MANAGEMENT UNDER CONDITIONS OF UNCERTAINTY ABOUT STOCK SIZE AND SUSTAINABLE YIELD

7.1 Over the past few years the Commission had sought the advice of the Scientific Committee on matters related to management under uncertainty. At its 1998 meeting the Commission had requested the Chairman of the Scientific Committee to set up a task group during the intersessional period to explore the scientific issues associated with developing a regulatory framework for fisheries management. This task group had considered these issues and prepared a report which had been tabled and had previously been considered by WG-FSA (SC-CAMLR-XVIII/BG/25). Before considering this paper, the Scientific Committee discussed specific points raised by the Commission last year (CCAMLR-XVII, section 10).

Management of *Dissostichus* spp. Stocks and in particular taking account of Uncertainties in Stock Structure and Recruitment

7.2 The Scientific Committee noted that new information available on growth and natural mortality had been tabled at WG-FSA. Whilst accepting that this had resulted in major advances, the Scientific Committee felt that there was still considerable scope for improving these estimates. In particular, it was noted that the values of natural mortality coefficients had been obtained by using basic models due to the paucity of age-density data from unexploited populations (Annex 5, paragraphs 3.100 to 3.104).

7.3 It was noted that further information on mortality might arise from analysis of tagging experiments. Such studies were being undertaken by Australia at Heard, McDonald and Macquarie Islands in addition to those planned by the UK using *D. eleginoides* from the toothfish experimental pot fishery (CCAMLR-XVIII/BG/38). Dr Holt agreed to provide information on the US long-term study on *D. mawsoni* at McMurdo Sound in the Ross Sea. The Scientific Committee looked forward to receiving reports on these activities.

Methods for Monitoring Spawning Stocks of *D. eleginoides*

7.4 Spawning activity of *D. eleginoides* is thought to occur from June to August in deep water on, or close to, the continental slope. Arising from this, the Scientific Committee agreed that it was very difficult in a number of subareas to monitor spawning aggregations using conventional trawl surveys.

7.5 The tagging studies mentioned above might provide some information on migration of this species to and from spawning and feeding grounds.

Methods for Assessment of Catch Limits in Mixed-gear Fisheries

7.6 WG-FSA had considered the problems associated with setting catch limits which satisfy CCAMLR's decision rules in determining an appropriate combined catch for trawl and longline fisheries within the same assessment area. WG-FSA noted that no formal mechanism for indicating the sustainability of combined catches is available at this stage. As an interim measure, the following formula was proposed for partitioning the long-term yield between a trawl and a longline fishery:

$$\text{Trawl catch} = (1-p_{\text{longline}}) \times Y_{\text{trawl}}$$

where p_{longline} is the proportion to be taken of longline annual yield, and Y_{trawl} is the long-term

annual yield for a trawl fishery.

Requirements for a General By-catch Conservation Measure

7.7 The Scientific Committee reiterated the need to assess the levels of by-catch in all fisheries in all areas. WG-FSA had noted that in longline fisheries for *Dissostichus* spp. the by-catch is dominated by Rajidae and Macrouridae (Annex 5, paragraph 4.73). It was noted that in those fisheries rajids are frequently discarded and not reported in the by-catch records.

7.8 Based on new information, WG-FSA agreed that for macrourids a maximum by-catch rate of 18% by mass of the *Dissostichus* spp. catch per fine-scale rectangle would be appropriate as a basis for setting general by-catch levels for new and exploratory fisheries. For Rajidae, the Scientific Committee agreed that the same by-catch provisions as had been proposed last year, namely 10 to 15% by mass, should be applied (Annex 5, paragraph 4.84).

7.9 In applying the above by-catch provisions, the Scientific Committee advised that it would be appropriate for vessels to move from a fishing location when the by-catch proportions had been exceeded. It recommended that the minimum distance a vessel should move should be 5 n miles from the fishing location (in the case of longlines, the fishing location would be set as the centre point between the longline setting location and the longline hauling location). The Scientific Committee also recognised that there should be a lower-level trigger below which it would not be necessary to require movement from a fishing location once the by-catch proportion had been exceeded. It was recommended that a total catch of 100 kg would be appropriate as such a trigger level.

7.10 The Scientific Committee noted that there remains a pressing need for reliable catch, effort and biological information for by-catch species. Furthermore it was noted that it was essential that data collection requirements, commensurate with those for target species, should be specified in conservation measures for new and exploratory fisheries.

Scientific Basis of a Regulatory Framework

7.11 The Chairman of the Scientific Committee introduced SC-CAMLR-XVIII/BG/25. This had been developed by a small ad hoc task group during the intersessional period. Brief discussion had taken place at WG-FSA (Annex 5, paragraphs 4.227 to 4.229). These topics were also discussed as the Scientific Committee considered new and exploratory fisheries.

7.12 It was noted that the development of a unified regulatory framework by the Scientific Committee and Commission is an iterative process which may take some time to complete. The Scientific Committee considered the subject under the following three broad headings: steps in the development of a fishery, procedures to guide the development of a fishery and the designation of the status of the different levels of the fishery.

7.13 The Scientific Committee considered this topic in the light of the requirements of Conservation Measures 31/X and 65/XII and the specific conservation measures for individual fisheries. It was noted that the requirements of Conservation Measure 65/XII (exploratory fisheries) were more exacting than those for Conservation Measure 31/X (new fisheries). The Scientific Committee considered that the initial requirements for information should be broadly based, and that as the fishery develops and it becomes clear what information is required for making assessments, the list could be relaxed.

Steps in the Development of a Fishery

7.14 It was agreed that the first and most important step would be to define the entry-level requirements for undeveloped fisheries, irrespective of whether they might currently be classified as 'new' or 'exploratory'. This would involve a notification procedure which contains a clear statement of the harvest strategy. This should provide available information on the targeted and by-catch species within the proposed fishery locality.

7.15 Alongside the notification procedure, research and data collection plans need to be developed as well as precautionary harvest strategies at scales of individual vessels and areas. These components would be used to formulate a management procedure under which the fishery is permitted to develop.

7.16 A variety of categories have been considered in the past to describe the different fisheries. These include the following categories: undeveloped, developing, established, lapsed and closed. The progress from one stage of fishery development to the next was viewed as a continuum with characteristics tailored to each fishery. The aim of the process would be to streamline the process of annual review in the face of a continuing increased workload being placed on assessment groups.

7.17 In considering lapsed fisheries, the Scientific Committee took as an example Conservation Measure 156/XVII which refers to *D. eleginoides* in Subarea 48.4. The precautionary catch limit was originally set following a study in the area in the 1992/93 season, but subsequently no commercial fishing has been reported. As such, the Scientific Committee had some information, the validity of which was deteriorating with time. Even so, the catch limit of 28 tonnes was seen as sufficiently precautionary as not to warrant annual review and might remain indefinitely. Such an approach might be extended to other areas in the future.

7.18 The currency of assessments was also considered with respect to situations where, in a locality where fishing had lapsed, it was likely to be resumed. The period of currency in this context would be equivalent to the average longevity of the target species in its natural state. An example of this was the proposed new fishery in Division 58.4.2, where information from the previous fishery over a decade ago would provide little insight into the current status of the stocks.

Procedure to Guide the Development of the Fishery

7.19 In developing management advice over the years, the Scientific Committee had developed a variety of procedures to determine the status of individual stocks and provide estimates of yield. Catch limits were set using conventional targets at the time. These included target levels of fishing mortality such as $F_{0.1}$. Subsequent work by WG-FSA showed that these target levels were inappropriate for CCAMLR. As a consequence, new decision rules were formulated leading to the development of the KYM and later the GYM.

7.20 This procedure had been developed for the krill fishery through the work of WG-EMM and expanded to *Dissostichus* spp. (SC-CAMLR-XVII, paragraph 5.134) and *C. gunnari* (Annex 5, paragraph 9.10) through the work of WG-FSA. Arising from this, the Scientific Committee noted that assessments on *D. eleginoides* and *C. gunnari*, both in Division 58.5.2 and Subarea 48.3, provided good examples of such a process.

Future Work and Management Advice

7.21 The Scientific Committee was pleased to note the progress that had been made, but

recognised that there was much which still needed to be done. Priorities were seen as:

(i) refining the fishery development framework from SC-CAMLR-XVIII/BG/25;

(ii) identifying data requirements from both commercial operations and research surveys;

(iii) developing robust procedures for assessment; and

(iv) addressing issues of determining the status of individual fisheries.

7.22 The Scientific Committee agreed that these activities should be addressed by the ad hoc task group in time for a draft document to be considered by WG-EMM and WG-FSA, and their comments should be considered at SC-CAMLR-XIX in 2000.

7.23 In view of the high level of IUU fishing in many parts of the Convention Area, the Scientific Committee noted that it was unrealistic to regard fisheries for *Dissostichus* spp. as new. It was therefore recommended that the advance notification scheme set out in Conservation Measure 65/XII be applied to all notifications of new and exploratory fisheries for *Dissostichus* spp.