

FISH RESOURCES

Fish Stock Assessment - Report of the Working Group

3.1 The Convener of the Working Group on Fish Stock Assessment (WG-FSA), Dr K.-H. Kock (Germany), presented a report of the meeting which had been held in Hobart at the offices of the Secretariat from 9 to 18 October 1990.

3.2 The Report of the WG-FSA is attached in Annex 5.

3.3 In reviewing the report, the Scientific Committee thanked the Convener and participants for all their hard work. A large number of background papers were presented to the WG-FSA meeting. A list of these documents is given in Annex 5, Appendix C.

3.4 The Scientific Committee endorsed the report of the WG-FSA and in receiving the report, used its findings as a basis for discussion of the agenda items to be covered under fish resources.

3.5 To avoid unnecessary duplication, where certain sections of the WG-FSA report were accepted with only minor or no comment, this Report refers to the relevant paragraphs in the Working Group report. This should be read in conjunction with that report.

3.6 At the request of the Scientific Committee (SC-CAMLR-VIII, paragraph 3.49) the Convener had prepared a document which analysed the problems of providing stock assessment advice. This was revised and endorsed by the Working Group. The Scientific Committee also endorsed the document which is in Annex 5, Appendix D.

3.7 The main conclusions of this document are as follows:

- (i) the quality of stock assessment and management advice by the WG-FSA will be improved by an increase in the number of research surveys and an improvement in the quality of catch and effort statistics; and
- (ii) uncertainty arising in the assessment of stocks will continue to be a major problem in the provision of management advice on fisheries resources in the

Convention Area and this uncertainty must be taken into account in reaching management decisions.

3.8 The Scientific Committee drew the Commission's attention to the problems identified in this document and pointed out that a large number of the difficulties associated in assessing the state of the stocks documented later in this Report are important examples of the problems identified in this document.

Review of Material for The Meeting

Catch and Effort Statistics (Annex 5, paragraph 8)
Size and Age Composition Data (Annex 5, paragraph 9)

3.9 There was a major problem in assessing many of the stocks as large amounts of relevant data were unavailable or incomplete. The Scientific Committee drew the Commission's attention to the fact that attempts to provide advice on the status of the stocks annually were being regularly and substantially undermined by the failure to provide relevant data in a timely manner.

By-Catch of Fish Larvae and Juvenile Fish
in the Krill Fishery (Annex 5, paragraphs 10 to 29)

3.10 The Working Group had reviewed a substantial amount of material which indicated that there was a potential problem of catches of young and larval fish in krill trawls.

3.11 The Scientific Committee endorsed in principle the idea that once nursery grounds for fish had been identified, these areas should be closed to krill fishing for the relevant periods.

3.12 Dr Naganobu expressed his reservations to this view.

3.13 Dr Shust agreed with the principles of operating the krill fishery in a manner that minimised the catch of young and larval fish, but expressed the view that more data needed to be collected on the problem before further action should be contemplated.

3.14 Mr O. Østvedt (Norway) suggested the possibility of dealing with the problem via by-catch regulations. However, this was considered to be problematic as the separation of larval fish from krill in commercial catches is difficult.

3.15 The Scientific Committee agreed that as a matter of priority, nursery grounds for fish should be identified. It was agreed that this should be a topic for the next meeting of the WG-FSA.

3.16 The Scientific Committee endorsed the suggestion of the Working Group (Annex 5, paragraph 27) that a program to monitor the by-catch of young and larval fish by the krill fishery should be initiated as soon as possible.

3.17 It was noted that the WG-FSA had developed a draft field sampling logsheet for the submission of data on this by-catch (Annex 5, Appendix J) and that an observer program would probably need to be implemented to undertake such monitoring (Annex 5, paragraphs 27 to 29).

Other Biological Information (Annex 5, Paragraphs 30 to 40)

3.18 The Scientific Committee noted the report of the Working Group without further comment.

Mesh Selection Experiments (Annex 5, Paragraphs 41 to 42)

3.19 The Working Group had reviewed further information on mesh selectivity experiments conducted by the USSR. These experiments had produced essentially similar results to previous work on the fishing targeted on *Champscephalus gunnari*.

3.20 The Scientific Committee noted that its recent advice on the modification of mesh regulations contained in Conservation Measure 2/III (SC-CAMLR-VIII, paragraph 3.18) had not been accepted by the Commission pending the results of these experiments (CCAMLR-VIII, paragraphs 80 to 83).

3.21 In 1989 the WG-FSA considered mesh sizes for *C. gunnari* which would allow some escapement of fish at various stages of development. A nominal mesh of 80 mm selects fish at about the length of 50% maturity, which is well below the length of first spawning. A 90 mm nominal mesh selects fish at about the mean length of first spawning. A nominal mesh of 100 mm would correspond to an age at first capture of 4 years which has been proposed as the optimum under the conditions of high fishing mortality.

3.22 The Scientific Committee agreed that they could now advise the Commission that all analyses supported the position that in Subarea 48.3 the above options for mesh regulation could be considered for the fishery targeted on *C. gunnari*.

Assessments Prepared by Member Countries (Annex 5, Paragraphs 43 to 59)

3.23 The Scientific Committee noted the Working Group's report on these assessments without comment.

Methodologies Used for Surveys and Assessments (Annex 5, Paragraphs 60 to 93)

3.24 The Scientific Committee endorsed the recommendation of the Working Group on these results.

Assessment Work (Annex 5, Paragraph 94)

3.25 The Scientific Committee recommended that the assessment summaries contained in Annex 5, Appendix L should be modified to exclude the recommendations of the Working Group. These summaries could then be used directly without the problem of confusion between the recommendation of the Working Group and those of the Scientific Committee. The Scientific Committee believed these summaries were useful and recommended that they should continue.

Statistical Area 48

Subarea 48.3 (South Georgia)

Catches (Annex 5, paragraph 95)

3.26 The Scientific Committee noted the information provided by the Working Group on historical catches without comment.

Assessments of Individual Stocks

Notothenia rossii in Subarea 48.3 (Annex 5, paragraphs 96 to 98)

3.27 The Scientific Committee noted that the report of the Working Group indicated that this stock was still at a very low level.

Management Advice

3.28 The Scientific Committee recommended that all conservation measures for this species should remain in force.

Champscephalus gunnari in Subarea 48.3 (Annex 5, paragraphs 99 to 141)

3.29 Three surveys had occurred during 1990 to assess the status of the stock. These surveys gave widely different estimates of the biomass of the stock. The estimates obtained by the RV *Akademik Knipovich* (USSR) and the BMRT *Anchar* (USSR) were in excess of two-times (*Akademik Knipovich*) and four-times (*Anchar*) the estimates obtained by the RV *Hill Cove* (UK/Poland).

3.30 Dr Beddington expressed concern about the wide disparity between these results which had not been explained by the Working Group. He believed that there were likely to be operational differences in the conduct of the different surveys.

3.31 Dr Shust stated his view that the results of the different surveys were both comparable and reliable and stated that for the first time, identical randomised survey designs had been used.

3.32 Lic. E. Marschoff (Argentina) expressed his concern about the design of the surveys because at least two of them had no significant difference in fishing density between the depth strata sampled nor between geographical positions of trawls contrary to normal biological expectations.

3.33 The Chairman of the Scientific Committee pointed out that the survey design used by the *Hill Cove* was the same as that used by RV *Professor Siedlecki* and RV *Walter Herwig* in previous years.

3.34 The Working Group had identified a number of sources of uncertainty concerning the status of the stock which the Scientific Committee noted. In addition, no length and age data from the commercial catches had been presented to CCAMLR.

3.35 The Working Group had examined the problem of setting TACs under uncertainty. They indicated that under reasonable statistical assumptions, the use of point estimates (e.g., from a survey) would have a 69% chance of the TAC being too high.

3.36 Dr Shust pointed out that there was a 31% chance of the TAC being too low.

Management Advice

3.37 The Working Group had presented a range of possible TACs based on the point estimates of the *Hill Cove* and *Akademik Knipovich* surveys (44 000 to 64 000 tonnes).

3.38 The Scientific Committee, in considering the uncertainties identified by the Working Group, did not believe that the range of TACs given was appropriate as a basis of management advice to the Commission. The Scientific Committee believed that the range should be extended to lower levels of TAC to reflect the uncertainties in the use of the point estimate and the discrepancy between the surveys in earlier years and those in 1990.

3.39 The USSR Delegation did not agree with these reservations and stated its view that the range given by the Working Group was the appropriate basis for giving management advice to the Commission and might well be conservative.

3.40 The Scientific Committee endorsed the comment of the Working Group that if the biomass is well estimated by the *Hill Cove* survey, setting a TAC on the basis of the *Akademik Knipovich* survey will result in a substantial depletion of the stock. If the biomass is well estimated by the *Akademik Knipovich* survey, setting a TAC on the basis of the *Hill Cove* survey will result in a substantial increase in the stock.

3.41 The Scientific Committee recommended (on the basis of advice of the Working Group) that due to the uncertainties, a conservative TAC be adopted to reduce the probability of over-exploiting the species.

3.42 Lic. E. Barrera-Oro (Argentina) stated that even if a TAC was set from the lowest figure of the range of TAC values (44 000 to 64 000 tonnes), the by-catch limit of 500 tonnes of *Notothenia gibberifrons* would be exceeded. He referred to WG-FSA-90/15 referred to in paragraph 185 of the Working Group report, where the *N. gibberifrons* by-catch in the directed fishery of *C. gunnari* using midwater trawls in Subarea 48.3 was evaluated based on the data submitted for 1987/88 and 1988/89. This evaluation specifies that between 138 and 638 kg of *N. gibberifrons* would be caught for each haul directed at *C. gunnari*. Taking the minimum value (i.e., 138 kg per haul), a TAC of 500 tonnes of *N. gibberifrons* by-catch would be reached with 3 600 hauls, which is equivalent to 14 000 tonnes of *C. gunnari*. This value of 14 000 tonnes is less than half of the minimum TAC proposed for the target species, *C. gunnari* in paragraph 3.37.

3.43 These observations were supported by a number of delegations.

3.44 Mr E. Balguerías (EEC) made the point that the catch of target species may need to be restricted by concerns over the by-catch of depleted species.

3.45 In this context, Dr W. de la Mare (Australia), supported by a number of other delegations, suggested that the figure referred to in paragraph 3.42 (14 000 tonnes) could form the basis for a conservative TAC for *C. gunnari*.

3.46 Dr Shust disagreed with the views expressed in paragraph 3.42. He pointed out that the reported catch of *N. gibberifrons* was only 11 tonnes in the catch of 8 000 tonnes of *C. gunnari* in 1990 when only midwater trawls were used. He pointed out that where a by-catch species exceeded 5% of the haul, the vessel would cease fishing in the area.

3.47 Dr de la Mare drew attention to paragraph 186 of the Working Group report which noted that it cannot be presumed that future fishing with midwater trawls will always result in negligible by-catch.

3.48 Lic. Marschoff stated that the by-catch of *N. gibberifrons* reported to CCAMLR from the last season is highly improbable in view of previously reported by-catches from midwater trawls.

Patagonotothen brevicauda guntheri in Subarea 48.3
(Annex 5, paragraphs 142 to 154)

3.49 Reported catch of this species was 145 tonnes although the TAC was 12 000 tonnes (Conservation Measure 16/VIII). It was stated that this was a result of no fishing being conducted within 12 miles of Shag Rocks.

3.50 There is some confusion in the reported data as catches reported to CCAMLR in 1987 and 1988 were indicated as coming from the South Georgia region. Research surveys have indicated that the species does not occur in this area.

3.51 The Scientific Committee noted that the report of the Working Group indicates considerable uncertainty with respect to current biomass, age structure, recent recruitment and demographic parameters.

Management Advice

3.52 The Working Group had recommended (Annex 5, paragraph 154) that the TAC should be at the lower end of the range (20 000 to 36 000 tonnes).

3.53 The basis of this recommendation was queried by Dr Beddington who pointed out that the previous TAC was 12 000 tonnes which had not been caught. There were major documented uncertainties in all the components of the stock assessment process and the catch data had been shown to be false.

3.54 The Scientific Committee's attention was drawn to paragraph 275 of the Working Group's report in which two views were expressed.

- (i) The TAC should be revised upward in the light of the TAC recommendations of the Working Group.
- (ii) The fishery should be closed until the major uncertainties identified with fine-scale data and those referred to in paragraphs 3.50 and 3.51 above could be resolved.

The Scientific Committee's discussion of this matter reflected these two views which are presented as alternative approaches to the Commission.

Dissostichus eleginoides in Subarea 48.3
(Annex 5, paragraph 155 to 170)

3.55 Catches in the 1988/89 season were 4 138 tonnes. Reported catches for 1989/90 have doubled to 8 311 tonnes.

3.56 The Scientific Committee noted that the intention of the USSR not to increase the fleet by more than one or two vessels in addition to the six vessels operating in 1988/89 (CCAMLR-VIII, paragraph 130(a)), had not prevented the doubling of catches in 1989/90. Essential information necessary for monitoring fishing power in this fishery has not been provided. The Scientific Committee felt that this information is essential to the management of this fishery. It was also noted that only a small amount of biological information from the fishery has been submitted.

3.57 At its last meeting, the Commission had not set any conservation measures for this stock: in part, as a result of the assertion (CCAMLR-VIII, paragraph 106) that the fishery is targeted on senescent fish. The results of the Working Group's analyses (Annex 5, paragraphs 161 and 162) indicate that this assertion is almost certainly false.

Management Advice

3.58 The Working Group had suggested that a TAC in the range of 1 200 to 8 000 tonnes would be appropriate.

3.59 The Scientific Committee, having reviewed the substantial uncertainties associated with the stock, recommended that a TAC should be set for the stock in the lower part of this range.

3.60 The USSR Delegation expressed the view that a TAC in the middle of the range would be appropriate in the light of its comments in the report of the WG-FSA.

3.61 Dr Kock had expressed concern on a fishery on *Dissostichus eleginoides* developing on a bank west of Shag Rocks just outside the Convention Area (CCAMLR-IX/MA/1) with a potential of extending further to the west. Due to uncertainties in stock boundaries, it is possible that these catches originate from the same stock which is currently exploited around Shag Rocks and South Georgia.

3.62 The Scientific Committee drew the Commission's attention to the fact that this fishery was occurring in all months of the year. Accordingly, there is a potential problem that the catch may have already exceeded a possible TAC.

3.63 Dr Shust reported that he had not received information on the catch of this species since July 1990.

3.64 Catches in the 1989/90 season were 2 501 tonnes from 1 August to 31 October and 3 410 tonnes by the end of November.

3.65 The Scientific Committee recommended that the Commission should consider imposing a closed season on this fishery from the beginning of July until the end of the 1991 Commission meeting.

3.66 The Scientific Committee recommended that in the event of a TAC being set by the Commission for this species, a five-day reporting period for catches should be utilized.

Electrona carlsbergi in Subarea 48.3
(Annex 5, paragraphs 172 to 183)

3.67 The Scientific Committee endorsed the recommendation of the Working Group and recommended that for myctophids caught in the CCAMLR Convention Area, all catches including those from adjacent areas to the north of Statistical Area 48, should be reported in fine-scale format.

Notothenia gibberifrons in Subarea 48.3
(Annex 5, paragraphs 184 to 197)

3.68 The Scientific Committee endorsed the analyses of the Working Group without comment.

Management Advice

3.69 On the basis of the analyses of the Working Group, the Scientific Committee recommended that there should be no directed fishery for this species and catches should be restricted to not more than 500 tonnes.

Chaenocephalus aceratus and *Pseudochaenichthys georgianus*
in Subarea 48.3 (Annex 5, paragraphs 198 to 207)

3.70 The Scientific Committee endorsed the analyses of the Working Group without comment.

Management Advice

3.71 On the basis of the Working Group's analyses, the Scientific Committee recommended that there should be no directed fishery for either species and that a TAC of 300 tonnes as a by-catch provision should be set.

Notothenia squamifrons in Subarea 48.3
(Annex 5, paragraphs 208 to 211)

3.72 The Scientific Committee noted the report of the Working Group without comment.

Management Advice

3.73 On the basis of the Working Group's advice, the Scientific Committee recommended that there should be no directed fishery for this species and that the by-catch provision of 300 tonnes should be retained by inclusion of this species in Conservation Measure 13/VIII.

Subarea 48.2 (South Orkney Islands)

3.74 Catches in 1990 were *C. gunnari*, 2 528 tonnes and *N. gibberifrons*, 340 tonnes.

Management Advice

3.75 The Working Group had requested new data at its 1989 Meeting. These data were not presented. Accordingly, the Working Group was not able to provide management advice for either *C. gunnari* or *N. gibberifrons*.

3.76 Lic. Barrera-Oro pointed out that in spite of CCAMLR Resolution 6/VIII the catch of *N. gibberifrons* taken as a by-catch in the directed fishery for *C. gunnari* was high (around 13%). This fishery used bottom trawls. He suggested that there should be a ban on bottom trawling for *C. gunnari* to reduce the by-catch of *N. gibberifrons*. This suggestion received support from a number of delegations.

3.77 Dr Shust did not agree with this suggestion. He believed any such advice should follow a proper assessment of the stock.

Subarea 48.1 (Antarctic Peninsula) (Annex 5, paragraphs 218 to 220)

3.78 Lic. Marschoff referred to analyses contained in WG-FSA-90/14 and discussed by the Working Group. This indicated a decline in recruitment of *N. rossii* and *N. gibberifrons* in Subarea 48.1.

3.79 There was no commercial fishing in this area and no new information was provided. The Scientific Committee made no recommendations about management advice.

Statistical Area 58

Catches (Annex 5, paragraphs 221 to 223)

3.80 The Scientific Committee noted the report of the Working Group without comment.

Subarea 58.5 (Kerguelen)

Division 58.5.1 (Kerguelen)
(Annex 5, paragraphs 224 to 243)

3.81 The work of the Working Group was seriously hampered by the absence of Dr Duhamel or any scientist with a direct knowledge of the fishery. The Scientific Committee supported the hope expressed by the Working Group that this absence of relevant scientists would not occur at future meetings.

Notothenia rossii in Division 58.5.1
(Annex 5, paragraphs 225 to 228)

3.82 The Scientific Committee endorsed the report of the Working Group.

Management Advice

3.83 The Scientific Committee recommended that there should be no directed fishery for this species and that there should be no resumption of the fishery until a biomass survey had established that the stock had recovered from past over-exploitation.

Notothenia squamifrons in Division 58.5.1
(Annex 5, paragraphs 230 to 233)

3.84 Catches continued at around the level of recent years. No new data were presented.

Management Advice

3.85 The Scientific Committee advised that a continuation of catch at the current levels will prevent recovery of the stock.

Champscephalus gunnari in Division 58.5.1
(Annex 5, paragraphs 234 to 243)

3.86 Catches were 226 tonnes in 1990.

3.87 The Scientific Committee endorsed the analyses of the Working Group.

Management Advice

3.88 On the basis of the advice of the Working Group, the Scientific Committee noted that the 1985 cohort now appears to be extinct. The Scientific Committee recommended that there be no directed fishery for this species until a survey has established the size of the new cohort.

Dissostichus eleginoides in Division 58.5.1
(Annex 5, paragraphs 240 to 243)

3.89 The Scientific Committee endorsed the work of the Working Group without comment.

Management Advice

3.90 There is an urgent need to assess this stock. No such assessments have been made due to a lack of information. No advice can be given.

Division 58.5.2 (Heard Island)
(Annex 5, paragraph 244)

3.91 The Scientific Committee noted the results without comment.

Subarea 58.4 (Enderby-Wilkes)

3.92 The Scientific Committee noted with concern the major inconsistency of the catch data on *Notothenia squamifrons* reported for Ob and Lena Banks and the catches reported for these two grounds separately.

Division 58.4.4 (Ob and Lena Banks)
(Annex 5, paragraphs 245 to 261)

Notothenia squamifrons (Lena Bank)

3.93 The Scientific Committee endorsed the analyses of the Working Group without comment.

Management Advice

3.94 The Scientific Committee recommended that catches should be limited to 305 tonnes.

Notothenia squamifrons (Ob Bank)

3.95 The Scientific Committee endorsed the analyses of the Working Group without comment.

Management Advice

3.96 The Scientific Committee recommended that catch levels should be below 267 tonnes.

Division 58.4.2 (Enderby-Wilkes Land)
(Annex 5, paragraphs 262 to 265)

3.97 The Scientific Committee endorsed the work of the Working Group without comment.

3.98 The Scientific Committee noted that *Pleuragramma antarcticum* is a prey species of interest to CEMP and that fine-scale data on the species are required to be submitted (SC-CAMLR-IX/7).

Management Advice

3.99 Due to lack of data, no management advice is possible.

General Advice to the Commission (Annex 5, paragraphs 267 to 279)

3.100 The Scientific Committee endorsed all the conclusions of the Working Group with respect to the Conservation Measures. The Commission's attention is drawn to the relevant paragraphs of the Working Group report, paragraphs 267 to 279.

Submission of Data (Annex 5, paragraphs 280 to 281)

3.101 The Scientific Committee endorsed the recommendations of the Working Group.

3.102 Prof. Lubimova (USSR) expressed concern about the latter part of paragraph 281, which was not appropriately placed in the Working Group report. This view was shared by several other delegations.

Questions from the Commission (Annex 5, paragraphs 282 to 294)

3.103 The Scientific Committee endorsed the Working Group's answers to the questions posed by the Commission. The Commission's attention is drawn to the appropriate paragraphs in the report, paragraphs 282 to 294.

Future Work
(Annex 5, paragraphs 295 to 304)

3.104 The Scientific Committee endorsed the data requirements outlined in the report.

3.105 Lic. Marschoff stated a view of a need for corroborative data from independent sources such as the observation program and (in spite of the political problems) the transshipment system in Subarea 48.3 which may give information on the location and species composition of catches.

Data Analyses and Software to be Prepared Prior to Next Meeting
(Annex 5, paragraphs 305 to 311)
Organization of the Next Meeting
(Annex 5, paragraphs 312 to 316)

3.106 The Scientific Committee noted and endorsed the Working Group's report on these matters.

3.107 The Scientific Committee endorsed the report of the task group convened by Dr M. Basson (UK) concerning information requirements of working papers submitted to the Working Group. This report is at Appendix F of the Working Group report.