 440, as being organizations with which CCAMLR wished to cooperate in matters relating to seabird bycatch. They were invited to nominate observers to attend CCAMLR meetings. Only CCSBT has thus far accepted the invitation, but this does not necessarily imply a lack of interest in minimization of bycatch on the part of those organizations that have not yet chosen to attend. The extent and implications of CCSBT's interactions with CCAMLR are elaborated upon later in this chapter.

Table 7a
International marine living resources organisations with competence or
interests over waters coincident with and/or adjacent to the CAMLR
Convention area

| ORGANISATION | FISHERIES MANAGED | AREAS COVERED |
|---|---|--|
| International Commission for the Conservation of Atlantic Tunas (ICCAT) | Tuna and tuna-like species | Atlantic Ocean between 50°N and 50°S |
| Indian Ocean Tuna Commission | Tuna and tuna-like species except southern bluefin tuna | Indian Ocean (FAO Areas 51 and 57) Western Pacific (FAO Area 71) |
| Indian Ocean Fisheries Commission (IOFC) | Species other than tuna and tuna-like species | Indian Ocean (FAO Areas 51 and 57) |
| South Pacific Commission (SPC) | Tunas No management responsibility, research only | Western and Central Pacific (southern boundary at 45°S between 150°E and 140°W) |
| South Pacific Forum Fisheries Agency (FFA) | All species of finfish and shellfish | 200 n.m. EEZ off South Pacific Ocean states |
| Commission for the Conservation of the Southern Bluefin Tuna (CCSBT) | Southern Bluefin Tuna | All areas where this species occurs, mainly south of 30°S. Overlaps CCAMLR area 58 |
| Inter-American Tropical Tuna Commission (I-ATTC) | All species of tuna and billfish | Eastern Pacific; part of FAO Areas 77 and 87 |

CCAMLR has maintained and to some extent fostered relations between regulatory bodies that are named in the CAMLR Convention. They are:

Table 7b
Regulatory bodies named in CAMLR Convention

| ORGANISATION | FISHERIES MANAGED | AREAS COVERED |
|---|---|--|
| International Whaling Commission (IWC) | All whales except small cetaceans not included in 1946 list | All waters in which whaling is prosecuted. Southern Ocean whale sanctuary S of 40°S and 60°S Antarctic coastline. Indian Ocean whale sanctuary overlaps with part of CCAMLR area |
| Convention on the Conservation of Antarctic Seals (CCAS) | All 6 species of Antarctic seals | South of 60°S i.e. Antarctic Treaty area |

7.2 INTERNATIONAL WHALING COMMISSION (IWC)

The IWC regulates whaling in all oceans and hence also in the CCAMLR area. As noted in chapter 2, whaling in the Southern Ocean had depleted stocks of whales even prior to the signing of the International Convention on the Regulation of Whaling (ICRW) in 1946.

Early interactions between CCAMLR and IWC .

IWC input

A significant contribution was made at the 1981 CCAMLR Preparatory meeting by the representative of the International Whaling Commission (IWC). He presented several papers, previously tabled at IWC meetings. One dealt with the implications for whales of the management of other living resources of the Southern Ocean and included a suggestion regarding a joint workshop between IWC and a number of other organizations to consider FIBEX results and plan for SIBEX (AMLR-PM/12 1981 Annex A). We shall return to this proposal for a workshop in chapter 7.

A second paper he tabled was a resolution on cooperation and coordination between IWC and the new commission (AMLR-PM/12 1981 Annex B). In his statement, the IWC representative reiterated that whales, as a major component of the Antarctic marine ecosystem, affect and are affected by the other living marine resources of Antarctic waters. Thus he envisaged a close working relationship between the two organizations. He reminded the delegates that the IWC had since it began in 1949:

...gained operational experience and appreciation of the complexities of the international management of marine living resources. The workings of the IWC and its Secretariat are remarkably similar to those envisaged for the CCAMLR Commission. The IWC will be pleased to provide any assistance in explaining the workings of the IWC...

(AMLR-PM/12 1981)

This offer was not taken up by the CCAMLR members. Leaving aside the success or failure of the IWC in conserving whale stocks, advice on running a comparable organization might have obviated some delay in getting down to business.

It appeared then that the two organizations, whose functions were so similar, would be dovetailing their research programs and pooling their data to conserve and protect Southern Ocean ecosystems. The extent to which this came about in CEMP is detailed in chapter 5.

IWC has about 40 members; about half of these are also CCAMLR members or acceding states. In many cases, the same people who participate in IWC are also on CCAMLR delegations, thus there is considerable opportunity for networking and transfer of knowledge. IWC took the initiative in defining its relation with the new CCAMLR Commission by issuing a set of recommendations on the Implications for Whales of Management Regimes for other Marine Resources. This stated that contracting parties should:

ensure that full account is taken of the responsibilities of the International Whaling Commission for the conservation and management of whale stocks in the Southern Ocean

(IWC 1980)

In view of its experience in data handling and its long-term interest in whale population dynamics, IWC mooted the possibility of a workshop sponsored jointly by IWC with a number of other organizations, including CCAMLR, to be held late 1981 (Rep. Int.Whal.Comm. 31 1981: 29.)

IWC passed a resolution regarding CCAMLR in which it clearly spelled out the coordination and cooperation it envisaged between the two organizations, as allowed for under the CAMLR Convention. It requested that IWC be given 'appropriate status' within CCAMLR so that it could contribute to CCAMLR's activities, and offered a reciprocal role in IWC to CCAMLR.

A framework for cooperation between the two organizations resulted from informal discussions between the Executive Secretary of CCAMLR and the Secretary of IWC in November 1982, in which they agreed on reciprocal arrangements for attending meetings and exchanging documents and advice. While IWC wanted a formal agreement, CCAMLR favoured less formal arrangements between itself and related organizations (CCAMLR-II 1983 §42) than did IWC. It is tempting to speculate that a more formal liaison might have resulted in greater

cooperation between CCAMLR and IWC and more effective conservation of ecosystems.

The proposed CCAMLR/IWC Workshop on Feeding Ecology of Southern Baleen Whales never took place in the form originally envisaged in the early 1980s. It was the understanding of CCAMLR that this workshop:

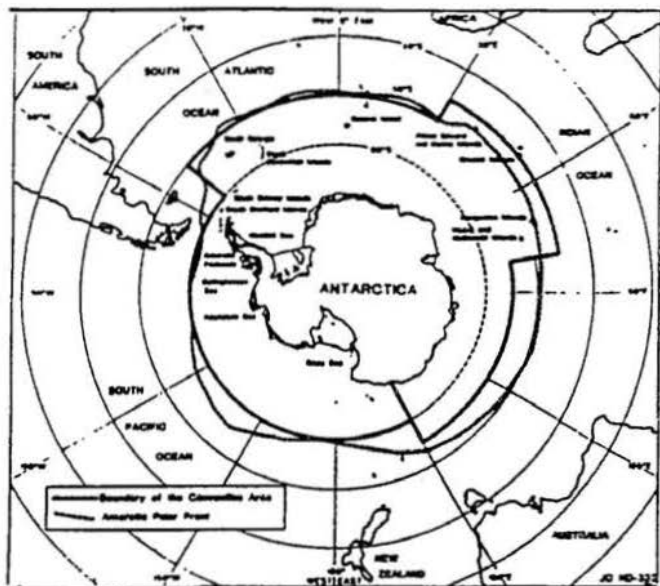
...was intended to permit a functional evaluation of the minke whale as a potential indicator of changes likely to result from the harvesting of krill (SC-CAMLR-IX 1990 §5.45)

(The minke whale was on the first list of potential CEMP predator indicator species put forward at Seattle, as discussed in chapter 5). CCAMLR members put in a considerable amount of background work in preparation for this workshop, but the workshop was deferred on various grounds by IWC until 1990. CCAMLR received notice that IWC wanted to change the objectives of the workshop: 'The terms of reference...should be expanded to cover studies of other major predators of krill, especially those pertinent to estimates of abundance and trends' (SC-CAMLR/IX/BG/12). No explanation was given. Since the study of krill predators by CEMP was by then well underway, the Scientific Committee rejected the amended workshop terms as inappropriate to CCAMLR, but wrote to IWC that it was still interested in participating in a workshop under the original proposal (SC-CAMLR-IX 1990 §5.49-5.51). This was not acceptable to IWC.

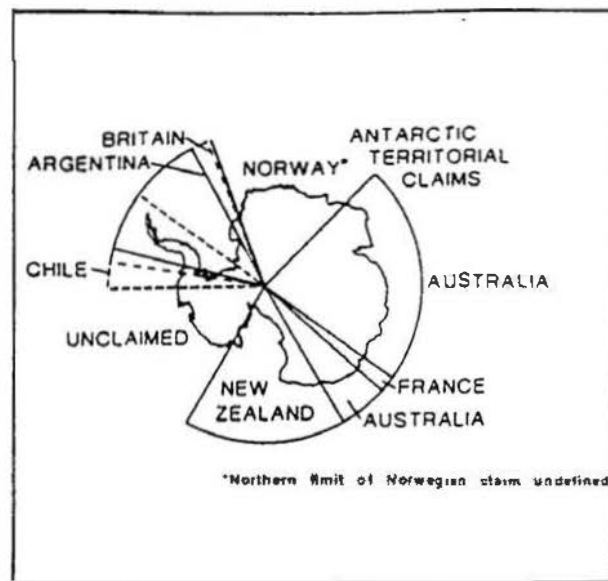
CEMP also requested data from IWC regarding krill needs of whales. IWC responded that this required much work and in any case data 'from the scientific Japanese take of minke whales is currently being analysed. This will provide a major source of information for the ...CCAMLR request'. (Rep. Int.Whal.Comm. 1993: 56).

Figure 7
CCAMLR and its relationship to other interests in the Southern Ocean

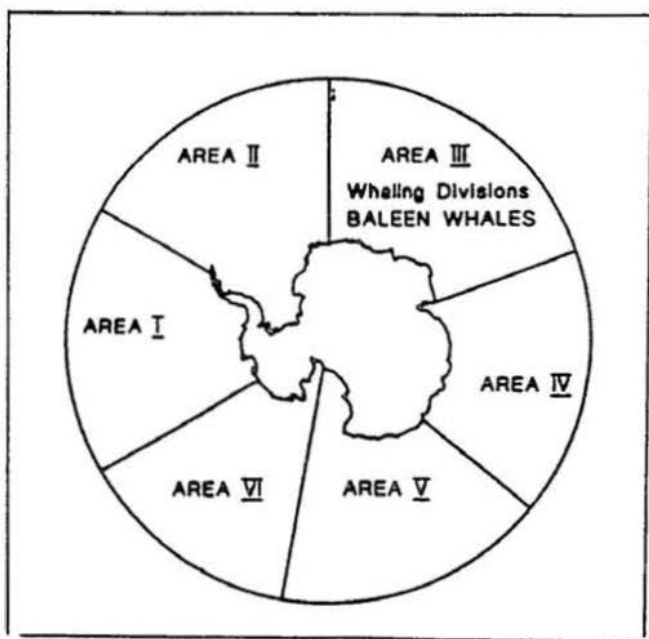
7.1 CCAMLR area



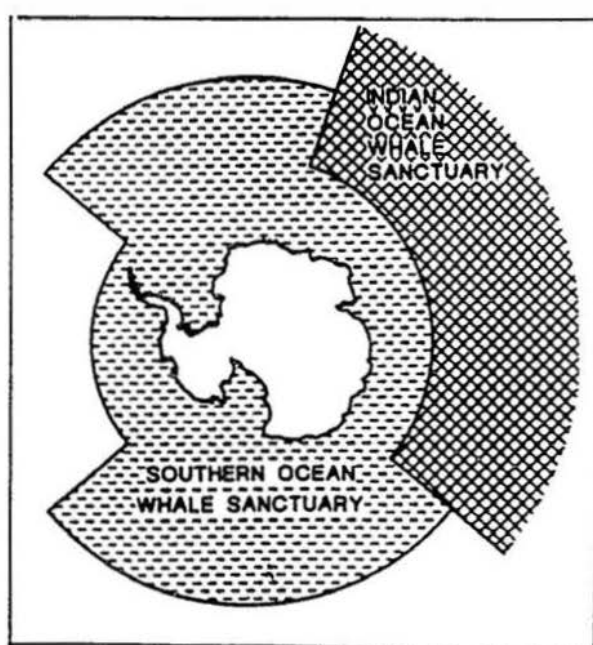
7.2 Antarctic territorial claims



**7.3 Whaling Divisions
 (Baleen whales)**



7.4 Whaling sanctuaries



7.2.1 Whaling moratoria and sanctuaries

Moratoria

In 1982, the year the CCAMLR commission was established, a moratorium on commercial whaling was agreed to take effect in 1986 (Wallace 1993b: 1546-1548).

Indian Ocean Sanctuary

A whaling sanctuary had already been established in the Indian Ocean to 55°S in 1979 (IWC 1946b Amendments to the Schedule 1979; Wallace 1993b: 1522-3). This sanctuary overlapped with part of the CCAMLR area.

Southern Ocean sanctuary

In 1994, the IWC members voted almost unanimously to create a further sanctuary, covering the entire Southern Ocean. This new sanctuary was contiguous with that of the Indian Ocean and took in the whole of the CCAMLR area, up to 40°S in some latitudes (IWC 1995: 27-29). The Southern Ocean whaling sanctuaries and their relation to the CCAMLR region are shown in figure 7.

Arguments against establishing the Southern Ocean sanctuary came from Japan, which has utilised whale meat as a human food source. The reasoning was that a sanctuary would do nothing to restore the ecosystem. It would disadvantage some species through competition for food, for example between the depleted blue and supposedly abundant minke whale populations (IWC 1994, Comments of the Governments of Japan).

At the IWC workshop that decided on the Southern Ocean sanctuary (IWC 1994) the absence of an official CCAMLR representative was noted with concern, in view of the role of CCAMLR in the management of Antarctic marine living resources. (The Australian delegation reported to CCAMLR on the workshop).

Scientific whaling

Some whaling is still carried out in the sanctuaries. Under Article VIII of the ICRW, members may issue themselves permits to take whales for the purposes of scientific study. Japan has taken several hundred minke whales per year under special permit. However, the IWC has recommended that research interests be addressed using non-lethal

methods and that governments should refrain from issuing permits for killing of whales in the Southern Ocean Sanctuary (IWC 1996 Appendix 9. IWC Res. 1995-8).

Whaling sanctuaries and their effect on CCAMLR

How does the declaration of the Southern Ocean whaling sanctuaries affect CCAMLR's operations? Since little whaling has been carried out in the Southern Ocean in recent years there is not likely to be a huge increase in the amount of food available to other predators. Cooperative non-lethal research into whale populations, similar to that being carried out under SCAR's APIS program may help to elucidate trophic interactions between whales and their prey. It is perhaps cynical to note - without implying whether it is right or wrong - that CCAMLR's WG-Krill (now part of WG-EMM) uses data on minke whale feeding that can only have come from dissection of dead specimens.

Future cooperation between IWC and CCAMLR

In spite of their importance in the ecosystems of the Southern Ocean and CCAMLR's professed ecosystem approach, whales are not often mentioned in the meetings of the CCAMLR Commission and Scientific Committee. A possible reason for this may be a kind of demarcation mentality on the part of both CCAMLR and IWC, and the lingering perception of the exclusivity of the members of the Antarctic Treaty System.

It appears, then, that while both organizations are making laudable attempts to protect the living resources of the Southern Ocean, much of their work to date has been done independently of one another. While some rapprochement has taken place it is feasible to suppose that much closer working relationships would benefit both organizations and the ecosystems for which they are jointly responsible. There are signs that such will happen in the years following an extensive whale observation program carried out under strict IWC guidelines by Australia early 1996. It is becoming clear that the role of the largest predators in Southern Ocean ecosystems cannot be disregarded (Thiele pers. comm.). The theme of possible closer relationships between CCAMLR and IWC is developed in the last chapter.

7.2.2 Voting procedures in IWC and CCAMLR

To point up the different ways in which IWC and CCAMLR operate, comparison is made here between their voting systems.

There are two levels of voting in CCAMLR: simple majority, and consensus. These are laid down as follows:

CAMLR Convention ARTICLE XII

1. Decisions of the Commission on matters of substance shall be taken by consensus. The question of whether a matter is one of substance shall be treated as a matter of substance.
2. Decisions on matters other than those referred to in paragraph 1 above shall be taken by a simple majority of the Members of the Commission present and voting.

On the other hand, IWC operates voting under a majority:

ICRW Article III

2. ...Decisions of the Commission shall be taken by a simple majority of those members voting except that a three-fourths majority of those members voting shall be required for action in pursuance of Article V. The Rules of Procedure may provide for decisions otherwise than at meetings of the Commission.

Significantly, Article V of the ICRW deals with amendments of the Schedule for the conservation and utilization of whale resources.

The effects of the two different kinds of decision-making procedures are as follows:

Simple majority voting, while probably more expeditious than trying to achieve agreement consensus can mean that resolutions can be passed which have the support of just over half the parties. Are those parties which voted against a motion subsequently bound by it or not? What is not clear is the status of parties who abstain from voting or who are absent at the time of voting.

Much of CCAMLR's business can be decided by simple majority voting. However, parties have an effective veto if there is a matter that they do not want passed. They submit that it is a 'matter of substance'; this then cannot be voted on but has to be submitted to the consensus process. If consensus is not then reached on whether the matter is a matter of substance, then what? If one member decides it is a matter of substance, then it is. This method had not been invoked in CCAMLR meetings in the period of Dr Powell as Executive Secretary (Powell pers. comm.).

Consensus decision-making means that all parties must agree to a measure before it can be passed. This can mean that a proposal may have to be changed to attain agreement. In CCAMLR, where there are fishing and non-fishing nations whose views have to be reconciled, this can mean dilution of conservation principles that underlie the convention. It can also force both sides to consider one another's views and result in measures that are more balanced and hence more likely to be implemented. Members have an escape clause if they have second thoughts about a measure even if they have already agreed to it:

CAMLR Convention ARTICLE IX

6.(c) if a Member of the Commission, within ninety days following the notification specified in sub-paragraph (a), notifies the Commission that it is unable to accept the conservation measure, in whole or in part, the measure shall not, to the extent stated, be binding upon that Member of the Commission;

According to Edward and Heap (1981) CCAMLR chose consensus voting because this had proved useful in the Antarctic Treaty system. Consensus voting would lead to fewer objections than a simple or three quarters majority voting system. Furthermore, they made this crucial observation:

The only point that is crystal clear is that no decision-making procedure can, of itself, force a state to accept a conservation measure which it deems to be contrary to its vital interests.

(Edwards and Heap 1981: 358)

Consensus voting would tend to favour the fishing nations where agreement on issues least damaging to their interests might force conservation-minded nations to allow, for example, higher catch rates. As

shown in chapter 3, however, the protection of the rights of claimants was as much an issue as conservation in the CCAMLR negotiations, which is why consensus helped to bring CCAMLR into being. Thus, asserts Vicuna (1991: 27)

consensus, far from being a bar to the ecosystem approach and the objectives of CCAMLR Article II, it has been the very fact that made it possible, for otherwise there would have been no overall arrangement for the Southern Ocean at all. The open-access system that caused so much damage to the living resources, notably whales and seals, is now being brought under control by the very existence of CCAMLR.

Consensus voting in CCAMLR clearly allows for the kinds of compromises which have aided the continued existence of the Antarctic Treaty. Moreover, consensus voting works under the 'ratchet' principle where small gains are achieved which are difficult to undo, because it requires consensus to undo them. By definition, ratchets do not work in reverse. CCAMLR is thus strengthened by the gradual accumulation of a body of measures and paradigms which have become part of the CCAMLR ecosystem philosophy.

By contrast, the requirement of the IWC that a three-quarter majority is needed to make decisions regarding whale stocks meant that decisions to halt or slow down whaling were delayed until the numbers of whale conservationists outnumbered the whaling nations by 3 to 1, a definite drawback to conservation. This matter is again alluded to in the final chapter.

It can be argued that consensus voting in CCAMLR is the product at least in part of the perception by whaling nations that the three-quarter majority rule was used in IWC to justify moratoria on commercial whaling.

7.3 CONVENTION FOR THE CONSERVATION OF ANTARCTIC SEALS (CCAS)

It will be recalled that the CAMLR Convention recognised the rights and obligations of CCAS and the actions already taken under its aegis. No substantial commercial sealing has taken place in the Southern Ocean since CCAMLR was established. North of 60°S seals have been included under legislation passed by members for their sovereign territory. It will be recalled from chapter 5 that Antarctic fur seals¹⁷⁷ were on the list of predator indicator species for the CCAMLR Ecosystem Monitoring Program.

A meeting held in 1988 by the parties¹⁷⁸ to review CCAS was concerned that the sealing zones laid down under CCAS were not totally consistent with the distribution of seal stocks, which was still incompletely known. SCAR and the parties to CCAS, should, it was stated, keep:

...the question of appropriate boundaries under review with the aim of re-defining zones in a manner more suitable for maintaining a satisfactory balance within the ecological system...As the [CCAS] Convention and the Convention on the Conservation of Antarctic Marine Living Resources share common ground in such an ecosystem approach, communication should be maintained between the Parties to these Conventions in reviewing zones.
(Heap 1994 §1.9.4)

As noted, SCAR is undertaking a major census of pack ice seals in its APIS program. The results of the synoptic multinational¹⁷⁹ circumpolar survey planned for 1998-9 will be of great scientific interest to WG-EMM. Together with the surveys carried out by IWC, the APIS program will extend and advance knowledge of the interactions of mammals in Southern Ocean ecosystems.

7.4 COMMISSION FOR THE CONSERVATION OF SOUTHERN BLUEFIN TUNA (CCSBT)

The Convention for the Conservation of Southern Bluefin Tuna (SBT Convention) which established the CCSBT was signed in 1993 and came into force in 1994. The CCSBT Commission is based in Canberra, only the second international organization after CCAMLR to have its headquarters in Australia. Its foundation members are also CCAMLR members, namely, Australia, Japan and New Zealand.

The SBT Convention is open to accession by other states wishing to fish for southern bluefin tuna and to coastal states through whose exclusive fishing or economic zones southern bluefin tuna migrate (CCSBT Convention 1993, Article 18). Southern bluefin tuna¹⁸⁰ are highly migratory fish, found throughout the Southern Ocean but mainly between 30°S and 60°S (Gon and Heemstra 1990: 404.) Thus their range overlaps the CCAMLR boundary in the region where the latter follows the 45°S line of latitude, i.e. Area 58. The preferred method of harvesting southern bluefin tuna is by longline, which, as discussed in chapter 4, has the potential of causing heavy incidental mortality of seabirds.

Although it was set up to regulate harvesting of only one species, the SBT Convention is one of the new breed of fishing agreements that incorporates an ecosystem approach somewhat akin to that of CCAMLR. This is not surprising considering the cross membership of the signatories. Furthermore, past and present CCAMLR delegates were involved in the actual formulation of the SBT Convention (Kerry, pers. comm.; Hermes pers. comm.) The two commissions interact and cooperate on matters of mutual interest (Hermes pers. comm.). The SBT Convention sets out its concern for organisms other than the target species:

'ecologically related species' means living marine species which are associated with southern bluefin tuna, including but not restricted to both predators and prey of southern bluefin tuna.
(CCSBT 1993, Article 2a)

It provides for the setting up of a scientific committee which shall:

report to the (SBT) Commission its findings...on the status of the southern bluefin tuna stock and, where appropriate, of ecologically related species. (CCSBT Convention 1993, Article 9c)

Like CCAMLR in its early years, CCSBT appears to be primarily concerned with the day -to-day management of an intense fishery. However, it has formed a subgroup, Ecologically Related Species (ERS) which first met late 1995. This meeting drew heavily on CCAMLR experience and expertise. The answers to questions regarding seabird mortality posed in that meeting closely parallel CCAMLR's own conclusions (CCSBT 1995).

Future interaction between this group and CCAMLR's IMALF group under WG-FSA will no doubt result in better protection for ecologically related species inside and outside the CCAMLR area.

7.5 OTHER ORGANIZATIONS

Table 7c lists international organizations which have research or political interests of relevance to CCAMLR; some of these, indicated thus * are named in Article XXXIII of the Convention.

Table 7c
Organizations engaged in Southern Ocean, Antarctic or related research

| ORGANISATION | RELEVANCE TO CCAMLR | AREA COVERED |
|---|--|--------------------------------|
| Scientific Committee on Antarctic Research (SCAR)* | Antarctic research | Antarctic Treaty area |
| Scientific Committee on Oceanic Research (SCOR)* | Ocean research | Worldwide |
| Intergovernmental Oceanographic Commission (IOC)* | Ocean research | Worldwide |
| Food and Agriculture Organization of the United Nations (FAO)* | Fisheries research and compilation of statistics | Worldwide |
| International Council for the Exploration of the Seas (ICES) | Marine and fisheries research | Primarily North Atlantic Ocean |

SCAR and SCOR have already been dealt with in the study. ICES and FAO are discussed below.

IOC appears to be planning a program of Southern Ocean research that parallels and in some respects duplicates that of CCAMLR¹⁸¹. without inviting involvement from CCAMLR experts.

Table 7d
Other relevant conventions or agreements

| CONVENTION | RELEVANCE TO CCAMLR | AREA COVERED |
|--|--|--|
| FAO Code of Conduct for Responsible Fishing 1995 | All marine living resources of the high seas: target species and other species belonging to the same ecosystem which are dependent on, or associated with, a target species. | Global |
| United Nations Conference on Environment and Development (UNCED) Agenda 21 Chapter 17 | Protection of the oceans...protection, rational use and development of their living resources | Global |
| Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) 1991 | Complementary to CCAMLR | South of 60°S |
| Convention on Biological Diversity 1992 Jakarta Mandate 1995 | Marine and other aquatic ecosystems; ecological complexes of which they are part | Global |
| Agreement on Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995) | Target stocks and species belonging to the same ecosystem or dependent upon or associated with the target stocks; | Areas beyond national jurisdiction/ areas under national jurisdiction |

These are discussed in this chapter.

There are increasing numbers of scientific programs and activities that are relevant to the work of CCAMLR. Some are listed in table 7e.

Table 7e
Programs and activities with CCAMLR involvement

| Name of program/Affiliation | CCAMLR involvement |
|---|---|
| GOSEAC Group of Specialists on Environmental Affairs and Conservation SCAR | Liaison |
| APIS Antarctic Pack Ice Seals SCAR | Cooperation with CEMP |
| Steering Group on Research Related to the Conservation of Large Baleen Whales in the Southern Ocean IWC | Report presented to CCAMLR Scientific Committee |
| Symposium on Fisheries Acoustics ICES | CCAMLR member participant |

The SCAR program on Antarctic Pack Ice Seals (APIS) was discussed in chapter 5. IWC/CCAMLR interactions are dealt with above. The inevitable result of all these interactions is the dissemination and transfer of knowledge and attitudes.

7.6 UNITED NATIONS INSTRUMENTS AND THEIR INTERACTIONS WITH THE CCAMLR COMMISSION AND ITS SCIENTIFIC COMMITTEE

The continuing interest in Antarctic matters on the part of the United Nations was noted in chapter 6. Various of its bodies interacted with CCAMLR, notably the Food and Agriculture Organization of the United Nations (FAO).

7.6.1 FAO

In spite of the fact that it is an organ of the United Nations, a body with which the ATS has had a sometimes difficult relationship, the FAO and CCAMLR have continued to explore ways of sharing expertise. An early manifestation of this was the compilation and publication of a guide to the living resources of the Southern Ocean, which resulted from a collaboration between FAO and CCAMLR (Fischer and Hureau 1985a; Fischer and Hureau 1985b). This was part of a series of identification sheets on worldwide commercial species initiated by the FAO.

All CCAMLR members are also members of the United Nations. CCAMLR sends representatives to appropriate FAO meetings and an FAO observer was invited to every annual CCAMLR Commission and Scientific Committee meeting. FAO has not, however, sent an observer every year. Some of the working group meetings also invited FAO participation, for example, the Working Group on Fish Stock Assessment. In addition, some former FAO personnel were on delegations of Members, e.g. Gulland (EEC); Everson (UK).

In 1992 the CCAMLR Commission became concerned that the FAO and other international organizations had little awareness of the innovative work being done under CCAMLR's auspices (CCAMLR-XI 1992 §11.6). Accordingly, a letter was sent by the Secretary to the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks and to the FAO (CCAMLR-XII 1993 §12.7; Annex 8). A list of CCAMLR's Conservation Measures was appended to the letter.

Further communication between FAO and CCAMLR went some way towards remedying the lack of awareness noted above. FAO had 'great interest in the pioneering approaches of CCAMLR to ecosystem management' and these were likely to be applicable to fisheries management in other areas, the FAO observer at CCAMLR-XII in 1993 stated.

As noted previously, observers are normally excluded from sessions of the annual CCAMLR meetings other than plenary, so that interchange of information is for the most part limited to short formal statements and informal contact during breaks in the meetings and intersessionally. The FAO observer at the 1995 meetings regretted that FAO had been unable to observe the sessions of Standing Committees of the Commission where management problems and solutions were dealt with, an area in which FAO can claim expertise (CCAMLR-XIV 1995 p 63, and Shotton, pers. comm.).

7.6.2 United Nations Conference on Environment and Development (UNCED) Agenda 21 Chapter 17

The outcomes of UNCED were several utopian documents: the Rio Declaration and Agenda 21. Chapter 17 of Agenda 21 (United Nations 1992a, United Nations 1992b), which deals with oceans, places much emphasis on practices aimed at protecting marine ecosystems. However, although the Secretariat of UNCED had requested information regarding CCAMLR's 'role in conserving Antarctic marine living resources' (CCAMLR-X 1991) §14.1) and the questions regarding this role posed by UNCED had been answered (CCAMLR 1991). The UNCED Secretariat had, moreover, been supplied with a set of CCAMLR Basic Documents and other relevant literature, which it intended to use to prepare background documents for the Conference which was held in Rio de Janeiro in 1992 (CCAMLR-XI 1992) §12.1).

CCAMLR ignored in UNCED

The Chairman of the CCAMLR Commission complained that, although the inaccurate and misleading references to the Antarctic Treaty System and CCAMLR contained in early drafts of the report of the UNCED conference had been removed from the final report, any 'meaningful references to the role of CCAMLR' had been suppressed (CCAMLR 1992). Australian Ambassador for the Environment, Penny Wensley, who opened the 1992 CCAMLR meeting, stated that CCAMLR had anticipated

by 12 years the principles of sustainable development adopted by UNCED (CCAMLR-XI 1992 §1.9).

7.6.3 The FAO Rome Consensus on World Fisheries 14-15 March 1995

A Ministerial Conference on Fisheries was held under in Rome under the aegis of the Director-General of FAO to review the state of world fisheries and to follow up recommendations of the United Nations Conference on Environment and Development (UNCED). It was attended by representatives of most nations and by a number of international organization, among them CCAMLR.

The main concern of the meeting was the state of the world's fish stocks, 70 per cent of which were regarded as 'fully exploited, over exploited, depleted or recovering'. A consensus was reached which recognised that without drastic action, those stocks would continue to decline. It proposed, therefore, that far-reaching changes in fisheries management strategies be adopted. Such changes included elimination of overfishing, rebuilding and enhancement of fish stocks, minimizing wasteful fisheries practices and rehabilitation of fish habitats. Fisheries for new and alternate species should be developed based on principles of scientific sustainability and responsible management. Significantly, it encouraged that:

an ecosystem approach to fisheries conservation and management be pursued. (FAO 1995c).

Clearly, by 1995, FAO was well aware of CCAMLR's philosophy.

7.6.4 Convention on Biological Diversity (CBD)

The Convention on Biological Diversity was negotiated by UNEP from 1988 and opened for signature at the UNCED negotiations in 1992. It was adopted in 1993. It has been ratified by over 130 nations; these include all members and acceding states of CCAMLR.

In November 1995 the second Conference of Parties (COP/2) on the CBD decided that urgent action was required to conserve marine and coastal ecosystems. The Jakarta Ministerial Statement on the Implementation of the Convention on Biological Diversity which emanated from this recognised:

that biological diversity that comprises variability of genes, species and ecosystems is the world's most valuable resource for the sustainability and welfare of all humankind; (COP/2 Biodiversity Statement and Report)

This theme was taken up by the FAO Kyoto Conference (see below).

7.6.5 Kyoto Declaration and Plan of Action

The International Conference on the Sustainable Contribution of Fisheries to Food Security held by FAO in Kyoto 4-9 December 1995 represents yet another attempt to address the problems of world fisheries and human nutrition. The 95 parties agreed that they would:

conduct, within their competences and, where appropriate, in cooperation with regional and other intergovernmental organizations, integrated assessments of fisheries in order to evaluate opportunities and strengthen the scientific basis for multispecies and ecosystem management. (FAO 1995b).

Here is a clear indication that FAO is following in CCAMLR's footsteps.

7.6.6 FAO Code of Conduct for Responsible Fisheries

The FAO Code of Conduct for Responsible Fisheries, drawn up in 1995, although clearly directed towards maintaining economically viable fisheries, contains numerous references to marine ecosystems. Its Article 3.2 specifies that the Code is also to be interpreted and applied in the light of numerous pre-existing agreements, declarations and conventions. However, although the CCAMLR Commission, like other intergovernmental bodies, had input to it, the FAO Code does not mention either the Antarctic Treaty or CCAMLR. This could be due to the fact that their competence is not global, and, possibly, the lingering stand-off between the United Nations and the ATS already discussed.

The FAO Code states:

...Management measures should not only ensure the conservation of target species but also of other species belonging to the same ecosystem which are dependent on, or associated with, a target species (FAO 1995 Article 5.2).

This is a direct reflection of CCAMLR principles. The FAO Code, however, stops short of advocating, as suggested in a letter from the CCAMLR Secretariat, that research and data collection should take place not only in association with, but also independent of, harvesting.

7.6.7 Precautionary Approach and CCAMLR's Ecosystem Approach - two sides of the same coin?

The precautionary principle and the precautionary approach constitute a diffuse suite of understandings of which uncertainty is the central characteristic. However, this has not prevented its being incorporated into a number of legal instruments, either explicitly or by implication. Agenda 21 Chapter 17 advocates precautionary approaches, as does the FAO Code of Conduct.

The difference between the precautionary principle and precautionary approach appears to be one of degree: for fisheries, it is more realistic to apply precautionary approaches. Garcia cited the CAMLR Convention, paraphrasing its Article II, as an example of a charter which sets down precautionary ecosystem approaches which he maintains are needed to ensure species sustainability (Garcia 1994). Agnew, former data manager of the CCAMLR Secretariat, stated that CAMLR Convention Article II §3c embodied risk management and a precautionary approach (Agnew 1995).

The FAO Technical Consultation on the Precautionary Approach to Capture Fisheries, held at Lysekil, Sweden, in 1995 was attended by several scientists associated with CCAMLR. It resulted in the formulation of precautionary approaches, couched in CCAMLR terms, involving 'prudent foresight' to fisheries. (FAO 1995).

Thus, the precautionary approach is another expression of an ecosystem approach, but for reasons alluded to above, the former has become more widely accepted. Garcia wrote:

The psychological importance of coining a new term should not be underestimated...if this term is perceived by policy-makers as carrying with it the feeling of urgency and of the need to take drastic preventive measures, it may be effective where traditional jargon failed.
(Garcia, 1994: 123)

CCAMLR has had in place a precautionary limit on the catch of Antarctic krill since 1991 (CCAMLR-X 1991 §10.4)

7.6.8 Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks 1995

Negotiations which resulted in the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Agreement SFS&HMFS) were initiated at the 1992 UNCED Conference held in Rio de Janeiro. CCAMLR was involved in preparing documents for that Conference and reported on it (CCAMLR 1992). CCAMLR also participated in and contributed to the meetings on developing a code for responsible fishing and the straddling stocks and highly migratory stocks conferences coordinated by the FAO. In spite of these involvements, it would seem, as explained below, that the concept of straddling stocks was not yet well understood by CCAMLR members. This was probably a consequence of the fact that there had been insufficient time to consider the final documents emanating from those meetings and conferences.

In the 1995 CCAMLR Commission meeting there was some discussion of straddling stocks, with a number of delegates expressing doubts whether the recently concluded Agreement SFS&HMFS applied to CCAMLR. It was agreed to refer to 'stocks occurring both inside and outside the Convention area', pending further investigation by the Commission as to whether such stocks were in fact straddling stocks (CCAMLR 1995a) §9.3-9.6).

The report of the Working Group on Fish Stock Assessment (WG-FSA) stated that, since Patagonian toothfish is taken in waters outside the Convention area adjacent to Subarea 48.3, it therefore constituted a straddling stock (CCAMLR 1995) §5.83. Under §10.11-10.13 of the WG-FSA

report, the *D.eleginoides* fishery in subarea 48.3 was to be managed 'in keeping with the principles' of Agreement SFS&HMFS, especially Articles 3-6 of its Annex I. The Scientific Committee noted that sources of uncertainty regarding *D. eleginoides* included those related to 'straddling stock issues'(CCAMLR-1995b § 6.3). The next section will attempt to clarify the relation, if any, between CCAMLR and the Agreement SFS&HMFS.

The relevance of the Agreement SFS&HMFS to CCAMLR

a) Boundaries

In chapter 3 we flagged that decisions over the positioning of the CCAMLR boundary would have implications for the Agreement SFS&HMFS. It will be recalled that the proposed boundary in the South Atlantic was moved to a position such that it was south of the Polar Front, south of Burdwood Bank where it had been placed by the FAO. This meant that there was a possibility of catching krill in Statistical Area 41, which is not under CCAMLR and thus outside the CCAMLR area of competence. Such harvesting has indeed occurred, and it has been documented by CCAMLR, which has thus treated the krill stock as a straddling stock.

Nothing in the Agreement SFS&HMFS precisely fits the CCAMLR case south of 60°S because of differing views regarding coastal state jurisdiction. The closest is found in its Article 8 §3:

Where a subregional or regional fisheries management organization or arrangement has the competence to establish conservation and management measures for particular straddling fish stocks or highly migratory fish stocks, States fishing for the stocks on the high seas and relevant coastal States shall give effect to their duty to cooperate by becoming a member of such organization or a participant in such arrangement, or by agreeing to apply the conservation and management measures established by such an organization or arrangement.

(Agreement SFS&HMFS).

Some stocks are harvested in the high seas on either side of the boundary of the area of competence of two different regulatory bodies but not in any State's Exclusive Economic or maritime zone. For example, harvesting of certain species in the high seas adjacent to the CAMLR Convention area is regulated to some extent, namely by IWC and by the Commission for

the Conservation of Southern Bluefin Tuna (CCSBT), which incorporates an ecosystem approach similar to that of CCAMLR. The Convention for the Conservation of Southern Bluefin Tuna 1993 Article 2a applies to all waters where Southern Bluefin Tuna may be caught; as discussed, this includes part of Statistical Area 58. Thus stocks need to be identified so that responsibility for their management can be clearly designated.

b) Species other than fish

As noted in the report of CCAMLR Working Group on Fish Stock Assessment (CCAMLR 1995c § 10.14) and as stated in its text, the Agreement SFS&HMFS applies to fish. Other organisms, for example, birds, are not covered in these United Nations instruments, yet bycatches of seabirds that feed both inside and outside the CCAMLR area are of particular current concern to CCAMLR and the CCSBT. These birds may be caught as a consequence of a fishery directed towards their prey species, or by birds being hooked by longliners while feeding off baited hooks. The question of whether such birds are regarded as part of the same ecosystem or as associated or dependent species, in the sense of the Agreement SFS&HMFS (see below) has not been addressed, since it deals only with fish.

The Agreement SFS&HMFS does recognise that rather than focussing on single target species, the state of ecologically related populations of organisms should be assessed. It requires that states shall:

assess the impacts of fishing, other human activities and environmental factors on target stocks and species belonging to the same ecosystem or dependent upon or associated with the target stocks.

(Agreement SFS&HMFS Article 5(d)).

and also

obtain and evaluate scientific advice, review the status of the stocks and assess the impact of fishing on non-target and associated or dependent species;

(Agreement SFS&HMFS Article 10d)

The underlined sections could be construed to include seabirds, though this is not stated. However, these clauses appear to be an expression of the

ecosystem approach pioneered by CCAMLR and an echo of ecosystem assessment already carried out by CCAMLR, as noted earlier.

The situation that confronts CCAMLR, namely the management of stocks being harvested both within the Convention area (but outside any state's maritime zone) and the adjacent unregulated high seas, is not dealt with in the Law of the Sea Convention (LOSC) or the Agreement SFS&HMFS.

c) Coastal states issues

In the Agreement SFS&HMFS and in LOSC there is the assumption of the exercise of jurisdiction of a coastal state or the derogation of that coastal state to a regional authority which acts for a number of coastal states. Ownership of, or jurisdiction over, resources of a coastal state within its maritime zone arguably entitles it to have say in the regulation of stocks which are found within and adjacent to its zone.

In the CCAMLR area there are cases where the Agreement SFS&HMFS probably applies without ambiguity. Stocks occurring on either side of boundaries of maritime zones around islands of undisputed sovereignty in the ocean north of 60°S but within the CCAMLR area would arguably constitute straddling stocks. These islands include Iles Kerguelen, Iles Crozets, (France); Heard Island and the MacDonald Islands (Australia); the Prince Edward Islands (South Africa) and Bouvetøya (Norway).

The CAMLR Convention provided for regulation outside its area of competence where Contracting Parties were responsible for adjacent ocean areas, but the provision is confined to Contracting Parties:

CAMLR Convention ARTICLE XI

The Commission shall seek to co-operate with Contracting Parties which may exercise jurisdiction in marine areas adjacent to the area to which this Convention applies in respect of the conservation of any stock or stocks of associated species which occur both within those areas and the area to which this Convention applies, with a view to harmonizing the conservation measures adopted in respect of such stocks.

Due to concerns over Patagonian toothfish, the Commission at its 1993 meeting passed Resolution 10/XII, entitled Resolution on Harvesting of Stocks Occurring Both Within and Outside of the Convention Area.

which cited both Articles II and XI of the CAMLR Convention and reaffirmed that Members should ensure that their flag vessels conduct harvesting of such stocks in areas adjacent to the Convention Area responsibly and with due respect for the Conservation Measures it has adopted under the Convention. (CCAMLR-XII, 1993 §4.22-24). As already noted, south of 60°S the existence of coastal states and maritime zones extending from those states is not recognised by all CCAMLR members or all ATCPs. Hence, attempting to apply the Agreement SFS&HMFS south of 60°S might open up sovereignty issues. Likewise, it is difficult to see how applying the Agreement SFS&HMFS to the case of South Georgia and the South Shetlands fisheries can be helpful in resolving that impasse.

d) Is CCAMLR a regional fishery organization?

At CCAMLR-XIV, Argentina and Chile put forward the proposition that CCAMLR is not a regional fisheries organization and that a structural amendment of the Convention would be required to transform it to such an organization (CCAMLR-XIV 1995 SCOI Report §2.43). The point is pertinent because the section of the Agreement SFS&HMFS which deals with compatibility of conservation and management measures sets out the duty of states:

Agreement on Straddling Stocks Article 7

2. Conservation and management measures established for the high seas and those adopted for areas under national jurisdiction shall be compatible in order to ensure conservation and management of the straddling fish stocks and highly migratory fish stocks in their entirety. To this end, coastal States and States fishing on the high seas have a duty to cooperate for the purpose of achieving compatible measures in respect of such stocks. In determining compatible conservation and management measures, States shall...

(c) take into account previously agreed measures established and applied in accordance with the (Law of the Sea) Convention in respect of the same stocks by a subregional or regional fisheries management organization or arrangement
(emphasis added)

In this context, CCAMLR is clearly a regional fisheries management organization, since it regulates harvesting of marine organisms within a

clearly delineated region by means of measures, as laid down in the CAMLR Convention Article IX. Chile reiterated that CCAMLR's brief was to:

...protect the entire ecological chain: krill, birds, seals, penguins, whales, and of course, fish. Thus, the scope of CCAMLR exceeds by far that of a mere fishing agreement, from which it is substantially different.

(CCAMLR-XIV 1995 §15.1)(emphasis added) .

It is difficult to understand why this difference should preclude CCAMLR from taking part in the provisions of the Straddling Stocks Agreement where it is applicable. It may be that the abrogation of sovereignty that is seen by some members as an inevitable consequence of such participation is the real issue at stake. In any case it may well behove other organizations to follow the example being set by CCAMLR.

7.7 NORTHERN HEMISPHERE MARINE ORGANIZATIONS

Several important developments in the Northern Hemisphere predated CCAMLR negotiations. These included the Marine Mammal Protection Act of the USA and the International Council for the Exploration of the Seas. This latter is discussed here in greater detail.

7.7.1 International Council for the Exploration of the Seas (ICES)

CCAMLR and the International Council for the Exploration of the Seas (ICES) display some superficial resemblances. Both are intergovernmental bodies which deal with marine fisheries in both high seas and seas under national jurisdictions, both have secretariats and scientific committees, and both promote and coordinate marine scientific research. In the 1970s, while CCAMLR's ecosystem standard was being written into its charter, ICES began the modern phase of its work as an intergovernmental marine science organisation: the provision of information and advice to Member Country governments and international regulatory commissions (including the European Commission) for the protection of the marine environment and for fisheries ((Floistad 1990; ICES 1995).

ICES is the world's oldest intergovernmental body whose concerns are with marine and fisheries science. It arose from proposals for an international cooperative scheme for marine scientific research in 1895. After preliminary meetings in 1899 and 1901 it was established in 1902 as a 'Gentleman's Agreement' by means of an exchange of letters between the eight governments concerned. There was no formally set up commission, but a Central Council was established in Copenhagen, where ICES still has its headquarters. The tasks of the council were to coordinate hydrographical and biological research of the oceans and publish the results of this research in its journal. Its work was financed by its member nations and its investigations included finfish, seals and whales. The Whaling Committee of ICES drafted the 1931 League of Nations Convention on Whaling (Birnie 1985: 109). Thus ICES was involved, albeit indirectly, in Antarctic resource management prior to CCAMLR.

A formal convention setting out ICES' brief was not signed until 1964; it entered into force in 1968. ICES's area of competence encompasses:

...the Atlantic Ocean and its adjacent seas and [is] primarily concerned with the North Atlantic.

(ICES 1964 Article 2)

ICES duties as described in its convention include:

The Council shall seek to establish and maintain working arrangements with other international organizations which have related objectives and co-operate, as far as possible, with them, in particular in the supply of scientific information requested.

(ICES 1964 Article 4)

There are similar clauses in the CAMLR Convention as noted above.

However, a major difference between the two bodies is that, while CCAMLR manages harvesting of marine living resources directly, ICES is an advisory body which, while it coordinates and gives advice to a number of fishery authorities, does not itself regulate any fishery. Thus there is one less step from the CCAMLR Commission's imposition and policing of recommended measures than there is in the case of ICES, where the advice has to be passed by a regulatory body before it can be applied. Another major difference is that the ICES area contains some of the world's most productive fishing grounds, while fisheries in the Southern Ocean have yielded less than 1% of the world marine fish catch over the last years.

Although naturally ICES membership is biased towards nations in the Northern hemisphere, the two organizations have a number of member and observer nations in common. Belgium, Canada, Finland, France, Germany, Netherlands, Norway, Poland, Russia, Spain, Sweden, United Kingdom, United States are ICES members, while Australia and South Africa have observer status in ICES.

The General Secretary of ICES stated:

Currently, the co-operation between ICES and CCAMLR is based on invitations issued by our Organisations to each other to send observers to our Annual Meetings and any particular scientific meetings that may be of relevance. We also ensure that information about the results provided by our scientific groups are disseminated to Working Groups on a 'need to know' basis.

(Hopkins pers. comm.).

He further stated:

ICES is in the process of developing Memoranda of Understanding with an extended group of co-operating international organisations, and CCAMLR is likely to be one that we would approach in the not too distant future.

Although, our geographical area of operations obviously do not overlap, there is a large degree of similarity in the disciplines and issues that we deal with.

(Hopkins pers. comm.).

These comments are borne out by ICES meetings of interest to CCAMLR. NAFO/ICES Symposium on the Role of Marine Mammals in the Ecosystem and on Fisheries and Plankton Acoustics, both held in 1995 were attended by CCAMLR scientists (SC-CAMLR-XIV, §11.26-27). Another area in which the aims of CCAMLR and those of ICES converge is on the problem of seabird interactions with fisheries. ICES held a symposium entitled Seabirds in the marine environment in late 1996. This had a Northern Hemisphere focus. Unfortunately there was no representative from CCAMLR to present a Southern Hemisphere point of view.

It is possible to envisage an advisory and coordinating role for CCAMLR outside its area of competence in the Southern Hemisphere similar to that of ICES in the north. This concept will be developed further in the last chapter.

7.7.2 The European Union and the Common Fisheries Policy.

The European Union (EU) acts on behalf of its member states in regard to certain delegated competencies by concluding agreements between itself and non-member nations and it participates in international instruments. The EU introduced a Common Fisheries Policy (CFP) in 1983, after many years of negotiations inspired by the dwindling of fish stocks and declarations of EEZs by coastal states. Spain and Portugal, nations with large fishing fleets, entered the EU in 1986, necessitating a revision of the CFP. Over one quarter of the EU catch for human consumption is harvested from international waters or those controlled by non-EU members.

Ecosystem considerations had not played an important part in the CFP. However, possibly through EU members involved in CCAMLR and through FAO meetings as already discussed, there is increasing exposure to such ideas. This is illustrated by a statement made at a meeting of EU ministers which dealt with the integration of fisheries and environmental issues. The report suggests that the Commissioners are importing into their fisheries policy the idea of the ecosystem approach:

...the European Commission attaches great importance [to]...the concept of the ecosystem approach. This approach is new and will need further thought and development... Basically, the Commission feels that the ecosystem approach, once clearly defined, should be fully applied to the management of marine ecosystems

(EU 1997) (emphasis added)

A role for CCAMLR in elucidating some of these ideas for the European Union is discussed under one of the schemas proposed in chapter 8.

CONCLUDING REMARKS

This chapter set out to show that CCAMLR is a leader, albeit little recognised, in setting standards for environmentally benign harvesting approaches. However, it is evident from the foregoing that the example set by CCAMLR is being followed by other bodies with interests in marine harvesting without perhaps a deep understanding of the implications of ecosystem approaches. There is a major gulf, however, between the theory and practice: what should be done to conserve ecosystems and at the same time maintain a reliable supply of protein and what actually happens in fisheries.

Nowhere does it appear to be fully recognised that management authorities are dealing with a living resource. Theory and statements of intention notwithstanding, all - including, regrettably, CCAMLR - behave as though ecosystems obey some kind of model devised by humans. There is hardly ever any recognition that the redundancy built into populations of living organisms, that allows for a certain amount of natural wastage and change, should be respected by setting very moderate harvesting targets. Instead, the principle of maximum sustainable yield is still not dead, continuing to underlie the thinking. To its credit, CCAMLR has begun to foster ecosystem consciousness and may help to clarify means of implementing these moderate approaches. At the same time it has to deal with the serious matters outlined above. Possible solutions are canvassed in chapter 8.

8 ANALYTICAL OVERVIEW AND CONCLUSIONS

INTRODUCTION

In this chapter we review the major questions posed in the opening chapter of the study and canvass possible answers. This will lead into a discussion of the present-day political powers of international fishery bodies to enforce compliance with measures and combat unregulated harvesting. A number of schemas for dealing with the Southern Ocean situation are presented for consideration. These are ranked in approximate order from narrowest to widest responsibility.

8.1 REVISITING QUESTIONS POSED IN THE STUDY

It will be recalled that the Introduction to the study identified questions to be addressed. These were set in a Kuhnian framework of paradigm change, where the paradigm under study was the ecosystem approach as espoused by the CCAMLR regime. We sought to examine the penetration and realization of the ecosystem approach within CCAMLR and in the wider world. Importantly, we wished to find out whether the success of the regime was due to the ecosystem paradigm.

We asked in what ways the ecosystem approach underlay the work of the CCAMLR Commission since its inception, and showed how several of the working groups, WG-DAC and WG-CEMP, were set up to deal directly with ecosystem questions. In addition, we showed in chapter 4 and 6 that low limits set on harvesting were aimed at protecting the marine ecosystems of the Southern Ocean. This answers in the affirmative the question of whether the ecosystem approach acted as a foundation for its work. Commission members indeed often invoked, and continue to invoke, the ecosystem approach by citing Article II, but this was not merely to reassure themselves that they were fulfilling the objectives of the Convention. The paradigm of the ecosystem approach formed a focus and binding force for the parties that often transcended considerations of sovereignty. We saw in chapter 7 that the adoption of the ecosystem approach has resulted in a regime that functions successfully as a regime

both independently and as part of the Antarctic Treaty System. Thus it has indirectly helped to strengthen the Antarctic Treaty System, a matter that was of concern to negotiators, as we pointed out in chapter 3.

The Convention's objectives, which as we recall were the conservation, including rational use, of Antarctic marine living resources, have not totally been achieved. As we saw in chapter 6, economic factors in the form of a lucrative fishery provided an impetus for harvesting that was conducted with neither the best interests of the ecosystem of the Southern Ocean nor that of the target species in mind.

Specific questions the study sought to answer were:

- Are there characteristics of the Southern Ocean that make it particularly suitable for trying out new methods of harvesting management?
- What was the role of the 'ecosystem approach' paradigm in establishing a system of harvesting management for the Southern Ocean?
- How has implementation of the ecosystem approach proceeded?
- Has the ecosystem approach as originally conceived undergone heuristic changes?
- Has the ecosystem approach been implemented as demanded by the Convention?
- What other factors have helped or hindered the achievement of the Convention's objectives?
- Has the example set by its implementation influenced ocean harvesting regimes elsewhere in the world?
- Are ecosystem approaches appropriate in situations where 'illegal' and unregulated harvesting is occurring?
- How can ecosystem approaches be used in conjunction with enforcement mechanisms to prevent or ameliorate ecosystem deterioration due to human action?

Below are some answers to the above questions.

8.1.1 Are there characteristics of the Southern Ocean that make it particularly suitable for trying out new methods of harvesting management?

Other than whaling and sealing, which took place in a series of episodes of heavy exploitation, the Southern Ocean has thus far supported only small fisheries. There are bio-oceanographic zones within it that allow it to be regulated to some extent as a discrete unit.

Its remoteness from centres of population meant that there were no coastal states to complicate matters. Moreover, where there were questions of sovereignty, these were mostly held in abeyance through the provisions of the Antarctic Treaty.

Thus the Southern Ocean provided a kind of laboratory for trialling management methods that it would have been difficult to introduce on top of existing fisheries in other parts of the globe. These matters are discussed in passing in all chapters.

8.1.2 What was the role of the 'ecosystem approach' paradigm in establishing a system of harvesting management for the Southern Ocean?

Chapter 3 showed that agreement in principle on this paradigm expedited the negotiations that might otherwise have stalled on issues of sovereignty. The ecosystem approach thus helped significantly in bringing the negotiations for a regulatory body for the Southern Ocean to a successful conclusion by serving as a focus that reconciled differing interests.

8.1.3 How has implementation of the ecosystem approach proceeded?

Once the CCAMLR Convention was ratified the machinery necessary to begin its implementation was established. We saw in chapter 4 that the first few years of the CCAMLR regime were characterised by procedural matters and stopgap measures to minimise overfishing. Because ways of implementing the ecosystem approach had to be invented while urgent

measures were needed to halt overfishing, the latter initially took precedence over the former. In some parts of the Convention area sovereignty problems and the demands of fishing members significantly hampered implementation of the ecosystem approach.

However, it was only two years after its commencement that work was underway to set up monitoring programs to fulfil the ecosystem approach. That this took place before formal groups had been established to set quotas for the stocks of living resources is clear proof of the importance attached to the ecosystem approach. The monitoring programs slowly began to bear fruit by allowing precautionary measures to be set for harvesting of key species.

8.1.4 Has the ecosystem approach as originally conceived undergone heuristic changes?

The regime has been characterised by much introspection and critical examination of practices as members endeavoured to keep in view the ecosystem paradigm underlying the CCAMLR Convention. Both through practical application and theoretical discussion, there has been considerable refinement and explication of the rather general ideas laid out in the CCAMLR Convention. However, the basic intent has not been obliterated.

Precautionary approach concepts that have grown up as offshoots of the ecosystem approach are now widely accepted as guiding principles for fisheries management in other parts of the world.

8.1.5 Has the ecosystem approach been implemented as demanded by the Convention?

The CCAMLR Commission has put in place many measures inspired by the ecosystem approach. The number and power of these measures increased from 1990 onwards. At the time of writing all sections of the Southern Ocean falling under the competence of CCAMLR where harvesting is taking place are covered by conservation measures. Thus the overriding ecosystem paradigm is helping to achieve the objectives as stated in the CCAMLR Convention. Possibly the most important of the Conservation Measures were those covering new and exploratory fisheries, as described in chapter 4.

8.1.6 What other factors have helped or hindered the achievement of the Convention's objectives?

Of all the political factors that helped in achieving the Convention's objectives, the cessation of the Cold War and the breakup of the former Soviet Union were probably the most significant. An immediate result of the latter was reduced fishing pressure on Southern Ocean stocks, as discussed in chapter 6.

Another important change was the greater international tolerance towards the Antarctic Treaty System. This was occasioned, firstly, by the admission of more members, some of which were its former critics. Secondly, the demise of the South African Apartheid regime led to reduced pressure in the United Nations on the Antarctic Treaty System.

These changes, discussed in chapter 6, allowed CCAMLR a greater participation in international fora on matters of ocean conservation and an incentive to pursue its ecosystem objectives. Chapter 7 showed that CCAMLR objectives have been extensively though not always explicitly been imitated by other fishing regulatory bodies.

The economics of harvesting and difficulties of processing Antarctic krill to form an acceptable human food have led to that industry being much reduced, to date, from the expected enormous harvests. As this species is a key prey item for animals in a significant area of the Southern Ocean, lack of harvesting pressure has helped to conserve those species that are dependent on it as a primary food source, thus fulfilling, even if only by

default, the precepts of Article II §3 of the Convention. In any case, the amount of krill caught has not thus far come close to the precautionary limits set.

Political factors that have hindered the achievement of CCAMLR objectives included the dispute, resolved in 1984, between two Southern Cone parties over sovereignty in the Beagle Channel. The continuing problems between Argentina and the United Kingdom over South Georgia and the South Sandwich islands have led to some harvesting practices that contravene CCAMLR regulations and the spirit of the Convention.

8.1.7 Has the example set by its implementation influenced ocean harvesting regimes elsewhere in the world?

A number of regulatory agreements, arguably beginning with the United Nations Law of the Sea, have incorporated ecosystem ideas that are traceable to concepts and procedures developed in CCAMLR. None has gone as far as CCAMLR in putting these ideas into practice. As already mentioned, precautionary approaches to harvesting that are closely allied to the ecosystem approach are widely accepted.

8.1.8 Are ecosystem approaches appropriate in situations where 'illegal' harvesting is occurring?

It has been amply shown in this study that application of ecosystem approaches relies on the most detailed scientific information available, obtained through programs of research and on data obtained from harvesting. Harvesters operating within the CCAMLR region but who do not comply with its conservation measures interfere with ecosystem approaches by reducing stocks of target species by unreported and unknown amounts. Acting outside the guidelines, they may remove undersized or immature fish or amounts of the spawning stock such that recruitment is reduced.

Moreover, such harvesting, by using methods that can result in major bycatch of nontarget fish species and of birds and mammals, likewise unreported, is a serious impediment to collecting scientific evidence on which to base wise management decisions. At the same time, the type of gear used may be doing physical damage to the habitat and there is the

possibility of unreported pollution by oil spills, ship wastes or loss of gear¹⁸².

Thus such 'illegal' harvesting makes nonsense of ecosystem approaches (as well as other forms of regulation) since they increase the already high level of uncertainty in making ecosystem assessments.

8.1.9 How can ecosystem approaches be used in conjunction with enforcement mechanisms to prevent or ameliorate ecosystem deterioration due to human action?

Some new international agreements have incorporated forms of words that are based on the CCAMLR conservation standard, even though within CCAMLR itself there is still much to be done before it can be said to have been achieved. The most serious obstacle to total conservation of Antarctic marine living resources is the unregulated harvesting already alluded to. The costs to the local ecosystems of such harvesting are difficult to measure but this is no reason to ignore them. It was pointed out in chapter 5 that CCAMLR's WG-EMM is contemplating assessing prey species other than krill. While this may yield data to help set quotas for the legal fishing, it is irrelevant to the illegal fishing.

The present rampant harvesting situation differs only in species and technology from the sealing, whaling and early finfish exploitation cycles in the Southern Ocean. Under these circumstances it is difficult not to be pessimistic about the future of Southern Ocean ecosystems. While harvesting was at a low level, it was feasible to run programs like CEMP, which peaceably increased the knowledge base about the krill-centric part of the Southern Ocean. The harvesting emphasis has changed from krill to finfish and the flouting of CCAMLR regulations threatens ecosystems through overfishing and bycatch of nontarget organisms, as discussed above.

CCAMLR thus faces a difficult impasse. While there is recognition that systems of protection for ecosystems are invalid unless coupled with effective enforcement of measures aimed at implementing those systems, positive action to realise those aims over the whole area has yet to be undertaken. This takes us back to the legal basis of international harvesting regulation. The following discussion re-examines these issues and offers some possible solutions.

8.2 REGULATORY POWERS OF INTERNATIONAL MARINE HARVESTING BODIES IN THE SOUTHERN OCEAN

Grotius wrote:

...if it were possible to prohibit...fishing, for in a way it can be maintained that fish are exhaustible, still it would not be possible to prohibit navigation, for the sea is not exhausted by that use.

(Grotius 1633: 43) (emphasis added)

Were Grotius alive today and see that his throwaway line is approaching reality in some parts of the ocean, it is possible that he would find a way to prohibit fishing. It now falls to bodies like CCAMLR to rise above problems of sovereignty and devise means of conserving at least a part of the oceanic ecosystems. Having pioneered an ecosystem approach to marine harvesting, CCAMLR now has an opportunity to take a leading role in devising means to stem illegal fishing. If it does not rise to this challenge, it may well become as discredited in the eyes of the world - and of future generations - as was the IWC during its darkest days. This can be averted.

We have examined a number of international instruments for controlling marine harvesting. Under the Law of the Sea, the remedy for unauthorised fishing in a coastal state's EEZ is in the purview of that state:

LOSC Article 73

Enforcement of laws and regulations of the coastal State

1. The coastal State may, in the exercise of its sovereign rights to explore, exploit, conserve and manage the living resources in the exclusive economic zone, take such measures, including boarding, inspection, arrest and judicial proceedings, as may be necessary to ensure compliance with the laws and regulations adopted by it in conformity with this Convention.

Where an area of high seas is under the governance of an international fishing agreement, the Vienna Law of Treaties provides that those states that are party to it are bound by its regulations, unless an objection

procedure has been invoked¹⁸³. Non-parties to such an agreement need take no heed of its provisions¹⁸⁴ unless a recognised customary rule of international law has been established¹⁸⁵. This can mean that fishing vessels bearing the flag of non-CCAMLR members may experience difficulty in landing fish caught in the CCAMLR area in ports of member states.

Where member states can be proved to have flouted the regulations of a convention to which it is party, the action to be taken depends on the provisions of that convention. It may amount to no more than censure or suspension of membership privileges. Under the CCAMLR Convention, the Commission is empowered to 'draw the attention' of all members to any actions by members that affect the implementation of the objectives of the Convention. A difficulty is that some states require that all citizens obey domestic legislation, including international treaties to which those states are party, no matter where those citizens are located¹⁸⁶, while other states require compliance only within their sovereign territories¹⁸⁷.

All CCAMLR members are party to the United Nations Law of the Sea (LOSC), even though not all have ratified it. The Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (Agreement SFS&HMFS) is not yet in force and only a few CCAMLR members have thus far ratified it. All are, however, party to the Convention on International Trade in Endangered Flora and Fauna 1973 (CITES).

There have been newspaper reports of re-flagging by of vessels belonging to CCAMLR members as a means of avoiding complying with regulations in place for fishing in high seas areas. If true, this contravenes the whole spirit of CCAMLR. Re-flagging, it will be recalled, is also forbidden under the FAO Draft Code of Conduct for Responsible Fishing.

There is a difficulty also in the legal niceties as to what constitutes 'fishing' and what constitutes 'innocent passage' or merely 'navigating' in a prohibited or restricted area¹⁸⁸. Unless a vessel is caught in flagrante delicto, obtaining proof of wrongdoing may be difficult. In any case, unless action against vessels is taken before they commence fishing, it is usually too late to prevent the mortality of their catch.

Lacking the powers of coastal states, international commissions such as CCAMLR, the IWC and the CCSBT can do little. The Agreement SFS&HMFS addresses the problem of stocks crossing boundaries between EEZs and high seas, but it has already been argued in chapter 7 that this applies in only small areas of the CCAMLR region.

Satellite surveillance would be ineffective, as vessels cannot be forced to carry vessel monitoring systems (VMS) on the high seas. Even if all ships had VMS and a vessel were detected in activities that were contrary to regulations, the long distances involved would give it ample chance to escape physical interception. International commissions generally do not have armed patrol vessels, which in any case would be illegal to use under present international law.

What of the role of the United Nations Law of the Sea (LOSC)? This overarching convention could be regarded as being more powerful than such regional bodies as those that hold sway in the Southern Ocean. However, both LOSC and the Agreement SFS&HMFS stipulate that regulation on a local level has to be carried out by regional organizations.

8.3 POSSIBLE SCHEMAS FOR HARVESTING MANAGEMENT IN THE SOUTHERN OCEAN

In suggesting any alternative schemas to guard Southern Ocean ecosystems against further depredation by harvesting and other human activities, we need to bear in mind the realities of operating in that area. All temperate ports are several thousand kilometres distant from the Antarctic mainland. Aircraft operations are dangerous due to severe weather conditions and the amount of fuel that is required to be carried even to reach some of the remote fishing grounds. Thus a cost-benefit exercise has to take into account the economic value of the fisheries, the cost of operation, and the diplomatic cost of taking action or, alternatively, of taking no action.

8.3.1 Schema 1 Continue with present arrangements

If no new action is taken in respect of the toothfish fishery, it is possible that within several years the fishery will either become much smaller as stocks are fished down to levels at which further harvesting is uneconomic, or it may even collapse. Unconfirmed newspaper reports tell of immature specimens being fished. If this is indeed the case the outlook for the fishery is not good. Furthermore, reportedly much of the illegal fishing is done by longlining, a method that carries with it the risk of bycatch of dependent species such as birds¹⁸⁹. Thus it follows that some action is needed.

Another possible consequence of taking no action is that the stocks of Patagonian toothfish and other species perhaps more important in the ecosystem may be depleted to such a degree that they are declared endangered species. If this occurs, such species will come under the protection of the Convention on International Trade in Endangered Flora and Fauna 1973 (CITES) which is a much larger body with greater powers of enforcement than CCAMLR has thus displayed. The whole matter will then pass out of CCAMLR hands and may well spell its end as a credible regime.

8.3.2 Schema 2 Enforce to maximum provisions allowed under CCAMLR Convention

This is an extension of the first schema. Until now, the full power of the CCAMLR Convention has not been applied, for reasons that have been discussed. Here are some suggestions to make the regime more robust.

Set and enforce national quotas

While we saw in chapter 2 that the ATCPs shrank away from making CCAMLR a regulatory body, there is nothing in the Convention that prevents it from setting national quotas and enforcing them. This would go some way towards controlling the amount of fish harvested.

Increase membership fees: user pays for environmental impact studies

CCAMLR membership fees should be increased to support the increased Secretariat activity advocated below. In particular, harvesters should pay a licence fee that is proportional to the estimated net economic value of the catch, instead of the token contribution that is at present collected. Part of this licence fee money should be expended on ecosystem assessment. It should be incumbent on potential harvesters to prove that their activity will not contravene CCAMLR conservation standards. There is obviously a role here for CEMP-style environmental impact studies, as foreshadowed in chapter 5.

Inspectors on all fishing vessels

There is nothing to prevent the requirement that all vessels harvesting in the CCAMLR area be crewed by international inspectors who can report on catches and on bycatch of nontarget species and some conservation measures to this effect already exist.

VMS on all fishing vessels

CCAMLR could make it mandatory that all vessels harvesting in the area be equipped with vessel monitoring systems. This schema, then, calls for much greater commitment on the part of CCAMLR members to policing the conservation measures than they have thus far displayed.

Secretariat enhancement

The Secretariat could be directed by the Commission to enhance its present role by becoming more proactive in liaising with other bodies and enlisting their aid in obtaining, processing and disseminating

information, while of course remaining strictly apolitical. Scientists already do this; their contributions have added to the CCAMLR database. Data emanating from the various scientific research programs must be compatible with that in the CCAMLR database; as pointed out in chapter 5, incompatible data are virtually useless for drawing meaningful comparisons and making extrapolations. The location of CCAMLR in Hobart makes it easy and logical to use the considerable modelling expertise of scientists in the local Antarctic community. In chapter 4, we described the Secretariat as an 'inconspicuous powerhouse'. It is time for it to step out of this obscurity and assume a higher profile as a focal point and coordinating body for Southern Ocean ecosystem studies, provided it is granted the right and financial support by the Commission to do this.

Increased role for NGOs

The role of nongovernment bodies, thus far minimal in CCAMLR, requires upgrading. Many of these bodies, for example IUCN and WWF, carry considerable weight in swaying public opinion and CCAMLR should use this capacity for publicising issues that require action¹⁹⁰. Alternatively, increased NGO representation on national delegations may be more effective.

8.3.3 Schema 3 Coastal, port and flag state controls

This is a further extension of the first schema, assigning a more proactive role to CCAMLR members as allowed under existing international law.

Coastal state controls

Under the provisions Law of the Sea, coastal states are empowered to exert controls over harvesting both within their Exclusive Economic Zones and by their nationals on the high seas. Depending on their domestic legislation, coastal states can control the number and types of fishing vessels that work in its Exclusive Economic Zone and set limits on the allowable catch. Provided domestic legislation is sufficiently robust, this is the most direct and effective way of controlling fisheries in areas under national jurisdiction.

Port state controls

Port states can police landed catches originating from outside their EEZ. If fish have been caught in contravention of an agreement to which the port state is a party, permission to land the catch may be refused. In order

to exert this kind of control it would be necessary to be able to prove the provenance of a particular harvest¹⁹¹. This can present difficulties unless an independent observer is on board to record precise locations where fish have been harvested. Many CCAMLR members indeed require it of their nationals that fishing vessels carry observers.

Member state citizen control

Enforcement of compliance with conservation measures on vessels flying the flag of a CCAMLR member depends on the domestic legislation of that state. As discussed earlier in this chapter, CCAMLR member states could be encouraged to pass domestic legislation, where such is not already in place, that all its citizens obey the precepts of CCAMLR while engaged in activities in the Southern Ocean, including all its conservation measures, and those parts of international law mentioned above regarding reflagging and exporting of endangered species. Coupled with this, if those states that have EEZs in the Southern Ocean resolve to establish a greater presence in those zones it will mean increased surveillance of the Southern Ocean as they traverse it on their way to their territories.

This schema, then, requires considerable political will on the part of CCAMLR members. Some¹⁹² have already shown themselves to be ready to exert the required controls, but much more concerted action is needed.

8.3.4 Schema 4 LME governance necessitating amalgamation of IWC-CCAMLR-CCAS

Given the limited capacity for action of all the regulatory bodies in the Southern Ocean it would appear that a more effective way to protect the Southern Ocean ecosystems would be for all these bodies: CCAMLR, IWC, and CCAS to amalgamate. This was foreshadowed by Barnes (1982) and also suggested by Kock (1994). This idea is also a variant on the theme of the Large Marine Ecosystem (LME) espoused by Sherman from 1986 (Sherman 1986; Sherman 1990). UNCED, discussed in chapter 7, chose to use EEZs as management units rather than LMEs and this is reflected in its Agenda 21, chapter 17. In the case of the Southern Ocean, the area covered by EEZs, whether disputed or undisputed, is very small.

What is suggested here in the first instance is a loose association between for the two principal organisations, CCAMLR and IWC, in which

scientists cooperate in ecosystem research involving whales. This is merely a continuation of a trend towards cooperation evinced in recent years. Such an arrangement should at least in the beginning allow considerable autonomy for bodies that have very different philosophies in spite of the overlap of members and interests. It is to be hoped that such collaboration would lead to increased trust and a willingness to share knowledge and resources, leading eventually to a possible amalgamation.

The next - or concurrent - sensible step would be to declare a Southern Ocean LME management zone covering the area covering the existing whale sanctuary, described in chapter 6. This could be regulated cooperatively and jointly by the CCAMLR, IWC and CCAS, using the CCAMLR Convention Article II ecosystem standard as its guiding principle¹⁹³.

The position of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) in this schema would have to be negotiated, as the highly migratory Southern bluefin tuna cross the boundary of the CCAMLR region.

Nothing in the Law of the Sea nor in the Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks prohibits the implementation of LME governance. Constraints are political, not legal, as pointed out by Belsky (1986).

8.3.5 Schema 5 Joint sovereignty of CCAMLR area north of 60°S

Eliminating the concept of high seas in the CCAMLR area could be achieved by dividing it into several regional management units under the leadership, as far as practicable, of states that have undisputed or shared sovereignty north of 60°S. Responsibility for managing the fisheries would then devolve on sovereign states, which could patrol and police their designated areas. This would probably mean that CCAMLR would become a 'regional fisheries body' in the wider sense, perhaps comparable to the EU. It would then be possible for arrangements to be made under the Agreement Straddling Fish Stocks and Highly Migratory Fish Stocks for stocks that straddle the CCAMLR boundary, sectional boundaries and the adjacent high seas.

The notions of sovereignty prevailing in the Antarctic Treaty area are enshrined under Article IV, together with the freedom of the seas in Article VI of the Antarctic Treaty. Under the schema now proposed, both of these articles require to be re-drafted.

Possible wordings of such redrafted articles follow.

Antarctic Treaty proposed new Article IV:

All parties renounce all rights to individual territorial sovereignty in Antarctica. Sovereignty in Antarctica is held jointly by all parties to this Treaty in a communal Southern Ocean EEZ.

If the Antarctic Treaty Article IV is amended as suggested, then Article IV of the CCAMLR Convention can stand.

Antarctic Treaty proposed new Article VI:

No states shall have access to the living resources of the high seas south of 60°S unless so licensed by the states party to the Convention on the Conservation of Antarctic Marine Living Resources.

A corresponding article would need to be appended to the CCAMLR Convention:

CCAMLR Convention proposed new article:

No states shall have access to the living resources of the Convention area unless so licensed by the states party to this Convention

An additional article should be inserted in both the CCAMLR Convention and the Antarctic Treaty requiring all parties to the Treaty and to the Convention also to accede to the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol).

The joint Antarctic Treaty-CCAMLR body created by this schema would acquire unto itself more wide-ranging powers to control fishing within the area than have been exercised to date. For example:

- All harvesting would be carried out in the spirit of Article II of the CCAMLR Convention, minimising damage to the marine environment and limiting bycatch
- Vessels fishing in the area would all be required to be licensed.
- Quotas would be allocated to nations based on TACs set by CCAMLR
- All vessels would report catches and bycatches in accordance with the appropriate CCAMLR conservation measures.
- All vessels would be required to carry vessel monitoring systems.
- Infringements would be subject to fines, impoundment of catch and vessels and withdrawal of licences
- Port controls would be exercised by member states to prevent landing of illegal catches
- Re-flagging of member states' vessels to evade the provisions of the regulatory body would be prohibited; where re-flagging is proven heavy punitive measures would be taken
- Each member state would contribute to the financing of one or more patrol vessels and aircraft, as well as purchase and maintenance of equipment based at the CCAMLR Secretariat for tracking vessels carrying VMS

8.3.6 Schema 6 Dissolution of CCAMLR as regulatory body

Under the existing arrangements, CCAMLR has not exerted sufficient power to deter illegal fishing. However, its various working groups have studied the ecosystems and the fisheries of the Southern Ocean probably more thoroughly than any other in the world. The level of expertise is comparable to that evinced by the committees and working groups of ICES, which advises fisheries regulatory bodies in the Northern Hemisphere.

Reconstitution of CCAMLR as the Southern Ocean equivalent of ICES would require that regulatory bodies be set up with responsibility for all living resources and ecosystems of the Southern Ocean.

The area south of 60°S, the Antarctic Treaty region, could be held under a joint international mandate by all the Antarctic Treaty Consultative Parties. It appears possible that a secretariat for the Antarctic Treaty will be established before 2000, its most likely location being a Southern Hemisphere country. This secretariat could be responsible for

administering the fishery by setting quotas and collecting license fees while marine research is coordinated by CCAMLR¹⁹⁴.

These rather utopian changes assume that international law will allow such further enclosure of oceans. Furthermore, it is assumed that all CCAMLR members and ATCPs would accede to such an arrangement, which will require amendments to both the Antarctic Treaty and the CCAMLR Convention.

Such regional management units would solicit scientific advice from the CCAMLR-ICES. IWC, CCSBT and CCAS could also benefit from this new CCAMLR body, which would coordinate all ecosystem research in the Southern Ocean. FAO would retain its advisory role and all other arrangements would remain the same, with the present Antarctic Treaty provisions remaining in place.

8.3.7 Schema 7 Declaration of entire CCAMLR area as a marine protected ecosystem, jointly administered by present Antarctic Treaty parties and coastal states

Given that the total harvest obtained from the Southern Ocean has in the last several decades not exceeded 0.5% of the total world marine fish landings, it would appear that no great economic harm would ensue were the Southern Ocean fishery closed down entirely. Neither has it come to pass, as many expected, that human nutritional protein shortages would be made good by exploitation of the Southern Ocean's krill resources. It is not possible to predict how long the toothfish harvest will continue at its present high level, but this argument assumes that this phase will be of short duration.

It has long been the goal of Antarctic NGOs to have Antarctica declared a world park. Marine parks are gaining credibility as refugia for organisms and as reserves for biodiversity. The IWC declared a whale sanctuary in the Indian Ocean in 1979 and in the Southern Ocean in 1994; this is a good example for CCAMLR and the Antarctic Treaty parties to follow. While monitoring and biological studies should continue, the constitution that sets up such a park should make it impossible to harvest under the guise of scientific research.

8.3.8 Schema 8 United Nations - FAO takeover

Although United Nations' involvement in Antarctic matters has long been eschewed by the Antarctic Treaty parties, there has been a strong dialogue between FAO and CCAMLR since 1980. The insistence of developing nations on a share in Antarctic living resources has abated since krill lost its appeal as a cheap protein source for human consumption¹⁹⁵, while the prospect the exploitation of Antarctic mineral resources receded after the signing of the Madrid Protocol. The United Nations appears to have softened its disapproval of the exclusivity of the Antarctic Treaty System since the latter has apparently become open to wider membership. It was shown in chapters 1 and 7 that United Nation instruments, including FAO, now recognise the validity of an ecosystem or precautionary approach to marine harvesting.

This then might be an appropriate time to hand the problem of the wise governance of the Southern Ocean over to the United Nations, under the auspices of the FAO. The 'Question of Antarctica', on the agenda for the United Nations General Assembly in 1996¹⁹⁶, raised the problems of policing the Southern Ocean inside and adjacent to the Antarctic Treaty area.

The Southern Ocean could be declared a Marine Mandated Area as laid down for terrestrial regions under the Treaty of Versailles¹⁹⁷. This could be administered under the United Nations through the International Marine Organisation. As well as preventing illegal harvesting, oil and waste discharges could then be monitored. Enforcement under the United Nations could take the form of the maritime equivalent of a United Nations peacekeeping force. Such a force would be essential in areas of uncertain or disputed sovereignty.

This last schema might be a difficult one for the present treaty parties to accept, given the historical schism between the Antarctic Treaty System and the United Nations. It may well be possible to work out a compromise where CCAMLR and FAO experts work more closely together. A further widening of CCAMLR membership might raise its profile and increase its standing in the global community. Certainly the opportunity is there in the shape of the Agreement SFS&HMFS, as discussed above.

8.3.9 Discussion

It must be stressed that all the schemas are suggestions only, and not prescriptive. We are investigating possibilities, however unlikely they may appear at first reading. The above schemas can be roughly classified as follows:

| | Brief description | Likely result |
|----------|--|--|
| Schema 1 | Continue with present arrangements | Disappearance of fishable stocks Degradation of Southern Ocean ecosystems |
| Schema 2 | Enforce to maximum provisions allowed under CCAMLR Convention | Greater control over removal of stocks and protection of ecosystems Better integration of scientific research; Increased role of CCAMLR Secretariat |
| Schema 3 | Coastal, port and flag state controls | Greater control over removal of stocks and protection of ecosystems Deterrence of illegal harvesters |
| Schema 4 | LME governance - amalgamation of IWC-CCAMLR-CCSBT-CCAS | Greater control over removal of stocks and protection of ecosystems Possible problems with enforcement |
| Schema 5 | Joint sovereignty of CCAMLR area north of 60°S under all CCAMLR members | Greater control over removal of stocks and protection of ecosystems Possible unwillingness of states to relinquish sovereignty |
| Schema 6 | Dissolution of CCAMLR as regulatory body: Southern Ocean ICES role | Greater control over removal of stocks and protection of ecosystems Possible problems with enforcement |
| Schema 7 | Declaration of entire CCAMLR area as a marine protected ecosystem, jointly policed by present ATCPs and coastal states | Greater control over removal of stocks and protection of ecosystems Enforcement by coastal states and ATCPs assuming rights and obligations of coastal states |
| Schema 8 | United Nations - FAO takeover: marine mandated region | Greater control over removal of stocks and protection of ecosystems Enforcement by UN 'Peacekeeping force' |

It can be seen that Schemas 4-8 represent a more-or-less progressive decrease in the power of CCAMLR and the Antarctic Treaty Consultative Parties, with Schema 8 providing for total relinquishing of power. It should be noted that both schemas 6 and 8 provide an important role for CCAMLR as a scientific advisory body.

We have seen that a major obstacle to CCAMLR asserting its conservation standard in Southern Ocean ecosystems is the complex issue of sovereignty in the region. Palmer (1982: 271) wrote: 'In international law, sovereignty casts a long shadow'¹⁹⁸. It follows that it will require a change of attitude on that issue on the part of members before more progress can be made. Barnes, alluded to in chapter 3, was also of this opinion:

Until the claims of individual states are eliminated, the establishment of a sound management scheme appears to be impossible. In the course of a transition to some form of international control at some time in the future, claimants should voluntarily drop their claims and act in concert with the remaining Treaty Parties and other representative countries to serve as trustees of Antarctica for the international community.

(Barnes 1982: 274)

It will also be necessary to abandon any lingering exclusivity on the part of the Antarctic Treaty System. These attitudinal changes require that greater trust be developed both among members and the wider world as represented by the United Nations.

The foregoing schemas assigned a minimal role to CCAMLR's ecosystem approach. The conclusions that follow review what that role has been, how it developed and what might be its future.

8.4 FINAL REMARKS: HAS CCAMLR WORKED?

Can it be said, then, that CCAMLR is achieving its objectives of conservation of Antarctic marine living resources using an ecosystem standard? Viewed with hindsight, were these objectives realistic?

It was stated at the beginning of this study that there was no simple answer to the question of whether CCAMLR is 'successful'.

It is astonishing that CCAMLR came into being at all. It was founded while major powers were still in the grip of the Cold War, and under conditions of disapprobation from some less developed nations. Human dietary protein shortages prompted interest in harvesting of Southern Ocean species. This interest focussed particularly on Antarctic krill, of which there was popularly assumed to be a large excess due to a reduction in the number of baleen whales. The fear of massive harvesting of krill, at that time thought to be the central organism of the Southern Ocean food web, and the effects of this on the ecosystem provided the initial impetus for the setting up of the regime by the Antarctic Treaty Consultative Parties.

While CCAMLR has had a chequered history thus far, the underpinning philosophy of the ecosystem approach has prevailed. With the expansion of its influence northwards, and the closing of loopholes in the application of its measures, CCAMLR is poised to embark on its mature phase.

Of the schemas outlined above, those that are most likely to succeed, given the political and practical realities, is probably some combination of Schema 2 and 3. Since CCAMLR operates quite well as an organization, totally discarding it now appears counterproductive. If the structures set in place can be made to function better and compliance of a larger number of nations can be assured under the umbrella of the Law of the Sea and its attendant agreements and codes, there is no reason why CCAMLR cannot go on from strength to strength.

One mechanism that would help to close loopholes alluded to above is that nationals of states that are CCAMLR members be required to abide by CCAMLR regulations while harvesting anywhere in the CCAMLR

region. Reflagging should be outlawed, as should the disposal of illegally caught fish through ports of states that are not CCAMLR members.

What can be said is that through the interaction of its members by way of the Commission, its Scientific Committee and the various working groups, and the Secretariat, a system of good practice has been set in place for the Southern Ocean which other regulatory bodies have seen fit to imitate. CCAMLR now functions well as a body in its own right. The epistemic community of scientists found focus for their work particularly through the ecosystem monitoring programs and the study of interactions of harvesting with other components of Southern Ocean ecosystems.

There is no doubt that CCAMLR is both a regulatory body and a conservation body, as it exerts its regulations by way of conservation measures whose purpose is directly or indirectly to protect ecosystems in its area of competence. This makes it still a rarity in fishery management.

The illegal and unreported harvesting in the Southern Ocean that has so exercised the CCAMLR regime in recent times has paradoxically had the effect of inspiring the members to give greater thought to the enforcement of measures to implement the ecosystem approach. While it would be ridiculous to assert that illegal harvesting is a 'good thing', in the longer term it may well prove a salutary lesson for those who think that goodwill and cooperation by themselves are sufficient.

The last section finished by reflecting on the small role played by ecosystem approaches in the suggested schemas for ocean harvest governance. However, this need not remain so: the fact that it is gaining acceptance in the wider world suggests a way forward. Just as CCAMLR owed its birth to the negotiating parties' embracing the ecosystem paradigm, the ideas that have emerged from CCAMLR's work may act as a unifying mechanism for harvesting nations to accept effective regulation.

The uncertainty inherent in ecosystems ought to be respected. This can be done by:

- **using ecosystems lightly**

while

- **obtaining the information needed to understand how the use of ecosystems is changing them**

In this context, 'using ecosystems lightly' means:

- Set moderate TACs based upon CCAMLR decision rules
- Change TACs in response to information from harvesters if necessary during the harvesting season¹⁹⁹
- Minimise bycatch of species other than the target species
- Avoid the use of fishing practices that irreversibly damage or alter the living and nonliving components of ecosystems
- Regulate use such that functional and numerical relationships among ecosystem components are maintained

CCAMLR is not by any means doomed. Illegal harvesting practices are a world-wide problem. While they are serious and must be dealt with, the fact that they are occurring in the CCAMLR region should not be regarded as a sign that CCAMLR cannot succeed. At the very least, CCAMLR is heading in a direction that promises the hope that ocean ecosystems will be saved from adverse depredation by humans: it has shown and continues to show the way in this. This not only assures its survival as a regime, but actions such as those suggested above will strengthen it and increase recognition of its important and responsible role in the conservation of Southern Ocean ecosystems. CCAMLR itself will no doubt continue to promote the evolution of ever better methods of ecosystem assessment. This evolution would be greatly enhanced with benefits for all concerned if other marine bodies take part cooperatively with CCAMLR in the research required to underpin those methods.

An obligation is engendered on CCAMLR members to share the ecosystem approach philosophy with other users of the oceans and urge them to adopt it. The general acceptance, through its example, of the ecosystem paradigm may be CCAMLR's most lasting achievement.

¹ The term harvesting is used in this study to mean removal of marine organisms by humans from the sea. Thus it includes fishing, which denotes directed harvesting activities aimed at a particular species or carried out in a specific area.

² Ranking of the Antarctic krill fishery vs other principal marine species caught worldwide (FAO Yearbook of Catches and Landings 1980-1992)

| Year | Rank |
|------|------|
| 1980 | 24 |
| 1981 | 25 |
| 1982 | 21 |
| 1983 | 40 |
| 1984 | 63 |
| 1985 | 50 |
| 1986 | 24 |
| 1987 | 30 |
| 1988 | 32 |
| 1989 | 31 |
| 1990 | 34 |
| 1991 | 53 |
| 1992 | 44 |

³ The term 'ecosystem approach' first occurred in the scientific literature dealing with water quality and fisheries of the Great Lakes in North America in the late 1960s (Bell 1994; Bocking 1994; Caldwell 1994; Kay and Schneider 1994). Since the establishment of the CCAMLR Commission, it has been used as an umbrella term to cover its activities where they take place in an ecosystem context.

⁴ This is close to Krasner's definition of regimes: '...sets of implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations' (Krasner 1982: 186).

⁵ Haas (1992, 1993) also stresses the importance of paradigms and epistemic communities.

⁶ The word *system* means 'organised whole', and *ecology* is 'the branch of biology which treats of the relation between organisms and their environment' (Macquarie Dictionary).

⁷ The Southern Ocean is not precisely defined cartographically. Its northern boundary is sometimes cited as being the Antarctic Polar Front. The FAO Southern Ocean program described below used the 45°S line of latitude while oceanography atlases tend to use the 20 or 30° S line of latitude as the northern boundary.

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- ⁸ There are several small communities on the Antarctic Peninsula which might be called semi-permanent, but they do not support a fishing industry.
- ⁹ Near Heard Island waves of 17 metres have been observed.
- ¹⁰ Transparent gelatinous tunicates that can occur in large blooms.
- ¹¹ Crustacea belonging to Subclass Copepoda, Order *Calanoida*.
- ¹² Small shrimp-like crustacea of Family EUPHAUSIIDAE, generally called krill, from a Norwegian term meaning whale food. There are some 80+ species, of which seven are found in the Southern Ocean. These belong to two genera: *Euphausia* and *Thysanoessa* (Fischer and Hureau 1985: 72).
- ¹³ *Euphausia superba*. Individual animals can attain maximum length of 6-7 cm. and weigh 1 gm.
- ¹⁴ Conversion by plants of carbon dioxide and energy into more complex compounds; most common form of primary production is photosynthesis utilising sunlight.
- ¹⁵ Phytoplankton is composed of microscopic plants, mostly species of algae, that carry out photosynthesis. Phytoplankton seasonally occurs in huge blooms, some measuring many kilometres in area; these blooms are unevenly distributed over the Southern Ocean. Algal blooms are grazed by zooplankton, including krill, whose numbers and biomass then also increase enormously.
- ¹⁶ Also called the shelf zone, as it extends over the continental shelf.
- ¹⁷ *Euphausia crystallorophius*, which nonetheless forms a major food base for many predators, replacing *E. superba* in this respect in this zone.
- ¹⁸ *Pleuragramma antarcticum*
- ¹⁹ Untrammelled access to the high seas for the purposes of navigation has from before Roman times been regarded as an indisputable right (Grotius 1633: 7-8). Access to the resources of the sea were similarly open to all (Fulton 1911: 2-3). Articulation of the rights of states in the high seas was inspired by opposition to the legitimacy of two Papal Bulls which divided the world's seas between rival states Spain and Portugal. Proclaimed in 1493, the division was formalised by the Treaty of Tordessilas of 1494 and its effect was to bar access to remote colonies to traders from other states. Grotius' treatise, entitled 'The freedom of the seas or the right which belongs to the Dutch to take part in the East Indian trade' and also known as 'Mare Liberum', was published anonymously in 1609. It had been commissioned by the Dutch East India Company to justify its activities in oceans that had been declared Spanish or Portuguese according to the Treaty of Tordessilas (Fulton 1911: 350).
- ²⁰ Grotius extended the freedom of navigation of the seas to the freedom to fish:
...the sea is common to all, because it is so limitless that it cannot become a possession of any one, and because it is adapted for the use of all, whether we consider it from the point of view of navigation or of fisheries...
(Grotius 1633: 28)

He noted the possibility that fish in the sea might be used up:

...if it were possible to prohibit...fishing, for in a way it can be maintained that fish are exhaustible, still it would not be possible to prohibit navigation, for the sea is not exhausted by that use.

(Grotius 1633: 43) (emphasis added)

²¹ 1958 Geneva Convention on the High Seas defined high seas as:

...all parts of the sea that are not included in the territorial sea or in the internal waters of a State (Article 1).

Article 2 sets out rights of states on the high seas for coastal and non-coastal stating:

(1) Freedom of navigation;

(2) Freedom of fishing;

²² Antarctic fur seal, *Arctocephalus gazella*

²³ *Mirounga leonina*

²⁴ Part of the reason for this was that the then newly founded United States had no foreign exchange credit and little cash reserve; thus seal skins served as currency in their trade with China (Brown, Brownell et al. 1974 : 1).

²⁵ Peak harvesting of elephant seals occurred in the 19th century, their oil used for lubrication in textile manufacture.

²⁶ The sperm whale, *Shyster catodon*, is the largest of the toothed whales.

²⁷ Baleen whales

| Common name (English) | Scientific name |
|-----------------------|-----------------------------------|
| Blue whale | <i>Balaenoptera musculus</i> |
| Fin whale | <i>Balaenoptera musculus</i> |
| Humpback whale | <i>Megaptera novaeangliae</i> |
| Sei whale | <i>Balaenoptera borealis</i> |
| Minke whale | <i>Balaenoptera acutorostrata</i> |

²⁸ Sperm whales yielded a high quality lubricating oil which was also used for making candles, while baleen whales were prized for their oil, baleen and, later, their meat.

²⁹ By the Norwegian Svend Foyn in the 1860s.

³⁰ Sperm whales did not figure in the BWU system.

³¹ Maximum Sustainable Yield (MSY), defined as '...the greatest yield or catch that can be removed from a resource every year without the impairing the ability of the resource to produce at that level and renew itself.' (Australia 1991: 191), had been a central tenet of fishery management. It was beginning to fall out of favour in the 1970s (Larkin 1977; Cushing 1988: 214).

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- ³² McHugh (1974) wrote that the BWU was an illogical management unit and the limit set by the IWC was always too high; even setting it at the MSY for blue whales - 300 BWU - would have been too high, given that these had been overfished even prior to 1946.
- ³³ Whale oil was used for the production, inter alia, of margarine, a butter substitute.
- ³⁴ D.G. Chapman, K.R. Allen, S.J. Holt; Gulland joined them (Cushing: 159).
- ³⁵ Inspired in part by the 1972 Stockholm Plan of Action; see below.
- ³⁶ The New Management Procedure was nonetheless a step forward, if only for its being based on management stocks rather than BWU.
- ³⁷ Underreporting by a factor of 10 in some cases.
- ³⁸ Little is known of pelagic species; there may be large stocks of myctophids.
- ³⁹ Statistical Bulletins refer to nominal catches, that is, landed catches as reported converted to live weight. Thus the figures correspond to the live weight of the animals as they were caught.
- ⁴⁰ Intergovernmental Oceanographic Commission (IOC), founded in 1946 under United Nations Educational, Scientific and Cultural Organization (UNESCO).
- ⁴¹ Founded in 1946 as the International Union for the Protection of Nature, it became the International Union for the Conservation of Nature in 1957. Now known as the World Conservation Union, but still referred to by the acronym IUCN, it coordinates the conservation work of a large number of scientific and conservation organizations and government agencies. IUCN has been influential in the drawing up of a number of international treaties dealing with living resources whose influence extends to the Southern Ocean. IUCN also publishes a Red Data Book series in which are listed species considered to be at risk, the blue whale being one such species.
- ⁴² Roberto Guyer used this term in a lecture given in The Hague; Zegers (1978) took it up.
- ⁴³ The development of space technology gave rise to the notion of 'spaceship earth' and a consciousness of the finiteness of its resources. However, a major increase in public environmental consciousness began in the 1960s following the publication of Carson's 'Silent Spring' (1962) and the writings of ecologists such as Ehrlich from the early 1970s. Hardin's gloomy expose of the 'tragedy of the commons' (Hardin 1968), added to the consciousness of the need to use the earth's resources more wisely. The United Nations Conference on the Human Environment, held at Stockholm in 1972, led to the Stockholm Declaration, one of the first encodings of the new thinking that helped to set the tone for the 1970s. Lovelock's Gaia hypothesis defined the earth (Gaia) as the largest living system and proposed means for sustaining it.
- ⁴⁴ The reason for Norway's claim having no clearly defined northern boundary was related to the sovereignty of its Northern Hemisphere Arctic claims.
- ⁴⁵ Coastal states are those that have a coastline from which sovereignty extends over an adjacent belt of sea - the territorial sea.

⁴⁶ Japan passed domestic enabling legislation during 1982 ; the Agreed Measures became effective 1 November 1982.(Bush 1982 v.1 : 168-9; CIESIN 1997).

⁴⁷ Some fishing nations were concerned that designation of marine SSSIs would hamper fishing, and it is suggested that they regarded CCAMLR rather than the Antarctic Treaty as the appropriate authority for setting up SSSIs.

⁴⁸ Entering into effect 1998

⁴⁹ Another commentator remarked that the depletion of North Atlantic seal populations caused sealing fleets to direct their attentions to the Antarctic.

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| Common name (English) | Scientific name |
|------------------------|---------------------------------|
| Southern elephant seal | <i>Mirounga leonina</i> , |
| Leopard seal | <i>Hydrurga leptonyx</i> , |
| Weddell seal | <i>Leptonychotes weddelli</i> , |
| Crabeater seal | <i>Lobodon carcinophagus</i> , |
| Ross seal | <i>Ommatophoca rossi</i> , |
| Southern fur seals | <i>Arctocephalus</i> sp. |

(CCAS, Article 1§2)

⁵¹ Namely, Crabeater, Weddell, Ross, Leopard. Small numbers of seal were killed for sledge dog food.

⁵² In 1988 a meeting was held to review the operations of CCAS. This reported that numbers of seals caught was decreasing from the previous decade because of the replacement of dogs sledges by motorised transport (Heap 1994: section 1.9.4).

⁵³ The Southern Cone is that part of the continent of South America which lies south of about 10°S, thus including part of Brazil, most of Chile and all of Paraguay, Uruguay and Argentina (Kelly and Child 1988: 3).

⁵⁴ The so-called Hughes doctrine consisted of two statements by Charles E. Hughes, Secretary of State, in which the United States attitude towards claims of sovereignty in the Antarctic were spelled out (Hall 1989).

⁵⁵ Marine Mammal Protection Act (MMPA) stated in respect of marine mammals:

...the primary objective of their management should be to maintain the health and stability of the marine ecosystem.

(MMPA Sec. 2§6) (emphasis added)

It provided for the reducing to levels approaching zero the incidental killing or injury of marine mammals during commercial fishing operations. MMPA was also empowered to impose strictures on parties contravening its provisions; penalties included fines and forfeiture of vessels. Trade in products derived from marine mammals was restricted, the MMPA prohibiting, except under some conditions:

...any person to use any port, harbor, or other place under the jurisdiction of the United States for any purpose in any way connected with the taking or importation of marine mammals or marine mammal products;

(MMPA Sec.102§2(B))

Hofman (1988) wrote that the MMPA was the 'first law anywhere in the world to require that management be approached from an ecosystem perspective'.

⁵⁶ Pelly Amendment 1973; Packwood-Magnussen Amendment 1979

⁵⁷ An alternative point of view suggests that the influence of the IWC was greater than indicated in this summary, particularly by the experience of the fishing nations. It led, it is suggested, to the adoption of 'conservation' including rational use, consensus voting, national allocation of catch being done outside the Commission and the restriction of membership.

⁵⁸ Greenpeace was originally founded in 1970 as the Don't Make a Wave Committee to protest against nuclear weapons testing. (Hunter 1978 p. 14); it was renamed Greenpeace in 1971. In 1975 Greenpeace began its 'save the whale' campaigns, which caught popular imagination. The perceived plight of the whales came to symbolise for many the imminent destruction of the earth's living resources. Williams (1993) describes the influence of Greenpeace on Antarctic policy.

⁵⁹ Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar) Entry into force: 21 December 1975

⁶⁰ The United Nations Conference on the Human Environment, held at Stockholm in 1972, led to the Stockholm Declaration.

⁶¹ Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972. Now known as the London Convention. Entry into force:

⁶² Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973. Entry into force: 1 July 1975.

⁶³ The International Convention for the Prevention of Pollution from Ships 1973/78 (MARPOL) Entry into force:

⁶⁴ For example, the Third United Nations Law of the Sea Conference, with admittedly many more parties, had held numerous sessions since 1973 which continued until its signing in 1982. The Law of the Sea came into force in 1994. CCAS had taken 6 years and the Agreed Measures 18 years to come into force.

⁶⁵ Many coastal states claimed 200 nautical mile (n.m.) offshore zones adjacent to their coasts, measured from the same baselines that were used to determine the landward borders of the territorial sea. Such zones are most usually referred to as Exclusive Economic Zone (EEZ), but also as fishing zones or maritime zones depending on the degree of control exercised over the area by the coastal state. Chile, by declaring such a zone in 1947, was

the first state to do so. Hollick (1977) averred that the choice of width - 200 nautical miles was based on a misconception,

⁶⁶Dr Laws had slides available because he foresaw that such an exposition was a possibility. When he produced them, Zegers reportedly remarked: 'You British are always prepared!' (Heap pers. comm.; Laws pers. comm.).

⁶⁷Presumably animals here means mammals, although the Spanish word for mammal is *mamífera*.

⁶⁸The Informal Composite Negotiating Text from the Sixth Session of the Third Conference on the Law of the Sea (1977) was available to delegates (Kerry pers. comm.).

⁶⁹France here flagged its concern over sovereignty in the waters around its subantarctic islands.

⁷⁰On 11 March 1978

⁷¹The New Principles Project was sponsored in part by IUCN and the World Wildlife Fund (WWF)⁷¹. Workshops held in the USA in 1974 and 1975 devised a set of New Principles for the conservation of wild living resources (Holt and Talbot 1978). A statement from the workshops was made available to the ongoing Law of the Sea negotiations and, according to Talbot (1996: 2) changed its management emphasis 'from a single-species to a more ecosystem-oriented approach'. Talbot further asserts that the New Principles were incorporated into CCAMLR, although other commentators have not noted this.

The essence of the New Principles was:

...a sophisticated approach to conservation that takes into account the ecosystem as well as the selected species or stocks considered to have special value at some particular time. Ecologically simplistic concepts such as maximum sustainable yield are not adequate for that purpose.

(Holt and Talbot 1978: 7).

⁷²The New Principles were:

1. The ecosystem should be maintained in a desirable state such that
 - a. consumptive and nonconsumptive values could be maximised on a continuing basis,
 - b. present and future options are ensured, and
 - c. risk of irreversible change or long-term adverse effects as a result of use is minimised.
2. Management decisions should include a safety factor to allow for the fact that knowledge is limited and institutions are imperfect.
3. Measures to conserve a wild living resource should be formulated and applied so as to avoid wasteful use of other resources.
4. Survey or monitoring, analysis, and assessment should precede planned use and accompany actual use of wild living resources. The results should be made available promptly for critical public review. (Holt and Talbot 1978: 13-14)

⁷³It will be recalled that the opening statements were made in a public session.

⁷⁴This effort was all the more heroic since it took place in the era before word processors were widely available.

⁷⁵This was discussed by the SCAR Working Party on Fish Biology (BIOMASS 1979:24).

⁷⁶ The Antarctic and Southern Ocean Coalition (ASOC) formed in response to the wishes of the ATCPs to deal with a single environmental action group rather than dozens (Kerry pers. comm.).

⁷⁷ Friends of the Earth (FOE), founded in 1972, began its association with Southern Ocean matters when it addressed a letter to the delegates at the first CCAMLR negotiations urging that 'Antarctica be declared an International Natural Wilderness Area', and expressing fear that 'economics and politics will predominate over concern for the

⁷⁸ The Preamble of the Informal Composite Negotiating Text of the Law of the Sea Conference is solely concerned with matters of international law, but interestingly the Preamble of the 1982 Law of the Sea Convention (LOSC) includes as an aim:

...the conservation of their living resources and the study, protection and preservation of the marine environment...

As LOSC was concluded 2 years after CCAMLR was signed, this phrase may well be an instance of cross-over of ideas from CCAMLR to the LOSC negotiations rather than the reverse.

Emphasis in earlier resource conventions was on ensuring adequate food supplies for humans. The Geneva Convention on Fishing and Conservation of the Living Resources of the High Seas of 1958 recognised that there was a danger of ocean resources being overexploited. Its Preamble stated that:

...the nature of the problems involved in the conservation of the living resources of the high seas is such that there is a clear necessity that they be solved, whenever possible, on the basis of international co-operation.

and its main purpose

...rendering possible the optimum sustainable yield from those resources so as to secure a maximum supply of food and other marine products. Conservation programs should be formulated with a view to securing in the first place a supply of food for human consumption.

(Geneva Convention on Fishing and Conservation of the Living Resources of the High Seas 1958 Article 2). The Preamble of the North-East Atlantic Fisheries Convention of 1959 asserts:

The States Parties to this Convention desiring to ensure the conservation of the fish stocks and the rational exploitation of the fisheries of the North-East Atlantic Ocean and adjacent waters, which are of common concern to them...

The International Convention for the Conservation of Atlantic Tunas of 1966 is likewise centred on human needs, stating in its Preamble:

The Governments...considering their mutual interest in the populations of tuna and tuna-like fishes found in the Atlantic Ocean, and desiring to co-operate in maintaining the populations of these fishes at levels which will permit the maximum sustainable catch for food and other purposes, resolve to conclude a Convention for the conservation of the resources of tuna and tuna-like fishes of the Atlantic Ocean...

None of the above mention ecosystems, nor is concern evinced for organisms other than humans beings and those that might form part of the human food supply.

⁷⁹ The Vienna Conventions (1969, 1986) are overarching agreements that embrace the general principles governing the administration of international law. Most of the Antarctic Treaty parties are also party to the 1969 Vienna Convention, which entered into force in January 1980, before CCAMLR was signed. Under this Vienna convention, measures passed as provided for under an agreement and any of its annexes that are agreed to by the parties are counted as being part of that agreement.

The 1986 Vienna Convention, which deals with states and international organizations, provides in its Article 30 for treaties that apply successively to the same subject matter. In such cases, earlier treaties are recognised or if the later treaty specifies this; otherwise, if the later treaty does not cancel out the earlier one, the earlier treaty applies to the extent that its provisions are compatible with those of the later treaty.

⁸⁰ The Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar) while not specifically mentioning ecosystems, focusses on protecting the 'ecological character of wetlands', and may therefore be counted as a precursor of the ecosystem approach.

⁸¹ The Agreement on Polar Bears of 1973 is interesting because of its polar connections and its attention to ecosystem ideas. It was prepared by the Polar Bear Specialist Group of the IUCN and concluded between the circum-Arctic nations: Canada, Denmark, Norway, USSR (now Russian Federation), USA; the latter three took part in the CCAMLR negotiations. There are no polar bears in Antarctica.

⁸² Phrase coined by H. Burmester, participant in the negotiations and senior official of Australia Attorney General's department. (pers. comm.). It appears that such an outline document is a way of circumventing the various different codes of law under which states operate: those that have fully codified law where everything is spelled out in detail, as in Roman law, and those whose law is based on cases and precedence. It also allows for wording to be sufficiently vague and general that governments have a wide choice of interpretations. A more recent example of this is the Framework Convention on Climate Change.

⁸³ A good general discussion of this lack of definition of conservation in resource treaties is given in Birnie and Boyle 1992 chapter 11.4.

⁸⁴Esteban de Salas Ortueta took office as Executive Secretary in 1993. He was formerly employed in the Fisheries Ministry of the Spanish Government.

⁸⁵This silent confrontation occurred during the first days of the second meeting of the Commission (Heap pers. comm.).

⁸⁶Japan 35116 tonnes; Korea 1429 tonnes; USSR 491656 tonnes (CCAMLR Statistical Bulletin v. 3) See also endnote 1.

⁸⁷In that season, Southern Ocean landings ranked 21st in world fisheries, but this still only amounted to only about 0.5% of total world landings (FAO Yearbook of statistics: catches and landings). See also endnote 2.

⁸⁸Dr Laws, the promulgator of the ecosystem approach at the negotiating sessions, was so discouraged by the lack of progress that he never attended CCAMLR meetings after 1982. (Chittleborough pers. comm.).

⁸⁹Chittleborough remarked 'There is much more to history than the sanitized official record'. Australian officials told him that the paper might give rise to the notion that Australia was reversing its position on whaling and sealing (Chittleborough pers. comm.). Another view is that acceptance of Chittleborough's ideas may have constituted an interpretation of the CAMLR Convention that was not intended.

⁹⁰Although it is not unreasonable for a new organization to take some years to begin to function, ECO (1984a, d) commented on a 'credibility crisis'.

⁹¹*Notothenia rossii*, *N.gibberifrons*, *N. kempi*, *N.squamifrons*. *Dissostichus eleginoides*,

⁹²Total allowable catch (TAC) is that amount of fish which it is agreed may be harvested in a season in a particular area or of a particular species. A TAC may be subdivided into allocated quotas.

⁹³Catch per unit effort (CPUE) is a convenient shorthand method of describing the efficiency of a fishery. Units of effort, for example, fishing hours, fishing days, numbers of hooks, pot hauls, vary with the kind of organism being harvested. Catch is most usually measured in tonnes.

CPUE can also be used in describing the state of the stocks, with varying degrees of reliability.

⁹⁴FAO had instituted a system of reporting fishery statistics based on major harvesting areas. Two kinds of STATLANT form were used : STATLANT form 08A, which collected broad scale data over large areas, and 08B, which dealt with smaller areas and collected finer scale data.

⁹⁵FIBEX and SIBEX - see chapter 2.

⁹⁶Convenor DG.M. Miller of South Africa

⁹⁷Attributed to John Heap, leader of the British Delegation.

⁹⁸Article II does not preclude maintenance of population levels above the minimum.

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- ⁹⁹ A precautionary catch limit for krill in subarea 58.4.2 was set on the basis of a near-synoptic survey conducted by Australia in January-March 1996.
- ¹⁰⁰ Ambassador Zegers, who had taken part in the CCAMLR negotiations. His proposal must be viewed in the context of the 1993 declaration of a Maritime Zone around South Georgia by the United Kingdom, discussed in chapter 6.
- ¹⁰¹ United Nations General Assembly Resolution 44/225 imposed a moratorium on all large-scale pelagic driftnet fishing.
- ¹⁰² The Scientific Committee of the IWC, of which Chittleborough had many years experience, always operated as an independent body advising the IWC Commission. This was not the case in CCAMLR and Chittleborough feared that a dangerous precedent had been set that was unlikely to be broken (Chittleborough pers. comm.).
- ¹⁰³ Among them Chittleborough and Laws.
- ¹⁰⁴ These notes derive from personal experience and interaction with the CCAMLR Secretariat. This study has not treated the financial and political background of the CCAMLR Secretariat. A forthcoming publication by Sandford deals with this.
- ¹⁰⁵ This was the first major scientific expedition to the Southern Ocean. Although a major purpose was to survey submarine cable routes for the Royal Navy, it made oceanographic observations and collected much biological material.
- ¹⁰⁶ German Deep Sea Expedition
- ¹⁰⁷ Under the command of Gerlache.
- ¹⁰⁸ Under the command of Drygalski.
- ¹⁰⁹ Scott's ship *Discovery* was used in several of the expeditions before being replaced by *Discovery II*.
- ¹¹⁰ Almost all writings on krill consulted in the course of this study cite Marr (1962).
- ¹¹¹ Reported on in three studies: Everson 1977; Grantham 1977; Eddie 1977. These were not field studies; they were compilations and analyses of available data.
- ¹¹² Ensuring accuracy and completeness of harvesting data was a separate problem which CCAMLR did much to overcome, through insistence on fine-scale reporting and detailed logging of catches. See chapter 4 on WG-FSA and WG-Krill and chapter 6.
- ¹¹³ Examples include: mussels as indicators of pollution; biological effects of atmospheric pollution of forests, wetlands, and agricultural ecosystems.
- ¹¹⁴ It should be noted that these writings postdate the setting up of the CCAMLR Ecosystem Monitoring Program by some years.
- ¹¹⁵ These were: Wandering albatross, King penguin, Adélie, Macaroni, Royal penguin, Chinstrap penguin.
- ¹¹⁶ Chinstrap, Macaroni and Royal penguins.
- ¹¹⁷ Comparisons between participants are not easy to make due to the different ways in which programs are funded (Costalunga 1997).
- ¹¹⁸ Inspired by Dr Mahathir

¹¹⁹For example, the representative from Bangladesh to the United Nations said: ...a few fortunate and privileged nations have been exploring and carrying out scientific studies.....we found ourselves left far behind in the economic, scientific and technological development attained by the colonial Powers and others who were fortunate enough not to be subjugated (Hamzah 1987: 251-2).

¹²⁰The 'Question of Antarctica' on the agenda of UNGA included a ritual mention of the South African Apartheid regime every year from 1983.

¹²¹See endnote 1.

¹²²Even at their maximum, fisheries in the Southern Ocean had not attained more than 1% of the world's total marine catch (FAO 1983 yearbook of fishery statistics: catches and landings).

¹²³By Papal intervention and the signing of a Treaty of Peace and Friendship between the protagonists in 1984.

¹²⁴It has been suggested that some of those who failed to get visas had applied too late to allow processing of their visa applications before the meeting. It is not known whether this was intentional.

¹²⁵, Southern elephant seal *Mirounga leonina*

¹²⁶Emperor penguin *Aptenoides forsteri*,

¹²⁷Crabeater seal *Lobodon carcinophagus*

Antarctic fur seal *Arctocephalus gazella*

Adélie penguin *Pygoscelis adeliae*

Chinstrap penguin *Pygoscelis antarctica*

Macaroni penguin *Eudyptes chrysophelus*

Minke whale *Baleoptera acutorostrata*

¹²⁸Adélie penguin *Pygoscelis adeliae*

Chinstrap penguin *Pygoscelis antarctica*

Macaroni penguin *Eudyptes chrysophelus*

Gentoo penguin *Pygoscelis papua*

Black-browed albatross *Diomedea melanophris*

Cape Petrel *Daption capense*

Antarctic Petrel *Thalassoica antarctica*

Antarctic Fur Seal *Arctocephalus gazella*

Crabeater Seal *Lobodon carcinophagus*

¹²⁹There is some disagreement on this point. It is alleged that copepods occur in as high a biomass as Antarctic krill (Hosie pers. comm.).

¹³⁰Cape Hallett/ Adare; Bouvet island; South Sandwich islands; South Orkney islands; Wilkes Land (Casey, Dumont D'Urville); Syowa Station; Cape Shepard (Amundsen Sea).

¹³¹Weddell Sea; Bellingshausen/Amundsen Seas.

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- ¹³²The latest edition of the Standard Methods, due August 1997, may be more explicit on these points.
- ¹³³Also known colloquially by field scientist as 'vomiting', it consists of gently introducing water via a tube into the stomach of the bird, inverting the animal over a bucket and using a finger to trigger vomiting. Literature often refers to the procedure as water-offloading.
- ¹³⁴While birds appear to return to the same general area in successive seasons, anecdotal evidence and personal observations suggest that at heavily -studied sites they tend not to return to previously-occupied nest sites but choose locations outside the study area.
- ¹³⁵There is much anecdotal evidence of penguins choosing to nest outside study colonies in subsequent years - rates of 90% have been mooted.
- ¹³⁶Document WG-CEMP-92/7; WG-CEMP-92/8 Rev. 1; WG-CEMP-92/12; WG-CEMP-93/16;
- ¹³⁷These indices were not published as some members considered this sort of information to be commercially sensitive.
- ¹³⁸Post-mortem performed personally on a skua-killed chick showed that tag had moved (during life) from the neck to the abdominal cavity. X-rays of tagged birds have been carried out but results are not yet published.
- ¹³⁹The reasons for this distinction are not made clear in ECO.
- ¹⁴⁰*Electrona carlsbergi*
- ¹⁴¹*Phalacrocorax atriceps* The species or its close relatives occur at many of the subantarctic islands.
- ¹⁴²Casaux pers. comm.
- ¹⁴³A workshop to study trophic interactions relevant to the toothfish fishery around Australia's Heard Island was held in 1997 in response to concerns expressed by scientists and lay persons. Predators of juvenile toothfish near Heard Island may include seals and penguins.
- ¹⁴⁴Report of Workshop on Methods of Assessment of *Dissostichus eleginoides* (WS-MAD)
- ¹⁴⁵The first sea ice indices were published in 1993 WG-CEMP-93/15.
- ¹⁴⁶Especially in the Antarctic Peninsula area- see Appendix C
- ¹⁴⁷From 1984, CCAMLR members expressed concern that incidental mortality caused by marine debris contravened Article II. Marine debris has not yet been made the subject of a resolution or conservation measure, although members continue to carry out surveys and report on them.
- ¹⁴⁸While the basic principles of inspection and observation were included in the Convention, to have attempted to reach agreement on a particular system would have delayed the negotiations.
- ¹⁴⁹*Dissostichus mawsoni*
- ¹⁵⁰Under Conservation Measure 112/XV and 113/XV.

¹⁵¹ Illegal fishing for this species has since extended to the Crozet Islands, the Marion and Prince Edward Islands and the Heard and McDonald Islands, all areas under control by sovereign states.

¹⁵² At the 1996 meeting of WG-FSA, the TAC for *D. eleginoides* for Statistical Division 58.5.2 was reviewed. No fishing had taken place in the areas during the previous two seasons, but a new and higher TAC was calculated using a formula based on a general yield model developed at WS-MAD and subsequently refined. Data from the South Georgia fishery and the adjacent fishery around Kerguelen in Statistical Division 58.5.1 were used in the calculations. The formula included a factor that took into account the needs of species dependent on *D. eleginoides*. The new TAC, to cover the period from 2 November 1995 to 31 August 1996 (or sooner if the TAC is reached before the expiry of the season), was set at 3800 tonnes. This exceeds the previous precautionary TAC of 297 tonnes by a factor of 12.5. The revised TAC was accepted by the Scientific Committee and the Commission with little comment. No official papers were tabled to show whether *D. eleginoides* constituted a food item for land-based species on Heard Island and the Macdonald Islands. See, however, Endnote 122 regarding workshop on fishery-predator interactions.

¹⁵³ This was due in part to other factors; including the sudden unavailability of state-subsidized fuel oil prices, making DWF trips to the Southern Ocean for a relatively low value product such as krill an unprofitable proposition.

¹⁵⁴ Such an annex, which is to provide for the means of assigning responsibility to respond to any environmental damage which may occur, is yet to be negotiated.

¹⁵⁵ The Madrid Protocol will come into force in January 1998, the last ratification having been lodged by Japan on 15 December 1997, as this study went into press.

¹⁵⁶ 26 ATCPs i.e. with full rights; 17 non-Consultative Parties.

¹⁵⁷ Namibia has enquired about CCAMLR membership.

¹⁵⁸ International Whaling Commission, established under the 1946 International Convention on the Regulation of Whaling. As explained in chapter 7, meetings of the IWC are attended by close to 100 observers from non-government organizations.

¹⁵⁹ Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar)

¹⁶⁰ Convention on International Trade in Endangered Species of Wild Flora and Fauna 1973

¹⁶¹ See also section on WG-DAC in chapter 4.

¹⁶² Such rules are represented, of course, by the Conservation Measures on new and exploratory fisheries.

¹⁶³ It was omitted from the agenda of the 1995 UNGA meeting.

¹⁶⁴ South Africa's Dr D. Miller was unanimously elected Chairman of the Scientific Committee in 1996, since this was the last year of Germany's Dr K-H Kock's chairmanship.

¹⁶⁵ Called World Park Base, it was built at Cape Evans, Ross Island, near New Zealand's Scott Base and the USA's McMurdo Station. It was dismantled and removed completely in 1992.

¹⁶⁶ In March 1997 Greenpeace announced the launch of its campaign to 'save endangered bluefin tuna', which it stated had been placed on IUCN's Red List of critically endangered species (Greenpeace Press Release 25 March 1997).

¹⁶⁷ Cost to nonfishing member: almost \$ 70,000AUST per annum; half that amount if membership is taken up in the second half of a year. Fishing members make an additional contribution. Total fishing contributions amount to only about \$18,000AUST per annum, about 1% of CCAMLR's total budget (CCAMLR Secretariat).

¹⁶⁸ See discussion on reflagging in chapter 8.

¹⁶⁹ It is worth remembering that this dispute is confined to the UK and Argentina, with Chile also somewhat involved.

¹⁷⁰ Free passage through EEZs is in any case allowed under LOSC.

¹⁷¹ Illegal fishing occurs when the activity is located in an area in which the fisher does not have the express permission of the sovereign state to operate; the most obvious example is fishing within the 200 nautical mile EEZ of another state.

Illegal fishing also occurs when the activity is located in an area in which the fisher is governed by the rules of a regulatory body and the fishing vessel flies the flag of a state that is a party to the agreement establishing those rules. This is also termed "extra-regulatory" or unregulated fishing.

However, where a vessel is flying the flag of a state that is **not** a signatory to that agreement, it cannot be forced to adhere to those rules, with the possible exception in cases where the object and intent of the treaty represents well-accepted principles and practices of customary law to which a state is morally, if not strictly legally, bound. If, however, a vessel flying the flag of a party to a convention was fishing beyond an agreed quota or using inappropriate harvesting techniques, it would be in breach of the rules of that convention and could be argued to be fishing illegally.

On the other hand, if in order to circumvent regulations, a vessel belonging to nationals of a treaty party "re-flags", that is, disguises the origin of the vessel so that it flies the flag of a state **not** party to a treaty, that vessel may be fishing in an irresponsible and unprincipled manner, but it is not, strictly speaking, fishing illegally, unless it can be proved that reflagging has occurred. Furthermore, it is not illegal to refuse to show identifying marks on vessels, although not doing so could raise questions regarding insurance and liability.

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- ¹⁷²The magic pudding, title of a book by Norman Lindsay, was a 'cut and come again' pudding from which slices could be cut which would then grow back. The metaphor seems an appropriate one to apply to marine harvesting.
- ¹⁷³This argument was used to justify, in part, the sending of an Australian fishing vessel to Subarea 58.5.2 in 1996/97 (Australian Fisheries Management Authority/ Antarctic Division public information session, March 1997).
- ¹⁷⁴ Although it can be argued that these are precautionary in name only.
- ¹⁷⁵ Unconfirmed reports allege one of the ships apprehended in Australian waters and flying a Panamanian flag was a Norwegian state-of-the art ship worth \$17m US; other reports allege that 200 ships are being purpose-built in China for the Southern Ocean fishery.
- ¹⁷⁶ This phrase is borrowed from I. Kiessling (pers.comm.) who used it in conjunction with problems of coastal integrated management.
- ¹⁷⁷ *Arctocephalus gazella*
- ¹⁷⁸ Members or acceding states to CCAS: Argentina, Australia, Belgium, Brazil, Canada, Chile, France, Germany, Italy, Japan, Norway, Poland, South Africa, the then USSR, UK, USA. New Zealand is a signatory. Thus not all CCAMLR parties are party to CCAS.
- ¹⁷⁹ Australia, UK, USA, Japan, Germany, Netherlands, Chile, Argentina, China
- ¹⁸⁰ *Thunnus maccoyii*
- ¹⁸¹ This was noted with some concern by Kock (SC-CAMLR-XV 1996 §11.17-19).
- ¹⁸² Such damage may of course be done by harvesters working legally, but is less likely to go unreported if observers are carried.
- ¹⁸³ Vienna Law of Treaties 1969 Article 19
- ¹⁸⁴ Vienna Law of Treaties 1969 Article 34
- ¹⁸⁵ Vienna Law of Treaties 1969 Article 38
- ¹⁸⁶ Including USA, UK (Shearer 1994)
- ¹⁸⁷ It is difficult to find out whether this applies to Norway, but it would appear from indirect evidence that this is the case.
- ¹⁸⁸ Debate on this issue was ongoing in CCAMLR for several years.
- ¹⁸⁹ While accurate figures are impossible to obtain, there are fears that the numbers of seabirds being killed as a result of being caught on longlines is much greater than has been reported.
- ¹⁹⁰ Greenpeace (Dalziel and de Poorter 1993) alerted the world to bird bycatch in the toothfish fishery; it will be recalled, however, that CCAMLR had already taken action to minimise the problem.
- ¹⁹¹ Techniques determining where stocks may have come from include differentiation of parasite burdens between stocks, DNA and isotope identification. The knowledge that such checks exist may deter illegal harvesters. However, such tests are expensive to perform and they require that observers be present to take samples.

¹⁹²For example, Chile, South Africa, France, United Kingdom. As this dissertation was in its final stages, an Australia operation apprehended two vessels fishing illegally in its EEZ around Heard Island in the Indian Ocean sector.

¹⁹³It is not, of course, suggested that CCAMLR take responsibility for whales or IWC for non-whale species.

¹⁹⁴The Inter-American Tropical Tuna Commission may be a model for this.

¹⁹⁵UNGA 1996 noted: 'Krill (*Euphausia superba*) are the key food for most Antarctic marine birds and mammals, and krill research efforts are central to CCAMLR management. In recent years, there has been a decline in catches of Antarctic krill primarily due to economic factors and driven by a reduction in the Russian Federation and Ukrainian fishing effort for this species. The current catch is less than 10 per cent of the total allowable catch, which itself is set at 10 per cent of the estimated krill biomass.

¹⁹⁶In fact, the 1996 UNGA only alluded to these matters briefly: 'There have been reports of illegal fishing of *D.eleginoides*. The illegal take is believed to equal or exceed the total allowable catch set by CCAMLR, seriously threatening sustainable management of this fishery. It is not known what effect this level of exploitation is having on fish populations. CCAMLR has introduced a revised scheme of international inspection in an attempt to combat this problem'.

¹⁹⁷While this is specifically directed towards 'underdeveloped' regions, most usually former colonies, there is no reason why this same idea should not be used for marine regions. It ties in quite well with marine protected areas of the Madrid Protocol and Large Marine Ecosystem ideas.

¹⁹⁸Palmer (1982: 283) in proposing the setting up of a United Nations organ to protect the global environment, advocates the abrogation of some sovereignty on the parts of states, and argues that it is in their self-interest to do so.

¹⁹⁹This useful technique, feedback management, is advocated by de la Mare (pers. comm.) and Constable (1992).

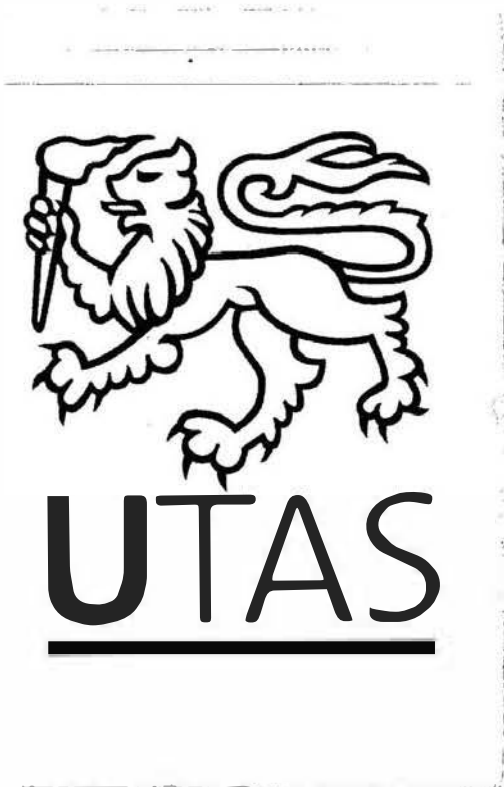
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APPENDICES

Appendix A

**Convention on the Conservation of Antarctic Marine
Living Resources**

Appendix B

**Conservation Measures put in place by CCAMLR 1984-
1996**

Appendix C

**Summary of Standard Methods in use at CEMP sites by
members**

Appendix D

Status of CCAMLR Contracting Parties

Appendix E

Events relevant to CCAMLR 1981-1995

Appendix A

CONVENTION ON THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES

The Contracting Parties,

RECOGNISING the importance of safeguarding the environment and protecting the integrity of the ecosystem of the seas surrounding Antarctica;

NOTING the concentration of marine living resources found in Antarctic waters and the increased interest in the possibilities offered by the utilization of these resources as a source of protein;

CONSCIOUS of the urgency of ensuring the conservation of Antarctic marine living resources;

CONSIDERING that it is essential to increase knowledge of the Antarctic marine ecosystem and its components so as to be able to base decisions on harvesting on sound scientific information;

BELIEVING that the conservation of Antarctic marine living resources calls for international co-operation with due regard for the provisions of the Antarctic Treaty and with the active involvement of all States engaged in research or harvesting activities in Antarctic waters;

RECOGNISING the prime responsibilities of the Antarctic Treaty Consultative Parties for the protection and preservation of the Antarctic environment and, in particular, their responsibilities under Article IX, paragraph 1 (f) of the Antarctic Treaty in respect of the preservation and conservation of living resources in Antarctica;

RECALLING the action already taken by the Antarctic Treaty Consultative Parties including in particular the Agreed Measures for the Conservation of Antarctic Fauna and Flora, as well as the provisions of the Convention for the Conservation of Antarctic Seals;

BEARING in mind the concern regarding the conservation of Antarctic marine living resources expressed by the Consultative Parties at the Ninth Consultative Meeting of the Antarctic Treaty and the importance of the provisions of Recommendation IX-2 which led to the establishment of the present Convention;

BELIEVING that it is in the interest of all mankind to preserve the waters surrounding the Antarctic continent for peaceful purposes only and to prevent their becoming the scene or object of international discord;

RECOGNISING, in the light of the foregoing, that it is desirable to establish suitable machinery for recommending, promoting, deciding upon and co-ordinating the measures and scientific studies needed to ensure the conservation of Antarctic marine living organisms;

HAVE AGREED as follows:

ARTICLE I

1. This Convention applies to the Antarctic marine living resources of the area south of 60° South latitude and to the Antarctic marine living resources of the area between that latitude and the Antarctic Convergence which form part of the Antarctic marine ecosystem.

2. Antarctic marine living resources means the populations of fin fish, molluscs, crustaceans and all other species of living organisms, including birds, found south of the Antarctic Convergence.

3. The Antarctic marine ecosystem means the complex of relationships of Antarctic marine living resources with each other and with their physical environment.

4. The Antarctic Convergence shall be deemed to be a line joining the following points along parallels of latitude and meridians of longitude:

50°S, 0°; 50°S, 30°E; 45°S, 30°E; 45°S, 80°E; 55°S, 80°E; 55°S, 150°E; 60°S, 150°E; 60°S, 50°W; 50°S, 50°W; 50°S, 0°.

ARTICLE II

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 changes or minimization of the risk of changes 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.

ARTICLE III

The Contracting Parties, whether or not they are Parties to the Antarctic Treaty, agree that they will not engage in any activities in the Antarctic Treaty area contrary to the principles and purposes of that Treaty and that, in their relations with each other, they are bound by the obligations contained in Articles I and v of the Antarctic Treaty.

ARTICLE IV

1. With respect to the Antarctic Treaty area, all Contracting Parties, whether or not they are Parties to the Antarctic Treaty, are bound by Articles IV and VI of the Antarctic Treaty in their relations with each other.

2. Nothing in this Convention and no acts or activities taking place while the present Convention is in force shall:

(a) constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in the Antarctic Treaty area or create any rights of sovereignty in the Antarctic Treaty area;

(b) be interpreted as a renunciation or diminution by any Contracting Party of, or as prejudicing, any right or claim or basis of claim to exercise coastal state jurisdiction under international law within the area to which this Convention

(c) be interpreted as prejudicing the position of any Contracting Party as regards its recognition or non-recognition of any such right, claim or basis of claim;

(d) affect the provision of Article IV, paragraph 2, of the Antarctic Treaty that no new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the Antarctic Treaty is in force.

ARTICLE V

1. The Contracting Parties which are not Parties to the Antarctic Treaty acknowledge the special obligations and responsibilities of the Antarctic Treaty Consultative Parties for the protection and preservation of the environment of the Antarctic Treaty area.

2. The Contracting Parties which are not Parties to the Antarctic Treaty agree that, in their activities in the Antarctic Treaty area, they will observe as and when appropriate the Agreed Measures for the Conservation of Antarctic Fauna and Flora and such other measures as have been recommended by the Antarctic Treaty Consultative Parties in fulfilment of their responsibility for the protection of the Antarctic environment from all forms of harmful human interference.

3. For the purposes of this Convention, "Antarctic Treaty Consultative Parties" means the Contracting Parties to the Antarctic Treaty whose Representatives participate in meetings under Article IX of the Antarctic Treaty.

ARTICLE VI

Nothing in this Convention shall derogate from the rights and obligations of Contracting Parties under the International Convention for the Regulation of Whaling and the Convention for the Conservation of Antarctic Seals.

ARTICLE VII

1. The Contracting Parties hereby establish and agree to maintain the Commission for the Conservation of Antarctic Marine Living Resources (hereinafter referred to as "the Commission").

2. Membership in the Commission shall be as follows:

(a) each Contracting Party which participated in the meeting at which this Convention was adopted shall be a Member of the Commission;

(b) each State Party which has acceded to this Convention pursuant to Article XXIX shall be entitled to be a Member of the Commission during such time as that acceding Party is engaged in research or harvesting activities in relation to the marine living resources to which this Convention applies;

(c) each regional economic integration organization which has acceded to this Convention pursuant to Article XXIX shall be entitled to be a Member of the Commission during such time as its States members are so entitled;

(d) a Contracting Party seeking to participate in the work of the Commission pursuant to sub-paragraphs (b) and (c) above shall notify the Depositary of the basis upon which it seeks to become a Member of the Commission and of its willingness to accept conservation measures in force. The Depositary shall communicate to each Member of the Commission such notification and accompanying information. Within two months of receipt of such communication from the Depositary, any Member of the Commission may request that a special meeting of the Commission be held to consider the matter. Upon receipt of such request, the Depositary shall call such a meeting. If there is no request for a meeting, the Contracting Party submitting the notification shall be deemed to have satisfied the requirements for Commission Membership.

3. Each Member of the Commission shall be represented by one representative who may be accompanied by alternate representatives and advisers.

ARTICLE VIII

The Commission shall have legal personality and shall enjoy in the territory of each of the States Parties such legal capacity as may be necessary to perform its function and achieve the purposes of this Convention. The privileges and immunities to be enjoyed by the Commission and its staff in the territory of a State Party shall be determined by agreement between the Commission and the State Party concerned.

ARTICLE IX

1. The function of the Commission shall be to give effect to the objective and principles set out in Article 11 of this Convention. To this end, it shall:

- (a) facilitate research into and comprehensive studies of Antarctic marine living resources and of the Antarctic marine ecosystem;
- (b) compile data on the status of and changes in population of Antarctic marine living resources and on factors affecting the distribution, abundance and productivity of harvested species and dependent or related species or populations;
- (c) ensure the acquisition of catch and effort statistics on harvested populations;
- (d) analyse, disseminate and publish the information referred to in sub-paragraphs (b) and (c) above and the reports of the Scientific Committee;
- (e) identify conservation needs and analyse the effectiveness of conservation measures;
- (f) formulate, adopt and revise conservation measures on the basis of the best scientific evidence available, subject to the provisions of paragraph 5 of this Article;
- (g) implement the system of observation and inspection established under Article XXIV of this Convention;
- (h) carry out such other activities as are necessary to fulfil the objective of this Convention.

2. The conservation measures referred to in paragraph 1 (f) above include the following:

- (a) the designation of the quantity of any species which may be harvested in the area to which this Convention applies;

- (b) the designation of regions and sub-regions based on the distribution of populations of Antarctic marine living resources;
- (c) the designation of the quantity which may be harvested from the populations of regions and sub-regions;
- (d) the designation of protected species;
- (e) the designation of the size, age and, as appropriate, sex of species which may be harvested;
- (f) the designation of open and closed seasons for harvesting;
- (g) the designation of the opening and closing of areas, regions or sub-regions for purposes of scientific study or conservation, including special areas for protection and scientific study;
- (h) regulation of the effort employed and methods of harvesting, including fishing gear, with a view, inter alia, to avoiding undue concentration of harvesting in any region or sub-region;
- (i) the taking of such other conservation measures as the Commission considers necessary for the fulfilment of the objective of this Convention, including measures concerning the effects of harvesting and associated activities on components of the marine ecosystem other than the harvested populations.

The Commission shall publish and maintain a record of all conservation measures in force.

4.

In exercising its functions under paragraph 1 above, the Commission shall take full account of the recommendations and advice of the Scientific Committee.

5. The Commission shall take full account of any relevant measures or regulations established or recommended by the Consultative Meetings pursuant to Article IX of the Antarctic Treaty or by existing fisheries commissions responsible for species which may enter the area to which this Convention applies, in order that there shall be no inconsistency between the rights and obligations of a Contracting Party under such regulations or measures and conservation measures which may be adopted by the Commission.

6. Conservation measures adopted by the Commission in accordance with this Convention shall be implemented by Members of the Commission in the following manner:

- (a) the Commission shall notify conservation measures to all Members of the Commission;
- (b) conservation measures shall become binding upon all Members of the Commission 180 days after such notification, except as provided in subparagraphs (c) and (d) below;
- (c) if a Member of the Commission, within ninety days following the notification specified in sub-paragraph (a), notifies the Commission that it is unable to accept the conservation measure, in whole or in part, the measure shall not, to the extent stated, be binding upon that Member of the Commission;
- (d) in the event that any Member of the Commission invokes the procedure set forth in sub-paragraph (c) above, the Commission shall meet at the request of any Member of the Commission to review the conservation measure. At the time

of such meeting and within thirty days following the meeting, any Member of the Commission shall have the right to declare that it is no longer able to accept the conservation measure, in which case the Member shall no longer be bound by such a measure.

ARTICLE X

1. The Commission shall draw the attention of any State which is not a Party to this Convention to any activity undertaken by its nationals or vessels which, in the opinion of the Commission, affects the implementation of the objective of this Convention.

2. The Commission shall draw the attention of all Contracting Parties to any activity which, in the opinion of the Commission, affects the implementation by a Contracting Party of the Objective of this Convention or the compliance by that Contracting Party with its obligations under this Convention.

ARTICLE XI

The Commission shall seek to co-operate with Contracting Parties which may exercise jurisdiction in marine areas adjacent to the area to which this Convention applies in respect of the conservation of any stock or stocks of associated species which occur both within those areas and the area to which this Convention applies, with a view to harmonizing the conservation measures adopted in respect of such stocks.

ARTICLE XII

1. Decisions of the Commission on matters of substance shall be taken by consensus. The question of whether a matter is one of substance shall be treated as a matter of substance.

2. Decisions on matters other than those referred to in paragraph 1 above shall be taken by a simple majority of the Members of the Commission present and voting.

3. In Commission consideration of any item requiring a decision, it shall be made clear whether a regional economic integration organization will participate in the taking of the decision and, if so, whether any of its member States will also participate. The number of Contracting Parties so participating shall not exceed the number of member States of the regional economic integration organization which are Members of the Commission.

4. In the taking of decisions pursuant to this Article, a regional economic integration organization shall have only one vote.

ARTICLE XIII

1. The headquarters of the Commission shall be established at Hobart, Tasmania, Australia.

2. The Commission shall hold a regular annual meeting. Other meetings shall also be held at the request of one-third of its Members and as otherwise provided in this Convention. The first meeting of the Commission shall be held within three months of the entry into force of this Convention, provided that among the Contracting Parties there are at least two States conducting harvesting activities within the area to which this Convention applies. The first meeting shall, in any event, be held within one year of the entry into force of this Convention. The Depositary shall consult with the signatory States regarding the first Commission meeting, taking into account that a broad representation of such States is necessary for the effective operation of the Commission.

3. The Depositary shall convene the first meeting of the Commission at the headquarters of the Commission. Thereafter, meetings of the Commission shall be held at its headquarters, unless it decides otherwise.

4. The Commission shall elect from among its Members a Chairman and Vice-Chairman, each of whom shall serve for a term of two years and shall be eligible for re-election for one additional term. The first Chairman shall, however, be elected for an initial term of three years. The Chairman and Vice-Chairman shall not be representatives of the same Contracting Party.

5. The Commission shall adopt and amend as necessary the rules of procedure for the conduct of its meetings, except with respect to the matters dealt with in Article XII of this Convention.

6. The Commission may establish such subsidiary bodies as are necessary for the performance of its functions.

ARTICLE XIV

1. The Contracting Parties hereby establish the Scientific Committee for the Conservation of Antarctic Marine Living Resources (hereinafter referred to as "the Scientific Committee") which shall be a consultative body to the Commission. The Scientific Committee shall normally meet at the headquarters of the Commission unless the Scientific Committee decides otherwise.

2. Each Member of the Commission shall be a Member of the Scientific Committee and shall appoint a representative with suitable scientific qualifications who may be accompanied by other experts and advisers.

3. The Scientific Committee may seek the advice of other scientists and experts as may be required on an ad hoc basis.

ARTICLE XV

1. The Scientific Committee shall provide a forum for consultation and co-operation concerning the collection, study and exchange of information with respect to the marine living resources to which this Convention applies. It shall encourage and promote co-operation in the field of scientific research in order to extend knowledge of the marine living resources of the Antarctic marine ecosystem.

2. The Scientific Committee shall conduct such activities as the Commission may direct in pursuance of the objective of this Convention and shall:

(a) establish criteria and methods to be used for determinations concerning the conservation measures referred to in Article IX of this Convention;

(b) regularly assess the status and trends of the populations of Antarctic marine living resources;

(c) analyse data concerning the direct and indirect effects of harvesting on the populations of Antarctic marine living resources;

(d) assess the effects of proposed changes in the methods or levels of harvesting and proposed conservation measures;

(e) transmit assessments, analyses, reports and recommendations to the Commission as requested or on its own initiative regarding measures and research to implement the objective of this Convention;

(f) formulate proposals for the conduct of international and national programs of research into Antarctic marine living resources.

3. In carrying out its functions, the Scientific Committee shall have regard to the work of other relevant technical and scientific organizations and to the scientific activities conducted within the framework of the Antarctic Treaty.

ARTICLE XVI

1. The first meeting of the Scientific Committee shall be held within three months of the first meeting of the Commission. The Scientific Committee shall meet thereafter as often as may be necessary to fulfil its functions.

2. The Scientific Committee shall adopt and amend as necessary its rules of procedure. The rules and any amendments thereto shall be approved by the Commission. The rules shall include procedures for the presentation of minority reports.

3. The Scientific Committee may establish, with the approval of the Commission, such subsidiary bodies as are necessary for the performance of its functions.

ARTICLE XVII

1. The Commission shall appoint an Executive Secretary to serve the Commission and Scientific Committee according to such procedures and on such terms and conditions as the Commission may determine. His term of office shall be for four years and he shall be eligible for re-appointment.

2. The Commission shall authorize such staff establishment for the Secretariat as may be necessary and the Executive Secretary shall appoint, direct and supervise such staff according to such rules, and procedures and on such terms and conditions as the Commission may determine.

3. The Executive Secretary and Secretariat shall perform the functions entrusted to them by the Commission.

ARTICLE XVIII

The official languages of the Commission and of the Scientific Committee shall be English, French, Russian and Spanish.

ARTICLE XIX

1. At each annual meeting, the Commission shall adopt by consensus its budget and the budget of the Scientific Committee.

2. A draft budget for the Commission and the Scientific Committee and any subsidiary bodies shall be prepared by the Executive Secretary and submitted to the Members of the Commission at least sixty days before the annual meeting of the Commission.

3. Each Member of the Commission shall contribute to the budget. Until the expiration of five years after the entry into force of this Convention, the contribution of each Member of the Commission shall be equal. Thereafter the contribution shall be determined in accordance with two criteria: the amount harvested and an equal sharing among all Members of the Commission. The Commission shall determine by consensus the proportion in which these two criteria shall apply.

4. The financial activities of the Commission and Scientific Committee shall be conducted in accordance with financial regulations adopted by the Commission and shall be subject to an annual audit by external auditors selected by the Commission.

5. Each Member of the Commission shall meet its own expenses arising from the attendance at meetings of the Commission and of the Scientific Committee.

6. A Member of the Commission that fails to pay its contributions for two consecutive years shall not, during the period of its default, have the right to participate in the taking of decisions in the Commission.

ARTICLE XX

1. The Members of the Commission shall, to the greatest extent possible, provide annually to the Commission and to the Scientific Committee such statistical, biological and other data and information as the Commission and Scientific Committee may require in the exercise of their functions.

The Members of the Commission shall provide, in the manner and at such intervals as may be prescribed, information about their harvesting activities, including fishing areas and vessels, so as to enable reliable catch and effort statistics to be compiled.

3. The Members of the Commission shall provide to the Commission at such intervals as may be prescribed information on steps taken to implement the conservation measures adopted by the Commission.

4. The Members of the Commission agree that in any of their harvesting activities, advantage shall be taken of opportunities to collect data needed to assess the impact of harvesting.

ARTICLE XXI

1. Each Contracting Party shall take appropriate measures within its competence to ensure compliance with the provisions of this Convention and with conservation measures adopted by the Commission to which the Party is bound in accordance with Article IX *of this* Convention.

2. Each Contracting Party shall transmit to the Commission information on measures taken pursuant to paragraph 1 above, including the imposition of sanctions for any violation.

ARTICLE XXII

1. Each Contracting Party undertakes to exert appropriate efforts, consistent *with the* Charter of the United Nations, to the end that no one engages in any activity contrary to the objective of this Convention.

2. Each Contracting Party shall notify the Commission of any such activity which comes to its attention.

ARTICLE XXIII

1. The Commission and the Scientific Committee shall co-operate with the Antarctic Treaty Consultative Parties on matters falling within the competence of the latter.

2. The Commission and the Scientific Committee shall co-operate, as appropriate, with the Food and Agriculture Organisation of the United Nations and with other Specialised Agencies.

3. The Commission and the Scientific Committee shall seek to develop co-operative working relationships, as appropriate, with inter-governmental and nongovernmental organizations which could contribute to their work, including the Scientific Committee on Antarctic Research, the Scientific Committee on Oceanic Research and the International Whaling Commission.

4. The Commission may enter into agreements with the organizations referred to in this Article and with other organizations as may be appropriate. The Commission and the Scientific Committee may invite such organizations to send observers to their meetings and to meetings of their subsidiary bodies.

ARTICLE XXIV

1. In order to promote the objective and ensure observance of the provisions of this Convention, the Contracting Parties agree that a system of observation and inspection shall be established.

2. The system of observation and inspection shall be elaborated by the Commission on the basis of the following principles:

(a) Contracting Parties shall co-operate with each other to ensure the effective implementation of the system of observation and inspection, taking account of the existing international practice. This system shall include, inter alia, procedures for boarding and inspection by observers and inspectors designated by the Members of the Commission and procedures for flag state prosecution and sanctions on the basis of evidence resulting from such boarding and inspections. A report of such prosecutions and sanctions imposed shall be included in the information referred to in Article XXI of this Convention;

(b) in order to verify compliance with measures adopted under this Convention, observation and inspection shall be carried out on board vessels engaged in scientific research or harvesting of marine living resources in the area to which this Convention applies, through observers and inspectors designated by the Members of the Commission and operating under terms and conditions to be established by the Commission;

- (c) designated observers and inspectors shall remain subject to the jurisdiction of the Contracting Party of which they are nationals. They shall report to the Member of the Commission by which they have been designated which in turn shall report to the Commission.

3. Pending the establishment of the system of observation and inspection, the Members of the Commission shall seek to establish interim arrangements to designate observers and inspectors and such designated observers and inspectors shall be entitled to carry out inspections in accordance with the principles set out in paragraph 2 above.

ARTICLE XXV

1. If any dispute arises between two or more of the Contracting Parties concerning the interpretation or application of this Convention, those Contracting Parties shall consult among themselves with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement or other peaceful means of their own choice.

2. Any dispute of this character not so resolved shall, with the consent in each case of all Parties to the dispute, be referred for settlement to the International Court of Justice or to arbitration; but failure to reach agreement on reference to the International Court or to arbitration shall not absolve Parties to the dispute from the responsibility of continuing to seek to resolve it by any of the various peaceful means referred to in paragraph 1 above.

3. In cases where the dispute is referred to arbitration, the arbitral tribunal shall be constituted as provided in the Annex to this Convention.

ARTICLE XXVI

1. This Convention shall be open for signature at Canberra from 1 August to 31 December 1980 by the States participating in the Conference on the Conservation of Antarctic Marine Living Resources held at Canberra from 7 to 20 May 1980.
2. The States which so sign will be the original signatory States of the Convention.

ARTICLE XXVII

1. This Convention is subject to ratification, acceptance or approval by signatory States.
2. Instruments of ratification, acceptance or approval shall be deposited with the Government of Australia, hereby designated as the Depositary.

ARTICLE XXVIII

1. This Convention shall enter into force on the thirtieth day following the date of deposit of the eighth instrument of ratification, acceptance or approval by States referred to in paragraph 1 of Article XXVI of this Convention.
2. With respect to each State or regional economic integration organization which subsequent to the date of entry into force of this Convention deposits an instrument of ratification, acceptance, approval or accession, the Convention shall enter into force on the thirtieth day following such deposit.

ARTICLE XXIX

1. This Convention shall be open for accession by any State interested in research or harvesting activities in relation to the marine living resources to which this Convention applies.
2. This Convention shall be open for accession by regional economic integration organizations constituted by sovereign States which include among their members one or more States Members of the Commission and to which the States members of the organization have transferred, in whole or in part, competences with regard to the matters covered by this Convention. The accession of such regional economic integration organizations shall be the subject of consultations among Members of the Commission .

ARTICLE XXX

1. This Convention may be amended at any time.
2. If one-third of the Members of the Commission request a meeting to discuss a proposed amendment the Depositary shall call such a meeting.
3. An amendment shall enter into force when the Depositary has received instruments of ratification, acceptance or approval thereof from all the Members of the Commission.
4. Such amendment shall thereafter enter into force as to any other Contracting Party when notice of ratification, acceptance or approval by it has been received by the Depositary. Any such Contracting Party from which no such notice has been received within a period of one year from the date of entry into force of the amendment in accordance with paragraph 3 above shall be deemed to have withdrawn from this Convention.

ARTICLE XXXI

1. Any Contracting Party may withdraw from this Convention on 30 June of any year, by giving written notice not later than 1 January of the same year to the Depositary, which, upon receipt of such a notice, shall communicate it forthwith to the other Contracting Parties.
2. Any other Contracting Party may, within sixty days of the receipt of a copy of such a notice from the Depositary, give written notice of withdrawal to the Depositary in which case the Convention shall cease to be in force on 30 June of the same year with respect to the Contracting Party giving such notice.
3. Withdrawal from this Convention by any Member of the Commission shall not affect its financial obligations under this Convention.

ARTICLE XXXII

The Depositary shall notify all Contracting Parties of the following:

- (a) signatures of this Convention and the deposit of instruments of ratification, acceptance, approval or accession;
- (b) the date of entry into force of this Convention and of any amendment thereto.

ARTICLE XXXIII

1. This Convention, of which the English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Government of Australia which shall transmit duly certified copies thereof to all signatory and acceding Parties.
2. This Convention shall be registered by the Depositary pursuant to Article 102 of the Charter of the United Nations.

Drawn up at Canberra this twentieth day of May 1980.

ANNEX FOR AN ARBITRAL TRIBUNAL

1. The arbitral tribunal referred to in paragraph 3 of Article xxv shall be composed of three arbitrators who shall be appointed as follows:
 - (a) The Party commencing proceedings shall communicate the name of an arbitrator to the other Party which, in turn, within a period of forty days following such notification, shall communicate the name of the second arbitrator. The Parties shall, within a period of sixty days following the appointment of the second arbitrator, appoint the third arbitrator, who shall not be a national of either Party and shall not be of the same nationality as either of the first two arbitrators. The third arbitrator shall preside over the tribunal;
 - (b) If the second arbitrator has not been appointed within the prescribed period, or if the Parties have not reached agreement within the prescribed period on the appointment of the third arbitrator, that arbitrator shall be appointed, at the request of either Party, by the Secretary-General of the Permanent Court of Arbitration, from among persons of international standing not having the nationality of a State which is a Party to this Convention.
2. The arbitral tribunal shall decide where its headquarters will be located and shall adopt its own rules of procedure.

3. The award of the arbitral tribunal shall be made by a majority of its members, who may not abstain from voting.
4. Any Contracting Party which is not a Party to the dispute may intervene in the proceedings with the consent of the arbitral tribunal.
5. The award of the arbitral tribunal shall be final and binding on all Parties to the dispute and on any Party which intervenes in the proceedings and shall be complied with without delay. The arbitral tribunal shall interpret the award at the request of one of the Parties to the dispute or of any intervening Party.
6. Unless the arbitral tribunal determines otherwise because of the particular circumstances of the case, the expenses of the tribunal, including the remuneration of its members, shall be borne by the Parties to the dispute in equal shares.

STATEMENT BY THE CHAIRMAN OF THE CONFERENCE ON THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES

The Conference on the Conservation of Antarctic Marine Living Resources decided to include in the publication of the Final Act of the Conference the text of the following statement made by the Chairman on 19 May 1980 regarding the application of the Convention on the Conservation of Antarctic Marine Living Resources to the waters adjacent to Kerguelen and Crozet over which France has jurisdiction and to waters adjacent to other islands within the area to which this Convention applies over which the existence of State sovereignty is recognized by all Contracting Parties.

"1. Measures for the conservation of Antarctic marine living resources of the waters adjacent to Kerguelen and Crozet, over which France has jurisdiction, adopted by France prior to the entry into force of the Convention, would remain in force after the entry into force of the Convention until modified by France acting within the framework of the Commission or otherwise.

2. After the Convention has come into force, each time the Commission should undertake examination of the conservation needs of the marine living resources of the general area in which the waters adjacent to Kerguelen and Crozet are to be found, it would be open to France either to agree that the waters in question should be included in the area of application of any specific conservation measure under consideration or to indicate that they should be excluded. In the latter event, the Commission would not proceed to the adoption of the specific conservation measure in a form applicable to the waters in question unless France removed its objection to it. France could also adopt such national measures as it might deem appropriate for the waters in question.

3. Accordingly, when specific conservation measures are considered within the framework of the Commission and with the participation of France, then:

(a) France would be bound by any conservation measures adopted by consensus with its participation for the duration of those measures. This would not prevent France from promulgating national measures that were more strict than the Commission's measures or which dealt with other matters;

(b) in the absence of consensus, France could promulgate any national measures which it might deem appropriate.

4. Conservation measures, whether national measures or measures adopted by the Commission, in respect of the waters adjacent to Kerguelen and Crozet, would be enforced by France. The system of observation and inspection foreseen by the Convention would not be implemented in the waters adjacent to Kerguelen and Crozet except as agreed by France and in the manner so agreed.

5. The understandings, set forth in paragraphs 1-4 above, regarding the application of the Convention to waters adjacent to the Islands of Kerguelen and Crozet, also apply to waters adjacent to the islands within the area to which this Convention applies over which the existence of State sovereignty is recognized by all Contracting Parties."

No objection to the statement was made.

Appendix B

CONSERVATION MEASURES PUT IN PLACE BY CCAMLR 1984-1996

| Measure | Subarea | Species | Effect ¹ | When in force |
|-----------------|------------------------------|---|--|--|
| 21/III | 12 n.m. around South Georgia | All | Prohibition of fishing other than scientific purposes G | |
| 2/III; 19/IX | All | Notothernia rossii ³ N. gibberifrons, N. kemp Dissostichus eleginoides N. squamifrons | Mesh size T | 1 Sept 1985- 30 Oct 1991; 1 Nov 1991+ |
| 3/IV | 48.3 | N. rossii | Prohibition of directed fishery G | 1985+ |
| 4/V | All | All | Mesh-size T | 1986+ |
| 5/V | 48.1 | N. rossii | Prohibition of directed fishery G | 1986+ |
| 6/V | 48.2 | N. rossii | Prohibition of directed fishery G | 1986+ |
| 7/V | 48.3 | All | Limitations on catch G | 1987+ |
| 8/VI | 48.3 | Champsocephalus gunnari | Limitation of total catch G | 1987/88 season |
| 9/VI | 48.3 | C. gunnari | Catch reporting | 1987+ |
| 10/VI | 48.3 | C. gunnari | Prohibition of directed fishery G | 1 April-1 October 1988 |
| 11/VII | 48.3 | C. gunnari | Prohibition of directed fishery G | 4 Nov 1988-20 Nov 1989 |
| 12/VII | 48.3 | Patagonotothen brevicauda guntheri | Catch limitation G | 1988/89 season |
| 13/VIII | 48.3 | C. gunnari | Limitation of total catch G | 1989/90 season |
| 14/VIII | 48.3 | N. gibberifrons Chaenocephalus aceratus Pseudochaenichthys georgianus N. squamifrons | Prohibition of directed fishery G | 1989/90 season |
| 15/VIII | 48.3 | C. gunnari N. gibberifrons Chaenocephalus aceratus Pseudochaenichthys georgianus N. squamifrons | Prohibition of directed fishery None to be taken except for scientific purposes G | 20 Nov 1989-Jan1990; 1 April-4 Nov 1990 20 Nov 1989-Jan1990; 1 April-4 Nov 1990 |
| 16/VIII | 48.3 | P. brevicauda guntheri | Catch limitation | 1989/90 season |

| | | | | |
|------------------------------|---|---|--|------------------|
| 17/VIII | 48.3 | All | Catch reporting G | 1989/90 season |
| 18/IX; XIII | CEMP sites | | Protection; Management C | |
| 19/IX | All except Kerguelen and Crozet | C. gunnari | Mesh size T | 1 Nov 1991 |
| 20/IX | 48.3 | C. gunnari | Limitation of total catch | 1990/91 season |
| 21/IX | 48.3 | C. gunnari | Prohibition of directed fishery G | 1 Apr-4 Nov 1991 |
| 22/IX | 48.3 | N. gibberifrons Chaenocephalus aceratus Pseudochaenichthys georgianus N. squamifrons | Prohibition of directed fishery G | 1990/91 season |
| 23/IX | 48.3 | P. brevicauda guntheri | Prohibition of directed fishery G | 1990/91 season |
| 24/IX | 48.3 | D. eleginoides | Catch limit | 1990/91 season |
| 25/IX | 48.3 | All | Catch and effort reporting | 1990/91 season |
| 26/IX | 48.3 | D. eleginoides | Effort and biological data reporting G | 1990/91 season |
| 27/IX | 48.1; 48.2 | Finfish | Prohibition of directed fishery G | 1990/91 season |
| 28/IX | 58.4 | N. squamifrons | Limitation of total catch | 1990/91 season |
| 29/X; XI; XII; XIII; XIV; XV | All | Seabirds | Minimisation of incidental mortality in the course of longline fishing L | 1991+ |
| 30/X | All except Kerguelen and Crozet | All | Net monitor cables prohibited T | 1994/95 season+ |
| 31/X | All except Kerguelen, Crozet, Prince Edward | All | New fishery notification by members N | 1991+ |
| 32/X | 48 | Euphausia superba | Precautionary catch limit T; P | 1991+ |
| 33/X | 48.3 | C. gunnari | Prohibition of directed fishery G | 1991/92 season |
| 34/X | 48.3 | N. gibberifrons Chaenocephalus aceratus P. georgianus N. squamifrons P. guntheri | Prohibition of directed fishery G | 1991/92 season |

| | | | | |
|------------|--------|---|--|----------------|
| 35/X | 48.3 | D. eleginoides | Catch limit G | 1991/92 season |
| 36/X | 48.3 | All | 5-day catch and effort reporting system G | 1991/92 season |
| 37/X | 48.3 | D. eleginoides | Effort and biological data reporting G | 1991/92 season |
| 38/X | 48.3 | Electrona carlsbergi | Limitation of total catch G | 1991/92 season |
| 39/X | 48.3 | E. carlsbergi | Biological data reporting G | 1991/92 season |
| 40/X | All | All | Catch and effort reporting system G | 1991+ |
| 41/X | 48.1 | Finfish | Prohibition of directed fishery G | 1991/92 season |
| 42/X | 48.2 | Finfish | Prohibition of directed fishery G | 1991/92 season |
| 43/X | 58.4.4 | N. squamifrons | Prohibition of directed fishery G | 1991/92 season |
| 44/XI | 48.4 | D. eleginoides | Total catch limitation G | 1992/93 season |
| 45/XI, XIV | 58.4.2 | Euphausia superba | Precautionary catch limit P | 1992+ |
| 46/XI | 48 | Euphausia superba | Allocation of precautionary catch limits P | 1992/3/4 |
| 47/XI | All | All | Scientific research exemption provisions G | 1992+ |
| 48/XI | 48.3 | N.gibberifrons Chaenocephalus aceratus P. georgianus N. squamifrons P. guntheri | Prohibition of directed fishery G | 1992/3/4 |
| 49/XI | 48.3 | C.gunnari | Total catch limitation G | 1992/93 season |
| 50/XI | 48.3 | N. rossii N.gibberifrons N. squamifrons Chaenocephalus aceratus P. georgianus | Limitation of bycatch G | 1992/93 |
| 51/XI;XII | All | All | 5-day catch and effort reporting system G | 1992+ |

| | | | | |
|------------|---|--|---|-----------------------|
| 52/XI | All | All | Monthly effort and biological data reporting system for trawl fisheries T | 1992+ |
| 53/XI | 48.3 | E. carlsbergi | Total catch limitation T; G | 1992/3 season |
| 54/XI | 48.3 | E. carlsbergi | Biological data reporting system T; G | 1992+ |
| 55/XI | 48.3 | D. eleginoides | Catch limit G | 1992/3 season |
| 56/XI | 48.3 | D. eleginoides | Effort and biological data reporting system T; G | 1992/3 season |
| 57/XI | 48.2 | All finfish | Prohibition of directed fishery G | 1992/3 season |
| 58/XI | 48.1 | All finfish | Prohibition of directed fishery G | 1992/3 season |
| 59/XI | 58.4.4 | N. squamifrons | Limitation of total catch T | 1992/3/4 |
| 60/XI | 48 | Crab | Limits on exploratory fishery G | 1992/3 season |
| 61/XI; XII | All | All | 10-day catch and effort reporting system G | 1992+ |
| 62/XI | Seal Island | | Protection of CEMP site C | May 1993+ |
| 63/XII; XV | All | Antarctic fur seals | Reduction in use of plastic packaging bands G | Banned 1995/6 season+ |
| 64/XII | All except Kerguelen, Crozet, Prince Edward | All | Application of conservation measures to scientific research G | 1993+ |
| 65/XII | All except Kerguelen, Crozet, Prince Edward | All | Exploratory fisheries N | 1993+ |
| 66/XII | 48.3 | C. gunnari | Total catch limitation G | 1993/94 season |
| 67/XII | 48.3 | E. carlsbergi | Precautionary TACP | 1993/94 season |
| 68/XII | 48.3 | N. rossii N. gibberifrons N. squamifrons Chaenocephalus aceratus P. georgianus | Limitation of bycatch T; G | 1993/94 season |
| 69/XII | 48.3 | D. eleginoides | Limits on fishery T; G | 1993/94 season |

| | | | | |
|--------------|---------------|--|--|---------------------------|
| 70/XII | 48.4 | D. eleginoides | Catch limit T; G | 1993/94 season |
| 71/XII | 48.3; 48.4 | D. eleginoides | Effort and biological data reporting system T; G | 1993/94 season |
| 72/XII | 48.1 | Finfish | Prohibition of directed fishery G | 6 Nov 1993+ |
| 73/XII | 48.2 | Finfish | Prohibition of directed fishery | 6 Nov 1993+ |
| 74/XII | 48.3 | Crab | Limits on exploratory fishery G | 1993/94 season |
| 75/XII | 48.3 | Crab | Experimental harvest regime G | 1993/94 - 1995/96 seasons |
| 76/XIII | 48.3 | N. gibberifrons Chaenocephalus aceratus P. georgianus N. squamifrons P. guntheri | Prohibition of directed fishery T;G | 1993/94 - 1995/96 seasons |
| 77/XIII | 48.4 | D. eleginoides | Catch limit T; G | 1993/94 season |
| 78/XIII; XIV | 58.5.2 | C. gunnari D. eleginoides | Precautionary catch limit T;P | 1994+ |
| 79/XIII | 48.3 | Crab | Limits on exploratory fishery N | 1994/95 season |
| 80/XIII | 48.3 | D. eleginoides | Limits on fishery T;G | 1994/95 season |
| 81/XIII | 48.3; 48.4 | D. eleginoides | Effort and biological data reporting system G | 1994/95 season |
| 82/XIII | Cape Shirreff | | Protection of CEMP site C | May 1995+ |
| 83/XIII | Vacant | | | |
| 84/XIII | 48.3 | E. carlsbergi | Precautionary TAC P;T | 1994/95 season |
| 85/XIII | 48.3 | N. rossii N. gibberifrons N. squamifrons Chaenocephalus aceratus P. georgianus | Limitation of bycatch T | 1994/95 season |
| 86/XIII | 48.3 | C. gunnari | Prohibition of directed fishery | 1994/95 season |
| 87/XIII | 58.4.4 | ⁴ Lepidonotothen squamifrons | Limitation of total catch | 1993/94 - 1995/96 seasons |
| 88/XIV | 58.4.3 | D. eleginoides D. mawsoni | New fishery N | 1995/96 season |

| | | | | |
|------------|------------|--|--|----------------------------|
| 89/XIV | 58.5.2 | Deep water species not covered by 78/XIV | New fishery N | 1995/96 season |
| 90/XIV; XV | 48.3 | Crab | Experimental harvest regime N | 1995/96 to 1997/98 seasons |
| 91/XIV | 48.3 | Crab | Limits on exploratory fishery N | 1995/96 season |
| 92/XIV | 48.4 | D.eleginoides | TACT; G | 1995/96 season |
| 93/XIV | 48.3 | D.eleginoides | TACT; G | 1995/96 season |
| 94/XIV | 48.3; 48.4 | D.eleginoides | Effort and biological data reporting system T; G | 1995/96 season |
| 95/XIV | 48.3 | G. gibberifrons, Chaenocephalus aceratus, P. georgianus, N. rossi, L. squamifrons | Limitation of bycatch T; G | Any season |
| 96/XIV | 48.3 | E.carlsbergi | Precautionary TAC P; T | 1995/96 season |
| 97/XIV | 48.3 | C. gunnari | TACT | 1995/96 season |
| 98/XIV | 48.3 | C. gunnari | Effort and biological data reporting system T | 1995/96 season |
| 99/XV | 48.3 | Martiala hyadesi (crab) | New fishery N | 1996/7 |
| 100/XV | 48.3 | G. gibberifrons, Chaenocephalus aceratus, P. georgianus, P. guntheri, L. squamifrons | Prohibition of directed fishery T; G | 1996/97 season |
| 101/XV | 48.4 | D.eleginoides | TACT; G | 1996/97 season |
| 102/XV | 48.3 | D.eleginoides | TAC | 1996/97 season |
| 103/XV | 48.3 | E. carlsbergi | Precautionary TAC | 1996/97 season |
| 104/XV | 48.3 | Crab | Limits on fishery G | 1996/97 season |
| 105/XV | 58.4.4 | L. squamifrons | TACT | 1996/97 season |
| 106/XV | 58.4.1 | Euphausia superba | Precautionary TAC P | Any |
| 107/XV | 48.3 | C. gunnari | TAC | 1996/97 season |
| 108/XV | Vacant | | | |
| 109/XV | 58.5.2 | D.eleginoides | TACT | 1996/97 season |
| 110/XV | 58.5.2 | C. gunnari | Precautionary TAC; T | 1996/97 season |

| | | | | |
|--------|------------------------|------------------------------|--|------------------|
| 111/XV | 58.5.2 | Deep water species | New fishery | 1996/97 season |
| 112/XV | All | Dissostichus spp. | General measures for new fisheries N | 1996/97 season |
| 113/XV | 58.4.3 | D. eleginoides D. mawsoni | New fishery N | 1996/97 season |
| 114/XV | 48.6 | D. eleginoides D. mawsoni | New fishery N | 1996/97 season |
| 115/XV | 88.1 88.2 | D. eleginoides D. mawsoni | New fishery N | 1996/97 season |
| 116/XV | 58.6 58.7 58.4.4 | D. eleginoides D. mawsoni | New fishery N | 1996/97 season |
| 117/XV | All | Trawl and longline fisheries | Monthly fine-scale effort-biological data reporting system G | When appropriate |

TABLE 2
RESOLUTIONS PASSED BY CCAMLR 1985-1996

| Resolution | Area | Species | Effect | When current | Comments |
|--------------|-------------------------|-----------------|---|-------------------------------|---|
| 1/IV | 48.3 | N. rossii | Refrain from directed fishery; limit bycatch T; G | 1985/86 season | |
| 2/IV | 48.1; 48.2 | N. rossii | Refrain from directed fishery; limit bycatch T;G | 1985/86 season | Precautionary measure |
| 3/IV | 58.5 | N. rossii | Prohibition of directed fishery T; G | | French data and analyses used |
| 4/V | 48.1; 48.2 | N. rossii | Prohibition of directed fishery T; G | Pending Cons Meas 5/V and 6/V | |
| 5/VIII | All | Seabirds | Protection from incidental mortality in the course of longline fishing L | | |
| 6/VIII | 48.1; 48.2 | N. gibberifrons | Refrain from directed fishery; limit bycatch T;G | | Precautionary measure |
| 7/IX | All | All | No expansion in driftnet fishing G | | |
| 8/X | Seal Island | | Protection of CEMP site C | | Voluntary compliance with draft management plan |
| 9/XI | All | All | Scientific research exemption provisions G | | |
| 10/XII | Adjacent to CCAMLR area | All | Harvesting to be carried out according to Cons Meas applying within CCAMLR area G | | |
| 11/XII; XIII | Cape Shirreff | | Protection of CEMP site C | | |

¹ Key: G = General; T= Trawl; L = Longline; N = New; C = CEMP site; P = Precautionary.

²Arabic numbers refer to the number of the Conservation Measure or Resolution given to it at its first formulation. Roman numerals refer to the Commission meeting at which it was adopted or amended.

eg. CM 45/XI, XIV means that this was the 45th measure to be passed, it was passed at the 11th meeting in 1992 and amended at the 14th meeting in 1995.

³The most frequently occurring names are abbreviated after the first mention of the genus. They are: *Notothernia* (N.), *Dissostichus* (D.), *Chamsopcephalus* (C.), *Patagonotothen* (P.); *Electrona* (E.) followed by species names in full as appropriate. Where the possibility exists of confusion due to genera having identical first letters, names are spelled out in full.

Euphausia superba (Antarctic krill) is spelled out in full.

⁴*Notothernia squamifrons* was changed to *Lepidonotothen* (L.) (SC-CAMLR-XIV Annex 5 p. 262 fn.)

Appendix C

Summary of Standard Methods in use at CEMP sites by members

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|--------------------|---------|--------|------------------------------------|------------|
| A: Penguins | | | | |

| | | | | | |
|------------|---|----------|------------------|----------------------------|------|
| A 1 | Weight on arrival at breeding colonies | Adélie | Argentina | Stranger Pt King George Is | 1988 |
| | | | | Laurie Is S.Orkney Is | 1988 |
| | | | | Esperanza St | 1991 |
| | | Adélie | Australia | Magnetic Is/ Prydz Bay | 1984 |
| | | | | Béchervaise Is | 1992 |
| | | Macaroni | Germany | Ardley Is/ S.Shetlands | 1991 |
| | | Macaroni | UK | Bird Is/ South Georgia | 1990 |

| | | | | | |
|------------|---|--------|-----------------------------|------------------------------------|------|
| A 2 | Length of first incubation shift | Adélie | Argentina | Stranger Pt King George Is | 1988 |
| | | | | Esperanza St | 1991 |
| | | Adélie | Australia | Magnetic Is/ Prydz Bay | 1984 |
| | | | | Béchervaise Is | 1991 |
| | | Adélie | Germany | Ardley Is/ S.Shetlands | 1991 |
| | | Adélie | Italy/ Australia | Edmonson Point, Ross Sea region | 1994 |

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|--------------------|--|-------------------------|---|---------------|
| A: Penguins | | | | |
| A 3 | Annual trends in breeding population size | Adélie | Argentina Stranger Pt/ King George Is | 1988 |
| | | | Esperanza St | 1991 |
| | | Adélie | Australia Magnetic Is/ Prydz Bay | 1984 |
| | | | Béchervaise Is | 1991 |
| | | | Shirley Island | 1995 |
| | | Macaroni Chinstrap | Brazil Elephant Is/ S.Shetlands | 1986 |
| | | Adélie Chinstrap | Chile Ardley Is S.Shetlands | 1982 |
| | | Adélie | Germany Ardley Is S.Shetlands | 1991 |
| | | Adélie | Japan Syowa St Network Site | 1970 |
| | | Adélie | Italy/ Australia Edmonsom Point, Ross Sea region | 1995 |
| A 4 | Demography | Macaroni Gentoo | UK Bird Is/ South Georgia | 1976 |
| | | Adélie Chinstrap Gentoo | UK Signy Is Network Site | 1979 |
| | | Adélie | USA Anvers Is | 1992 |
| | | | | |
| | | Macaroni Chinstrap | Brazil Elephant Is S.Shetlands | 1986 |
| | | Chinstrap | Chile Ardley Is/ S.Shetlands | 1982 |
| | | Macaroni Chinstrap | USA Seal Is S.Shetlands | 1988 |
| | | Adélie | Anvers Is Palmer Station | 1988 |

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|--------------------|---------|--------|------------------------------------|---------------|
| A: Penguins | | | | |

| | | | | | |
|------------|-----------------------------------|-----------|-----------------------------|---------------------------------------|------|
| A 5 | Duration of foraging trips | Adélie | Australia | Magnetic Is Prydz Bay | 1984 |
| | | | | Béchervaise Is | 1992 |
| | | | | Shirley Is | 1995 |
| | | Adélie | Italy/ Australia | Edmonsom Point, Ross Sea region | 1995 |
| | | Adélie | USA | Anvers Is Palmer Station | 1990 |
| | | Chinstrap | | Seal Is S.Shetlands | 1988 |
| | | Macaroni | | Seal Is S.Shetlands | NA |

| Parameter | Species | Nation | Site name/ IS R/ Network site | Year begun |
|--------------------|---------|--------|-------------------------------------|---------------|
| A: Penguins | | | | |

| | | | | | |
|------------|-----------------------------|----------------------------|-----------------------------|---|--------------|
| A 6 | Breeding success | Adélie | Argentina | Stranger Pt King George Is | 1988 |
| | | | | Laurie Is Esperanza St | 1988 |
| | | Adélie | Australia | Magnetic Is/ Prydz Bay | 1984 |
| | | | | Béchervaise Is | 1992 |
| | | Macaroni Chinstrap | Brazil | Shirley Is Elephant Is/ S.Shetlands | 1995 1986 |
| | | Chinstrap | Chile | Ardley Is S.Shetlands | 1982 |
| | | Adélie | Germany | Ardley Is | 1991 |
| | | Adélie | Italy/ Australia | Edmonsom Point, Ross Sea region | 1995 |
| | | Chinstrap Gentoo | Korea | Barton Pen., King George Is | 1992 |
| | | Macaroni Gentoo | UK | Bird Is/ South Georgia | 1976 |
| | | Adélie Chinstrap Gentoo | | Signy Is Network Site | 1979 |
| | | Macaroni Chinstrap | USA | Seal Is S.Shetlands | 1988 |
| | | Adélie | | Anvers Is Palmer St | 1988 |

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|--------------------|---------|--------|------------------------------------|---------------|
| A: Penguins | | | | |

| | | | | | |
|------------|-----------------------------|-----------------------|-----------------------------|---------------------------------------|------|
| A 7 | Fledgling weight | Adélie | Australia | Magnetic Is/ Prydz Bay | 1984 |
| | | | | Béchervaise Is | 1992 |
| | | | | Shirley Is | 1995 |
| | | Macaroni Chinstrap | Brazil | Elephant Is S.Shetlands | 1986 |
| | | Adélie | Germany | Ardley Is | 1991 |
| | | Adélie | Italy/ Australia | Edmonsom Point, Ross Sea region | 1995 |
| | | Gentoo | Korea | Barton Pen., King George Is | 1992 |
| | | Macaroni Gentoo | UK | Bird Is/ South Georgia | |
| | | Chinstrap Macaroni | USA | Seal Is S.Shetlands | 1988 |
| | | Adélie | | Anvers Is Palmer St | 1988 |

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|--------------------|---------|--------|------------------------------------|---------------|
| A: Penguins | | | | |

| | | | | | |
|------------|-------------------|-----------------------|-----------------------------|---------------------------------------|------|
| A 8 | Chick diet | Adélie | Australia | Magnetic Is/ Prydz Bay | 1984 |
| | | | | Béchervaise Is | 1992 |
| | | | | Shirley Is | 1995 |
| | | Macaroni Chinstrap | Brazil | Elephant Is/ S.Shetlands | 1986 |
| | | Chinstrap | Chile | Ardley Is S.Shetlands | 1982 |
| | | Adélie | Germany | Ardley Is | 1991 |
| | | Adélie | Italy/ Australia | Edmonsom Point, Ross Sea region | 1995 |
| | | Macaroni Gentoo | UK | Bird Is/ South Georgia | 1986 |
| | | Chinstrap | USA | Seal Is S.Shetlands | 1988 |
| | | Adélie | | Anvers Is Palmer St | 1988 |

| | | | | | |
|------------|--------------------------------|-----------------------|------------------|---------------------------|------|
| A 9 | Breeding chronology | Adélie | Australia | Magnetic Is/ Prydz Bay | 1984 |
| | | | | Béchervaise Is/Mawson | 1991 |
| | | | | Shirley Is | 1995 |
| | | Chinstrap Macaroni | USA | Seal Is S.Shetlands | 1988 |
| | | Adélie | | Anvers Is | 1988 |

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|------------------------|---------|--------|------------------------------------|---------------|
| B: Flying birds | | | | |

| | | | | | |
|----|---|---------------------------|----|---------------------------|------|
| B1 | Breeding population size | Black-browed albatross | UK | Bird Is/ South Georgia | 1977 |
| B2 | Breeding success | Black-browed albatross | UK | Bird Is/ South Georgia | 1977 |
| B3 | Age-specific annual survival and recruitment | Black-browed albatross | UK | Bird Is/ South Georgia | 1977 |

| Parameter | Species | Nation | Site name/ ISR/ Network site | Year begun |
|-----------------|---------|--------|------------------------------------|---------------|
| C: Seals | | | | |

| | | | | | |
|----|--|----------|-------|-------------------------------|---------------|
| C1 | Cow foraging/ attendance cycles | Fur seal | Chile | Cape Sheriff | 1988 |
| | | Fur seal | UK | Bird Is/ South Georgia | 1988 |
| | | | | Seal Is S.Shetlands | 1988 |
| C2 | Pup growth | Fur seal | Chile | Cape Sheriff Ant Peninsula | 1985 |
| | | Fur seal | UK | Bird Is/ South Georgia | 1973; 1978 |
| | | | | Seal Is S.Shetlands | 1988 |

Appendix D

STATUS OF CCAMLR CONTRACTING PARTIES

| Contracting Party | Original signatories date signed | Date of ratification ¹ | Effective date | Commission Membership | Madrid Protocol Signed /Ratified |
|---|----------------------------------|-----------------------------------|-------------------|-----------------------|----------------------------------|
| Argentina | 11 September 1980 | 28 May 1982 | 28 June 1982 | 27 June 1982 | (S)(R) |
| Australia | 1 September 1980 | 6 May 1981 | 7 April 1982 | 7 April 1982 | (S)(R) |
| Belgium | 11 September 1980 | 22 February 1984 | 23 March 1984 | 3 March 1984 | (S)(R) |
| Brazil | | 28 January 1986 | 27 February 1986 | 8 September 1986 | (S)(R) |
| Chile | 11 September 1980 | 22 July 1981 | 7 April 1982 | 7 April 1982 | (S)(R) |
| EEC (now EU) | | 21 April 1982 | 21 May 1982 | 21 May 1982 | (S)(R) |
| France | 16 September 1980 | 16 September 1982 | 16 October 1982 | 16 October 1982 | (S)(R) |
| German Democratic Republic ² | 11 September 1980 | 30 March 1982 (AP) | 29 April 1982 | 29 April 1982 | (S)(R) |
| Germany, Federal Republic of | 11 September 1980 | 23 April 1982 | 23 May 1982 | 23 May 1982 | |
| India | | 17 June 1985 | 17 July 1985 | 29 June 1986 | (S)(R) |
| Italy | | 29 March 1989 | 28 April 1989 | 30 June 1990 | (S)(R) |
| Japan | 12 September 1980 | 26 May 1981 (AC) | 7 April 1982 | 7 April 1982 | (S) |
| Korea, Republic of | | 29 March 1985 | 28 April 1985 | 19 November 1985 | (S)(R) |
| New Zealand | 11 September 1980 | 8 March 1982 | 7 April 1982 | 7 April 1982 | (S)(R) |
| Norway | 11 September 1980 | 6 December 1983 | 5 January 1984 | 5 January 1984 | (S)(R) |
| Poland | 11 September 1980 | 28 March 1984 | 27 April 1984 | 27 April 1984 | (S)(R) |
| South Africa | 1 September 1980 | 23 July 1981 | 7 April 1982 | 7 April 1982 | (S)(R) |
| Spain | | 9 April 1982 | 9 May 1984 | 21 October 1987 | (S)(R) |
| Sweden | | 6 June 1984 | 6 July 1984 | 30 December 1989 | (S)(R) |
| USSR ³ | 11 September 1980 | 26 May 1981 (AC) | 7 April 1982 | 7 April 1982 | (S)(R) |
| United Kingdom | 11 September 1980 | 11 August 1981 | 7 April 1982 | 7 April 1982 | (S)(R) |
| United States | 11 September 1980 | 18 February 1982 | 7 April 1982 | 7 April 1982 | (S)(R) |
| Ukraine (part of former USSR) | | 22 April 1994 | 22 May 1994 | 14 December 1994 | (S)? |
| Uruguay | | 22 March 1985 | 21 April 1985 | 26 August 1996 | (S)(R) |
| Bulgaria | | 1 September 1992 | 30 September 1992 | Nonmember | |
| Canada | | 1 July 1988 | 31 July 1988 | Nonmember | (S) |
| Finland | | 6 September 1989 | 6 October 1989 | Nonmember | (S)(R) |
| Greece | | 12 February 1987 | 14 March 1987 | Nonmember | (S)(R) |
| Netherlands | | 23 February 1990 | 25 March 1990 | Nonmember | (S)(R) |
| Peru | | 23 June 1980 | 23 July 1980 | Nonmember | (S)(R) |

¹ Key: AC = acceptance; AP = approval/accession

² German Democratic Republic discontinued membership 3 October 1992 after unification with Federal Republic of Germany to form Germany.

³ Succeeded by Russian Federation 15 January 1992; Ukraine also claims to be successor to USSR.

Appendix E

EVENTS RELEVANT TO CCAMLR 1981-1995

1981

CCAMLR / ATS

CCAMLR Preparatory meeting
FIBEX cruises
ATCM XI Buenos Aires

International events

1982

CCAMLR / ATS

CCAMLR Convention ratified
CCAMLR Commission, Scientific Committee established and hold first meetings. No official report of Scientific Committee

International events

Falkland/Malvinas Islands conflict

Malaysia Statement on Antarctica UN
UN Law of the Sea Convention signed

UN World Charter for Nature

Krill catch exceeds 500000 tonnes
Agreed Measures come into force
Fourth Special Antarctic Treaty Consultative Meeting on Minerals commences

IWC imposes ban on commercial whaling to take effect 1986

1983

CCAMLR / ATS

Fourth Special Antarctic Treaty Consultative Meeting on Minerals continues

International events

Statement on Antarctica 7th Summit
Non-aligned Countries

CCAMLR-II; Scientific Committee meeting

Question of Antarctica debated at UN General Assembly

Working Group on Data Collection and Handling meeting
ATCM XII Canberra

EU Common Fisheries Policy adopted

1984

CCAMLR / ATS

Fourth Special Antarctic Treaty Consultative Meeting on Minerals continues.

International events

Beagle Channel dispute between Chile and Argentina concluded with Treaty of Peace and Friendship

CCAMLR-III; SC-CAMLR-III
Conservation Measures 1/III; 2/III
Ad hoc CEMP set up.

Question of Antarctica debated at UN General Assembly

Meeting CCAMLR ad hoc working group
Data Collection and Handling.

SIBEX cruises.

1985

CCAMLR / ATS

Fourth Special Antarctic Treaty Consultative Meeting on Minerals continues.

First meeting ad hoc WG-CEMP Seattle.

CCAMLR-IV; SC-CAMLR-IV.

System inspection and observation WG-CEMP established.

CCAMLR/FAO species identification sheets published.

ATCM XIII Brussels

International events

Question of Antarctica debated at UN General Assembly

South Georgia and South Sandwich Islands Order

1986

CCAMLR / ATS

Fourth Special Antarctic Treaty Consultative Meeting on Minerals continues.

WG-CEMP meeting.

CCAMLR-V; SC-CAMLR-V.

First Special Meeting of Commission on Brazil membership.

Krill catch 446000 tonnes (second highest level).

International events

Question of Antarctica debated at UN General Assembly

IWC ban on commercial whaling comes into effect

Vienna Convention on the Law of Treaties between states and international organizations or between international organizations

Spain and Portugal join EU expanding its fishing capacity by 75%

1987

CCAMLR / ATS

Fourth Special Antarctic Treaty Consultative Meetings on Minerals continue.

WG-DAC meeting.

WG-CEMP meeting.

WG-FSA formalised.

CCAMLR-VI; SC-CAMLR-VI.

CEMP Standard Methods published.

CCAMLR/IOC Scientific Seminar on Antarctic Ocean variability.

ATCM XIV Rio de Janeiro

International events

Question of Antarctica debated at UN General Assembly

1988

CCAMLR / ATS

Fourth Special Antarctic Treaty Consultative Meeting on Minerals concludes: CRAMRA signed.
CCAMLR-VII; SC-CAMLR-VII.
ASOC invited as observer to CCAMLR meetings.
Standing Committee on Observation and Inspection (SCOI) established.
WG-DAC meeting.
No WG-CEMP meeting.
WG-Krill formalised.

International events

Question of Antarctica debated at UN General Assembly

1989

CCAMLR / ATS

CCAMLR-VIII; SC-CAMLR-VIII

WG-DAC meeting; WG-CEMP meeting.
WG-FSA meeting; First WG-Krill meeting.
Establishment system inspection and observation.
ATCM XV Paris

International events

Question of Antarctica debated at UN General Assembly

Breakup of USSR, Eastern bloc communist regimes commences

1990

CCAMLR / ATS

CCAMLR-IX; SC-CAMLR-IX.
WG-CEMP meeting

WG-FSA meeting.

Res. 7/IX on driftnets.

International events

Question of Antarctica debated at UN General Assembly

Breakup of Apartheid system in South Africa commences

UK/Argentina Joint Statement on the Conservation of Fisheries

1991

CCAMLR / ATS

CCAMLR-X; SC-CAMLR-X
WG-CEMP meeting
WG-FSA meeting

Protocol on Environmental Protection to the Antarctic Treaty signed (Madrid Protocol)

APIS program planned.
ATCM XVI Bonn

International events

Question of Antarctica debated at UN General Assembly

SO-Globec initiated

1992

CCAMLR / ATS

CCAMLR-XI; SC-CAMLR-XI
WG-CEMP meeting
Joint WG-CEMP, Krill meeting.
WG-FSA meeting.
Dr D Powell resigns as Executive Secretary of CCAMLR.

ATCM-XVII Venice

International events

Question of Antarctica debated at UN General Assembly
UNCED; Agenda 21
Cancun declaration
Convention on Biological Diversity

1993

CCAMLR / ATS

CCAMLR-XII; SC-CAMLR-XII.
WG-CEMP meeting.
WG-FSA meeting.
Joint WG-CEMP, Krill meeting.

Esteban de Salas takes up appointment as Executive Secretary of CCAMLR.

International events

Question of Antarctica debated at UN General Assembly

Compliance Agreement (reflagging)

Convention for the Conservation of Southern Bluefin Tuna

Proclamation (Maritime Zone) No. 1 of 1993 South Georgia/South Sandwich Islands

1994

CCAMLR / ATS

CCAMLR-XIII; SC-CAMLR-XIII.
WG-CEMP meeting.
Joint WG-CEMP, Krill meeting.
WG-EMM established.

ATCM-XVIII Kyoto

International events

Question of Antarctica debated at UN General Assembly

IWC declares Southern Ocean whaling sanctuary

Law of the Sea comes into force

1995

CCAMLR / ATS

CCAMLR-XIV; SC-CAMLR -XIV.

Illegal fishing reported in CCAMLR area.

ATCM-XIX Seoul

International events

Spanish fishing vessel *Estai* impounded by Canada

New fishing licence system introduced for Community fishing boats operating in and outside EU waters.

No debate on Question of Antarctica at UN General Assembly

FAO Draft code of conduct for responsible fisheries

FAO Kyoto Declaration and Plan of Action on the Sustainable Contribution of Fisheries to Food Security

FAO Rome Consensus on World Fisheries

Agreement Straddling Fish Stocks and Highly Migratory Fish Stocks signed

