

SC-CAMLR-XXX

**SCIENTIFIC COMMITTEE FOR THE CONSERVATION
OF ANTARCTIC MARINE LIVING RESOURCES**

**REPORT OF THE THIRTIETH MEETING
OF THE SCIENTIFIC COMMITTEE**

HOBART, AUSTRALIA
24–28 OCTOBER 2011

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Chair of the Scientific Committee
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Abstract

This document presents the adopted report of the Thirtieth Meeting of the Scientific Committee for the Conservation of Antarctic Marine Living Resources held in Hobart, Australia, from 24 to 28 October 2011. Reports of meetings and intersessional activities of subsidiary bodies of the Scientific Committee, including the Working Groups on Ecosystem Monitoring and Management, Fish Stock Assessment, Incidental Mortality Associated with Fishing, Statistics, Assessments and Modelling, and a Workshop on Marine Protected Areas, are appended.

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**REPORT OF THE THIRTIETH
MEETING OF THE SCIENTIFIC COMMITTEE**
(Hobart, Australia, 24 to 28 October 2011)

OPENING OF MEETING

1.1 The Scientific Committee for the Conservation of Antarctic Marine Living Resources met from 24 to 28 October 2011 at the CCAMLR Headquarters in Hobart, Tasmania, Australia. The meeting was chaired by Dr D. Agnew (UK).

1.2 The Chair welcomed to the meeting representatives from Argentina, Australia, Belgium, Brazil, Chile, People's Republic of China (hereafter referred to as China), European Union, France, Germany, Italy, Japan, Republic of Korea, Namibia, New Zealand, Norway, Poland, Russian Federation, South Africa, Spain, Sweden, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America and Uruguay.

1.3 The Chair also welcomed to the meeting observers from the Netherlands (Acceding State), along with observers from ACAP, ASOC, CCSBT, CEP, COLTO, IUCN, IWC, SCAR and SEAFO, and encouraged them to participate in the meeting to the extent possible. SCAR also represented SCOR in relation to their joint activity relevant to CCAMLR's work (Southern Ocean Observing System (SOOS)).

1.4 The List of Participants is given in Annex 1. The List of Documents considered during the meeting is given in Annex 2.

1.5 The report of the Scientific Committee was prepared by Drs J. Arata (Chile), E. Barrera-Oro (Argentina), M. Belchier (UK), A. Constable (Australia), S. Hanchet (New Zealand), S. Kawaguchi (Australia), R. Leslie (South Africa), Ms I. Lutchman (UK), Dr G. Parkes (UK), Mr T. Peatman (UK), Drs D. Ramm (Data Manager), K. Reid (Science Officer), R. Sarralde (Spain), B. Sharp (New Zealand), V. Siegel (EU), H. Steen (Norway), P. Trathan (UK), J. van Franeker (EU), D. Welsford (Australia) and X. Zhao (China).

1.6 While all parts of this report provide important information for the Commission, paragraphs of the report summarising the Scientific Committee's advice to the Commission have been highlighted.

Adoption of agenda

1.7 The Provisional Agenda had been circulated prior to the meeting (SC-CAMLR-XXX/1) and was adopted without change (Annex 3).

Chair's report

1.8 The following meetings took place in 2011:

- (i) WG-EMM met in Busan, Republic of Korea, from 11 to 22 July 2011 and was convened by Dr G. Watters (USA) (Annex 4)
- (ii) WG-SAM was also held in Busan from 11 to 15 July 2011, concurrently with the meeting of WG-EMM, and was co-convened by Drs Constable and C. Jones (USA) (Annex 5)
- (iii) WS-MPA was held at the Institut Paul Emile Victor (IPEV), Brest, France, 29 August to 2 September 2011, was co-convened by Dr P. Penhale (USA) and Prof. P. Koubbi (France), and hosted by IPEV and the Agence des Aires Marines Protégées (AAMP) (Annex 6)
- (iv) WG-FSA was held from 10 to 22 October 2011 in Hobart. It was convened by Dr Jones (Annex 7)
- (v) WG-IMAF was held from 10 to 12 October 2011 in Hobart. It was convened by Mr J. Moir Clark (UK) (Annex 8).

1.9 Dr Agnew, on behalf of the Scientific Committee, thanked all chairs, conveners and coordinators of intersessional meetings, and France and the Republic of Korea for hosting the meetings of WG-SAM, WG-EMM and WS-MPA in 2011.

ADVANCES IN STATISTICS, ASSESSMENTS, MODELLING, ACOUSTICS AND SURVEY METHODS

Statistics, assessments and modelling

2.1 The Scientific Committee reviewed advice from WG-SAM. It recalled that this year's meeting of WG-SAM included a focus topic on data-poor exploratory fisheries (the terms of reference of which were set out in SC-CAMLR-XXIX, paragraph 3.133). The Working Group was co-convened by Drs Constable and Jones.

2.2 The Scientific Committee noted that most of the advice of WG-SAM (Annex 5) directly informed the work of WG-FSA and is considered under the relevant agenda items. The Scientific Committee noted, in particular, advice pertaining to the following items in Annex 5:

- (i) evaluation of research hauls in exploratory fisheries (paragraph 2.9)
- (ii) CPUE in longline fisheries (paragraphs 2.15 and 2.33)
- (iii) preliminary assessment in Divisions 58.4.4a and 58.4.4b (paragraph 2.17)
- (iv) research fishing (paragraphs 2.19, 2.25, 2.26 and 5.3 to 5.6)
- (v) performance metrics for surveys and tag-based research (paragraphs 2.38, 2.46 and 2.48)
- (vi) research design for data-poor fisheries (paragraphs 2.40, 2.44 and 2.47 to 2.49)
- (vii) tag-loss rates used in CASAL (paragraph 3.6)

- (viii) pre-recruit survey in Subareas 88.1 and 88.2 (paragraph 3.14)
- (ix) research fishing in areas which cannot support a viable fishery (paragraph 5.7)
- (x) review of the Secretariat's Strategic Plan (paragraph 6.5)
- (xi) Convener of WG-SAM (paragraph 8.3).

2.3 The Scientific Committee noted that the advice arising from the focus topic discussion on research plans for data-poor exploratory fisheries and the opportunity for Members to incorporate this advice into revised proposals in advance of WG-FSA, had contributed to substantially improved proposals for CCAMLR-sponsored research in data-poor toothfish fisheries being proposed and agreed this year.

2.4 The Scientific Committee agreed that the primary purpose of research in data-poor fisheries should be to collect data that will lead to a robust estimate of stock status and enable the estimation of precautionary catch limits consistent with CCAMLR decision rules (Annex 5, paragraphs 2.25 and 2.26 and Table 6).

2.5 The Scientific Committee noted that this year's focus topic on data-poor fisheries was outside the traditional quantitative remit of WG-SAM, and agreed that the terms of reference for WG-SAM could productively be expanded to allow consideration of a wider range of focus topics on an as-needed basis to inform the work of CCAMLR. The Scientific Committee agreed that the designation of different focus topics in particular years was a useful model to allow Members to prepare papers on a coherent topic and to send different experts to the meetings as appropriate for particular topics. The Scientific Committee identified the following focus topics as potentially valuable for discussion by WG-SAM in the short to medium term:

- (i) applying international best practice from tagging programs and tag-based research
- (ii) developing and evaluating methods to estimate IUU removals and trends in levels of IUU effort (SC-CAMLR-XXIX, paragraph 6.5; Annex 7, paragraph 3.24)
- (iii) evaluating preliminary research plans
- (iv) developing spatially explicit operating models to evaluate toothfish management procedures
- (v) developing methods for assessing the impact of larval fish by-catch from the krill fishery (Annex 7, paragraph 3.23)
- (vi) developing risk assessment methods for skate and macrourid by-catch in toothfish fisheries.

2.6 The Scientific Committee noted that the review and evaluation of research plans would likely need to be a standing topic for discussion every year and may constitute a considerable workload in its own right, but that if Members follow the clear guidance arising from this year's focus topic discussion and from WG-FSA, then the standard of the research proposals can be expected to improve and it should be possible to complete this work within a standing subgroup of WG-SAM and WG-FSA.

2.7 Some Members noted that the scheduling of WG-SAM with the mid-year meeting of WG-EMM was useful in order to draw on a range of expertise, but that these meetings should be held consecutively rather than in parallel, to allow effective participation by Members with small delegations.

2.8 The Scientific Committee thanked Dr Constable for his leadership of WG-SAM, noting that this was his final meeting as Convener.

Acoustic survey and analysis methods

2.9 SG-ASAM did not meet intersessionally between SC-CAMLR-XXIX and SC-CAMLR-XXX. However, the Scientific Committee noted the recommendation of WG-EMM for a meeting of SG-ASAM to be held during the forthcoming intersessional period along with a proposed list of issues that this meeting should address (Annex 4, paragraphs 2.225 and 2.226). The Scientific Committee noted that fishing-vessel-based acoustic data could provide qualitative and some quantifiable data on the distribution and relative abundance of other pelagic species such as myctophiids and salps, as well as krill.

2.10 Consequently, the Scientific Committee requested that SG-ASAM meet in 2012 and provide advice on:

- (i) Survey design –
 - (a) the implications of directed and undirected survey design for collection of acoustic data by fishing vessels, including the location and timing of transects, and the desirability of using existing acoustic transects in Subareas 48.1, 48.2 and 48.3 (including those used in the CCAMLR-2000 Survey)
 - (b) the potential for collection of acoustic data between and at trawl stations during fishing operations
 - (c) the collection of biological data, CPUE and information on spatial patterns of fished krill aggregations required to interpret acoustic data and assist in target identification and aggregation characteristics.
- (ii) Acoustic data collection –
 - (a) define the minimum requirements for acoustic data collection that could provide quantifiable estimates of krill biomass/distribution from fishing vessels, recognising that the vessels may not be configured to collect acoustic data at 38, 120 and 200 kHz as per the CCAMLR protocol (assuming appropriate survey design). This should include details of calibration, vessel noise characteristics and acoustic frequencies available on the vessel and whether the data are to be collected in a supervised (e.g. by scientists or suitably qualified observers on the vessel) or unsupervised (by vessel crew) manner. Where data are to be collected in

an unsupervised manner, SG-ASAM should be requested to provide a detailed set of instructions to ensure that acoustic data are properly collected and stored

- (b) define requirements for acoustic data collection and analysis methods that provide information on abundance and distribution of pelagic species other than krill.
- (iii) Acoustic data processing –
 - (a) provide advice on the most appropriate way to process acoustic data arising from fishing vessels, including target identification, biomass estimation and associated uncertainty. This should include advice on the most appropriate data formats and data management implications of collection of acoustic data.

HARVESTED SPECIES

Krill resources

2009/10 fishery

3.1 The krill fishery in Subarea 48.1 was closed when the catch reached 99.8% of the trigger level for the subarea (155 000 tonnes). This was the first time that the krill fishery has been closed because it has reached one of the trigger levels (Subarea 48.1), noting that these were introduced for the first time in 2009. The final verified catch for Subarea 48.1 was 153 262 tonnes based on STATLANT data (Table 1; Annex 4, paragraph 2.3). The catch in Subarea 48.1 in 2009/10 remains the highest ever recorded in this subarea.

2010/11 fishery

3.2 Six Members with a total of 13 vessels fished for krill in 2010/11 with about two-thirds of the catch taken from Subarea 48.2 (Table 2). The reported catch to 24 September 2011 was 179 131 tonnes (SC-CAMLR-XXX/BG/1). The three major fishing nations were Norway (102 815 tonnes), Republic of Korea (29 052 tonnes) and Japan (26 390 tonnes). There was also a small amount of krill taken as by-catch (<1 tonne) during a UK trawl survey in Subarea 48.3.

3.3 Following modification of CM 23-06 in 2010, in-season data are now reported at five-day intervals when catches in any one season exceed 50% of the subarea-specific limit (Annex 4, paragraph 2.14). In addition, all vessels are required to submit haul-by-haul catch and effort (C1) data in accordance with CM 23-06 (Annex 4, paragraph 2.15).

3.4 The Scientific Committee noted that at the time of the meeting, all vessels fishing for krill in 2011 had exited the fishery, and it was not known if any vessels would return to the fishery prior to the end of 2010/11.

Fishing patterns

3.5 The fishery had concentrated in the Bransfield Strait area in 2009/10 due to low sea-ice cover allowing extended access to the region. In 2010/11, Subarea 48.1 was mostly covered by sea-ice and fishing operations moved to Subareas 48.2 and 48.3 (Annex 4, paragraph 2.7).

3.6 Dr M. Kiyota (Japan) noted the importance of facilitating spatial flexibility in fishery operation if the fishery was to be commercially sustainable. This was because there were large fluctuations in the spatial distribution of krill, as well as in the year-to-year variability in access to the fishing grounds.

Krill fishery notifications for 2011/12

3.7 At the time of WG-EMM-11, six Members had submitted notifications for a total of 15 vessels intending to participate in krill fishing operations during 2011/12 (Table 3). The notifications were for trawl fisheries for krill in Subareas 48.1, 48.2, 48.3 and 48.4. No notifications were submitted for exploratory krill fisheries in Subarea 48.6 or elsewhere. The three largest expected catches notified were from Norway (175 000 tonnes), China (70 000 tonnes) and the Republic of Korea (67 000 tonnes). The total notified catch was 391 000 tonnes (Annex 4, paragraph 2.9).

3.8 The notification for one of the two Chilean krill fishing vessels was withdrawn prior to the Scientific Committee meeting, leaving just one notified Chilean-flagged vessel (*Betanzos*).

3.9 The EU reported that the *Dalmor II*, notified by Poland, may not operate in the fishery in 2011/12 and may be replaced by another Polish-flagged krill fishing vessel. The expected level of catch by the replacement vessel will remain at the same level as previously notified.

3.10 Ukraine submitted a late notification for one vessel and an expected catch of 30 000 tonnes from Subareas 48.1 to 48.4 (SC-CAMLR-XXX/BG/13). The Scientific Committee noted that it was a matter for the Commission to decide whether the late notification should be accepted.

3.11 The Scientific Committee advised the Commission that the withdrawal of a Chilean-flagged vessel and the addition of the Ukrainian-flagged vessel would result in the total notified catch for 2011/12 being 401 000 tonnes, a similar level notified for 2009/10 and 2010/11, and not substantially different from the 391 000 tonnes considered by WG-EMM.

Escape mortality and green weight

3.12 Two pilot studies to estimate escape mortality were conducted in 2010/11, one by Ukraine using fine-mesh 'chafers' and another by Japan using video cameras. Both studies

demonstrated that it will be challenging to estimate escape mortality. The Scientific Committee encouraged further work noting that it would be valuable to combine results from the two methods and standardise approaches (Annex 4, paragraphs 2.54 and 2.55).

3.13 Norway noted it could not pursue the planned observation of krill escapement using the trial camera system (SC-CAMLR-XXIX, paragraph 3.13) due to financial problems experienced by the vessel operator.

3.14 The Scientific Committee noted that all methods for estimating green weight of krill have associated uncertainty, and that the absolute uncertainty in catch estimates increases in proportion to the catch. This uncertainty is not accounted for in the current management process which uses a point estimate of total catch, without any uncertainty estimate, to monitor progress in catches taken during the season (Annex 4, paragraphs 2.56 to 2.58).

3.15 The Scientific Committee noted the importance of understanding the source of variation, overall level of variation, and potential bias in the estimates of green weight, in order to be able to reflect these uncertainties in management advice. The Scientific Committee requested that WG-EMM characterise such variability and uncertainty to investigate their impacts on krill management advice.

Trigger level

3.16 The Scientific Committee noted that CM 51-07 will expire this year and that it should be reviewed and revised in order to meet the requirements of Article II of the Convention, taking into account the resource requirements of krill-dependent predators (Annex 4, paragraph 2.66).

3.17 The Scientific Committee considered two main questions that would be pertinent to this review, and noted the advice of WG-EMM which had investigated these questions in relation to Subarea 48.1 where the interim catch limit of 155 000 tonnes was reached in 2009/10 (Annex 4, paragraph 2.73):

- (i) Was the current subdivision effective in limiting the impact on predators in Subarea 48.1 in 2009/10?
- (ii) Is the cap in Subarea 48.1 at an appropriate level if the fishery is going to be concentrated in Subarea 48.1, perhaps regularly, in the future?

3.18 Twenty-three CEMP parameters covering three CEMP sites and three CEMP species that forage in the Bransfield Strait were examined. These monitoring parameters did not substantially overlap in time with the fishery. The Scientific Committee concluded that the CEMP data were unlikely to reflect the immediate impact the fishery might have had. The Scientific Committee was unable to determine whether the aggregated fishing in Bransfield Strait during 2009/10 had impacted the predators in that area or not. The Scientific Committee also noted that no data were available to evaluate the likely impact of other catch levels for the Subarea 48.1 allocation of the trigger level (Annex 4, paragraphs 2.80 and 2.82).

3.19 Given the experience in 2009/10, the Scientific Committee noted that unless the timings of the fishery catches and CEMP observations are aligned in particular years, it will be difficult to answer these two questions under existing CEMP monitoring arrangements.

3.20 The Scientific Committee agreed that it would need to address the following points to investigate whether the spatial subdivision of the trigger level is effective for protecting predators (Annex 4, paragraph 2.87):

- (i) advance notice of the areas in which the fishery will/could be concentrated so that monitoring can occur relative to those areas
- (ii) an assessment of abundance of krill in the area before fishing begins and the flux of krill through the area
- (iii) an assessment of the requirements of predators in the area to be fished
- (iv) an assessment of whether the requirements of predators were affected by fishing.

3.21 The Scientific Committee noted that to investigate whether predators were effectively protected would require a large injection of resources, and that Members currently undertook such investigations to the best extent possible within their resources, providing the best science possible. The Scientific Committee was therefore unable to determine from available data, whether the subdivision between subareas according to CM 51-07 was precautionary enough or over-precautionary.

3.22 The Scientific Committee reiterated that in the absence of additional information, the advice remains that to be consistent with the precautionary approach and to avoid concentration of the catch as the trigger level is approached, a spatial allocation of the trigger level (620 000 tonnes) by subarea (CM 51-07) is required (Annex 4, paragraph 2.95).

3.23 The Scientific Committee advised the Commission that the precautionary subarea allocation scheme for the trigger level described in CM 51-07 should be retained until sufficient information is acquired for its revision (Annex 4, paragraph 2.97).

3.24 The Scientific Committee noted that in 2009/10 the krill fishery had operated in Admiralty Bay, which is ASMA No. 1. After reviewing the management plan for that ASMA, the Scientific Committee was unsure whether such fishing activity was compatible with the Code of Conduct for that ASMA, as described in point 8.2 of its management plan. Accordingly, the Scientific Committee advised the Commission of the overlap of commercial fishing operations within the ASMA. Such information may also need to be communicated to the ATCM as it may impact on the values within ASMA No. 1 (Annex 4, paragraph 2.84).

3.25 Dr Barrera-Oro expressed his concern on the lack of clarity in the management plan in relation to fisheries' access into the area where many seabird and fur seal breeding colonies exist, and that if, in the future, the ice conditions similar to 2009/10 occur again, it may impact on the performance of these land-based predators.

3.26 The Scientific Committee noted that at the time when this management plan was established, the effects of fishing in the region were not considered. Due to the recent development of the fishery, the Scientific Committee noted that it may be appropriate to revise the management plan to include fishing operations.

3.27 Dr Penhale referred to the management plan of ASMA No. 7, Southwest Anvers Island and Palmer Basin. The management plan notes that harvesting of marine living resources should be conducted in accordance with the provisions of the management plan and with due recognition of the important scientific and environmental values of the area. Any such activities should be conducted in coordination with research and other activities taking place, and could include development of a plan and guidelines that would help to ensure that harvesting activities did not pose a significant risk to the other important values of the area.

Krill recruitment variation, B_0 and precautionary yield

3.28 The Scientific Committee noted WG-EMM's discussions on estimates of recruitment variation, B_0 , and precautionary yield for krill (Annex 4, paragraphs 2.59 to 2.65). It noted that the degree of recruitment variability currently used in the GYM might be an underestimate and that, for stocks with high interannual variability in abundance arising from recruitment, the probability of biomass falling below 20% of the initial biomass might be greater than 0.1 even in the absence of fishing (Annex 4, paragraph 2.64). The Scientific Committee further noted that in these circumstances it would be impossible to satisfy that part of the GYM decision rule designed to limit the probability of biomass falling below the 20% reference point to a maximum of 0.1.

3.29 The Scientific Committee noted WG-EMM's concern that current estimates of recruitment variability derive from samples taken in the early 1990s, and may not reflect krill recruitment variability. It was noted that recruitment variability may also alter with climate change.

3.30 The Scientific Committee agreed that investigation of recruitment variability, including estimating recruitment strengths in years since the early 1990s, is needed and may require reassessment of the catch limit. It also agreed that alternative application of the decision rules that would be appropriate in these circumstances (such as the decision rules used to establish annual catch limits for icefish) may need to be investigated if recruitment variability is too high or there are long-term trends in recruitment. These should be afforded a high priority.

Other issues related to management of the krill fishery

3.31 The Scientific Committee also noted WG-EMM's discussions concerning ecosystems other than the krill-centric ecosystem, and discussions on the status and trends of krill predators, species composition of fish by-catch in the krill fishery, the biology and ecology of krill, issues related to climate change effects on krill and krill predators, as well as the results from both acoustics and net surveys of krill; the Scientific Committee also noted the conclusions from a workshop entitled 'Antarctic krill in a changing ocean' which was co-sponsored by the EU and the Netherlands (Annex 4, paragraphs 2.138 to 2.141). The Scientific Committee noted that SC-CAMLR-XXX/BG/3 provided a number of recommendations for future work that broadly overlap with the priorities of the Scientific Committee (see also section 8).

3.32 The Scientific Committee specifically noted advice that juvenile krill of age-class 1+ are predominately concentrated in near-shore areas along the entire Antarctic Peninsula from Marguerite Bay in the south, to Bransfield Strait in the north. Fishing in nursery areas will have a different impact on the stock than fishing on adults, and management of the krill fishery will need to account for this (Annex 4, paragraph 2.137).

Symposium on Feedback Management of Krill

3.33 The Scientific Committee endorsed the six components proposed by WG-EMM that will form the basis of its future work to develop a feedback management procedure for krill (Annex 4, paragraph 2.155). The six components are:

1. development of a list of candidate feedback management approaches, including consideration of any operational implications for the fishery and for monitoring
2. identification of an agreed suite of indicators appropriate to candidate feedback management approaches
3. review of spatial and temporal structure in the ecosystem in which the current Area 48 fishery operates and consideration of the implications for monitoring and management
4. development of agreed decision-making mechanisms for the candidate feedback management approaches, including decision rules which identify how fishing strategies and/or monitoring are to be adjusted on the basis of the indicators
5. provision of advice on operationalising the objectives of Article II in the context of a changing ecosystem
6. evaluation of candidate feedback management approaches.

3.34 The Scientific Committee specifically recommended that the Commission note advice from WG-EMM on each of these six components (Annex 4, paragraphs 2.156, 2.160, 2.163, 2.167, 2.172 to 2.174, 2.179, 2.182, 2.186, 2.188 and 2.191).

3.35 The Scientific Committee endorsed the proposed work schedule outlined by WG-EMM (Annex 4, paragraph 2.157). It acknowledged that such a work schedule would be facilitated by the development of computer simulation models and that such models could expedite the delivery of the feedback management approach. It agreed that WG-EMM would undertake elements 1 to 2 of feedback management development in 2012, 3 to 4 in 2013 and 5 to 6 in 2014.

CEMP and STAPP

3.36 The Scientific Committee noted progress made by WG-EMM and WG-EMM-STAPP (Annex 4, paragraphs 2.193 to 2.214).

3.37 The Scientific Committee particularly noted the status of work to estimate abundance and consumption of krill by pack-ice seals, fur seals, penguins and flying seabirds in Area 48, and to partition the overall foraging effort by these predator groups into SSMUs (Annex 4, paragraph 2.199 and Table 5). It noted that work has been completed for pack-ice seals, and work on estimating overall abundance and krill consumption for fur seals and penguins is expected to be completed within the next few years. The remaining components of the work plan, which involve estimating overall abundance and consumption for flying seabirds, and partitioning the foraging effort by fur seals, penguins and flying seabirds across SSMUs, is expected to take at least another five years.

3.38 The Scientific Committee recognised that there is a significant knowledge gap for flying seabird status and trend information for birds in the CAMLR Convention Area, and considered that CCAMLR needs to find a means of engaging with the broader community of scientists working on flying seabirds (Annex 4, paragraph 2.203).

3.39 The Scientific Committee noted that the value of time-series data collected under prescribed CEMP methodologies increase as the time series grow in length and that reducing or stopping existing CEMP programs would severely compromise the ability to monitor change in the ecosystem (Annex 4, paragraph 2.212). However, it recognised that rising costs and funding restrictions are making it increasingly difficult for Members to continue long-term work as individual national programs. The Scientific Committee therefore encouraged the development of multinational CEMP programs wherever possible.

3.40 The Scientific Committee agreed that CEMP needs to focus on information required by the Commission to make management decisions (Annex 4, paragraph 2.213). The development of a feedback monitoring and management system may require CEMP to change or evolve from its present form to include greater spatial coverage, to monitor at different spatial and temporal scales, and to include more or different parameters and revised methods for existing parameters.

3.41 The Scientific Committee noted that products and outcomes of WG-EMM-STAPP in regard to estimates of penguin population size and trends will be very useful to CCAMLR in providing a larger-scale context for the detailed measurements made locally at CEMP sites.

3.42 The Scientific Committee welcomed plans by Ukraine to increase data available to CEMP by collecting information on seabirds and seals around the Argentine Islands.

Fish resources

Fisheries information

Catch, effort, length and age data reported to CCAMLR

3.43 Members' fishing vessels operated in the fisheries targeting icefish (*Champsocephalus gunnari*), toothfish (*Dissostichus eleginoides* and/or *D. mawsoni*) and krill (*Euphausia superba*), and catches reported to 24 September 2011 are summarised in Table 1; no directed fishing occurred on crabs (*Paralomis* spp.) during the season (see also SC-CAMLR-XXX/BG/1).

3.44 Three other fisheries were conducted in the Convention Area in 2010/11:

- fishery for *D. eleginoides* in the French EEZ in Division 58.5.1
- fishery for *D. eleginoides* in the French EEZ in Subarea 58.6
- fishery for *D. eleginoides* in the South African EEZ in Subareas 58.6 and 58.7, which also includes associated fishing in Area 51 outside the Convention Area.

3.45 The preliminary total catch of target species by country and region reported from fisheries conducted in the CAMLR Convention Area in 2010/11 are summarised in Table 2.

3.46 The Scientific Committee noted the catches of toothfish from waters outside the Convention Area reported in the CDS (Annex 7, Table 2).

3.47 Dr Barrera-Oro advised that the catch limit in the Argentine EEZ in Area 41 in 2010/11 was 3 250 tonnes. The fishery is carried out by longline and trawl but is restricted to depths greater than 800 m to protect juveniles. Since 2007, vessels are required to tag *D. eleginoides* at a rate of two fish per tonne of green weight caught, and to date 3 500 individuals have been tagged and released. Recapture rates have been low in the current season and there is little evidence of large-scale fish movement.

3.48 Prof. O. Pin (Uruguay) advised that 567 tonnes of *D. eleginoides* had been caught in the Uruguayan EEZ in Area 41 in 2010/11. The catch had been taken by longline or trotline (approximately 95% of the catch) and pots (5%).

3.49 The Scientific Committee welcomed this information and urged Members managing fisheries for *D. eleginoides* outside the Convention Area to provide information to WG-FSA on these fisheries, including details of the assessments and management measures in place. The Scientific Committee also urged Members with such fisheries to attend the meetings of WG-FSA to the extent possible.

3.50 The Scientific Committee noted the development of procedures, databases and data forms developed by the Secretariat during the intersessional period (Annex 7, paragraph 3.1). This included updating the fishery and scientific observer data forms, developing the tag overlap statistic calculator, processing data, allocating research hauls in the exploratory fisheries in Subareas 48.6 and 58.4, and updating the Fishery Reports and Bottom Fishing and VME report.

3.51 The Scientific Committee discussed whether maps depicting the fine-scale characterisation of *Dissostichus* fisheries in the Convention Area should be made available in publicly accessible documents such as the *Statistical Bulletin*. It was agreed that the maps are highly informative, but it was noted that there could be commercial sensitivity around the publication of such fine-scale data.

3.52 The Scientific Committee agreed that further work should be carried out in advance of next year's meeting to ensure that only high-quality validated data are included in any maps being produced. It was also recommended that the Secretariat write to Members in order to determine factors that might restrict the type and spatial resolution of data that could be included in maps for public access.

3.53 The COLTO Observer (Mr M. Exel) informed the Scientific Committee that the publication of detailed maps showing the location of catches could be used by IUU operators.

3.54 The Scientific Committee noted that it could only advise on the scientific rationale for wider publication of maps; issues of data access and confidentiality were areas to be dealt with by the Commission.

Input for stock assessment

3.55 The Scientific Committee noted that WG-FSA had reviewed all available research data which were subsequently used in updating stock assessments of fish in the Convention Area. This included catch-at-length/age data from fisheries, research surveys, catch and effort analyses, tagging studies, biological parameters, stock structure and management areas, unaccounted mortality from lost fishing gear, and depredation.

Research surveys

3.56 The Scientific Committee noted that two Members reported on research surveys undertaken in 2010/11 (Annex 7, paragraphs 4.6, 4.7 and 4.10 to 4.13):

- (i) A bottom trawl survey in Subarea 48.3 was carried out by the UK. The results from the survey were used to update the assessments of icefish and toothfish in this subarea.
- (ii) Three bottom trawl surveys in Division 58.5.2 were carried out by Australia in September 2010, March 2011 and May 2011. The results of the May 2011 survey were used to update assessments of toothfish and icefish in this division.

Assessments and management advice

Champscephalus gunnari South Georgia (Subarea 48.3)

3.57 The Fishery Report for *C. gunnari* at South Georgia (Subarea 48.3) is contained in Annex 7, Appendix E, and discussion by WG-FSA is in Annex 7, paragraphs 6.1 to 6.6.

3.58 In 2010/11 the catch limit set for *C. gunnari* in Subarea 48.3 was 2 305 tonnes. Limited commercial fishing was conducted by one vessel in February and one in September/October 2011 but with zero catches. A total of 10 tonnes was reported from the research survey.

3.59 The Scientific Committee noted that there had now been two years of negligible commercial catches despite catch limits of over 2 000 tonnes. The very low availability of krill observed in 2009 (SC-CAMLR-XXIX, Annex 8, paragraph 3.18) is thought to have had an impact on the vertical distribution of icefish and may have made them less available to the pelagic trawl fishery. The Scientific Committee recommended that the issue of negligible commercial catches should be addressed at next year's WG-FSA meeting if they remain low in 2011/12.

3.60 Dr S. Kasatkina (Russia) noted that Russia has prepared a manual on icefish age determination which will be submitted for discussion at the next meeting of WG-FSA.

3.61 The Scientific Committee endorsed the short-term assessment method of the Working Group, implemented using the length-based method described in WG-FSA-11/30 to calculate future catch limits in accordance with the CCAMLR decision rules for icefish.

Management advice

3.62 The Scientific Committee recommended that the catch limit for *C. gunnari* should be set at 3 072 tonnes in 2011/12 and 2 933 tonnes in 2012/13 based on the outcome of the short-term assessment.

Chamsocephalus gunnari Heard Island (Division 58.5.2)

3.63 The Fishery Report for *C. gunnari* in Division 58.5.2 is contained in Annex 7, Appendix F, and discussion by WG-FSA is in Annex 7, paragraphs 6.7 to 6.13.

3.64 The catch limit of *C. gunnari* in Division 58.5.2 for 2010/11 was 78 tonnes and the catch reported for this division as of 9 October was 1 tonne.

3.65 The Scientific Committee noted that WG-FSA had considered a proposal to introduce a limit reference point for the *C. gunnari* fishery in Division 58.5.2, whereby where the stock assessment of *C. gunnari* in Division 58.5.2 indicated a stock biomass (represented by the lower one-sided 95% confidence limit of the survey biomass estimate) of less than 1 000 tonnes, or the decision rules indicated a catch limit of less than 100 tonnes, a commercial catch limit would not be set. Instead, a 30-tonne combined research and by-catch limit would apply, which would allow the annual trawl survey to continue to monitor the stock, and accommodate by-catch of icefish that may occur in the *D. eleginoides* trawl fishery in this division.

3.66 The Scientific Committee noted that the rationale for the proposed limit reference point was not based on detailed analyses and would be strengthened by further evaluation taking into account stock-specific biology and ecosystem roles. The Scientific Committee also agreed that limit reference points be explored for other *C. gunnari* fisheries in the Convention Area.

3.67 The Scientific Committee noted that a short-term assessment was implemented in the GYM, using the one-sided bootstrap lower 95% confidence bound of total biomass of 983 tonnes from the 2011 survey and using the revised growth parameters described in WG-FSA-10/12; other fixed parameters remained unchanged from previous assessments.

3.68 The projection of fish of 1+ to 3+ age classes from 2010/11 gave a projected yield of 101 tonnes in 2011/12 and 82 tonnes in 2012/13.

3.69 The Scientific Committee noted that the assessment for catch in 2011/12 indicated a lower one-sided 95% confidence level of biomass less than 1 000 tonnes and therefore recommended that the new limit reference point be applied pending the results of a planned survey in 2012.

Management advice

3.70 The Scientific Committee recommended that the conservation measures applying to the fisheries in Division 58.5.2 be modified to take account of the interim limit reference point.

3.71 Scientific Committee recommended a catch limit for *C. gunnari* in 2011/12 of 0 tonnes, with a 30-tonne research and by-catch limit.

Dissostichus eleginoides South Georgia (Subarea 48.3)

3.72 The Fishery Report for *D. eleginoides* in Subarea 48.3 is contained in Annex 7, Appendix G, and the discussion by WG-FSA is in Annex 7, paragraphs 6.14 to 6.25.

3.73 The catch limit for *D. eleginoides* in 2010/11 was 3 000 tonnes, and the recorded catch was 1 788 tonnes.

3.74 The Scientific Committee noted that while the groundfish survey and commercial catch-at-age both suggest the 2001 cohort was relatively strong (Annex 7, paragraph 6.20), there is still uncertainty in the strength of this cohort. The Scientific Committee also noted the importance of the assumptions regarding fleet structure and associated selectivity on estimates of year-class strength, and the effects of this on estimation of long-term yield.

3.75 The Scientific Committee noted that two CASAL assessment models were considered by WG-FSA: a two-fleet model, with an initial fleet 1985–1997 and a new fleet 1998–2011; and a three-fleet model, with an initial fleet 1985–1997, an intermediate fleet 1998–2003 and a new fleet 2004–2011.

3.76 The Scientific Committee endorsed the assessment undertaken by WG-FSA using the two-fleet model presented in Annex 7, paragraphs 6.21 to 6.23 and Appendix G.

Management advice

3.77 The Scientific Committee noted the advice of WG-IMAF that the 2011/12 season for longline fishing operations may be extended in two periods: (i) to start on 16 April; and (ii) to end on 14 September for any vessel which has demonstrated full compliance with CM 25-02 in the previous season (paragraphs 4.9 and 4.10; Annex 8, paragraph 8.11).

3.78 The Scientific Committee recommended a catch limit of 2 600 tonnes for 2011/12 and 2012/13.

Dissostichus spp. South Sandwich Islands (Subarea 48.4)

3.79 The Fishery Report for *D. eleginoides* in Subarea 48.4 is contained in Annex 7, Appendix H, and the discussion by WG-FSA is in Annex 7, paragraphs 6.26 to 6.33.

3.80 A tagging experiment has been conducted in Subarea 48.4 North over the last six years. This experiment was extended to Subarea 48.4 South in 2008/09.

3.81 The catch limits for *D. eleginoides* and *D. mawsoni* in Subarea 48.4 North in 2010/11 were 40 and 0 tonnes (except for scientific purposes) respectively, with recorded catches of 36 and 1 tonne respectively. The catch limit for *Dissostichus* spp. in Subarea 48.4 South in the 2010/11 season was 30 tonnes, with a recorded catch of 17 tonnes.

D. eleginoides in the northern area

3.82 The Scientific Committee noted that the use of an integrated assessment model incorporating both catch-at-age and catch-at-length data was recommended by WG-FSA (Annex 7, paragraph 6.29).

3.83 The yield satisfying the CCAMLR decision rule using projections with randomised lognormal year-class strength with a mean of the long-term average of the stock and a CV of 1, was 48 tonnes.

Dissostichus spp. in the southern area

3.84 The Scientific Committee noted that a three-year tagging experiment in Subarea 48.4 South was completed in 2010/11.

3.85 Due to reduced catches and low tag returns realised in the last year of the experiment, it was proposed to extend the tagging experiment for a fourth year in Subarea 48.4 South in 2011/12, carrying forward the original proposal objectives from 2009 as detailed in WG-FSA-09/18.

3.86 The Scientific Committee noted that Petersen estimates from tag recaptures to date suggest a vulnerable population of approximately 600 tonnes for *D. mawsoni* and 150–350 tonnes for *D. eleginoides*. This is consistent with estimates made in 2010 (SC-CAMLR-XXIX). Application of γ from the most recent Subarea 48.3 assessment (0.038) to estimates of vulnerable biomass resulted in a yield estimate of 33 tonnes.

Management advice

3.87 The Scientific Committee recommended the following limits for toothfish and by-catch in Subarea 48.4:

Subarea 48.4 North –

- (i) a catch limit of 48 tonnes for *D. eleginoides*
- (ii) the continued prohibition of the targeting of *D. mawsoni* other than for scientific research purposes
- (iii) maintenance of catch limits for by-catch species, with a limit for macrourids of 7.5 tonnes (16% of the catch limit for *D. eleginoides*) and a limit for rajids of 2.5 tonnes (5% of the catch limit for *D. eleginoides*).

Subarea 48.4 South –

- (i) a catch limit of 33 tonnes for *Dissostichus* spp. (*D. eleginoides* and *D. mawsoni* combined)
- (ii) maintenance of a move-on rule for by-catch species, with a macrourid trigger of 150 kg and 16% of the catch of *Dissostichus* spp., and a trigger for rajids set at 5% of the catch of *Dissostichus* spp.
- (iii) the tagging experiment be extended for a fourth year carrying forward the original proposal objectives.

Dissostichus eleginoides Heard Island (Division 58.5.2)

3.88 The Fishery Report for *D. eleginoides* in Division 58.5.2 is contained in Annex 7, Appendix I, and the discussion by WG-FSA is in Annex 7, paragraphs 6.34 to 6.42.

3.89 The catch limit of *D. eleginoides* in Division 58.5.2 west of 79°20'E for 2010/11 was 2 550 tonnes (CM 41-08). The catch of *D. eleginoides* reported for 2010/11 up to 10 October was 1 676 tonnes. Of this, 1 122 tonnes was taken by longline, 521 tonnes by trawl and 33 tonnes by pot.

3.90 The Scientific Committee endorsed the work of WG-FSA and agreed that the estimated current stock status at 2011 was 63% of B_0 and the long-term annual yield that meets the CCAMLR decision rules was calculated to be 2 730 tonnes.

3.91 The Scientific Committee noted the program of future work outlined in Annex 7, paragraph 6.41.

Management advice

3.92 The Scientific Committee recommended that the catch limit for *D. eleginoides* in Division 58.5.2 west of 79°20'E should be 2 730 tonnes for 2011/12 and 2012/13.

Dissostichus eleginoides Kerguelen Islands (Division 58.5.1)

3.93 The Fishery Report for *D. eleginoides* in Division 58.5.1 is contained in Annex 6, Appendix J, and the discussion by WG-FSA is in Annex 7, paragraphs 6.43 to 6.47.

3.94 The catch of *D. eleginoides* reported for this division to August 2011 was 2 906 tonnes.

3.95 The Scientific Committee noted that WG-FSA reviewed a preliminary assessment of *D. eleginoides* in Division 58.5.1. The CASAL integrated assessment model uses catch, CPUE and length-frequency data from the commercial fishery (1979–2011), IUU estimates, abundance estimates from scientific surveys and tagging data to derive estimates of yield. The Scientific Committee noted that the model as it is currently configured could not be used for management advice.

3.96 The Scientific Committee commended the considerable progress made in the development of the assessment model and recognised the cooperative work between France and Australia during the intersessional period. It encouraged further development of this assessment along with continued collection and analysis of data on catch and effort and tagging and other data that could be used to progress understanding of fish stocks and fishery dynamics on the Kerguelen Plateau.

Management advice

3.97 No new information was available on the state of fish stocks in Division 58.5.1 outside areas of national jurisdiction. The Scientific Committee therefore recommended that the prohibition of directed fishing for *D. eleginoides*, described in CM 32-13, remains in force.

Dissostichus eleginoides Crozet Islands (Subarea 58.6)

3.98 The Fishery Report for *D. eleginoides* in Subarea 58.6 (French EEZ) is contained in Annex 7, Appendix K, and the discussion by WG-FSA is in Annex 7, paragraphs 6.48 to 6.53.

3.99 The catch of *D. eleginoides* reported for this subarea to August 2011 was 551 tonnes. Only longlining is currently permitted in the fishery. The IUU catch for 2010/11 had not been estimated.

3.100 The standardised CPUE series for this fishery was not updated by WG-FSA.

Management advice

3.101 The Scientific Committee encouraged the estimation of biological parameters for *D. eleginoides* in the French EEZ of Subarea 58.6, and the development of a stock assessment for this area. The Scientific Committee encouraged France to continue its tagging program in Subarea 58.6.

3.102 The Scientific Committee recommended that avoidance of zones of high by-catch abundance should also be considered.

3.103 No new information was available on the state of fish stocks in Subarea 58.6 outside areas of national jurisdiction. The Scientific Committee therefore recommended that the prohibition of directed fishing for *D. eleginoides*, described in CM 32-11, remain in force.

Dissostichus eleginoides Prince Edward and Marion Islands
(Subareas 58.6 and 58.7) and Area 51 inside the South African EEZ

3.104 The Fishery Report for *D. eleginoides* in Subareas 58.6 and 58.7 inside the South African EEZ is contained in Annex 7, Appendix L, and the discussion by WG-FSA is in Annex 7, paragraphs 6.54 to 6.60.

3.105 The catch limit of *D. eleginoides* in the South African EEZ for 2010/11 was 440 tonnes for the period 1 December 2010 to 30 November 2011. The catch reported for Subareas 58.6 and 58.7 as of 5 October 2011 was 176 tonnes and 129 tonnes in Area 51, all of which was taken by trotlines.

3.106 The Scientific Committee noted that the catch limit of *D. eleginoides* in the South African EEZ for 2011/12 is likely to be 320 tonnes, and that a revised operational management procedure to form the basis for management advice is under development by national scientists.

Management advice for *D. eleginoides* at Prince Edward and
Marion Islands (Subareas 58.6 and 58.7) inside the EEZ

3.107 The Scientific Committee was unable to provide management advice for the fishery in the South African EEZ at the Prince Edward Islands.

Management advice for *D. eleginoides* at Prince Edward Islands
(Subareas 58.6 and 58.7 and Division 58.4.4) outside the EEZ

3.108 No new information was available on the state of fish stocks in Subareas 58.6 and 58.7 and Division 58.4.4 outside areas of national jurisdiction. The Scientific Committee therefore advised that the prohibition of directed fishing for *D. eleginoides*, described in CMs 32-10, 32-11 and 32-12, remains in force.

Other fisheries

Antarctic Peninsula and South Shetland Islands (Subarea 48.1)
and South Orkney Islands (Subarea 48.2)

3.109 The Scientific Committee recommended that the existing CMs 32-02 and 32-04 on the prohibition of finishing in Subareas 48.1 and 48.2 respectively, remain in force.

Crabs (*Paralomis* spp. Subarea 48.3)

3.110 Crabs were not harvested during 2010/11 and no notifications of intention to fish for crabs in 2011/12 have been received by CCAMLR.

3.111 The Scientific Committee noted that WG-FSA had considered a review of information on biology and ecology of Lithodidae crabs around South Georgia which also provided an overview of the development of a management regime (WG-FSA-11/26).

3.112 The Scientific Committee noted that the current precautionary catch limit might not be sustainable in the long term if it were reached consistently. There is a high level of discarding and uncertainty surrounding discard mortality.

Management advice

3.113 The Scientific Committee recommended that the crab fishery in Subarea 48.3 be closed.

Fish and invertebrate by-catch

3.114 The Scientific Committee deliberations on this item are reported in section 7. This agenda item will be considered in detail by WG-FSA in 2012.

New and exploratory fisheries

3.115 Seven exploratory longline fisheries for *Dissostichus* spp. were agreed for 2010/11 (CMs 41-04 to 41-07 and 41-09 to 41-11). Activities in these fisheries are summarised in Annex 7, Table 1.

3.116 Nine Members notified for exploratory longline fisheries for *Dissostichus* spp. in Subareas 48.6, 88.1 and 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b for 2011/12 (Annex 7, Table 6). Another Member (Ukraine) withdrew its notification for Subareas 88.1 and 88.2 before the meeting.

3.117 The Scientific Committee noted the exceptionally high CPUEs recorded in SSRU 5841E in the last two seasons and in SSRU 5842E in 2010/11, which were at least five

times higher than those recorded in previous seasons for the same SSRUs. The Scientific Committee agreed that they were anomalously high and requested further investigation by the Secretariat, WG-FSA and Members, to understand the reason for this.

3.118 Consideration of the cumulative tag releases prepared by the Secretariat showed that in exploratory fisheries most vessels released tags continuously, at or above the required rates, throughout their fishing trips. The Scientific Committee recommended that a performance metric to reflect the deviations away from the required tag-to-tonne ratio line be developed during the intersessional period.

3.119 Length-frequency overlap statistics showed that in all subareas/divisions all vessels had achieved the required overlap statistic of at least 50% between tag-release length frequency and catch-weighted length frequency under CM 41-01 during 2010/11 (Annex 7, Tables 8 and 9). The Scientific Committee was encouraged to see that almost all vessels had improved their performance over the last three years, some significantly, and this confirms that vessels can achieve the required overlap statistic of 60% in 2011/12.

3.120 In November 2010, prior to the start of the 2010/11 fishing season, the Korean government invited the Secretariat's Science Officer and the Scientific Observer Data Analyst to visit Korea in order to provide a briefing to Korean stakeholders involved in CCAMLR fisheries (CCAMLR-XXIX, paragraph 11.24). The aim of the visit was to clarify the requirements for, and methods of, data collection on board fishing vessels, including tagging of toothfish. Dr K. Seok (Republic of Korea) thanked the Secretariat for undertaking this outreach task and noted that the success of this work was reflected in the much improved performance in the tagging program in 2010/11.

3.121 In 2010/11, 6 279 *Dissostichus* spp. were tagged and released in the exploratory longline fisheries and 285 tags were recovered (Annex 7, Tables 10 and 11). As in previous years, most tags have been recaptured in Subareas 88.1 and 88.2. Of almost 14 000 tags released in Subareas 48.6 and 58.4, there have been only 69 (0.5%) recaptures. Only seven tags were recaptured from these subareas in 2010/11: two from Subarea 48.6 and five from Division 58.4.1. This is the lowest number of tags recaptured in these subareas since the start of the tagging program even though catches in 2010/11 in these subareas were higher than in the previous two years.

Progress on assessments in data-poor exploratory fisheries (Subareas 48.6 and 58.4)

3.122 The Scientific Committee recalled its discussion on 'data-poor fisheries' at its 2010 meeting (SC-CAMLR-XXIX, paragraphs 3.125 to 3.133), which had led to the focus topic at WG-SAM in 2011. The term 'data-poor exploratory fisheries' was adopted for this purpose to refer to fisheries for which a robust stock assessment that provides advice on catch limits according to CCAMLR decision rules has not been developed due to lack of information. The term was used to refer to the exploratory fishery in Subarea 48.6 as well as to exploratory and closed fisheries in Subarea 58.4. The following section refers to those exploratory fisheries with non-zero catch limits (i.e. Subarea 48.6, Divisions 58.4.1, 58.4.2 and 58.4.3a).

3.123 The Scientific Committee noted that the failure to acquire the data necessary to develop assessments in data-poor exploratory fisheries (Subarea 48.6 and Divisions 58.4.1, 58.4.2 and 58.4.3a) may be a consequence of research implementation rather than research design, and that the success of tagging programs may be undermined in a number of different ways, including a low tag overlap statistic, lack of spatial overlap between fishing effort and previous release of tags, depredation of tagged fish by killer whales, release of fish in poor condition (e.g. high mortality of tagged fish associated with trotlines) and capture of tagged fish by IUU vessels (Annex 7, paragraph 6.73).

3.124 Drs L. Pshenichnov (Ukraine) and V. Bizikov (Russia) considered that one of the main reasons for the lack of tag recaptures in Divisions 58.4.1 and 58.4.2 were the closed SSRUs in those divisions. They also noted that capture of fish by IUU vessels was also likely to be a problem.

3.125 Dr Pshenichnov noted that the most recent scientific and fishing data show that unstandardised CPUEs in Divisions 58.4.1 and 58.4.2 are at a similar or higher level to those in Subareas 88.1 and 88.2. Following this logic, he noted that the divisions in Subarea 58.4 had a similar or higher population of *D. eleginoides* to that in Subareas 88.1 and 88.2. He considered that, to be able to assess the population of the stock in these divisions, all the SSRUs should be open to fishing. He further proposed that the catch limits for these divisions should revert to the same levels that they were in 2008: 780 tonnes in Division 58.4.2, 600 tonnes in Division 58.4.1, with not more than 160 tonnes from each SSRU.

3.126 Dr Constable noted that the Scientific Committee had already questioned the anomalously high CPUEs reported in the last two years for certain SSRUs in these divisions, and that there was a need for further investigation to understand the reason for this (paragraph 3.117). He further noted the problems identified in standardising CPUEs between different gear types and these will need to be resolved before the Scientific Committee draws conclusions from the CPUE data. Dr Watters considered that the success in other tagging programs in Subareas 48.4, 88.1 and 88.2 had come from concentrating tagging effort and that fishing in the closed SSRUs was unlikely to increase the recapture rates.

3.127 The Scientific Committee recalled its advice from last year that the assessment of *Dissostichus* spp. in data-poor exploratory fisheries was of a very high priority, and noted that no progress had been made in the assessment of these fisheries over the past few years. It also agreed that the research being conducted under the existing research plan in CM 41-01, Annex B, is unlikely to lead to assessments in these fisheries in the next 3–5 years.

3.128 The Scientific Committee therefore recommended that the number of research hauls be increased, and that the tagging rates should be increased to five tagged fish per tonne caught in Subareas 48.6 and 58.4 (CMs 41-04, 41-05, 41-06 and 41-11), to increase the amount of data and the number of tags available for recapture. Increasing the number of research hauls in aggregations of fine-scale rectangles in which tags have been released in the past few years will increase the likelihood of tagged fish being recaptured.

3.129 The Scientific Committee agreed that the aim of research hauls was to concentrate effort in locations where tagged fish had been released. It reviewed catch and effort data from the SSRUs and number of fine-scale rectangles fished in Subareas 48.6 and 58.4 over the past three seasons (Table 4). The Scientific Committee recommended that research hauls should

be restricted to those fine-scale rectangles and a buffer zone of the width of one fine-scale rectangle around them. This buffer zone would allow for recapture of tagged fish that had moved since being released, and would improve fishing access even when some of the fine-scale rectangles were inaccessible due to sea-ice cover. The Scientific Committee recommended that after the first 10 research hauls were completed, fishing should continue with research hauls and commercial hauls at or above a ratio of 1:3.

3.130 To concentrate effort in locations where tagged fish had been released, the Scientific Committee further recommended that the minimum distance between research hauls be reduced from 5 n miles to 3 n miles.

3.131 The Scientific Committee therefore recommended replacing paragraph 3 of CM 41-01, Annex B, as follows:

‘Except when fishing in Statistical Subareas 88.1 and 88.2 (see paragraph 5), any vessel undertaking prospecting or commercial fishing in any SSRU must undertake the following research activities:

- (i) On first entry into an SSRU, the first 10 hauls, whether by trawl or longline, shall be designated ‘research hauls’ and must satisfy the criteria set out in paragraph 4. All research hauls shall be carried out within the fine-scale rectangles defined by the CCAMLR Secretariat¹.
- (ii) On completion of the first 10 research hauls the vessel may continue fishing in the SSRU, but is required to complete at least one research haul for every three commercial hauls thereafter in the SSRU, such that the ratio of research hauls to commercial hauls after the completion of the first 10 research hauls does not fall below a ratio of 1:3.

¹ The Secretariat will generate a list of fine-scale rectangles for each SSRU in exploratory fisheries. These lists will be provided to notifying Members prior to the start of the fishing season. If fine-scale rectangles designated for research sets are blocked by sea-ice the vessel should move to the nearest available rectangle(s) with fishing depth between 550 and 2 200 m, and conduct the research sets in this (those) rectangle(s).’

3.132 The Scientific Committee recommended making the following modification to CM 41-01, Annex B, paragraph 4(i):

- (i) ~~each research haul must be separated by not less than 5 n miles from any other research haul~~ each research haul must be separated by not less than 3 n miles from any other research haul;’

3.133 The Scientific Committee recommended making the following modifications to CM 41-01, Annex C, paragraph 2(ii):

- (ii) The program shall target toothfish of all sizes in order to meet the tagging requirement, ~~only toothfish that are in good condition shall be tagged and the availability~~ only single-hooked fish in good condition shall be tagged and released (noting that fish hooked only in the mouth are counted as single-hooked). The availability of these fish shall be reported by the observer. The length frequency of tagged toothfish shall reflect the length frequency of the

catch of each species of *Dissostichus*². Each vessel catching more than 10 tonnes of *Dissostichus* spp. in a fishery shall achieve a minimum tag overlap statistic of 60% from 2011/12 onward³. All released toothfish must be double-tagged and releases should cover as broad a geographical area as possible. In regions where both species occur, the tagging rate shall be in proportion to the species and lengths of each *Dissostichus* spp. present in the catches.’

3.134 Pending the submission of research proposals in 2012 (as recommended in paragraphs 3.137 and 3.138), those changes identified in paragraphs 3.131 and 3.132 will expire at the end of 2011/12.

3.135 The Scientific Committee noted that the focus topic on implementing research proposals in data-poor exploratory fisheries held by WG-SAM (Annex 5, paragraph 2.21) had identified a number of key elements which had led to assessments of toothfish in SSRU 882E and Subarea 48.4 North. These included a robust experimental design with a well-coordinated multi-year tagging program focused on repeatedly visiting a relatively small area and a commitment by vessels to achieving high tagging performance. It further noted that research incorporating these elements could potentially be applied in data-poor exploratory fisheries to provide the data necessary to assess the stocks.

3.136 The Scientific Committee noted the principles elaborated by WG-SAM for research in data-poor exploratory fisheries and the requirement for research proposals to provide details on how these principles will be addressed (Annex 5, paragraphs 2.25 and 2.26). The Scientific Committee discussed the detailed format presented in Table 6 of Annex 5 that would enable the Scientific Committee to evaluate, inter alia, the likelihood that the proposal will satisfy the requirements for CCAMLR-sponsored research. During the meeting, the Scientific Committee revised this table to incorporate elements in format 2 of CM 24-01 (Table 2).

3.137 The Scientific Committee noted the general applicability of the format in Table 5 and recommended that this table should replace the current format 2 in CM 24-01. The Scientific Committee recommended that CM 21-02 be revised to refer to the format in Table 5 for the submission of research proposals associated with notifications for participation in data-poor exploratory fisheries within Subareas 48.6 and 58.4.

3.138 To give effect to the process of review of research proposals by the Scientific Committee and its working groups, the Scientific Committee recommended a change to the deadline by which notifications for participation in data-poor exploratory fisheries and the associated research proposals are to be submitted to the Secretariat. This could be achieved by aligning this with the existing deadline of 1 June for submission of notifications for participation in exploratory fisheries for krill (CM 21-02, paragraph 5i). This will enable research proposals to be reviewed iteratively at the intersessional working group meetings during July and again by WG-FSA in October in advance of the 2012 meeting of the Scientific Committee.

Other research

3.139 The Scientific Committee noted that several Members were ageing *D. mawsoni* otoliths (Annex 7, paragraphs 6.81 and 6.82) and requested WG-FSA to initiate a coordinated plan to age *D. mawsoni* otoliths from all the data-poor exploratory fisheries in Subareas 48.6 and 58.4 at its 2012 meeting.

3.140 The Scientific Committee recommended that on all research hauls (paragraph 3.131) observers be required to collect data characterising the suitability of captured fish for tagging, including the number of hooking injuries (Annex 7, paragraph 5.41).

3.141 The Scientific Committee recognised that the 2-tonne trigger level currently set to activate Annex 41-01/C was too low and could result in an unintentional failure to implement the conservation measure and recommended that Annex 41-01/C, paragraph 2(ii), be modified as follows: 'Each vessel catching more than 10 tonnes of *Dissostichus* spp. in a fishery shall achieve a minimum tag overlap statistic of 60% from 2011/12 onward'.

3.142 The Scientific Committee recommended that the CCAMLR tagging protocols be reviewed, updated and translated into other languages intersessionally.

Development of advice on catch limits for *Dissostichus* spp.

Dissostichus spp. in Subarea 48.6

3.143 Three Members (Japan, Republic of Korea and South Africa) and four vessels fished in Subarea 48.6 SSRUs A, B, C and G in 2010/11. The precautionary catch limit for *Dissostichus* spp. was 200 tonnes north of 60°S (SSRUs A and G) and 200 tonnes south of 60°S (SSRUs B–F). A total catch of 393 tonnes was taken. Information on this fishery is summarised in Annex 7, Appendix M.

3.144 The number of tag recaptures was very low in Subarea 48.6 in 2010/11. The Scientific Committee noted that in total there have been very few tag recaptures from this subarea, and that no progress could be made on assessments of *D. eleginoides* in Subarea 48.6. The Scientific Committee noted all vessels fishing in Subarea 48.6 in 2010/11 achieved a tag overlap statistic greater than 50% (range 53–95%).

3.145 Five Members (Japan, Republic of Korea, Norway, Russia and South Africa) and a total of seven vessels notified their intention to fish for toothfish in Subarea 48.6 in 2011/12.

3.146 The Scientific Committee agreed that it could provide no new advice on catch limits for this subarea for 2011/12. It recommended increasing the research requirements in this fishery for 2011/12 (paragraphs 3.128 to 3.134) and for the 2012/13 fishing season (paragraphs 3.137 and 3.138).

3.147 The Scientific Committee requested the Secretariat examine the possibility of obtaining a Petersen estimate of *Dissostichus* spp. biomass from tag recaptures in Subarea 48.6 in the intersessional period.

Dissostichus spp. Division 58.4.1

3.148 Three vessels from two Members (Republic of Korea and Spain) fished in the exploratory fishery in Division 58.4.1 in 2010/11. The precautionary catch limit for toothfish was 210 tonnes in three SSRUs (C: 100 tonnes, E: 50 tonnes and G: 60 tonnes), and 216 tonnes were taken between 1 December 2010 and 12 March 2011. Information on this fishery is summarised in Annex 7, Appendix N.

3.149 High levels of IUU fishing have been reported in 2005/06 and 2006/07 and an estimated IUU catch of 910 tonnes was taken in 2009/10. The IUU catch of *Dissostichus* spp. in 2010/11 was not estimated.

3.150 A total of 5 759 *D. mawsoni* and 314 *D. eleginoides* have been tagged and released in Division 58.4.1, and 26 *D. mawsoni* and one *D. eleginoides* have been recaptured in that division. The Scientific Committee noted that all vessels fishing in Division 58.4.1 in 2010/11 achieved a tag overlap statistic greater than 50% (range 52–74%).

3.151 Six Members (Japan, Republic of Korea, New Zealand, Russia, South Africa and Spain) and a total of 11 vessels notified their intention to fish for toothfish in Division 58.4.1 in 2011/12.

3.152 The Scientific Committee agreed that it could provide no new advice on catch limits for this division for 2011/12. It recommended increasing the research requirements in this fishery for 2011/12 (paragraphs 3.128 to 3.133) and for 2012/13 (paragraphs 3.137 and 3.138).

Dissostichus spp. Division 58.4.2

3.153 In 2010/11, one Member (Republic of Korea) fished in Division 58.4.2 and reported a catch of 136 tonnes. SSRU E was closed on 24 February 2011 (SSRU E catch limit for *Dissostichus* spp.: 40 tonnes; final reported catch: 136 tonnes), and consequently the fishery was closed on 25 February 2011 (SSRU A catch limit for *Dissostichus* spp.: 30 tonnes; final reported catch: 0 tonnes). Information on this fishery is summarised in Annex 7, Appendix O.

3.154 The IUU catch of *Dissostichus* spp. in 2010/11 was not estimated.

3.155 The vessel fishing in Division 58.4.2 achieved the target tagging rate of three tags per tonne of green weight and achieved a tag overlap statistic greater than 60%. A total of 408 toothfish were tagged and released in 2010/11 and no tagged toothfish were recaptured.

3.156 Five Members (Japan, Republic of Korea, New Zealand, South Africa and Spain) and a total of five vessels notified their intention to fish for toothfish in Division 58.4.2 in 2011/12.

3.157 The Scientific Committee noted the large catch overrun in SSRU E (catch limit for *Dissostichus* spp.: 40 tonnes; final reported catch: 136 tonnes) and expressed concern that this may compromise the long-term research in this division and the ability to develop adaptive management strategies and stock assessments.

3.158 Dr Constable noted that the consequence of the overrun in SSRU 5842E needs to be considered in light of the distribution of the overall population and the risks to the stock. With respect to risks, the level of IUU fishing and the historical time series of catches need to be considered.

3.159 The Scientific Committee recommended the development of simulation studies which could provide a suitable method for exploring how these fisheries could be managed, including overruns in any one area.

3.160 Some Members requested that the Commission consider reducing the recommended catch limit in SSRU E for a period of time to reflect the overrun of catches, but noted that if the limit is reduced to zero there would be no possibility of recaptures of tagged fish.

3.161 The Scientific Committee agreed that it could provide no new advice on catch limits for this division for 2011/12. It recommended increasing the research requirements in this fishery for 2011/12 (paragraphs 3.128 to 3.133) and for 2012/13 (paragraphs 3.137 and 3.138).

Dissostichus spp. Division 58.4.3a

3.162 In 2010/11, the exploratory fishery for *Dissostichus* spp. in Division 58.4.3a was limited to one Japanese vessel using longlines only. The precautionary catch limit for toothfish was 86 tonnes. The vessel fished and reported a total catch of 4 tonnes of *D. eleginoides*. Information on this fishery is summarised in Annex 7, Appendix P. There was no estimate of IUU fishing in 2010/11.

3.163 Fourteen toothfish were tagged and released in 2010/11 and no tagged toothfish were recaptured during that season.

3.164 Three Members (France, Japan and South Africa) notified their intention to fish for toothfish in Division 58.4.3a in 2011/12.

3.165 The Scientific Committee agreed that it could provide no new advice on catch limits for this division for 2011/12. It recommended increasing the research requirements in this fishery for 2011/12 (paragraphs 3.128 to 3.133) and for 2012/13 (paragraphs 3.137 and 3.138).

Dissostichus spp. Subareas 88.1 and 88.2

3.166 In 2010/11, five Members and 16 vessels fished in the exploratory fishery in Subarea 88.1 between December 2010 and January 2011. The fishery was closed on 14 January 2011 and the total reported catch of *Dissostichus* spp. was 2 882 tonnes (101% of the limit). The following SSRUs were closed during the course of fishing:

- SSRUs B, C and G closed on 10 December 2010, triggered by the catch of *Dissostichus* spp. (total catch 349 tonnes; 94% of the catch limit)

- SSRUs J and L closed on 9 January 2011, triggered by the catch of *Dissostichus* spp. (total catch 428 tonnes; 114% of the catch limit)
- SSRUs H, I and K closed on 14 January 2011, triggered by the catch of *Dissostichus* spp. (total catch 2 105 tonnes; 100% of the catch limit).

3.167 Five Members and 12 vessels fished in the exploratory fishery in Subarea 88.2 between December 2010 and February 2011. The fishery closed on 8 February 2011 and the total reported catch of *Dissostichus* spp. was 576 tonnes, including 10 tonnes taken during research fishing in SSRU A (100% of the limit) (CCAMLR-XXX/BG/8, Table 2). The following SSRUs were closed during the course of fishing:

- SSRUs C, D, F and G closed on 8 February 2011, triggered by the catch of *Dissostichus* spp. (total catch 216 tonnes; 101% of the catch limit)
- SSRU E closed on 8 February 2011, triggered by the catch of *Dissostichus* spp. (total catch 350 tonnes; 97% of the catch limit).

3.168 Details of notifications of intentions to fish in 2011/12 are summarised in CCAMLR-XXX/11. For Subarea 88.1, notifications were submitted by seven Members with a total of 20 vessels. For Subarea 88.2, notifications were submitted by six Members with a total of 19 vessels. The Fishery Report for *Dissostichus* spp. in Subareas 88.1 and 88.2 is in Annex 7, Appendix R.

3.169 The Scientific Committee agreed that estimation of fishing mortality due to lost gear was a useful development and should be estimated for other fishery regions and considered for use in other assessment models (Annex 7, paragraphs 4.35 and 4.36). The Scientific Committee reminded Members of the requirement to complete C2 fields, by reporting zeros if no hooks attached to sections of the main line were lost.

3.170 Within Subarea 88.2, SSRUs 882C–G were assessed as a single stock for the first time, and two fisheries were identified: north of 70°50'S and south of 70°50'S.

3.171 The CASAL model, using catch-at-age and tag-recapture data and *D. mawsoni* biological parameters, was used to estimate the current and initial population size, and to calculate the long-term annual yield for Subareas 88.1 and 88.2 (SSRUs C–G) that would satisfy the CCAMLR decision rules as detailed in Annex 7, paragraphs 6.121 to 6.123.

3.172 The constant catch for which there was median escapement of 50% of the median pre-exploitation spawning biomass level at the end of the 35-year projection period for the Ross Sea (Subarea 88.1 and SSRUs 882A–B) was 3 282 tonnes. A total catch limit of 3 282 tonnes was therefore recommended.

3.173 The Scientific Committee recommended that the allocation method used to set the 2009/10 catch limits for SSRUs in Subarea 88.1 be continued for 2011/12. This resulted in 428 tonnes in the north (SSRUs 881B, C, G), 2 423 tonnes on the slope (SSRUs 881H, I, K) and 431 tonnes on the shelf (SSRUs 881J, L).

3.174 The Scientific Committee further noted that allowance would need to be made for the estimated catch associated with the 65 prescribed sets in the proposed pre-recruit survey (detailed in paragraphs 9.40 to 9.42). The Scientific Committee noted that the anticipated

catch from the survey was 40 tonnes, but that the actual catch could be in the range of 22 to 71 tonnes. The Scientific Committee noted that the survey should be effort-limited, rather than catch-limited, and therefore recommended that a research catch of 80 tonnes, which would nominally cover the first two surveys, be set aside from the catch limit on the shelf in 2011/12 to allow the pre-recruit survey to be conducted immediately following the closure of the fishery in Subarea 88.1. The research catch limit will be reviewed at the 2012 CCAMLR meeting.

3.175 The Scientific Committee agreed that gear standardisation, both within and between years, was a critical factor in the implementation of this survey and noted that this would be easiest to achieve by using the same vessel between years.

3.176 The constant catch for which there was median escapement of 50% of the median pre-exploitation spawning biomass level at the end of the 35-year projection period for SSRUs 882C–G was 530 tonnes. A total catch limit of 530 tonnes for these SSRUs combined is therefore recommended.

3.177 The Scientific Committee noted that the Subarea 88.2 fishery had been modelled as two fisheries with a split at 70°50'S, and considered that this was also an appropriate way to allocate catch limits. Over the last three seasons 76.7% of the catch was taken from the north of 70°50'S and 23.3% of the catch was taken from the south. The Scientific Committee therefore recommended that 406 tonnes be assigned to the region between 65°S and 70°50'S and the remaining 124 tonnes be assigned to the region south of 70°50'S. It further recommended that the SSRUs in Subarea 88.2 be renumbered in accordance with that outlined in Annex 7, Figure 7, noting that a catch limit of 406 tonnes should be applied to the new SSRU 882H and the catch limit of 124 tonnes be amalgamated across the new SSRUs 882C–G. It further recommended that the proportional allocation and SSRUs should be reviewed in two years' time when this subarea is next assessed.

3.178 The Scientific Committee agreed that other measures in the research and data collection plans, including the tagging requirement of one fish per tonne, be retained for the exploratory fisheries in Subareas 88.1 and 88.2.

3.179 The Scientific Committee considered a proposal for the conditional transition of the fishery for *Dissostichus* spp. in the Ross Sea from exploratory to established (WG-FSA-11/32). The Scientific Committee noted the view of WG-FSA (Annex 7, paragraphs 10.5 and 10.6) that sufficient information had become available to warrant removal of its exploratory status as it meets the criteria set out for exploratory fisheries in paragraph 1 of CM 21-02. The Scientific Committee agreed that there were many elements of the existing conservation measures which had been essential for reaching this status and whose retention would be essential in the future.

3.180 However, before the Scientific Committee can recommend to the Commission that this fishery can fully satisfy the requirements in paragraph 1 of CM 21-02, it requested advice from WG-FSA on the key elements of the data collection plan, research plan and assessment procedures in the existing conservation measures that would be necessary for the requirements in CM 21-02 to be met in the future and to ensure the continued assessment and management of the fishery.

INCIDENTAL MORTALITY ARISING FROM FISHING OPERATIONS

4.1 WG-IMAF met this year in parallel with WG-FSA, but with a reduced agenda which is presented in Annex 8, Appendix A.

Marine debris

4.2 WG-IMAF reported that surveys to monitor marine debris at study sites in Subareas 48.1, 48.2, 48.3 and 58.7 showed that the types of debris found are generally non-fishing items.

4.3 Dr Trathan drew the attention of the Scientific Committee to Figure 5 of SC-CAMLR-XXX/BG/5, which showed that marine debris associated with albatrosses at South Georgia has increased. Most of the items of debris cannot be directly attributed to fishing activities. The UK will continue to monitor trends in the occurrence of marine debris and encouraged other Members to establish similar monitoring programs so as to expand the area surveyed.

4.4 Prof. G. Duhamel (France) indicated that France will present further monitoring on marine debris from the Crozet and Kerguelen Islands next year.

4.5 The Scientific Committee endorsed the decision by WG-IMAF that observers should be trained to identify animals with hydrocarbon soiling and report them to CCAMLR (Annex 8, paragraph 7.7).

Incidental mortality of seabirds and marine mammals associated with fisheries

4.6 Incidental mortality of seabirds and marine mammals in fisheries was discussed by WG-IMAF. WG-IMAF-11/5 Rev. 2 contained a review of the information by the Secretariat.

4.7 The Scientific Committee noted that the total extrapolated mortalities within Subarea 58.6 and Division 58.5.1 was estimated to be 220 seabirds, which was down from 2009/10, and noted the progress made by France in recent years to reduce the incidental mortalities within their EEZs; incidental mortalities elsewhere in the Convention Area were similar to the near-zero levels of recent years.

4.8 The Scientific Committee considered three proposals to vary mitigation measures within a fishery: WG-IMAF-11/8 and 11/9 for Subarea 48.3 and WG-IMAF-11/7 for Division 58.5.2. The Scientific Committee endorsed the advice of WG-IMAF in respect of these proposals.

4.9 To give effect to the proposal for an additional season extension in Subarea 48.3, the Scientific Committee advised the Commission that paragraphs 5, 6 and 7 of CM 41-02 be modified as follows (new text in bold):

5. For the purpose of the longline fishery for *Dissostichus eleginoides* in Statistical Subarea 48.3, the **2011/12 and 2012/13 seasons are** defined as the period from 1 May to 31 August in each season, or until the catch limit is reached, whichever

is sooner. For the purpose of the pot fishery for *Dissostichus eleginoides* in Statistical Subarea 48.3, the **2011/12** and **2012/13** seasons are defined as the period from 1 December to 30 November, or until the catch limit is reached, whichever is sooner. The **2011/12** season for longline fishing operations may be extended in two periods: (i) to start on **16 April** and (ii) to end on 14 September for any vessel which has demonstrated full compliance with Conservation Measure 25-02 in the previous season.

6. The following decision rule shall apply to the extension of the **2012/13** season:

- (i) if, on average, less than one bird per vessel is caught during the two extension periods in the **2011/12** season, the **2012/13** season **extension** shall start on **11 April 2013**;
- (ii) if, on average, between one and three birds per vessel, or more than 10 and fewer than 16 birds in total, are caught during the extension periods in the **2011/12** season, the **2012/13** season **extension** shall start on **16 April 2013**; or
- (iii) if, on average, more than three birds per vessel, or more than 15 birds in total, are caught during the extension periods in the **2011/12** season, the **2012/13** season shall start on **21 April 2013**.

7. The extensions to the seasons in **2011/12** and **2012/13** shall be subject to a combined catch limit of three (3) seabirds per vessel per season. If a total of three seabirds is caught **by one vessel** during the two extension periods in any one season, fishing shall cease immediately for that vessel **in the extension periods**. In the case of the extension at the start of the season, fishing shall not resume until 1 May of the corresponding season and the extension at the end of that season shall not apply.

4.10 The Scientific Committee also advised the Commission that paragraphs 5 and 6 of CM 41-08 be modified for 2011/12 and 2012/13 as follows (new text in bold):

5. The operation of the trawl fishery shall be carried out in accordance with Conservation Measure 25-03 so as to minimise the incidental mortality of seabirds and mammals through the course of fishing. The operation of the longline fishery shall be carried out in accordance with Conservation Measure 25-02, except paragraph 5 (night setting) shall not apply for vessels using integrated weight lines (IWLs) during the period **15 April–May** to 31 October in **the 2011/12 and 2012/13** ~~each season~~ **seasons**. Such vessels may deploy IWL gear during daylight hours if, prior to entry into force of the licence, each vessel shall demonstrate its capacity to comply with experimental line-weighting trials as approved by the Scientific Committee and described in Conservation Measure 24-02.

During the period 15 April to 30 April in ~~each season~~ **the 2011/12 and 2012/13** ~~seasons~~, vessels shall use IWL gear in conjunction with ~~night setting and paired~~ streamer lines.

6. Each vessel participating in this fishery shall have at least one scientific observer, and may include one appointed in accordance with the CCAMLR Scheme of

International Scientific Observation, on board throughout all fishing activities within the fishing period, with the exception of the period 15 April to 30 April in each season the 2011/12 and 2012/13 seasons when two scientific observers shall be carried.

4.11 The Scientific Committee noted that the proposal contained in WG-IMAF-11/8 was not supported by WG-IMAF as it may cause an added risk to wandering albatross populations. Noting operational safety benefits in daylight setting, the UK indicated an intention to resubmit the proposal taking into consideration additional information on mitigating the risk to seabirds, including results from the trial period for daylight setting in Division 58.5.2.

4.12 The Scientific Committee endorsed the decision by WG-IMAF that the requirement to record the aerial extent of streamer lines should be discontinued in areas where only night setting is allowed (Annex 8, paragraph 3.39) and recommended that appropriate changes be made to the observer logbooks.

4.13 Recognising that there will always be a risk of incidental mortality of seabirds associated with fishing, the Scientific Committee noted that there is a need to understand the potential impact of different levels of incidental mortality on seabird populations and to estimate the risks to different species of flying seabirds of mortality both within and outside the CCAMLR area. The Scientific Committee requested models to be developed to examine this question and the results brought to the attention of the Scientific Committee.

Future consideration of incidental mortality of seabirds and marine mammals associated with fisheries

4.14 The Scientific Committee considered the discussion by WG-IMAF on the future requirements for the consideration of incidental mortality (Annex 8, paragraphs 10.1 to 10.8) and agreed that, while the number of seabirds being killed had reduced, the risk to those seabirds had not reduced. Therefore, there remains a need for the Scientific Committee to retain the issue of incidental mortality on its agenda.

4.15 The Scientific Committee agreed that the routine review of incidental mortality and of the implementation of conservation measures associated with mitigation measures, could be undertaken by the Secretariat and reported to the Scientific Committee. The Scientific Committee encouraged further coordination between the Secretariats of ACAP and CCAMLR in order to ensure that requests for information to ACAP on by-catch mitigation and data with which to review seabird risk assessments are provided on a schedule that allows consideration by the appropriate expert group of ACAP.

4.16 The Scientific Committee recalled the history of WG-IMAF noting that the success of WG-IMAF could be partly attributed to the fact that it stimulated cooperation between various stakeholders in the Southern Ocean in the Scheme of International Scientific Observation.

Advice to the Commission

4.17 Noting that ‘stickwater’ is an unavoidable by-product of at-sea processing of krill, and that stick water is not a strong attractant to seabirds and therefore does not pose a significant threat to seabirds (Annex 8 paragraph 3.43), the Scientific Committee recommended the following change to CM 25-03:

[footnote 3] ‘Stickwater’ is a liquid discharge produced as a by-product of krill processing. As stickwater does not contain a source of food for birds it is not considered as offal in respect of CM 25-03, footnote 2.

SPATIAL MANAGEMENT OF IMPACTS ON THE ANTARCTIC ECOSYSTEM

Bottom fishing and VMEs

5.1 The Scientific Committee considered the deliberations of WG-FSA and WG-EMM with respect to bottom fishing and VMEs. As endorsed by the Scientific Committee in 2010 (SC-CAMLR-XXIX, paragraph 15.4) these discussions were restricted to three main topics: (i) reviewing notifications of new VMEs under CM 22-06; (ii) reviewing Members’ preliminary assessments of bottom fishing impacts; and (iii) updating the assessment of bottom fishing impacts in the VME report. Other matters pertaining to VMEs will be considered in 2012.

5.2 The Scientific Committee considered two new notifications of encounters with potential VMEs notified under CM 22-06 (WG-EMM-11/10) and endorsed advice from WG-EMM that these two areas be added to the VME registry (Annex 4, paragraph 3.4). The Scientific Committee noted that these areas are the first VMEs notified in an area currently open to fisheries for *Dissostichus* spp. (SSRU 881G) and that no mechanism currently exists to ensure protection of these areas. The Scientific Committee agreed that the appropriate mechanism for protection in such instances is a matter for the Commission, but that protection measures could be applied as appropriate on a case-by-case basis.

5.3 The Scientific Committee recommended prohibiting bottom fishing within the areas of two circles, centred at 66°56.04'S 170°51.66'E and 67°10.14'S 171°10.26'E, with radii of 1.25 n miles (2.32 km) (Annex 7, paragraph 7.4) to provide protection of these VMEs from direct effects of interactions with fishing gear.

5.4 The Scientific Committee recalled its advice (SC-CAMLR-XXIX, paragraph 5.8) that combined cumulative impact assessments for all bottom fishing methods be updated annually by the Secretariat. The Scientific Committee recommended that the PlotImpact software be used by the Secretariat to update the combined bottom fishing impact assessment (Annex 7, paragraph 7.6).

5.5 The Scientific Committee recommended that all Members with vessels using bottom fishing gear types for which vessel-specific gear descriptions are not yet available in the CCAMLR gear library be required to provide detailed descriptions of their vessel-specific

fishing gear, including gear configuration, setting and hauling procedures, likely bottom fishing footprint (per unit effort) and estimated impacts on VME taxa within the footprint (Annex 7, paragraph 7.8).

5.6 The Scientific Committee noted that these gear descriptions are important not only for estimating bottom fishing impacts, but also for understanding other aspects of the interaction of different fishing gears with target and by-catch species, e.g. gear selectivity and rates of multiple-hooking injuries affecting the suitability of captured fish for tagging programs (Annex 7, paragraph 5.39).

5.7 The Scientific Committee endorsed the recommendations in Annex 7, paragraph 7.9, that the Spanish gear description in WG-FSA-11/53 and trotline configuration shown in Annex 7, Figure 5, should be added to the CCAMLR gear library for reference and use by other Members. It also recommended that previous papers describing fishing gear configurations (WG-FSA-05/26, 06/5 and 06/15) should be added to the gear library with author permission.

5.8 The preparation and evaluation of Members' preliminary bottom fishing impact assessments in new and exploratory fishery notifications is very time-consuming, both for Members and for WG-FSA, and is largely unnecessary for those gear types for which gear descriptions and gear-specific impact assessments are already available in the CCAMLR gear library.

5.9 The Scientific Committee recommended that the preliminary impact assessment pro forma be simplified to require that, for Members intending to use vessel-specific gear configurations already described in the CCAMLR gear library, they provide only their expected level of effort deployment in the coming season and a cross-reference to an existing gear description/impact assessment in the CCAMLR gear library (paragraph 5.5).

Marine Protected Areas

Report of the 2011 Workshop on Marine Protected Areas

5.10 Dr Penhale and Prof. Koubbi presented the report of the Workshop on Marine Protected Areas held in Brest, France, from 29 August to 2 September 2011 (Annex 6).

5.11 The Scientific Committee noted that a number of methods could be used for designing a representative system of MPAs, including bioregionalisation and/or systematic conservation planning (SCP).

5.12 The Scientific Committee noted that insights from the invited experts may assist in the development of SCP processes in the Southern Ocean (Annex 6, Appendix D).

5.13 The Scientific Committee endorsed further development of a GIS database proposed by the UK (Annex 6, paragraph 2.5) as this would aid the management of spatial data, including in the development of proposals for MPAs. It encouraged the CCAMLR Secretariat to liaise with the UK to further develop the GIS database so that it may be made available for the use of all Members.

5.14 The Scientific Committee recalled the kinds of objectives for which MPAs may be designated to achieve the aims of Article II (SC-CAMLR-XXIV, paragraphs 3.53 and 3.54). It also noted that MPA proposals should clearly state the specific objectives for which they are designated in different areas.

5.15 Some Members recommended that the areas selected for protection, as well as the levels of protection sought for each area, should be made explicit for all MPA proposals, consistent with the discussion in Annex 6, paragraph 3.41. Proposals should clearly define conservation values, monitoring plan, implementation and research plans (hereunder time horizons) for MPAs.

5.16 The Scientific Committee recommended that proposals include a clear description of the balance between protection of ecological function and allowance for, and impact on, harvesting.

5.17 The Scientific Committee noted the importance of (i) defining clear objectives for MPAs, (ii) having clear approaches and methods to determine how the objectives will be achieved by designating MPAs, (iii) providing explicit consideration of rational use, and (iv) devising a method for showing the trade-offs, if any, between possible MPAs and harvesting (Annex 6, paragraph 5.4).

5.18 The Scientific Committee noted paragraph 5.6 of Annex 6, which noted that in order to achieve a representative system of MPAs:

- (i) the interests of rational use need to be accounted for in the process of establishing a network of MPAs
- (ii) the objectives of each MPA need to be stated explicitly and that the system of MPAs needs to take account of achieving the objectives over the region, noting that individual MPAs may have differing specific objectives to other MPAs, such as protection of vulnerable communities from fishing, reference areas for managing fisheries or for understanding impacts of climate change, or for providing protection to predators from direct competition with fishing
- (iii) when an MPA is designed to include protection of spawning areas as part of stock management, then it would be beneficial for the Scientific Committee and, as appropriate, the working groups, to review the implications for the stocks
- (iv) individual MPAs may have zones within them to regulate different activities in different locations
- (v) MPAs can be established using the precautionary approach and that the performance of any of the MPAs with respect to their values needs to be reviewed, based on monitoring or other data, to determine if the values of the MPAs are likely to have remained in the MPAs, particularly in light of the effects of climate change, and whether the MPA is still required and/or whether its boundaries should be revised or moved

- (vi) in presenting a proposal for an MPA, an analysis, which may include an optimisation analysis, needs to be presented on the degree to which the objectives for an MPA have been met along with the degree to which rational use may be affected
- (vii) stakeholder consultation is expected through the processes of the Scientific Committee and Commission.

5.19 The Scientific Committee discussed progress made to develop MPAs in the 11 priority areas identified in 2008. It was noted that the utility of the priority area was limited, because the entire CCAMLR area was not included. Research on bioregionalisation for MPA development, such as for East Antarctica, the Ross Sea and Crozet–Kerguelen, identified larger regions of importance.

5.20 The Scientific Committee endorsed the development of planning domains for representative systems of MPAs (Annex 6, Figure 3). It noted the substantial work done on the Ross Sea and Eastern Antarctica and agreed that the next phase of development of MPAs could include the Western Antarctic Peninsula–South Scotia Arc domain (domain 1), the del Cano–Crozet domain (domain 5) and the circumpolar SCP effort (SCP) (Annex 6, paragraph 6.22). The Scientific Committee endorsed proposals by Members to hold technical workshops for each of these areas in 2012, and encouraged them to present their results to WG-EMM for consideration by all Members.

5.21 Dr Pshenichnov informed the Scientific Committee that Ukraine will begin research in the coming season on the determination, and establishment, of an MPA in the area of the Argentine Islands Archipelago (SC-CAMLR-XXX/BG/11). The research plan will include geophysical, hydrological and biological research, and a survey of coastal areas adjacent to an MPA and accessible benthic habitat. After completion of the research, final MPA boundaries will be determined and the management and ecological monitoring plans for the MPA will be developed and submitted according to the procedure described in Annex V to the Protocol on Environmental Protection to the Antarctic Treaty.

5.22 Some Members noted that it was important that management plans and research and/or scientific monitoring plans be associated with every MPA proposal, together with a clear timeframe within which MPAs will be reviewed on the basis of the information collected under these plans. Scientific review needs to consider the timescales of the relevant ecological processes, and may vary from a few years to several decades.

5.23 Some Members considered that monitoring and research plans should be developed prior to the designation of an MPA. Other Members considered that it was possible to first designate MPAs and later to consider such plans.

5.24 Some Members considered that the process for designating the South Orkneys MPA should not be considered a precedent for the establishment of MPAs because it did not include a management plan or scientific monitoring plan.

5.25 Dr Trathan reminded the Scientific Committee that at the time of adoption of CM 91-03, the conservation measure was viewed as the management plan (CM 91-03, paragraph 1). He informed the Scientific Committee that the UK continued to undertake research on the ecosystem covered by the South Orkneys MPA.

5.26 Taking account of the views of Members expressed in paragraphs 5.22 to 5.25, the Scientific Committee requested the Commission to consider how monitoring and implementation plans for MPAs might be developed and provide guidance to the Scientific Committee, on what the Commission expected of it in this regard.

5.27 The Scientific Committee agreed that monitoring could take several forms and there is a need to be clear, when using the term, which type of monitoring was being referred. For example, monitoring could be:

- (i) directed at establishing whether the MPA objectives are being delivered, and particularly whether the threats to the values are being successfully mitigated by the MPA
- (ii) monitoring to establish whether the values on which the MPA was designated are changing, for instance in response to climate change
- (iii) monitoring in comparison to other areas, where MPAs have been designated as reference areas under wider ecosystem monitoring schemes.

Proposals

5.28 The Scientific Committee received two submissions describing MPA scenarios for the Ross Sea region (New Zealand and the USA), one proposal for a representative system of MPAs covering East Antarctica (Australia and France) and one proposal concerning areas now covered by ice shelves that in the future are expected to collapse or disappear due to climate change (UK).

5.29 At the introduction of the debate on specific proposals, the Scientific Committee Chair clarified that the objective of the work of the Scientific Committee would be to comment on the science underlying the MPA proposals, and in particular whether this was the best available scientific advice to support the proposed MPA boundaries consistent with the objectives of the proposal.

Ross Sea planning domain

5.30 Dr Watters introduced the US scenario for an MPA in the Ross Sea region (SC-CAMLR-XXX/9). It was emphasised that this was not a proposal to be forwarded to the Commission this year, but that a proposal was intended to be forwarded next year. The scientific basis of the suggested proposal had been evaluated and endorsed at the MPA Workshop in Brest.

5.31 Several delegates questioned the basis for the boundaries and size of the proposed area, and also the difference in area boundaries between the US and New Zealand proposals. Dr Watters emphasised that the areas were selected taking into account several ecological aspects as outlined in the proposal, and that the aims and methods differed between the US and New Zealand proposals, but that the scientific approaches were sound. The exact boundaries need to be re-thought for the final version.

5.32 Dr Arata expressed concern that a reallocation of the fishery out of the proposed MPA would potentially affect fish populations outside the MPA through concentration of effort. The areas closed to fishery may also result in an overcrowding of the fishing vessels in the open areas outside the proposed MPAs. Dr Arata also expressed that in regard of the area being proposed for protecting the spawning ground for *D. eleginoides*, he considered that there are other measures that are more appropriate such as seasonal closures, so before proceeding, the expected outcome of creating such an MPA should be better discussed within the appropriate CCAMLR working group. Dr Watters acknowledged that these issues would have to be considered in the final proposal with a monitoring plan.

5.33 Dr Kiyota stated that since one objective of the US scenario for an MPA in the Ross Sea region was a reference area, it should have a mechanism to ensure the exclusion of human activities that would negatively impact the objectives established for the MPA. Dr Watters emphasised that rational use in the definition was not simply related to fishing.

5.34 Several delegates expressed concern about the feasibility of implementing a monitoring plan for such a large area to ensure its value as a reference area. Dr Watters agreed that there would be large, but not insurmountable, challenges connected to the monitoring and research that would have to be considered when developing a monitoring plan.

5.35 Dr Sharp introduced the MPA scenario by New Zealand for the Ross Sea region (SC-CAMLR-XXX/10). It was emphasised that this was not a finished proposal to be forwarded to the Commission this year, but that New Zealand sought feedback from the Scientific Committee and Commission on boundaries and the MPA planning method that New Zealand used. The scientific basis had been evaluated and endorsed at the MPA Workshop in Brest.

5.36 Dr Bizikov supported the planning approach used in the New Zealand proposal and especially the rigorous and transparent approach and the consultation process with the stakeholders during the preparation. He questioned the size of the suggested MPA. Dr Sharp pointed out that the size and the borders result from the input parameters (protection targets) as shown in Table 1 of SC-CAMLR-XXX/10. They can be changed with accompanying changes in outcomes.

5.37 Dr Kiyota emphasised the need for an SCP process when planning MPAs since many of the stakeholders' interests could be considered in the light of clear objectives and conservation target. He welcomed the use of SCP in the New Zealand proposal, and the fact that it had explicitly considered the effect of fisheries on the value of each target area, which was requested by Japan during the discussion at the MPA Workshop (Annex 6, paragraph 5.10). Dr Kiyota noted that such analysis of the effect of the fishery on the value of target areas should be included in every MPA scenario.

5.38 Mr L. Yang (China) commented that the suggested area was quite large and that there was not enough data presented for the eastern part of the proposed MPA.

5.39 Dr Sharp responded that the northeast area protects spawning *D. mawsoni* providing recruits to the Ross Sea stock (target area 22), and that the southeast area protects moulting

habitats for emperor penguins and crabeater seals (target area 5). The eastern area at moderate latitudes is protected only to achieve representativeness targets with respect to bioregions, and is of lesser importance.

5.40 Dr Sharp emphasised that the similarities between the US and New Zealand scenarios reflect protection objectives that were broadly similar and MPA planning methods that were different but compatible. The differences between the New Zealand and US scenarios reflect different policy aims regarding choosing an appropriate balance between protection and rational use. Specifically, the New Zealand scenario includes a higher level of accommodation for fishery outcomes than does the US scenario. The appropriate balance between protection and rational use is a decision for which advice from the Commission would be useful.

5.41 Some Members questioned whether protection of benthic features in the absence of a clearly identified threat provided sufficient justification for declaring MPAs over large areas.

5.42 Dr Sharp clarified that the New Zealand MPA scenario was only weakly driven by benthic protection objectives, because even though benthic habitat areas were assigned high protection targets in Table 1 of SC-CAMLR-XXX/10, these areas are very small (WS-MPA-11/25, Figure 2). He emphasised that the boundaries of the New Zealand MPA scenario are strongly driven by the choice of high-protection targets for target areas 10 (*Pleuragramma antarcticum*), 13 and 14 (top predators on toothfish), 18 and 19 (habitats for sub-adult *D. mawsoni*), and lower protection targets for target areas 21 and 22 (presumed *D. mawsoni* spawning locations), and that the rationale for these protection targets was endorsed by the MPA Workshop (Annex 6, paragraph 3.40). Dr Sharp emphasised that under the systematic conservation planning framework described in SC-CAMLR-XXX/10, assigning similar protection targets for these areas will result in MPA boundaries similar to those in the New Zealand scenario.

5.43 Dr Sharp offered to share the MPA planning software used in New Zealand's planning process with interested Members, to aid transparent MPA development and evaluation. The software will generate the information in Table 1 of SC-CAMLR-XXX/10 for any user-defined MPA boundary.

5.44 The ASOC Observer (Dr R. Werner) pointed out that the Ross Sea's unique values make it extremely valuable to science and that 520 scientists world-wide had signed a statement calling for protection of the entire shelf and slope to prevent degradation of those values by human activities. Furthermore, the ASOC Observer also noted that in 2010 the Commission had concluded that the development of a designation process and a monitoring plan may proceed in a step-wise fashion or both processes may occur simultaneously (SC-CAMLR-XXIX, paragraphs 5.36 and 5.37; CCAMLR-XXIX, paragraph 7.8).

Recommendations to the Commission

5.45 The Scientific Committee endorsed the scientific basis of the Ross Sea region scenarios put forward by New Zealand and the USA. It agreed that the scenarios contained the best scientific advice for the area, and supported the rationale for the identification of conservation objectives presented in the scenarios.

5.46 The Scientific Committee agreed that the differences between the scenarios reflected different objectives and choices for implementation, in particular, the relative weight given to the displacement of fishing effort, but that these were matters for the Commission.

5.47 The Scientific Committee agreed that these scenarios needed no further scientific analysis and debate within the Scientific Committee.

East Antarctica planning domain

5.48 Dr Constable presented the proposal by Australia and France for a representative system of MPAs (RSMMPA) in the East Antarctica planning domain (SC-CAMLR-XXX/11). This paper proposed that the East Antarctic RSMMPA be endorsed by the Scientific Committee and that it be recommended to the Commission as part of the commitment to delivering MPAs by 2012:

- (i) The primary data, analyses and interpretation leading to the bioregionalisation and identification of values and the placement of the proposed MPAs were provided to WG-EMM and the Scientific Committee (SC-CAMLR-XXIX/11) for consideration in 2010, with further analyses and revision provided to the MPA Workshop and in this proposal in 2011. These assessments were based on known biology, ecology and biogeography of the region combined with the application of general ecological theory.
- (ii) The structure of the paper was due to the limited translation available for the proposal resulting in the translated section only containing the proposal with the justification placed in the second section. The third section contained the review of data and analyses available for this task, constituting the best scientific evidence available. The sections that were new to the Scientific Committee were the recent analyses concerning krill and toothfish fisheries and an assessment of the trade-offs between ecological and biodiversity values, reference areas and fisheries. This new work resulted in revision of the Prydz Bay MPA and the D'Urville Sea–Mertz MPA to better provide for, respectively, fisheries for toothfish and location of the conservation and reference area values. This layout of the paper did not mean that the areas were determined prior to justification.
- (iii) The conservation values are summarised in SC-CAMLR-XXX/11, Tables 2.1 to 2.3, noting that the scale of the areas derived from the size of summer foraging areas for Adélie penguins was the primary determinant of size of the proposed areas.
- (iv) The detailed assessments of rational use for krill and toothfish show that access to the target populations will not be impacted by the proposal while ensuring suitable reference areas are available for monitoring trends and change in the ecosystem unaffected by fishing activities and allowing for monitoring for the effects of fishing.

5.49 Drs Bizikov and Pshenichnov pointed out that the proposal was not adequately translated into Russian. This was due to time constraints and length of the proposal due to it representing seven suggested MPAs. The Scientific Committee agreed to allow Dr Constable to present the proposal to enable discussion of its scientific background.

5.50 Dr Bizikov and Mr Yang noted that the proposal for a representative system of MPAs by Australia and France lacks sufficient scientific logic and data in identifying the threat or risk from which the values of the proposed MPAs should be protected, and to which extent and through what mechanism. Thus, the conservation values in this proposal are not properly identified. They noted that the proposed sizes of the MPAs are unnecessarily large, and their boundaries are not well justified. As most proposed MPAs cover existing and former fishing grounds of toothfish and krill, and there is no quantitative analysis of historical fishing distributions, it is not clear how the proposed system of MPAs is balanced with 'rational use'.

5.51 Dr Constable noted that data on historical fisheries activities in the region were analysed and included in the paper on rational use submitted to the Scientific Committee last year (SC-CAMLR-XXIX/BG/9). He had been advised that such data would not be useful in this work and, as a result, they have not been included in the paper this year. The analyses can be consulted if needed, but confirm the additional analyses undertaken this year.

5.52 Dr Bizikov and Mr Yang acknowledged the efforts of Australia and France in conducting research on bioregionalisation of East Antarctica and made a general request for further data to prove the necessity to protect particular areas, the objectives and aims of protection, research and monitoring programs for each protected area and the proposed periodicity of revision of the research programs and MPA status by the Scientific Committee.

5.53 Dr Bizikov questioned the actual boundaries and the size of the suggested MPAs and thought that, since they followed the meridians and not any other feature, the MPAs became unnecessarily large. This claim was supported by Dr Pshenichnov. It was also questioned why the suggested MPAs seem to follow those already established SSRUs that are currently closed for the toothfish fishery.

5.54 In response, Dr Constable noted the following partial longitudinal overlap between the proposed MPAs and current access to SSRUs in exploratory fisheries for *Dissostichus* spp.:

- (i) Gunnarus MPA – Division 58.4.2 SSRU A (open)
- (ii) Enderby MPA – Division 58.4.2 SSRUs B (closed) and C (closed)
- (iii) MacRobertson MPA – Division 58.4.2 SSRU D (closed)
- (iv) Prydz MPA – Division 58.4.2 SSRU E (open) and Division 58.4.1 SSRU B (closed)
- (v) Drygalski MPA – Division 58.4.2 SSRUs B (closed) and C (open)
- (vi) Wilkes MPA – Division 58.4.2 SSRUs E (open) and F (closed)
- (vii) D'Urville Sea–Mertz MPA – Division 58.4.2 SSRUs G (open) and H (closed).

5.55 Some Members of the Scientific Committee felt that the constraints to fisheries were not adequately covered in the proposal.

5.56 Mr Yang and Drs Bizikov and Pshenichnov also pointed out insufficient background data supporting any of the claims that would warrant an MPA. They questioned the conservation targets and argued that there was no identified risk to any of the ecosystem components.

5.57 Dr Constable noted that conservation targets were likely to be satisfied because the scale of population and ecosystem processes have determined the size of the MPAs, particularly the reference areas.

5.58 This view was supported by Prof. Koubbi and Drs Watters and Trathan.

5.59 In summarising the discussion, many Members noted that:

- (i) catch limits on toothfish and krill will not be impacted
- (ii) research within MPAs to help assess catch limits and fishing options will still be possible
- (iii) the methods to distribute fisheries activities (SSRUs) would need to be revised given the proposed MPAs
- (iv) how fisheries and research will be progressed after the establishment of MPAs is an implementation issue that will need to be addressed by the Commission
- (v) there is agreement that –
 - (a) the conservation values and values of reference areas have been identified
 - (b) the locations where those values are most important have been identified
 - (c) all of the available data and scientific evidence have been examined and utilised in this process, meaning that the best scientific evidence available has been used
- (vi) the boundaries have been determined based on the best scientific evidence available and are the minimum area to be highly likely to encompass the conservation and reference values, noting that –
 - (a) they have been adjusted since the original proposal to take better account of fisheries requirements and that fisheries will now not be affected
 - (b) they can be reviewed and revised as more data become available
- (vii) the main question concerns how to manage current and future threats and risks and whether MPAs are required to protect the values before there is demonstrable evidence that the values have been impacted.

5.60 Prof. Koubbi emphasised that the results and justification of the East Antarctica RSMPA were presented last year and, with improvements, this year to the appropriate forums of the Scientific Committee. There is a strong scientific basis for this proposal following the use of approved concepts of bioregionalisation and the approach for establishing a comprehensive, adequate and representative (CAR) system. Additional ecoregionalisation of

the D'Urville Sea–Mertz area since last year enabled revision of the location of the D'Urville Sea–Mertz MPA. Further, a long-term monitoring program is being established for this region.

5.61 Dr Trathan noted that the work undertaken by Australia and France in East Antarctica provided the best available scientific evidence for providing spatial marine protection for the ecological values present in that region. He noted that Australia and France had jointly collated all available evidence and that it was difficult to conceive what other evidence could be provided. Dr Trathan noted that it would be helpful if those Members that felt the evidence was insufficient could provide detailed and specific comments so that Australia and France could address any outstanding objections. Dr Trathan noted that the work of the Scientific Committee could only move forward if scientific proposals were evaluated and subjected to detailed scientific criticism, rather than receiving less-well-defined broad generic concerns.

5.62 Dr Watters concurred with this view and stated that if specific comments and criticism could not be provided, the Scientific Committee must infer that the evidence presented is indeed the best available. He also noted that some of the MPAs are unique at a circumpolar scale, including the D'Urville Sea–Mertz and Gunnarus MPAs.

Recommendations to the Commission

5.63 The Scientific Committee agreed that the East Antarctica proposal (SC-CAMLR-XXX/11) contains the best scientific evidence available.

5.64 Some Members argued that there is insufficient scientific background to say that there is great risk to specific conservation values, and requested more and better scientific background for the proposal.

5.65 Other Members argued that the MPAs were an appropriate size to achieve the specific objectives for the MPAs, including conservation and reference areas, while allowing for rational use. They also noted that there was sufficient information for the Commission to establish the East Antarctica RSMMPA.

5.66 The Scientific Committee had no further scientific guidance on how the proposal might be improved and whether there is sufficient information for the Commission to decide on these matters. It requested the Commission to consider the proposal to decide if it is sufficiently detailed, and if not, provide guidance on how this proposal can be progressed.

Ice shelves

5.67 Dr Trathan presented an MPA proposal for protection of marine habitats exposed after the collapse of an ice shelf (SC-CAMLR-XXX/13). He recalled that regional climate change is now known to be well established in the Antarctic, particularly in Area 48 and especially in the Antarctic Peninsula region. One of the most evident signs of climate change has been ice-shelf collapse and glacial retreat; overall, 87% of the Peninsula's glaciers have retreated in recent decades.

5.68 The Scientific Committee recognised that ice-shelf collapse will lead to the exposure, and generation, of new marine habitats and to subsequent biological colonisation. It noted that colonisation of these habitats may simply include species from areas that are immediately adjacent to the collapsed ice shelf; however, other complex processes may also take place as warmer waters may also create opportunities for species to return that were last present during the last interglacial, a warmer period than at present. In addition, altered ecosystem dynamics may also allow new alien species to invade as ocean warming potentially removes physiological barriers that have previously led to the isolation of the Antarctic benthos.

5.69 The intent of the UK MPA proposal was to provide strong protection which does not preclude scientific research in the future. The Scientific Committee thought that the newly exposed marine environments after a shelf collapses offer a unique chance to study colonisation and other important processes. The Scientific Committee noted that scientific research on ecological processes underneath, and adjacent to, ice shelves was already being carried out and that any spatial protection must not restrict the ability of scientists to undertake scientific research.

5.70 Drs Zhao and Bizikov stated that they thought the proposal lacked any clear conservation target and furthermore contained no scientific analysis.

5.71 The Scientific Committee noted that providing spatial protection to the areas occupied by ice shelves would not have any impact on any existing fisheries or logistic operations because the areas covered by ice shelves are not currently accessible or utilised by shipping. However, it recognised that regional climate change will make these areas more accessible in the future and greater access would increase the risk of human perturbation.

5.72 The Scientific Committee emphasised that any proposals to designate areas under ice shelves as ASMAs/ASPAs would require coordination of the CEP and ATCM with CCAMLR since areas under ice shelves were marine areas and any agreed spatial protection would require CCAMLR's prior approval.

5.73 Dr Trathan recalled the Scientific Committee's previous discussions concerning the ATME on Climate Change (SC-CAMLR-XXIX, paragraphs 8.3 to 8.7). ATME Recommendation 26 highlighted the need to provide automatic interim protection to newly exposed areas such as marine areas exposed through ice-shelf collapse.

5.74 The IUCN Observer (Ms D. Herr) welcomed the precautionary approach put forward by the UK in its proposal on providing precautionary protection for locations under retreating ice shelves, and underscored the need to develop enhanced spatial management responses based on the use of best scientific evidence available.

5.75 The ASOC Observer thanked the UK for this paper and its proposal to protect areas of the Southern Ocean that are exposed by the retreat or collapse of ice shelves. Protecting these areas provides a unique opportunity to understand how ecosystems respond to environmental change, including climate change. Implementing such protection is consistent with CCAMLR's precautionary approach to management. Plans for research would be useful and the ASOC Observer pointed out that research is currently proposed by Australia to investigate changes in the oceanic environment where the Mertz Glacier tongue has recently calved away and it is these types of studies that the UK proposal would facilitate.

Recommendations to the Commission

5.76 The Scientific Committee recognised that the UK proposal necessarily lacked detailed scientific data. Nevertheless, it acknowledged the scientific and conservation value of habitats exposed after an ice-shelf collapse, and their value to scientific research.

5.77 The Scientific Committee noted that spatial protection could be implemented as a precautionary measure, so that protection was automatically afforded to those areas when ice shelves collapsed. Alternatively, it recognised that protection could be implemented in a reactive manner once ice-shelf collapse had occurred. The Scientific Committee therefore requested that the Commission provide advice about the manner (precautionary or reactive) in which spatial protection should be afforded to ice shelves, ice tongues and glaciers.

General comments

5.78 Drs Parkes and Leslie noted that the Scientific Committee had received a number of well-developed papers concerning the establishment of MPAs in the Antarctic this year and that earlier versions of some of these papers had already been reviewed by WG-EMM-11 and the MPA Workshop. The establishment of MPAs is itself a reflection of the choice between a precautionary and a reactive management approach. CCAMLR has a long history of taking a precautionary approach and establishment of MPAs on the basis of the best scientific evidence available is entirely consistent with that. Dr Parkes expressed concern that, during discussion of these papers, some Members had articulated views that appeared to contradict the precautionary approach and reverse the burden of proof by judging the sufficiency of data and scientific advice rather than whether it is the best available. Dr Parkes considered that such views were extremely disturbing as they had the potential to seriously undermine the work of the Scientific Committee.

5.79 Drs Zhao and Bizikov expressed the view that it is the lack of a suitable working mechanism that is creating all these difficulties. At present, the working process towards the establishment of an MPA is primarily a one-way bottom-up process in that not enough guidance has been given to the Scientific Committee from the Commission, especially on issues with a policy nature but that have important scientific implications; and not enough effort has been invested in seeking a common ground amongst Members on important issues that govern the outcomes of the working process, and different proponents may aim at different objectives and with different protection targets. They urged the Scientific Committee to seek advice from the Commission on this matter.

5.80 The IUCN Observer recalled the Commission's endorsement of the use of MPAs as one means to furthering the objective of CCAMLR and of the work plan towards the achievement of a representative system of MPAs within the Convention Area by 2012. She highlighted that the critical aspect of representativeness is dependent on the inherent characteristics of ecosystems. It is not dependent on the potential impacts of human uses or activities.

5.81 The IUCN Observer reiterated that MPAs function as a long-term insurance policy for the conservation of nature and associated ecosystem services. They range from strictly protected no-take areas to multiple-use zones, with different objectives and characteristics as

laid out by the IUCN Protected Areas categories. Protected areas should prevent any exploitation or management practices that will be harmful to the objectives of designation. However, activities consistent with these objectives are permissible.

IUU FISHING IN THE CONVENTION AREA

6.1 The Scientific Committee noted the report of WG-FSA on the level of IUU fishing in the Convention Area (Annex 7, paragraphs 3.24 to 3.28). The Scientific Committee noted that last year it asked the Secretariat to monitor trends in IUU effort rather than estimate IUU catch, but that estimates of total removals are needed for stock assessments (SC-CAMLR-XXIX, paragraph 6.5). It also noted that WG-FSA this year recommended that the Scientific Committee task appropriate experts to develop methodologies to generate these estimates for IUU removals (Annex 7, paragraph 3.24). It agreed with the recommendation of WG-FSA that there were sufficient data available to begin a statistical analysis of the trends in IUU fishing (see WG-FSA-11/10, Table 4). The Scientific Committee endorsed the recommendation of WG-FSA that WG-SAM advise on how this work can be further developed in order to provide information on trends in IUU fishing and estimates of IUU catches.

6.2 The Scientific Committee noted that the estimation of IUU catches may not be urgent given that IUU fishing is mostly occurring currently in areas where exploratory fisheries do not have assessments. However, it did note that such estimates will help the Scientific Committee understand the potential impacts of IUU fishing in those areas. The Scientific Committee requested the Commission assemble experts with knowledge of IUU catches and the market data that could be used for investigating total IUU removals to help with this task. This may involve assembling experts from SCIC and WG-SAM in the same way that the Joint Assessment Group was established in the past.

6.3 Given the trends in the observations of IUU fishing indicated by WG-FSA (WG-FSA-11/10, Table 4), the Scientific Committee drew to the attention of the Commission that IUU fishing is unlikely to be declining in Subarea 58.4, with IUU catches predominantly being *D. mawsoni*.

CCAMLR SCHEME OF INTERNATIONAL SCIENTIFIC OBSERVATION

7.1 Information collected by scientific observers for finfish on board longline, trawl and pot vessels and krill trawl cruises was summarised by the Secretariat in SC-CAMLR-XXX/BG/4. In accordance with the text of the CCAMLR Scheme of International Scientific Observation, paragraph A(f), the Secretariat provided copies of all scientific observer reports to the Receiving Members.

7.2 The Scientific Committee endorsed the recommendation of WG-EMM (Annex 4, paragraph 2.42) to revise the logbook forms used by observers on krill fishing vessels according to Table 1 in Annex 4. It further endorsed the recommendation by WG-FSA that the K12 form be modified to enable length measurements of fish and fish larval by-catch to be recorded (Annex 7, paragraph 8.6i).

7.3 The Scientific Committee endorsed the recommendation by WG-EMM that sample collection for measurement of krill length frequency and fish by-catch must be taken before any other sorting of the catch has taken place (i.e. before any large fish are removed).

7.4 The Scientific Committee noted the review by WG-EMM of the *Scientific Observers Manual* (2011) (Annex 4, paragraph 2.43). The Scientific Committee agreed that the paragraphs listing priorities for krill observers in Section 2 should be revised as follows, with the understanding that items (i) and (ii) should take priority over item (iii) over the two-year period of the observer trial.

- (i) Krill length measurement using 'Krill biological data form' to:
 - collect length-frequency data from all regions for the understanding of stock structure
 - facilitate the understanding of the differences in gear selectivity between different fishing techniques and gear configurations.
- (ii) Fish by-catch data collection using 'fish sampling protocol' to:
 - determine the level of by-catch of fish, including fish larvae.
- (iii) Incidental mortality data collection using 'Incidental mortality and warp strike forms' to:
 - determine the level of warp strikes and incidental mortality of seabirds and seals.

7.5 The Scientific Committee noted the clarification made by WG-EMM on the definition of 'haul' used in the observer logbook (Annex 4, paragraph 2.35). The Scientific Committee endorsed the clarification that the 'observed haul' be linked with krill length measurements.

7.6 The Scientific Committee noted that vessels use different meshes and net configurations across the krill fleet, and requested vessels and observers record which net and configuration is being used on each haul, to enable the selectivity of the different net mesh and configurations to be analysed.

7.7 The Scientific Committee requested that the Secretariat communicate the agreed changes to observer priorities and logbooks to technical coordinators pending the next revision of the *Scientific Observers Manual*.

7.8 The Scientific Committee agreed that observer data and reports from all observers referred to in CM 51-06 need to be available for review and analysis by the Scientific Committee and its working groups. The Scientific Committee agreed that the second sentence of footnote 1 in CM 51-06 should be modified as follows: 'Data and observer reports shall be submitted to CCAMLR **according to the requirements of the CCAMLR Scheme of International Scientific Observation** for inclusion in the CCAMLR database and analysis by the Scientific Committee and its working groups'.

7.9 The Scientific Committee noted that the difference between the continuous and conventional mode of krill trawling led to some ambiguity regarding the application of

paragraph 3(ii). The Scientific Committee recommended that paragraph 3(ii) be modified as follows: ‘a target coverage rate of more than 20% of hauls or haul units shall be sampled during the period that an observer is on board the vessel per fishing season’. The Scientific Committee also recommended the addition of a footnote to this paragraph, defining a haul unit as a two-hour contiguous period of fishing using the continuous trawling method.

7.10 The Scientific Committee noted the discussions on the potential conflict between the sampling flexibility allowed in the instructions in the *Scientific Observers Manual* and the precise requirements of CM 51-06. The Scientific Committee requested that WG-EMM consider this matter at its 2012 meeting, recognising that CM 51-06 is due to be reviewed in 2012.

7.11 With regard to the observer coverage of the krill fishery, the ASOC Observer made the following statement:

‘ASOC would like to call your attention to our paper, CCAMLR-XXX/BG/19 – “30 years of krill fisheries management – challenges remain”. Particularly with regard to the scheme of scientific observation in the krill fishery, although the two-year experimental design of scientific observation produced positive results, it seems that sufficient observer data will not be obtained to allow the CCAMLR Scientific Committee to provide advice to the Commission. Therefore, we sustain that CCAMLR should extend CM 51-06 for another fishing season (2012/13) and at the same time persist in its efforts to work toward 100% observer coverage across all vessels in the krill fishery as the best way to achieve systematic observer coverage.’

7.12 Dr Pshenichnov presented SC-CAMLR-XXX/BG/6, submitted by Ukraine, noting that the majority of krill vessels intending to fish in 2011/12 are likely to carry observers and that the implementation of 100% observer coverage should be seriously considered by WG-EMM in reviewing CM 51-06 in 2012.

7.13 The Scientific Committee endorsed the recommendation by WG-FSA (Annex 7, paragraph 8.3) to modify the position reporting format for vessels and observers.

7.14 The Scientific Committee noted paragraph 8.6 in Annex 7, describing the results of observations of fish by-catch and cetaceans from on board krill vessels in 2010/11. It endorsed the recommendation that observers be requested to continue to photograph and retain samples of larval fish to validate identification of some fish species.

7.15 The Scientific Committee noted the recommendation of WG-FSA (Annex 7, paragraph 8.7) to constitute a task group with representation from all interested parties (including WG-FSA, WG-EMM, WG-IMAF and SCIC) to review observer sampling requirements across all fishing sectors and conservation measures. The Scientific Committee recommended that the Secretariat develop a scoping paper on this matter in the intersessional period.

7.16 The Scientific Committee noted the recommendation by WG-FSA that CM 41-01, Annex B, be revised to clarify the rate of *Dissostichus* spp. sampling required in Subareas 88.1 and 88.2 (Annex 7, paragraph 8.7i). It noted that it was a vessel’s responsibility to ensure sufficient samples were available to observers to complete their duties

as outlined in the CCAMLR Scheme of International Scientific Observation and the CCAMLR *Scientific Observers Manual*. It therefore recommended the following changes to CM 41-01:

- (i) Annex B, paragraph 5, be altered to read ‘...the vessel shall ensure that the observer has access to sufficient samples to enable all fish of each *Dissostichus* species in a haul (at a rate of 7 fish per 1 000 hooks up to a maximum of 35 fish for each species) are measured...’
- (ii) Annex A, paragraph 2, be altered to read ‘The vessel shall ensure that sufficient samples are available to ensure all data required by the CCAMLR *Scientific Observers Manual* for finfish fisheries can be collected by the on-board observers’, and the following subparagraphs (i) to (viii) be removed.

7.17 The Scientific Committee also requested that the technical coordinators ask observers to include details in their cruise reports as to the circumstances if insufficient samples are collected as required by the CCAMLR *Scientific Observers Manual*.

7.18 The Scientific Committee noted that WG-FSA had considered the way in which hook types were recorded by observers in logbooks; currently these data are not recorded in a standardised way and are difficult to interpret. WG-FSA has requested that the Secretariat change the observer logbooks to include optional fields for the following:

- hook dimensions
- instructions to take a scaled photograph of the hook.

The Scientific Committee endorsed this recommendation, and also recommended that standardisation of corresponding fields in the C2 forms be explored intersessionally.

7.19 The Scientific Committee Chair introduced SC-CAMLR-XXX/8, which presented a proposal for the implementation of the CCAMLR Observer Training Program Accreditation Scheme (COTPAS). The Scientific Committee noted that COTPAS represented significant progress in ensuring uniform high-quality data is maintained across CCAMLR observer programs. The Scientific Committee Chair thanked the co-authors of the paper for their work in significantly advancing this issue.

7.20 The Scientific Committee endorsed the proposal described in SC-CAMLR-XXX/8 but noted that some of the details required further scrutiny. The Scientific Committee requested that Members provide commentary on the details of the proposed procedure described in SC-CAMLR-XXX/8 early in the intersessional period to assist the Scientific Committee to progress this issue. It also encouraged Members to consider participating in a trial of the initial review and technical peer review (parts a–c of the proposed procedure), to enable the Scientific Committee Chair to provide a final proposal for the implementation of COTPAS at SC-CAMLR-XXXI.

CLIMATE CHANGE

8.1 Dr van Franeker presented the report of a workshop entitled ‘Antarctic Krill and Climate Change’ (SC-CAMLR-XXX/BG/3). The one-week workshop was co-sponsored by

the EU and the Netherlands on Texel Island (Netherlands) in April 2011. The intention was to bring krill specialists together from inside and outside CCAMLR to discuss krill biology under the scenario of climate change and the implications for management of krill stocks. Past and future trends in agents of climate change, such as ocean warming, sea-ice decline, and ocean acidification, and their impact on Antarctic krill and ecosystems, were reviewed.

8.2 The following conclusions were drawn by the workshop (SC-CAMLR-XXX/BG/3):

- Ocean warming: As a stenotherm, krill are unlikely to tolerate large oscillations in temperature outside -0.5° and 1°C over longer periods of time. Signs of stress will become most evident at the northern limit, such as South Georgia.
- Changing sea-ice: Changes in the structural composition and extent of sea-ice will disproportionately impact larvae and juveniles as they most strongly depend on sea-ice algae, so recruitment and immature survival are seriously compromised by climate change.
- Acidification: Embryonic development may be affected by acidification and in larvae and post-larvae somatic growth, reproduction, fitness and behaviour may be compromised.
- Circulation patterns: Expected changes in ocean circulation on the one hand, may trigger better nutrient advection and increase connectivity of krill populations and transport of larvae. On the other hand, changes in stratification may change phytoplankton composition and productivity, reducing food availability for krill, and exporting larvae out of suitable conditions. Which of these effects prevails is likely to vary considerably among regions, depending on local hydrography and bathymetry.
- Elevated UV radiation: The direct impact of UV-B on the krill population can occur through genetic damage, physiological effects or behavioural reactions. Indirect effects can arise through declines in primary productivity caused by increased UV radiation, and changes in the structure of food webs.

8.3 The workshop noted that most of the issues noted in paragraph 8.2 highlight the potential negative effects of climate change on krill.

8.4 The Scientific Committee noted the recommendation of the workshop of the need for precaution in the light of climate change and growing fisheries interest, and in particular that a group of experts from outside CCAMLR also recommended that the subdivided trigger levels for Area 48 in CM 51-07 should be maintained until better scientific information is available.

8.5 The workshop also recommended that a substantial increase in research, including CEMP, effort is needed to provide improved estimates of krill biomass and production, variability in recruitment and mortality in relation to climate change.

8.6 The Scientific Committee discussed the possibility of extending the work carried out by Atkinson et al. (2004) to determine whether the declines in krill stocks reported in that paper are continuing, given the eight years of additional survey data that have been added to the KRILLBASE database. The Scientific Committee asked the incoming Scientific

Committee Chair to contact the relevant data holders and originators and request that the database be submitted to CCAMLR and made available for work by the CCAMLR Scientific Committee under the Rules for Access and Use of CCAMLR Data.

8.7 Dr G. Milinevsky (Ukraine) expressed his gratitude to the KRILLBASE data originators for recent access to the database for his study and indicated that KRILLBASE should also be made available to oceanographers who study impacts of various parameters on krill distribution and abundance.

8.8 SC-CAMLR-XXX/BG/9 proposed that analyses of the CCAMLR fishery database be combined with available data on acoustic surveys, in order to study the distribution of fishable biomass of krill. The paper also proposed a program for providing an international survey to obtain information on the trends in distribution of krill in the Scotia Sea.

8.9 The Scientific Committee encouraged Members to develop papers on the subject of large-scale surveys to address this issue, for submission to WG-EMM.

8.10 Dr S. Iversen (Norway) informed the Scientific Committee that Norway, subject to availability of funds, is planning another krill project, including a survey with the research vessel *G.O. Sars* in 2013/14. If more vessels are made available it may be an opportunity to undertake another synoptic survey.

8.11 Dr Constable provided an update to the Scientific Committee on work being undertaken in the IMBER program on ICED. A second workshop is to be held in Hobart, Australia, from 7 to 11 May 2012, to further discuss a collective approach to the Southern Ocean Sentinel, including optimal locations for routine monitoring and places where integrated studies might be useful for this task. The expectation is that these discussions will further add to the development of the biological monitoring envisaged for SOOS (paragraphs 10.4 and 10.5) and provide the opportunity to benchmark the status of Southern Ocean ecosystems and to understand trends in status that could be used to provide the overall context for ecosystem-based fisheries management in CCAMLR.

SCIENTIFIC RESEARCH EXEMPTION

9.1 The Scientific Committee considered information regarding research undertaken and notifications received in accordance with CM 24-01. Research fishing undertaken as part of exploratory fisheries with overall catch limits greater than zero, conducted in accordance with CM 41-01, is considered under Item 3(v).

9.2 The Scientific Committee noted that WG-FSA addressed research plans to inform current or future assessments and fishing using commercial vessels and considered the advice of WG-FSA regarding research undertaken during 2010/11 and research notified for 2011/12 set out in Annex 7, paragraphs 5.1 to 5.45 and paragraphs 9.4 to 9.7.

Proposals for research fishing under CM 24-01 in closed fisheries or fisheries with zero catch limits

9.3 There were three proposals for research fishing under CM 24-01 in closed fisheries or fisheries with zero catch limits:

- in the closed *Dissostichus* spp. fisheries in Subarea 88.3 submitted by Russia (WG-FSA-11/37)
- in the closed *D. eleginoides* fishery in Divisions 58.4.4a and 58.4.4b submitted by Japan (Ob and Lena Banks) (WG-FSA-11/15 Rev. 1)
- in the closed *Dissostichus* spp. fishery in Division 58.4.3b (BANZARE Bank) submitted by Japan (WG-FSA-11/13 Rev. 1).

9.4 There was also a notification for a 10-tonne research catch in the *Dissostichus* spp. fishery in SSRU 882A (for which the catch limit is currently zero) submitted by Russia.

9.5 The Scientific Committee noted that WG-FSA had considered these proposals with reference to the principles to be followed when developing CCAMLR-sponsored research (SC-CAMLR-XXVII, paragraphs 8.9 to 8.11), and further noted that the focus topic at WG-SAM-11 had provided specific advice based on the principles to be used in evaluating plans for research in data-poor exploratory fisheries (Annex 7, paragraph 5.2).

9.6 The evaluation of the extent to which each proposal addressed the general principles for CCAMLR-sponsored research and the advice and specific recommendations provided by WG-SAM is set out in Annex 7, Table 3. Several changes were made to the research design arising from discussions in WG-FSA and the evaluation in Annex 7, Table 3, refers to the research proposal, including these changes.

Subarea 88.3 *Dissostichus* spp.

9.7 The Scientific Committee noted that the research proposed by Russia is the second year of a three-year program that was first proposed at last year's meeting.

9.8 The Scientific Committee noted the conclusion of WG-FSA that the research described in WG-FSA-11/37 was unlikely to lead to a robust estimate of stock status (Annex 7, paragraph 5.6), and provided recommendations to modify the research proposal. The Scientific Committee agreed that the research should be spatially concentrated within the area in which toothfish are most abundant and tag recaptures are most likely (i.e. SSRUs 883B–C), and that the research proposal should utilise the process outlined by Annex 5, paragraph 2.40, to estimate appropriate research catch levels. In addition, the Scientific Committee noted that the catch limit of 65 tonnes included in the proposal was inconsistent with catch rates reported in WG-FSA-11/36 and was unlikely to be caught on the 50 trotline sets proposed in the research design.

9.9 The Scientific Committee endorsed the specific advice of Annex 5, paragraph 5.6, regarding the assessment of stock biomass, the provision of additional data on the spatial distribution of tag releases in 2010/11, consideration of the likely condition of tagged fish on release and an increase in the tagging rate to 10 fish per tonne.

9.10 With respect to the proposed catch limit of 65 tonnes, Dr Bizikov noted that this was an upper limit calculated on the basis of a figure of 1 300 kg per haul, which is close to the highest catch from an individual line recorded in 2010/11, multiplied by 50 sets. Hence, it is unlikely to be realised and should be regarded not as an objective, but as an allocation sufficient to ensure that the research could be completed.

9.11 The Scientific Committee considered a revised version of the research proposal in SC-CAMLR-XXX/BG/17. The revised proposal undertook to take into account all the recommendations of WG-FSA (Annex 7, paragraph 5.6) and WG-SAM (Annex 5, paragraph 5.6), including an increase in the tagging rate to 10 fish per tonne. The Scientific Committee agreed that the research should proceed in 2011/12 on this basis.

9.12 In presenting the revised proposal, Dr Bizikov extended an invitation for scientists from other delegations to collaborate in the modelling of stock status based on the results of the research. Dr Welsford welcomed this invitation and looked forward to working on this with Russian colleagues.

9.13 In recommending that this research proceed, the Scientific Committee recalled that there is now very clear guidance from WG-SAM and WG-FSA both on the level of information expected to be submitted with proposals for CCAMLR-sponsored research, and also the procedure by which those proposals should be submitted for review by the Scientific Committee and its working groups. In particular, the Scientific Committee noted the great benefit that had been derived this year from research proposals being reviewed first by WG-SAM and subsequently being revised and resubmitted to WG-FSA. The Scientific Committee noted its recommendation for a revised format for research proposals in CM 24-01 and a revised deadline for notifications and research proposals in data-poor exploratory fisheries in CM 21-02 (paragraphs 3.137 and 3.138).

Subarea 88.2 SSRU 882A *Dissostichus* spp.

9.14 The Scientific Committee noted the review by WG-FSA of a notification from Russia for scientific research under CM 24-01 with a catch limit of up to 10 tonnes of toothfish in SSRU 882A (for which the catch limit is currently zero). No associated research proposal was submitted. The research notification states that the purpose of the research is to collect biological and spatial distribution information, but does not include an indication of how data collected during the research would be analysed and used to inform the management of the Ross Sea fishery. The Scientific Committee also noted that the results of the previous years' research fishing in the same SSRU had not been submitted for review by the Scientific Committee.

9.15 Dr Bizikov advised the Scientific Committee that the research was part of a two-year program that was presented to the Scientific Committee last year (SC-CAMLR-XXIX, paragraphs 9.13 to 9.22) and the results would be submitted to the next meeting of WG-FSA.

9.16 The Scientific Committee recalled that the process of annual review and recommendation for improvement to research proposals by WG-SAM and WG-FSA had been an important part of developing successful research and urged all Members engaged in research to participate fully in this process.

Division 58.4.4 (Ob and Lena Banks), *Dissostichus* spp.

9.17 The Scientific Committee noted the consideration by WG-FSA of the research conducted in 2010/11 in Divisions 58.4.4a and 58.4.4b (Ob and Lena Banks) and a proposal to continue the survey in 2011/12. The Scientific Committee agreed that the purpose and design of the proposed research were consistent with the advice of WG-SAM for data-poor fisheries and that the research was likely to achieve its aims, subject to the adoption of changes recommended by the Working Group (Annex 7, paragraphs 5.10 and 5.11).

9.18 The Scientific Commission endorsed the conclusions of WG-FSA with respect to the suitability of fish to be tagged, depredation, preliminary estimation of plausible biomass, target CVs for tag-based estimates and a precautionary research catch limit (Annex 7, paragraphs 5.12 to 5.22). The Scientific Committee welcomed the level of detail presented in Annex 7 regarding how this research should be conducted and how it is intended to support the development of a stock assessment for the subarea.

9.19 The Scientific Committee noted the use in CCAMLR documents of various terms to refer to factors that affect the suitability of a fish to be tagged, including 'condition', 'injury' and 'trauma' and the associated potential for confusion. 'Condition' may be confused with the relationship between fish length and weight. The aim of tagging fish in 'good condition' as required under CM 41-01, paragraph 2(ii), is to release tagged fish that have a high probability of survival and are therefore suitable for tagging. The Scientific Committee recommended that the terminology in CM 41-01, paragraph 2(ii), be modified this year to refer to tagging fish with a high probability of survival.

9.20 The Scientific Committee expressed concern over the multiple-hooking injuries and the general poor condition of toothfish caught on trotlines (Annex 7, Figure 4) and noted that it may be difficult for vessels using trotlines to achieve the required tagging rate and high tag overlap statistic while only tagging fish with a high probability of survival.

9.21 The Scientific Committee recommended that if, for particular gear types, the number of fish suitable for tagging across all size classes is insufficient to achieve a high tag overlap statistic, a greater proportion of research fishing should be conducted using alternative gear types for which multiple-hooking injury rates are lower (e.g. autoline or Spanish line).

9.22 The Scientific Committee noted that the paired deployment of mixed Spanish line and trotline sets used by the *Shinsei Maru No. 3* in 2010/11 provided valuable information to evaluate the suitability for tagging of fish caught using different gear types, and recommended that this research should be continued in 2011/12.

9.23 The Scientific Committee requested WG-FSA to consider the implications of potentially high post-capture tagging mortality of tagged fish associated with trotlines on the

time series of data on tag releases and the suitability of historical tagging data for use in assessments. The Scientific Committee recommended that the best practices for evaluating the suitability of a fish for tagging be developed intersessionally.

9.24 Information describing the ‘fate’ of tagged fish (e.g. swam away alive, attacked by predators) have been routinely recorded by CCAMLR international scientific observers since 2009. No data exists on injury status and condition relating to the likelihood of survival. The Scientific Committee noted that the analysis in Division 58.4.4 relied on detailed supplemental information on the suitability of fish for tagging recorded during the research carried out by Japan in 2011. The Scientific Committee agreed that information of this kind should continue to be collected by vessels engaged in research fishing.

9.25 The Scientific Committee agreed that there was value in maintaining a consistent survey design over time and recommended that the survey be effort-limited in 2012, deploying a total of 71 sets in an allocated spatial grid including SSRUs B–C. The Scientific Committee endorsed the proposal to deploy at least 14 mixed Spanish line/trotline sets to provide an increased number of single-hooked fish in good condition suitable for tagging. This would also provide additional data for examining the effects of different gear types on fish condition and gear selectivity.

9.26 With respect to a precautionary catch limit, the Scientific Committee noted the advice of WG-FSA that research catches up to 115 tonnes could be appropriate for this stock (Annex 7, paragraph 5.22). In 2011, using an identical survey design to that proposed for 2012, the total catch was 35.4 tonnes. The Scientific Committee recommended that the research proceed subject to the advice of WG-FSA (Annex 7, paragraphs 5.10 to 5.18) with a catch limit of 70 tonnes, noting that the actual catch is expected to be lower than this.

Division 58.4.3b (BANZARE Bank), *Dissostichus* spp.

9.27 The Scientific Committee noted the consideration by WG-FSA of the research conducted in 2010/11 in Division 58.4.3b and a proposal to continue the survey in 2011/12 (Annex 7, paragraphs 5.24 to 5.43). The Scientific Committee endorsed WG-FSA’s evaluation of performance metrics for the research undertaken in 2010/11 and the spatial design of the research to be carried out in 2011/12, as set out in Annex 7, Figure 3.

9.28 The Scientific Committee noted the discussion on the suitability of fish to be tagged (Annex 7, paragraphs 5.27 to 5.29), the issues being similar to those raised with respect to the research fishing in Division 58.4.4 (Ob and Lena Banks). Only 2.9% of the trotline-caught *D. mawsoni* on BANZARE Bank were single-hooked and in good condition and hence would be suitable for tagging under the revised tagging recommendations. Only 31% of *Dissostichus* spp. actually tagged in 2010/11 were single-hooked and in good condition. The Scientific Committee recommended that any analysis of future recaptures of tagged fish should consider their ‘trauma status’ at the time of release (Annex 7, paragraph 5.27).

9.29 The Scientific Committee recommended that Members undertaking tag-based research in data-poor exploratory fisheries under CM 24-01 be required to evaluate and report the effects of their fishing gear on fish condition and injury status and modify their research

design and/or choice of fishing gear configuration accordingly to ensure that the requirements of an effective tagging program are met. Where particular gear types are incapable of capturing sufficient fish suitable for tagging, alternate sampling tools should be used.

9.30 The Scientific Committee endorsed the advice of WG-FSA regarding the gear configuration to be used in the survey in order to achieve higher numbers of single-hooked fish suitable for tagging (Annex 7, paragraphs 5.30 to 5.32) and to test the effects of different gear configurations on the suitability of fish for tagging.

9.31 The Scientific Committee endorsed the recommendation of WG-FSA that a detailed analysis of the distribution of tags, the effect of different gear types on trauma and condition and tagging rates across the survey area be provided by Japan at next year's meeting.

9.32 The Scientific Committee noted the Working Group's conclusions with respect to a preliminary estimation of plausible biomass and a precautionary research catch limit for the research on BANZARE Bank (Annex 7, paragraphs 5.33 to 5.36).

9.33 The Scientific Committee recalled its previous discussions on the stock in Division 58.4.3b, including agreeing that:

- (i) areas of the division have been depleted by unsustainable levels of IUU fishing (SC-CAMLR-XXVI, paragraphs 4.144 and 4.145; SC-CAMLR-XXVII, paragraphs 4.145 to 4.147; SC-CAMLR-XXVIII, paragraphs 4.198 and 4.199)
- (ii) the population of fish on BANZARE Bank was primarily large spawning *D. mawsoni* (SC-CAMLR-XXVII, paragraph 4.146) and these fish were likely to originate in East Antarctica (Divisions 58.4.1 and 58.4.2) (SC-CAMLR-XXVIII, paragraphs 4.196 and 4.197).

9.34 The Scientific Committee agreed that it was difficult to provide advice on the status and trends of the stock, and the potential for a future fishery in the area until such time as available data on the current status of the stock on BANZARE Bank, historical fishing data, the results of past surveys and current research, and estimates of past and ongoing IUU removals, have been fully analysed and reviewed. It agreed that such analyses should be focused on providing estimates of the current status of the stock, and identifying the additional data needed to provide a robust stock assessment. It agreed that it would not be able to revise its future management advice until such time as these analyses have been reviewed.

9.35 The Scientific Committee recommended that, in the interim, the proposed research using the *Shinsei Maru No. 3* on BANZARE Bank proceed in 2011/12 subject to the advice of WG-FSA (Annex 7, paragraphs 5.27 to 5.32 and 5.36), limited to 48 sets as shown in Annex 7, Figure 3, with a catch limit of 40 tonnes.

9.36 Plans for research in the subsequent year should be determined following the analyses and review noted above. The Scientific Committee noted that analyses of the impacts of delaying a subsequent year of research on the recovery of tags and development of stock assessments, including the effects of expected levels of movement and mortality, would assist with planning future tag-based research in data-poor exploratory fisheries such as in Division 58.4.3b.

General advice on tag-based research in other areas

9.37 The Scientific Committee endorsed the advice of WG-FSA with respect to tag-based research (Annex 7, paragraphs 5.37 to 5.43), noting in particular:

- the general applicability of the advice provided in respect of research in Divisions 58.4.3b and 58.4.4 concerning the tagging of fish with a high probability of survival
- the differences between trotline gear configurations utilised by different vessels, and that some of these differences, e.g. numbers of hooks per bundle, bundle spacing or snood length, are likely to substantially influence the rate of multiple-hooking injury and the corresponding suitability of fish for tag and release (Annex 7, paragraph 5.39)
- the request that all vessels participating in data-poor exploratory fisheries provide detailed information from all research hauls to assess the suitability for tagging of fish caught using different gear types (Annex 7, paragraph 5.41)
- the recommendation that depredation avoidance and mitigation practices be developed as much as possible into clearly defined protocols, and that the use of a holding tank to retain tagged fish until predators are absent be considered on board vessels undertaking tag-based research in areas where depredation is known to occur (Annex 7, paragraph 5.42).

9.38 The Scientific Committee noted that several vessels have notified for participation in exploratory fisheries for *Dissostichus* spp. using trotline gear only. Using only trotlines may pose a significant challenge to these vessels meeting the requirements of tagging for the purposes of stock assessment.

9.39 The Scientific Committee recommended that the tagging requirements in CM 41-01, Annex C, be updated to require that only *single-hooked fish with a high probability of survival* be tagged and released. It also recommended operational guidance for tagging programs be developed to achieve CCAMLR's objectives in the intersessional period (Annex 7, paragraph 5.38).

Proposals for research fishing in fisheries with assessments

9.40 The Scientific Committee considered a proposal for a CCAMLR-sponsored research survey to monitor the abundance of pre-recruit *D. mawsoni* in the southern Ross Sea presented in SC-CAMLR-XXX/7, and endorsed the advice of WG-FSA regarding this proposal (Annex 7, paragraphs 5.44 and 5.45).

9.41 The Scientific Committee noted that this proposed survey design was consistent with the advice in SC-CAMLR-XXIX, paragraph 3.185, and agreed with the conclusions of WG-SAM and WG-FSA that it is likely to achieve its objectives and represented a good example of how research proposals should be reviewed by the Scientific Committee and its working groups.

9.42 The Scientific Committee endorsed the research design proposed in SC-CAMLR-XXX/7 (see also paragraphs 3.173 to 3.174) and recommended annual reporting and review of interim research results by WG-FSA.

9.43 The Scientific Committee also noted the following other notifications of scientific research activities in 2011/12 received by the Secretariat in accordance with CM 24-01, paragraph 2:

- (i) Germany: Subarea 48.1 (March–April 2012), fish research
- (ii) Chile: Subarea 48.3 (August 2012), toothfish
- (iii) UK: research survey in Subarea 48.3
- (iv) Australia: research survey in Division 58.5.2
- (v) USA: research survey for pelagic fish in Subarea 48.1.

COOPERATION WITH OTHER ORGANISATIONS

10.1 The CEP Observer to SC-CAMLR (Dr Penhale) introduced SC-CAMLR-XXX/BG/12 and noted that prior to the last CEP meeting in Argentina in June–July 2011, Uruguay hosted a two-day workshop on marine and terrestrial specially managed areas. During CEP IV and the preceding workshop, cooperation with SC-CAMLR in relation to spatial protection was highlighted as being of particular importance.

Cooperation with SCAR

10.2 The SCAR Observer to SC-CAMLR (Dr Trathan) presented three papers: CCAMLR-XXX/BG/11, BG/14 and BG/15. In relation to CCAMLR-XXX/BG/11, it was noted that the ‘Biogeographic Atlas of the Southern Ocean’ and the work of CAML had generated much scientific information. It was suggested that Russia’s work on crustaceans in the Atlantic sector could be included (paragraph 15.10). The importance of the data from CAML and the modelling of spatial distribution was an important input into the development of a representative system of MPAs.

10.3 Mr D. Delbare (Belgium) noted the utility of the SCAR-MarBIN database, but also noted that due to financial constraints, Belgium could not ensure the future financial security of the project, and urged Members to consider how this will be addressed.

10.4 The Observer from SCAR and SCOR (Dr L. Newman) presented a report on SOOS (CCAMLR-XXX/BG/13) which was launched in August 2011. The report provided an update on IPY efforts, the establishment of a multidisciplinary observation system, climate change and sea level rise. SOOS noted that an initial science plan and implementation strategy was soon to be released, and this would provide clear steps to achieve the key objectives of SOOS. Areas of overlap in relation to CEMP, as well as the Southern Ocean Sentinel project, were noted. The Scientific Committee nominated the Science Officer to be its representative on the SOOS Steering Committee.

10.5 The Scientific Committee congratulated SCAR and SCOR in relation to the establishment of SOOS noting that it provides a good source of future data and encouraged

the maintenance of strong linkages between the Scientific Committee with SOOS, including enhanced cooperation on feedback management of krill through engagement in the relevant working groups.

10.6 The SCAR Observer to SC-CAMLR introduced CCAMLR-XXX/BG/15, providing SCAR highlights and noting the fruitful interactions between CCAMLR and SCAR. Recent SCAR highlights of relevance to SC-CAMLR include: the publishing of a new strategic plan for 2011 to 2016; three new potential scientific research programs of relevance to CCAMLR; the conclusion of CAML; and a horizon scanning workshop on Antarctic conservation for the 21st century which was attended by the CCAMLR Science Officer.

10.7 The Scientific Committee noted the work of SCAR in understanding the impact of climate change state and on the status of marine ecosystems, highlighting that it is an important topic in relation to the CCAMLR performance review. It also recommended that the second SCAR ACCE update (CCAMLR-XXX/BG/13) be forwarded to WG-EMM for detailed consideration.

Report from observers from other organisations

10.8 The IWC Observer presented SC-CAMLR-XXX/BG/2 on the outcomes of the 63rd Meeting of SC-IWC. The Scientific Committee noted that:

- the current abundance estimates of Antarctic minke whales from the circum-Antarctic survey II (CP2) and circum-Antarctic survey III (CP3) were 612 000 (CP2) and 421 000 whales (CP3) respectively
- minke whales are present in the pack-ice in some numbers year-round and abundance estimates are currently being calculated, however, whether the number of minke whales present in the pack-ice is sufficient to explain the difference in minke whale abundance, remains questionable.

10.9 ASOC submitted four papers relevant to the Scientific Committee, CCAMLR-XXX/BG/19, BG/20, BG/21 and BG/23. In respect of these papers, ASOC highlighted the need for CCAMLR to:

- retain CM 51-07 to avoid the spatial concentration of krill catches
- continue to work towards 100% observer coverage of all vessels in the krill fishery as the best way to achieve systematic observer coverage
- support an expanded and developed CEMP program, including by supporting new sources of funding
- support the designation of an initial representative system of MPAs by 2012 and to support the outcomes of the MPA Workshop
- the importance of providing comprehensive protection to the Ross Sea.

10.10 The Scientific Committee thanked ASOC for its continued positive engagement in the work of CCAMLR.

Future cooperation with other international organisations

10.11 The Scientific Committee reviewed the calendar of meetings of interest to the Scientific Committee (SC-CAMLR-XXX/BG/14) and invited Members to provide reports of those meetings to its meeting next year, noting that the Secretariat's Data Manager is the current Chair of the CWP and will report from that meeting (as well as the concurrent meeting of FIRMS).

10.12 Australia informed the Scientific Committee of its intention to hold a krill workshop in 2012 (CCAMLR-XXX/BG/15).

10.13 The Chair noted the request of the Association of Responsible Krill Harvesting Companies (ARK) to attend SC-CAMLR meetings and the Scientific Committee agreed that ARK should be afforded status as an Observer in 2012.

PERFORMANCE REVIEW

CEMP Fund

11.1 Norway and the EU introduced a proposal for creating a new Special Fund for supporting CEMP sites to increase the monitoring of the Antarctic ecosystem (CCAMLR-XXX/40). The proposal is supported by a contribution from Norway of A\$100 000; the EU will also announce a contribution to this proposed fund. Norway and the EU invited other Members, particularly those participating in the krill fishery, to contribute to this fund. The Scientific Committee welcomed the proposal and its likely ability to contribute to krill management, and the contributions to the fund from Norway and, in the future, the EU.

11.2 The Scientific Committee agreed to the creation of an ad hoc CEMP Fund correspondence group and the development of terms of reference for the use of the funds. The Scientific Committee Chair, the WG-EMM Convener and the contributors to this fund will coordinate intersessionally to develop the terms of reference for this group and its composition.

11.3 It was noted that there was some overlap between the Science Capacity Fund and the proposed CEMP Fund, which could be managed more efficiently if harmonisation between the two funds and their objectives was achieved, and that this should be considered also by the correspondence group. The Secretariat noted that any amalgamation of the special funds would have to be considered by SCAF.

Scholarship Scheme

11.4 SC-CAMLR-XXIX established the CCAMLR Scientific Scholarship Scheme (SC-CAMLR-XXIX, paragraphs 15.10 to 15.13). The aim of the scheme is to contribute to capacity building within the CCAMLR scientific community and to contribute to consistent and high attendance and participation by scientists from all Members, and consistent and high-quality scientific advice being provided by the Scientific Committee.

11.5 The call for applications for the Scholarship Scheme was distributed as COMM CIRC 11/62–SC CIRC 11/29 and was also disseminated through other appropriate organisations such as SCAR and the Association of Polar Early Career Scientists (APECS).

11.6 Eight applications were received from five Members.

11.7 The Scholarship Review Panel was chaired by the senior Vice-Chair (Dr Jones) and included the other Vice-Chair of the Scientific Committee (Prof. Koubbi), the remaining conveners of the Scientific Committee's working groups (Drs Constable and Watters), two other senior members of the CCAMLR scientific community (Dr Barrera-Oro and Prof. M. Vacchi (Italy)) and the CCAMLR Science Officer (Dr Reid).

11.8 The Review Panel reviewed all applications and came to a unanimous decision that the first award of the CCAMLR Scientific Scholarship, of up to A\$30 000 over two years, should be made to Dr R. Wiff from Chile. Dr Wiff received a PhD from the University of St Andrews in 2010 and is currently working on determining the stock status of data-poor exploratory fisheries in Chile, including those for *D. eleginoides*. The panel particularly commended Dr Wiff for clearly aligning his proposal with a specific priority area of work of the Scientific Committee and with a mentor (Dr R. Mitchell, UK) who is currently actively engaged in the working group to which that work would be delivered.

11.9 The Review Panel also agreed to write to unsuccessful applicants to provide advice on the level of detail and information required and to encourage them to apply in future where appropriate.

11.10 Dr Bizikov noted that the Scientific Scholarship Scheme, from the outset, was conceived to support young scientists from Member States in the working groups of CCAMLR. Awarding one young expert during the year does not correspond with the original objectives of this scheme.

11.11 Dr Arata thanked the Review Panel and looked forward to Dr Wiff's fruitful and positive participation in the working groups and the Scientific Committee.

11.12 The Scientific Committee noted that this year the Review Panel had agreed to fund a single applicant, but that in future it may be possible to fund more than one scholarship in a given year depending on the number of suitable applicants.

11.13 In reviewing the proposals, the Review Panel agreed that the assessment of the applicants suitability had been difficult because of a lack of detail, including how the proposed research would contribute to the work of the working group. In an effort to improve this, the Panel suggested that the application form be modified to include a greater degree of

detail on the proposed science project and expected deliverables. The Panel also agreed that for the purposes of this scheme ‘early-career scientists’ would be within one year prior of the expected completion of a PhD or within five years after obtaining a PhD.

Invitation of Observers to CCAMLR working groups

11.14 At SC-CAMLR-XXIX, the WG-EMM Convener agreed to lead an intersessional discussion on the potential mechanism to facilitate Observer involvement in the working groups (SC-CAMLR-XXIX, paragraph 15.19). Dr Watters presented the suggestion that he had made at WG-EMM and the ensuing discussion at that meeting (Annex 4, paragraphs 6.4 to 6.7). WG-FSA also discussed the proposal and arrived at some suggestions for increasing transparency and communication with observer groups (Annex 7, paragraph 10.12).

11.15 Dr Watters reported that whilst there was discussion on various aspects at these two meetings, there was neither disagreement nor agreement on the proposal.

11.16 The Scientific Committee agreed to ask these two working groups to again consider the proposals, and the solutions to issues raised at the meetings and at the Scientific Committee (SC-CAMLR-XXIX, paragraph 15.19), at their meetings in 2012.

11.17 These discussions should, inter alia, include consideration of:

- (i) the relevant qualifications of individuals who might participate in working group meetings on behalf of Observers, noting that fishing industry representatives have provided important insight on the operation of fisheries and that relevant expertise does not necessarily correspond with an individual’s academic qualifications
- (ii) minimum standards for allowing their participation in the meetings, such as authoring of a paper submitted for the discussion by one of the working groups, and its presentation during a meeting of the group, as proof of their interest and expertise on the matters being discussed
- (iii) mechanisms to ensure confidentiality, including mechanisms to ensure that Members can have private discussions as needed.

11.18 The Scientific Committee also noted that WG-EMM (Annex 4, paragraph 6.7) and WG-FSA (Annex 7, paragraph 10.12) gave further consideration to alternative ways of enhancing transparency and communication with observer groups and audiences outside the CCAMLR community more broadly (e.g. the public and the media). While the Secretariat may be able to play an increased role in such communication (e.g. as per suggestions in CCAMLR-XXX/8), the Scientific Committee agreed that this should be carefully considered in the light of the other priorities set for the Secretariat. It was recognised that, if Members’ participants from the working groups engage in outreach and communications, it would be useful for the Secretariat to provide standard material for these activities.

BUDGET FOR 2012 AND FORECAST BUDGET FOR 2013

12.1 The Scientific Committee noted that the provision of technical and logistic support for meetings of the Scientific Committee and its working groups is part of the central role of the Secretariat and, as such, is funded from the Commission's General Fund (e.g. attendance of staff at meetings, production and translation of reports), and the Executive Secretary manages the allocation of resources in this fund to ensure the provision of adequate support for intersessional activities. The Scientific Committee also noted that the implementation of the accounting changes initiated by the Secretariat in 2010 has resulted in a change in the way that the cost of staff support to meetings in Hobart is allocated in the accounts.

12.2 The Scientific Committee agreed to focus its budget discussion on consideration of Special Funds of relevance to the work of the Scientific Committee, as well as identifying projects requiring additional funds from the Commission.

12.3 The Scientific Committee agreed to the following expenditures:

- a two-year scientific scholarship funded from the General Science Capacity Special Fund (up to A\$30 000 over two years, starting in 2012)
- participation costs for invited experts and Secretariat staff at the technical workshops on MPAs, funded from the MPA Special Fund and following consultation with the MPA Special Fund correspondence group (Circumpolar SCP Workshop in Brussels, Belgium, in April–May 2012 – approximately A\$25 000; del Cano–Crozet Workshop in 2012 – approximately A\$20 000; Western Antarctic Peninsula–South Scotia Arc Workshop in early 2012 – approximately A\$14 000).

12.4 The Scientific Committee endorsed the following expenditures under the General Fund:

- translation of the tagging protocol into the languages commonly spoken on board fishing vessels in exploratory fisheries (approximately seven languages – A\$2 000)
- translation into English, where required, of research plans in exploratory fishery notifications in order for the working groups to fully consider the information provided
- participation costs for external experts on the review panel of COTPAS (up to A\$10 000).

ADVICE TO SCIC AND SCAF

13.1 The Chair transmitted the Scientific Committee's advice to SCIC and SCAF during the meeting. The advice to SCAF is summarised in section 12. The advice to SCIC was derived from the Scientific Committee's consideration of information provided by WG-EMM, WG-FSA and WG-IMAF.

SECRETARIAT SUPPORTED ACTIVITIES

Review of the Secretariat's Strategic Plan and data management systems

14.1 The Scientific Committee noted the review of the Secretariat's Strategic Plan (CCAMLR-XXX/8), and the advice from WG-EMM (Annex 4, paragraph 6.3), WG-FSA (Annex 7, paragraph 10.4) and WG-SAM (Annex 5, paragraph 6.5). The Scientific Committee agreed that it would not comment on the revised plan given that this matter was being reviewed concurrently by SCAF.

14.2 The Scientific Committee also noted the outcomes of the independent review of the Secretariat's data management systems (CCAMLR-XXX/5) and associated work in 2011 on the redevelopment of the Secretariat's document archive, development of an Enterprise Data Model and redevelopment of the CCAMLR website. The Scientific Committee also noted the Secretariat's plan for further work in 2012 and 2013.

Data Centre

14.3 The Scientific Committee noted the Data Centre's activities in 2010/11 and measures taken to maintain the integrity of CCAMLR data (SC-CAMLR-XXX/BG/8). It also noted the growing need for developing the Secretariat's capacity for storing, displaying and analysing spatial data, including digital maps of VMEs (CM 22-06) and the requirements identified by WG-EMM (Annex 4, paragraph 2.101) and WS-MPA (Annex 6, paragraph 2.5).

14.4 The Secretariat is currently working with the British Antarctic Survey (BAS) to identify CCAMLR's mapping requirements and their potential delivery, including consideration of a GIS tool for use by Members and a standard protocol for the submission of GIS data. The Scientific Committee thanked BAS for this collaboration.

14.5 The Scientific Committee endorsed the development of the Secretariat's capacity for handling and analysing spatial data, and encouraged Members participating in spatial analysis to contribute data to the Secretariat's GIS database once established. The Scientific Committee agreed that the availability of the data underlying spatial analysis reported at meetings would further assist in the development of advice on MPAs and the impacts of bottom fishing.

14.6 The Scientific Committee noted that during a recent scientific collaboration between two Members, each collaborating Member submitted a data request in order to gain access to a common set of CCAMLR data. In order to facilitate such collaboration in the future, the Scientific Committee agreed that data released to one Member under the Rules for Access and Use of CCAMLR Data may be forwarded by that Member to other nominated Members collaborating on the project team.

Publications

14.7 The following documents were published in 2011 in support of the Scientific Committee's work:

- (i) *Report of the Twenty-ninth Meeting of the Scientific Committee*
- (ii) *CCAMLR Science*, Volume 18
- (iii) *Statistical Bulletin*, Volume 23.

14.8 In 2011, papers published in Volume 18 of the journal were publicly available on the CCAMLR website immediately following approval of the proof by the primary author. All subscribers were notified of the availability of the 2011 volume once the final paper was posted. The hard copy of Volume 18 will be distributed in November 2011.

14.9 In 2011, *CCAMLR Science* had a five-year impact factor of 1.196 and an Article Influence of 0.529 and these scores were ranked 29th and 18th respectively out of the 46 journals in the Fisheries subject category in Thomson Reuters *Journal Citation Reports*, Science Edition.

14.10 The Scientific Committee thanked the authors and reviewers for their outstanding contributions to the journal, and the Secretariat's editorial team for maintaining the high publication standards.

14.11 The Scientific Committee also thanked the Secretariat for developing a new searchable document archive which was trialled during the meeting, and for the use of USB memory sticks which provided access to documents and related updates during the meeting. These developments had further reduced the amount of paper used at the meeting.

14.12 The Scientific Committee endorsed the proposal to simplify the permission system used for the CCAMLR website (CCAMLR-XXX/41). The new system would provide a single sign-on method, and would be role-based with roles able to be set to expire annually, or at a pre-set time.

SCIENTIFIC COMMITTEE ACTIVITIES

Priorities for the work of the Scientific Committee and its working groups

15.1 The Scientific Committee noted that WG-SAM was originally intended to provide a forum for quantitative experts to discuss technical quantitative matters and provide advice to other CCAMLR working groups (primarily WG-FSA, but also WG-EMM and SG-ASAM) or to the Scientific Committee regarding new statistical methods or stock assessment modelling frameworks. With the development in recent years of established and agreed stock assessment model frameworks for use in many CCAMLR fisheries, the work of WG-SAM to undertake statistical review of new modelling methods may no longer be required on an annual basis.

15.2 The Scientific Committee considered the following four options for scheduling the work of WG-SAM: (i) that the work of WG-SAM be absorbed into WG-FSA; (ii) that the status quo of annual mid-year meetings be retained; (iii) that the periodicity of the WG-SAM meetings be adjusted to reflect a reduced workload, e.g. meeting every second year; (iv) that WG-SAM be organised on a more ad hoc basis as needed, similar to the current arrangement for SG-ASAM. The Scientific Committee agreed that the first option was not desirable because it was often necessary that WG-SAM provide its advice well in advance of WG-FSA. The Scientific Committee agreed that with regard to the frequency of the meetings, options (iii) or (iv) were preferred, but that if the terms of reference for WG-SAM were

expanded to include consideration of more diverse focus topics, then in practice WG-SAM would likely occur on an annual or near-annual basis, given the number of suitable topics already identified and likely to arise in future.

15.3 The Scientific Committee agreed that the terms of reference for WG-SAM should be modified to allow consideration of a wider range of focus topics identified as required on an annual basis to inform the work of CCAMLR, that the evaluation of research plans should be a standing item on the agenda every year, and that WG-SAM should also continue to provide advice as required on quantitative and statistical matters consistent with its original terms of reference.

15.4 If the requirement to submit research proposals in notifications for exploratory fisheries is adopted, then the Scientific Committee noted that there was likely to be a number of research proposals to be reviewed during its intersessional meetings in July and again in October. The Scientific Committee also noted the increasing reliance of the assessments of *Dissostichus* spp. on tagging programs throughout the Convention Area. Given this increased emphasis on tagging, it agreed that it was timely to have a focus topic on tagging, which could include implementation of the tagging program, alternative tagging technologies, experiments to examine tag mortality and tag detectability, tag-based stock assessment issues, review of tagging protocols, and development and provision of a training module for vessel operators. The Scientific Committee recommended this be a focus topic during its intersessional meetings in July 2012.

15.5 In considering the priorities for the work of the working groups (Table 6) the Scientific Committee agreed that the priority items were feedback management of krill, research proposals for data-poor exploratory fisheries and MPAs. It also noted:

- (i) the utility of analyses of krill CPUE and acoustic data series in Area 48
- (ii) the evaluation of potential factors affecting the recovery of depleted stocks and whether any current management activities could impede the recovery of such stocks
- (iii) the removal of climate change from Table 6 reflects the need to consider this issue as a component of a range of issues, rather than simply as a stand-alone item.

Intersessional activities during 2010/11

15.6 The Scientific Committee considered the requirements for conveners of working groups, noting advice from WG-EMM (Annex 4, paragraph 6.11), WG-SAM (Annex 5, paragraph 8.3) and WG-FSA (Annex 7, paragraph 13.2).

15.7 The Scientific Committee welcomed Dr Belchier as the new Convener of WG-FSA, and Dr Hanchet as the new Convener of WG-SAM, and Dr Kawaguchi as the new Co-convener of WG-EMM in 2012.

15.8 The Scientific Committee noted the request from the MPA Workshop for three workshops in 2012 (paragraph 5.20) and welcomed the offers to host technical workshops from:

- Chile and Argentina in respect of the Western Antarctic Peninsula–South Scotia Arc domain (domain 1)
- France in respect of the del Cano–Crozet domain (domain 5)
- Belgium in respect of the circumpolar SCP.

15.9 The Scientific Committee agreed that the MPA Special Fund correspondence group should review the terms of reference and organisation of these technical workshops and that outputs of these technical workshops be presented to WG-EMM in order to facilitate broader engagement in the provision of advice to the Scientific Committee.

15.10 Dr Bizikov informed the Scientific Committee of the preparation by Russian scientists of a field identification guide to Decapod crustaceans in the Atlantic Sector of Antarctica. The Scientific Committee encouraged Russia to submit a translated final version to the technical workshop on MPA planning in domain 1 (West Antarctic Peninsula and the South Scotia Arc) to be held in 2012.

15.11 The Scientific Committee agreed to the following meetings in the 2011/12 intersessional period:

- SG-ASAM (Bergen, Norway, April/May 2012) (Co-conveners: Drs R. Korneliussen (Norway) and J. Watkins (UK))
- WG-SAM (Tenerife, Spain, July) (Convener: Dr Hanchet)
- WG-EMM (Tenerife, Spain, July) (Co-conveners: Drs Watters and Kawaguchi)
- WG-FSA (CCAMLR Headquarters, Hobart, Australia, from 8 to 19 October 2012) (Convener: Dr Belchier).

15.12 The Scientific Committee recalled the discussion in SC-CAMLR-XXIV, paragraphs 13.1 to 13.11, on reorganising the working groups of the Scientific Committee and suggested that there may be benefit in considering this issue in the light of the current workload experienced by the Committee and its working groups. The Scientific Committee recognised that there were a number of issues to consider in changing the current structure and timing of its intersessional meeting and agreed to put this item on the agenda of WG-EMM, WG-FSA and the Scientific Committee next year.

15.13 Dr Constable undertook to consult with Members intersessionally and to prepare a paper on potential alternative arrangements for intersessional meetings that would facilitate greater engagement and would also allow better consideration of issues related to ecology, biology and conservation.

15.14 Dr Barrera-Oro emphasised that in identifying priority items for future work, it was essential that important issues related to the functioning of the Antarctic marine ecosystem were not neglected. In particular, he noted the importance of fish-centric ecosystem interactions, noting that these had not been considered in the working groups for the past three years.

15.15 The Scientific Committee agreed that the reports of its meeting and of its working groups need to accurately reflect the range of important and complex issues under consideration and that it was timely to review the instructions and processes required to ensure that all rapporteurs are able to use a consistent style. The incoming Scientific

Committee Chair agreed to prepare a paper in the intersessional period, in consultation with Scientific Committee representatives, in order to develop a set of style guidelines and protocols, including, for example, instruction on the use of personal rather than Member attribution of statements.

Invitation of Observers to the next meeting

15.16 The Scientific Committee agreed that all Observers invited to the 2011 meeting would be invited to participate in SC-CAMLR-XXXI.

Invitation of experts to the meetings of working groups

15.17 The Scientific Committee agreed that, where appropriate experts were identified, that these could be invited to participate in working groups and subgroups through consultation with the conveners of those meetings and the Secretariat in respect of budgetary matters.

ELECTION OF CHAIR AND VICE-CHAIR

16.1 Dr Agnew's term as Chair ended with SC-CAMLR-XXX and the Scientific Committee sought nominations for a new Chair. Dr E. Marschoff (Argentina) nominated Dr Jones and this nomination was seconded by Dr Constable. Dr Jones was unanimously elected to the position for a term of two regular meetings and the Scientific Committee extended a very warm welcome to the incoming Chair.

16.2 Dr Jones' term as Vice-Chair also ended with this meeting and the Scientific Committee sought nominations for a new Vice-Chair. Dr Koubbi nominated Dr Zhao and this nomination was seconded by Mr L. López Abellán (Spain). Dr Zhao was unanimously elected to the position for a term of two regular meetings (2012 and 2013). A very warm welcome was extended to the incoming Vice-Chair.

OTHER BUSINESS

17.1 Prof. Duhamel informed the Scientific Committee that a publication arising from a Symposium on the Ecosystem and Fisheries of the Kerguelen Plateau, held from 14 to 16 April 2010 in Concarneau, France (SC-CAMLR-XXVIII, paragraph 9.42), has now been published and copies are available on request from Dr Welsford.

17.2 Dr Barrera-Oro informed the Scientific Committee that Argentina will conduct a second consecutive research cruise on krill larvae on board the oceanographic vessel *Puerto Deseado* to the South Orkney Islands and Weddell–Scotia region from 20 January to 8 March 2012 (SC-CAMLR-XXX/BG/16).

ADOPTION OF THE REPORT

18.1 The report of the Thirtieth meeting of the Scientific Committee was adopted.

CLOSE OF THE MEETING

19.1 The close of the meeting completed Dr Agnew's term as Chair of the Scientific Committee.

19.2 In closing the meeting, Dr Agnew thanked the conveners of the working groups and all meeting participants for their expert contributions to the work of the Scientific Committee. He recalled the concerns expressed in 2008 by the Scientific Committee and the Performance Review Panel at the declining levels of participation in the Scientific Committee and its working groups (SC-CAMLR-XXVII, paragraphs 16.5 to 16.8). Since that time the Scientific Committee has successfully introduced a range of measures to address this situation, including practices to facilitate capacity such as mentoring of new working group attendees, widening the responsibility for rapporteuring and engagement of participants not having English as a first language, joint research activities, and the development of the CCAMLR Scholarship Scheme, made possible by the establishment of the General Science Capacity Fund. Dr Agnew was pleased to report that although more effort will continue to be needed, there is evidence that these measures are working to increase participation by individual scientists and by Members in the work of the Scientific Committee. For example, in 2007, 27 scientists from 10 Members attended WG-EMM, and a total of 133 papers were produced for the combined subsidiary groups of the Committee; in 2011 these numbers were 44, 14 and 196 respectively.

19.3 Dr Agnew thanked the Secretariat, interpreters and meeting services for supporting the meeting of the Scientific Committee. These collective efforts had contributed to another successful meeting. Dr Agnew also thanked Drs Constable (outgoing Convener of WG-SAM) and Jones (outgoing Convener of WG-FSA) for their scientific leadership.

19.4 Dr Constable and Mr A. Wright (Executive Secretary), on behalf of the Scientific Committee, thanked Dr Agnew for his expertise in chairing the Committee's deliberations, and for guiding a busy and productive meeting. The Scientific Committee recognised Dr Agnew's long-standing involvement in CCAMLR, from his work as the Secretariat's Data Manager (1989–1996) to his role as Chair of the Scientific Committee. Dr Agnew has been instrumental in developing and guiding the work of the Scientific Committee and the Commission, as well as the Antarctic Treaty System.

19.5 Mr Wright presented Dr Agnew with a gavel in commemoration of his time in the Chair.

REFERENCES

Atkinson, A., V. Siegel, E. Pakhomov and P. Rothery. 2004. Long-term decline in krill stock and increase in salps within the Southern Ocean. *Nature*, 432: 100–103.

Table 1: Catches (tonnes) of target species reported in 2009/10 (December 2009 to November 2010) (source: STATLANT data). All catches shown for Divisions 58.4.3b and 58.4.4 resulted from research fishing.

Species	Country	Subarea or division																	Total
		48.1	48.2	48.3	48.4	48.6	58.4.1	58.4.2	58.4.3a	58.4.3b	58.4.4a	58.4.4b	58.5.1	58.5.2	58.6	58.7	88.1	88.2	
Icefish	Australia													352					352
<i>Champscephalus gunnari</i>	Chile			1															1
	UK			11															11
Total (icefish)		0	0	12	0	0	0	0	0	0	0	0	0	352	0	0	0	0	364
Toothfish	Australia													2 459					2 459
<i>Dissostichus eleginoides</i>	Chile			351															351
	EU – Spain			648															648
	France											4 912		663					5 575
	Japan					10	2			2	9	50							73
	Korea					39													39
	New Zealand			336	27												<1		363
	South Africa			175										77	72				325
	UK			864	31														894
	Uruguay			145															145
<i>Dissostichus mawsoni</i>	Argentina																30	8	38
	China	<1*																	<1*
	EU – Spain																309	42	352
	Japan					184	86			12									282
	Korea					159	108	93									789		1 148
	New Zealand				31												1 310		1 341
	Russia		<1*																<1*
	UK				26												200	259	484
Total (toothfish)		<1*	<1*	2 519	114	392	196	93	0	14	9	50	4 912	2 459	741	72	2 639	309	14 518

(continued)

Table 1 (continued)

Species	Country	Subarea or division																Total	
		48.1	48.2	48.3	48.4	48.6	58.4.1	58.4.2	58.4.3a	58.4.3b	58.4.4a	58.4.4b	58.5.1	58.5.2	58.6	58.7	88.1		88.2
Krill <i>Euphausia superba</i>	China	67	1 879																1 946
	EU – Poland	6 605	390																6 995
	Japan	28 924	995																29 919
	Korea	41 863	3 784																45 648
	Norway	75 803	34 886	8 712															119 401
	Russia		8 065																8 065
Total (krill)		153 262	49 999	8 712	0	0	0	0	0	0	0	0	0	0	0	0	0	0	211 974
Crab <i>Paralomis</i> spp.	Australia												0						<1*
	EU – Spain			<1*														<1*	<1*
	Japan					<1*				<1*	<1*								<1*
	Korea					<1*													<1*
	New Zealand			<1*	<1*													<1*	<1*
	Russia			62															62
	South Africa														<1*				<1*
	UK			<1*															<1*
	Uruguay			<1*															<1*
Total (crab)		0	0	62	<1*	<1*	0	0	0	0	<1*	<1*	0	0	<1*	0	<1*	<1*	62

* Taken as by-catch

Table 2: Preliminary total catch (tonnes) of target species reported in 2010/11 (source: catch and effort reports unless indicated otherwise). Note: The season started on 1 December 2010 and closes on 30 November 2011, and catches are those reported to the Secretariat to 24 September 2011, unless indicated otherwise. All catches shown in Divisions 58.4.3b and 58.4.4 and Subareas 88.2 (SSRU A) and 88.3 resulted from research fishing.

Species	Country	Subarea or division																		Total	
		48.1	48.2	48.3	48.4	48.6	58.4.1	58.4.2	58.4.3a	58.4.3b	58.4.4a	58.4.4b	58.5.1	58.5.2	58.6	58.7	88.1	88.2	88.3		
Icefish <i>Champscephalus gunnari</i>	Australia													1						1	
	China		<1*																	<1*	
	Korea	<1*	<1*																	<1*	
	Norway		<1*																	<1*	
	UK			10																10	
Total (icefish)		<1*	<1*	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	11	
Toothfish <i>Dissostichus eleginoides</i>	Australia													1 614						1 614	
	Chile			272																272	
	EU – Spain						0										0			0	
	France**												2 906		551					3 457	
	Japan					0		4	2		35									41	
	Korea					11											1			12	
	New Zealand			383	19												0			402	
	Russia																1			1	
	South Africa						22								34	51				107	
	UK			1 119	20															1 139	
	Uruguay			14																14	
	<i>Dissostichus mawsoni</i>	China		<1*																<1*	
		EU – Spain						75										427			502
		Japan					197			8											205
		Korea					156	141	136									721	76		1 230
		New Zealand			0	5												889	244		1 137
		Russia															318	122	5		445
		South Africa						6													6
		UK				10												525	120		655
		Uruguay																	13		13
Total (toothfish)			0	0	1 788	54	393	216	136	4	11	0	35	2 906	1 614	585	51	2 882	576	5	11 254

(continued)

Table 2 (continued)

Species	Country	Subarea or division																		Total
		48.1	48.2	48.3	48.4	48.6	58.4.1	58.4.2	58.4.3a	58.4.3b	58.4.4a	58.4.4b	58.5.1	58.5.2	58.6	58.7	88.1	88.2	88.3	
Krill	Chile		13	1 799																1 811
<i>Euphausia superba</i>	China	2 088	13 932																	16 020
	EU – Poland	489	2 555																	3 044
	Japan	222	19 467	6 701																26 390
	Korea	4 999	17 615	6 439																29 052
	Norway	1 360	62 971	38 483																10 2815
	UK			<1*																<1*
Total (krill)		9 158	116 552	53 421	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17 9131
Crab	Australia													<1*						<1*
<i>Paralomis</i> spp.	Chile			<1*																<1*
	Japan										<1*									<1*
	New Zealand			<1*													<1*	<1*		<1*
	Russia																	<1*	<1*	<1*
	UK			<1*	<1*													<1*		<1*
	Uruguay			<1*																<1*
Total (crab)		0	0	<1*	<1*	0	0	0	0	0	0	<1*	0	<1*	0	0	<1*	<1*	<1*	<1*

* Taken as by-catch

** Catch reported in fine-scale data to 12 August 2011

Table 3: Information provided in the notifications for krill fisheries in 2011/12.

Member	Vessel	Expected level of krill catch (tonnes)	Months during which fishing has been notified												Subareas and/or divisions where fishing has been notified						
			2011	2012											Subarea				Division		
			Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	48.1	48.2	48.3	48.4	58.4.1	58.4.2	
Chile ^a	<i>Betanzos</i>	20 000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
China	<i>An Xing Hai</i>	15 000	x	x	x	x	x	x	x	x	x	x			x	x	x				
	<i>Kai Li</i>	11 000	x	x	x	x	x	x	x	x	x	x			x	x	x				
	<i>Kai Xin</i>	18 000	x	x	x	x	x	x	x	x	x	x			x	x	x				
	<i>Kai Yu</i>	11 000	x	x	x	x	x	x	x	x	x	x			x	x	x				
	<i>Lian Xing Hai</i>	15 000	x	x	x	x	x	x	x	x	x	x			x	x	x				
Japan	<i>Fukuei Maru</i>	30 000		x	x	x	x	x	x	x	x			x	x	x					
Korea	<i>Dongsan Ho</i>	37 000			x	x	x	x	x	x	x		x	x	x	x	x				
	<i>Insung Ho</i>	12 000			x	x	x	x	x	x	x			x	x	x					
	<i>Kwang Ja Ho</i>	18 000			x	x	x	x	x	x	x			x	x	x					
Norway	<i>Juvel</i>	50 000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
	<i>Saga Sea</i>	65 000	x	x	x	x	x	x	x	x	x	x	x		x	x	x		x		
	<i>Thorshøydi</i>	60 000	x	x	x	x	x	x	x	x	x	x			x	x	x				
Poland ^b	<i>Dalmor II</i>	9 000			x	x	x	x	x	x	x			x	x	x					
Ukraine ^c	<i>Maksim Starostin</i>	30 000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x		
Total	15 vessels	401 000	10	11	15	15	15	15	15	15	15	15	6	5	4	15	15	15	3	0	0

^a Chile withdrew its notification for the vessel 'to be announced'.

^b Poland has indicated that the *Dalmor II* may be replaced by another vessel.

^c Ukraine submitted a late notification (SC-CAMLR-XXX/BG/13).

Table 4: Number of sets, *Dissostichus* catch and mean CPUE in fishable depths (600–1 800 m) over the previous three seasons (2008/09 to 2010/11) inside and outside proposed research areas. FSR – fine-scale rectangle.

Subarea/ division	SSRU	Inside research area					Outside research area			
		Number FSRs	Total number sets	Number research sets	% Research sets	Catch (tonnes)	CPUE (tonnes/set)	Total number sets	Catch (tonnes)	CPUE (tonnes/set)
48.6	486A	11	94	18	19	42	0.4	12	4	0.4
	486B	4	27	8	30	95	3.5	5	9	1.8
	486C	5	49	7	14	92	1.9	0	0	-
	486D	3	38	8	21	96	2.5	1	0	0.4
	486E	3	42	17	40	249	5.9	5	29	5.9
	486G	21	350	55	16	419	1.2	12	2	0.2
58.4.1	5841C	11	219	42	19	302	1.4	5	2	0.4
	5841E	5	44	11	25	135	3.1	6	18	2.9
	5841G	12	267	24	9	159	0.6	4	6	1.4
58.4.2	5842A	1	3	3	100	22	7.5	7	36	5.1
	5842E	8	99	34	34	236	2.4	2	1	0.3
58.4.3a	5843aA	7	64	16	25	34	0.5	4	1	0.2

Table 5: Proposed format for research proposals submitted in accordance with CM 24-01, paragraph 3.

Category	Information
1. Main objective	(a) Objectives for the research and why it is a priority for CCAMLR. (b) Detailed description of how the proposed research will meet the objectives, including annual research goals (where applicable). (c) Rationale for research, including relevant existing information on the target species from this region, and information from other fisheries in the region or similar fisheries elsewhere.
2. Fishery operations	(a) Fishing Member (b) Vessel to be used: <ul style="list-style-type: none"> • Vessel name • Vessel owner • Vessel type (research or commercial vessel) • Port of registration and registration number • Radio call sign • Overall length and tonnage • Equipment used for determining position • Fishing capacity • Fishing processing and storage capacity (c) Target species (d) Fishing or acoustic gear to be used: <ul style="list-style-type: none"> • Trawl type; mesh shape and size • Longline type • Other sampling gear • Type of acoustic gear and frequency (e) Fishing regions (divisions, subareas and SSRUs) and geographical boundaries (f) Estimated dates of entering and leaving CAMLR Convention Area.
3. Survey design, data collection and data analysis	(a) Research survey/fishing design (description and rationale): <ul style="list-style-type: none"> • Spatial arrangements of stations/hauls (random or semi-random) • Stratification according to e.g. depth or fish density • Calibration/standardisation of sampling gear • Proposed number and duration of stations/hauls • Other requirements (e.g. tagging rates) • How will performance metrics be achieved? (e.g. tag overlap statistics for tagging program) (b) Data collection: types and sample size or quantities of catch, effort and related biological, ecological and environmental data (e.g. sample size by location/haul) (c) Methods for data analysis (description of methods by data types detailed in (b)). (d) How and when will the data meet the objectives of the research (e.g. lead to a robust estimate of stock status and precautionary catch limits). Include evidence that the proposed methods are highly likely to be successful.
4. Proposed catch limits	(a) Proposed catch limits and justification. (Note that the catch limits should be at a level not substantially above that necessary to obtain the information specified in the research plans and required to meet the objectives of the proposed research.) (b) Evaluation of the impact of the proposed catch on stock status: <ul style="list-style-type: none"> • Rationale that proposed catch limits are consistent with Article II of the Convention • Evaluation of time scales involved in determining the responses of harvested, dependent and related populations to fishing activities. • Information on estimated removals, including IUU activities. (c) Details of dependent and related species and the likelihood of their being affected by the proposed fishery

(continued)

Table 5 (continued)

Category	Information
5. Research capability	<p>(a) Name(s) and address of the chief scientist(s) responsible for planning and coordinating the research</p> <p>(b) Number of scientists and crew to be on board the vessel</p> <p>(c) Is there opportunity for inviting scientists from other Members? If so, indicate a number of such scientists.</p> <p>(d) Evidence that the proposed fishing vessels and nominated research providers have the resources and capability to fulfil all obligations of the proposed research plan.</p>
6. Reporting for evaluation and review	<p>(a) List of dates by which specific actions will be completed and reported to CCAMLR. If the research is a stand-alone survey, Members shall commit to providing a progress report to WG-FSA and/or WG-EMM for review and comment and a final report within 12 months of completion of the research to the Scientific Committee.</p> <p>(b) If research is multi-annual, Members shall commit to providing annual research reviews to be submitted to WG-FSA and/or WG-EMM, including review of progress towards meeting research objectives and associated proposed time lines in initial proposal, and proposals for adjustments to the research proposal if required.</p>

Table 6: Indicative program of work for the Scientific Committee for the next three years. Where items of work will contribute towards completion of the Performance Review recommendations, this is indicated. The year in which issues will be addressed is indicated by an 'x' and the group which will be responsible for undertaking the work is indicated in the final column.

	PRP report	2012	2013	2014	Work by
Krill					
Analysis of fisheries data		x	x	x	EMM
Feedback management	3.1.2.2, 3.1, 3.2.6	1–2	3–4	5–6	EMM (SAM 2014)
Recruitment variation, B_0		x	x		EMM
Fishing vessel survey		x		x	EMM/ASAM
Catch monitoring, escape mortality, green weight	3.3.4.2, 3.3.4.3		x		EMM
CEMP review and STAPP	3.1.2.2, 3.1.2.3, 3.1.3.2.6, 3.1.3.2.7, 3.2.1.4	x	x	x	EMM
Krill observer scheme		x	x		EMM
Fish					
Biennial assessments			x		FSA/SAM
Other assessments 48.4, 58.5.1		x	x	x	FSA
By-catch	3.1.3.2.1, 3.1.3.2.2	x		x	FSA
Data-poor fisheries	3.1.1.2, 3.1.1.3	x	x	x	FSA/SAM*
Depleted/recovering stocks	3.1.1.1	x		x	FSA
Biology and ecology and fish-based ecosystem interactions		x	x	x	FSA/EMM
Tagging program		x		x	FSA/SAM*
MPA	2.4.3.1, 2.4.3.2				
MPA issues		x		x	EMM†
Observers					
Accreditation	3.3.4.1	x	x	x	COTPAS
Observer scheme review	3.3.4.2		x		
VME					
Outstanding future work (SC-CAMLR-XXIX, Annex 8, paragraph 9.37)		x			FSA
Modelling			x		SAM
CM 22-06		x	x	x	EMM
Review and update of impact assessments		x	x	x	FSA
Method assessment for all bottom methods			x		FSA

* Potential focus topic for SAM in 2012 noting the potentially revised role of SAM (paragraph 2.5). The numbers in 'Feedback management' refer to the milestones in paragraph 3.33.

† Technical workshops during 2012

2012 SG-ASAM 1 week in April/May
 SAM or * 1 week prior to, or following, EMM
 EMM 2 weeks (early July)
 FSA 2 weeks

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- CCAMLR-XXX/BG/33 Report of the IWC Observer from the 63rd Annual Meeting of the IWC, 3–14 July 2011, St Helier, Jersey, UK
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- CCAMLR-XXX/BG/39 Report from the CCAMLR Observer to the Meeting of the Extended Commission for the 18th Annual Session of the Commission for the Conservation of Southern Bluefin Tuna (10–13 October 2011, Bali, Indonesia)
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- CCAMLR-XXX/BG/40 Report on VMS data for the *Yangzi Hua 44* (Ex *Paloma V, Trosky*)
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- CCAMLR-XXX/BG/42 Observer's Report from the Seventh Session of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean
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- CCAMLR-XXX/BG/43 New and revised conservation measures recommended by SCIC for adoption by the Commission

CCAMLR-XXX/BG/44 Proposals for new and revised conservation measures forwarded by SCIC to the Commission for further consideration

CCAMLR-XXX/BG/45 Conservation measures revised in accordance with the advice from the Scientific Committee

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K. Vyshniakova (Ukraine)

WG-FSA-11/32 The Ross Sea toothfish fishery: proposal for conditional transition of classification from exploratory to established
C. Jones (USA) and S. Hanchet (New Zealand)

WG-FSA-11/41 By-catch observation during krill fishing cruise (48.1, 48.2 Statistical Subareas, 2011)
K. Vyshniakova (Ukraine)

**AGENDA FOR THE THIRTIETH MEETING
OF THE SCIENTIFIC COMMITTEE**

**AGENDA FOR THE THIRTIETH MEETING
OF THE SCIENTIFIC COMMITTEE**

1. Opening of meeting
 - (i) Adoption of agenda
 - (ii) Chair's Report

2. Advances in statistics, assessments, modelling, acoustics and survey methods
 - (i) Statistics, assessments and modelling
 - (ii) Acoustic survey and analysis methods
 - (iii) Advice to Commission

3. Harvested species
 - (i) Krill resources
 - (a) Status and trends
 - (b) Ecosystem effects of krill fishing
 - (c) Advice to Commission

 - (ii) Fish resources
 - (a) Status and trends
 - (b) WG-FSA advice
 - (c) Advice to Commission

 - (iii) Crab resources
 - (a) Status and trends
 - (b) WG-FSA advice
 - (c) Advice to Commission

 - (iv) Fish and invertebrate by-catch
 - (a) Status and trends
 - (b) WG-FSA advice

 - (v) New and exploratory finfish fisheries
 - (a) New and exploratory fisheries in 2010/11 season
 - (b) Notifications for new and exploratory fisheries in 2011/12 season
 - (c) Advice to Commission

4. Incidental mortality arising from fishing operations
 - (i) Marine debris
 - (ii) Incidental mortality of seabirds and marine mammals associated with fisheries
 - (iii) Future consideration of incidental mortality of seabirds and marine mammals associated with fisheries
 - (iv) Advice to Commission

5. Spatial management of impacts on the Antarctic ecosystem
 - (i) Bottom fishing and vulnerable marine ecosystems
 - (a) Status and trends
 - (b) Advice to Commission
 - (ii) Marine Protected Areas
 - (a) Scientific analysis of proposals for MPAs
 - (b) Advice to Commission
6. IUU fishing in the Convention Area
7. CCAMLR Scheme of International Scientific Observation
 - (i) Scientific observations
 - (ii) Advice to Commission
8. Climate change
9. Scientific research exemption
10. Cooperation with other organisations
 - (i) Cooperation with Antarctic Treaty System
 - (a) Committee for Environmental Protection
 - (b) Scientific Committee for Antarctic Research
 - (ii) Reports of observers from other international organisations
 - (iii) Reports of representatives at meetings of other international organisations
 - (iv) Future cooperation
11. Performance Review
 - (i) CCAMLR Scientific Scholarship Scheme
12. Budget for 2012 and forecast budget for 2013
13. Advice to SCIC and SCAF
14. Secretariat supported activities
15. Scientific Committee activities
 - (i) Priorities for work of Scientific Committee and its working groups
 - (ii) Intersessional activities
 - (iii) Invitation of observers to next meeting
 - (iv) Invitation of experts to meetings of working groups
 - (v) Next meeting

16. Election of Chair and Vice-Chair
17. Other business
18. Adoption of report of Thirtieth Meeting
19. Close of meeting.

**GLOSSARY OF ACRONYMS AND ABBREVIATIONS
USED IN SC-CAMLR REPORTS**

GLOSSARY OF ACRONYMS AND ABBREVIATIONS USED IN SC-CAMLR REPORTS

AAD	Australian Government Antarctic Division
ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACAP BSWG	ACAP Breeding Sites Working Group (BSWG)
ACC	Antarctic Circumpolar Current
ACW	Antarctic Circumpolar Wave
ADCP	Acoustic Doppler Current Profiler (mounted on the hull)
ADL	Aerobic Dive Limit
AEM	Ageing Error Matrix
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AKES	Antarctic Krill and Ecosystem Studies
ALK	Age-length Key
AMD	Antarctic Master Directory
AMES	Antarctic Marine Ecosystem Studies
AMLR	Antarctic Marine Living Resources
AMSR-E	Advanced Microwave Scanning Radiometer – Earth Observing System
ANDEEP	Antarctic Benthic Deep-sea Biodiversity
APBSW	Bransfield Strait West (SSMU)
APDPE	Drake Passage East (SSMU)
APDPW	Drake Passage West (SSMU)
APE	Antarctic Peninsula East (SSMU)
APEC	Asia-Pacific Economic Cooperation
APECS	Association of Polar Early Career Scientists
APEI	Elephant Island (SSMU)

APEME Steering Committee	Steering Committee on Antarctic Plausible Ecosystem Modelling Efforts
APIS	Antarctic Pack-Ice Seals Program (SCAR-GSS)
APW	Antarctic Peninsula West (SSMU)
ASE	Assessment Strategy Evaluation
ASI	Antarctic Site Inventory
ASIP	Antarctic Site Inventory Project
ASMA	Antarctic Specially Managed Area
ASOC	Antarctic and Southern Ocean Coalition
ASPA	Antarctic Specially Protected Area
ASPM	Age-Structured Production Model
ATCM	Antarctic Treaty Consultative Meeting
ATCP	Antarctic Treaty Consultative Party
ATME	Antarctic Treaty Meeting of Experts on the Impacts of Climate Change for Management and Governance of the Antarctic region
ATS	Antarctic Treaty System
ATSCM	Antarctic Treaty Special Consultative Meeting
AVHRR	Advanced Very High Resolution Radiometry
BAS	British Antarctic Survey
BED	Bird Excluder Device
BICS	Benthic Impact Camera System
BIOMASS	Biological Investigations of Marine Antarctic Systems and Stocks (SCAR/SCOR)
BROKE	Baseline Research on Oceanography, Krill and the Environment
BRT	Boosted Regression Trees
CAC	Comprehensive Assessment of Compliance
cADL	calculated Aerobic Dive Limit
CAF	Central Ageing Facility

CAML	Census of Antarctic Marine Life
CAMLR Convention	Convention on the Conservation of Antarctic Marine Living Resources
CAML SSC	CAML Scientific Steering Committee
CAR	Comprehensiveness, Adequacy, Representativeness
CASAL	C++ Algorithmic Stock Assessment Laboratory
CBD	Convention on Biodiversity
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCAMLR-2000 Survey	CCAMLR 2000 Krill Synoptic Survey of Area 48
CCAMLR-IPY- 2008 Survey	CCAMLR-IPY 2008 Krill Synoptic Survey in the South Atlantic Region
CCAS	Convention on the Conservation of Antarctic Seals
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CCSBT-ERS WG	CCSBT Ecologically Related Species Working Group
CDS	Catch Documentation Scheme for <i>Dissostichus</i> spp.
CDW	Circumpolar Deep Water
CEMP	CCAMLR Ecosystem Monitoring Program
CEP	Committee for Environmental Protection
CF	Conversion Factor
CircAntCML	Circum-Antarctic Census of Antarctic Marine Life
CITES	Convention on International Trade in Endangered Species
CM	Conservation Measure
CMIX	CCAMLR's Mixture Analysis Program
CMP	Conservation Management Plan
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COFI	Committee on Fisheries (FAO)
COLTO	Coalition of Legal Toothfish Operators

CoML	Census of Marine Life
COMM CIRC	Commission Circular (CCAMLR)
COMNAP	Council of Managers of National Antarctic Programs (SCAR)
CON	CCAMLR Otolith Network
COTPAS	CCAMLR Observer Training Program Accreditation Scheme
CPD	Critical Period–Distance
CPPS	Permanent Commission on the South Pacific
CPR	Continuous Plankton Recorder
CPUE	Catch-per-unit-effort
CQFE	Center for Quantitative Fisheries Ecology (USA)
CS-EASIZ	Coastal Shelf Sector of the Ecology of the Antarctic Sea-Ice Zone (SCAR)
CSI	Combined Standardised Index
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CT	Computed Tomography
CTD	Conductivity Temperature Depth Probe
CV	Coefficient of Variation
C-VMS	Centralised Vessel Monitoring System
CVS	Concurrent Version System
CWP	Coordinating Working Party on Fishery Statistics (FAO)
DCD	<i>Dissostichus</i> Catch Document
DMSP	Defense Meteorological Satellite Program
DPM	Dynamic Production Model
DPOI	Drake Passage Oscillation Index
DVM	Diel vertical migration
DWBA	Distorted wave Born approximation model
EAF	Ecosystem Approaches to Fishing

EASIZ	Ecology of the Antarctic Sea-Ice Zone
E-CDS	Electronic Web-based Catch Documentation Scheme for <i>Dissostichus</i> spp.
ECOPATH	Software for construction and analysis of mass-balance models and feeding interactions or nutrient flow in ecosystems (see www.ecopath.org)
ECOSIM	Software for construction and analysis of mass-balance models and feeding interactions or nutrient flow in ecosystems (see www.ecopath.org)
EEZ	Exclusive Economic Zone
EG-BAMM	Expert Group on Birds and Marine Mammals (SCAR)
EIV	Ecologically Important Value
ENFA	Environmental Niche Factor Analysis
ENSO	El Niño Southern Oscillation
EOF/PC	Empirical Orthogonal Function/Principal Component
EoI	Expression of Intent (for activities in the IPY)
EPOC	Ecosystem, productivity, ocean, climate modelling framework
EPOS	European <i>Polarstern</i> Study
EPROM	Erasable Programmable Read-Only Memory
eSB	Electronic version of CCAMLR's <i>Statistical Bulletin</i>
ESS	Effective Sample Size(s)
FAO	Food and Agriculture Organization of the United Nations
FEMA	Workshop on Fisheries and Ecosystem Models in the Antarctic
FEMA2	Second Workshop on Fisheries and Ecosystem Models in the Antarctic
FFA	Forum Fisheries Agency
FFO	Foraging–Fishery Overlap
FIBEX	First International BIOMASS Experiment
FIGIS	Fisheries Global Information System (FAO)
FIRMS	Fishery Resources Monitoring System (FAO)

FMP	Fishery Management Plan
FOOSA	Krill–Predator–Fishery Model (previously KPFM2)
FPI	Fishing-to-Predation Index
FRAM	Fine Resolution Antarctic Model
FV	Fishing Vessel
GAM	Generalised Additive Model
GATT	General Agreement on Tariffs and Trade
GBIF	Global Biodiversity Information Facility
GBM	Generalised Boosted Model
GCMD	Global Change Master Directory
GDM	Generalised Dissimilarity Modelling
GEBCO	General Bathymetric Chart of the Oceans
GEOSS	Global Earth Observing System of Systems
GIS	Geographic Information System
GIWA	Global International Waters Assessment (SCAR)
GLM	Generalised Linear Model
GLMM	Generalised Linear Mixed Model
GLOBEC	Global Ocean Ecosystems Dynamics Research
GLOCHANT	Global Change in the Antarctic (SCAR)
GMT	Greenwich Mean Time
GOOS	Global Ocean Observing System (SCOR)
GOSEAC	Group of Specialists on Environmental Affairs and Conservation (SCAR)
GOSSOE	Group of Specialists on Southern Ocean Ecology (SCAR/SCOR)
GPS	Global Positioning System
GUI	Graphical User Interface
GRT	Gross Registered Tonnage

GTS	Greene et al., (1990) linear TS versus length relationship
GYM	Generalised Yield Model
HAC	A global standard being developed for the storage of hydroacoustic data
HCR	Harvest Control Rule
HIMI	Heard Island and McDonald Islands
IA	Impact Assessment
IAATO	International Association of Antarctica Tour Operators
IASOS	Institute for Antarctic and Southern Ocean Studies (Australia)
IASOS/CRC	IASOS Cooperative Research Centre for the Antarctic and Southern Ocean Environment
IATTC	Inter-American Tropical Tuna Commission
ICAIR	International Centre for Antarctic Information and Research
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICED	Integrating Climate and Ecosystem Dynamics in the Southern Ocean
ICES	International Council for the Exploration of the Sea
ICESCAPE	Integrating Count Effort by Seasonally Correcting Animal Population Estimates
ICES WGFASST	ICES Working Group on Fisheries Acoustics Science and Technology
ICFA	International Coalition of Fisheries Associations
ICSEAF	International Commission for the Southeast Atlantic Fisheries
ICSU	International Council for Science
IDCR	International Decade of Cetacean Research
IFF	International Fishers' Forum
IGBP	International Geosphere-Biosphere Programme
IGR	Instantaneous Growth Rate
IHO	International Hydrographic Organisation
IKMT	Isaacs-Kidd Midwater Trawl
IMAF	Incidental Mortality Associated with Fishing

IMALF	Incidental Mortality Arising from Longline Fishing
IMBER	Integrated Marine Biogeochemistry and Ecosystem Research (IGBP)
IMO	International Maritime Organization
IMP	Inter-moult Period
IOC	Intergovernmental Oceanographic Commission
IOCSOC	IOC Regional Committee for the Southern Ocean
IOFC	Indian Ocean Fisheries Commission
IOTC	Indian Ocean Tuna Commission
IPHC	International Pacific Halibut Commission
IPOA	International Plan of Action
IPOA-Seabirds	FAO International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries
IPY	International Polar Year
IRCS	International Radio Call Sign
ISO	International Organization for Standardization
ISR	Integrated Study Region
ITLOS	International Tribunal for the Law of the Sea
IUCN	International Union for the Conservation of Nature and Natural Resources – the World Conservation Union
IUU	Illegal, Unreported and Unregulated
IW	Integrated Weight
IWC	International Whaling Commission
IWC-IDCR	IWC International Decade of Cetacean Research
IWL	Integrated Weighted Line
IYGPT	International Young Gadoids Pelagic Trawl
JAG	Joint Assessment Group
JARPA	Japanese Whale Research Program under special permit in the Antarctic
JGOFS	Joint Global Ocean Flux Studies (SCOR/IGBP)

KPFM	Krill–Predatory–Fishery Model (used in 2005)
KPFM2	Krill–Predatory–Fishery Model (used in 2006) – renamed FOOSA
KYM	Krill Yield Model
LADCP	Lowered Acoustic Doppler Current Profiler (lowered through the water column)
LAKRIS	Lazarev Sea Krill Study
LBRS	Length-bin Random Sampling
LMM	Linear Mixed Model
LMR	Living Marine Resources Module (GOOS)
LSSS	Large-Scale Server System
LTER	Long-term Ecological Research (USA)
<i>M</i>	Natural Mortality
MARPOL Convention	International Convention for the Prevention of Pollution from Ships
MARS	Multivariate Adaptive Regression Splines
MAXENT	Maximum Entropy modelling
MBAL	Minimum Biologically Acceptable Limits
MCMC	Monte Carlo Markov Chain
MCS	Monitoring Control and Surveillance
MDS	Mitigation Development Strategy
MEA	Multilateral Environmental Agreement
MEOW	Marine Ecoregions of the World
MFTS	Multiple-Frequency Method for in situ TS Measurements
MIA	Marginal Increment Analysis
MIZ	Marginal Ice Zone
MLD	Mixed-layer Depth
MODIS	Moderate Resolution Imaging Spectroradiometer
MoU	Memorandum of Understanding

MP	Management Procedure
MPA	Marine Protected Area
MPD	Maximum of the Posterior Density
MRAG	Marine Resources Assessment Group (UK)
MRM	Minimum Realistic Model
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
MV	Merchant Vessel
MVBS	Mean Volume Backscattering Strength
MVP	Minimum Viable Populations
MVUE	Minimum Variance Unbiased Estimate
NAFO	Northwest Atlantic Fisheries Organization
NASA	National Aeronautical and Space Administration (USA)
NASC	Nautical Area Scattering Coefficient
NCAR	National Center for Atmospheric Research (USA)
NEAFC	North East Atlantic Fisheries Commission
NI	Nearest Integer
NIWA	National Institute of Water and Atmospheric Research (New Zealand)
nMDS	non-Metric Multidimensional Scaling
NMFS	National Marine Fisheries Service (USA)
NMML	National Marine Mammal Laboratory (USA)
NOAA	National Oceanic and Atmospheric Administration (USA)
NPOA	National Plan of Action
NPOA-Seabirds	FAO National Plans of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries
NRT	Net Registered Tonnage
NSF	National Science Foundation (USA)

NSIDC	National Snow and Ice Data Center (USA)
OBIS	Ocean Biogeographic Information System
OCCAM Project	Ocean Circulation Climate Advanced Modelling Project
OCTS	Ocean Colour and Temperature Scanner
OECD	Organisation for Economic Cooperation and Development
OM	Operating Model
PaCSWG	Population and Conservation Status Working Group (ACAP)
PAR	Photosynthetically Active Radiation
PBR	Permitted Biological Removal
PCA	Principal Component Analysis
PCR	Per Capita Recruitment
pdf	Portable Document Format
PF	Polar Front
PFZ	Polar Frontal Zone
PIT	Passive Integrated Transponder
PRP	CCAMLR Performance Review Panel
PS	Paired Streamer Line
PTT	Platform Terminal Transmitter
RES	Relative Environmental Suitability
RFB	Regional Fishery Body
RFMO	Regional Fishery Management Organisation
RMT	Research Midwater Trawl
ROV	Remotely-Operated Vehicle
RPO	Realised Potential Overlap
RTMP	Real-Time Monitoring Program
RV	Research Vessel
RVA	Register of Vulnerable Areas

SACCB	Southern Antarctic Circumpolar Current Boundary
SACCF	Southern Antarctic Circumpolar Current Front
SAER	State of the Antarctic Environment Report
SAF	Sub-Antarctic Front
SBDY	Southern Boundary of the ACC
SBWG	Seabird Bycatch Working Group (ACAP)
SCAF	Standing Committee on Administration and Finance (CCAMLR)
SCAR	Scientific Committee on Antarctic Research
SCAR-ASPECT	Antarctic Sea-Ice Processes, Ecosystems and Climate (SCAR Program)
SCAR-BBS	SCAR Bird Biology Subcommittee
SCAR-CPRAG	Action Group on Continuous Plankton Recorder Research
SCAR-EASIZ	Ecology of the Antarctic Sea-Ice Zone (SCAR Program)
SCAR-EBA	Evolution and Biodiversity in Antarctica (SCAR Program)
SCAR-EGBAMM	Expert Group on Birds And Marine Mammals
SCAR-GEB	SCAR Group of Experts on Birds
SCAR-GOSEAC	SCAR Group of Specialists on Environmental Affairs and Conservation
SCAR-GSS	SCAR Group of Specialists on Seals
SCAR-MarBIN	SCAR Marine Biodiversity Information Network
SCAR/SCOR- GOSSOE	SCAR/SCOR Group of Specialists on Southern Ocean Ecology
SCAR WG-Biology	SCAR Working Group on Biology
SC-CAMLR	Scientific Committee for the Conservation of Antarctic Marine Living Resources
SC CIRC	Scientific Committee Circular (CCAMLR)
SC-CMS	Scientific Committee for CMS
SCIC	Standing Committee on Implementation and Compliance (CCAMLR)
SC-IWC	Scientific Committee for IWC

SCOI	Standing Committee on Observation and Inspection (CCAMLR)
SCOR	Scientific Committee on Oceanic Research
SCP	Systematic Conservation planning
SD	Standard Deviation
SDWBA	Stochastic Distorted-wave Born Approximation
SEAFO	South East Atlantic Fisheries Organisation
SeaWiFS	Sea-viewing Wide Field-of-view Sensor
SG-ASAM	Subgroup on Acoustic Survey and Analysis Methods
SGE	South Georgia East
SGSR	South Georgia–Shag Rocks
SGW	South Georgia West (SSMU)
SIBEX	Second International BIOMASS Experiment
SIC	Scientist-in-Charge
SIOFA	Southern Indian Ocean Fisheries Agreement
SIR Algorithm	Sampling/Importance Resampling Algorithm
SMOM	Spatial Multispecies Operating Model
SNP	Single Nucleotide Polymorphism
SO-CPR	Southern Ocean CPR
SO GLOBEC	Southern Ocean GLOBEC
SOI	Southern Oscillation Index
SO JGOFS	Southern Ocean JGOFS
SOMBASE	Southern Ocean Molluscan Database
SONE	South Orkney North East (SSMU)
SOOS	Southern Ocean Observing System
SOPA	South Orkney Pelagic Area (SSMU)
SOS Workshop	Southern Ocean Sentinel Workshop
SOW	South Orkney West (SSMU)

SOWER	Southern Ocean Whale Ecology Research Cruises
SPA	Specially Protected Area
SPC	Secretariat of the Pacific Community
SPGANT	Ocean Colour Chlorophyll- <i>a</i> algorithm for the Southern Ocean
SPM	Spatial Population Model
SSB	Spawning Stock Biomass
SSG-LS	The Standing Scientific Group on Life Sciences (SCAR)
SSM/I	Special Sensor Microwave Imager
SSMU	Small-scale Management Unit
SSMU Workshop	Workshop on Small-scale Management Units, such as Predator Units
SSRU	Small-scale Research Unit
SSSI	Site of Special Scientific Interest
SST	Sea-Surface Temperature
STC	Subtropical Convergence
SWIOFC	Southwest Indian Ocean Fisheries Commission
TASO	ad hoc Technical Group for At-Sea Operations (CCAMLR)
TDR	Time Depth Recorder
TEWG	Transitional Environmental Working Group
TIRIS	Texas Instruments Radio Identification System
TISVPA	Triple Instantaneous Separable VPA (previously TSVPA)
ToR	Term of Reference
TrawlCI	Estimation of Abundance from Trawl Surveys
TS	Target Strength
TVG	Time Varied Gain
UBC	University of British Columbia (Canada)
UCDW	Upper Circumpolar Deep Water
UN	United Nations

UNCED	UN Conference on Environment and Development
UNEP	UN Environment Programme
UNEP-WCMC	UNEP World Conservation Monitoring Centre
UNCLOS	UN Convention on the Law of the Sea
UNFSA	the United Nations Fish Stock Agreement is the 1995 United Nations Agreement for the Implementation of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
UNGA	United Nations General Assembly
UPGMA	Unweighted Pair Group Method with Arithmetic Mean
US AMLR	United States Antarctic Marine Living Resources Program
US LTER	United States Long-term Ecological Research
UV	Ultra-Violet
UW	Unweighted
UWL	Unweighted Longline
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
VOGON	Value Outside the Generally Observed Norm
VPA	Virtual Population Analysis
WAMI	Workshop on Assessment Methods for Icefish (CCAMLR)
WC	Weddell Circulation
WCO	World Customs Organization
WFC	World Fisheries Congress
WCPFC	Western and Central Pacific Fisheries Convention
WG-CEMP	Working Group for the CCAMLR Ecosystem Monitoring Program (CCAMLR)
WG-EMM	Working Group on Ecosystem Monitoring and Management (CCAMLR)

WG-EMM-STAPP	Subgroup on Status and Trend Assessment of Predator Populations
WG-FSA	Working Group on Fish Stock Assessment (CCAMLR)
WG-FSA-SAM	Subgroup on Assessment Methods
WG-FSA-SFA	Subgroup on Fisheries Acoustics
WG-IMAF	Working Group on Incidental Mortality Associated with Fishing (CCAMLR)
WG-IMALF	ad hoc Working Group on Incidental Mortality Arising from Longline Fishing (CCAMLR)
WG-Krill	Working Group on Krill (CCAMLR)
WG-SAM	Working Group on Statistics, Assessments and Modelling
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WSC	Weddell–Scotia Confluence
WS-Flux	Workshop on Evaluating Krill Flux Factors (CCAMLR)
WS-MAD	Workshop on Methods for the Assessment of <i>D. eleginoides</i> (CCAMLR)
WSSD	World Summit on Sustainable Development
WS-VME	Workshop on Vulnerable Marine Ecosystems
WTO	World Trade Organization
WWD	West Wind Drift
WWW	World Wide Web
XBT	Expendable Bathythermograph
XML	Extensible Mark-up Language
Y2K	Year 2000
YCS	Year-class Strength(s)