HARVESTED SPECIES

Krill Resources

Status and Trends

4.1 The krill fishery in 2002/03 has operated in Subareas 48.1, 48.2 and 48.3 and the catch reported at the time of the meeting was 110 334 tonnes (Table 2). The total catch for 2002/03 is expected to be similar to that reported in 2001/02 (125 987 tonnes) once catch figures for the remaining months of 2003 have been received (Table 3).

4.2 Plans for krill fishing in 2003/04 were presented to the Scientific Committee (Table 4).

4.3 The Scientific Committee noted that the projected krill catch for 2003/04 was more than 30% greater than the expected total catch for 2002/03. This projected increase is significant because in most previous years total future catch levels indicated to the Scientific Committee had been at or below existing catch levels.

4.4 Dr Sushin noted that the projected krill catch for 2003/04 may not be realised and any increase could be assessed at the 2004 meeting of WG-EMM.

4.5 Dr Constable noted that if the projected rate of increase were to continue, then the trigger level of 620 000 tonnes in Area 48 could be reached in five to six years and that the fishery may start to expand faster than the capacity of the Scientific Committee to provide management advice. Although such a sustained increase in krill catches over a number of years may be unlikely, the Scientific Committee noted that it did not currently have access to reliable information from which it could assess how likely such an increase might be.

4.6 WG-EMM had reported that it was unable to make any assessment of the developments in the krill fishery because information on future fishery plans by Members was incomplete and/or anecdotal (Annex 4, paragraphs 3.6 to 3.8). The Scientific Committee agreed that annual submission of information on the detailed fishing plans of all Member nations were required and that this would include at a minimum: the number of vessels, the locations of planned fisheries, the months when fishing would proceed and the expected catch levels.

4.7 Although some of this information is provided in verbal reports and in Reports of Members' Activities submitted to the Commission, there was no formal mechanism for the submission of this information in a form that was easily accessible to the Scientific Committee and to WG-EMM.

4.8 Accordingly, a pro forma was designed which would contain the information indicated by WG-EMM as being necessary to plan for any changes in the level of the krill fishery (Annex 6). The Scientific Committee agreed that completed forms should be submitted in advance of the annual meeting of WG-EMM by Members intending to fish for krill in the upcoming season so that appropriate advice could be provided to the Scientific Committee on trends in the krill fishery.

4.9 It was recognised that information that would be presented in this notification would only be preliminary and that operational factors might affect the actual levels of catch in any year. Nevertheless, the Scientific Committee agreed that the standardised provision of such

information on krill fishing plans would be a valuable development in understanding trends in the krill fishery. Further details of fishing activities could also be presented in the Reports of Members' Activities submitted annually to the Commission.

4.10 WG-EMM had requested the Secretariat to report to the Scientific Committee on the possible availability of krill from sources which had not been reporting their catch to CCAMLR (Annex 4, paragraph 3.32). The Secretariat reported that they had recently investigated commercial sources of krill and that all appeared to be the results of fishing by Members which were reporting their catches to CCAMLR.

Advice from WG-EMM

4.11 The Scientific Committee endorsed WG-EMM's recommendation that the Secretariat continue to report krill catches by SSMU (Annex 4, paragraphs 3.9 and 3.10).

4.12 The approaches to validate CEMP indices of krill availability based on fisheries information indicated by WG-EMM (Annex 4, paragraphs 3.9 and 3.10) were endorsed. It was noted that this would require temporary access to haul-by-haul data from the krill fishery and that this research would involve collaboration among scientists in Australia, Japan and Russia. These analyses would take into account the results of the CCAMLR krill CPUE study which was concluded in 1989.

Advice to the Commission

4.13 The projected krill catch for 2003/04 is more than 30% greater than the expected catch for 2002/03 (paragraph 4.3). Six Members expect to be fishing for krill in 2003/04 (Table 4).

4.14 Clarification of Members' krill fishing plans through the submission of standardised information to WG-EMM on the form developed at the meeting would allow the Scientific Committee a better insight into developments in the fishery and would permit an assessment of whether the development of management procedures for krill were keeping pace with operational developments.

Fish Resources

Status and Trends

Fishing Activity in the 2002/03 Season

4.15 Seven fisheries, including two exploratory fisheries, were carried out for finfish under conservation measures in force during the fishing season of 2002/03. These included fisheries for *D. eleginoides* and *C. gunnari* in Subarea 48.3 and Division 58.5.2, and exploratory fisheries for *Dissostichus* spp. in Subareas 88.1 and 88.2 and Division 58.4.2. Other fisheries for *D. eleginoides* occurred in the EEZs of South Africa (Subareas 58.6 and 58.7) and France (Subarea 58.6 and Division 58.5.1) by longlines.

4.16 The Scientific Committee noted that catches of target species by region and gear reported from fisheries conducted in the CCAMLR Convention Area in the 2002/03 fishing season are summarised in Annex 5, Table 3.1. These had been updated to 3 October 2003 and reported in SC-CAMLR-XXII/BG/1.

4.17 The Scientific Committee noted that catch effort and length data were submitted for all fisheries managed under conservation measures as well as most of the fisheries operating in EEZs.

Reported Catches of *Dissostichus* spp.

4.18 Reported catches of *Dissostichus* spp. are shown in Annex 5, Table 3.1. Inside the CCAMLR Convention Area a total of 15 931 tonnes was reported during the 2002/03 season compared with 15 302 tonnes in the previous season. Catches outside the Convention Area were 18 919 tonnes during the 2002/03 season compared with 35 484 tonnes in the previous season. This information is detailed in Annex 5, Table 3.1. Most of this catch was reportedly taken from Areas 41, 47, 51, 57 and 87.

Estimates of Catch and Effort from IUU Fishing

4.19 These results are set out in Annex 5, Tables 3.1 to 3.3.

4.20 The Scientific Committee noted that the catch of *Dissostichus* spp. outside the Convention Area in 2001/02, and reported in the CDS, was taken mostly in Area 41 (14 032 tonnes) and Area 51 (10 620 tonnes). However, in 2002/03 (to October 2003), most of the catch was reported from Areas 41 (7 108 tonnes) and 87 (4 419 tonnes), and the catch reported from Areas 51 and 57 had contributed 24% of the total catch reported outside the Convention Area (down from 41% in 2001/02).

4.21 Prof. Beddington expressed concern that JAG did not meet prior to the WG-FSA meeting and that, as a consequence, it was not possible to have its definitive estimate of total removals available for use in the assessment process. He further suggested that it would be desirable for JAG to meet prior to WG-FSA in future and that an opportunity should be made for JAG to familiarise itself with the methods used by WG-FSA to estimate total removals, and vice versa, as this may prove useful in the development of a single procedure to be used for compliance and assessment purposes. The Convener of WG-FSA (Dr Everson) concurred with Prof. Beddington's suggestion and reiterated the Working Group's recommendation that JAG be scheduled to meet prior to WG-FSA so that an agreed estimate of total removals was available for the assessment process. The Scientific Committee recommended that the proposal for JAG to meet before WG-FSA and for intersessional work on the development of an agreed procedure be pursued as a matter of priority.

4.22 Dr Constable made the point that the Secretariat had gone to some lengths not to make judgements on the veracity of the information presented in Annex 5, Table 3.1 for the Working Group, including those from the CDS. Dr Constable also noted that the FAO

definition of IUU includes unreported and unregulated fishing in addition to illegal fishing, and that perhaps the Working Group and Scientific Committee should be careful not to infer that all IUU fishing is necessarily associated with illegal catches.

4.23 Further discussion by the Scientific Committee on IUU fishing was reported under Agenda Item 7 (Annex 5, paragraphs 7.4 to 7.10).

Research Surveys

4.24 Research surveys had been undertaken in 2002/03 by the USA in Subarea 48.1 (Annex 5, paragraph 3.28) and Australia in Division 58.5.2 (Annex 5, paragraph 3.30). New Zealand conducted a pilot acoustic study for toothfish and grenadiers in Subarea 88.1 (Annex 5, paragraph 3.33).

4.25 Estimates of total stock biomass in Subarea 48.1 for eight species of finfish calculated from three US surveys (1998, 2001, 2003) have fluctuated with no signal of substantial year classes or significant recruitment for any species. Even though standing stocks of *Gobionotothen gibberifrons* remain the largest relative to all other species, that species appears to have undergone a decline in mean biomass.

4.26 Dr Barrera-Oro pointed out that studies conducted by Argentina on inshore sites of the South Shetland Island area over a period of 20 years (Barrera-Oro et al., 2000; WG-FSA-03/89) are consistent with the results of the offshore survey. He noted that information from research activities inshore complements offshore survey observations. Dr Kock noted that estimates of *G. gibberifrons* biomass from German surveys also indicate a decline and consistently poor recruitment since 1996.

4.27 This observation was also supported by Dr E. Fanta (Brazil) from inshore studies conducted by Brazil in the same area over two decades.

Future Surveys

4.28 The following surveys were notified to WG-FSA:

- USA – from 16 May to 16 July 2004, a bottom trawl survey to Shag Rocks and South Georgia (Subarea 48.3), the South Sandwich Islands (Subarea 48.4) and Bouvet Island (Subarea 48.6) (Annex 5, paragraph 3.28);
- UK – in January 2004, a bottom trawl survey to South Georgia and Shag Rocks (Subarea 48.3) (Annex 5, paragraph 3.47);
- UK – in March 2004, an acoustic and pelagic trawl survey to the north of South Georgia and Shag Rocks (Subarea 48.3) (Annex 5, paragraph 3.48);
- New Zealand – in January to March 2004, biodiversity survey to the Ross Sea (Subarea 88.1) (Annex 5, paragraph 3.49);

- Australia – from December 2003 to January 2004, in the Heard and McDonald Islands area by *Aurora Australis* as part of a larger marine science survey, a random stratified trawl survey to assess the biomass and age structure of *C. gunnari* and the abundance of *D. eleginoides* recruits (Annex 5, paragraph 3.51);

- Australia – in May–June 2004, a random stratified survey in the Heard and McDonald Islands area of Division 58.5.2, to assess the biomass and age structure of *C. gunnari* and the abundance of *D. eleginoides* recruits (Annex 5, paragraph 3.52).

Fish Biology/ Ecology/Demography

4.29 The Scientific Committee noted the papers that were tabled at WG-FSA which included topics on fishing grounds and stock identity, by-catch, *D. eleginoides*, *D. mawsoni*, *C. gunnari* and stone crabs (Annex 5, paragraph 7.1).

4.30 The Scientific Committee noted progress made by the CCAMLR Otolith Network (CON) and noted that there were key aspects of its work that would be taken up by WG-FSA-SAM.

4.31 The Scientific Committee noted the formation of an ad hoc subgroup on tagging of toothfish (Co-conveners Mr N. Smith (New Zealand), Mr Williams and Dr M. Belchier (UK)) and the tagging protocols developed by the subgroup and adopted by WG-FSA. The Scientific Committee recommended that tagging be a requirement of conservation measures in all new and exploratory toothfish fisheries and noted the valuable information already gained from tagging studies in Divisions 58.5.2 and 58.4.2 and Subarea 48.3.

Developments in Assessment Methods

4.32 The Scientific Committee noted the substantial progress made on assessment methods by WG-FSA-SAM at its intersessional meeting held in London, UK, in August 2003, and by WG-FSA-SFA, held the following week in Cambridge, UK. The Scientific Committee thanked the workshop participants and convener and host of WG-FSA-SAM, Drs Constable and G. Kirkwood (UK) respectively, and the conveners of WG-FSA-SFA, Drs Collins and Gasiukov.

4.33 The Scientific Committee acknowledged the substantial contribution of the work of the subgroup to improving the methods and procedures for the assessments at this year's Working Group meeting and endorsed the program of future work identified for WG-FSA-SAM (Annex 5, paragraphs 9.2 to 9.24).

4.34 The Scientific Committee noted the request for the attendance of the Data Manager for the whole meeting and Secretariat support for the final two days of the 2004 WG-FSA-SAM meeting, and recommended that funding for this support be sought from SCAF.

4.35 The Scientific Committee endorsed the Working Group's recommendation that acoustic estimates of biomass could be incorporated into assessments of yield of *C. gunnari* in

Subarea 48.3. It encouraged further work on how to examine the uncertainties associated with these estimates as identified in the workshop report and for incorporating uncertainties into the assessments (Annex 5, paragraph 3.41).

4.36 Dr V. Siegel (European Community) noted the different conclusions reached by WG-FSA-SFA and WG-FSA with respect to whether acoustics could be used for estimating abundance of *C. gunnari*. He asked for clarification on whether the Working Group had discussed the implications of endorsing the use of acoustics for assessment purposes and whether this meant that all future surveys for *C. gunnari* in Subarea 48.3 will need to be done with an acoustics component.

4.37 Dr Everson clarified to the Scientific Committee that bottom trawl surveys would continue to be used for the estimation of standing stock, but acoustic estimates of biomass would be incorporated into assessments of *C. gunnari* in years when such information became available to WG-FSA.

4.38 A number of Members noted the progress that had been made by WG-FSA-SFA and emphasised the need to better understand the different sources of uncertainty associated with estimates of abundance of *C. gunnari* from acoustics. These included the temporal variation in estimates of biomass and the size, age and species composition of the pelagic component.

4.39 Dr V. Sushin (Russia) noted that the results of the WG-FSA-SFA report demonstrated that a large proportion of the biomass of *C. gunnari* could be located in the pelagic zone and that this may include both 1+ and adult fish. He also suggested that, consistent with the Scientific Committee's desire to use the best available scientific evidence, the Scientific Committee should endeavour to develop a new method of assessing stocks of icefish based on combined trawl and acoustic surveys for *C. gunnari*.

4.40 Dr Constable drew the attention of the Scientific Committee to the discussion at WAMI on the potential bias of estimates of biomass from trawl survey data (SC-CAMLR-XX, Annex 5, Appendix D, paragraphs 7.17 to 7.29). Results presented to that workshop showed that sources of bias might be addressed using methods other than through the undertaking of acoustic surveys. In addition, the issue of bias is likely to be different in different parts of the Convention Area. For that reason, he indicated that the method by which acoustic data is incorporated into assessments needs to be evaluated before accepting it as a general requirement in assessments for *C. gunnari*.

4.41 The Scientific Committee noted the need to address these outstanding areas of uncertainty in acoustic estimates of biomass and asked that the implications of using different methods of biomass estimation be considered as part of the evaluation of assessment methods for *C. gunnari* to be undertaken by WG-FSA-SAM.

Assessment and Management Advice

Assessed Fisheries

D. eleginoides at South Georgia (Subarea 48.3)

4.42 The catch limit for the fishery for *D. eleginoides* in Subarea 48.3 in the 2002/03 season was 7 810 tonnes (Conservation Measure 41-02). The total catch of *D. eleginoides* from this fishery, as reported by 3 October 2003 in the catch and effort reporting system, was 7 534 tonnes, most of which had been taken by longline.

Trends in Fishing Vulnerability

4.43 The distribution of annual estimated vulnerabilities indicate a 'shallow' (400–500 m) fishing pattern and a 'deep'(~1 200 m) fishing pattern (Annex 5, paragraphs 5.88 to 5.94 and Figures 5.4 and 5.5). Observations indicated that fishing in depths of 200 to 400 m resulted in large (>50%) catches of immature fish (Annex 5, paragraph 5.93).

4.44 The Scientific Committee noted the Working Group's suggestion that some restriction of fishing in shallower waters might be useful. The Scientific Committee agreed with the desirability of reducing catches of immature *D. eleginoides* and encouraged the Working Group to explore potential options and implications for doing so, including restricting fishing in shallower depths, during the intersessional period.

CPUE Standardisation

4.45 The Scientific Committee noted the progress made in developing methods for standardisation of CPUE data from longlines and trawl fisheries that incorporate the various uncertainties (Annex 5, paragraphs 5.96 to 5.103).

Recruitment Series

4.46 The Scientific Committee noted that a review by WG-FSA of estimates of recruitment used in the 2002 assessment of *D. eleginoides* in Subarea 48.3 had identified a number of problems (Annex 5, paragraphs 5.104 to 5.111). In particular, there had been an error in the data extractions for the 2002 UK survey that led to the recruitments in 2001, 2002 and 2003 being substantially overestimated.

4.47 Inconsistencies had also been identified in the analyses of the 1990 UK survey data. As a result, the corresponding recruitment estimates calculated last year were too high and the estimates of recruitment from the 1990 survey may have affected estimates of yield prior to 2002.

4.48 In order to continue to improve the quality control procedures for the assessment process, the Scientific Committee endorsed the recommendation of WG-FSA that validation procedures be developed for all data extractions and analytical procedures and that they be routinely applied during the assessment process.

4.49 Following a discussion that clarified the nature and potential sources of these problems, the Scientific Committee agreed that there was an urgent need to review and evaluate the entire process of estimating *D. eleginoides* recruitment from trawl surveys for use in assessments, including a variety of general analytical and interpretation issues.

4.50 Points discussed by the Scientific Committee that should be considered in this evaluation should include, but not be restricted to, the following:

(i) the reading of ages, the estimation of growth curves and how age information should be incorporated into the CMIX analyses. In particular, account needs to be taken in the estimation of recruitment of the potential errors and uncertainties in the age information and assignment of ages to mixture components;

(ii) which age groups should be included in the estimation of recruitment, bearing in mind the extent to which they are fully selected in the survey hauls and the possibility of higher natural mortality in younger age groups;

(iii) taking account of possible variations in catchability between surveys;

(iv) the need for a clear set of decision rules to guide those attempting CMIX analyses;

(v) evaluation of survey design and interannual variation in catchability of age classes for estimation of recruitment series for *D. eleginoides*.

4.51 Prof. Beddington noted the inconsistency in growth and mortality parameters, specifically the M/K ratio and the large difference in that ratio for Subarea 48.3 compared to that in Division 58.5.2. The Scientific Committee recalled the recommendation of WG-FSA-SAM that input parameters for assessments should be checked for internal consistency. It further reiterated the importance of validating estimates of growth and mortality obtained from otolith readings with independent estimates (e.g. from tagging) and the Scientific Committee's desire to address this issue as a matter of urgency.

4.52 The Scientific Committee noted that different ranges of lengths and/or ages have been used to estimate growth parameters and this would be expected to strongly influence the resulting estimates of K and L_∞. The Scientific Committee recommended that the issue of consistent approaches to estimation of growth parameters be pursued as part of the work program of WG-FSA-SAM.

4.53 Dr Sushin raised a general concern regarding the potential that current estimates of recruitment from Subarea 48.3 may be overestimated as a result of the mixture analysis method used. He suggested the need to examine the reliability of the current method for estimating recruitments and how the recruitment series is incorporated in assessments of yield using the GYM. He suggested it would be useful to examine alternative methods for

estimating recruitments and assessing yields. The Scientific Committee agreed with the desirability of evaluating all aspects of the assessment process for *D. eleginoides*, and it noted the future work program recommended by WG-FSA to address these issues.

4.54 Dr Constable supported Dr Sushin's desire to evaluate current and alternative methods. He noted that the validation of the GYM by the development of a Java GYM based on the mathematical specifications and codes has partly addressed this issue for the current model and software used to assess long-term yield.

4.55 The Scientific Committee noted the importance of maintaining confidence in the assessment process by evaluating the consequences of changes in the assessment procedure to meeting the objectives of the Commission before adopting them. To that end, it encouraged the further development of an evaluation framework within WG-FSA-SAM and for Members to submit alternative approaches for evaluation.

4.56 The Scientific Committee thanked WG-FSA for its contribution to this difficult assessment and noted that the manner in which the assessments are now done facilitates the direct involvement of a wider range of participants in the assessment process and acknowledged that this improves the rigour and transparency of the assessment process.

Assessment

4.57 The Scientific Committee noted the sensitivity test conducted by the Working Group to investigate the consequences of the changes in the recruitment series on the assessment of yield. The sensitivity tests were:

(i) a baseline scenario using the recruitment series used in the WG-FSA-02 assessment (SC-CAMLR-XXI, Annex 5, paragraphs 5.60 and 5.61);

(ii) as for (i), but using the revised recruitments for the 2002 survey calculated during WG-FSA-03;

(iii) as for (i), but using the revised recruitments for the 1990 and 2002 surveys calculated during WG-FSA-03.

4.58 The precautionary catch limit resulting from use of the original 2002 recruitment series was 7 813 tonnes, a similar level to that estimated last year, as expected. When the revised recruitment series for the 2002 survey was used, the precautionary catch limit was reduced to 5 524 tonnes. When the revised series for both the 1990 and 2002 surveys were used, the precautionary catch limit was reduced further to 1 979 tonnes.

4.59 The Scientific Committee noted that a further review by WG-FSA of the revised recruitments calculated from the 1990 survey data conducted late in the meeting had identified further inconsistencies, such that the revised recruitment estimates might now be too low. WG-FSA did not have time to further revise these estimates.

4.60 Noting that the Working Group was unable to provide a recommended catch limit, the Scientific Committee discussed the potential consequences of the errors and options for a staged approach to align future catch limits with the long-term yield, in the case that the current catch limit is in excess of what would be considered precautionary.

4.61 Dr Sullivan suggested that, in the absence of a recommended catch limit from WG-FSA, it may be appropriate to use the average of the total annual catches (including estimated IUU catches) for the period 1996/97 to 2001/02. Dr Sullivan suggested that it may be reasonable to assume that this was a sustainable level of catch for Subarea 48.3, given there was no evidence of a decline in the standardised CPUE trend for this period (Annex 5, Figure 5.6).

4.62 Dr Kock supported this proposal. He suggested that it should be linked to a staged progression to align the fishery with a revised estimate of long-term yield for Subarea 48.3.

4.63 Various Members expressed some concern with the proposal as the harvest levels may have been set above the true precautionary yield for a number of years given the potential error associated with the estimate of recruitment for the 1990 survey. Other Members expressed some concern with the use of CPUE as an index of stock status. In particular they noted that CPUE is a relatively insensitive index of abundance, due to the formulation of the index and the potential shifts in fishing practices to mask changes in abundance, except in circumstances of dramatic declines in stock size.

4.64 Dr Constable noted that he would be uncomfortable providing advice to the Commission based on trends in CPUE, given the uncertainties associated with the Subarea 48.3 CPUE time series and the unfinished considerations of WG-FSA-SAM on this issue. Dr Constable suggested that an alternative approach for recommending a catch limit for this year would be to recognise that the catch limit should be between 2 000 and 5 500 tonnes, based on the WG-FSA sensitivity analyses, and apply a discount factor to the revised 2002 assessment, recognising that this may still be above a catch limit that might come out of a full review. He recommended that such a proposal would be contingent on: (i) a thorough appraisal of the data and surveys included in the assessment of Subarea 48.3, and (ii) a reassessment of the long-term annual yield be provided to the Scientific Committee in 2004 that provides for consistency between the input parameters, and as far as practicable, the uncertainties in those input parameters.

4.65 The Scientific Committee noted that given the uncertainties in the estimated recruitment series, the Working Group was unable to recommend a specific catch limit for *D. eleginoides* for the 2003/04 fishing season. In view of the effects of corrections to the errors identified with the recruitment series used in the 2002 assessment, the Scientific Committee noted the Working Group's recommendation that whatever catch limit the Commission should adopt for *D. eleginoides* for the 2003/04 fishing season should be substantially less than that which applied in 2002/03 (7 810 tonnes).

4.66 The Scientific Committee noted that the Working Group's use of 'substantially less' in the above recommendation could be widely interpreted depending on perspective and suggested a more quantitative indication would have been useful.

Management Advice for *D. eleginoides* (Subarea 48.3)

4.67 The Scientific Committee noted that WG-FSA was unable to provide specific advice on a catch limit for *D. eleginoides* in Subarea 48.3 in the 2003/04 fishing season (paragraphs 4.65 and 4.66).

4.68 The Scientific Committee agreed that in determining a precautionary catch limit to recommend for the 2003/04 season, it would be appropriate to apply a discount factor to the precautionary yield calculated using the revised estimate of recruitment for 2002, to account for the additional uncertainty in this year's assessment of the stock. Application of a discount factor of 20% would result in a precautionary catch limit of 4 419 tonnes, which is very close to the average total removals (including estimated IUU catches) taken over the seasons 1995/96 to 2001/02 (4 425 tonnes).

4.69 It was noted that between 1995/96 and 2001/02 there was no evidence of a decline in CPUE as standardised by WG-FSA. However, the Scientific Committee noted that as WG-FSA-SAM has not concluded its review of CPUE standardisation methods, it is currently not possible to use stability of catches and CPUEs as a measure of confidence in the long-term sustainability of these average catches.

4.70 The Scientific Committee recommended that the catch limit for *D. eleginoides* in Subarea 48.3 for the 2003/04 season should be 4 420 tonnes with the understanding that a new assessment of long-term yield will be provided next year by WG-FSA.

4.71 The remaining provisions of Conservation Measure 41-02 should be carried forward for the 2003/04 season.

4.72 Any catch of *D. eleginoides* taken in other fisheries in Subarea 48.3 should be counted against the catch limit determined by the Commission.

Priority Work for Future Assessments of *D. eleginoides* in Subarea 48.3

4.73 The Scientific Committee endorsed the program of work identified by WG-FSA for the intersessional period to fully review and revise the recruitment series for Subarea 48.3 as a high priority (Annex 5, paragraphs 9.20 to 9.25). The Scientific Committee recognised the importance of obtaining a consistent and reliable recruitment series for assessing the *D. eleginoides* stock in Subarea 48.3 and emphasised the importance of having this available for review at the 2004 meeting.

4.74 The Scientific Committee noted the Working Group's advice that, because of the precautionary long-term nature of the assessment process, a failure to reliably estimate a precautionary yield in a single year would be less serious than would be the case for a fishery subject to annual assessments of optimised yield. Following the determination of a revised recruitment series for Subarea 48.3 next year, it will become apparent whether or not previous catches have been above those that would have been calculated historically as precautionary yields using that recruitment series. If previous catches have been above precautionary yield levels, then this will be taken into account when calculating subsequent precautionary yields.

4.75 WG-FSA had conducted a preliminary analysis of observer data collected between 1993 and 2003 on proportions of immature *D. eleginoides* in the catch by depth zone. The Scientific Committee noted the analysis conducted by WG-FSA that indicated in the shallowest depth zone (200–400 m) the proportion of immature fish exceeded 50% (Annex 5, paragraph 5.93). The analysis also indicated that only between 5 and 10% of the catch is taken in this depth zone.

4.76 On the basis of this analysis and with a view to providing additional protection to young fish, Dr Sushin proposed that restrictions should be placed on fishing in depths less than 400 m. The Scientific Committee agreed that there may well be value in imposing a restriction of this type, but it felt that further detailed analysis of maturity by length and depth zone would be needed before a definitive recommendation could be developed. The Scientific Committee urged that such analyses be carried out intersessionally, and requested WG-FSA to re-examine this issue at its next meeting.

D. eleginoides at South Sandwich Islands (Subarea 48.4)

4.77 No new information was made available to WG-FSA for *D. eleginoides* in Subarea 48.4 (South Sandwich Islands) on which to base an update of the assessment.

Management Advice for *D. eleginoides* (Subarea 48.4)

4.78 The Scientific Committee recommended that Conservation Measure 41-03 be carried forward for 2003/04. As with last year, the Scientific Committee recommended review of the currency of the existing assessment. However, the Scientific Committee noted the advice of WG-FSA that, given the high workload at its meetings, the Working Group was unlikely to be able to review this measure in the near future.

D. eleginoides at Kerguelen Islands (Division 58.5.1)

4.79 The Scientific Committee thanked Prof. G. Duhamel (France) for the provision of haul-by-haul catch and effort data for Division 58.5.1.

4.80 The Scientific Committee was concerned about the declining trend in CPUE and the decreasing average size of fish in the legal catch and noted the concurrent increases in estimated total removals over the same period (Annex 5, paragraphs 5.126 to 5.128).

4.81 Prof. Duhamel noted that the increase in total removals and decline in CPUE was due to increased IUU catches, not legal catches by French vessels.

Management Advice for *D. eleginoides* (Division 58.5.1)

4.82 Given the dramatic increase in total removals from 2000 onwards and the corresponding decline in standardised CPUE, the Scientific Committee agreed that it is imperative that steps be taken to substantially reduce total removals from 2003 levels.

4.83 The Scientific Committee recommended that Conservation Measure 32-09 remain in force for the period 1 December 2003 to 30 November 2004 in respect of Division 58.5.1.

D. eleginoides at Heard and McDonald Islands (Division 58.5.2)

4.84 The catch limit of *D. eleginoides* in Division 58.5.2 for the 2002/03 season was 2 879 tonnes (Conservation Measure 41-08) for the period from 1 December 2002 to the end of the Commission meeting in 2003. The catch reported for this division at the time of the Scientific Committee meeting was 2 130 tonnes. It is expected that the catch limit will be reached before the end of the current fishing season.

4.85 Prof. Beddington noted the difference in growth and mortality parameters used in the assessments in Division 58.5.2 and Subarea 48.3. In particular he found it difficult to reconcile the value of the growth parameter (K) used in the assessment in Division 58.5.2 being less than half the value of that used in the assessment in Subarea 48.3. Dr Constable concurred with Prof. Beddington and noted that there was a range of uncertainties which may contribute to the observed differences, including potential biases between readers of otoliths and reader error (i.e. observation error). Dr Constable recommended that estimates of these uncertainties and methods for incorporating them into estimates of parameters are urgently required.

4.86 Dr Jones noted that there were differences in survey design between years that may affect the estimates of recruitment used in GYM assessment of yield. The Scientific Committee noted that this issue has been identified in the future work program of WG-FSA and encouraged Members to submit papers to the next meeting of WG-FSA-SAM examining this issue.

4.87 Prof. Duhamel noted that this year the fishery in Division 58.5.2 included both trawl and longline operations and asked whether vulnerability functions for both methods had been used in the assessment. Dr Constable responded that the vulnerability function for trawl only had been used in this year's assessment and that methods for incorporating vulnerability functions for mixed fisheries will be addressed in the intersessional period.

4.88 The GYM assessment was updated using the updated series of total removals, assuming legal catches equal to the catch limit and a new estimate of IUU catches, and revised recruitment series agreed by WG-FSA (Annex 5, paragraphs 5.132 to 5.137). The estimate of precautionary long-term annual yield was 2 873 tonnes.

Management Advice for *D. eleginoides* (Division 58.5.2)

4.89 The Scientific Committee recommended that the catch limit for Division 58.5.2 in the 2003/04 season be revised to 2 873 tonnes, representing the long-term annual yield estimate from the GYM. This catch limit is recommended to pertain only to the assessment area which is to the west of 79°20'E.

4.90 The remaining provisions of Conservation Measure 41-08 should be carried forward for the 2003/04 season.

D. eleginoides at Crozet Islands (Subarea 58.6) inside the EEZ

4.91 The Scientific Committee noted the analyses of haul-by-haul catch and effort data conducted by WG-FSA for Subarea 58.6.

4.92 The Scientific Committee was concerned about the declining trend in CPUE and the decreasing average weight of fish in the legal catch evident from the results of these analyses (Annex 5, paragraphs 5.189 to 5.192).

Management Advice for *D. eleginoides* at Crozet Islands (Subarea 58.6) inside the EEZ

4.93 The Scientific Committee noted the dramatic decline in CPUE since 2000, even under the relatively low levels of total removals, and stressed that it is imperative that future total removals be reduced until further analyses clarify the cause of the CPUE decline and steps can be taken to conserve the stock.

D. eleginoides at Crozet Islands (Subarea 58.6) outside the EEZ

4.94 The Scientific Committee recommended that Conservation Measure 32-11, which prohibits targeted fishing for *D. eleginoides* outside the EEZ, remain in force.

D. eleginoides at Prince Edward Islands (Subarea 58.7) inside the EEZ

4.95 The Scientific Committee welcomed the revised assessment of *D. eleginoides* in the South African EEZ around the Prince Edward Islands (Annex 5, paragraphs 5.194 to 5.201) and noted that it has not been possible to resolve the conflicting signals between the trends in CPUE and length frequency of the catch.

Management Advice for *D. eleginoides* at Prince Edward Islands (Subarea 58.7) inside the EEZ

4.96 Noting the considerations of the Working Group (Annex 5, paragraph 5.195), the Scientific Committee recommended that the annual total allowable catch in the Prince Edward Islands EEZ should not exceed 300 tonnes, subject to target levels of recovery that might be adopted by the Commission.

D. eleginoides at Prince Edward Islands (Subarea 58.7) outside the EEZ

4.97 The Scientific Committee recommended that the prohibition of directed fishing in Subarea 58.7 outside the Prince Edward Islands EEZ (Conservation Measure 32-12) should continue.

C. gunnari at South Georgia (Subarea 48.3)

4.98 The catch limit for the fishery for *C. gunnari* in Subarea 48.3 in the 2002/03 season was 2 181 tonnes (Conservation Measure 42-01). This conservation measure included several other conditions applied to this fishery. These included restricting the total catch of *C. gunnari* taken in the period between 1 March to 31 May to 545 tonnes to reduce possible targeting of spawning concentrations.

4.99 All fishing took place between 18 December and 26 February with a total catch of 2 155 tonnes. Twenty-six tonnes of the catch limit remain and the fishing season will remain open until 30 November 2003 (Annex 5, paragraph 5.145).

4.100 The Scientific Committee agreed to incorporate the results from an acoustic survey in 2002 that estimated biomass of a component of the pelagic biomass of *C. gunnari* in the depth range 8–58 m above the bottom into the assessment (Annex 5, paragraphs 5.148 to 5.152).

4.101 The Scientific Committee noted that the Working Group had done two assessments of the precautionary catch limit for *C. gunnari* in 2003/04 and had been unable to agree on a single catch limit (Annex 5, paragraphs 5.169 to 5.172). The first assessment included the age-1+ cohort from 2001/02 and resulted in a projected yield of 3 570 tonnes for the 2003/04 season. The assessment excluding the age-1+ cohort from 2001/02 resulted in a projected yield of 2 205 tonnes for the 2003/04 season (Annex 5, paragraph 5.174).

4.102 Prof. Beddington requested clarification as to the nature of the assumptions made about mortality and recruitment of the age-1+ cohort in the two assessments conducted by the Working Group. Dr G. Parkes (UK) noted that projections were done over two years. In the case excluding age-1 fish, there is an assumption of no recruitment of the age-1+ cohort in either year of the projection. In the assessment including the age-1+ cohort, there is partial recruitment as age-2+ cohort in the first year of the projection and full recruitment as 3 year olds in the second year.

4.103 Dr Sushin suggested that the assessment including the age-1+ cohort should be supported as it takes advantage of the additional information obtained from the acoustic

estimate and should be conservative given it uses the lower 95% CI of the biomass estimate and a comparatively high average value of natural mortality. Other Members supported this suggestion.

4.104 Drs Kock, Jones and others noted the recent paper considered by WG-FSA (WG-FSA-03/74) with respect to the contribution of *C. gunnari* to the diet of gentoo penguins and Antarctic fur seals in Subarea 48.3 and the potential for there to be considerable interannual variation and differences in age-specific natural mortality, particularly in the 1- and 2-year age classes.

4.105 The Scientific Committee noted earlier work that had demonstrated interannual and age-specific differences in the natural mortality of *C. gunnari* (i.e. de la Mare et al., 1998). In light of these uncertainties, some Members expressed concern that there was not sufficient understanding of the factors affecting the abundance of early year classes and that they would not be comfortable recommending the assessment that included the age-1+ cohort.

4.106 Dr Constable noted that the assessment procedure differed from that agreed at WG-FSA-SAM and drew attention to the Scientific Committee's earlier request to fully evaluate new assessment procedures before they are adopted for assessments by WG-FSA.

4.107 Dr E. Marschoff (Argentina) noted that stock estimates are well below the catches taken in the 1980s. He suggested that there appeared to be two strategies for moving forward: (i) continue to take relatively small annual yields, or (ii) close the fishery to allow the stock to recover and noted that this decision pertains to the Commission.

4.108 Prof. Beddington suggested that the two assessments represented 'extremes' of the assumptions about mortality and recruitment to the fishery of age-1 fish over the period of the projections. He expressed some concern about the internal consistency of the parameters used in the assessment, in particular the high value of natural mortality and the low value of K, given the values of these parameters used for Division 58.5.2. He suggested that perhaps a catch limit somewhere between the outcomes of the two assessments represented a reasonable way forward. He also noted a fundamental difference of opinion with Dr Marschoff's suggested option to close the fishery.

4.109 Dr Constable concurred with Prof. Beddington that it was useful to compare parameters between areas to better understand the dynamics of *C. gunnari*. He suggested, however, that it may not be reasonable to expect consistency in the parameter estimates used in the assessments given the large differences in the densities of *C. gunnari*, krill and land-based predators between Division 58.5.2 and Subarea 48.3, and the likely effects of these differences on rates of growth and mortality.

Management Advice for *C. gunnari* (Subarea 48.3)

4.110 Having reviewed the assumptions underlying these two assessments, the Scientific Committee agreed that an appropriate precautionary catch limit for *C. gunnari* in Subarea 48.3 for the 2003/04 season lay in the range bounded by the two assessments conducted by WG-FSA (2 205–3 570 tonnes). However, in view of the uncertainties in the natural mortality rates assumed in the assessment that included age-1 fish in the projections

(paragraphs 4.101 to 4.109), and the other uncertainties (Annex 5, paragraphs 5.170 to 5.172), it was unable to recommend a specific precautionary catch limit within this range.

4.111 The Scientific Committee had no information from which to consider or revise its advice of 2002 in respect of the current seasonal limitation in Conservation Measure 42-01. It therefore recommended that these aspects of the conservation measure should be unchanged. The Scientific Committee recommended the continuation of other aspects of Conservation Measure 42-01.

C. gunnari at Kerguelen Islands (Division 58.5.1)

4.112 The last commercial catches of *C. gunnari* in Division 58.5.1 were taken in the 1995/96 season. A survey was undertaken in 2001/02 (WG-FSA-02/65). Current information is that the biomass of *C. gunnari* in the survey area has remained at low levels since 1996/97. The Scientific Committee recommended that the fishery for *C. gunnari* within the French EEZ of Division 58.5.1 should remain closed in the 2003/04 season and continue to be closed until information on stock status is obtained from a survey.

C. gunnari at Heard and McDonald Islands (Division 58.5.2)

4.113 The Scientific Committee noted the details of the 2002/03 fishing season for *C. gunnari* in Division 58.5.2 (Annex 5, paragraphs 5.115 and 5.116). The catch limit for the 2002/03 season was 2 980 tonnes. The reported catch up to 3 October 2003 was 2 343 tonnes.

4.114 The assessment followed the short-term projection method to update catch limits for the 2003/04 season also used for this species last year (see Annex 5, paragraphs 5.181 to 5.184).

4.115 Prof. Beddington noted the large change in projected yield for the coming season in comparison to 2002/03 and questioned whether this was related to the apparent high mortality of 4–5 year olds and poor recruitment in recent years. Dr Constable recalled the discussion at WAMI (SC-CAMLR-XX, Annex 5, Appendix D) where the high levels of recruitment variability in this stock was noted. He also noted that, similar to Subarea 48.3, the 5- and 6-year-old age classes appear to either suffer higher mortality rates or become unavailable to the fishery. Further explanation is given in Annex 5, paragraph 5.182.

4.116 The Scientific Committee recalled its previous discussion with respect to the need to balance interannual variation in yield for the fishery with a long-term sustainable catch, and noted the work program of WG-FSA-SAM had identified the need to develop and evaluate a management procedure for *C. gunnari*.

Management Advice for *C. gunnari* (Division 58.5.2)

4.117 The Scientific Committee recommended that the total catch limit for *C. gunnari* should be revised to 292 tonnes for the period from 1 December 2003 to 30 November 2004.

4.118 The remaining provisions of Conservation Measure 42-02 should be carried forward to the 2003/04 season.

4.119 The Scientific Committee considered ways of providing for stable catches from one year to another given the large fluctuations in the abundance of this species and to avoid harvesting age-2 cohorts entering the fishery during the season that have not been assessed. One suggestion to solve the latter problem was to consider a minimum length of 290 mm from May 2004.

Other Finfish Fisheries

Antarctic Peninsula and South Orkney Islands (Subareas 48.1 and 48.2)

4.120 The Scientific Committee noted that WG-FSA considered other finfish fisheries in Subareas 48.1 (Antarctic Peninsula) and 48.2 (South Orkney Islands). Based on the results of a bottom trawl survey conducted by the USA in 2003 in Subarea 48.1, there appears to be little scope to reopen the fisheries in the two subareas in the near future given the comparatively low biomass of the abundant fish species.

Management Advice (Subareas 48.1 and 48.2)

4.121 The Scientific Committee endorsed the advice of WG-FSA that Conservation Measures 32-02 and 32-03 should remain in force.

Electrona carlsbergi (Subarea 48.3)

4.122 No new information was made available to the Scientific Committee on which an update of the previous assessment could be based. The Scientific Committee agreed that in light of the lack of new information or interest in developing the fishery for this species the fishery should be closed until such time that a fishery-independent survey of biomass is undertaken and presented to WG-FSA for review.

Management Advice for *E. carlsbergi* (Subarea 48.3)

4.123 The Scientific Committee recommended that the fishery should be closed until such time that there is a revised assessment of long-term yield from WG-FSA.

4.124 The Scientific Committee recommended that Conservation Measure 43-01 be revoked.

Statements by Argentina and the UK

4.125 Dr Marschoff stated that SC-CAMLR-XXII/4 (Annex 5), as well as some other documents related to WG-FSA and WG-IMAF, contained incorrect references to the territorial status of the Malvinas Islands (Falkland), South Georgia Islands and the South Sandwich Islands attributing them a territorial status they do not have. While reserving its position, Argentina recalled its sovereignty rights over the Malvinas Islands, South Georgia and the South Sandwich Islands and the surrounding waters.

4.126 The UK noted Argentina's statements relating to references in Annex 5 and elsewhere. The UK's position on this issue is well known; the UK has no doubts about its sovereignty over the Falkland Islands, South Georgia and the South Sandwich Islands and the surrounding maritime areas.

4.127 Argentina rejected the views expressed by the UK and reiterated its position.

Fish By-catch associated with Longline and Trawl Fisheries

4.128 There has been much progress towards assessing the long-term status of by-catch taxa. This was identified as an issue for urgent attention at SC-CAMLR-XXI (SC-CAMLR-XXI, Annex 5, paragraphs 5.151 to 5.153). The key issues that need to be addressed are:

- assessments of the status of by-catch taxa (particularly rajids and macrourids)
- assessments of the expected impacts of fisheries on by-catch species
- consideration of mitigation measures.

4.129 WG-FSA-03 recommended (Annex 5, paragraph 5.231) that at the next meeting of the Working Group, issues of potential mutual interest to WG-FSA and WG-IMAF should be discussed. These should include:

- estimation of by-catch levels and rates
- assessment of risk, both in terms of geographical areas and population demography
- mitigation measures
- scientific observer duties.

4.130 The Scientific Committee endorsed this program of work.

4.131 Concerning the status of individual species or species groups, insufficient biological information was available at WG-FSA for rajids (skates and rays), and so no assessments were undertaken for these taxa (Annex 5, paragraph 5.234).

4.132 For the other high-priority species group, macrourids (rattails or grenadiers), there were sufficient biological data available to WG-FSA to calculate or revise the value of γ for the three species of *Macrourus* encountered in the fisheries in the CCAMLR Convention Area (Annex 5, paragraphs 5.235 to 5.256). The best estimates of γ were 0.01439 for *M. whitsoni* in Subarea 88.1 (Annex 5, paragraph 5.241), 0.0251 for *M. carinatus* in Division 58.5.2 (Annex 5, paragraph 5.246), 0.01654 for *Macrourus* spp. in Division 58.4.3 (Annex 5,

paragraph 5.251) and 0.02197 for *M. holotrachys* in Subarea 48.3 (Annex 5, paragraph 5.254). These values indicate that these species have relatively low productivity and may be vulnerable to overexploitation.

4.133 WG-FSA noted that no estimates of biomass (B_0) were available for *Macrourus* spp. in Subareas 48.3 or 88.1 and as such, no estimate of precautionary yield could be calculated. The Working Group further noted that an estimate of B_0 is unlikely to be forthcoming in the next few years (Annex 5, paragraph 5.261).

4.134 For *M. carinatus* in Division 58.5.2 an estimate of B_0 was derived using the mean density estimate of *Macrourus* spp. obtained from a research trawl survey of BANZARE Bank in the adjoining Division 58.4.3b, pro-rated to the area of seabed in the same depth range (600–1 500 m) in Division 58.5.2. This gave a mean biomass for Division 58.5.2 of 14 402 tonnes. Applying $\gamma = 0.0251$ gives an estimate of yield for *M. carinatus* in Division 58.5.2 of 360 tonnes (Annex 5, paragraph 5.249). The Scientific Committee accepted this value as the best available estimate of the precautionary by-catch limit.

4.135 The Scientific Committee endorsed the advice of WG-FSA that the application of by-catch limits is to provide adequate protection for by-catch species, with the understanding that the fishery takes steps to reduce and minimise by-catch rates. These by-catch limits, with their attendant uncertainties, should not be used as an indication of long-term sustainable yield, and sustained by-catch at these levels over a number of years would require a revised assessment.

4.136 The Scientific Committee agreed that the development of avoidance and mitigation measures for by-catch species should therefore be given high priority. An incentive for the fishing operators in this regard is the reduction in the 'nuisance value' of by-catch supplanting catches of target species.

4.137 The Scientific Committee also endorsed the recommendation of WG-FSA that future work include research leading to the estimation of population parameters and standing stocks for rajids and macrourids. This will become more urgent as the duration of active fisheries increases.

4.138 Dr Constable also noted that paragraphs 9.11 and 9.12 of the WG-FSA report (Annex 5) recommended that until assessments of stock abundance are available, work to refine assessments of those species is not warranted. For such populations, for which there is no indication of an appropriate harvest rate, the emphasis should be on avoidance of capture.

4.139 In the absence of assessments for by-catch species the Scientific Committee endorsed the recommendation of WG-FSA that precautionary measures that place upper limits on by-catch and reduce the potential for localised depletion be adopted.

4.140 The Scientific Committee noted that in 2002, WG-FSA attempted to calculate the total by-catch removals from observer data. An estimate could not be made for all areas because of a lack of data in some cases on the proportion of longline sets observed for by-catch. Also, no data were available on the fish by-catch cut or lost from longlines before being brought on board (Annex 5, paragraph 5.267).

4.141 Although observer logbooks and forms were revised to make provision for such data, most observer reports in the 2002/03 season were submitted on the old forms. However it was possible to calculate estimates of retained and discarded by-catch in all fisheries except those in Subarea 58.6 and Division 58.5.1 using data extracted from Members' own databases. In addition, the amount of by-catch cut from longlines before being brought on board could be calculated for Subarea 48.3 and Division 58.5.2. The Scientific Committee endorsed the request of WG-FSA that Members collecting data in a non-standard format should ensure that all by-catch data are transferred to the CCAMLR database.

4.142 Estimates of retained/discarded by-catch are presented in Annex 5, Table 5.25. For macrourids, the percentage of the target species catch ranges from less than 1% (Division 58.5.2) to 26% (Subarea 58.6). For rajids the percentage ranges from less than 1% (Subarea 48.3) to 20% (Subarea 58.6).

4.143 The Scientific Committee welcomed the attempt by WG-FSA to estimate the amount of by-catch cut or dropped off the line before being brought on board, and the first attempt to estimate the survivorship of these fish in the catch–release process (Annex 5, paragraphs 5.273 to 5.279). Results are summarised in Annex 5, Table 5.26. The Scientific Committee commended the study by the UK on skate survivorship, recognising the operational difficulties involved and the value of the results. It encouraged further studies in this regard, which would provide information on whether there are differences in survivorship between vessels or whether a universal estimate can be applied to each species.

4.144 For Subarea 48.3, the estimate of rajids cut off the line ranges from 37 to 179 tonnes for the 2002/03 season depending on the survival rate assumed, and for Division 58.5.2 the range is 35 to 45 tonnes. For macrourids in Subarea 48.3, the range is 74 to 248 tonnes, although the Scientific Committee noted that as all macrourids are likely to be dead on reaching the surface because of the expansion of their swim-bladders, the higher figure is likely to be correct. In Division 58.5.2 the macrourid mortality was estimated at 5 tonnes.

4.145 The Scientific Committee noted that WG-FSA was unable to assess variations in by-catch level by different vessels (Annex 5, paragraphs 5.280 and 5.281) and that such an analysis could be undertaken intersessionally. The Scientific Committee endorsed this approach to understand inter-vessel differences in by-catch, which could be used to develop mitigation and avoidance measures for by-catch.

4.146 The Scientific Committee also noted the discrepancies in reporting by-catch between the various reporting systems (Annex 5, paragraphs 5.282 to 5.284). In summary, these are:

- STATLANT data underestimate by-catch;
- fine-scale and catch and effort estimates were generally similar although data quality was inconsistent and varied by year and area;
- fine-scale data (haul-by-haul) is the most comprehensive of the three datasets for by-catch.

4.147 The Scientific Committee endorsed WG-FSA's recommendation to report accurately by-catch in all data formats.

4.148 The Scientific Committee noted that WG-FSA had identified a potential conflict of advice to vessels and observers with respect to by-catch in that on the one hand live rajids should be cut from the line, whereas there is also a requirement for observers to collect data and perform survivorship experiments (Annex 5, paragraphs 5.289 to 5.292). The Scientific Committee endorsed WG-FSA's advice that, where possible, all rajids should be cut from lines while still in the water except on the request of the observer during the observer's biological sampling period.

4.149 The Scientific Committee also endorsed WG-FSA's request that Members and observers report, when feasible, the fishing strategies and techniques adopted to minimise by-catch so that these can be considered in the wider context of general measures on by-catch mitigation (Annex 5, paragraphs 5.293 to 5.296).

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4.150 The estimate of precautionary yield for *M. carinatus* in Division 58.5.2 of 360 tonnes should be considered as the precautionary by-catch limit.

4.151 Data on by-catch should be reported as accurately as possible in all data formats.

4.152 Observers should record the proportion of hauls/sets observed for both retained/discarded by-catch and cut off/lost by-catch. In addition, observers should record fish that are cut or lost from longlines.

4.153 The data requirements for fish and invertebrate by-catch and the priority tasks for observers in collecting this information should be reviewed intersessionally by the by-catch subgroup of WG-FSA.

4.154 IUU fishing will result in mortality of by-catch species, and therefore the total removals estimated at this meeting should be treated as minimum estimates.

4.155 When not retained for processing, all rajids should be cut from lines while still in the water where possible, except on the request of the observer during the observer's biological sampling period.

4.156 Members and observers, where feasible, should provide a report to the Secretariat on the methods or strategies of fishing that minimise non-target fish by-catch.

New and Exploratory Fisheries

New and Exploratory Fisheries in 2002/03

4.157 Six conservation measures relating to eight exploratory fisheries were in force during 2002/03, but fishing only occurred in respect of three measures and four fisheries. Information on catches from active exploratory fisheries during 2002/03 is summarised in Annex 5, Table 5.1.

4.158 The only exploratory fishery where significant activity took place was for *Dissostichus* spp. in Subarea 88.1. A total of 1 792 tonnes of *Dissostichus* spp. was taken against a catch limit of 3 760 tonnes. The 2002/03 season was restricted by icebergs and sea-ice. Although the Ross Sea Polynya was open, no fishing took place south of 72°30'S because of safety concerns, therefore little catch was taken from the southern SSRUs.

4.159 Although the overall catch was about 50% of the catch limit for Subarea 88.1, catch limits in two fine-scale rectangles were exceeded by 3%, and the catch limit on SSRU 881C was exceeded by 106 tonnes (13%). It was noted that the catch limits were exceeded because of the high catch rates and the five-day reporting cycle (CCAMLR-XXII/BG/8). It was also noted that currently for each active fishery (e.g. longline fishery in Subarea 88.1 south of 65°S), the Secretariat reported every five days to Members engaged in that fishery and provided an up-to-date total catch of the target species by fine-scale rectangle, SSRU and for the fishery as a whole. However, the Secretariat only forecast closure dates for the fishery as a whole, and did not attempt to forecast closures in fine-scale rectangles or SSRUs.

4.160 Catches in other exploratory fisheries for *Dissostichus* spp. were 106 tonnes in Subarea 88.2 against a catch limit of 375 tonnes, and 117 tonnes in Division 58.4.2 against a catch limit of 500 tonnes.

4.161 The Scientific Committee noted that four Members were in breach of paragraph 9 of Conservation Measure 41-01 which requires Members who have lodged an exploratory fishery notification but decide subsequently not to fish to notify the Secretariat of that fact. Notifications by Members not intending to enter a fishery had only been received from Japan, in respect of five areas, and New Zealand, in respect of one area.

4.162 As part of Conservation Measure 41-01 all vessels are required to carry out a research plan which includes completing a minimum number of research sets on entering an SSRU. Of the 10 vessels fishing in the new and exploratory fisheries, only one Russian vessel failed to complete its quota of research sets. The Scientific Committee welcomed the results of the research activities of the other vessels, which in some cases had completed more than their required 20 research sets per SSRU.

New and Exploratory Fisheries Notified for 2003/04

4.163 A summary of new and exploratory fisheries notifications for 2003/04 is given in SC-CAMLR-XXII/BG/5 Rev. 1 (Annex 5, Table 5.1). There was a total of 31 notifications made by 14 Members. The numbers of vessels for the notifications for exploratory fisheries for *Dissostichus* spp. in 2003/04 are shown, grouped by subarea or division, in Annex 5, Table 5.2. Four notifications were incomplete or not submitted by the deadline. Conservation measures in force for those areas for the 2002/03 season are provided in Annex 5, Table 5.2.

4.164 As was the case last year, there were multiple notifications of exploratory fisheries for *Dissostichus* spp. for several subareas or divisions (Annex 5, Table 5.2). While this is of concern, the Scientific Committee also noted that the experience of previous years indicated that a number of these might not be activated.

4.165 The Scientific Committee noted that there were a number of notifications for Subareas 48.1, 48.2, 58.6, 58.7 (outside EEZs) and Division 58.4.4 where directed fishing on *Dissostichus* spp. is prohibited. The Scientific Committee noted that conservation measures indicated that these will remain closed to the toothfish fishery until a survey has been completed, the results analysed, and the fishery is reopened on the advice of the Scientific Committee to the Commission.

4.166 Other notifications were for fishing in Division 58.4.1 and Subarea 88.3, which were closed to fishing in the 2002/03 season. The Scientific Committee noted that neither area has defined SSRU boundaries or catch limits. There were also notifications for the assessed fisheries in Subarea 48.3 and Division 58.5.2.

4.167 WG-FSA had requested clarification on its role in assessing notifications with regard to closed areas and notifications that were incomplete and those that had been submitted late (Annex 5, paragraph 5.14). It had also requested direction on how to proceed with assessing all-encompassing notifications as opposed to assessing notifications that follow strictly the requirements of the conservation measures.

4.168 The Scientific Committee further noted that notifications fall into two categories:

(i) notifications to participate in an exploratory fishery that had been active in the previous season and with operational details consistent with existing measures;

(ii) notifications to fish in subareas and divisions currently closed to fishing by conservation measures and/or with operational details absent or not consistent with existing measures.

4.169 The Scientific Committee was concerned that the large number of notifications placed a considerable workload on WG-FSA and WG-IMAF, which are expected to review all notifications. To allow the Scientific Committee to evaluate how the proposed fishing activities are likely to provide information from which assessments can be made, the Scientific Committee recommended that, in order to undertake exploratory fishing in subareas or divisions currently closed by conservation measures, Members should follow the procedures outlined in Conservation Measure 24-01 (Application of Conservation Measures to Scientific Research). This will require that a research plan be submitted to the Secretariat at least six months in advance of the planned start date.

4.170 Given the considerable workload of WG-FSA and WG-IMAF, the Scientific Committee requested clarification from the Commission on its role in assessing notifications which were submitted late.

4.171 In reviewing the notifications, the Scientific Committee observed that there had been an improvement in specifying intended catches. The Scientific Committee emphasised that intended catch levels should be governed by what is required for economic viability and by operational and data acquisition considerations, as specified in Conservation Measure 21-02.

4.172 The Namibian Representative noted that Namibia had withdrawn notifications CCAMLR-XXII/29 and XXII/31 and did not want them discussed by the Scientific Committee.

4.173 There have been a very large number of notifications for fishing in some localities. It was noted that, depending on the size of the precautionary catch limits, this implies that if all vessels operated simultaneously, the available catch per vessel could be lower than that required for economic viability, especially for those vessels operating in high latitudes where fishing imposes considerable operational difficulties.

4.174 There were also two notifications for exploratory trawl fisheries. An Australian notification is for a trawl fishery for *Dissostichus* spp. and *Macrourus* spp. in Divisions 58.4.3a and 58.4.3b. A Russian notification is for a mixed trawl fishery targeting *Chaenodraco wilsoni, Trematomus eulepidotus, Lepidonotothen kempi* and *Pleuragramma antarcticum* and several other Nototheniidae in Division 58.4.2.

4.175 The Scientific Committee noted that some Members have experienced difficulties with some provisions of Conservation Measures 10-04 and 24-02 in that there are potentially contradictory requirements for the holding of fishing licences and for the conduct of bottle tests (Annex 5, paragraph 13.1). This should be drawn to the attention of the Commission.

Small-scale Research Unit (SSRU) Boundaries

4.176 The Scientific Committee recalled its advice from last year to investigate more appropriate SSRU boundaries for Subarea 88.1 during the intersessional period (SC-CAMLR-XXI, Annex 5, paragraphs 5.27 to 5.31).

4.177 The Scientific Committee agreed that the new SSRUs proposed by WG-FSA better captured the irregular shapes of the bathymetric features and fishing grounds encountered in the subarea, and resulted in SSRUs more similar in size to those in other CCAMLR areas. The resulting 12 new SSRUs are shown in Annex 5, Figure 5.1.

4.178 The Scientific Committee recognised that it is becoming difficult to manage the closure of fine-scale rectangles in Subarea 88.1 because of the increase in the number of vessels operating there. The Scientific Committee believed that increasing the numbers of SSRUs, whilst at the same time removing catch limits on fine-scale rectangles, will overcome many of the current problems with area closures. This is because it will drastically reduce the number of subdivisions (fine-scale rectangles) that the Secretariat has to manage, whilst at the same time increasing the catch limit in each new subdivision (SSRU). In general, this means that catch limits will be approached more slowly and be easier to manage. However, some of the proposed SSRUs will likely have catch limits that are equal to or less than the current 100 tonne fine-scale rectangle limit, and would therefore also face the same reporting issues as highlighted for fine-scale rectangles. Other options for better managing catch limits on SSRUs include reducing the amount of effort in SSRUs, more frequent reporting of catches, and, in addition, the forecasting of closures of SSRUs. (At present forecasting is only carried out for larger subareas and divisions.)

4.179 The Scientific Committee recommended that the new SSRUs be adopted and the approaches above be considered in managing the distribution of effort in this exploratory fishery.

4.180 The Scientific Committee discussed the application of this approach to other new and exploratory fisheries in the CCAMLR Convention Area. Although some limited catch and

distributional data were available for Subarea 88.2 and Division 58.4.2, the data were too sparse to revise SSRU boundaries in these areas. The Scientific Committee recommended that the SSRU boundaries for these and other areas be reviewed when more data were available, but consistency could be applied across subareas and divisions for which little information is available.

4.181 The Scientific Committee also noted that there were notifications for exploratory longline fisheries in Division 58.4.1 and Subarea 88.3. This is the first notification to fish in Division 58.4.1 and there are no existing SSRU boundaries for either area. The Scientific Committee recommended that SSRU boundaries be no larger than 10° of longitude to be consistent with SSRU boundaries in other high-latitude subareas and divisions.

Approaches to Setting Catch Limits for Subarea 88.1

4.182 Totals of 1 740 tonnes of *D. mawsoni* and 51 tonnes of *D. eleginoides* were caught during 2002/03. This exploratory fishery has now been in operation for the past six seasons (WG-FSA-03/44). During that time, the total catches of *Dissostichus* spp. have been 41 tonnes in 1998, 296 tonnes in 1999, 745 tonnes in 2000, 659 tonnes in 2001, 1 333 tonnes in 2002 and 1 791 tonnes in 2003.

4.183 For the last three years WG-FSA has used the approach for calculating precautionary yields for *Dissostichus* spp. for Subarea 88.1 outlined in SC-CAMLR-XIX, Annex 5, paragraphs 4.20 to 4.33. This approach is based on analogy with *D. eleginoides* in Subarea 48.3, where yields are calculated based on the estimates of mean recruitment in that population.

4.184 The Scientific Committee noted that the former assessment of yield for Subarea 88.1 should no longer be used because of errors in the estimates of mean recruitment of *D. eleginoides* in Subarea 48.3 (paragraphs 4.36 to 4.48). The corresponding estimates of yield for the whole of Subarea 88.1 based on the alternative Subarea 48.3 recruitment series are given in Table 5. The Scientific Committee noted that in the past these estimates had been discounted by factors ranging from 0.3 to 0.5.

4.185 The Scientific Committee also noted that the existing catch limit of 3 760 tonnes for Subarea 88.1 had been derived by increasing the 2001/02 catch limit by 50%, rather than accepting the corresponding change based on the assessment of Subarea 48.3.

4.186 The Scientific Committee was unable to develop management advice based on assessments of precautionary yields for Subarea 88.1. However, as a precautionary measure the Scientific Committee recommended that the current catch limit should not be exceeded. It further considered that the yield by analogy with the Subarea 48.3 approach should no longer be used to estimate yield in this subarea. It was recognised there was an urgent need to develop methods in this subarea that will provide an independent assessment of long-term sustainable yield for this area.

Approaches to Setting Catch Limits for Subarea 88.2

4.187 An exploratory fishery has now been carried out in Subarea 88.2 for the last two seasons with reported catches of *Dissostichus* spp. of 41 tonnes in 2001/02 in SSRU 882A and 106 tonnes in 2002/03 from SSRU 882E.

4.188 In line with the approach taken for Subarea 88.1, the corresponding estimates of yield for Subarea 88.2 are given in Table 5. Note that these estimates apply only to SSRU 882A.

4.189 The Scientific Committee also noted that the existing catch limit of 375 tonnes for Subarea 88.2 had been derived by increasing the 2001/02 catch limit by 50%. The Scientific Committee was unable to provide any further management advice on appropriate yields or catch limits for Subarea 88.2. However, as a precautionary measure the Scientific Committee recommended that the current catch limit should not be exceeded. It further considered that the yield by analogy with the Subarea 48.3 approach should no longer be used to estimate yield in this subarea. It strongly recommended the need to develop methods in this subarea that will provide an independent assessment of long-term sustainable yield for this area.

Progress towards Assessments of Subarea 88.1

4.190 At last year's meeting the Commission urged Members to undertake further research on methods of monitoring abundance of *Dissostichus* spp. in Subareas 88.1 and 88.2 (CCAMLR-XXI, paragraph 9.18). During the intersessional period New Zealand looked at a number of different approaches including the feasibility of acoustics, standardised CPUE analysis, simulation studies of research sets, and a tagging feasibility study (Annex 5, paragraph 5.46). Of these approaches, New Zealand considered that the implementation of a suitably designed tag–recapture experiment was most likely to succeed.

4.191 At the WG-FSA meeting the relative benefits of trawl surveys, tagging studies, depletion experiments and experimental management of fishing effort were discussed (Annex 5, paragraphs 5.47 to 5.55) and these are summarised in Annex 5, Table 5.4.

4.192 The Scientific Committee recognised the importance of trawl surveys in the assessment process for *Dissostichus* fisheries in Subarea 48.3 and Division 58.5.2. Because of the value and importance of the *Dissostichus* fishery in Subarea 88.1, it recommended that the feasibility of a fishery-independent research survey be determined and a survey be conducted in the future to provide information on recruitment, biomass and distribution that would be valuable for stock assessment purposes. The Scientific Committee noted that there would likely be logistical difficulties such as the large size of Subarea 88.1, as well as uncertain and potentially heavy ice conditions. However, the Scientific Committee noted the success of the multinational CCAMLR-2000 Survey, and recommended options such as surveying a smaller part of the area, or particular SSRUs, and having contingency plans if ice proved to be a problem. They also noted that historical ice charts could be examined that could provide useful information to the design of such a survey.

4.193 The Scientific Committee noted that a tag–recapture experiment on *D. eleginoides* at Macquarie Island had led to an assessment of accessible biomass in the area (Tuck et al., 2003). The Scientific Committee endorsed the inclusion of tagging as a requirement in the research plans for the Subarea 88.1 and 88.2 fisheries for the 2003/04 season. Further details

on tagging protocols are provided in the WG-FSA report (Annex 5, paragraphs 7.11 to 7.18 and Appendix D). It also noted that, at the proposed rate of tagging of one tag per tonne of toothfish catch, it would take at least 10 years before a precise estimate of abundance could be obtained. The Scientific Committee urged WG-FSA to consider how mark–recapture information might be used in the interim with the inclusion of how to incorporate the attendant uncertainties in the assessments. To date, New Zealand vessels have tagged 2 000 fish in these subareas (Annex 5, paragraph 5.62).

4.194 The Scientific Committee considered that additional approaches would be required to provide estimates of biomass in the short to medium term and recommended that, during the intersessional period, the following work program be carried out by Members fishing in Subarea 88.1:

- carry out further tagging simulation studies as detailed in Annex 5, Appendix D, to determine the best approach to tagging in Subarea 88.1 that could lead to an assessment (Annex 5, Appendix D, paragraph 8);
- review practicalities and possible research designs for carrying out a trawl survey on juvenile *Dissostichus* spp. in the Ross Sea (Annex 5, paragraph 5.56);
- carry out simulation studies to determine optimal ways to direct fishing effort, both within and between years, to achieve necessary contrast in fishery and stock parameters that could lead to an assessment.

This approach would include adoption of the proposed SSRUs and implementation of the tagging program in 2003/04, a work program in the intersessional period, with a review at the 2004 CCAMLR meeting, and further implementation of the tagging program and other approaches for the 2004/05 and 2005/06 seasons as discussed below.

4.195 For the 2003/04 season the Scientific Committee recommended that the catch limit for the whole of Subarea 88.1 be apportioned to the SSRUs on the basis of the fishable seabed area (600–1 800 m) and mean CPUE per SSRU. The percentage of the catch for each SSRU is given in Table 6. This will encourage effort to be directed into areas that have been consistently fished in recent years.

4.196 The Scientific Committee noted that in using this approach some SSRUs would end up with low catch limits. It also noted that the Secretariat might have considerable difficulty in managing areas with small catch limits. It advised the Commission to consider these factors when setting catch limits for these SSRUs.

4.197 In some of the proposed SSRUs the large distance between bathymetric features means that there may be operational difficulties in placing 20 research sets meeting the 5 n mile separation criteria as required in Conservation Measure 41-02. The Scientific Committee recommended that this be overcome by requiring only 10 research sets in SSRUs where the fishable seabed area is less than 15 000 km^2.

4.198 The Scientific Committee recommended that the outcomes of this intersessional work be evaluated at the WG-FSA-SAM meeting in 2004, and the results of that evaluation be considered by WG-FSA and the Scientific Committee in 2004. It also noted that different approaches to obtain the necessary data to lead to an assessment may not be mutually

exclusive. For example, an experiment combining an intensive tagging program and the management of effort in a few SSRUs for two to three years could provide a powerful tool for estimating population abundance and other input parameters required for an independent assessment of yield (Annex 5, paragraph 5.57).

4.199 The Scientific Committee also briefly discussed provisions for by-catch in Subarea 88.1. It advised that the total by-catch limits for the subarea should be the same as for 2002/03, and that catch limits for each SSRU should be pro-rated in the same way as the catch limits for *Dissostichus* spp. It encouraged further work in the intersessional period to examine more appropriate SSRU by-catch levels that are more in accordance with the by-catch distribution and abundance.

Exploratory Longline Fisheries for *Dissostichus* spp.
in Divisions 58.4.1 and 58.4.2

4.200 The Scientific Committee noted that, excluding Namibian proposals, 12 vessels had been notified for fishing in Division 58.4.2 and five vessels notified to fish in Division 58.4.1 for *Dissostichus* spp. using longlines. It also noted that the existing conservation measure, Conservation Measure 41-05, for exploratory longline fishing for *Dissostichus* spp. in Division 58.4.2 has the following elements among others:

(i) SSRUs are 10° longitude in width;

(ii) fishing is prohibited in waters less than 550 m to protect benthic communities;

(iii) further protection to benthic communities is provided by closing half of each SSRU;

(iv) a catch limit of 100 tonnes per SSRU is applied;

(v) the overall catch limit for the division is 500 tonnes.

4.201 The Scientific Committee also noted its discussion and consideration of the following points, along with points raised by WG-FSA:

(i) SSRUs should be no more than 10° longitude in width (Annex 5, paragraphs 5.28, 5.29 and 5.82);

(ii) fishery activities should be conducted in a manner that they lead to an assessment in the short term (Annex 5, paragraph 5.83);

(iii) a tagging program combined with concentration of effort in some SSRUs could provide a better understanding of the stock and is likely to be a promising approach that could lead to an assessment at present, pending consideration of simulation trials in the coming year and a review of the potential implementation of research surveys (Annex 5, paragraph 5.83);

(iv) a research plan should be part of every exploratory fishery (Annex 5, paragraphs 5.72 and 7.12);

(v) the development of an experimental approach would be desirable to help understand the dynamics of the fishery and for providing important data for assessments (Annex 5, paragraph 5.83), which could be undertaken with the assistance of simulation studies intersessionally.

4.202 It was also noted that the results of this year's exploratory fishery in Division 58.4.2 showed that the implementation of the research sets as currently specified requires a greater area than half an SSRU. Those results also showed which SSRUs would be more accessible given the current understanding of the variability in ice conditions.

4.203 On that basis, it was agreed to recommend the following for the exploratory longline fisheries in Divisions 58.4.1 and 58.4.2 combined:

(i) 10° longitude SSRUs be established throughout these divisions;

(ii) the area of Division 58.4.1 north of 60°S be considered as a single SSRU;

(iii) for protection to benthic communities (SC-CAMLR-XIX, paragraph 9.15), it is recommended that the existing provision to prohibit fishing in waters less than 550 m be retained.

4.204 With respect to setting limits on exploratory catches in each SSRU, some Members recommended that:

(i) half the 10° longitude SSRUs across Divisions 58.4.1 and 58.4.2 combined have a catch limit of 200 tonnes in each SSRU while the other half have a catch limit of zero until an assessment has been undertaken to determine how the fishery can be developed appropriately across the whole area in the longer term;

(ii) this approach would be consistent with the existing conservation measure and provide for an orderly development of the fishery, opportunities to gather data from a tagging program and the fishery as well as providing some protection to benthic communities (SC-CAMLR-XIX, paragraph 9.15);

(iii) based on existing knowledge from the fishery and recognising the operational requirements of the research plan and the difficulties imposed by ice, alternate SSRUs have the catch limit of zero tonnes beginning with the SSRU at the western end of Division 58.4.2 having a catch limit of 200 tonnes and the alternating seven will end with the SSRU at the eastern end of Division 58.4.1 having a catch limit of zero tonnes;

(iv) the northern SSRU in Division 58.4.1 would have a catch limit of 200 tonnes;

(v) the variation in catch limits across SSRUs would be reviewed next year by WG-FSA.

4.205 Others did not agree with setting a catch limit of zero tonnes in some areas because it would present operational difficulties due to the variation in ice conditions and the unpredictability of which SSRUs might be accessible. They also indicated that they would prefer data be gathered throughout these divisions for assessment purposes. To that end, they recommended that the catch limit in each SSRU should be 100 tonnes.

Exploratory Trawl Fishery in Division 58.4.2

4.206 The Scientific Committee noted that no advice is available on the notification for an exploratory trawl fishery in Division 58.4.2. In the absence of advice, it draws the attention of the Commission to the following:

(i) a conservation measure, 237/XX, was established for a similar fishery in 2001;

(ii) the current notification indicates it will primarily use pelagic trawl methods and does not indicate a request to undertake bottom trawl experiments as specified in the former conservation measure;

(iii) consideration of trawling in this area in the past has noted the need to provide interim protection to benthic habitats pending research on the potential impacts of bottom trawling (SC-CAMLR-XIX, paragraph 9.15);

(iv) Russian scientists maintain the view that bottom trawling will be necessary in order to catch fish and that the species indicated in the notification are not found in areas where benthic sponge and coral communities are present. Dr Sushin clarified that the notification talks of the possibility of demersal trawls. Such trawls on Russian vessels are carried out by bottom trawls;

(v) restriction of the fishery to deeper waters may protect benthic communities but the specified target species are not likely to be found in those waters;

(vi) consistent approaches in SSRUs and other measures will need to be applied to this fishery and the longline fishery in Division 58.4.2.

Management Advice on Trawl Fishery for *Macrourus* spp. and *Dissostichus* spp. in Divisions 58.4.3a and 58.4.3b

4.207 The assessment of *Macrourus* spp. in Divisions 58.4.3a and 58.4.3b was revised (Annex 5, paragraph 5.251). The Scientific Committee recommended a catch limit of 159 tonnes for Division 58.4.3a and of 26 tonnes in Division 58.4.3b. The Scientific Committee noted that the notification for the catch of *Macrourus* spp. in 2003/04 is for a larger overall total catch (CCAMLR-XXII/25), as it was based on the previous assessment of *Macrourus* spp. in these divisions.

Comments on Research Plans

4.208 In each of the exploratory fishery notifications, the research plans proposed at least met the minimum requirements specified in Conservation Measure 41-01 and in some aspects exceeded them.

4.209 The Scientific Committee did not have time to thoroughly review the research plan and data collection plans specified in Conservation Measure 41-01 during the meeting, but recommended that they be reviewed intersessionally.

Advice to the Commission

4.210 The Scientific Committee recommended that notifications to fish in subareas and divisions currently closed to fishing under conservation measures should follow procedures outlined in Conservation Measure 24-01, which requires that a research plan be submitted to the Secretariat at least six months in advance of the planned start date.

4.211 The Scientific Committee requested clarification from the Commission on how it should deal with late notifications.

4.212 The Scientific Committee recommended that the yield by analogy with Subarea 48.3 should no longer be implemented to determine yields in Subareas 88.1 and 88.2. The Scientific Committee could offer no specific advice on catch limits for the *Dissostichus* spp. fisheries in Subareas 88.1 or 88.2. However, as a precautionary measure the Scientific Committee recommended that the current catch limits should not be exceeded for these two subareas. It recommended that the division of any catch limit agreed by the Commission in Subarea 88.1 should follow the proportions given in Table 6.

4.213 The Scientific Committee recommended the adoption of new SSRUs proposed by WG-FSA and new approaches be considered for managing catch limits in those areas (paragraph 4.178).

4.214 The Scientific Committee recommended the continuation of the research plans in these fisheries with a change that only 10 research sets be required in SSRUs where the fishable seabed area is less than 15 000 km^2 (paragraph 4.197) and with the addition of the mark–recapture program discussed by WG-FSA.

4.215 The Scientific Committee recommended that, for the exploratory longline fisheries in the combined Divisions 58.4.1 and 58.4.2:

(i) 10° longitude SSRUs be established throughout these divisions;
(ii) the area of Division 58.4.1 north of 60°S be considered as a single SSRU;
(iii) the existing provision to prohibit fishing in water less than 550 m be retained.

4.216 The Scientific Committee drew the Commission's attention to the discussion on catch limits for *Dissostichus* spp. in Divisions 58.4.1 and 58.4.2 in paragraphs 4.204 and 4.205, indicating considerations on the variation of the existing conservation measure for exploratory longline fishing in Division 58.4.2 and its application to Division 58.4.1.

4.217 The Scientific Committee drew the attention of the Commission to its discussion on the proposed exploratory trawl fishery in Division 58.4.2 in paragraph 4.206.

4.218 The Scientific Committee recommended catch limits of *Macrourus* spp. of 159 tonnes in Division 58.4.3a and 26 tonnes in Division 58.4.3b (paragraph 4.207).

4.219 The attention of the Commission is drawn to the fact that some Members have experienced difficulties with some provisions of Conservation Measures 10-04 and 24-02 in that there are potentially contradictory requirements for the holding of fishing licences and for the conduct of bottle tests (paragraph 4.175).

4.220 With respect to other exploratory longline fisheries, the Scientific Committee drew the attention of the Commission to:

(i) consideration of the size of SSRUs to be no more than 10° longitude wide (paragraph 4.203);

(ii) consideration of changes to the research plan (paragraph 4.214);

(iii) measures contained in Conservation Measure 41-04 for Subarea 48.6 are recommended to remain in force for the coming season also taking account of advice in paragraph 5.38.

Crab Resources

4.221 No target fishery for stone crabs was carried out in 2002/03 and no proposal for the harvest of crabs has yet been received by CCAMLR for the 2003/04 season. The Scientific Committee recommended that existing Conservation Measures 52-01 and 52-02 on stone crabs should remain in force.

Squid Resources

Martialia hyadesi (Subarea 48.3)

4.222 No target fishery for squid was carried out in 2002/03 and no new request has been submitted to CCAMLR to continue exploratory fishing on this species. The Scientific Committee recommended that the existing Conservation Measure 61-01 for the squid *Martialia hyadesi* should remain in force.