HARVESTED SPECIES

Krill Resources

Krill Fishing

4.1 Reported catches of krill from catch and effort data are shown in Table 2. A total of 118 705 tonnes was caught during the 2001/02 season (up to 18 October 2002). The catch was taken by Japan, Republic of Korea, Poland, Ukraine and the USA. All of the catch came from Area 48; however, the catch cannot be reported by subareas as a result of differences in the format of the catch data submitted.

4.2 The overall total represents an increase from the 93 572 tonnes caught in the previous year, although this increase is not as great as the forecast indicated by the fishing plans presented to the Scientific Committee last year (SC-CAMLR-XX, paragraph 2.7). The same five nations participated in the fishery in both years.

4.3 Dr Goubanov informed the Scientific Committee that in the period from July 2001 to June 2002, three Ukrainian krill fishing vessels caught a total of 21 240 tonnes of krill in Subarea 48.2 and 14 280 tonnes in Subarea 48.3.

4.4 At the meeting of WG-EMM-02 fishing plans were reported from Japan, which indicated that there would be three vessels fishing for krill in the 2002/03 season with an estimated catch of 60 000 to 65 000 tonnes, and the USA, which indicated that there may be a single vessel fishing for krill in Area 48.

4.5 Dr Goubanov indicated that in the forthcoming season the Ukrainian fishery would be carried out by three to four vessels in Area 48 and that the projected catch would be between 40 000 and 50 000 tonnes. On board every vessel (or at least on board one vessel of the group of vessels operating in the same sector) there will be a national scientific observer.

4.6 The Scientific Committee recognised that it was unable to provide detailed data on the krill catch during the current year and requested guidance from the Commission on how the catch for the current year should be reported in future and how it may wish to receive information on trends in this fishery.

Advice from WG-EMM

4.7 The Scientific Committee noted that the information provided from the fishing nations on their future plans is generally less accurate than is necessary to indicate future trends in the krill fishery (Annex 4, paragraphs 2.1 to 2.12, 2.44 and 2.75).

4.8 The Scientific Committee agreed that interpretation of CPUE data from the krill fishery would not be possible without additional information on factors such as vessel type and product type, and that data submission on these parameters should be sought. Further, the voluntary submission of CPUE and associated data makes the krill fishery unique amongst CCAMLR fisheries which otherwise require mandatory submission of detailed catch and effort data (Annex 4, paragraphs 2.13 to 2.20 and 2.69).

4.9 The Scientific Committee welcomed the considerable information that was submitted on the developmental phase of a US-flagged krill fishing operation and reiterated its requirement for continued submission of detailed information from krill fishing fleets at all phases of their development (SC-CAMLR-XX, paragraph 2.4).

4.10 The Scientific Committee further welcomed the market analysis reported by the US krill fishing operation as well as technological information from patent databases in an effort to understand the potential development of the fishery. Apparent trends include the increased use of krill for aquaculture and pharmaceutical products over human consumption; developments in harvesting methods that may enable production of new products derived from krill; and the expansion of interest from traditional fishing nations to companies from other countries in the development of new products derived from krill (Annex 4, paragraphs 2.43 to 2.50).

4.11 The Scientific Committee recognised the importance of identifying the market factors critical to the krill fishery and to evaluate how these might be monitored to assess the development potential of the fishery. Several factors were identified in this regard; these included:

(i) the advisability of subscribing to a commercial source for market prices and other information;

(ii) obtaining information on factors that might affect the development of the krill fishery, such as the possible movement of under-utilised large fishing trawlers in the northern hemisphere to the krill fishery in the Southern Ocean;

(iii) development of competence necessary to access and interpret economic, marketing and technological information; and

(iv) monitoring the demand for aquaculture feeds and development of krill fisheries elsewhere in the world (Annex 4, paragraphs 2.45, 2.71 and 2.73).

Forecasting Closure of the Fishery

4.12 In response to a request by the Commission (CCAMLR-XX, paragraph 4.16) regarding mechanisms to forecast closure of the krill fishery, the Scientific Committee noted that a shorter reporting interval than that currently in place would be required to avoid a potential 30% overshoot.

4.13 Drs Kawaguchi and K. Shust (Russia) stressed that since the current level of catch is still well below the precautionary catch limit, it should not be an urgent task to change the reporting system. Dr Kawaguchi suggested that, as the predicted catch forecast approaches the precautionary catch limit for krill, then the reporting periods should be changed accordingly.

4.14 The Scientific Committee questioned whether it was appropriate that the frequency of data reporting in the krill fishery should be related to the forecast level of catch given the lack of data on which to make accurate predictions (see paragraph 4.7). It also noted that this requirement should be included in the fishery plan as part of the regulatory framework.

4.15 In addition, the Scientific Committee noted that the subdivision of the precautionary catch limit of krill in Area 48 into SSMUs (paragraph 3.17) will require a greater degree of fine-scale reporting than currently required.

Data Reporting

4.16 The Scientific Committee noted that the consistency and timeliness of data reporting was deteriorating. The low level of data submission and the timing of those submissions meant that important relevant aspects of the work of the Scientific Committee were not able to proceed (Annex 4, paragraph 2.64 to 2.68 and 2.74).

4.17 The Scientific Committee reaffirmed the need for detailed data on catch and effort from krill fisheries, and for the timely submission of such data using a consistent format. The SSMU Workshop (Annex 4, Appendix D) had demonstrated the utility of such data especially in relation to the development of key potential mechanisms for the precautionary management of the krill fishery and for the delineation of SSMUs.

4.18 The Scientific Committee recognised the important contribution made by Japanese data to the SSMU Workshop (Annex 4, paragraph 2.21) which highlights the need to have such data available to the work of WG-EMM.

4.19 The Scientific Committee noted that monthly catch data (with no specified format) and STATLANT data were the only types of mandatory data required from krill fisheries, which made these fisheries inconsistent with all others managed by CCAMLR. The Scientific Committee also recognised the importance of data collected by scientific observers. It was agreed that these data complemented the detailed catch and effort data being sought from the krill fisheries. However, the irregular collection of observer data limited the scope of analyses based on such data (Annex 4, paragraphs 5.43 and 5.47).

4.20 The debate over the submission of detailed data for the krill fishery is longstanding, having been initiated at SC-CAMLR-VII in 1988. In recognition of this, the Scientific Committee indicated the importance of identifying the reasons for the difficulty in resolving the issue, in particular to examine the extent to which it was either not possible to collect the data or whether there were issues relating to the validation and submission of data.

4.21 The information presented by the US-flagged krill fishing operation provided an indication that it is possible to make such data available to the work of WG-EMM. Consequently, advice is sought from the Commission on how to implement the Scientific Committee's requirement for submission of detailed catch and effort data to the Secretariat (Annex 4, paragraphs 2.74, 5.50, 5.51, 5.57 and 5.60).

4.22 The Scientific Committee agreed that there were compelling reasons for requiring detailed data for krill fisheries. In recognising the need for, and utility of, detailed data for the krill fishery, the Scientific Committee requested that a subgroup convened by Dr Kawaguchi develop formalised data reporting requirements that address the formats and frequencies for those data required for the work of the Scientific Committee that it is reasonable to collect from the krill fishery.

4.23 The Scientific Committee noted the current inconsistencies in data reporting between different Members operating in the krill fishery and also noted the need for detailed data reporting when the precautionary catch limit for krill in Area 48 is subdivided into SSMUs.

4.24 The Scientific Committee recommended that the current reporting requirement of monthly catch data by FAO statistical area be maintained.

4.25 In addition, the Scientific Committee recommended that catch and effort data aggregated over 10 x 10 n mile squares by 10-day periods be reported for the entire fishing season no later than 1 April of the following year.

4.26 The Scientific Committee further recommended that these reporting requirements be considered as interim requirements.

4.27 When the precautionary catch limit for krill in Area 48 is subdivided among SSMUs, the Scientific Committee recommended that reporting of haul-by-haul data by 10-day periods be required.

Fish Resources

Status and Trends

Fishing Activity in the 2001/02 Season

4.28 Nine fisheries, including two exploratory fisheries, were carried out for finfish under conservation measures in force during the fishing season of 2001/02. 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. 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 trawl and longlines.

4.29 The Scientific Committee noted that catches of target species had been described in Annex 5, Table 3.1; these had been updated to 18 October 2002 and reported in SC-CAMLR-XXI/BG/1. The Scientific Committee agreed that only catches within the Convention Area available at the start of the Scientific Committee meeting will be considered, and that future Scientific Committee meetings will use this approach.

4.30 Catches of all target species within the Convention Area by Member country are shown in Table 2 for the 2001/02 fishing season, and Table 3 for the 2000/01 fishing season.

Reported Catches of *Dissostichus* spp.

4.31 Reported catches of *Dissostichus* spp. are shown in Tables 2 and 3. Inside the CCAMLR Convention Area a total of 12 817 tonnes was reported during the 2001/02 season compared with 13 725 tonnes in the previous season. Catches outside the Convention Area

were 25 054 tonnes during the 2001/02 season compared with 33 918 tonnes in the previous season. This information is detailed in Annex 5, Table 5.30. Most of this catch was reportedly taken from Areas 51, 57 and 87.

Estimates of Catch and Effort from IUU Fishing

4.32 To mitigate confusion arising from multiple data formats on total removals due to IUU fishing, all information has been standardised to fishing season.

4.33 For subareas and divisions other than Subarea 48.3, WG-FSA used the approach adopted in recent years to estimate the magnitude of IUU fishing effort and catches of *Dissostichus* spp. during the 2001/02 fishing season. In Subarea 48.3, the IUU catch of fish for the past three seasons was estimated using a simulation model that uses estimates of the encounter frequency of a fisheries protection vessel.

4.34 The estimated unreported catch for all subareas and divisions in the Convention Area was 10 898 tonnes (Annex 5, Table 3.2). This compares to an estimated IUU catch of 8 802 tonnes in the 2000/01 season. The estimated unreported catch within the Convention Area was some 46% of the total catch in 2001/02 compared with 39% in 2000/01. When the 25 054 tonnes of toothfish reported via the CDS as caught outside the Convention Area are added, the total global removal of toothfish in the 2001/02 season is estimated at 48 769 tonnes, compared to 56 445 tonnes during the 2000/01 season.

4.35 The Scientific Committee reviewed the historical trends in IUU activity and evaluation of the threats arising from IUU fishing presented in Annex 5, paragraphs 5.202 to 5.223. It expressed concern that continued IUU pressure would increase the potential for catastrophic and precipitous declines in stock biomass, and result in dramatic changes in estimates of sustainable yield as demonstrated in Figure 4.

4.36 The Scientific Committee noted the advice of WG-FSA outlined in Annex 5, paragraphs 5.224 to 5.227. The Working Group was principally concerned about the continued high levels of catch reported from Area 51. Drs Shust and Goubanov pointed out that Russia and Ukraine have biological and seabed information from the Indian Ocean sector (Area 51) that could assist the Scientific Committee in better determining the likelihood of such large catches from Area 51. Dr Shust informed the Scientific Committee that an analysis of sea floor bathymetry and seabed area calculations from 500 to 2 000 m in this area have been undertaken by Russia and will be reported to WG-FSA in 2003.

4.37 A preliminary analysis was undertaken by WG-FSA to address the feasibility of such large catches from Area 51 (Annex 5, paragraphs 5.210 to 5.212). The Working Group concluded it was extremely unlikely that such large catches could be taken from the limited available seabed area. There was strong agreement from the Scientific Committee that catches reported from Area 51 were IUU removals from the Convention Area. This has severe consequences both for the assessment of sustainable yields in areas adjacent to the Convention Area, and for the viability of toothfish populations into the future.

4.38 Dr K. Sullivan (New Zealand) observed that this was the first time IUU fishing had been estimated for Subarea 88.1 (Annex 5, Table 3.2). He noted that there was no direct

evidence (vessel sightings) to confirm that IUU fishing had occurred, but accepted that it was precautionary to include this catch. Mr Watkins pointed out a windy buoy had been observed, but no fishing gear.

4.39 The Scientific Committee was asked by WG-FSA (Annex 5, paragraph 5.225) to provide comment on whether the assessments currently conducted by the Working Group are adequate with respect to IUU fishing, and if not what additional calculations might be required.

4.40 The Scientific Committee discussed the potential of including estimates of projected IUU catches in assessments of fish species in the Convention Area. Mr Jones pointed out that including projected IUU catches in the assessment could substantially reduce the yield that would be available for the legal fisheries. Further, there would be considerable uncertainty in future estimates of IUU catches. Dr Constable and Prof. J. Beddington (UK) agreed with the points of Mr Jones. They also noted that estimating IUU catch is outside the expertise of WG-FSA, and would be a topic best addressed by a technical subgroup that includes members from SCOI, WG-FSA and the Scientific Committee.

4.41 The Scientific Committee agreed that the current process for updating the stock assessments each year with the latest estimates of IUU fishing was the best practice at present.

Fish Biology/Demography/Ecology

4.42 The Scientific Committee welcomed a number of important contributions on the biology, demography and ecology of finfish resources which had been presented to WG-FSA. The Scientific Committee endorsed the use of separate background documents on the biology and demography of target species in the form of species profiles, and agreed that these profiles should be updated annually for use by WG-FSA and the Scientific Committee. The species profile for *Dissostichus* spp. is located in SC-CAMLR-XXI/BG/30, and for *C. gunnari* in SC-CAMLR-XXI/BG/29. The Scientific Committee thanked Dr Everson for his hard work during the intersessional period in preparing these documents.

4.43 It was noted that the method used to estimate cohort strength from length densities is dependent on the growth rates of the fish. This had contributed significantly to the uncertainties associated with the assessments of *C. gunnari* in Subarea 48.3 (paragraph 4.76) and Division 58.5.2 (paragraph 4.89). It was noted that during the intersessional period further work is planned on estimating the age of icefish from otoliths. It is hoped that this will lead to a workshop meeting in 2004 at which age determination methods can be agreed.

Developments in Assessment Methods

4.44 The Scientific Committee endorsed the use of a background document to describe the development and use of assessment methods employed by WG-FSA. This background document (SC-CAMLR-XXI/BG/28) will be updated each year as new approaches are explored and adopted by WG-FSA.

4.45 The Scientific Committee welcomed the progress toward making assessment software used during WG-FSA available to more participants through seminars and tutorials conducted during WG-FSA. The Scientific Committee thanked Dr Constable for his work to broaden the use of the assessment software, including tutorials to WG-FSA.

Research Surveys

4.46 Four trawl surveys and one acoustic survey of demersal fish species were carried out during the 2001/02 fishing season (Annex 5, paragraphs 3.38 to 3.43).

4.47 In particular, the Scientific Committee noted the development of promising acoustic techniques developed by Russia to survey *C. gunnari* in Subarea 48.3. The Scientific Committee encouraged the further development of the acoustic technique for assessing fish stocks, and recommended the establishment of an intersessional subgroup on fisheries acoustics. The objectives of the subgroup would be to evaluate the application of acoustics methods in estimating biomass of exploited fish in the CCAMLR Convention Area. In particular, the subgroup would be asked to re-examine the acoustic data from acoustic surveys to provide robust estimates of biomass, confidence intervals and age composition.

4.48 Dr E. Barrera-Oro (Argentina) drew the attention of the Scientific Committee to the trammel net research sampling conducted by Argentina throughout a total period of 20 years on King George and Nelson Islands in the South Shetland Islands and on the west coast of the Antarctic Peninsula. These studies demonstrated that after the commercial fishery numbers of juvenile *N. rossii* in Subarea 48.1 remain at low levels (Barrera-Oro et al., 2000; Casaux et al., 2000). He noted that these results were consistent with the conclusions from the research survey of Subarea 48.1 carried out by Germany and the US AMLR Program, that stocks of *N. rossii* appear to have not recovered (Annex 5, paragraphs 3.41, 5.131 and 5.132).

Assessment and Management Advice

Assessed Fisheries

D. eleginoides at South Georgia (Subarea 48.3)

4.49 The catch limit for the fishery for *D. eleginoides* in Subarea 48.3 in the 2001/02 season was 5 820 tonnes (Conservation Measure 221/XX). The total catch of *D. eleginoides* from this fishery, as reported by 18 October 2002 in the catch and effort reporting system, was 5 618 tonnes, most of which had been taken by longline.

4.50 The assessment of long-term annual yield for *D. eleginoides* for Subarea 48.3 was updated using the GYM. Several changes were incorporated during the WG-FSA-02 assessment, including a change in the GYM software to take account of the different timing of recruitment (Annex 5, paragraph 4.5), a new catch series (Annex 5, Table 5.9), the addition of the 2002 UK survey estimates of toothfish recruitment, new estimates of recent IUU catch, new estimates of fishing vulnerability at age and an updated CPUE series. The resulting precautionary estimate of long-term annual yield was 7 810 tonnes.

4.51 Dr Shust expressed several concerns about the assessment, and reiterated the concerns of Dr P. Gasiukov (Russia), made during WG-FSA, which are summarised in Annex 5, paragraph 5.81. He expressed concerns over the high degree of uncertainty in estimates of recruitment, natural mortality rate and selectivity at age. He also noted that alternative assessments using the dynamic production model and age-structured production models had produced much lower estimates of standing stock and yields to those of the GYM. Furthermore, that in some years substantial numbers of immature fish were taken in the fishery.

4.52 Dr Kock underscored the concerns expressed during WG-FSA as summarised in Annex 5, paragraphs 5.69 and 5.70. The primary concern was the substantial increase in yield in the current assessment based on the results of a single trawl survey. He pointed out that small increases in catchability between surveys could have a large effect on estimates of yield from the GYM. Dr E. Marschoff (Argentina) agreed that small variations in research survey design can have significant impacts on estimates of recruitments resulting in large variations in catch limits from year to year. He recommended, as a precautionary approach, to maintain catch limits at the current level. Dr Sullivan noted that there has been a 50% decline in the standardised CPUE (Annex 5, Figure 5.3).

4.53 Prof. Beddington noted that the GYM is already a very conservative approach to estimating long-term yield. He remarked that some of the assumptions of the more classical quantitative approaches employed by Dr Gasiukov, such as initial equilibrium conditions, were known to be violated during the analysis. Regarding the standardised CPUE trajectory, Prof. Beddington indicated that the decline was primarily due to a high level of IUU catch. He further pointed out that since the late 1990s, when the GYM procedure had been used as a basis for setting catch limits, there has been a slight increase in the CPUE trend.

4.54 Dr Constable noted that the GYM assessment approach is accepted as a precautionary approach that takes account of many of these uncertainties and is the same approach that has been used in recent years. He reiterated that WG-FSA encouraged the evaluation of alternative assessment techniques for use by WG-FSA, and that they will be discussed at the meeting of the Subgroup on Assessment Methods during the intersessional period. He also remarked that classical assessment methods had been used by WG-FSA prior to 1995, but at the Workshop on Methods for the Assessment of *D. eleginoides* this new method was developed for *D. eleginoides* because of the problems known to be evident in those classical methods.

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

4.55 The Scientific Committee recommended that the catch limit for *D. eleginoides* for the 2002/03 fishing season be set at 7 810 tonnes. It also noted the points raised by several Members in paragraphs 4.49 to 4.54.

4.56 The remaining provisions of Conservation Measure 221/XX should be carried forward for the 2002/03 season.

4.57 Any catch of *D. eleginoides* taken in other fisheries (such as the pot fishery) in Subarea 48.3 should be counted against this catch limit.

D. eleginoides at South Sandwich Islands (Subarea 48.4)

4.58 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)

4.59 The Scientific Committee recommended that Conservation Measure 180/XVIII be carried forward for 2002/03. As with last year, the Scientific Committee recommended that the situation in this subarea be reviewed with a view to considering the period of validity 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 (Division 58.5.1)

4.60 The Scientific Committee was not able to consider any updated assessments or give advice on *D. eleginoides* population status or exploitation in Division 58.5.1 (Kerguelen) because recent haul-by-haul data had not been provided. The Scientific Committee endorsed the recommendation of WG-FSA that these data, as well as any other information that would help determine the current stock status, should be made available for assessment purposes.

4.61 Prof. G. Duhamel (France) informed the Scientific Committee that the fishery inside the French EEZ is in the process of changing from a trawl fishery to a longline fishery. He further noted that there had been a substantial decline in trawl CPUE that could not be attributed to legal catches. He offered to provide haul-by-haul data for Division 58.5.1 and Subarea 58.6 to the CCAMLR Secretariat in the near future.

4.62 The Scientific Committee thanked Prof. Duhamel for providing information on the current status of the fishery in Division 58.5.1, and looked forward to the submission of the haul-by-haul data. It agreed that the presence of a French scientist and comprehensive information from the fishery at WG-FSA is essential for undertaking an assessment of the status of *Dissostichus* spp. stocks in Division 58.5.1 and adjacent areas such as the Crozet Island region (Subarea 58.6).

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

4.63 The catch limit of *D. eleginoides* in Division 58.5.2 for the 2001/02 season was 2 815 tonnes (Conservation Measure 222/XX) for the period from 1 December 2001 to the end of the Commission meeting in 2002. The catch reported for this division at the time of the Scientific Committee meeting was 1 812 tonnes. It is expected that the catch limit will be reached before the end of the current fishing season.

4.64 The GYM assessment was updated using the new series of total removals and new estimates of recruitment from a 2002 trawl survey. The estimate of precautionary long-term annual yield was 2 879 tonnes.

4.65 Prof. Beddington noted that Australia's notification of a longline fishery in Division 58.5.2 would require WG-FSA to consider the different gear selectivities in future assessments. Dr Constable referred to the work undertaken by WG-FSA in 1999, which considered the implications of catch limits for different gear types in the same management area (SC-CAMLR-XVIII, Annex 5, paragraph 4.75). Dr Kirkwood noted that the use of trawl selectivity in the GYM was the more precautionary approach (Annex 5, paragraph 5.16).

4.66 The Scientific Committee endorsed the view of WG-FSA that the assessments of yield for *D. eleginoides* arising from the survey and other work on the Heard Island Plateau were solely applicable to *D. eleginoides* on the plateau. Thus, it was agreed that the advice from these assessments pertains to the area in Division 58.5.2 west of 79°20'E (Annex 5, paragraph 5.91).

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

4.67 The Scientific Committee recommended that the catch limit for Division 58.5.2 in the 2002/03 season be revised to 2 879 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.

4.68 The Scientific Committee noted that the introduction of longline fishing to Division 58.5.2 (CCAMLR-XXI/10) could involve a change in the assessment in future years. However, the Scientific Committee recommended the general application of the catch limit above to trawl and longline operations, as this is a suitable precautionary approach at this stage (Annex 5, paragraph 5.16).

4.69 The remaining provisions of Conservation Measure 222/XX should be carried forward for the 2002/03 season.

D. eleginoides in Subarea 58.7

Prince Edward Islands EEZ

4.70 The Scientific Committee welcomed the assessment of *D. eleginoides* in the South African EEZ around the Prince Edward Islands described in Annex 5, paragraphs 5.126 to 5.128. The Scientific Committee noted that this assessment indicated that *D. eleginoides* stocks in the EEZ since 1996 have been subject to high levels of illegal catch leading to a sharp decline in the longline CPUE. It also showed that spawning stock biomass has been depleted to only a few percent of the pre-exploitation level. The Scientific Committee further noted that ultimately projections suggest that the annual allowable catch in the Prince Edward Islands EEZ could be up to 400 tonnes. However, such a catch level would depend on target levels of recovery that may be adopted by the Commission. It was noted that the changes in length composition might lead to conclusions different to those reliant on the CPUE data alone, and that further analysis would be reported to WG-FSA in 2003.

4.71 The Scientific Committee expressed concern about the continuation of this fishery given the extremely low estimated level of current spawning biomass relative to pre-exploitation levels. Mr Watkins stated that the area had been subject to significant IUU fishing in the past, and that the presence of a fishing vessel would act as a deterrent to IUU fishing activity.

Outside Prince Edward Islands EEZ

4.72 The Scientific Committee recommended that the prohibition of directed fishing for *D. eleginoides* in Subarea 58.7 (Conservation Measure 160/XVII) should continue.

C. gunnari at South Georgia (Subarea 48.3)

4.73 The catch limit for the fishery for *C. gunnari* in Subarea 48.3 in the 2001/02 season was 5 557 tonnes (Conservation Measure 219/XX). The total catch of *C. gunnari* from this fishery, as reported by 18 October 2002 in the catch and effort reporting system, was 2 656 tonnes.

4.74 The assessment followed the short-term projection method to update catch limits for the 2002/03 season (Annex 5, paragraphs 5.102 to 5.109). The assessment was updated using information derived from trawl surveys conducted by Russia and the UK in 2002. WG-FSA re-estimated the potential bias of the gears and agreed to a correction factor of 1.241 to be applied to the UK survey results. A difference of this magnitude was consistent with the differences between the trawl headline heights of the UK and Russian trawls.

4.75 Length densities from the UK and Russian surveys were analysed using the CMIX program to estimate numbers of fish at age. Concern was expressed by the Scientific Committee at the difficulty experienced in identifying 4-year-old fish in either the Russian or UK data. It agreed that the methods used to separate the cohorts for the purposes of assessment be reviewed by WG-FSA at its next meeting (paragraph 4.43).

4.76 The Scientific Committee agreed that the problems may be addressed by the age determination from otolith samples. It reiterated the importance of obtaining reliable age determinations in *C. gunnari* to assist with these assessments, and strongly encouraged the continuation of age and growth studies of *C. gunnari* during the intersessional period.

4.77 In view of the low estimate of biomass, Dr Marschoff considered it appropriate to afford to this stock the same degree of protection given to other stocks of the species by closing the fishery. He queried whether the food value of the catch is commensurate with the conservation issues at stake.

4.78 Prof. Beddington noted that this latter question is not within the remit of the Scientific Committee.

4.79 In response to Dr Marschoff's first point, Dr Shust noted that the icefish biomass in Subarea 48.3 from the Russian and UK surveys in 2002 is lower compared to the one from the acoustic survey. In general, the biomass was in excess of 40 000 tonnes and it cannot be considered low compared to recent years.

4.80 The results of the assessment indicated a projected yield of 2 181 tonnes in year 1 and 1 361 tonnes in year 2.

4.81 Dr V. Sushin (Russia) expressed concern that the bottom trawl surveys underestimated the biomass of *C. gunnari*. He suggested that recent changes in environmental conditions may have resulted in a change of the vertical distribution of *C. gunnari* stocks. More importantly, he noted that the acoustic method provides a more realistic estimate of standing stock throughout the water column than within the depth range sampled by bottom trawls. Arising from this, the standing stock estimate used to calculate the catch limit was significantly lower than the true biomass. Accordingly, he was very disappointed that the results of Russian acoustic surveys had not been used in the assessments, even though these results had been analysed and agreed on at a workshop in Cambridge, UK, in September 2002. He suggested that the results of the abovementioned acoustic survey be used by WG-FSA in 2003 for the assessment of total allowable catch for icefish.

4.82 The Scientific Committee agreed that a substantial proportion of the biomass is in the water column and was not available to the bottom trawl. However, it noted that WG-FSA recognised that additional uncertainties, such as target strength, mark identification and species composition introduce uncertainty, and potential bias, into the acoustic biomass estimate (see Annex 5, paragraphs 5.96 to 5.101). Time constraints and the lack of acoustic expertise meant it was not possible to resolve these issues at the WG-FSA meeting. Consequently, it was also not possible to derive new estimates of biomass and confidence intervals that would allow the use of these data in assessments.

4.83 The Scientific Committee strongly endorsed further development of the use of acoustic surveys for estimating the abundance of this species as it seems likely to be an important method for future assessments. It further recommended an intersessional workshop to directly address issues surrounding the use of acoustic methods to estimate the biomass of *C. gunnari* for use in the assessment of precautionary yield.

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

4.84 The Scientific Committee recommended that the precautionary catch limit for icefish in 2002/03 should be set at 2 181 tonnes.

4.85 The Scientific Committee had no information from which to consider or revise its advice of 2001 in respect of the current seasonal limitation in Conservation Measure 219/XX. It therefore recommended that these aspects of the conservation measure should be unchanged.

4.86 The Scientific Committee recommended the continuation of other aspects of Conservation Measure 219/XX, except for aspects subject to consideration of recommendations in paragraphs 5.42 to 5.50, including that it may be appropriate to reconsider whether bottom trawl gear might be permitted under appropriate conditions (Annex 5, paragraphs 5.113, 6.202 and 6.233(iii)).

C. gunnari at Kerguelen Islands (Division 58.5.1)

4.87 The Scientific Committee noted that icefish surveys in Division 58.5.1 have been conducted between 1996/97 and 2001/02 (WG-FSA-02/65), and that these surveys indicate that the biomass of *C. gunnari* is currently at low levels. The Scientific Committee also noted that the fishery for *C. gunnari* within the French EEZ of Division 58.5.1 would remain closed in the 2002/03 season (see also Annex 5, paragraph 5.84).

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

4.88 The Scientific Committee noted the details of the 2001/02 fishing season for *C. gunnari* in Division 58.5.2 (Annex 5, paragraphs 5.115 and 5.116). The catch limit for the 2001/02 season was 885 tonnes. The reported catch up to 18 October 2002 was 850 tonnes.

4.89 The assessment followed the short-term projection method to update catch limits for the 2002/03 season also used for this species last year (see Annex 5, paragraphs 5.118 to 5.120). Given the difficulties in separating ages 3 and 4 fish (paragraph 4.75), WG-FSA agreed as a precautionary approach to assume the cohort was comprised of 4-year-olds.

4.90 The catch limit satisfying the agreed criteria is 5 130 tonnes over two years. This is made up of 2 980 tonnes in the first year and 2 150 tonnes in the second year.

4.91 A cohort of 1-year-old fish was observed which may become legal size towards the end of the 2003/04 fishing season. The Scientific Committee agreed that WG-FSA should consider next year how unassessed cohorts might be able to be protected from being exploited prior to being assessed.

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

4.92 The Working Group agreed that the total catch limit should be revised to 2 980 tonnes for the period from 1 December 2002 to 30 November 2003.

4.93 The remaining provisions of Conservation Measure 220/XX should be carried forward to the 2002/03 season.

Other Finfish Fisheries

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

4.94 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 Germany in 2002 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)

4.95 The Scientific Committee endorsed the advice of WG-FSA that Conservation Measures 72/XVII and 73/XVII should remain in force.

Electrona carlsbergi (Subarea 48.3)

4.96 No new information was made available to WG-FSA on which an update of the previous assessment could be based. The Scientific Committee agreed that WG-FSA revise the assessment for *E. carlsbergi* at its 2003 meeting.

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

4.97 The Scientific Committee agreed that provisions of Conservation Measure 223/XX should be retained and carried forward to the 2002/03 season.

Fishery Closure Mechanism

4.98 The Scientific Committee reviewed the method for predicting fishery closure dates (Annex 5, paragraph 5.123 to 5.125). It recommended that the Secretariat continue to

estimate future catches to predict closure dates, but that in applying the method it should incorporate information available to it on future vessel movements into its estimation of future effort on a trial basis. This will increase the accuracy of the prediction of closure dates, which in turn should reduce the level of under- or overshoot of the catch limit.

4.99 The Scientific Committee also noted that when there were a large number of vessels fishing in an area with a small catch limit, the timing of the fishery closure would be administratively difficult to manage (paragraph 4.105).

New and Exploratory Fisheries

New and Exploratory Fisheries in 2001/02

4.100 Thirteen conservation measures relating to exploratory fisheries were in force during 2001/02, but fishing only occurred in respect of three of these. In most of the active exploratory fisheries, the numbers of days fished and the catches reported were small. The notable exception was the exploratory fishery for *Dissostichus* spp. in Subarea 88.1 conducted under Conservation Measure 235/XX. During 2001/02 vessels from New Zealand took 1 275 tonnes of *Dissostichus* spp. south of 65°S.

New and Exploratory Fisheries Notified for 2002/03

4.101 Eight notifications of new or exploratory fisheries were made for 2002/03, and Australia also notified the commencement of a longline fishery for *D. eleginoides* in Division 58.5.2. All notifications had been received by the Secretariat by the due date, except for the Russian notification, for which only a statement of intent to submit had been received. The formal Russian notification was received on 6 September 2002.

4.102 The Scientific Committee noted that the longline fishery for *D. eleginoides* in Division 58.5.2 notified by Australia was not formally a new or exploratory fishery, but rather the introduction of a new fishing gear to an established fishery. The Scientific Committee welcomed the approach taken by Australia in providing advance notification of the proposed fishery and of the management provisions planned for that fishery.

4.103 There were multiple notifications of exploratory fisheries for *Dissostichus* spp. for several subareas or divisions (Annex 5, Table 5.2). While this is of potential concern, the Scientific Committee also noted that the experience of previous years suggested many of these may not be activated. The Scientific Committee noted in particular that notifications (sometimes multiple) have been made every year since 1997 for Subarea 48.6, but none have yet been activated.

4.104 The Scientific Committee also noted that there are still inconsistencies in the way in which notifications specified intended catch levels. As was the case again last year, some notifications attempted to specify realistic levels of intended catches, while others simply specified an intended catch that was equal to the current precautionary catch limit. While this inconsistency continues, the task of assessing the likely effects of multiple new or exploratory fisheries in an area is made much more difficult.

4.105 There have been a large number of notifications for Subareas 48.6, 88.1 and 88.2 and Division 58.4.4. 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 in high latitudes where fishing imposes considerable operational difficulties. In Subarea 88.2 the catch limit set at CCAMLR-XXI could potentially be taken in a short time or be overshot if all notified vessels participate. In Division 58.4.4, if all five notified vessels participate and achieve typical daily catch rates, it may be administratively impossible for the Secretariat to close the fishery before the catch limit set at CCAMLR-XXI has been taken.

4.106 In relation to Division 58.4.4, Dr Constable also noted that this area is believed to have been subject to high levels of IUU fishing. He considered that more information is needed about the state of *D. eleginoides* stocks in this area before any further fishing is allowed. Mr Watkins agreed and suggested that the Commission consider designation of a marine protected area in the region if Division 58.4.4 were closed to fishing. The Scientific Committee endorsed these views.

4.107 The Scientific Committee noted that there are additional administrative problems in managing conservation measure provisions for fishing in fine-scale rectangles and SSRUs when many vessels are fishing simultaneously in a subarea or division, particularly in terms of identifying when a vessel is considered to be resident in an area. Mr Watkins also noted that, while minimum soak times are set for fishing in fine-scale rectangles, no corresponding maxima are set. This needs clarification, since longer soak times are associated with larger by-catches.

4.108 The assessment of *D. eleginoides* in the Prince Edward Islands EEZ (paragraphs 4.70 and 4.71) suggested that the stock in that area had been greatly reduced from its unexploited level primarily by IUU fishing. This raises major concerns about the status of *D. eleginoides* stocks throughout Subareas 58.6 and 58.7. The catch limit for exploratory fisheries in Subarea 58.7 outside EEZs is currently zero. The Scientific Committee agreed that exploratory fisheries notified for Subarea 58.6 in 2002/03 should not proceed until appropriate information on stock status, such as from a stock survey, became available. Mr Watkins advised that South Africa would submit some new information on stocks in this area for consideration at next year's meeting.

4.109 With regard to provision of advice on precautionary catch limits for stocks likely to be subject to new or exploratory fisheries in 2002/03, the Working Group agreed that this would only be possible this year for Subareas 88.1 and 88.2. For all the other subareas and divisions for which notifications have been made, the Working Group is unable to provide any new advice on precautionary catch limits.

Precautionary Catch Limits

Subareas 88.1 and 88.2

4.110 Using new data resulting from the exploratory fishery in Subarea 88.1, estimates of precautionary yields for this subarea have been calculated by SSRU. These estimates are

given in Annex 5, Table 5.3. The estimated yield for Subarea 88.1 has more than doubled since last year to 13 882 tonnes. This increase was due to the large increase in CPUE in Subarea 88.1 in 2001/02, as well as the increased recruitment estimates for Subarea 48.3.

4.111 Using new data resulting from the exploratory fishery in Subarea 88.2, an estimate of precautionary yield of 602 tonnes for this subarea has been calculated (Annex 5, Table 5.4). The Scientific Committee noted that this yield estimate applies only to SSRU A.

4.112 The Scientific Committee agreed that the revised estimates of yield for Subareas 88.1 and 88.2 should be treated with considerable caution and that a discount factor should again be applied to the results of these assessments. In this respect, it noted that discount factors of 0.3 and 0.5 had been used for *D. mawsoni* in Subarea 88.1 in the last two years. Recent catches, catch limits and estimated yields for each SSRU are given in Annex 5, Table 5.4. Mr Jones suggested that, in light of the uncertainties associated with this estimate of precautionary yield, another possible alternative would be to leave the catch limits at the same level at which they were set last year.

4.113 The Scientific Committee recognised that the approach employed by WG-FSA to estimate precautionary yield in Subareas 88.1 and 88.2 may have reached a point where the limitations had outweighed the efficacy.

4.114 The Scientific Committee noted the views of WG-FSA that the CPUE series used in the current assessments of Subareas 88.1 and 88.2 should not be updated further. This emphasises the importance of the research component of the exploratory fisheries in these subareas. The Scientific Committee therefore encouraged further research on recruitment, and on the most effective means of deploying effort. In particular, the Scientific Committee strongly encouraged continuation of mark–recapture experiments by New Zealand and all other Members who fish in these subareas in 2002/03.

Incidental Mortality

4.115 Consideration of new and exploratory fisheries from the perspective of seabird incidental mortality was undertaken by ad hoc WG-IMAF (Annex 5, paragraphs 6.162 to 6.178 and Table 6.9; SC-CAMLR-XXI/BG/21) and is reported in paragraphs 5.38 to 5.40.

Crab Resources

4.116 In the 2001/02 season a single Japanese vessel undertook commercial pot fishing for crabs in Subarea 48.3. The fishery targeted two species, *Paralomis spinosissima* and *P. formosa,* in accordance with Conservation Measure 225/XX. The vessel conducted fishery-based research in accordance with Conservation Measure 226/XX and Annex 226/A (see Annex 5, paragraphs 5.139 to 5.142). The total catches were 56 and 57 tonnes of *P. spinosissima* and *P. formosa* respectively.

4.117 The Scientific Committee noted that there was insufficient information available to conduct a rigorous stock assessment on either species, but recognised the value of the experimental harvest.

4.118 The Scientific Committee agreed that there was insufficient new biological information on size at maturity to warrant a revision of Conservation Measure 225/XX pertaining to the minimum retention size of crabs. The Scientific Committee endorsed the request of WG-FSA that all existing data on male cheliped height and length be submitted to CCAMLR, and a more comprehensive analysis of male size at maturity be conducted.

Advice to the Commission

4.119 The Scientific Committee recommended that Conservation Measure 226/XX remain in force.

4.120 Following a proposal from the Japanese Delegation, the Scientific Committee recommended a revision of paragraph 6 of Conservation Measure 225/XX (SC-CAMLR-XXI/BG/19 Rev. 3). This will allow observers to sample crabs after sorting, providing the observer is given unrestricted access to the catch for proper random sampling. It was emphasised that the observer should continue to sample the whole catch prior to sorting as well as sampling after sorting.

Squid Resources

4.121 The Convener of WG-FSA reported that no notification had been submitted for the *Martialia hyadesi* fishery for the 2002/03 season. He also reported that the Working Group agreed that Conservation Measure 238/XX should be retained and carried forward for the 2002/03 season.