Report of the Forty-third
Meeting of the Scientific Committee
(Hobart, Australia, 14 to 18 October 2024)

This is a preliminary[1] version of the SC-CAMLR-43 Report
as adopted on Friday 18 October 2024.

[1] Preliminary in this case means that further proofreading and verification may still be required by the Secretariat.

Contents

* Annexes 4 to 7 are available on the CCAMLR website

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Opening of the meeting

1.1 The Forty-third meeting of the Scientific Committee was held from 14 to 18 October 2024 at the CCAMLR Headquarters in Hobart, Tasmania, Australia. The meeting was chaired by Dr C. Cárdenas (Chile). The plenary sessions of the meeting were streamed to a listening audience.

1.2 Dr Cárdenas welcomed all participants, whether in-person or as an online audience (Annex 1). He anticipated his first meeting as Chair of the Scientific Committee to be a collaborative and fruitful meeting.

1.3 Dr Cárdenas encouraged the delegates to work together using the best available science to provide consensus advice to the Commission, but noted that in cases where consensus cannot be reached, all views will be presented.

1.4 Dr Cárdenas noted the passing of Professor Marino Vacchi, who was a longstanding Scientific Committee Representative for Italy, achieving a Wombat award, and being heavily involved in the scientific leadership of CCAMLR. He expressed condolences from the Scientific Committee to Marino's family and colleagues. He also noted the loss of 13 lives at sea in the sinking of the FV *Argos Georgia* and paused to remember their families as well.

1.5 Mr N. Walker (New Zealand) also expressed his condolences to Professor Vacchi's colleagues and noted that New Zealand has placed observers on board the FV *Argos Georgia* during previous voyages and had a special connection with the vessel and the crew.

1.6 Dr A.M. Fioretti (Italy) thanked the Scientific Committee for their condolences on the loss of their esteemed friend and colleague.

1.7 The List of Documents considered during the meeting is given in Annex 2. A glossary of acronyms and abbreviations used in CCAMLR reports is available online at https://www.ccamlr.org/node/78120.

1.8 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. Contributed statements are indicated in italics.

1.9 The report of the Scientific Committee was prepared in accordance with Rule 3 of the SC-CAMLR Rules of Procedure by S. Alfaro-Rodríguez (European Union (EU)), M. Belchier (United Kingdom (UK)), P. Brtnik (Germany), S. Carney (Australia), M. Collins (UK), A. Dunn (New Zealand), M. Eléaume (France), M. Favero (Argentina), S. Fielding (UK), L. Ghigliotti (Italy), S. Grant and S. Hill (UK), C. Jones (United States of America (USA)), S. Kawaguchi (Australia), E. Kim (Republic of Korea (Korea)), L. Krüger (Chile), D.

Maschette (Australia), T. Okuda (Japan), S. Parker (Secretariat), F. Santa Cruz (Chile), M. Santos (Argentina), F. Schaafsma (Netherlands), K. Teschke (Germany) S. Thanassekos (Secretariat), N. Walker (New Zealand), X. Wang (People's Republic of China (China)), G. Watters (USA), Y. Ying and G. Zhu (China) and P. Ziegler (Australia).

Adoption of the agenda

1.10 The Scientific Committee adopted the Provisional Agenda which had been circulated as SC CIRC 24/30 prior to the meeting consistent with Rule 7 of the Scientific Committee's Rules of Procedure. The Agenda was adopted without change (Annex 3).

1.11 The Scientific Committee agreed to hold a discussion on the implementation of the CCAMLR rules for data access under 'Secretariat supported activities'.

Chair's report

1.12 The Chair of the Scientific Committee noted the large amount of work undertaken this past year, which included the meetings of the working groups, including a joint FSA-IMAF working group, the Harmonisation Symposium, as well as an age determination workshop, all of which have reports submitted and have generated significant and important advice for the Scientific Committee to consider. In addition, the Scientific Committee submitted papers to the Committee for Environmental Protection (CEP) and the International Whaling Commission (IWC) and the UN-DOALOS to report on and progress specific issues. The following meetings were held by, or supported the work of, the Scientific Committee:

(i) Second Workshop on Age Determination Methods (WS-ADM2-2024), 22–26 April, University of Colorado Boulder, Colorado, USA

(ii) Weddell Sea Marine Protected Area Phase 2 Research and Monitoring Plan Workshop, 23–26 April 2024, Oslo, Norway

(iii) Working Group on Acoustic Survey and Analysis Methods (WG-ASAM-2024), 20–24 May, Cambridge, UK

(iv) Working Group on Statistics, Assessments and Modelling (WG-SAM-2024), 24–28 June, Leeuwarden, Netherlands

(v) Working Group on Ecosystem Monitoring and Management (WG-EMM-2024), 1–12 July, Leeuwarden, Netherlands

(vi) Harmonisation Symposium (HS-2024), 16–20 July, Incheon, Korea

(vii) Joint meeting of the Working Group on Fish Stock Assessment and the Working Group on Incidental Mortality Associated with Fishing (WG-FSA-IMAF-2024), 30 September – 11 October, Headquarters, Hobart

(viii) Committee on Environmental Protection Paper submitted to CEP-XXVI, 20–24 May, Kochi, India

(ix) SCAR 2024 open science Conference, 19–23 August, Pucón, Chile

(x) International Whaling Commission – Paper submitted to IWC SC-69 (SC69B), 22 April – 3 May, Bled, Slovenia via IWC liaison

(xi) FAO meeting on Other Effective Area-based Conservation Measures (OECMs), 22–24 January, Rome, attended by Marino Vacchi

(xii) Summary provided to UN-DOALOS on Sustainable fisheries management in the face of climate change (April) – SC-CIRC 24/16

(xiii) SCB meetings for organisation and planning.

Harvested Species: General issues

2.1 SC-CAMLR-43/BG/01 summarised catches of target species from directed fishing on toothfish, icefish and krill in the Convention Area in 2022/23 and 2023/24 (until 31 May 2024) and from research fishing under Conservation Measure (CM) 24-01. Catches from 2022/23 were derived from aggregated haul by haul (C1 or C2 data), whilst 2023/24 data were derived from in-season catch and effort data.

2.2 The Scientific Committee advised that the current krill catch is 498 000 tonnes, which is the highest on record and may exceed 500 000 tonnes by the end of the 2024 season, and that this historic high catch underlined the urgency of progressing the revised Krill Fishery Management Approach (KFMA).

2.3 CCAMLR-43/BG/09 Rev. 1 summarised fishery notifications for the 2024/25 season. The number of vessels notifying to participate in the exploratory fisheries for toothfish in the 2025 season increased by three vessels compared to the 2024 season. The number of vessels notifying to participate in the krill fisheries decreased by one vessel compared to the previous season.

2.4 The Scientific Committee also noted the discussion of this information by WG-FSA-IMAF-2024 (paragraphs 1.21 to 1.24).

2.5 ASOC introduced CCAMLR-43/BG/03, which provides an analysis of Southern Ocean fishery subsidies for both krill and toothfish fisheries.

2.6 The Scientific Committee thanked ASOC for the paper, but noted uncertainty about the numbers of interviews conducted and that it had limited relevance to the work of the Scientific Committee.

2.7 The WG-ASAM co-convenor, Dr S. Fielding (UK), introduced the report of the WG-ASAM-2024 meeting held at British Antarctic Survey in Cambridge from 20 to 24 May (SC-CAMLR-43/11). The meeting was attended by 14 participants from 6 Members, with one

invited expert (ARK). The meeting discussed standardised approaches for acoustic surveys to inform the development of the KFMA.

2.8 The Scientific Committee thanked WG-ASAM for their detailed work to standardise approaches to conducting acoustic surveys and noted it will be valuable in advancing the new KFMA.

2.9 Dr Hinke introduced the report of WG-EMM-2024 (SC-CAMLR-43/13) from the meeting of the Working Group held in Leeuwarden, in the Kingdom of the Netherlands from 1 to 12 July. The meeting included discussions on krill biology and ecology, krill fishery management, ecosystem monitoring and spatial management, with focus topics on CEMP and harmonization of the D1MPA proposal with the revised KFMA.

2.10 Dr Okuda introduced the report from WG-SAM-2024 (SC-CAMLR 43/12), which was held in Leeuwarden, in the Kingdom of the Netherlands from 24 to 28 June.

2.11 The Scientific Committee thanked the host Members, institutions and local organisers of the intersessional working groups, notably the British Antarctic Survey, Wageningen Marine Research, the Arctic Centre of the University of Groningen and the Dutch Ministry of Foreign Affairs.

2.12 Mr Somhlaba introduced the report of the joint meeting of WG-FSA-IMAF-2024 held in Hobart from 30 September to 11 October.

2.13 The Scientific Committee noted the discussion in WG-FSA-IMAF-2024 (paragraphs 1.25–1.28) in respect of the inclusion of the status of CCAMLR fisheries in the FAO Global State of Stocks Index (SOSI) report. The Scientific Committee noted that the CCAMLR fishery status does not map directly to the FAO categories, and that summary tables had been prepared to reflect both the CCAMLR status and the FAO category.

2.14 The Scientific Committee agreed to make the relevant parts of the summary tables (Tables 1 and 2) available on the CCAMLR website, as they provide useful information on the current status of stocks in the Convention Area.

2.15 The Scientific Committee agreed that it is valuable to report CCAMLR's management approach and current stock status for CCAMLR fisheries to show other organisations how CCAMLR manages its fisheries as a contribution to the biennial SOSI report.

2.16 The Scientific Committee agreed to task the Secretariat with summarising how CCAMLR manages its fisheries (drawing from CCAMLR literature and WG-FSA-IMAF-2024/16) to accompany the tables and to seek comment from Members via SC-CIRC prior to submission to the FAO by the end of 2024.

2.17 The Scientific Committee recalled the recommendations from the Climate Change Workshop held in hybrid format in 2023 (SC-CAMLR-43/10) and agreed that the recommendations should be incorporated into the work plans of the relevant working groups (Annex 3, Item 11.3).

Harvested Species: Krill

2.18 SC-CAMLR-43/05 proposed revisions to Conservation Measures 51-07 and 51-01, including a proposal to roll-over any remaining catch allocated to summer to the winter and a proposal for flexibility in the catches allocated to individual management units, similar to the approach taken in 51-07 to split the trigger-level between subareas 48.1–48.4 as some of those summer catch limits allocated in some candidate MUs are only a few thousands to a few hundred tonnes which is difficult for fisheries to operate.

2.19 The Scientific Committee recalled the discussions at WG-EMM-2024 (paragraphs 4.3 to 4.9).

2.20 Some Members noted that any proposal to move catch between spatial or temporal allocations needs scientific justification and that such an approach is not consistent with the Spatial Overlap Analysis, which seeks to spread catches in space and time, These Members also noted that the CCAMLR fishing season starts on 1 December and hence the summer season (1 Oct to 31 Mar) includes months at the start and end of the calendar year, making any roll-over from summer to winter difficult to implement.

2.21 The authors of SC-CAMLR-43/05 noted that the summer/winter split of the catch limits is mainly to account for the seasonal difference in prey demand of the various predators and also the fishery preference, and reducing some catches from the high prey demand summer season is unlikely to affect the feeding performance of krill predators.

2.22 CCAMLR-43/24 considered proposals to revise Conservation Measure 51-07, suggesting that proposed revisions, which included a specific catch limit for Subarea 48.1, were inconsistent with the provisions of CM 51-07 and CM 51-01, which established a coordinated catch limit for Area 48. The authors noted that the management of the krill fishery in Subarea 48.1 should be implemented as part of a coordinated management of the Area 48 fishery. and noted that the current approach in CM 51-07 and CM 51-01 has been considered precautionary (SC-CAMLR-40, para 3.17) and should remain in place until the new KFMA is fully implemented.

2.23 Most Members noted that any implementation of the revised KFMA should proceed in a stepwise manner and recalled that any increase in catch limits needs to be accompanied by an increase in fishery and ecosystem monitoring.

2.24 Some Members noted that whilst scientific information indicates that there may be scope to increase catch limits in Subarea 48.1, there is no urgency to amend the trigger level in CM 51-01, as the trigger level provides an acceptable level of precaution while the KFMA is fully developed. Norway proposed that, since CM 51-01 and CM 51-07 are so intricately interconnected, changes in one CM must result in changes in the other and referred to WG-EMM-2024/24 explaining the rationale behind this.

Statistical Area 48

2.25 SC-CAMLR-43/BG/22 presented an analysis of the dynamics of Antarctic krill in a fishery hotspot in the Bransfield Strait, using the acoustic data collected during routine fishing

operations from the 2012/13 to 2021/22 fishing seasons. Multi-year observations indicated a significant increase of krill biomass from the end of austral spring/summer (December to March) to autumn/winter (April and May) in the hotspot. It highlighted that krill biomass in this hotspot in winter could be several-fold of those estimates for the entire Bransfield Strait stratum in summer seasons. The analyses also implied that the krill fishery was operated in areas in which there were ample krill resources.

2.26 The Scientific Committee thanked China for providing such important information and noted the seasonal accumulation of krill in the Bransfield Strait. The Scientific Committee encouraged further investigation on the seasonal variation of krill length composition and noted that the increase of krill biomass was not likely to result from krill growth but rather from influx of krill from other areas, i.e. the Bellingshausen Sea and the Weddell Sea, which might be an important factor contributing to the accumulation of krill in the Bransfield Strait during the autumn and winter seasons. It also recognised that both offshore-nearshore migration and vertical migration of krill may contribute to their accumulation.

2.27 The Scientific Committee noted the importance of further understanding both influx and outflux of krill at a broader scale, including the potential downstream ecosystem effects of fishing in areas where krill concentrate. The Scientific Committee also noted previous studies suggesting that there may be large accumulations of krill in coastal areas which are typically not covered by acoustic surveys or used by fishery.

2.28 The Scientific Committee highlighted the importance of using acoustic data from fishing vessels and encouraged Members to conduct similar research in broader areas, such as the Gerlache Strait, and further investigate the causes of the accumulation of krill.

2.29 SC-CAMLR-43/07 presented a data collection plan for krill to support the implementation of the KFMA and contribute to the Research and Monitoring Plan (RMP) for the Domain 1 Marine Protected Area (D1MPA) proposal. The paper proposed an at-sea data collection plan by the fishery and observers to be included as a new annex for CM 51-07.

2.30 The Scientific Committee thanked Australia for presenting the proposal and noted that a holistic approach is needed for developing an integrated data collection plan, including coordination with ecosystem monitoring particularly CEMP data collection, for both the KFMA and the D1MPA proposal. It recalled that data collection to support the harmonisation approach was discussed under a focus topic during the WG-EMM-2024 meeting (paragraphs 5.65-5.71 and Tables 7 and 8 in WG-EMM-2024). The Scientific Committee also noted that the inclusion of all these elements into CM 51-07 was inappropriate, as the data collection plan would be relative to multiple Conservation Measures and Scientific Observer tasks. It further noted some of the data collection plan may require collaboration with the fishery industry.

2.31 The Scientific Committee also recalled that WG-ASAM has made significant progress on developing standards and protocols for krill acoustic surveys which could be incorporated into such a data collection plan. It noted that such a data collection plan may not only relate to the KFMA or D1MPA proposals, but also other CCAMLR work in general.

2.32 ASOC thanked Australia for this important proposal. In this context, ASOC also agreed that the ability to monitor catches, by-catch and the impact on the wider ecosystem should not be outpaced by catch limit increases. They considered this a good opportunity to harmonise efforts and expand this data collection plan to meet the needs of the D1MPA RMP.

2.33 The Scientific Committee recalled that CEMP indicators and associated data processing procedures to evaluate the status and monitor the changes of dependent predator populations are still lacking. It also noted the need for a data analysis plan and a data management plan in addition to the development of a data collection plan.

2.34 The SC noted ongoing work on developing essential variables and data processing procedures (SC-CAMLR-42/BG/20, SC-CAMLR-43/BG/32). Such Essential Variables could include CEMP relevant indicators and data processing procedures.

2.35 The Scientific Committee agreed to progress the work during the intersessional period and set up a Discussion group to develop a data collection plan after the meeting. Dr Kawaguchi volunteered to lead the Group.

2.36 The Scientific Committee agreed on a general structure of the data collection plan for the Discussion group to develop further during the intersessional period and submit a paper to relevant working groups in 2025. The data collection plan will consist of several separate tables developed for the KFMA, the D1MPA RMP, CEMP/health check and environmental impacts, accompanied by an overarching figure and/or table that links these tables. The data collection plan brings together all data collection needs within Subarea 48.1 in one place to assist coordination of data collection for various data collection initiatives.

2.37 The Scientific Committee endorsed the four proposed elements of data collection and future work to progress the Krill Stock Hypothesis (paragraph 3.27, WG-EMM-2024).

Progress towards acoustic biomass estimates

2.38 SC-CAMLR-43/BG/14 presented a summary of the multi-year krill acoustic surveys conducted by Chinese krill fishing vessels and scientific observers onboard in Subarea 48.1. It noted that the vessels have been conducting regular acoustic surveys using scientific echo-sounders in Subarea 48.1 since the 2013/14 fishing season. Six annual summer surveys were conducted in the Bransfield Strait and west of the South Shetland Islands strata from 2013 to 2020. The annual effort was continued with surveys conducted later in the fishing season to increase the understanding on the krill stock status in autumn and winter, and the survey area was also extended gradually to cover the Gerlache Strait, the Joinville Islands and the Elephant Island strata over the last few years. These surveys provided important information on the dynamics of the krill stock in Subarea 48.1, and in particularly the inter-annual variability of krill biomass and knowledge on krill in winter and data-limited regions, which could aid the overall design of the concerted CCAMLR monitoring efforts for the successful implementation of the revised KFMA.

2.39 The Scientific Committee welcomed the series of acoustic surveys and thanked China for its extensive work. It also noted that the US AMLR surveys and the Chinese krill surveys provided the basis for the development of transects and sampling stations in Subarea 48.1 by WG-ASAM-2024.

2.40 The Scientific Committee also noted that Norway has also been conducting annual krill acoustic surveys using fishing vessels or support vessels in Subarea 48.2 since 2011, and comparison of results from these two survey series could improve the understanding of the

connectivity and distribution patterns between the two subareas. The Scientific Committee encouraged future collaborations among Members to address the interconnectivity and patterns of krill between Subareas 48.1 and 48.2, as well as the intra- and inter-annual variations of krill stocks.

2.41 The Scientific Committee also discussed the potential of collecting krill predator data during the acoustic surveys and adding an RMT1 to the RMT8 nets to collect krill biological data for the development of the Krill Stock Hypothesis.

2.42 China thanked the Scientific Committee for the suggestions and comments and welcomed collaboration with other Members. It noted that some of the suggestions have already been taken into account for future surveys, such as the application of the RMT8+1 net as a krill sampling device to address sample collection regarding krill population biology.

2.43 The Scientific Committee noted the discussion from WG-ASAM on methods for calibrating echosounders on fishing vessels, including the standard sphere and sea-bed method.

2.44 The Scientific Committee endorsed the recommendation that Battery Impedance Tests (BITE tests) should be conducted prior to a survey to ensure all sectors of the transducers were performing appropriately. It also noted that the echosounders should at least be calibrated during, or at the end of, the survey period. And ideally a calibration would be undertaken prior to a survey to ensure the echosounder was performing correctly.

2.45 The Scientific Committee endorsed the recommendation that the Echosounder Calibration Protocol (Appendix D, WG-ASAM-2024) should be used by fishing vessels if conducting acoustic surveys with EK80 software.

2.46 The Scientific Committee recognised that not all fishing vessels were equipped with EK80 echosounders and highlighted the importance of collecting high-quality acoustic data for monitoring krill biomass. It agreed the recommendation for intersessional work by the WG-ASAM e-group (https://groups.ccamlr.org/group/3) to develop simplified protocols for other transceiver and software versions for consideration in WG-ASAM-2025.

2.47 The Scientific Committee recalled that all the Chinese acoustic krill surveys (SC-CAMLR-43/BG/14) were conducted by fishing vessels equipped with up-to-date scientific echosounders. It also noted that these surveys were an industry contribution with the aid of a Chinese government sponsored project together with observer training and deployment.

2.48 Recognising the importance and challenges of conducting echosounder calibrations, including the lack of sufficient acoustic expertise onboard a vessel, the Scientific Committee encouraged coordinated effort between vessels, including through ARK.

2.49 The Scientific Committee considered how to implement the concept of fishing vessels working in concert to conduct acoustic surveys to provide krill area biomass estimates. It noted that such work would benefit from advice from fishery experts such as ARK. It further noted that this work could be considered within the data collection plan and ARK could also join this Discussion group.

2.50 The Scientific Committee noted that WG-ASAM developed criteria to acoustically sample areas not yet surveyed in Subarea 48.1 (paragraph 3.29, WG-ASAM-2024) whilst developing advice on transects covering the whole of Subarea 48.1. This included considering

whether model-based estimators of krill biomass may be more appropriate than the currently endorsed Jolly and Hampton survey estimator. They requested that WG-ASAM consider this in future work.

2.51 The Scientific Committee considered the proposed survey transects and sampling stations for Subarea 48.1 (WG-ASAM-2024, Figure 1). It noted that transects spacing differed among some strata and encouraged further investigation on the effect of transect spacing. It also noted three options of sample station spacing were provided in the figure (20nm, 40 nm and mixed), alongside an adaptable sampling strategy (paragraph 3.32 WG-ASAM 2024). It recognised the importance of using fishing vessels to collect a variety of scientific data and agreed that a pragmatic approach is needed in terms of fishing vessel capability when conducting such surveys.

2.52 The Scientific Committee noted that krill length frequency data from the trawl stations could be used to provide estimates of a krill recruitment index, in addition to parameterising the target strength model used to convert acoustic backscatter to krill biomass.

2.53 The Scientific Committee noted that in addition to the data collection protocols, WG-ASAM be tasked with developing acoustic survey data analysis protocols. This would include reviewing the timescale for producing a krill biomass assessment from acoustic survey data and who would be responsible for undertaking it. The Scientific Committee recalled that a workflow (WG-EMM-2024/28, Figure 1) on regularly updating the precautionary catch limit for Subarea 48.1 and the elements required for producing the necessary outputs from each element of the new KFMA were discussed during WG-EMM 2024 meeting (paragraphs 4.16 to 4.20 WG-EMM-2024) and requested the document be considered by WG-ASAM 2025.

2.54 The Scientific Committee noted that WG-ASAM developed an Acoustic Survey Metadata Form, which is still in improvement in the e-group (https://groups.ccamlr.org/group/3) and encouraged Members to utilise the form during the acoustic surveys and submit improvement suggestions as experience gained from the surveys is deemed appropriate.

2.55 The Scientific Committee endorsed the recommendation from WG-ASAM that the Acoustic Survey Trawl Sampling protocol specifies that both RMT8 and scientific macroplankton nets can be used as standard sampling gear for sampling depths 0 to 200 m (or 10 m from seabed). It further endorsed the recommendation that details of such samplers be fully documented in the Acoustic Survey Metadata Form (paragraph 3.71, WG-ASAM-2024).

2.56 The Scientific Committee endorsed the recommendation from WG-ASAM that the Acoustic Survey Trawl Sampling Protocol (Appendix E, WG-ASAM-2024) be used by fishing vessels conducting acoustic surveys and that they complete the corresponding set of metadata within the Acoustic Survey Metadata Form (paragraph 3.71, WG-ASAM-2024).

2.57 The Scientific Committee noted the difference in mesh size and mouth opening of the two recommended sampling gears. The Scientific Committee noted that different members have used different sampling gears and identified benefits of using an RMT8+1 to sample smaller krill, as well as concerns about the representativeness of krill samples collected with the small mouth opening of the RMT8 net, compared with the larger mouthed macrozooplankton net.

2.58 The Scientific Committee requested the Secretariat to compile historical studies on the efficiency of different gears for krill sampling, to provide a background for further consideration of this issue.

2.59 The Scientific Committee noted the discussion from the WG-ASAM on the collection of oceanographic data for acoustic surveys. It endorsed the recommendation that the Acoustic Survey CTD Sampling Protocol (Appendix F, WG-ASAM-2024) could be used by fishing vessels conducting acoustic surveys.

2.60 The Scientific Committee discussed the challenges associated with implementing CTD sampling on fishing vessels and identified that CTD sampling following net sampling would add significant time onto the survey time. The Scientific Committee agreed that the Acoustic Survey CTD Sampling Protocol to include attaching a CTD to the krill sampling net which could use vessel time more efficiently.

2.61 The Scientific Committee noted that both the Acoustic Survey Trawl Sampling Protocol and the Acoustic Survey CTD Sampling Protocol were specifically related to the acoustic surveys for krill biomass estimation.

2.62 The Scientific Committee endorsed the recommendation from WG-ASAM that any future changes to strata boundaries affecting biomass estimates be submitted to WG-ASAM for consideration before krill biomass is recalculated.

2.63 The Scientific Committee noted the discussion regarding the candidate management units in Subarea 48.1. It endorsed the recommendation from WG-EMM that the candidate MUs in Scenario 2 of WG-EMM-2024/25 be used in the future work of the Scientific Committee, whilst recognising that MUs could be adjusted in future if required.

2.64 The Scientific Committee noted that the transects identified in Figure 1 (WG-ASAM-2024) would be appropriate to derive krill biomass estimates from the agreed MUs (paragraph 2.1.39) noting that the boundaries of the proposed MUs and amendments to them had been considered during WG-ASAM.

2.65 The Scientific Committee endorsed the recommendation from WG-ASAM that for future surveys, the percentage of a stratum covered by sea ice should be reported along with krill biomass estimates and considered this future work for WG-ASAM-2025.

2.66 The Scientific Committee identified that as the requirement to undertake monitoring acoustic surveys was a key component of the KFMA and could lead to significant future work for WG-ASAM. It noted that WG-ASAM was a small group and encouraged Members to further contribute to and participate in WG-ASAM to achieve this.

2.67 The Scientific Committee recognised the merits of aligning WG-ASAM and WG-EMM and considered that a joint day between the meetings may enable progress on items such as a comparison between the Jolly and Hampton survey estimator and model-based estimators of krill biomass and density.

Progress towards a stock assessment

2.68 SC-CAMLR-43/BG/27, presented by ASOC, described ongoing research on the transport of larval Antarctic krill in the West Antarctic Peninsula. The research uses a high-resolution ocean circulation model to improve the understanding of the influence of ocean circulation and sea ice motion on the distribution of the early developmental stages of Antarctic krill. The research has identified potential critical spawning areas and larval overwintering hotspots, providing insights into the dynamic spatial distribution of krill. Specifically, preliminary results identified that most larvae in the Bransfield Strait originated from the Bransfield Strait with additional transport from Weddell Sea, and most larvae off the shelf south of Anvers Island either utilised the Grandidier Passage region or Marguerite Bay as a nursery.

2.69 The authors highlighted that the research is expected to produce information useful for the harmonisation of the KFMA and for the D1MPA proposal. The preliminary results demonstrated the potential of these models to identify spawning grounds, key areas, and transport paths for specific larval developmental phases, highlighting how these can vary under different assumptions, thereby providing critical insights for krill research and fishery management. Additional work will be completed and presented to WG-EMM-2025 to identify specific areas where the model simulations indicate that seasonal closures could protect both spawning stocks and crucial overwintering habitat for larval krill.

2.70 The Scientific Committee thanked ASOC for this work and recognised the value of the analysis and results for the harmonisation process, and further encouraged ASOC to contribute to SKEG activities to improve the Krill Stock Hypothesis.

Progress towards a spatial overlap assessment

2.71 SC-CAMLR-43/BG/02 Rev. 1 presented the Spatial Overlap Analysis (SOA) to identify a spatial and temporal distribution of catch limits amongst management units (MUs) in Subarea 48.1 using the management units, general protection zones (GPZ) and seasonal protection zones (SPZs) recommended by the Harmonisation Symposium. The implementation included a monthly timestep to account for differences between SPZs during closure periods, and the analysis included several sensitivity analyses to explore the effects of assumptions and data used. In all scenarios, the highest proportion of catch was assigned to the Gerlache Strait during winter. Elephant Island, Bransfield Strait, and Drake Passage were also each allocated more than 10% of the catch under 'baseline' scenarios. The paper summarised the limitations and caveats identified in previous contributions to SC-CAMLR and its working groups, and emphasised the influence of input assumptions on the SOA outputs, particularly noting that modelled Gerlache Strait krill biomass in the SOA is 360% of the value based on WG-ASAM estimates (SC-CAMLR-41, Table 3). The authors suggested that further consideration of inputs and limitations is a pre-requisite for future application of the SOA and invited other Members to collaborate.

2.72 The Scientific Committee thanked the authors for implementing the Spatial Overlap Analysis in the short time since the Harmonisation Symposium. Technical aspects of the paper were reviewed by WG-FSA-2024 (paragraphs 2.4 and 2.5).

2.73 The Scientific Committee noted the information in the paper that the regional risk or overlap score is not an appropriate metric for comparing desirability and baseline implementations. Such scenarios concentrate catch in MUs with historical fishing activity with little allocated to other MUs which may result in overall lower risk. Such an approach is not consistent with the objectives of the SOA. The Scientific Committee also noted the data limitations and other caveats affecting application of the SOA, which have been documented by the authors. Some Members considered it necessary that these issues should be resolved before its implementation. Other Members consider that these caveats should not prevent the use of SOA outputs, but that additional precautions, such as a maximum harvest rate in a management unit, may be built into the process to avoid overly high harvest rates for data poor management units. The Gerlache Strait remains a data-poor area where the additional data requirements include better estimates of fish energy requirements.

2.74 The Scientific Committee noted that the data that the SOA is supplied with has a considerable impact on the outcome (SC-CAMLR-43-BG-02, p. 4) and that sensitivity testing using modelled or simulated data should be explored.

2.75 The Scientific Committee recalled that engagement among Members to improve and expand the analytical approach are valuable and suggested that strategies to increase members participation to work on the issues might be developed. The Scientific Committee welcomed Members expressing their interest in contributing to the improvement of the SOA, and requested the Secretariat to coordinate to make those model input data available through appropriate channels (e.g., an SOA Discussion group) to facilitate engagement of interested Members.

2.76 ARK thanked the authors for their extensive work within a short timeframe. ARK agreed with the observation that the SOA model still has many caveats, which should be addressed with the involvement of a broader pool of scientists. However, ARK raised concerns about the potential lack of objectivity in implementing the SOA model, as suggested when changes need to be introduced to accommodate for unexpected results in a specific MU. As such, ARK hopes future iterations of the SOA will maintain consistency and objectivity across all MUs.

Progress towards a revised krill management approach

2.77 The WG-EMM chair, Dr. J. Hinke (USA), presented the relevant general paragraphs of the WG-EMM-2024 report (Paragraph 6.37) with the recommendation to adopt the Terms of Reference outlined in WG-EMM-2024/34 for a collaboration with the Scientific Committee of the International Whaling Commission (IWC-SC). The collaboration seeks to leverage the expertise of the IWC-SC to facilitate the development of advice on cetacean-related data, survey design, and subsequent analyses, syntheses and ecological modelling, and to develop research networks to contribute to the review of CEMP and to inform the revised krill fishery management approach.

2.78 The Scientific Committee endorsed the recommendation to adopt the Terms of Reference outlined in WG-EMM-2024/34.

2.79 The WG-FSA chair, Dr Somhlaba, presented the relevant general paragraphs of the WG-FSA-IMAF-2024 report (paragraph 2.3) recommending the publication of WG-FSA-IMAF-2024/03 as part of the Fishery Report.

2.80 The Scientific Committee noted that WG-FSA-IMAF-2024/03 presented a summary of advances on the revised KFMA up to 2023, in response to the Scientific Committee's request (SC-CAMLR-42, paragraph 2.42; WG-EMM-2024, paragraph 4.2).

2.81 The Scientific Committee thanked the Working Groups and the Secretariat for the important document, which helps readers understand the revision process of the KFMA and increase transparency.

2.82 The Scientific Committee recalled that the revision of the KFMA is a living document that is updated each year from the discussions of Working Groups and SC and has been annually updated in the fishery report to inform the general public about the state of krill stocks in CCAMLR area.

2.83 Dr Zhao (China) who has been an advocator of compiling such a document and making it public, had reservations about the document being made public in its present form, as some previous text has been changed but has not been reviewed by SC.

2.84 As discussions were inconclusive, the Scientific Committee tasked the Secretariat to work during the intersessional period on a new version of the document with improved text to present in WG-EMM-2025, where it could be discussed with interested Members.

Harmonisation of conservation and krill fishery management initiatives

2.85 CCAMLR-43/29 presented the Conveners' report of the Symposium on Harmonisation of Conservation and Krill Fishery Management Initiatives in the Antarctic Peninsula Region (HS), which was held in Incheon, Republic of Korea from 16 to 20 July 2024. The Conveners' report presented a set of recommendations for further consideration by the Scientific Committee and Commission noting that the recommendations did not represent the consensus of all participants. These recommendations describe a potential 'harmonised approach' that could simultaneously increase catch limits for krill in Subarea 48.1 while establishing zones in which directed fishing would either be prohibited or seasonally restricted (Figure 2). The proposed timings of seasonal closures vary between zones. The recommendations included seasonal catch limits for management units within Subarea 48.1 (Table 3). The HS recommended implementation of these elements in the short term but recognised the need to improve data collection efforts. It therefore noted that a suitable period for an initial phase of harmonisation would be three years during which time policies should be implemented to generate the required data to regularly update components of the KFMA in a timely manner, and to evaluate the efficacy of the proposed D1MPA. At the end of the three years, and following a review, the harmonised approach could be modified.

2.86 The Scientific Committee thanked the symposium convenors (Dr G. Watters (USA) and Ms J.R. Kim (Korea)), sponsors (ASOC and ARK), host (Korea), steering committee, participants, the Secretariat and WG-EMM for their efforts in making the HS successful. The Scientific Committee recognised that significant progress has been made in refining both the revised KFMA and the D1MPA proposal in the last year, with the specific objective of achieving a harmonised approach. The symposium demonstrated a pathway that is available to progress work towards improved management. The Scientific Committee endorsed both the approach of jointly working across all contributing scientists, decision makers and observers

and the objective of developing a holistic management plan for Subarea 48.1. It recognised that this approach could be extended to other CCAMLR areas.

2.87 CCAMLR-43/37 presented a revised proposal for a Conservation Measure establishing a D1MPA based on the revised spatial structure of SPZs and GPZs recommended by the Harmonisation Symposium (CCAMLR-43/29), while retaining the previously proposed GPZ in Subarea 48.2.

2.88 SC-CAMLR-43/BG/16 presented results of recalculated target coverage of D1MPA objectives following the recommendations of the Harmonisation Symposium about management units and Seasonal and General Protection Zones (SPZs and GPZs). The authors found that the HS scenario still achieves the D1MPA conservation targets. The paper recommended the adoption of the modified D1MPA as proposed in CCAMLR-43/37, including the Subarea 48.2 GPZ as it maximises the protection for *Pygoscelis* penguins. 50% of the chinstrap penguin breeding population in Domain 1 would remain unprotected if this GPZ is not included.

2.89 SC-CAMLR-43/BG/17 provided Argentina and Chile's comments in response to the recommendations made by the HS in relation to the scale of applicability of the harmonisation process, a potential staged approach among subareas, the inclusion of additional buffer protection zones, new precautionary catch limits, an integrated KFMA-D1MPA data collection plan and some requirements of a revision after a trial period for the implementation.

2.90 The Scientific Committee thanked the authors of this series of papers for their considerable work before and after the HS, and for their flexibility in adapting the D1MPA proposal to include SPZs and further work in response to the HS. Participants were encouraged by new work since the HS, including these papers and SC-CAMLR-43/BG/02 Rev. 1, and recognised the need to maintain momentum.

2.91 Some Members considered that progress could be made by focusing initially on Subarea 48.1 and implementing protection zones in subareas 88.3 and 48.2 at a later stage.

2.92 Dr B. Krafft (Norway) advised that the draft Conservation Measure should be altered to remove the proposed spatial restriction on calibration of acoustic instruments and questioned whether the scientific catch limitations within CM 24-01 are sufficient to provide appropriate scientific data for all MPA RMPs.

2.93 CCAMLR-43/22 restated the position of the Russian Federation that scientific and legal aspects for a harmonised approach between KFMA and D1MPA are unjustified. The authors noted that KFMA and D1MPA suggest that the current fishery impacts krill resources and dependent predators, considering the observed overlap between predator feeding areas and fishing grounds as evidence of fishery's impact on the ecosystem. The authors noted that key issues for the scientific justification of the KFMA and D1MPA to achieve the objectives of ecosystem-based and precautionary approaches to krill resource require clarity in relation to: (i) the development of scientifically based criteria and diagnostics to assess the possible ecosystem impact of the fishery, taking into account the mixed effects of fishing, environmental variability (or climate change), and competition between predator species; and (ii) the potential of fisheries at their current level to affect krill resources and dependent predators and, if so, on what spatial and temporal scales. The authors also noted that the revision of the KFMA in Subarea 48.1, as well as in subareas 48.2 to 48.4, should only be undertaken as part of a

coordinated management of the krill fishery in Area 48, based on the dynamics of oceanological processes and the interannual variability in the spatial distribution of krill, taking into account krill flux and the interrelationships between subareas. The authors noted that the following scientific justification of the Harmonised scenario remain unresolved: justification of the boundaries of the General Protection Zones (GPZ) and the boundaries of the Seasonal Protection Zones (SPZ), as well as the D1MPA boundaries; and justification of indicators for assessing the effectiveness of harmonisation of KFMA and D1MPA. With regard to the legal aspects of harmonisation, the authors noted that the harmonisation does not comply with the current conservation measures CM 51-01 and CM 51-07 (CCAMLR-43/24). Furthermore, implementing the harmonised MPA scenario is only possible under the Conservation Measure designating the D1MPA in the CCAMLR area, which will consider both the GPZ and SPZ frameworks. Considering the above, the Russian Federation stress that the proposals to harmonise the KFMA and establish the D1MPA in Subarea 48.1 are not legally justified under existing conservation measures. The authors stated that a holistic approach is needed across subareas 48.1 to 48.4 and that a recent survey conducted using the Russian FV *Komandor* will provide relevant data.

2.94 The Scientific Committee welcomed the offer of additional information on krill and the ecosystem in subareas 48.1 to 48.4. It noted that the authors of CCAMLR-43/22 reserve their position and encouraged further discussion of the implementation of a harmonised approach.

2.95 The Scientific Committee noted that evidence of by-catch, including three humpback whales in the past year (WG-FSA-IMAF-2024, paragraph 5.26) could be a signal of a negative impact of fishing. The Scientific Committee also noted a series of existing CMs and ongoing efforts adopted by CCAMLR with the intention to minimise such impacts.

2.96 SC-CAMLR-43/BG/07 presented advice from the CCAMLR Secretariat on practical and administrative adjustments that might be needed to implement the KFMA as recommended by the HS (CCAMLR-43/29). Key services that will need to be reviewed and updated include: server and data storage capacity; automatic upload systems for reported data; analytical software to process VMS data and generate management information; website functionality and content. The Secretariat will need time to prepare for the introduction of a harmonised KFMA. When the harmonised KFMA is fully implemented it is likely that additional FTE staff would be required as would new hardware and software, with proportionate increases in cost for support services.

2.97 The Scientific Committee thanked the Secretariat for its work and noted that implementing more sophisticated fishery management approaches, especially those with enhanced reporting requirements and multiple spatial catch limits, will have significant cost implications. It also noted the importance of a preparation period before implementation.

2.98 CCAMLR-43/BG/26 submitted by ARK provided an analysis of the effects that the harmonised approach is likely to have on krill fishing operations. The first result was that krill fishing patterns will change drastically with the introduction of catch limits per management unit (MU) and year-round and seasonal closures. The second significant result was that the harmonised approach would allow for about 50% of the total recommended catch limit in CCAMLR-43/29 to be caught. The difficulties in fully accessing the catch limits were mainly driven by the implementation of the SOA model, and to a lesser extent by the D1MPA proposal. The authors stated that winter allocations to BS are low compared to krill availability and those allocated to EI and SSIW in winter are high, despite krill availability being low and operational

hazards being high. The authors asked CCAMLR members to review the functions used in the Spatial Overlap Analysis model and consider fishery desirability in their discussions. They deemed it necessary to add flexibility to the MU catch limits to account for interannual variation in krill distribution.

2.99 The Scientific Committee thanked the authors for this perspective, noting that the industry expertise in operational aspects of fishing is valuable to the work of the Scientific Committee. It was noted that the analysis was based on the assumption that the industry continues to follow established spatial and temporal fishing patterns. The purpose of the revised KFMA and the D1MPA protection zones is to manage the distribution of fishing effort, through a combination of catch spreading and closed areas, to reduce the risk of ecosystem impacts consistent with objective of Convention. The analysis suggests that these measures will provide an incentive for the industry to modify fishing patterns.

2.100 The Scientific Committee discussed the role of ice conditions on catch dynamics and recalled discussions at WG-EMM-2024 (paragraphs 2.4–2.6). Ice affected access to Subarea 48.2 during most winters but appears to be less important in Subarea 48.1. Further analysis could be conducted at the spatial scale of management units.

2.101 CCAMLR-43/BG/44 outlined ASOC's key priorities for both D1MPA and the KFMA. Recommendations for D1MPA included: inclusion of key foraging grounds in the Gerlache and Bransfield straits within the GPZ; adoption of the entire proposed MPA in one step, including the GPZ around the South Orkney Islands in Subarea 48.2; inclusion of critical fin whale foraging grounds around Elephant Island in the GPZ; and permanent designation of the MPA. Recommendations for the KFMA included: maintain the current trigger level of 620 000 tonnes for Area 48 until smaller management units are established for subareas 48.1, 48.2, 48.3, and 48.4; disperse fishing catch and effort across smaller spatial scales; ensure that catch limits are set using the most precautionary methodologies; implement an effective monitoring system within the next year, including an update of the CEMP that accounts for cetaceans and provides indicators of negative impacts from fishing on predators to support adaptive fisheries management. The authors also emphasised the need to strengthen compliance measures related to by-catch mitigation, port inspections, transhipment, and VMS (vessel monitoring system) reporting, and to develop a procedure to adjust fisheries management in response to negative indicators affecting predators or changes in climatic conditions.

2.102 The Scientific Committee thanked ASOC for continued engagement with the harmonisation process

2.103 The Scientific Committee discussed the possibility of developing advice for the Commission based on the outputs of the HS.

2.104 Many Members supported the following elements of a harmonised approach to spatial conservation and krill fishery management in the Antarctic Peninsula region:

(i) the management units identified by the HS, which were based on ‘scenario 2’ from WG-EMM-2024 (paragraph 5.18; SC-CAMLR-43, Figure 1 and paragraph 2.63);

(ii) staged implementation of the D1MPA proposal as presented in Figure 1 of CCAMLR-43/37 (see Figure 3), starting in subareas 48.1 and 88.3 and based on

the recommendations of the HS, with a commitment to inclusion of Subarea 48.2 within a defined time period;

(iii) spreading of catch limits between management units and seasons based initially on the recommendations of the HS;

(iv) the development of improved monitoring of krill biomass and ecosystem health;

(v) an initial implementation for a period of three years during which monitoring and methodology would be improved in preparation for a comprehensive review at the end of year 3. This would require a mechanism for modification of the approach in response to the review.

2.105 The Scientific Committee recalled its agreement in 2022 that 'the catch limits, presented in Table 2 (of SC-CAMLR-41), are based on the use of the best available science'. It further recognised that significant progress has been made on the development of standard protocols for the implementation of KFMA, in particularly the acoustic survey by fishing vessel towards regularly monitoring of krill stock in Subarea 48.1 (SC-CAMLR-43, paragraphs 2.1.1 to 2.1.41).

2.106 The Scientific Committee noted the catch limits (Table 3) recommended by HS were derived based on Table 2 of SC-CAMLR-41, with further reduction on catch limits in the Gerlache Strait by 50% (paragraph 5.48, WG-EMM-2024) and the PB and DP (paragraph 5.52, WG-EMM-2024), to provide additional precaution.

2.107 Some Members suggested that the catch limits recommended by the HS (Table 3) could be implemented in Subarea 48.1 after an appropriate period of preparation. These Members suggested that these catch limits represent best available science and are consistent with the precautionary approach.

2.108 Some Members noted that the HS recommended a total catch limit for Subarea 48.1 of 395 431 tonnes (or 255% of the current level as specified in CM 51-07) and raised the following concerns about this recommendation:

(i) CCAMLR-XXVII (paragraph 2.48) and WG-EMM-07 (paragraphs 2.79 and 4.76) have previously supported orderly development of the krill fishery. Increasing catch limits for Subarea 48.1 to 255% of the current level in a single season would be inconsistent with orderly development of the fishery.

(ii) According to SC-CAMLR-41 (Table 3) these catch limits allocate 56% of the precautionary catch limit for the whole of Subarea 48.1 to an area containing less than 50% of the Subarea's estimated krill biomass and which is considered a sensitive predator foraging area. This is inconsistent with the objective of minimising the risk of concentrating catch in sensitive predator foraging areas.

(iii) These catch limits do not represent the consensus position of HS participants.

2.109 These Members therefore suggested that more precautionary catch limits should be applied in the initial implementation of a harmonised approach. Three alternative suggestions were suggested to add this additional precaution:

(i) reduce the catch limits suggested by the HS by a constant amount, such as 35%

(ii) retain the catch limits suggested by the HS as caps on the catch in each management unit, subject to an overall catch limit for Subarea 48.1 set at a lower level, such as 257 000 tonnes (65% of the total catch limits suggested by the HS)

(iii) implement option (ii) above initially and allow staged increases in the overall catch limit for Subarea 48.1 over time subject to appropriate improvements in monitoring and approval by the Scientific Committee.

2.110 Dr Zhao noted that the SC and the CC has adopted the new, revised KFMA in 2019 which is the foundation of all the works progressed up to now and called colleagues to follow what had been agreed before.

2.111 Dr Kasatkina objected to the implementation of a harmonised approach on the basis of arguments presented in CCAMLR-43/22 (paragraph 2.1.5.9) and proposed cooperation in revising the KFMA taking into account data from the RV *Atlantida* 2020 cruise, collected using standardised observation methods and including acoustic survey accompanied by data collection on the state of the environment (hydroteorological and oceanological data, primary production, phyto- and zooplankton), krill biology data and observations on the distribution and abundance of seabirds and mammals). Dr Kasatkina stated that the RV *Atlantida* data are the best available at the present time and could be useful in revising the KFMA taking into account the proposals in CCAMLR-43/22.

2.112 Several Members reiterated the view that there is sufficient evidence of negative impacts of the krill fishery (WG-FSA-2024, paragraph 2.7).

2.113 The Scientific Committee recommends further consideration of a harmonised approach and its implementation, based on the catch limits for the krill fishery and data collection plan discussed by the SC (paragraphs 2.105–2.109).

Statistical Area 58

2.114 SC-CAMLR-43/04 presented Australia and Japan's response to the comments on WG-FSA-2023/68 made by SC-CAMLR-42 on the potential influence of sea ice coverage on krill densities and the submission of standardised metadata for the surveys. The paper highlighted WG-ASAM-2024/06, which assessed the potential influence of sea ice coverage on krill densities and noted that WG-ASAM-2024 concluded that the reduction in estimated krill biomass observed during the 2021 survey of Division 58.4.2-East was caused by a real reduction in krill density (biomass per unit area) rather than a change in sampling spatial coverage due to sea ice (WG-ASAM-2024, paragraphs 4.15 - 4.17). Standardised metadata for the krill biomass surveys in Division 58.4.1 and Division 58.4.2-East had also been submitted to WG-ASAM and endorsed by the WG-ASAM (WG-ASAM-2024, paragraphs 4.17 and 4.20).

2.115 The Scientific Committee noted that the updated krill assessment presented in WG-FSA-2023/68 had already been endorsed, and proposed catch limits recommended (SC-CAMLR-42, paragraph 2.98). It thanked Australia and Japan for following up on the comments during the intersessional period and endorsed the results of the analysis. The Scientific Committee noted the lower krill density in Division 58.4.2-East observed in 2021

compared to 2006, but considered that these two estimates did not provide sufficient information to conclude that there was a declining trend in biomass in the region. The Scientific Committee further noted the importance of the distinction between krill density and biomass, that the survey area in 2021 was smaller than that during the 2006 survey due to sea ice, and that density should not be extrapolated to non-surveyed areas.

2.116 Dr Kasatkina (Russian Federation) noted that information in Area 58 on krill biomass and biology is still lacking and noted that it was important to conduct additional surveys in the area.

Harvested species: Finfish

3.1 The Scientific Committee considered several general issues related to finfish fisheries, and discussions on these issues are summarised in subsections on research plans for exploratory fisheries, a general workplan for improving assessments of *Dissostichus* spp., management strategy evaluations and harvest control rules, evidence for change in stock assessment and population parameters or processes, age determination of toothfish, tag overlap, and scientific observation.

Research plans for exploratory fisheries

3.2 CCAMLR-43/38 presented a proposal for a new annex to CM 21-02 that would specify the requirements for research plans under CM 21-02 paragraph 6(iii) and would need to be accompanied by other revisions to CMs 21-02 and 24-01. The intent of the proposal is to clarify requirements and reflect differences between research plans for exploratory toothfish fisheries under CM 21-02 and scientific research exemptions under CM 24-01.

3.3 The Scientific Committee noted that research plans for exploratory fisheries required under CM 21-02 can vary substantially in objectives, format, and design from scientific research exemptions under CM 24-01. However, both types of research plans must currently be submitted in accordance with Annex 24-01/A Format 2. Using a single format for submitting different types of research plans has led to different interpretations of the requirements for research.

3.4 Some Members did not endorse the proposal to include a new annex in CM 21-02. These Members noted that research plans for exploratory fisheries have multiple objectives, and some of these objectives, e.g., enumerating by-catch and characterizing trends in CPUE, might be more easily achieved with standardised gear. These Members also noted that CCAMLR's assessments of exploratory fisheries are reliant on fishery-dependent data, where standardised gears might usefully simplify analyses and interpretation.

3.5 Other Members welcomed the proposal to include a new annex in CM 21-02, which would simplify scientific review of research plans for exploratory fisheries and reduce confusion on the requirements for such plans. These Members noted that research under CM 21-02 is usually focused on estimating stock biomass of *Dissostichus* spp. from tagging studies and does not depend on the use of standardised fishing gear. These Members further noted that the relevance and value of standardised fishing gear is more relevant when area-based

approaches are used to estimate biomass (e.g., trawl surveys to estimate the biomass of pre-recruits) and considered that the new annex proposed for CM 21-02 would also suffice in these cases.

3.6 The Scientific Committee further considered acoustic surveys, which may also be relevant to exploratory fisheries. Acoustic surveys can be conducted from different platforms and using different instruments because these instruments can be calibrated to provide a common result when the acoustic target has a known target strength. In this case, calibration is an alternative to standardisation. It was further suggested that if, in the future, a new annex is included within CM 21-02 it be expanded to require additional details regarding the acoustic instruments, calibration procedures, and data-analysis methods that may be used.

General workplan for improving assessments of *Dissostichus* spp.

3.7 The Scientific Committee considered advice from WG-FSA-IMAF-2024 on the general workplan for improving assessments of *Dissostichus* spp. (WG-FSA-IMAF-2024, paragraph 4.41). It noted that the workplan could be improved by including an additional element related to the specification of recruitment in projections used to develop catch-limit advice based on stock assessments and application of the CCAMLR decision rules.

3.8 The Scientific Committee recommended the following work be conducted and presented during future meetings of WG-SAM, with the conclusions presented to WG-FSA-2026.

(i) investigate sex-disaggregated assessment models for Subarea 48.3 and Divisions 58.5.1 and 58.5.2

(ii) investigate alternative estimators of abundance based on tag-recapture data and compare them with the Chapman estimator

(iii) continue ongoing work to account for spatial changes and other sources of bias in tag-recapture data, and incorporate these into stock assessments

(iv) explore alternative approaches to characterise variability and trends in future recruitment and apply these alternatives in stock projections

3.9 ASOC expressed its concerns at the state of a number of stocks which are estimated to be below the target of 50% of initial spawning stock biomass (SSB0) and urged the Scientific Committee to utilise a precautionary approach in recommending catch limits. It also highlighted the need to support precautionary catch limits that recognise periods of low recruitment and ensure that stocks are rebuilt when below the target level (especially in Division 58.5.2).

Management strategy evaluations and harvest control rules

3.10 The Scientific Committee considered SC-CAMLR-43/BG/34, which provides a general introduction to management strategy evaluation (MSE) and harvest control rules (HCRs) and includes a glossary of relevant, common terms. The paper also proposes standardised terms for probability and uncertainty that the Scientific Committee could use when reporting

performance indicators and HCRs. The paper notes that management strategies provide a more predictable approach than the traditional use of stock assessments to provide scientific advice regarding fisheries management. Management strategies rely on a set of agreed management objectives for each fishery and stock, and MSE (also known as management procedure evaluation) is used to select an HCR that is most likely to achieve the management objectives.

3.11 The Scientific Committee noted deliberations by WG-SAM-2024 on HCRs and MSE (WG-SAM-2024, paragraphs 6.5-6.14), which included discussion on HCRs based on harvest rates ('U-based HCRs') and a list of issues that should be addressed to advance development of MSE for assessed toothfish stocks. These U-based HCRs were presented as alternatives to the constant catch HCRs that CCAMLR currently uses to manage fisheries for *Dissostichus* spp. WG-SAM-2024 also provided an example of how U-based HCRs could be integrated within the current CCAMLR decision rules for toothfish (WG-SAM-2024, paragraph 6.9).

3.12 The Scientific Committee endorsed paragraphs 6.9 and 6.10 from WG-SAM-2024. The Scientific Committee also noted that U-based HCRs do not rely on assumptions about future recruitment patterns. Nevertheless, the performance of U-based HCRs depends on future recruitment (WG-SAM-2024, paragraph 6.8), and assumptions about future recruitment would still be needed if a U-based HCR is integrated within the current decision rules for toothfish.

3.13 The Scientific Committee also noted deliberations by WG-FSA-IMAF-2024 on HCRs and MSE (WG-FSA-IMAF-2024, paragraphs 4.45-4.50), which included recommendations on a workplan to advance MSE and evaluate HCRs for assessed toothfish fisheries. The Scientific Committee noted that scientific studies and research have demonstrated that U-based HCRs will generally outperform constant catch HCRs (WG-FSA-IMAF-2024, paragraph 4.49). The Scientific Committee also noted that WG-FSA-IMAF-2024 advised that the current CCAMLR toothfish decision rules could be supplemented with an interim U-based HCR, and such a supplemental HCR should be evaluated within an MSE to be refined or improved in the future (WG-FSA-IMAF-2024, paragraph 4.50).

3.14 Given the discussions by and advice from WG-SAM-2024 and WG-FSA-IMAF-2024, some Members recommended the Commission consider integrating a U-based HCR into the current decision rules for assessed toothfish fisheries on an interim basis, until an MSE has been developed that formally evaluates the current HCRs, the interim U-based HCR, and other HCRs considering potential, future changes in stock productivity. They encouraged the Commission to consider, as a precautionary measure for when stocks are below target, an interim change as follows (additions shown in underline and deletions shown in strikethroughs);

(i) Choose a yield γ1, so that the probability of the spawning biomass dropping below 20% of its median pre-exploitation level over a 35-year harvesting period is 10%.

(ii) Choose a yield γ2, so that the median escapement of the spawning biomass at the end of a 35-year period is 50% of the median pre-exploitation level.

(iii) <u>Choose a yield γ3, so that the exploitation rate of the spawning biomass is equal to the long-term exploitation rate that ensures the stock will be at 50% of the median pre-exploitation level using a constant exploitation rate (U50).</u>

(iv) Select the lower of γ1, ~~and,~~ γ2, <u>and γ3</u> as the yield.

3.15 The Scientific Committee endorsed the MSE workplan provided in paragraph 4.48 from WG-FSA-IMAF-2024. The Scientific Committee noted that developing an MSE will take significant resources and time, and encouraged Members conducting the work to be ambitious and present preliminary results to WG-SAM and WG-FSA in order to provide advice to the Scientific Committee in 2026. The Scientific Committee encouraged Members to submit papers to WG-SAM and WG-FSA to advance the development of MSEs for toothfish. To progress the workplan, the Scientific Committee requested:

(i) WG-SAM-2025 provide advice to the Scientific Committee in 2025 on the range of uncertainties to which the management strategy should be robust (WG-FSA-IMAF-2024, paragraph 4.48(i)(a-d)) and suitable operating models for consideration in the MSE (WG-FSA-FSA-2024, paragraph 4.48(ii))

(ii) WG-FSA-2025 provide advice to the Scientific Committee in 2025 on suitable performance indicators and metrics (WG-FSA-IMAF-2024, paragraph 4.48(iii)) and, in 2026, potential 'breakout' or 'stop' rules (WG-FSA-IMAF-2024, paragraph 4.48(iv)(a-b)).

(iii) WG-FSA-2026 provide advice to the Scientific Committee in 2026 on the results of their work on MSE, including recommendations for the choice of HCRs and any proposed changes to the CCAMLR toothfish decision rules.

3.16 ASOC welcomed the development of harvest control rules for toothfish and especially the development of particular ramp rules which set zero catch well before stocks get to the level of 20% initial spawning stock biomass. These rules should be more precautionary in periods of low fish recruitment, and especially where the stocks are below target levels, as recommended by WG-FSA-2024 in paragraph 4.50. These rules should respond to ecosystem and climate change, and include provisions for 'break out' or 'stop rules' when environmental or other conditions fall outside those evaluated by the management strategy.

Evidence for change in stock assessment and population parameters or processes

3.17 The Scientific Committee recalled its previous request that Members provide a summary of evidence for changes in stock assessment parameters or processes that could be due to the effects of environmental variability or climate change for all fisheries (SC-CAMLR-42 paragraph 2.149). The Scientific Committee noted that substantial and important progress had been made to provide such summaries for the assessed toothfish stocks (WG-FSA-IMAF-2024, Tables 19–23) and encouraged this work be continued as stock assessments are updated.

3.18 The Scientific Committee also recommended that research and data collection plans in exploratory fisheries and under CM 21-01 include the collection of data that may assist in providing such information.

Age determination of toothfish

3.19 The Scientific Committee noted the deliberations on age determination for *Dissostichus* spp. in paragraphs 5.30-5.40 of WG-SAM-2024 and paragraphs 4.16-4.29 of WG-FSA-IMAF-

2024. Both Working Groups concluded that the Second Age Determination Workshop, convened at the University of Colorado, Boulder, Colorado USA from 22 to 26 April 2024, was successful and proved useful for developing standard guidelines to read otoliths and establish a reference set of otoliths. The Scientific Committee thanked Drs Brooks, Devine and Hollyman for convening the workshop.

3.20 The Scientific Committee recommended that a third Age Determination Workshop take place during the 2024/25 intersessional period. The third workshop should continue to standardise methods and build a reference set of otoliths according to the Terms of Reference provided in WG-FSA-IMAF-2024 Appendix D.

3.21 The Scientific Committee recommended that the third workshop be supported at the same level of funding that was requested for the second workshop (A$15,000) and include Secretariat participation.

Tagging performance

3.22 The Scientific Committee noted deliberations on the tag overlap statistic in paragraphs 4.118-4.125 of WG-FSA-IMAF-2024 and recalled that it had previously asked the Secretariat to track the performance of vessels in achieving tag overlap thresholds in exploratory fisheries. The Secretariat subsequently contacted Members whose vessels achieved between 60% and 80% tag overlap to better understand factors causing a low tag overlap statistic. The Scientific Committee emphasised that this inquiry was not related to a compliance issue. Rather, the inquiry was made to determine whether tag overlap might be increased and thus lead to improvements in assessments of *Dissostichus* spp. The Scientific Committee acknowledged that there are several factors that may result in tag overlap below 80% (WG-FSA-IMAF-2024, paragraph 4.120).

3.23 The Scientific Committee requested the Secretariat to continue tracking the performance of vessels in achieving tag overlap thresholds (WG-FSA-2023, paragraph 4.32-4.34; SC-CAMLR-42 para 2.137). However, the review process should be adjusted such that Members be requested to respond to any instances of tag overlap between 60% and 80% in advance of WG-FSA-2025, and that the Secretariat collate and summarise the responses for consideration by WG-FSA-2025. The Scientific Committee also tasked the Secretariat to request that Members provide information on their tagging protocol or strategy (e.g., every n^{th} fish) (WG-FSA-IMAF-2024, paragraph 4.123 and 4.124).

3.24 The Scientific Committee requested WG-FSA and WG-SAM to revisit tag metrics, not only focusing on tag overlap metrics but also on the tag release and recapture performance to assess and potentially improve the quality of data for use in stock assessments.

Scientific observation

3.25 The Scientific Committee noted the deliberations by WG-FSA-IMAF-2024 on issues related to SISO (WG-FSA-IMAF-2024, paragraphs 6.1-6.9), which included discussions related to the CCAMLR Tagging Protocol and a newly developed CCAMLR Tagging Manual for use by vessels and observers.

3.26 The Scientific Committee recommended that the hyperlinks in paragraphs 2(i) and 5 of Conservation Measure 41-01 be updated so that they link to the most recent version of the CCAMLR Tagging Protocol.

3.27 The Scientific Committee thanked COLTO for translating waterproof posters summarising the CCAMLR Tagging Protocol. These posters may be useful to Members from both CCAMLR and adjoining Regional Fishery Management Organizations (RFMOs) (WG-FSA-IMAF-2024, paragraph 6.8).

3.28 The Scientific Committee endorsed the tagging manual in SC-CAMLR-43/BG/38 and asked the Secretariat to make it available along with other vessel and observer guides (paragraph 9.9).

Statistical Area 48

Icefish (*C. gunnari*) in Subarea 48.2

3.29 The Scientific Committee noted the deliberations by WG-FSA-IMAF-2024 on a research plan submitted by Ukraine to conduct a research survey for *C. gunnari* in Subarea 48.2 (WG-FSA-IMAF-2024/68 Rev. 1). The proposed survey would be an effort-limited acoustic trawl survey occurring over three fishing seasons and commencing in the 2024/25 fishing season. The main objectives of the survey would be to determine the distribution, abundance and stock structure of *C. gunnari*; provide information on ecosystem change, and improve integrated ecosystem-based approaches to fisheries in Subarea 48.2.

3.30 The Scientific Committee also noted that the proposal had been revised in response to all comments made by WG-FSA-IMAF-2024, that WG-ASAM-2024 had encouraged the proposal without raising concerns (WG-ASAM-2024, paragraph 7.8), and that WG-SAM-2024 considered outcomes from the proposed work would be useful, again without raising concerns (WG-SAM-2024, paragraph 7.21). Despite all this, WG-FSA-IMAF-2024 did not endorse the proposal.

3.31 The Scientific Committee acknowledged the inconsistency in the outcomes from WG-FSA-IMAF-2024, WG-ASAM-2024, and WG-SAM-2024 with respect to the research plan proposed by Ukraine. It was agreed that such inconsistencies could be reduced if each working group limits its review of research plans to those parts for which it has relevant expertise, and the Scientific Committee considers the recommendations from each working group separately. It was noted that, in the case of the research plan proposed by Ukraine, this approach had not been followed.

3.32 Dr Kasatkina (Russian Federation) noted that the first step of the research program proposed by Ukraine in Subarea 48.2 was provided in 2022. Dr Kasatkina also noted that elements relating to the acoustic part and plankton data have not been completed (WG-SAM-2023/22; WG-FSA-2023/48), recalling that an external expert did not process the acoustic data and did not provide any information regarding the quality of the acoustic data (WG-FSA-2022, paragraph 5.45). Dr Kasatkina noted that the initial proposal (WG-FSA-IMAF-2024/68) as well as the revised proposal (WG-FSA-IMAF-2024/68 Rev. 1) required clarity on fundamental

aspects such as the methodology of the acoustic-trawl survey, acoustic data collection and processing procedures, expected survey results, and an indicator of the survey efficiency. Dr Kasatkina also noted the need to clarify who will collect and process the acoustic data, given that the proponents do not have acousticians to implement the acoustic-trawl survey, and it is still assumed that the collection and processing of data will be carried out by an external expert. Dr Kasatkina noted that the revised proposal includes changes in data collection, using two or three frequency methods, and significant changes in the milestones. Dr Kasatkina noted that the revised proposal requires consideration by WG-SAM-2025 and WG-ASAM-2025 emphasizing that there is still no clarity regarding the methodology for the implementation of the multifrequency method to distinguish krill and icefish distributions in the water column, clarity regarding the expected results and survey efficiency as well as who will provide data collection and processing of data and noted that the WG-ASAM-2024 approved the document WG-ASAM-2024/08 as a whole, without any recommendations for the implementation of the acoustic trawl survey, since the methodological aspects of the proposed survey for mackerel icefish (*C. gunnari*) were not reflected in WG-ASAM-2024/08. Dr Kasatkina noted that there is still uncertainty regarding the installation of a 38-kHz transducer on the Ukrainian vessel and the echosounder calibration using a reference sphere, being an essential condition for the implementation of the proposed acoustic trawl survey.

3.33 Dr K. Demianenko (Ukraine) confirmed that a 38 kHz transducer is scheduled to be installed in the proposed survey vessel by the end of October 2024. The new transducer will be calibrated and used together with 120 kHz and 200 kHz transducers that are already installed. Dr Demianenko further confirmed that collecting the acoustic data is within Ukraine's capacity, and that the data will be available to all Members.

3.34 Dr T. Knutsen (Norway) noted that, pending funding, scientists from the Norwegian Institute of Marine Research are prepared to assist with acoustic settings and calibration and data analysis, including a multi-frequency approach. Dr Knutsen also noted that Norwegian scientists have experience with acoustic surveys of species that lack swim bladders.

3.35 Dr Kasatkina noted that there is currently no clarity regarding the acoustic equipment for implementing the acoustic-trawl survey *C. gunnari* in the Statistical Subarea 48.2 proposed by Ukraine, as well as regarding the methodology and effectiveness of this research proposal, possible results and their practical significance. Dr Kasatkina did not support the proposal by Ukraine to conduct an acoustic trawl survey in Subarea 48.2 under CM 24-01 for *C. gunnari* commencing in the 2024/25 season.

3.36 The Scientific Committee did not reach consensus to endorse the research survey for *C. gunnari* in Subarea 48.2.

Icefish (*C. gunnari*) in Subarea 48.3

3.37 The Scientific Committee recalled its previous advice and recommended that the catch limit for *C. gunnari* in Subarea 48.3 be set at 3 579 t for the 2024/25 fishing season based on the biomass estimate from the UK survey conducted in 2023 (SC-CAMLR-42 paragraph 2.155) (Table 4).

Toothfish (*D. eleginoides*) in Subarea 48.3

3.38 Dr M. Collins (UK) introduced SC-CAMLR-43/BG/13, which summarised two recently published papers that analysed 25-years (1997-2021) of data from the *D. eleginoides* fishery in subarea 48.3 using data requested from the CCAMLR Secretariat. The analysis showed some inter-annual variability in the mean size of fish caught, but no systematic change. Periodic reductions in fish size were likely linked to recruitment pulses. The studies also showed no significant change in the size at maturity over 25 years and a small, but ecologically insignificant, change in the timing of spawning (1 day over 25 years). There was evidence of bimodality in spawning, with a small peak in April and a major peak in July.

3.39 The Scientific Committee concluded that the results summarized in SC-CAMLR-43/BG/13 demonstrate that there is no scientific basis to block operation of the *D. eleginoides* fishery in Subarea 48.3. Previous assertions by representatives from the Russian Federation that there have been decreases in the lengths of first maturity of male and female and in the average length of toothfish caught by the fishery have been disproven.

3.40 Dr Kasatkina noted that during the last ten years of fishing in Subarea 48.3, the basis of catches at all depths is formed by immature fish, and fish with a length of 5-7 years are already involved in the fishery. Dr Kasatkina noted that there is still a lack of biological data based on the overall distribution of the Patagonian toothfish population in Subarea 48.3 and noted the need for fishery-independent data on the distribution and abundance of Patagonian toothfish throughout all habitats of the toothfish in Subarea 48.3. Dr Kasatkina stressed that the need for such data was recommended in the 2018 and 2023 independent reviews. Dr Kasatkina recalled the Russian position on the need for an international longline survey that would cover all habitats of the *D. eleginoides* population in Subarea 48.3, supplementing the data on juvenile toothfish obtained from a trawl survey of demersal fish, where toothfish are only bycatch recalling that there are no other survey data on Patagonian toothfish in Subarea 48.3.

3.41 In response to Dr Kasatkina's statement, most Members noted that many thousands of otoliths sampled from the catch demonstrate that the vast majority of fish caught by the fishery in Subarea 48.3 are older than 5-7 years, but some young fish occur in the catch when pulses of new recruits enter the fishery. These Members also noted that the surveys are not just icefish surveys; these surveys have multiple objectives, including to estimate the biomass of pre-recruiting toothfish (e.g., WG-FSA-IMAF-2024, paragraph 8.11). It was recalled that the independent review of all toothfish stock assessments conducted in 2023 concluded that the assessments follow best practices, including integration of results from pre-recruit surveys, and are the best available science.

3.42 Dr Collins noted that there will be another groundfish survey during January-February 2025, and there is an opportunity for Members to participate in the survey. Scientists interested in participating in the survey were welcomed to contact Dr Collins.

3.43 The Scientific Committee noted the updated stock assessment of *D. eleginoides* in Subarea 48.3 (WG-FSA-IMAF-2024/29 and WG-FSA-IMAF-2024/30) and the deliberations by WG-FSA-IMAF-2024 on this assessment (WG-FSA-IMAF-2024, paragraphs 4.51-4.63). These deliberations included, *inter alia*, discussions on the integration of tag-based estimates of biomass into the stock assessment and the method for projecting recruitment in application of the CCAMLR decision rules.

3.44 The Scientific Committee noted that WG-FSA-IMAF-2024 recommended a catch limit of 2 062 t for *D. eleginoides* in Subarea 48.3 during the 2024/25 and 2025/26 fishing seasons (WG-FSA-IMAF-2024, paragraph 4.64), but, at the time the working group was adopting its report, Dr Kasatkina stated that she did not support the management advice (WG-FSA-IMAF-2024, paragraph 4.65).

3.45 The Scientific Committee also noted that Dr Kasatkina did not participate in the assessment subgroup during WG-FSA-IMAF-2024 (WG-FSA-IMAF-2024, paragraph 4.66), but that she did comment on the status of the *D. eleginoides* stock in Subarea 48.3 during plenary discussion in another agenda item (WG-FSA-IMAF-2024, paragraph 1.27). The Scientific Committee encouraged full participation in all relevant discussions during future years so that any scientific concerns can be discussed and addressed.

3.46 Dr Kasatkina (Russian Federation) noted that the current assessment of Patagonian toothfish in Subarea 48.3 performed using data from an illegitimate toothfish fishery undertaken in the 2021/22 and 2022/23 seasons in the absence of a conservation measure on the fishery for Patagonian toothfish in Subarea 48.3. Dr Kasatkina noted that the use of illegal fishing data in developing fishery management recommendations is not acceptable in any case and is contrary to the CAMLR Convention (Article 2).

3.47 Most Members noted that it is essential to account for all relevant data in stock assessments. The status of a stock and the effects of fishing cannot be well estimated if all relevant data are not considered in stock assessments.

3.48 Most Members also noted that the catch and age-composition data submitted for Subarea 48.3 were collected in accordance with CCAMLR standards and are of high quality.

3.49 Most Members agreed that Dr Kasatkina's statement indicates concerns that are not scientific concerns, and that the Commission is competent to address policy and political concerns.

3.50 Dr Kasatkina noted that she cannot support the management advice and stated the lack of consensus regarding the management advice for the *D. eleginoides* stock in Subarea 48.3.

3.51 Most Members noted that a catch limit for *D. eleginoides* in Subarea 48.3, set at 2062 tonnes for 2024/25 and 2025/26 and based on the assessment in WG-FSA-IMAF-2024/29 and WG-FSA-IMAF-2024/30, would be consistent with the precautionary yield estimated using the CCAMLR decision rules and the use of best available science (Table 4).

Toothfish (*Dissostichus spp*) in Subarea 48.4

3.52 The Scientific Committee noted deliberations by WG-FSA-IMAF-2024 on *D. mawsoni* in Subarea 48.4 (WG-FSA-IMAF-2024, paragraphs 4.106-4.111), which included discussions on a tag-based population assessment (WG-FSA-IMAF-2024/31) and the harvest rate applied to the result of this assessment.

3.53 The Scientific Committee endorsed the advice of WG-FSA-IMAF-2024 (WG-FSA-IMAF-2024, paragraph 4.112) and recommended that the catch limit for *D. mawsoni* in Subarea 48.4 be set at 37 tonnes for the 2024/25 fishing season (Table 4).

3.54 The Scientific Committee recommended that the catch limit for *D. eleginoides* in Subarea 48.4 of 19 tonnes in CM 41-03 remain in place for the 2024/25 fishing season (Table 4).

Toothfish (*D. mawsoni*) in Subarea 48.6

3.55 The Scientific Committee noted deliberations by WG-FSA-IMAF-2024 on *D. mawsoni* in Subarea 48.6 (WG-FSA-IMAF-2024, paragraphs 4.126-4.140), which, *inter alia*, included discussions on the stock hypothesis for *D. mawsoni* in Area 48, toothfish ageing, the development of a Casal2 assessment model, and a research plan for the exploratory fishery for *D. mawsoni* in Subarea 48.6.

3.56 The Scientific Committee endorsed the advice of WG-FSA-IMAF-2024 (WG-FSA-IMAF-2024, paragraphs 4.141) and recommended continuing the research fishing in Subarea 48.6 according to the research proposal in WG-FSA-IMAF-2024/23.

3.57 The Scientific Committee also endorsed the advice in paragraph 4.142 of WG-FSA-IMAF-2024 and recommended that the catch limit for *D. mawsoni* in Subarea in 48.6 be based on the trend analysis shown in Table 4 and set at 152 tonnes in Research Block 486_2, 50 tonnes in Research Block 486_3, 151 tonnes in Research Block 486_4, and 242 tonnes in Research Block 486_5 for the 2024/25 fishing season.

Statistical Area 58

Icefish (*C. gunnari*) in Division 58.5.2

3.58 The fishery for *C. gunnari* in Division 58.5.2 is operated in accordance with CM 42-02 and associated measures. In 2023/24, the catch limit for *C. gunnari* was 714 tonnes. Details of this fishery and the stock assessment of *C. gunnari* are contained in the Fishery Report (https://fisheryreports.ccamlr.org).

3.59 The Scientific Committee noted that WG-FSA-2024 reviewed an assessment of *C. gunnari* in Division 58.5.2 (WG-FSA-IMAF-2024/36) that was based on the results of the trawl survey described in WG-FSA-IMAF-2024/58 Rev. 1 and updated life history parameters for *C. gunnari* in Division 58.5.2, using data collected between 1997 and 2024 from surveys and the commercial fishery described in WG-FSA-IMAF-2024/39. Bootstrapped biomass estimates had a mean of 16 051 tonnes, with a one-sided lower 95% confidence bound of 9 731 tonnes. The assessment projected forward the one-sided lower 95% confidence bound of biomass of fish aged 1+ to 3+ (9 363 tonnes) with three different growth models (fitted to data from 2011-2017, 2011-2024 and 2018-2024) and 2024 weight-at-length parameters. Using the growth model for 2018-2024 in the assessment resulted in yields of 1 824 tonnes for 2024/25 and 1 723 tonnes for 2025/26 that allow for 75% escapement, therefore satisfying the CCAMLR decision rules.

3.60 The Scientific Committee recommended that the catch limit for *C. gunnari* in Division 58.5.2 should be set at 1 824 tonnes for 2024/25 and 1 723 tonnes for 2025/26 (Table 4).

Toothfish (*Dissostichus spp*) in Area 58)

3.61 SC-CCAMLR-43/BG/04 presented information regarding the tagging and recapture of toothfish across the boundaries of CCAMLR and SIOFA Convention Areas, showing transboundary movements of tagged toothfish documented through the data sharing agreement between the two organisations. This paper shows only the movements of toothfish tagged in either SIOFA or CCAMLR that have been recaptured across the boundary between the regional bodies (approximately 10-12 fish per year). The Scientific Committee noted that quality checks of biological data associated with some tag-recaptures may be needed.

3.62 The Scientific Committee welcomed the collaboration with SIOFA and noted the benefits of this data sharing agreement. It also noted that the locations and numbers of recaptured fish are highly influenced by fishing locations and the relative amount of fishing effort in each area. The Scientific Committee suggests further collaborative analyses could also consider transboundary movements of other species which may provide information on changes in distribution associated with climate change. The Scientific Committee further noted that the inclusion of tagging data within the CCAMLR Subarea 58.6, and Divisions 58.4.1 and 58.4.2 could provide more comprehensive understanding of such transboundary movements and stock connectivity, and requested the Secretariat to progress a similar tagging data sharing arrangement with SEAFO.

Antarctic toothfish (*D. mawsoni*) in Divisions 58.4.1 and 58.4.2

3.63 The Scientific Committee noted the discussion at WG-SAM (paragraphs 8.4-8.19) and WG-FSA-IMAF-2024 (paragraphs 4.143-4.152) regarding the research conducted in the *D. mawsoni* exploratory fishery in Divisions 58.4.1 and 58.4.2, and an updated research plan from 2022/23 to 2025/26 by Australia, France, Japan, the Republic of Korea, and Spain under CM 21-02, paragraph 6(iii).

3.64 The Scientific Committee noted that exploratory fishing under this research plan has been conducted in Division 58.4.2 in the past season by two Members using autoline, but that no exploratory fishing for toothfish has been allowed in Division 58.4.1 since 2018/19.

3.65 The Scientific Committee noted that WG-SAM-2024 (paragraph 8.19) and WG-FSA-IMAF-2024 (paragraph 4.152) recommended that a comparison of gear types in Division 58.4.1 would best be undertaken by using a depth-stratified, random sampling design, using two gear types in each research block, with paired sets being as close together as feasible. The Working Groups further concluded that this study would represent a useful survey design that could be used to examine the effects of mixed gear types on a variety of different aspects.

3.66 The Scientific Committee recommended that effects of different gear types on collected data be compared using data from the Ross Sea region fishery, where extensive data sets from vessels using the three longline gear types will allow for data analyses at small spatial scales.

3.67 Dr Kasatkina noted that multiple gear types should not be used for research proposals submitted under CM 21-02 paragraph 6(iii) as research plans should be reported in accordance with the Conservation Measure 24-01, Annex 24-01/A, format 2 which refers to calibration/standardisation of sampling gear. Dr Kasatkina pointed out that there are no provisions in the rules of procedure of the Scientific Committee and the Commission for partial implementation of CCAMLR Conservation Measures

3.68 Dr Kasatkina noted that the data available today clearly demonstrate the influence of the longline types on the indices of scientific fishing, such as the CPUE, the length and species composition of catches, mark-recapture data, and VME data (WG-FSA-IMAF-2024/77). Dr Kasatkina also noted that in the CCAMLR practice there are no approved definitions and procedures for assessing the characteristics of longlines as a tool for toothfish research fishing such as the swept volume per longline setting (or impact fishing zone), the catchability and selectivity and conducting research to compare the performance of trawling with different longline constructions , in her opinion, requires a preliminary discussion of solutions to these problems.

3.69 Dr Kasatkina noted that science experiments on effects of different gear types on collected data could be carried out in a Special Research Zone (SRZ), such as in the Ross Sea (Subarea 88.1 and 88.2). Dr Kasatkina stated that she did not support such an experiment in Division 58.4.1 as this was not in line with Conservation Measure 21-02.

3.70 Many Members noted that the proposed research plan represents a good scientific experiment to test the effects of multiple gear types on the data collection in a tagging program and recommended it to go ahead. These Members expressed disappointment that the Scientific Committee could again not find consensus on the research plan proceeding in Division 58.4.1.

3.71 The Scientific Committee agreed that research program in Division 58.4.1 is an appropriate scientific experiment that should be conducted, and referred the matter of which Conservation Measure this research should proceed under be considered by the Commission.

3.72 The Scientific Committee endorsed the research plan for the exploratory fishery in Division 58.4.2, but was unable to reach consensus on how to proceed in the exploratory *D. mawsoni* fishery in Division 58.4.1.

3.73 The Scientific Committee recommended that the catch limit for *D. mawsoni* in Divisions 58.4.1 and 58.4.2 be based on the trend analysis shown in Table 4 for the 2024/25 fishing season.

Patagonian toothfish (*D. eleginoides*) in Division 58.5.1

3.74 The fishery for *D. eleginoides* in Division 58.5.1 is conducted in the French Exclusive Economic Zone (EEZ) of the Kerguelen Islands. Details of the fishery and the stock assessment are contained in the Fishery Report (https://fisheryreports.ccamlr.org).

3.75 The Scientific Committee welcomed the ongoing development of the stock assessment of *D. eleginoides* in Division 58.5.1, noting the presentations of an updated integrated assessment model for the Kerguelen Islands *D. eleginoides fishery* in Division 58.5.1 up to the end of 2022/23 (WG-FSA-IMAF-2024/67), diagnostics for the assessment (WG-FSA-IMAF-2024/41) and analyses of the spatial bias in mark-recapture data (WG-FSA-IMAF-2024/61).

3.76 The Scientific Committee noted the progress on methods to evaluate the effect of spatial bias on the model from tag-recapture data, and an evaluation of the HCRs as recommended by WG-SAM in 2024.

3.77 The updated assessment model was run in Casal2 and estimated SSB0 at 188 460 tonnes (95% CI: 175 690 – 203 010 tonnes). The estimated SSB status in 2023 was 56.4% (95% CI: 54.2 – 60.2%).

3.78 The Scientific Committee noted additional work on tagging data did not suggest any evidence of a strong spatial bias. The authors suggested that decline in spatial variability noted in their analyses may in part be due to some quality control checks and adjustment of tag recapture matches.

3.79 The Scientific Committee noted that preliminary analyses suggested that when the tag recapture and tag release spatial bias correction factors were applied to the Chapman estimates, the combined effect on the resulting abundance estimates was small and did not result in a trend in bias over time.

3.80 The Scientific Committee noted that the application of the HCRs as recommended by WG-SAM-2024 performed well in achieving the target spawning biomass under the average future recruitment scenario, but with contrasting levels of catch and varying proportions of years spent above or below the target. In scenarios when future recruitment was low, all three HCRs resulted in projected SSB falling to levels below the 60% target. However, the U-ramp rules proved to be more precautionary, leading to higher average biomass levels than the constant-U rule (WG-SAM-2024, paragraph 6.8).

3.81 The Scientific Committee welcomed the proposed development of a sex-based model for the stock, noting that this may better account for changes in population structure and biological parameters.

3.82 The Scientific Committee noted that the assessment estimated a catch limit of 4 610 tonnes, and that this complied with CCAMLR decision rules under the assumption that the entire historical recruitment time series was representative of future recruitment.

3.83 The Scientific Committee noted that if future recruitment was assumed to be at a level similar to that estimated from the integrated assessment model for the period from 2007 – 2018, this would result in a lower yield. However, the Working Group also noted that the 2018-year class strength was estimated to be above average.

Patagonian toothfish (*D. eleginoides*) in Division 58.5.2

3.84 The fishery for *D. eleginoides* in Division 58.5.2 operated in accordance with CM 41-08 and associated measures. In 2023/24, the catch limit for *D. eleginoides* was 2 660 tonnes

and 735 t was taken as of 31 May 2024. Details of the fishery and the stock assessment are contained in the Fishery Report (https://fisheryreports.ccamlr.org/).

3.85 The Scientific Committee noted the work progressed regarding the fishery for *D. eleginoides* in Division 58.5.2 and discussed at WG-FSA-IMAF (paragraphs 4.78 – 4.93). The Scientific Committee also noted the large amount of work to estimate abundance calculated using the Chapman estimator from tagging data collected by the fishery (WG-FSA-IMAF-2024/69), and an updated assessment for Patagonian toothfish (*D. eleginoides*) in Division 58.5.2 (WG-FSA-IMAF-2024/50 and WG-FSA-IMAF-2024/64).

3.86 The Scientific Committee noted that the 2024 assessment model estimated SSB0 at 64 083 tonnes (95% CI: 60 139–68 635 tonnes) and the current status (B2024) was 37.9% of SSB0 (95% CIs 37.8–38.0% SSB0). Based on the result of this assessment and the application of the CCAMLR decision rules, the paper noted that a catch limit of 2 640 tonnes would be consistent with the CCAMLR decision rules. The authors considered that this assessment was consistent with the 2023 stock assessment model, but bias caused by the spatial patterns in the tag data was likely to have led to an underestimate of SSB0, recent stock status and a declining trend in recruitment. The authors considered that this updated model did not provide new advice to inform an updated recommendation on catch limits relative to the 2023 model and recommended to roll over the 2023 advice of 2 660 tonnes for the 2024/25 season. The authors considered that approach would have a low level of risk.

3.87 The Scientific Committee welcomed the work to refine the stock assessment, including the calculation of Chapman abundance indices for different regions of the fishery, the use of spatial approaches to identify trends in effort in core and smaller areas, and investigating alternative ways to include tag data in the Casal2 assessment.

3.88 The Scientific Committee welcomed the proposed future workplan for this assessment, and Australia's commitment to delivering it (WG-FSA-IMAF para 4.89). The Scientific Committee also noted that the structured fishing trial may provide helpful information, and that a presentation on survey design and preliminary results at WG-SAM-2025 would be very informative.

3.89 The Scientific Committee noted that the assessment was likely to be more uncertain than indicated by the confidence intervals estimated from the model. However, the Scientific Committee considered that:

(i) the spatial analysis suggests that abundance estimates from tagging are likely to be an underestimate, but that the extent of the underestimate is uncertain,

(ii) the summary statistics of age data suggests that the median age may have declined in the last decade, but that this may be a local effect in the core fishing area,

(iii) based on the available information, this stock is likely to be below the 50% target reference point, but above the 20% limit reference point,

(iv) the narrow confidence limits for current biomass status estimated by the model may lead to an underestimate of the risk of falling below 20% during the 35-year projection period.

3.90 The Scientific Committee discussed the application of the CCAMLR decision rule to the assessment of *D. eleginoides* in Division 58.5.2. Noting the estimated stock status and uncertainty caused by the spatial and temporal variability of tagging effort in the stock assessment, the Scientific Committee considered stock projections in which the spawning stock biomass returned to target level of 50%B0 after only 20 years rather than after the 35-year projections period in the CCAMLR Decision Rules (Figure 4). Projections indicated that with a catch of 2,120 tonnes the stock would reach 50% of SSB0 after 20 years.

3.91 The Scientific Committee noted that the stock assessments for Subareas 48.3 and 48.4, Divisions 58.5.1 and 58.5.2 and Subarea 88.1 had used different approaches to implementing stock projections in the CCAMLR decision rules and encouraged assessors to work together to address this (paragraphs 3.7–3.9).

3.92 The Scientific Committee recommended a catch limit for *D. eleginoides* in Division 58.5.2 of 2,120 tonnes for the 2024/25 and 2025/26 seasons.

Other areas outside of national jurisdiction in area 58

3.93 No new information was available on the state of fish stocks in Divisions 58.4.3a. 58.4.3b, 58.4.4a, 58.5.1 and 58.5.2, or Subareas 58.6 and 58.7 outside areas of national jurisdiction. The Scientific Committee, therefore, recommended that the prohibition of directed fishing for *D. eleginoides*, described in CM 32-02, CM 41-06 and CM 41-07 remain in force in 2024/25.

Statistical Area 88

Toothfish (*D. mawsoni*) in Area 88

3.94 The Scientific Committee noted WG-FSA-IMAF-2024/32 updated the Bayesian sex- and age-structured integrated stock assessment model for *D. mawsoni* in the Ross Sea region using Casal2. The 2024 base case model with recent (10-year) recruitment has been used for the provision of management advice, leading to a proposed catch limit of 3 278 t for the 2024/25 and 2025/26 seasons.

3.95 The Scientific Committee noted preliminary investigation in the use of Chapman abundance estimates using tag-release and recapture data, rather than the tag-release and recapture data in the Casal2 model. The preliminary model fitted the overall trend In the Chapman abundance estimates, but additional process error was not used that would have allowed the model to fit the observed uncertainty (WG-FSA-IMAF-2024/32).

3.96 The Scientific Committee noted that WG-FSA-IMAF-2024/65 presented the results of the 2024 Ross Sea shelf survey, and that only 12 out of 45 stations in the core strata and all 10 stations in the special stratum could be completed before the annual sea-ice freeze. The survey commenced later in the season due to the extended 2023/24 fishing season. The Scientific Committee also noted that completing the core strata should be prioritised in future years (WG-EMM-2024, paragraph 7.9).

3.97 The Scientific Committee noted that a Vulnerable Marine Ecosystem (VME) risk area was triggered under CM 22-07 in McMurdo Sound. The Scientific Committee recommended that investigation of the VME using underwater cameras should be included within future research surveys in this area.

3.98 The Scientific Committee recalled the Ross Sea Data Collection Plan (SC-CAMLR-42, Annex 7 WG-FSA work plan; WG-FSA-2023, paragraph 4.190-4.191) and encouraged Members to fully implement the data collection plan in the upcoming season. The Scientific Committee requested the Secretariat send reminders to vessels notified for Ross Sea fishery to follow the data collection plan, and recommended to the Commission that CM 41-09 be modified to refer to the requirement for Members with vessels fishing in this area to enable the delivery of the Ross Sea Data Collection Plan by its vessel crew and observers.

3.99 The Scientific Committee noted the continuation of the Ross Sea shelf survey (RSSS) (WG-FSA-IMAF-2024, paragraph 4.163) with an agreed catch limit for 2024/25 of 99 tonnes (SC-CAMLR-41, paragraph 3.138). The Scientific Committee noted that the RSSS, conducted annually since 2012, would be the third in the current 3-year research plan (2022/23–2024/25).

3.100 The Scientific Committee recommended the Ross Sea shelf survey outlined in WG-FSA-IMAF-2024/72 for the 2024/25 season proceed, with a catch limit set at 99 tonnes (including the core strata and the Terra Nova Bay stratum, SC-CAMLR-42, paragraph 2.198).

3.101 The Scientific Committee recalled that options for catch allocation in Ross Sea have previously been discussed, with the catch either deducted from the total Ross Sea region catch (2017/18 and 2018/19) or from the catch allocated to the RSRMPA special research zone (SRZ, 2019/20–2021/22) (SC-CAMLR-41, paragraph 3.139).

3.102 The Scientific Committee recommended that the values given as Method 3 in Table 5 be used to update the catch limits in the Ross Sea region for 2024/25 and 2025/26 years.

3.103 The Scientific Committee noted that WG-FSA-IMAF-2024/52 proposed a new research plan for Antarctic toothfish (*D. mawsoni*) under CM 24-01, paragraph 3 in Subarea 88.3 by the Republic of Korea and Ukraine to take place in 2024/25 and 2026/27. The new research plan proposed removal of Research Blocks 5, 7, 8, 9, and 10 and the addition of two new Research Blocks, which have not previously had a catch limit (11 and 12, WG-FSA-IMAF-2024, Table 10). 30 research hauls are planned in each of the new Research Blocks (WG-FSA-IMAF-2024, Table 11 and Figure 1). The Scientific Committee further noted the surveys will start from Research Block 6 and then proceed in the Research Blocks from east to west with considering the sea ice condition. The Scientific Committee also noted that the removal and addition of research blocks in this research program imply changes in the sampling design, and the influence of these changes need consideration on the collected data and its analysis.

3.104 The Scientific Committee noted that some parts of the proposed new Research Blocks in the original proposal (WG-SAM-2024/03) are excluded as part of the harmonisation process for D1MPA, as discussed during the Harmonisation symposium.

3.105 The Scientific Committee noted that the low number of tagged fish recaptured from this area could impact a future stock assessment. The Scientific Committee also noted that utilising the revised tagging manual (paragraph 3.28) could assist in improving tagging procedures and fish handling.

3.106 The Scientific Committee recommended that the catch limit for the Ross Sea region (Subarea 88.1 and SSRUs 882A–B) be set at 3 278 tonnes for the 2024/25 and 2025/26 seasons based on the outcome of the assessment, with 99 tonnes allocated for the Ross Sea shelf survey in 2024/25 (SC-CAMLR-41, Annex 9, paragraph 5.66).

3.107 The Scientific Committee recommended that the catch limits for Subarea 88.2 SSRUs 882C-H be based on the trend analysis as shown in Table 4.

3.108 The Scientific Committee endorsed the research plan for *D. mawsoni* under CM 24-01, paragraph 3 in Subarea 88.3 from 2024/25 to 2026/27.

3.109 The Scientific Committee recommended that the catch limits for Subarea 88.3 be based on the trend analysis as shown in Table 4.

Non-target catch

Fish and invertebrate by-catch

4.1 The Scientific Committee considered the discussions held by WG-FSA-IMAF regarding by-catch management in krill fisheries (WG-FSA-IMAF-2024, paragraphs 5.10–5.23).

4.2 The Scientific Committee discussed the by-catch extrapolation method presented in WG-FSA-IMAF-2024/05 (WG-FSA-IMAF-2024, paragraph 5.15) and agreed on the importance of better understanding by-catch of small fish, particularly for species and areas that have been historically overfished (e.g. *C. gunnari* in Subarea 48.2). While noting that the method for extrapolation followed standard methodology (WG-FSA-IMAF-2024, paragraph 5.14), the Scientific Committee discussed issues of small sample sizes, potential effects of different fishing gears, misidentification of fish, spatial concentration of some fish species and the spatial scale of data aggregation. The Scientific Committee noted that future developments of the extrapolation method were planned (WG-FSA-IMAF-2024, paragraph 5.16).

4.3 The Scientific Committee noted that in recent years, C1 by-catch weights were relatively similar to those derived from the observer data without extrapolation, indicative of increased observer effort and lower uncertainty. It noted that misidentification issues pertained to the smallest fish, that the development of larval identification guides was on the workplan of SCARFISH (WG-FSA-IMAF-2024, paragraphs 5.1–5.3) and that an estimated 80% of species identifications by observers were correct (WG-FSA-IMAF-2024/13). The Scientific Committee noted that the protocols for the sampling of by-catch by observers needed to be considered when developing new data collection protocols as part of the revision of the KFMA.

4.4 The Scientific Committee endorsed the recommendation by WG-FSA-IMAF (WG-FSA-IMAF-2024, paragraph 5.17) to circulate a questionnaire to vessel operators to better understand current by-catch sampling processes with results to be reported to WG-FSA-2025 by the Secretariat.

Incidental mortality of seabirds and marine mammals associated with fisheries

4.5 The Scientific Committee considered the discussions held by WG-FSA-IMAF regarding incidental mortality associated with fishing (IMAF) (WG-FSA-IMAF-2024, paragraphs 5.26–5.91), noting that in longline fisheries, 43 white-chinned petrel (*Procellaria aequinoctialis*) mortalities were recorded, along with six southern elephant seals (*Mirounga leonina*) and one minke whale (reported as *Balaenoptera acutorostrata*), the first recorded mortality for this species in CCAMLR fisheries. In trawl fisheries, the cape petrel (*Daption capense*) was the most common seabird mortality, with three recorded incidents, whilst two humpback whale (*Megaptera novaeangliae*) mortalities occurred, and one injured individual was reported as released alive with injuries likely to compromise its long-term survival.

4.6 The Scientific Committee noted per-cruise extrapolated warp strike estimates for traditional krill trawlers were 336 light strikes and zero heavy strikes, while continuous krill trawlers recorded 457 light strikes and 2 189 heavy strikes, up to 11 September 2024. The Scientific Committee further noted that one vessel had not recorded observation periods for warp strikes, and highlighted the importance of collecting this information.

4.7 ASOC made the following statement:

> *'ASOC is concerned about the by-catch of marine mammals and seabirds in the krill fishery. Reports of 2 189 heavy seabird strikes on trawl warps from continuous krill trawlers raise concerns, as these likely cause serious injury or death (WG-FSA-IMAF-2024, paragraph 5.27). Data reporting issues (WG-FSA-IMAF-2024, paragraph 5.33) suggest the actual impact could be greater. Ongoing reports of humpback whales in krill trawls and the first recorded minke whale death in the toothfish fishery highlight the need for stronger mitigation measures (WG-FSA-IMAF-2024, paragraph 5.26). ASOC further noted that reports of bird strikes during net monitor cable trials in the continuous trawl fishery (WG-FSA-IMAF-2024, paragraphs 5.49–5.51), especially in Subarea 48.2, show a need for stronger mitigation measures. ASOC urges krill trawl vessels to enhance ecosystem impact monitoring and eliminate impacts on seabirds and marine mammals, especially before any increases in catch limits.'*

4.8 The Scientific Committee considered CCAMLR-43/46 which presented a proposed revision of CM 25-03. The authors noted that a small portion of the net monitoring cable (NMC) in Norwegian krill trawlers is above the surface in continuous trawlers, and that Norwegian trawlers currently operating in the krill fishery have developed extensive mitigation measures, resulting in clearly lower strike rates. Hence, the authors proposed a revision of CM-25-03, which reverts the warp strike observation level required for vessels that have undertaken the trial and where the mitigation measure has been accepted by WG-IMAF to the warp strike observation level required for other trawlers not using a NMC (currently 3 x 15-minute periods). Reporting should be included with and follow normal SISO reporting procedures.

4.9 The Scientific Committee recommended that the Commission differentiate the requirement for the *Antarctic Endurance* and *Antarctic Sea* vs other vessels participating in the NMC seabird mitigation trial, since these vessels demonstrated a low level of strike activity compared to the stern trawler FV *Saga Sea*. In relation to the FV *Saga Sea*, the Scientific Committee recommended to continue improving the mitigation devices for the 2024/2025 season.

4.10 The Scientific Committee noted that all three vessels will comply with the 5% of total active fishing time observation coverage of the NMC and warp cables as required (CCAMLR-42 para 4.111-4.112). Observer coverage can be achieved with a combination of on-deck and video observations. A report on the improvement and functionality of the FV *Saga Sea* mitigation device should presented to the next meeting of WG-IMAF, while standard reporting from the 5% of total active fishing time observation coverage will be included with the SISO reporting.

4.11 The Scientific Committee commended Norway for their efforts and extensive work, and noted the discussions held by WG-FSA-IMAF on this subject (WG-FSA-IMAF-2024, paragraphs 5.48–5.66). It noted the usefulness of vessel diagrams presented by the authors and encouraged Members to include these in their notifications as they were informative of vessel configuration and mitigation measures, hence helping understand the higher strike rates of stern trawlers when compared to side trawlers. The Scientific Committee also noted that detailed trawl diagrams would be valuable, including mesh inserts and sizes.

4.12 The Scientific Committee noted results presented in three trials reports of Chinese krill fishing vessels FV *Fu Xing Hai* and *Shen Lan* (WG-FSA-IMAF-2024, paragraph 5.54-5.58) indicating the effect of bird behaviour, weather and natural light conditions on bird strikes, high effectiveness of mitigation devices to minimise bird strikes, especially the snatch block.

4.13 The Scientific Committee recommended maintaining the derogation of the prohibition of use of NMC in CM 25-03, and that the Commission note the progress made by the *Antarctic Endurance* and *Antarctic Sea* in mitigating the seabird interactions, but the need of improving the mitigation around the NMC and warp to prevent the high seabird strikes in the *Saga Sea* vessel remains. The Scientific Committee noted that flexibility in the methods by which the seabird strike observations could be undertaken (video and on deck) provided that both methods are utilised on vessels participating in such trials. The Scientific Committee noted that developing metrics and mitigation specifications to help determine when NMC trials could end would be beneficial (WG-FSA-IMAF-2024, paragraph 5.61) and encouraged WG-IMAF to consider developing such metrics and mitigation specifications.

4.14 The Scientific Committee discussed the use of video monitoring and the usefulness of such approaches (see also CCAMLR-43/BG/33, Item 9), and the value of on deck observations as they provide information not able to be collected by video. The Scientific Committee noted (WG-FSA-IMAF-2024, paragraph 5.64) that once video observations data are included in submissions to the Secretariat to allow retrospective analyses when required, this may enable the derogation in CM 25-03 to not require trial reporting to WG-IMAF for vessels that have been part of the trial for several years and have demonstrated low rates of bird strikes (e.g., Antarctic Sea and Antarctic Endurance for this year).

4.15 The Scientific Committee noted that the most frequently struck birds for krill trawlers are small petrels, which are highly manoeuvrable while flying, and this characteristic may mitigate the potential injury caused by strikes, and requested the Secretariat to compare the species composition of struck birds between krill and finfish trawl fisheries based on observation data.

4.16 ACAP made the following statement:

'The Agreement on the Conservation of Albatrosses and Petrels thanks the FSA-IMAF working Group for all their work on seabird by-catch and we welcome the reports submitted this year on the development of seabird by-catch mitigation methods for continuous krill trawl vessels. Sixteen ACAP-listed species occur in the CCAMLR area and most are in decline. Also seven of the nine High Priority Populations identified by ACAP for immediate conservation action occur in the CCAMLR area.The declines in ACAP-listed species are largely driven by mortalities associated with fishery interactions so ACAP welcomes all measures to reduce seabird interactions with fishing vessels.We note the high variability in bird strikes reported to IMAF, among vessels and between the Net Monitoring Cables and trawl warps. We also note with some concern that the extrapolated data suggest the occurrence of many thousands of bird strikes with warps and cables in the krill trawl fishery each year. As such we welcome the Commission's decision in 2023 to increase the level of warp strike observations onboard all trawling vessels to at least 5% of total fishing effort from the 2024/2025 season. This observations effort will allow us to better estimate the true interaction rates and the data will also inform analyses and discussion on the effectiveness of mitigation measures.Given the high number of strikes with trawl warps, ACAP emphasises the importance of the adoption and implementation of effective mitigation methods to prevent strikes with the warps of trawl vessels and we respectfully remind CCAMLR that ACAP's BPA provides proven and practical measures to reduce bird strikes with trawl warps.

ACAP is also concerned about the high number of extrapolated bird strikes with the Net Monitoring Cable reported for some continuous krill trawlers. At the recent meeting of its Seabird Bycatch Working Group (SBWG), ACAP welcomed the submission of a paper by Norwegian scientists and MRAG on mitigation measures and bird strikes associated with their continuous krill trawlers. The SBWG agreed that there was insufficient evidence to determine the effectiveness of the proposed mitigation measures for continuous trawlers. This outcome was endorsed by the ACAP Advisory Committee. However, ACAP agreed to further develop its Best Practice Mitigation Advice for trawl vessels and to consider specific measures that may be effective for continuous trawlers. We would of course report back to IMAF on progress and on further updates to this BP mitigation advice.Finally, while ACAP's and indeed other experts could not participate in the IMAF/FSA meetings this year, ACAP would very much welcome the opportunity for its experts to participate in the future meetings of the IMAF working group.'

4.17 The Scientific Committee welcomed the ACAP-SC-CAMLR collaboration, noted that the ACAP best practices document was a living document, and encouraged Members to always use the most recent version of this document.

4.18 UN DOALOS made the following statement:

'We thank all for allowing DOALOS as an observer at this meeting of the CCAMLR Scientific Committee. UN DOALOS welcomes the discussion on this issue and would draw attention to the inclusion of seabird by-catch in the recommendations of the resumed Review Conference on the UN Fish Stocks Agreement in 2023, noting recommendation 12.b includes "encourage cooperation to strengthen the protection of seabirds from the impact of fishing, by taking, to the extent possible, national and regional action to: (i) Establish and implement monitoring, data collection and reporting requirements for seabird by-catch species; (ii) Develop, implement and monitor risk and

science-based by-catch mitigation measures for seabirds; (iii) Encourage regional fisheries management organizations and arrangements to, as appropriate, develop harmonized measures and cooperate with the Agreement on the Conservation of Albatrosses and Petrels.'

4.19 The Scientific Committee considered the discussions held by WG-FSA-IMAF regarding mitigation methods for marine mammals (WG-FSA-IMAF-2024, paragraphs 5.67–5.72) and endorsed the recommendation to clarify the requirements for use of MMED in relevant CMs (WG-FSA-IMAF-2024, paragraph 5.73). It discussed whether the use of such mitigation measures should be mandatory for finfish trawl fisheries, noting that seal mortalities were previously recorded in the finfish trawl fisheries(WG-FSA-IMAF-24/10), and agreed that this required further consideration at the next WG-IMAF meeting.

4.20 The Scientific Committee recommended the following text be substituted for operative paragraph 7 of CMs 51-01 and 51-02 as well as operative paragraph 8 of CMs 51-03 and 51-04: 'The use of one or more marine mammal exclusion devices on trawls is mandatory. Exclusion devices shall minimise incidental capture of cetaceans (whales) and pinnipeds (seals and fur seals).'

Stick Water

4.21 The Scientific Committee considered the discussions held by WG-FSA-IMAF regarding mitigation methods for seabirds (WG-FSA-IMAF-2024, paragraphs 5.74–5.84).

4.22 The Scientific Committee noted that there was the potential for stick water to attract seabirds in krill fishing operations. It noted that the olfactory organs of procellariform birds are sensitive to scent compounds such as pyrazines, which are generated as a by-product of krill processing. They noted the potential that these compounds could attract seabirds to krill fishing operations from large distances. The Scientific Committee further noted that there is a lack of evidence regarding such effects on seabird behaviour when they arrive at the source.

4.23 The Scientific Committee noted that the composition of stick water may vary among vessels according to the processing methods employed onboard which may affect how attractive it is to different species. Combined with the way the vessel is configured to discharge stick water, this may have an influence on seabird attraction and the rate of bird strikes.

4.24 Scientific Committee tasked the Secretariat to develop a survey and circulate it to Members in order to determine 1) the types of products that are produced by vessels in krill fisheries, 2) the location of stick water discharge from vessels, and 3) how by-products from krill processing methods on individual vessels contribute to the composition of stick water. It agreed that this information may assist in determining if stick water contains potential food sources for birds.

4.25 The Scientific Committee noted that this is the 3rd survey that the Scientific Committee has requested the Secretariat to circulate amongst Members. It recommended that the Secretariat endeavour to combine these surveys into a single survey prior to circulation.

Gear specifications and diagrams

4.26 The Scientific Committee noted the review undertaken on a set of gear diagrams intended for inclusion in Conservation Measure 25-02, Annex C (WG-FSA-IMAF-2024, paragraphs 5.79–5.80). It noted that this effort addressed inconsistencies between the gear specifications and the diagrams provided for Spanish and trotline longline gear configurations.

4.27 The Scientific Committee endorsed the proposal set out in WG-FSA-IMAF-2024/09, with the revised diagrams for CM 25-02, and referred them to the Commission.

Warp strike observation protocols

4.28 The Scientific Committee reviewed the advice provided by ACAP (WG-FSA-IMAF-2024, paragraph 5.85), consisting of a seabird warp strike observation protocol for trawl fisheries, and agreed that this should be incorporated into the SISO tasking. They noted that the advice highlights the importance of estimating the abundance of seabirds in the vicinity of fishing operations in assessing the risk of heavy warp strikes.

4.29 The Scientific Committee agreed that the current finfish trawl bird abundance observation protocols should be brought into line with those proposed for the krill fishery.

Pinniped identification guide

4.30 The Scientific Committee noted the updated pinniped identification guide, following comments received from WG-IMAF-2023 (WG-FSA-IMAF-2024, paragraph 5.89). They noted that guide provides updated information for identifying the most common pinnipeds in the CCAMLR area and standard protocols for measuring carcasses and collecting biological data from by-caught species. The Scientific Committee endorsed its use by observers and the recommendations provided therein.

Bottom fishing and vulnerable marine ecosystems

4.31 The Scientific Committee considered the addition of a VME site based on discussions at WG-EMM-2024 (paragraphs 7.26–7.27). The Scientific Committee considered that WG-EMM-2024/48 Rev. 1 contained information consistent with WG-EMM adopted methodology (WG-EMM-2022/46 Rev. 1) to assess VME indicator abundance using video footage.

4.32 The Scientific Committee recommended the addition of the Lambda Island location as set out in WG-EMM-2024/48 Rev. 1, Annex 1 to the CCAMLR VME registry by the Secretariat.

Ecosystem monitoring and management

5.1 SC-CAMLR-43/BG/10 provided an overview and update of the EU Biodiversa+ Weddell Sea Observatory of the Biodiversity and Ecosystem Change (WOBEC) project. The WOBEC project consortium includes scientists from 11 institutions from 8 countries (Germany, Belgium, Italy, the Kingdom of the Netherlands, Norway, Poland, United States of America and Sweden). The WOBEC is aimed at establishing a systematic ecosystem monitoring framework in the Eastern Weddell Sea, and covers parts of the proposed Weddell Sea Marine Protected Area (WSMPA) Phases 1 and 2. Baseline data on biodiversity and ecosystem of the Eastern Weddell Sea are being made available to the public, and the use of technologies for long-term monitoring is being explored. It was noted that the process is being developed in close collaboration with CCAMLR and conservation stakeholders to ensure broad participation in the process. Dr K. Teschke (Germany) informed that a *Polarstern* cruise to the WOBEC study area is planned for 2025/2026. Information on the project has also been presented to WG-EMM-2024 and at the SCAR Open Science Conference.

5.2 The Scientific Committee welcomed the presentation and stressed the relevance of the WOBEC project in support for the research and monitoring activities in the Weddell Sea. Such an initiative represents an example of strong international cooperation in support of research and monitoring in the Southern Ocean.

5.3 The Scientific Committee considered SC-CAMLR-43/BG/12 reporting on Oceanites' activities since the CCAMLR-42 meeting. The newly released State of Antarctic Penguins 2024 report (https://www.oceanites.org/research-portal/state-of-antarctic-penguins-reports) was presented and changes in penguin populations were noted. Oceanites has established the baselines for mapping penguin colonies using drones that capture high-resolution two-dimensional images for penguin counting. Three-dimensional photogrammetric images have also been used to create a reference data library. All data feed into the comprehensive and growing open-access database (https://penguinmap.com/mapppd/)to which CCAMLR scientists are invited to contribute.

5.4 The Scientific Committee congratulated Oceanites for the excellent work and invited all Members to collaborate.

5.5 SC-CAMLR-43/BG/18 provided an update on the development of a collaborative, multi-Member monitoring program for Adélie penguins in Seaview Bay, Inexpressible Island in ASPA 178. The programme will be undertaken by Chinese, Italian and Korean scientists who will use standard CEMP methods to monitor Adélie penguins and Antarctic skuas.

5.6 The Scientific Committee welcomed the development of a multi-Member CEMP monitoring programme in the region and noted it would contribute to ecosystem monitoring of the Ross Sea region. It was noted that the Adélie penguin colony has been monitored for over 30 years and is one of the oldest known Adélie penguin colonies.

5.7 The SCAR Fellow, N. Friscourt, presented SC-CAMLR-43/BG/20 regarding her research on the role of Antarctic fur seals as bioindicators of seasonal and ocean basin scale variation of the Southern Ocean food web. This cross-basin study highlights significant seasonal dietary shifts in fur seals at Bird Island and Cape Shirreff using a minimally invasive method. The potential of Antarctic fur seals as bioindicators for monitoring seasonal and long-term changes in primary producers and biogeochemical processes of the Southern Ocean was

also underscored. This research could support CEMP by identifying environmental variables that can be used to assess the impacts of climate change on the Southern Ocean ecosystem, and help inform circumpolar ecosystem modelling, particularly during the austral winter.

5.8 The Scientific Committee congratulated the SCAR fellow for the interesting research and underlined the importance and success of the scholarship initiatives in building capacity. The value of developing novel low impact methods for collecting data was also acknowledged. The Scientific Committee looks forward to receiving further updates on the project at the next meeting of WG-EMM.

5.9 SC-CAMLR-43/BG/23 provided an overview and examples of national and multinational investigations, sustained long-term time series and internationally coordinated observing systems which combined, form the backbone of the Southern Ocean observing system and are integral to efforts to deliver sustained observations. However, a chronic lack of observations, which challenges the ability to detect and assess the consequences of change was highlighted. SC-CAMLR-43/BG 30 presented preliminary maps of observational coverage of the Southern Ocean and SOOS' data visualization tool, SOOSmap. These papers are a first step which will inform further work to assess gaps and to establish an inventory of monitoring efforts in the Southern Ocean.

5.10 The Scientific Committee thanked SCOR and SCAR for the update and highlighted the great value and importance of these observing systems and long-term time series data across the work of the Scientific Committee.

5.11 The SC noted SC-CAMLR-43/BG/24 which presented details on the establishment of the new SCAR Action Group on Fish (SCARFISH) that was proposed and approved by the SCAR Delegates in August 2024. The group aims to identifying research gaps in fish biology and fostering broader international collaboration and coordination to fill those gaps, synthesizing fish research needs from CCAMLR and working to integrate more comprehensive Southern Ocean fish research into CCAMLR, and broadening diversity of researchers in Southern Ocean fish research. The group had already been introduced and welcomed at WG-FSA-IMAF-2024 (WG-FSA-IMAF-2024, paragraphs 5.1-5.3). The Scientific Committee endorsed the areas of mutual interest between SCARFISH and CCAMLR (WG-FSA, Table 12).

5.12 The Scientific Committee underlined the mutual interest of SCARFISH and CCAMLR. It also noted the importance of engaging with SKEG as a good model to be followed.

5.13 SC-CAMLR-43/BG/26 summarised the introduction of data layers into an EcoIndex, which offers new insights into regions of high ecological value across different trophic levels. The EcoIndex integrates biological observations obtained through remote sensing and advanced Earth System Model (ESM) data, identifying areas of regional importance around the Antarctic continent and evaluating the impact of polynyas on these regions.

5.14 The Scientific Committee welcomed such an ambitious work that could also benefit from particle sedimentation modelling. Members encouraged discussion within the WG-EMM.

5.15 SC-CAMLR-2024/BG/33 submitted on behalf of SCAR and IAATO provided an update on the current status and known impacts of High Pathogenicity Avian Influenza (HPAI) in Antarctica. The paper summarises HPAI cases from the 2023/24 season and notes the work

undertaken by SCAR to i) prepare a biological risk assessment for the Antarctic region and its bird and marine mammal biodiversity, and ii) establish an HPAI database to monitor and record information on the spread of HPAI outbreaks in the sub-Antarctic and Antarctica. SCAR and IAATO encourage Members to ensure that biosecurity guidelines and procedures are implemented to minimise the risk of spreading the disease within the Convention Area through human activities, and to continue vigilance and monitoring as well as sample collection and testing.

5.16 The Scientific Committee thanked SCAR for providing this comprehensive assessment of the status and impacts of HPAI in Antarctica and noted there is a high likelihood that HPAI has remained present in that region during the austral winter. The Scientific Committee also noted that as sub-Antarctic and Antarctic species begin to return to breed at the start of the 2024/25 austral summer, the risk remains high for intra-regional spread, infection to multiple species, and continuing impacts to wildlife.

5.17 The Scientific Committee considered the discussion of HPAI at WG-EMM (SC-CAMLR-43/13, paragraphs 3.69–3.77) and recommended that the guidelines for handling and disposing of seabirds and marine mammals by vessels in CCAMLR waters (SC-CAMLR-43/13 Appendix D) be uploaded to the CCAMLR website to be available to all Members.

5.18 The Scientific Committee noted that HPAI may have multi-year and long-term impacts that could have consequences for CEMP monitoring with impacts on data collection and interpretation. The SC requested that details of impacts of HPAI on CEMP sites should be reported on a standardised data submission form to be developed by the secretariat (SC-CAMLR-43/13, paragraph 3.76).

5.19 Dr N. Kelly (Australia) informed the Scientific Committee that Australia has recently developed an HPAI response plan that could be shared with interested Members on request.

5.20 SC-CAMLR-43/BG/32 submitted by Belgium, SCAR and SCOR, provided an overview of the most recent activities of the SCAR Antarctic Biodiversity Portal (biodiversity.aq). An initial report on the 2023 workshop on Essential Variables (EVs) is now available online. It introduced the SCAR DistAnt Ecological Model Output Repository, which provides a repository and software tools to access ecological model outputs from Antarctica and the Southern Ocean (431 layers from 18 publications). In addition, the biodiversity.aq portal is now accessible in all four official CCAMLR languages.

5.21 The Scientific Committee thanked the authors for the update and welcomed the availability of the biodiversity portal in all four official CCAMLR languages.

5.22 The Scientific Committee considered SC-CAMLR-43/BG/08 Rev.1 submitted by the United Kingdom which provides a proposed model for an annual report on the State of the Environment and Antarctic Marine Living Resources in Area 48 (Scotia Sea). The paper presents both a one-page summary and more detailed reporting on environmental data on sea ice, sea surface temperature, surface air temperature, chlorophyll-a concentration, climate indices, and iceberg presence, alongside information on the CCAMLR Ecosystem Monitoring Programme in the region and catch and effort data for the krill fishery up until July 2024. The report is intended to provide the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), Scientific Committee, and stakeholders with an annual appraisal of the environment and marine living resources in Area 48.

5.23 The Scientific Committee thanked the authors for the development of the comprehensive report noting that such reports would be extremely valuable for providing context on the state of the environment for the work of Scientific Committee and Commission. The Scientific Committee noted that further consideration should be given to the development of such reports for other regions within the Convention Area including the most appropriate spatial coverage of these reports. The SC noted that during its discussions of the paper at WG-EMM it was suggested that reports could be developed at the scale of the MPA planning domains.

5.24 The Scientific Committee also noted that the frequency at which reports require updating should also be considered further and consideration should also be given to the automation of the process of updating such reports. The Scientific Committee also noted that the report presents different variables at different timescales and it may be advantageous to show all variables at the same time scale.

5.25 The Scientific Committee noted that a range of additional variables could be considered for inclusion in such 'State of the Environment' reports including model forecast data and information on alternative trophic pathways in addition to krill. It was noted that SC-CAMLR-43/BG/08 Rev.1 included data on the krill fishery but other fishery information should also be considered for inclusion for Area 48.

5.26 The Scientific Committee noted the discussion at WG-EMM on the state of the ecosystem reports (SC-CAMLR-43/13, paragraphs 6.73–6.79) and the recommendations of WG-EMM on the format of reports (SC-CAMLR-43/13, paragraph 6.76). The SC noted that further consideration should be given to showing raw data as well as to the use of unpublished data in state of the environment reports if they are to be made publicly available and also noted that accessibility to the information within the report could be improved through the development of an app.

5.27 New Zealand noted that they are considering developing a status of the environment report summary for the Ross Sea region and contributions from other Members and scientists will be welcomed. The Scientific Committee recommended that a Discussion group be formed to facilitate further discussion of the development of regional state of the environment reports between Members.

5.28 The Scientific Committee noted the extensive discussion at WG-EMM on CEMP (SC-CAMLR-43/13, paragraphs 6.21–6.72) and in particular the progress made during the intersessional period on the tasks attributed to four temporary teams which were created to progress recommendations towards the broader endeavour of ecosystem monitoring, using data from existing CEMP sites and other sources.

5.29 The Scientific Committee noted the concerns of WG-FSA (SC-CAMLR-43/14, paragraph 8.15 – 8.17) that IUCN had recently listed the icefish species *Pseudochaenichthys georgianus* as 'endangered' and *C. aceratus* as 'vulnerable' but that the IUCN had not consulted with CCAMLR in making these determinations.

5.30 The Scientific Committee further noted that limited information on some species in the Convention Area may introduce uncertainty in future IUCN evaluations and urged Members to improve species identification and data collection from all fisheries in the Convention Area.

5.31 The IUCN welcomed the opportunity to respond and informed the Scientific Committee that details of the IUCN red list process including rules, guidelines and criteria for listing can be found on the IUCN website. The Red Listing process is carried out by independent scientific experts and, whilst there is no official requirement to liaise with CCAMLR whilst undertaking the listing process, it was recommended that reference to all relevant literature be made. In this instance the independent experts did not seek access to the CCAMLR data holdings for these icefish species. The IUCN informed the Scientific Committee that there is a process to challenge the addition of a species to the IUCN red list and further details of this petition process against listing can be found on the IUCN red list website.

Spatial management of impacts on the Antarctic ecosystem

6.1 CCAMLR-43/BG/35 presented a literature survey on the benefits of large-scale MPAs and framed the findings within four key contexts: (i) the ecological processes and biodiversity that underpin these areas, (ii) their role in supporting climate resilience, mitigation and adaptation, (iii) the economic benefits they generate, and (iv) their importance for research and science. In light of these benefits, the European Union and its Members States recommended that CCAMLR adopt the proposals to designate large-scale MPAs in East Antarctica, the Weddell Sea, and the Antarctic Peninsula, as a key step towards establishing a representative system of MPAs in the Convention Area, to which CCAMLR committed in 2008 (CCAMLR-XXVII, paragraph 7.2) and 2011 (CCAMLR-XXX, paragraph 7.4).

6.2 The Scientific Committee welcomed the paper highlighting the benefits of large-scale MPAs, including increasing biodiversity and promoting the sustainable use of marine living resources.

6.3 Dr H. Li (China) commented on the ecological benefits and cost efficiency. The Convention Area is recognised under the effective conservation measures and well-managed fisheries, the situation of ecological benefits shall be different for highly fished areas and needs to be proved with the evaluation of RSRMPA. The Southern Ocean includes some data-poor areas, the data and integrated analysis used to justify the designation of MPA will be expensive. Larger MPAs are less expensive per unit, which cause the possibility of unclear protection targets, indicators and their parameters, and lacking the consideration of following RMP.

6.4 Dr Kasatkina noted that extensive research is needed to justify the establishment of MPAs and their boundaries, and that a set of indicators is needed to assess MPA performance, as well as a clear idea of who will conduct regular research and monitoring in large-scale MPAs.

6.5 In SC-CAMLR-43/BG/19, ASOC outlined how scientific research is critical to understanding and managing the rapidly changing environment of Antarctica and the Southern Ocean and the importance of considering contributions from international research programmes and observatories, such as WOBEC. ASOC recommended protected ecosystems to differentiate the effects of climate change from other stressors, improve marine conservation, and ensure that decision-making is consistent with the objectives of the CAMLR Convention in the Antarctic Treaty System, particularly with regard to increasing anthropogenic pressures and the need for precautionary measures in fisheries management.

Existing marine protected areas, including research and monitoring plans for MPAs

6.6 CCAMLR-43/48 presented suggestions for establishing Marine Protected Areas in the CAMLR Convention Area – specifically, regulation of the uniform process for establishing MPAs and the Commission's management of MPAs taking into account the current legal and scientific aspects of establishing MPAs in the Convention Area. The authors proposed to develop a roadmap as a tool for achieving the objectives of the MPA and a draft of such a roadmap is provided in this paper. It included:

(i) amending CM 91-04 by introducing sufficient procedural and implementation measures to regulate a unified process for the establishment and management of MPAs in the Convention Area;

(ii) suspending discussions on new proposals for the designation of Marine Protected Areas in the Convention Area until the rules governing the unified process for establishing MPAs in the CCAMLR area have entered into force (CM 91-04, Annexes 1-3); and

(iii) transitioning SOISS MPA (CM 91-03) under the governance of the revised CM 91-04, with all necessary submitted documents and by consensus of the Scientific Committee and the Commission.

6.7 The Scientific Committee noted that the paper is largely policy-related and lacks scientific elements that could be addressed. Most Members do not support the concept of 'sufficient science' outlined in the paper and clarified that the Scientific Committee should adhere to the language of the Convention, including best available science as outlined in Resolution 31/XXVI, to ensure a streamlined process, to be applied across all CCAMLR areas.

6.8 China noted that their proposal submitted to the Commission (CCAMLR-43/41) shares concerns with CCAMLR-43/48 on baseline data and Research and Monitoring Plan (RMP) suggestions for the scientific elements, such as data requirements for the scientific justification of MPAs, their goals, objectives, boundaries, and RMP.

6.9 SC-CAMLR-43/BG/11 included a published article which proposes to use the world's largest MPA in the Ross Sea, Antarctica as a model system to create an international, interdisciplinary network supporting policy-relevant research and monitoring that could be implemented in other remote, large-scale international MPAs. The article describes a framework for building a 'Research Coordination Network' consisting of three key components:

(i) policy engagement;

(ii) community partner engagement; and

(iii) integrated science comprising three themes: data science and cyberinfrastructure, biophysical modelling, and observations that include monitoring and process studies.

6.10 The authors suggested that the Research Coordination Network could be used as an example of how to bring together diverse interdisciplinary participants towards an effective, integrated science-policy collaboration.

6.11 The Scientific Committee welcomed the document. The framework was regarded as helpful for supporting the review of the Ross Sea region MPA (RSRMPA) in 2027, for facilitating international cooperation and for increasing efficiency. The Scientific Committee noted that the governance of the 'Research Coordination Network' will be developed as the project evolves, and further discussed the advantage of incorporating the already existing data infrastructures from other organisations such as SOOS, and the wealth of information already deposited in the CMIR (CCAMLR MPA Information Repository).

6.12 Dr. Kasatkina noted that, in their opinion, such an MPA would require a huge amount of scientific data to justify the goals, boundaries, monitoring indicators and assess the effectiveness of the MPA, as well as subsequent regular studies in the MPA to implement the RMP. In her opinion, examples of existing MPAs show how difficult it is to conduct such complex studies, presenting the corresponding reports. She drew attention to the CCAMLR-43/48 which discuss the scientific and legal aspects of establishing an MPA in the CCAMLR Area.

6.13 Dr Li suggested that there is no clear baseline dataset or clear design objectives of the RSRMPA which would facilitate evaluation of the ecological benefits of this large-scale MPA as discussed in SC-CAMLR-43/BG/35.

6.14 Dr Kasatkina recalled the upcoming reporting for the first stage of the RSRMPA in 2027 and, referring to document CCAMLR-SM-III/09, noted the absence of a RMP approved by the Commission, recalling that there is also no clarity regarding the monitoring indicators that meet the stated objectives of the RSRMPA and the indicators for assessing the effectiveness of the RSRMPA, as well as no clarity regarding the source of resource provision for conducting research programs in the RSRMPA, and above all, for the catch limit for Antarctic toothfish.

6.15 The Scientific Committee recalled that the objectives for the RSRMPA are detailed in CM 91-05 along with the priority elements for research and monitoring (CM 91-05 Annex C) and that the current RSRMPA RMP has been endorsed by the Scientific Committee (SC-CAMLR-XXXVI para 5.45). Details of the baseline data and many hundreds of projects are detailed in the online CMIR and an update of scientific progress was given in 2022 as part of the RSRMPA five year review (SC-CAMLR-41/BG/36, SC-CAMLR-41 para 6.12-6.15).

6.16 SC-CAMLR-43/01 provides information in support of the 2024 review of the South Orkney Islands Southern Shelf (SOISS) MPA in accordance with CM 91-03 and included an updated draft MPA RMP for consideration by the Scientific Committee. SC-CAMLR-43/BG/03 supports paper SC-CAMLR-43/01 providing information relevant to the 2024 review of the SOISS MPA, including information on fishing activities in Subarea 48.2, research and monitoring activities undertaken by the UK, Norway, Uruguay, Argentina and France, and updates on the key ecosystem indicators identified in the draft MPA RMP. The authors recommended that CM 91-03 is maintained in its current form until the next review in 2029 or until appropriate alternative measures are agreed as part of the D1MPA and harmonisation processes, noting that consideration of potential alternative measures could be undertaken during the proposed 3-year initial phase of harmonisation. It was further recommended that the Scientific Committee consider endorsing the draft RMP.

6.17 The Scientific Committee recognised that this MPA has been the first step towards a network of MPAs. The ongoing development of the harmonisation process was regarded as an opportunity to examine how the objectives of 91-03 and the draft RMP could be achieved and

incorporated as part of a wider regional approach for Subareas 48.2 and 48.1. The paper further shows the importance and effectiveness of the MPA, for example, to protect foraging areas of Adélie penguins after the breeding season. Most Members endorsed the draft RMP included in the document and considered it ready for adoption. Some Members suggested the consideration of additional data in the review.

6.18 Dr Kasatkina referred to paper SC-CAMLR-43/09, which provided further comments on the status of the SOISS MPA. The authors noted that he Scientific Committee and the Commission did not adopt the Reports for the second review period of the MPA. It was also argued that the third review period (2020–2024) did not facilitate the organisation and implementation of regular research and still, no research directly related to achieving the MPA objectives was carried out for monitoring of biodiversity and ecosystems in and around MPA, measurable criteria and indicators of the MPA performance are still missing. The authors noted that the absence of the RMP approved by the Scientific Committee and the Commission makes it impossible to assess the achievement of the objectives of the MPA for the third reporting period (2000–2024), repeating the same situation with the lack of reporting for previous periods (2009–2014, 2015–2019). Dr Kasatkina noted also that the European Union and the United Kingdom were expected to carry out the work to align CM 91-03 and CM 91-04, which should be completed by the end of the second review period scheduled for 2019 (CCAMLR -XXXIII, paragraph 5.88). Russia noted the necessity of determining the status of the SOISS MPA, as repeatedly stated at the CCAMLR meetings (SC-CAMLR-XXXVI/BG/26; SC-CAMLR-XXXVII/18; CCAMLR-41/40; CCAMLR-SM-III/08)

6.19 Dr L. Xing (China) noted that the data and analysis in the support of SOISS MPA review is insufficient in accordance with the conservation objectives. On conserving important predator foraging areas, the data and analysis of baleen whales could be added as they regularly appeared off the South Orkney Islands (Åsvestad et al., 2024). On conserving representative examples of pelagic bioregions, fish species feed on krill could be analysed. On conserving representative examples of benthic bioregions, the data of benthic habitat and species are insufficient, and analysis on benthic community structure and temporal variations of benthic species could be improved.

6.20 ASOC thanked the authors of SC-CAMLR-43/01 and SC-CAMLR 43/BG03 for their work to review the South Orkney Islands Southern Shelf MPA and thanked relevant Members for the drafting of RMPs for both this MPA and the RSR MPA. ASOC urged the SC to support the recommended research and monitoring plan for the South Orkney Southern Shelf MPA, noting the SC has already endorsed the RSR MPA RMP. ASOC further encouraged SC-CAMLR to advise the Commission on the importance of ensuring the continuity of CM 91-03 and adopt the RMPs for both existing MPAs, which will allow CCAMLR to improve management of these essential and important conservation areas.

Review of the scientific elements of proposals for new MPAs

6.21 SC-CAMLR-43/06 presented updated draft priority elements for scientific research and monitoring in support of the proposed Weddell Sea Marine Protected Area Phase 2. The priority elements include the recommendation from WG-EMM-2024, suggestions from the WSMPA Phase 2 Research and Monitoring Plan (RMP) workshop in Oslo (Norway, 22–26 April 2024) and feedback provided by CCAMLR Members and Observers. The authors requested that the

Scientific Committee consider and provide advice on whether the draft priority elements meet the requirements of CM 91-04 or how it may require further refinement.

6.22 SC-CAMLR-43/BG/09 presented information on recommendations from SC-CAMLR-42 and WG-EMM-2024 on how the proposed improvements to the scientific basis of the Weddell Sea Phase 2 Marine Protected Area proposal have been addressed and provided a response to the suggestions and requests on the proposal from SC-CAMLR-42 and CCAMLR-42.

6.23 The Scientific Committee noted that an updated proposal for the WSMPA Phase 2 will be submitted to the Commission with improved consistency in zoning with the WSPMA Phase 1 proposal. The Scientific Committee also noted that supporting data and documents will be submitted to the CCAMLR MPA Information Repository (CMIR), and that the WSMPA Atlas will be updated with two new tables for baseline data, analyses and indicators linked to each MPA objective.

6.24 The Scientific Committee thanked the authors for the extensive work in response to recommendations from SC-CAMLR-42 and WG-EMM-2024. Many members noted that the priority elements met the requirements specified in CM 91-04 and that the science supporting the WSP2 MPA proposal as set out in SC-CAMLR-43/BG/09 was well developed and based on best available science.

6.25 Many Members noted that the RMP workshop in Oslo in April 2024 had provided an excellent opportunity to develop this RMP in an open, collaborative and constructive way.

6.26 The Scientific Committee noted that more baseline data could be added to the RMP, which is a living document. It further noted that Adélie penguin tracking data was collected in 2011 and 2012, and that more recent data could be included in the RMP, especially as there is evidence that penguins are foraging from Prydz Bay into the area of the proposed MPA.

6.27 Dr J. He (China) noted that an RMP is one of the crucial elements for the establishment of MPAs. An MPA proposal should contain an operable RMP, and priority elements should be organised under an RMP working framework. Dr He noted that some of the indicators do not contain sufficient field observations on parameters such as species life cycle and distribution, and that these indicators are different from those predicted by numerical models. Dr He further noted that more baseline data are needed since some early data does not reflect the current situation and recommended to conduct surveys to collect more baseline data in future years.

6.28 Dr Kasatkina noted that there is further work required on the RMP. and that there is no clarity on indicators that can be used to assess the effectiveness of the MPA and referred to previous documents submitted to SC-CAMLR-42 on establishing uniform requirements for the designation of MPAs and RMPs.

6.29 Dr Kasatkina noted the need to regulate a unified process of establishing MPAs in the CCAMLR Area and referred to document CCAMLR-43/18, which presents the relevant proposals. She also noted the need to present additional information in the justification of monitoring indicators, as well as indicators for estimating MPA efficiency.

6.30 Oceanites noted that they had collected data on many penguin colonies in the areas that could be used as baseline data for the RMP.

6.31 ASOC noted the priority elements require regular monitoring. Data can be collected on resupply trips or using remote data to provide a pragmatic approach.

Other spatial management issues

6.32 SC-CAMLR-43/08 provided a workflow pathway for transmitting an ATCM-proposed ASPA or ASMA designation and management plan between the ATCM and CCAMLR where the ASPA or ASMA contains a marine area. The paper recommended that the CCAMLR Secretariat be the designated recipient for proposed ASPAs and ASMAs that contain a marine area, and that when such a proposal is received, the CCAMLR Secretariat immediately forward it and any accompanying information to SC-CAMLR and its relevant Working Groups for consideration. SC-CAMLR would then prepare recommendations and advice for CCAMLR's review of the proposal. The paper recommended that the CCAMLR Secretariat transmit the results of the Commission's review (including approval or non-approval) and relevant report text to the ATCM Secretariat for CEP and ATCM consideration. Noting that several of the ASPA proposals endorsed by the Commission since the last time Annex CM 91-02/A was updated have now been approved by ATCM, the paper recommended that the Commission charge the Secretariat with updating the list of ASPAs and ASMAs in CM 91-02, and with keeping it updated thereafter.

6.33 The Scientific Committee noted that the proposal seeks to provide efficiencies in how information is transmitted from the CEP to CCAMLR and to ensure the processed is standardised.

6.34 Many members agreed the current process is confusing and time consuming and welcomed the proposed improved process. They supported the proposed mechanism and noted the proposed amendments would simplify the process and remove additional complexity where an ASMA/ASPA proponent is not a Member of CCAMLR. They recalled previous circumstances where revisions were delayed unnecessarily due to the existing process.

6.35 Dr Li noted that the proposed process should continue to be driven by the proponents and expressed concerns over the implications of the proposed pathway on the rules of procedures of CCAMLR and SC-CAMLR, e.g. timeline requirements for document submission. In addition, the proposal contains large number of procedures for ATCM and CEP, and some policy and legal elements that should be considered by the Commission.

6.36 Most Members agreed that the process is proponent-driven and noted that the proposed changes would not impact this. However, when CCAMLR has made a decision on an ASPA or ASMA proposal, the CCAMLR Secretariat, rather than the proponents, should present that information to the ATCM and vice versa.

Climate change

7.1 Dr E. Pardo (New Zealand) introduced paper SC-CAMLR-43/10, which reported on the progress on recommendations from the Workshop on Climate Change (WS-CC-2023). The tables in the paper summarised progress on the recommendations from WG-EMM-2024. The paper recommended that the Scientific Committee review and update the tables (including with

information from WG-FSA-IMAF-2024, and from other relevant papers and work programmes via Members and Observers to SC-CAMLR-43), to help track and report ongoing progress with WS-CC-2023 recommendations.

7.2 The Scientific Committee noted that an update on the progress on recommendations from the Workshop on Climate Change (WS-CC-2023) was provided by WG- FSA-IMAF-2024 (Tables 17 and 18).

7.3 The Scientific Committee noted that the tables show that considerable progress on the recommendations from WS-CC-2023 has been made, and the tables provided a useful resource to track the progress on the recommendations. It requested that tasks identified in the tables are integrated into WG workplans (paragraphs 11.17–11.21). The Scientific Committee also noted that updates to the work could combine the progress across the Working Groups, as that would facilitate a broader overview of progress on climate change issues for the Scientific Committee.

7.4 The Scientific Committee recommended incorporating the tasks identified in WG-FSA-IMAF-2024 Tables 17 and 18 into the workplans for the relevant Working Groups.

7.5 The Scientific Committee requested that the tables in WG-FSA-IMAF-2024 (Tables 19–23) summarising evidence for changes in stock assessment and population parameters or processes that could be due to the effects of environmental variability or climate change be made available as part of the relevant Fishery Reports.

7.6 SC-CAMLR-43/BG/15 provided updates on recent climate change research and observed changes that are relevant to the work of CCAMLR. The paper noted that Antarctic sea ice extent has experienced record lows for the last three years and Southern Ocean sea-surface temperatures and heat content in the upper 2000 m have continued to be well above average. Krill habitat, behavior and population dynamics are being impacted by changing climate, reduced sea ice and rising temperatures which have led to apparent reductions in adult krill population density, swarm size and frequency in the northern Southwest Atlantic since the 1970s. Krill habitat and associated population distribution have also contracted poleward, likely due to the reduction of sea ice.

7.7 The paper also noted that a new SCAR Action Group on Climate was being established that will assist with climate information assessment and provision of information to CCAMLR, CEP, ATCM and partner organisations. CCAMLR Members are encouraged to make specific requests for information from SCAR where relevant to future work on climate change. Dr C. Brooks (SCAR) also welcomed feedback on the types of information that Members would find most useful to support understanding and to facilitate the integration of climate change information into CCAMLR's work program.

7.8 SC-CAMLR-43/BG/37 Rev. 1 presented an update on the progress in developing plans for a joint CEP/SC-CAMLR climate change and monitoring workshop in 2025. In 2023-24, the Committee for Environmental Protection (CEP) and SC-CAMLR agreed to hold a joint workshop. The workshop intends to strengthen cooperation and coordination between the CEP and SC-CAMLR to monitor and manage climate change effects. The workshop Terms of Reference, Steering Committee composition have been agreed and with Conveners Dr R. Cavanagh (UK) and Dr H. Herata (Germany).

7.9 The Scientific Committee welcomed the development of the joint CEP/SC-CAMLR climate change and monitoring workshop and thanked the steering committee for organising the meeting. The Scientific Committee encouraged the organisers to consider options for holding the meeting in association with the 2026 ATCM/CEP meetings to avoid conflicts with other CCAMLR meetings that will be held in 2025.

7.10 ASOC thanked Members for the work in the intersessional period on understanding climate change impacts in Antarctica, and particularly the progress made on the recommendations agreed at the climate change workshop in 2023. ASOC supports the assignment of recommendations to the relevant working groups and also encourages Members to progress planning the important joint CEP/CCAMLR climate change workshop.

7.11 Members are encouraged to engage in the e-group on climate change and the e-group on the CCAMLR climate change glossary.

Illegal, unreported and unregulated (IUU) fishing in the Convention Area

8.1 Mr Somhlaba introduced discussions from the WG-FSA-IMAF-2024 report on the scientific information relevant to assisting in identifying illegal, unreported and unregulated (IUU) fishing activity in the Convention Area.

8.2 The Scientific Committee noted the discussion in WG-FSA-IMAF-2024 (paragraphs 8.1–8.3) on how Members are improving the identification of their fishing gears and recommended strengthening CM 10-01 to require marking more than just the line buoys. The Scientific Committee also noted the improvements in vessel-specific markings using different materials, dimensions, and branding on each component of the fishing gear in Ukrainian longline fishing gears as presented in WG-FSA-IMAF-2024/48.

8.3 The Scientific Committee further noted the discussion in WG-FSA-IMAF-2024 (paragraphs 1.14 – 1.18) in respect of recovered IUU gear and noted that improved identification of fishing gears originating from CCAMLR vessels would improve the ability to assign recovered or sighted fishing gear to licensed vessels, rather than being reported as IUU.

8.4 While noting that the following was not in relation to IUU fishing, COLTO introduced CCAMLR-43/BG/02 Rev.1 which provides the outcomes of a longline gear workshop held in Oslo, Norway from 15-16 August 2024. The workshop discussed the various aspects of using and maintaining demersal autoline gear in toothfish fisheries, in relation to how to minimise gear losses, and increasing the chances of recovering lost gear. The workshop also discussed gear end-of-life use. In addition, given discussions at CCAMLR-42 on gear marking (CCAMLR-42 para 7.60), the workshop also discussed elements of the FAO Voluntary Guidelines on the Marking of Fishing Gear and how current CCAMLR longline requirements compare.

8.5 The Scientific Committee noted the outcomes of the longline gear workshop and thanked COLTO for the paper.

CCAMLR Scheme of International Scientific Observation

9.1 The Scientific Committee noted CCAMLR-43/BG/33 on the implementation of electronic monitoring systems (EMS) in Chile to control discards, incidental by-catch and fishing regulation. The paper recommends that CCAMLR consider EMS in the applications of:

(i) improving monitoring standards of the fishing fleets operating in the Convention Area

(ii) strengthening transparency of fishing activities

(iii) providing additional information for the assessment of compliance with conservation measures, and

(iv) as a complementary tool for the Scheme of International Scientific Observation (SISO), to conduct monitoring and research associated with incidental by-catch and mortality of seabirds and marine mammals resulting from their interaction with fishing activities.

9.2 The paper further recommends the establishment of a Discussion group to discuss the drafting of guidelines of an EMS Program in the CAMLR Convention Area, along with the minimum standards for the program, equipment, and EMS data. Document CCAMLR-43/BG/33 Rev 1 contains draft of ToR for the EMS Discussion group establishment.

9.3 The Scientific Committee thanked Chile for this initiative and noted a number of previously discussed EMS trials undertaken by Members conducted in their national fisheries. The Scientific Committee noted the implementation of EMS by Chile has led to a significant improvement in data quality and compliance.

9.4 The Scientific Committee noted that EMS had been discussed at WG-FSA-IMAF-2024 (paragraphs 4.177–4.179, 5.9, 5.32) which highlighted that EMS offers a number of benefits and recommended the development of a workplan for EMS for scientific data collection. The Scientific Committee further noted this workplan could include considerations on developments in artificial intelligence technology for processing of EMS data.

9.5 COLTO highlighted that many of their members' vessels have EMS installed and could provide expertise on at sea use of EMS systems.

9.6 The Scientific Committee noted that ACAP has developed EMS guidelines and protocols for data collection which could contribute to the development of an EMS program for CCAMLR.

9.7 The Scientific Committee made the following recommendations:

(i) a Discussion group be established to allow observers to participate

(ii) the terms of reference include the development of a workplan for scientific data collection from EMS, noting these may have different system requirements from those used for compliance

(iii) that WG-IMAF or WG-FSA undertake a focus topic on scientific data collection from EMS.

9.8 The Scientific Committee noted SC-CAMLR-43/BG/38, which is an update of WG-FSA-IMAF-2024/40, based on comments received during WG-FSA-IMAF-2024 (paragraphs 6.6–6.9). The Scientific Committee thanked Ms M. Williamson and Mr C. Heinecken (South Africa) for their work in the development of the tagging manual following the recommendations of WS-TAG-2023.

9.9 The Scientific Committee endorsed the recommendation from WG-FSA-IMAF-2024 (paragraph 6.9) and tasked the Secretariat with making the tagging manual available online to members along with other vessel and observer materials (paragraph 3.28).

9.10 SC-CAMLR-43/02 reported on a workshop for training Russian scientific observers and inspectors working in the CAMLR Convention Area. The workshop program covered a wide range of aspects related to scientific observation and inspection in CCAMLR fisheries for krill, toothfish and crabs.

9.11 The Scientific Committee noted the paper provided guidance for Members developing observer programs and covered the types of information which could be collected. The Scientific Committee also noted that observers are trained annually with observers from the previous season reporting back to the workshop, for example the observers deployed this season on the krill vessel *FV Komandor* and the toothfish vessel *FV Alpha Crux* who went through the training last year also participated in this year's workshop.

9.12 Dr Arata noted that ARK was pleased to support the CCAMLR Secretariat with *in-situ* training on krill fishing operations during this past Austral summer. ARK facilitated Mr. I. Forster's travel from Hobart to Montevideo, and from there to the krill fishing grounds from January to February 2024. Mr Foster stayed on the fishing grounds from 28 January to 13 February, during which he visited the following fishing vessels: Antarctic Sea, Antarctic Endurance, Long Fa, and Shen Lan. ARK covered his travel expenses. The experience highlighted the value of collaboration and reciprocal learning between the Secretariat and the fishing crews.

9.13 The Scientific Committee thanked ARK and the China Fund for providing their support for the Secretariat to embark on this opportunity. The Scientific Committee noted that this opportunity will result in the development of better guides, manuals and forms through a better understanding of the on-vessel processes and the ability to collect high quality video and photographic materials.

9.14 ARK announced the introduction of the 'Krill Scientific Observer Prize' in recognition of the significant contributions made by scientific observers on behalf of CCAMLR. Every year, the Secretariat receives thousands of krill biological measurements, information on seabird and marine mammal interactions, and general observations about krill fishing operations. These observations are later used by CCAMLR to improve krill fishery management. To honour their contribution, ARK has launched this prize which recognises the efforts of the observers. ARK thanked the Secretariat, which in consultation with experts at WG-FSA, identified the top observers deployed in 2022/23 season. First prize (A$500) was awarded to Bing Su, deployed on the *FV Shen Lan*; second prize (A$300) was awarded to

Viktor Podhornyi, deployed on the *FV More Sodruzhestva;* and third prize (A$200) was awarded to Bo Kyun Choi, deployed on the *FV Sejong*.

9.15 The Scientific Committee welcomed the offer from ARK to fund several prizes acknowledging the contributions of observers deployed in the krill fishery. The Scientific Committee noted the advice in WG-FSA-IMAF-2024 (paragraph 6.5) that the allocation of the prizes should be based on an effort-weighted lottery system, as this would remove any influence on data collection.

Cooperation with other organisations

10.1 The Executive Secretary presented paper CCAMLR-43/10 describing cooperation with other organisations under formal Arrangements and Memoranda of Understanding that CCAMLR has signed. The Secretariat recommends that the Scientific Committee endorse re-signing of the cooperation agreements with SPRFMO and ACAP. The paper further notes that following adoption by ATCM of Measure 17 (2024) a change will be necessary to the Annex of CM 91-02.

10.2 The Scientific Committee endorsed the Secretariat recommendation to renew the cooperation agreements with SPRFMO and ACAP.

10.3 ACAP expressed its willingness to continue its cooperation with CCAMLR under a Memorandum of Understanding, and looked forward to renewing the MOU later this year. ACAP noted that it had paid particular attention to the work of WG-IMAF, providing information through an invited expert to assist in its deliberations. Even though the different arrangements this year meant that an ACAP expert could not take part, ACAP had contributed by submitting updated Best Practice Advice on mitigating seabird bycatch, and other relevant information, and hoped that in upcoming years its experts would again be able to attend meetings of WG-IMAF. ACAP encouraged CCAMLR Members who are interested in ACAP's work to attend meetings of its Working Groups and to contribute with relevant information on their own research and conservation actions.

10.4 The Executive Secretary presented paper CCAMLR-43/30 containing the draft Memorandum of Understanding between CCAMLR and the Government of Peru, aimed at enhancing the cooperation in relation to the work of the Scientific Committee, foster engagement in its work and data exchange.

10.5 The Scientific Committee welcomed the draft MOU presented by the Secretariat, looking forward to further collaboration with the Government of Peru.

Cooperation within the Antarctic Treaty System

10.6 The Scientific Committee considered SC-CAMLR-43/BG/35 which provided the annual report of the Committee for Environmental Protection (CEP) observer to the CCAMLR Scientific Committee. The report provides information on the discussions at CEP26 on five topics of common interest between the CEP and SC-CAMLR: Climate Change, Biodiversity and non-native species, Species requiring special protection, Spatial Management and area

protection, and Ecosystem and environmental monitoring. The outcomes of these discussions were:

(i) On the joint topic of 'Climate change implications for the environment', a proposal to update the Climate Change Response Work Plan by adding actions related to sea-ice change had been adopted. This was driven by concern about the rapid and large sea-ice loss and potential impacts on Antarctic species and habitats.

(ii) On the joint topic of 'Biodiversity and non-native species', the CEP discussed the status of Highly Pathogenic Avian Influenza (HPAI) in Antarctica based on a joint report by SCAR, COMNAP, IAATO, and CCAMLR, noting that in 2024 HPAI was confirmed at seven sites within the Antarctic Treaty Area. The CEP agreed that Parties should ensure that they have robust HPAI guidelines, encourage vigilance and monitoring, and continue to share information on suspected and confirmed cases to inform future decision making on this topic.

(iii) On the joint topic of 'Species requiring special protection', the CEP discussed a proposal to designate the Emperor penguin (Aptenodytes forsteri) as a Specially Protected Species. The CEP advised the ATCM that most Members strongly supported the recommendation that the emperor penguin be designated as an Antarctic Specially Protected Species, but that consensus was not reached. However, the CEP agreed that protection of emperor penguins should remain a high priority.

(iv) Finally, on the joint topic of 'Spatial Management and Area Protection', the CEP considered a revised management plan for the merger of Antarctic Specially Protected Areas (ASPA) 152, Western Bransfield Strait, and 153, Eastern Dallman Bay. The management plan for the proposed ASPA was previously evaluated by SC-CAMLR and approved by the Commission at CCAMLR-42 in 2023. The new ASPA was subsequently adopted by the ATCM as ASPA 182.

Reports of observers from other international organisations

10.7 The Scientific Committee considered CCAMLR-43/BG/27 by the Association of Responsible Krill Harvesting Companies (ARK), noting the paper highlighted a good year for ARK and its Members, and the hopes that it will constitute a milestone in the implementation of the KFMA and the D1MPA.

10.8 ARK announced that Rongcheng East China Fisheries Corporation, operating FV *Hua Xiang 9*, has joined the Association, increasing to ten the number of ARK-affiliated companies. ARK underlined its continuing support of the KFMA, carrying out krill acoustic surveys in Subareas 48.1 and 48.2. During this year two vessels operated in parallel to survey the largest area yet within the core Management Units of Subarea 48.1. ARK also contributed to the work of WG-ASAM (e.g. improving of krill survey protocols) and participated in the discussions leading to the MPA and catch-limit scenarios elaborated at the HS. ARK also informed the implementation of Voluntary Restriction Zones (VRZs) for the 6th consecutive year, with the entire fishing fleet complying with the voluntary closures. ARK acknowledged that the ultimate

goal is implementing the KFMA and D1MPA for Subarea 48.1 in the first stage and the whole of Area 48 in the medium term. Finally, ARK recommend the implementation of a Daily Catch and Effort Reporting System when the quota assigned or left is smaller than 30,000 tonnes, adjustment that would avoid catch overruns and is a necessary step for implementing the revised KFMA.

10.9 The Scientific Committee thanked ARK for its valuable contributions to its work.

10.10 The Scientific Committee considered CCAMLR-43/BG/34 submitted by ASOC, noting the support of several science projects through funding from the Blue Nature Alliance, including two from the National Museum of Natural History in France: one on phylodiversity patterns in the Southern Ocean and another developing an East Antarctic Marine Biodiversity Observation Network for data access and analysis.

10.11 ASOC also reported on the work of The Antarctic Wildlife Research Fund, co-founded by ASOC. Two projects were selected for funding in 2023, awarding a total of US$160,000. ASOC also informed that The International Cryosphere Climate Initiative released the State of the Cryosphere Report: Two Degrees is Too High ahead of COP28 in Dubai, including updates on the Antarctic ice sheet and Southern Ocean acidification, warming, and freshening. WWF (ASOC member organisation) collaborated with Intrepid Travel for research on baleen whale foraging in the Antarctic Peninsula and, together with the British Antarctic Survey, used satellite imagery to study emperor penguin colonies. WWF is also supporting research on the response of Adélie penguins to climate change, focusing on extending protections in the D'Urville Sea-Mertz Marine Protected Area by the Centre National de la Recherche Scientifique. Finally, ASOC reported the support in the organisation of the April 2024 Scientific Committee on Antarctic Research Krill Expert Group workshop and is a stakeholder of the Biodiversa+ Weddell Sea Observatory of Biodiversity Ecosystem Change project. ASOC also provided financial and organisational support to the CCAMLR Harmonization Symposium in Incheon, South Korea in 2024.

10.12 The Scientific Committee thanked ASOC for its valuable contributions to its work.

10.13 The Scientific Committee considered CCAMLR-43/BG/36 containing the Scientific Committee on Antarctic Research (SCAR) annual report to CCAMLR 2023/24, highlighting activities of relevance to discussions within SC-CAMLR. During its 11th Open Science Conference in August 2024 in Pucón, Chile, SCAR Delegates approved the establishment of a new action group focused on climate change and a new SCAR Fish Action Group. SCAR Delegates also approved a new Program Planning Group focused on Changes in Circumpolar Antarctic Gradients in Ecosystems (C-CAGE) with the goal to use the natural environmental gradients in temperature, ice cover, and other physical drivers that exist in different parts of Antarctica and the sub-Antarctic to better predict the likely outcomes for life as the region's habitats change.

10.14 The SCAR report highlights components of its Scientific Research Programmes, including INSTANT (INStabilities and Thresholds in ANTarctica) as a cross-disciplinary programme looking at quantifying Antarctica's contribution to past and future global sea-level change, AntClimNow (Near-term Variability and Prediction of the Antarctic Climate System) looking at near-term Antarctic climate variability and trends, understanding contemporary climate change, and modelling future climate projections, and Ant-ICON (Integrated Science

to Inform Antarctic and Southern Ocean Conservation) looking at the conservation and management of Antarctica and the Southern Ocean.

10.15 Ant-ICON with SCATS continued their fellowship program which enables an early to mid-career researcher to participate in these meetings as part of the SCAR delegation. In this 2nd year of the fellowship, we selected two fellows - one to attend the ATCM/CEP and one for the SC-CAMLR meeting.

10.16 SCAR also highlighted its engagement with other activities relevant to CCAMLR, including providing Antarctic Climate Change and the Environment updates and to advance efforts and tools to support decision making under a changing climate. This includes addressing recommendations from the 2023 CCAMLR Workshop on Climate Change, including the ongoing development of a climate model framework. Further, the SCAR Krill Expert Group has continued to work towards improving understanding of krill biology and ecology and acting as a conduit between the wider krill research community and CCAMLR. Finally, SCAR, in collaboration with the International Arctic Science Committee and other key partners, is involved in early discussions on planning for the 5th International Polar Year from 2032-2033. SCAR will continue to provide objective and independent advice on scientific issues to the Antarctic Treaty System and as such stands ready to assist CCAMLR as required.

10.17 The Scientific Committee noted the range of relevant work being undertaken by SCAR, and thanked them for their contributions, and encouraged Members to engage with the relevant groups.

10.18 The Scientific Committee considered the paper SC-CAMLR-43/BG/29 including the 2023-2024 report of SOOS. This paper highlighted the annual Southern Ocean contribution to the Bulletin of American Meteorological Society's 2023 State of the Climate Report. The paper also highlights that 2023 was characterised by substantial ocean warming exacerbated by the 2023 El Nino, evidence of cascading impacts on ocean biogeochemistry and record low sea-ice coverage with potential alterations in the underlying processes that determine the state of sea-ice. This paper also underlines two publications in a SOOS coordinated special issue focused on the Weddell Sea and waters off Dronning Maud Land; one on new approaches to quantitative networks to understand the structure and stability of complex marine communities, and another outlining a framework for establishing long-term cross-disciplinary studies on decadal timescales with the Dronning Maud Land as a model system. SOOS is also currently coordinating a special issue in *Elementa* on understanding the trajectory and implication of a changing Southern Ocean, and the need for an integrated Southern Ocean observing system. Lastly, SOOS reminded SC-CAMLR of its' key products: SOOSmap, SOOS' data visibility tool for standardised, curated datasets of the Southern Ocean, and DueSouth, SOOS' logistical database with upcoming expedition information to the Southern Ocean. SOOS' welcomes feedback and input into these products.

10.19 Dr K. Reid (FAO) introduced SC-CAMLR-43/BG/36 that outlined five aspects of the FAO Deep-sea fisheries Project (DSF Project) of relevance to SC-CAMLR and encouraged engagement with relevant experts in planned FAO workshops. He acknowledged that while CCAMLR is not a project partner there is a wealth of relevant experience and expertise in SC-CAMLR and the hoped that the positive relationship between CCAMLR and the DSF Project will continue. The FAO also noted the request from FAO for stock status descriptions that had been discussed extensively both in WG-FSA and in the Scientific Committee, and thanked the CCAMLR Secretariat for their support in this work and very much welcome the considerations

of the Scientific Committee in ensuring that all management approaches and objectives are reflected appropriately in the FAOs status of stocks report.

10.20 The Scientific Committee welcomed the report from the FAO and supported the engagement with the work of the DSF Project outlined in SC-CAMLR-43/BG/36 and looked forward to the outcomes being reported to SC-CAMLR in the future. In particular, the Scientific Committee welcomed the opportunity to engage with the DSF Project in the consideration of climate change impacts in fisheries management bodies, approaches to the assessment of data-limited stocks and the development of approaches to improve data on catches of chondrichthyans (sharks, rays and skates) in deep-sea fisheries.

10.21 The Coalition of Legal Toothfish Operators (COLTO) announced the results of its CCAMLR toothfish tag return lottery. The winners were selected at random by the Secretariat from tag returns in CCAMLR's Exploratory fisheries. First place went to the Ukrainian flagged FV *Marigolds*, who recovered an Antarctic toothfish, over 9 years after it was tagged in subarea 88.2. Notably, it was recaptured only 8 km from its initial release point. Second and third place went to the Spanish flagged FV *Tronio* and Japanese flagged FV *Shinsei Maru No. 8*, respectively, who both recovered Antarctic toothfish in subarea 48.6, which had been at liberty for a little over 12 months. COLTO congratulated this years' winners and thanked all crews and observers for their continued at-sea efforts.

Reports of representatives at meetings of other international organisations

10.22 Dr Kelly introduced paper SC-CAMLR-43/BG/21 containing some discussion points of interest to the SC-CAMLR from the 2024 meeting of the Scientific Committee of the International Whaling Commission (IWC-SC). The paper also includes a summary of two specific collaborations between SC-CAMLR and IWC-SC; one on minimising whale mortalities in the krill trawl fishery, and the other on whale science to inform CEMP and the krill fishery management approach more broadly. Those collaborations will progress on CCAMLR's new Discussions platform.

10.23 Dr Kelly also highlighted paper CCAMLR-43/BG/43, which is an observer's report from the recent meeting of the IWC (IWC69) in Peru. Of note was the adoption of a resolution submitted by the EU on Cooperation in Antarctica, which made specific reference to the IWC's longstanding relationship with CCAMLR, and encouraged more formal arrangement for collaboration and exchange. Finally, Dr Kelly touched on the topic of the importance of whales to CCAMLR, expressing that whilst it is true that CCAMLR derogates responsibility for the management of whales in the Convention Area to the IWC, CCAMLR set itself the objective of maintaining the ecological relationships between harvested, dependent and related populations of AMLR. Given how enmeshed various whale management needs are, it further highlights the need for CCAMLR and IWC to work together, now and in the future.

10.24 The Scientific Committee expressed its support to the collaboration between CCAMLR and IWC framed in the work of WG-IMAF to address emerging cetacean conservation issues.

10.25 The SC Chair also highlighted the value of the recently created 'IWC Collaboration' Discussion Group to facilitate the participation of experts in discussions and generation of advice relevant to CCAMLR and IWC agendas.

Future cooperation

10.26 No discussions took place under this agenda item.

Scientific Committee activities

Science Fund reporting

11.1 SC-CAMLR-43/BG/06 presented the summary of the review of a proposal submitted to this year's round of the CEMP Special Fund.

11.2 The CEMP Special Fund Management Panel (CSFMP) reviewed the research proposal by Drs Hinke and D. Krause (USA) on reconciling divergent population trends with concurrent observations of gentoo penguin predation rates on Antarctic krill.

11.3 The Scientific Committee welcomed this proposal and considered it to be of high quality, takes advantage of current research programs and data sources in the area and targets a better understanding of factors associated with chick production using new technologies. The review noted that other Member research programs have conducted similar studies in the area and further noted that the proposed analytical methodology to reliably relate recorded sensor data to specific foraging behaviours is not well described in the proposal.

11.4 The Scientific Committee endorsed the recommendation of the CSFMP on funding the proposal to support purchase of GPS and accelerometer loggers. Total costs will be A$32 177 (with 80% paid in 2025 and 20% following a final report in October 2026).

11.5 The Scientific Committee endorsed the Proposal 2019/01 (Whale sighting survey development) award to Dr A. Lowther (Norway) to receive a no-cost extension to accommodate an additional season of data collection.

11.6 Dr Parker also summarised projects that are receiving funding from the CEMP Special Fund.

CCAMLR Scientific Scholarships Scheme

11.7 SC-CAMLR-43/BG/07 presented the outcomes of the review conducted by the Scientific scholarship review panel in 2024. It was noted that the Scientific scholarship review panel reviewed two applications received this year.

11.8 The Scientific Committee recommends to award a scholarship to Dr Z. Filander (South Africa) for work on predicting present and future distributions of VMEs in the greater Weddell Sea. Ms. Filander will have Dr K. Teschke (Germany) as her mentor and also recommends to award a scholarship to Ms R. Leeger (USA), for work on population distribution and connectivity of Antarctic toothfish, whose work will be mentored jointly by professor G. Zhu and Dr J. Devine.

11.9 The Scientific Committee strongly supported the recommendations of the Scientific scholarship review panel to award these scholarships and highlighted the importance of the work that will be developed and the contribution that such work will make to CCAMLR.

11.10 The Scientific Committee noted the importance of the scheme and thanked the Secretariat for the summary showing the large amount of work that the recipients (20 scholarships and 187 authored or co-authored papers submitted to CCAMLR working groups, workshops and the Scientific Committee) have contributed through the years since 2012. It also noted the importance of this scheme in bringing in early career researchers into the work of CCAMLR, highlighting that some of them have taken key roles such as conveners of the working groups, vice Chairs of the Scientific Committee, or national representatives in Scientific Committee.

11.11 The Scientific Committee strongly recommended that the Commission develop a sustainable financing plan to maintain this and other capacity development programs, noting that the value for money from this program has contributed to substantial science input into the working groups for less cost than a full-time employee. Otherwise, the fund will be depleted in 2026.

Scientific Committee strategic plan and working group priorities

11.12 The Scientific Committee considered CCAMLR-43/06 which presented a summary of outcomes of the Performance Review 2 undertaken by the Secretariat.

11.13 The Scientific Committee agreed to the changes made by the Secretariat and also agreed to amend progress made under Recommendation 7 by acknowledging modifications made to the D1MPA proposal following on from the harmonisation symposium.

11.14 SC-CAMLR-43/BG/25 which presented a progress report on high priority scientific issues for the Scientific Committee undertaken by the CCAMLR Scientific Committee Bureau.

11.15 The Scientific Committee thanked the Scientific Committee Bureau for the paper and noted that ten out of the thirteen priorities showed some progress and proposed to review why three of the priorities had not yet shown progress.

11.16 The Scientific Committee noted paragraph 2 of the ToRs in paper WG-EMM-2024/34 for engagement between CCAMLR Members and IWC. Dr S. Hill (UL) and Dr Kelly proposed to engage with experts from both organisations to produce a paper on high level strategic objectives for ecosystem modelling to be submitted to relevant working groups next year.

11.17 The Scientific Committee considered the WG-ASAM workplan and noted the significant work undertaken during WG-ASAM to address Target Species 1(a): Develop methods to estimate biomass for krill. They further noted the addition of 3 items to the WG-ASAM workplan in response to discussions at Scientific Committee and the request to integrate tasks recommended by the CCAMLR Climate Change Workshop (WS-CC-2023) listed in Tables 17-18 of the WG-FSA-IMAF-2024 report (noting that tables 17-18 are the most recent versions of tables 1-2 from WS-CC-2023, with updates on progress from WG-EMM-2024 and WG-FSA-IMAF-2024). These included: Target Species topic a(ii), Task 4; Target Species topic b(v) and Target Species topic c(iv) (Table 6).

11.18 The Scientific Committee considered the WG-SAM workplan and noted the modification to time frames and contributors. They further noted the addition of items to the WG-SAM workplan added in response to the request to integrate tasks recommended by the CCAMLR Climate Change Workshop (WS-CC-2023) listed in Tables 17-18 of the WG-FSA-IMAF-2024. This included: Target Species topic d (11(ii)); Target Species topic (e 13(iii)); and Ecosystem impacts topic a task 14 (Table 7).

11.19 The Scientific Committee considered the WG-EMM workplan, noting the addition of two tasks during the WG-EMM meeting including to develop a data collection plan for the KFMA and D1MPA and to add cetaceans as part of the CEMP programme (Administrative topic task h and Ecosystem impacts topic a(v)). They noted the addition of several further items in response to the request to integrate tasks recommended by the CCAMLR Climate Change Workshop (WS-CC-2023) listed in Tables 17-18 of the WG-FSA-IMAF-2024. This included: Target species a task iii; Target species b task iii; Target species b task viii; Ecosystem impacts topic a task vi-ix; and the addition of extreme events tasks i-ii in Ecosystem impacts topic a (Table 8).

11.20 The Scientific Committee considered the WG-IMAF workplan, noting the addition of four tasks during the WG-FSA-IMAF meeting relating to elephant seals (2.4), stick water (5.6) and trawl classification (5.7) . They noted the further addition of Task 3.2 (Theme 3, Seabirds and Marine mammals-risk assessment) in response to the request to integrate tasks recommended by the CCAMLR Climate Change Workshop (WS-CC-2023) listed in Tables 17-18 of the WG-FSA-IMAF-2024 (Table 9).

11.21 The Scientific Committee considered the FSA workplan and noted that tasks that have been completed are indicated in the table. They noted the addition of a new topic to Target Species (c.1) Connectivity of target and non-target species using new technologies, to reflect emerging work in this area. They also noted the addition of three new priority research topic tasks to target species topic 1(g) i- iii in response to the request to integrate tasks recommended by the CCAMLR Climate Change Workshop (WS-CC-2023) listed in Tables 17-18 of the WG-FSA-IMAF-2024 (Table 10).

11.22 The Scientific Committee discussed whether ‘target species topic to develop stock assessments to implement decision rules for krill’ of the FSA workplan should remain or whether it should be considered solely in the EMM workplan. They recalled that different working groups had participants with different expertise and items were often referred between working groups to receive relevant expert opinions as one working group rarely had all the relevant expertise needed to address management of a species or fishery. They noted that this item only needed to be included in the FSA agenda if there was an output from the assessment model to consider or WG-EMM/WG-SAM/SC had requested specific advice requiring the expertise available in the other working groups.

SC-CAMLR supported working group meetings and workshops for 2024/2025

11.23 The Scientific Committee endorsed the following meetings and workshops in 2025:

(i) Age Determination Workshop in Cambridge, UK (19th to 23rd May 2025)

(ii) WG-ASAM in Geilo, Norway (30th June to 4th July 2025)

(iii) WG-SAM in Tenerife, Spain (16th to 20th June 2025)

(iv) WG-EMM in Geilo, Norway (7th July to 18th July 2025)

(v) WG-FSA in Hobart (6th to 17th October 2025)

(vi) Scientific Committee in Hobart (20th to 24th October 2025)

(vii) Cap-DLISA Casal2 workshop (TBD)

11.24 The Scientific Committee recommended that the Commission support the Cap-DLISA funding proposal to the General Capacity Building Fund to hold a Casal2 stock assessment workshop in 2025 (WG-SAM-2024, paragraph 7.14).

11.25 The Scientific Committee acknowledged the challenges of integrating IMAF and FSA, especially during years when FSA has a high volume of stock assessments to review. They also noted that invited experts were an important contribution to IMAF and the combined meeting had impacted this and restricted the number of days for the meeting.

11.26 The Scientific Committee reflected that whilst sea-bird by-catch in longline fisheries is traditionally an FSA issue, recent issues were focussed on by-catch of whales and sea-bird trawl wire interactions related to the krill fishery. They considered that WG-IMAF could run parallel to the second week of WG-EMM to engage with relevant krill expertise.

11.27 The Scientific Committee noted that ACAP's advisory committee and its WGs would not meet in 2025, and so there would be no new advice from ACAP until the ACAP 2026 meeting in March/April. The Scientific Committee agreed that IMAF should meet after this ACAP meeting in 2026 and be aligned with the last week of WG-EMM-2026.

11.28 The Scientific Committee recalled that Dr C Péron (France) had finished her role as co-chair of WG-SAM and thanked her for her leadership that had started in Concarneau in 2019 and through the COVID period along with Dr Okuda (Japan). The Scientific Committee welcomed the nomination of Dr D. Maschette (Australia) to join Dr T. Okuda as Co-convenor for WG-SAM in 2025.

Invitation of experts and observers to meetings of working groups and workshops

11.29 The Scientific Committee noted the important contribution of engagement with Peru, in particular sharing their acoustic data collected over many years in Subarea 48.1. The Scientific Committee invited Peruvian scientists to the ASAM and EMM working groups, as reflected in the Scientific Committee report 2024, and detailed in the proposed MOU with Peru to be considered by the Commission (paragraph 10.5).

11.30 The Scientific Committee encouraged Members to provide acoustic experts for participation in WG-ASAM and invite ARK to send experts to discussions at WG-ASAM.

Election of Scientific Committee Vice-chair

11.31 The Scientific Committee sought nominations for a new Junior Vice-Chair. Dr S. Chung (Korea) was unanimously elected to the position for a term of two regular meetings (2025 and 2026). A warm welcome was extended to the incoming Junior Vice-Chair. Dr Chung thanked the Scientific Committee for the opportunity to increase his contribution to CCAMLR.

11.32 The Scientific Committee thanked Dr L. Ghigliotti (Italy) for taking on the role of Senior Vice Chair a year early, including her chairing when the Scientific Committee Chair was reporting to SCIC and SCAF. They noted she would continue the role of Senior Vice-Chair in 2025.

Next meeting

11.33 The next meeting of the Scientific Committee will be held at the CCAMLR Headquarters building (181 Macquarie Street) in Hobart, Australia, from 20th to 24th October 2025.

Secretariat supported activities

12.1 The Scientific Committee considered SC-CAMLR-43/03, which presented proposed improvements to the CCAMLR Statistical Bulletin, to enhance process efficiency, transparency and data quality.

12.2 The Scientific Committee thanked the Secretariat for the useful proposal and agreed to all its elements with one exception, where it requested moving the publication schedule back one month to May (paragraph 5 of the paper) to allow more time to issue and review the Draft Statistical Bulletin (steps 3 to 8 in Table 2 of the paper).

12.3 The Scientific Committee considered SC-CAMLR-43/BG/28, which presented an estimate of the annual costs of maintaining the acoustic data repository and of improving the CCAMLR authentication system to allow for authentication integration with R Shiny applications.

12.4 The Scientific Committee welcomed the paper and noted the estimate of a one-time cost of A$4,000 to allow authentication of the acoustic visualisation tool and annual costs of A$8,880 to manage the acoustic data repository. The Scientific Committee further noted that an annual cost of A$12,000 for the enterprise version of shiny server would be cost effective in the future.

12.5 The Scientific Committee considered SC-CAMLR-43/BG/05 Rev. 1, which presented a progress report on the science tasks conducted by the Secretariat during the 2023/24 intersessional period, and made recommendations on a data sharing protocol with SEAFO and on the publication of the CCAMLR data access rules workflow diagram (SC-CAMLR-43/BG/05 Rev. 1, Figure).

12.6 The Scientific Committee thanked the Secretariat Science team for their effective support throughout the year and during meetings, as well as for the quality of their paper submissions to the Scientific Committee and its working groups. It further thanked the Science team for the Spatial Data Viewer which was particularly helpful during discussions of WG-EMM-2024 and HS-2024.

12.7 The Scientific Committee discussed the CCAMLR data access rules diagram, which was modified during the meeting in consultation between interested Members. It noted that the intent of the diagram was to provide a practical implementation of the rules and to facilitate understanding of the data request process. The Scientific Committee agreed to further progress its development in the intersessional period through collaboration, and requested the Secretariat establish a new Discussion group for this purpose.

12.8 As part of the discussions, the Scientific Committee requested the Secretariat present information on the number of data requests that were approved, declined or unanswered, in the last 2 years. It noted the large number of data requests which did not receive a reply and that if the absence of reply were to be considered a refusal, this would have to be brought to the attention of the Scientific Committee and Commission. In addition, many data extracts would be incomplete and potentially lead to biased analyses. The Scientific Committee further noted that reduced access to data may cause issues of transparency (paragraph 5.29), limit scientific progress (e.g. papers from a PhD thesis by a CCAMLR scholarship recipient are currently delayed for publication due to data request issues) and may hinder the provision of scientific advice to the Commission. The Scientific Committee suggested the Secretariat contact Members to attempt to find solutions.

12.9 The Scientific Committee also noted that transparency and free use of CCAMLR data should not be achieved at the expense of violating the rules that govern the access and the use of CCAMLR data, and requested the Secretariat to work with DSAG and Members to work on a procedure to facilitate data access in accordance with the Rules for Access and Use of CCAMLR Data or consider revising the rules to deliver on the intention of the CCAMLR Convention and enables the SC to conduct its work efficiently.

12.10 Some Members acknowledged having failed to answer data requests on some occasions due to the high volume of emails they receive daily. The Scientific Committee suggested the Secretariat explore alternative communication methods, such as a webpage with tick boxes, or another more streamlined process, to try and resolve this issue.

12.11 The Scientific Committee discussed the assignment of DOIs to CCAMLR papers and noted the ongoing efforts (CCAMLR-43/25).

Budget for 2024/25 and advice to SCAF

13.1 The Scientific Committee collated its advice relative to funding required to support its activities in 2024/2025.

13.2 For General Science Capacity Fund expenses, the Scientific Committee noted:

(i) Travel support for Member participation in the third ageing workshop of A$15 000 (paragraph 3.21),

(ii) Support for two new scholarships plus two existing scholarships totalling A$60 000 (paragraph 11.8),

(iii) Ongoing convener travel assistance for three working group conveners totalling A$75 000, and

(iv) Co-funding of the Cap-D-LISA GCBF for A$15 000 (paragraph 11.24).

13.3 The Scientific Committee also noted 2025 support from the CEMP Special Fund for a new proposal from Hinke and Krause for A$32 177 (paragraph 11.4), an existing proposal by La Brousse for A$37 000 and a no cost extension for a Lowther whale survey proposal (paragraph 11.5).

13.4 The Scientific Committee also noted requests for Secretariat participation in WS-ADM3 (paragraph 3.21), and approximately A$8 880 to A$12 000 for maintenance of an acoustic data repository hosted by the Secretariat (paragraph 12.4).

Other business

14.1 CCAMLR-43/31 presented a proposal for a 3rd performance review of CCAMLR in 2025, following previous reviews in 2008 and 2017. The review ToRs would build on results and progress in implementing recommendations from the previous reviews as well as CCAMLR priorities for the next five years.

14.2 The Scientific Committee noted the proposal and that it would be discussed by the Commission.

14.3 France and Australia informed the Scientific Committee of an upcoming 3rd Kerguelen Plateau Symposium to be held in Concarneau, France from 31 March to 2 April 2025 https://kps2025.sciencesconf.org/. The objective of the Symposium is to update the status of scientific knowledge on the Kerguelen Plateau and to discuss future science programs in support of ecosystem-based fisheries management and conservation in the region. The themes of the 3rd Kerguelen Plateau Symposium are:

(i) Marine geomorphology, oceanography, biogeochemistry and microbiology;

(ii) Climate changes and their impacts on marine ecosystems;

(iii) Advances in marine ecosystem knowledge/marine food web;

(iv) Developments in fisheries resource assessment, by-catch mitigation and resource management;

(v) Marine policy and spatial planning.

Adoption of report of the Forty-third meeting

15.1 The report of the meeting was adopted requiring 12 h and 30 min of discussion.

Close of Meeting

16.1 The plenary sessions of the meeting were streamed via Zoom and were attended by 35–67 participants each day.

16.2 Dr Watters thanked that Chair, the secretariat, interpreters and support staff for an awesome job in organising and supporting the meeting.

16.3 Dr Zhao joined Dr Watters in thanking the Secretariat and thanked the Chair for a successful first meeting.

16.4 Dr Cárdenas thanked the Secretariat for a super job in supporting him in this role, as well as the interpreters, Congress, translators, report preparation team and all the others whose hard work made the meeting a success.

16.5 The meeting was closed.

References

Åsvestad Linn, Ahonen Heidi, Menze Sebastian, Lowther Andrew, Lindstrøm Ulf and Krafft Bjørn A. 2024. Seasonal acoustic presence of marine mammals at the South Orkney Islands, Scotia SeaR. Soc. Open Sci.11230233. http://doi.org/10.1098/rsos.230233

Table 1: Status of commercial fisheries in the Convention Area as of 1 October 2024. Current research fisheries and fisheries that operated before the CAMLR Convention entered into force are not included. 'Near target' indicates stocks with biomasses (CCAMLR Assessment Categories 1 and 2) or harvest rates (CCAMLR Assessment Category 3) currently or projected to be within ±5% of established CCAMLR targets. 'Above target' and 'below target' indicate stocks with biomasses or harvest rates outside of this range. Target biomasses are 50% (60% in Division 58.5.1) of unfished spawning biomass for *Dissostichus* spp. and 75% of unfished biomass for *Euphausia superba* and *Champsocephalus gunnari*. Category 1 assessments are integrated stock assessments (*Dissostichus* spp.) or 2-yr projections based on the results of recent trawl surveys (*C. gunnari*). Category 2 assessments (*E. superba*) are 20-yr projections based on the results of hydroacoustic surveys conducted > 5 years in the past. Category 3 assessments (*Dissostichus* spp.) are trend analyses of catch per unit effort or mark-recapture estimates of vulnerable biomass, with target harvest rates of 4% for toothfish in Category 3. FAO Status determined on the basis of indicated FAO Characteristic from FAO (2011). Blank indicates no information available.

Species	CCAMLR Subarea or Division	Last calendar year of reported catch	CCAMLR assessment category	CCAMLR status as of 1 October 2024	FAO status (FAO characteristic) as of 1 October 2024
Euphausia superba	48.1, 48.2, 48.3 and 48.4	2024	2[4]	Above target	Underfished (3)
	48.5	1991		Not assessed	
	48.6	1993		Not assessed	
	58.4.1	2017	2[4]	Above target	Underfished (3)
	58.4.2	2018	2[4]	Above target	Underfished (3)
	58.4.3	1979		Not assessed	
	58.4.4	1979		Not assessed	
	88.1	1990		Not assessed	
	88.2	1980		Not assessed	
	88.3	1991		Not assessed	
Champsocephalus gunnari	48.2	1990		Commercial fishing prohibited	
	48.3	2018	1	Above target	Underfished (2)
	58.5.1	2015		Not assessed	
	58.5.2	2024	1	Near target	Underfished (2)
Dissostichus eleginoides	48.1	Never commercially fished		Commercial fishing prohibited	
	48.2	Never commercially fished		Commercial fishing prohibited	
	48.3[1]	2024	1	Near target	Underfished (2)
	48.4	2024	1	Above target	Underfished (2)
	58.4.3a outside areas of national jurisdiction	2018		Closed fishery with catch limit of zero tonnes	
	58.4.3b	2009		Not assessed	
	58.4.4a	2000		Not assessed	
	58.4.4b	2020		Not assessed	
	58.5.1[2]	2024	1	Near target	Underfished (2)
	58.5.2 within areas of national jurisdiction	2024	1	Below target	Maximally Sustainably Fished (2)

	58.5.2 outside areas of national jurisdiction	Never commercially fished		Commercial fishing prohibited	
	58.6[2]	2024		Above target	Underfished (2)
	58.7[2]	2024		Not assessed	
Dissostichus mawsoni	48.1	Never commercially fished		Commercial fishing prohibited	
	48.2	Never commercially fished		Commercial fishing prohibited	
	48.4	2024	3	Near target	Underfished (1)
	48.5	Never commercially fished		Commercial fishing prohibited	
	48.6	2024	3	Near target	Maximally Sustainably Fished (3)
	58.4.1	2018		Commercial fishing prohibited	
	58.4.2	2024	3	Near target	Underfished (3)
	58.4.3b outside areas of national jurisdiction	2009		Closed fishery with catch limit of zero tonnes	
	88.1 and 88.2AB	2024	1	Above target	Underfished (2)
	88.2C-G and H	2024	3	Near target	Maximally Sustainably Fished (3)
	88.3[3]	Never commercially fished		Commercial fishing prohibited	

[1] Catch and effort data from fishing for *Dissostichus eleginoides* in Subarea 48.3 for 2022, 2023 and 2024 were received by the Secretariat. Said fishing was carried out in the absence of a CCAMLR Conservation Measure for 48.3, since CM 41-02 was not readopted for the 2021/22, 2022/23 and 2023/24 fishing seasons.

[2] This stock is managed by national authorities.

[3] Annual research fishing occurs, with catches reported through 2024.

[4] CCAMLR assessment categories for krill will be refined in the next 12 months by the Working Groups of the Scientific Committee.

Table 2: Status of stocks in the Convention Area for species that are not commercially harvested as of 1 October 2024. Research fisheries are not included.

Species or Family	CCAMLR Subarea or Division	Last year of reported catch	CCAMLR Assessment category	CCAMLR status as of 1 October 2024	FAO status (FAO characteristic) as of 1 October 2024
Lithodidae	48.2	2010		Not assessed	
	48.3	2010		Not assessed	
Martialia hyadesi	48.3	2001		Not assessed	
Macrouridae	58.4.3a	2004		Not assessed	
	58.4.3b	2004		Not assessed	
Channichthyidae	48.3	1986		Not assessed	
Chaenocephalus aceratus	48.1	Never commercially fished		Commercial fishing prohibited	
	48.2	Never commercially fished		Commercial fishing prohibited	
	48.3	Never commercially fished		Commercial fishing prohibited	
Chaenodraco wilsoni	58.4.2	2004		Not assessed	
Pseudochaenichthys georgianus	48.1	Never commercially fished		Commercial fishing prohibited	
	48.2	Never commercially fished		Commercial fishing prohibited	
	48.3	Never commercially fished		Commercial fishing prohibited	
Nototheniidae	48.3	1980		Not assessed	
	58.4.4	1979		Not assessed	
	58.5	1978		Not assessed	
	58.6	1983		Not assessed	
Lepidonotothen kempi	58.4.2	2004		Not assessed	
Trematomus eulepidotus	58.4.2	2004		Not assessed	
Pleuragramma antarcticum	58.4.2	2004		Not assessed	
Gobionotothen gibberifrons	48.1	Never commercially fished		Commercial fishing prohibited	
	48.2	1988		Commercial fishing prohibited	
	48.3	Never commercially fished		Commercial fishing prohibited	
Lepidonotothen squamifrons	48.1	Never commercially fished		Commercial fishing prohibited	

	48.2	Never commercially fished	Commercial fishing prohibited
	48.3	Never commercially fished	Commercial fishing prohibited
	58.4.4a except for waters adjacent to the Prince Edward Islands	Never commercially fished	Commercial fishing prohibited
	58.4.4b	Never commercially fished	Commercial fishing prohibited
Notothenia rossii	48.1	Never commercially fished	Commercial fishing prohibited
	48.2	Never commercially fished	Commercial fishing prohibited
	48.3	1985	Commercial fishing prohibited
Patagonotothen guntheri	48.1	Never commercially fished	Commercial fishing prohibited
	48.2	Never commercially fished	Commercial fishing prohibited
	48.3	1988	Commercial fishing prohibited
Myctophidae	88.3	1988	Not assessed
Electrona carlsbergi	48.1	Never commercially fished	Commercial fishing prohibited
	48.2	Never commercially fished	Commercial fishing prohibited
	48.3	1991	Commercial fishing prohibited
Sharks	all	Never commercially fished	Commercial fishing prohibited
All other finfishes	48.1	Never commercially fished	Commercial fishing prohibited
	48.2	Never commercially fished	Commercial fishing prohibited

Table 3: Catch limits by season for management units in Subarea 48.1 as recommended by the Harmonisation Symposium (CCAMLR-43/29). For context, the maximum annual catch in Subarea 48.1 is currently capped at 155 000 tonnes (CM 51-07) and the maximum recorded annual catch in Subarea 48.1 was 161 772, taken in 2021 (Fisheryreports.ccamlr.org)

MU	Summer	Winter	Total
JOIN	533	11 852	12 385
EI	44 241	73 311	117 552
BS	4 077	73 110	77 187
SSIW	36 693	48 858	85 551
GS	7 952	70 698	78 650
PB	8 437		8 437
DP	15 669		15 669
Total	93 496	277 829	**395 431**

Table 4: Proposed precautionary finfish catch limits (tonnes) for consideration by the Commission for 2024/2025. AUS – Australia; CHL – Chile; ESP – Spain; FRA – France; GBR– United Kingdom; JPN – Japan; KOR – Republic of Korea; NAM – Namibia, NZL – New Zealand; RUS – Russian Federation; UKR – Ukraine; URY – Uruguay.

Subarea/ division	Fishing area	Target species	Catch limit		*Macrourus* spp.	Skates and rays	Other species	Conservation measure	Notified Members
			2023/24	2024/25					
48.3	48.3	*C. gunnari*	5 138	3 579	-	-	See CM 33-01	33-01, 42-01	Not applicable
48.3[1]	48.3A	*D. eleginoides*	-	-	-	-	See CM 33-01		Not applicable
	48.3B	*D. eleginoides*	600	619	-	-	See CM 33-01		Not applicable
	48.3C	*D. eleginoides*	1 400	1 443	-	-	See CM 33-01		Not applicable
	Total	*D. eleginoides*	2 000	2 062	-	-	See CM 33-01		Not applicable
48.4	48.4_SSI	*D. eleginoides*	19	19	9	2.8		41-03	Not applicable
	48.4_SSI	*D. mawsoni*	43	37	9	2.8		41-03	Not applicable
48.6	48.6_2	*D. mawsoni*	148	152	24	7	24	33-03, 41-04	ESP, JPN, KOR
	48.6_3	*D. mawsoni*	42	50	8	2	8	33-03, 41-04	ESP, JPN, KOR
	48.6_4	*D. mawsoni*	126	151	24	7	24	33-03, 41-04	ESP, JPN, KOR
	48.6_5	*D. mawsoni*	202	242	38	12	38	33-03, 41-04	ESP, JPN, KOR
	Total	*D. mawsoni*	518	595	-	-	-		
58.4.1	58.4.1_1[2]	*D. mawsoni*	112 (50 sets)	112 (50 sets)	17	5	17	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
	58.4.1_2[2]	*D. mawsoni*	80 (50 sets)	80 (50 sets)	12	4	12	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
	58.4.1_3[2]	*D. mawsoni*	79 (60 sets)	79 (60 sets)	12	3	12	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
	58.4.1_4[2]	*D. mawsoni*	46 (30 sets)	46 (30 sets)	7	2	7	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
	58.4.1_5[2]	*D. mawsoni*	116 (50 sets)	116 (50 sets)	18	5	18	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
	58.4.1_6[2]	*D. mawsoni*	50 (50 sets)	50 (50 sets)	8	2	8	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
	Total	*D. mawsoni*	483	483	-	-	-	33-03, 41-11	AUS, ESP, FRA, JPN, KOR
58.4.2	58.4.2_1	*D. mawsoni*	103	124	19	6	19	33-03, 41-05	AUS, FRA
	58.4.2_2	*D. mawsoni*	206	165	26	8	26	33-03, 41-05	AUS, FRA
	Total	*D. mawsoni*	309	289	-	-	-	33-03, 41-05	AUS, FRA
58.5.2	HIMI	*C. gunnari*	714	1 824			See CM 33-02	42-02, 33-02	Not applicable
	HIMI	*D. eleginoides*	2 660	2 120			See CM 33-02	41-08, 33-02	Not applicable

Subarea/ division	Fishing area	Target species	Catch limit		*Macrourus* spp.	Skates and rays	Other species	Conservation measure	Notified Members
			2023/24	2024/25					
88.1 and 882AB	North of 70° S	*D. mawsoni*	665	623	99	31	31	41-09	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR
	South of 70° S	*D. mawsoni*	2 309	2 163	316	108	108	41-09	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR
	SRZ	*D. mawsoni*	456	393	72	19	19	41-09	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR
	Shelf Survey	*D. mawsoni*	69	99	-	-	-	24-05, 41-09	NZL
	Total	*D. mawsoni*	3 499	3 278	487	158	158	41-09	
88.2	88.2_1	*D. mawsoni*	184	184	29	9	29	33-03, 41-10	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR, URY
	88.2_2	*D. mawsoni*	322	378	60	18	60	33-03, 41-10	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR, URY
	88.2_3	*D. mawsoni*	242	390	62	19	62	33-03, 41-10	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR, URY
	88.2_4	*D. mawsoni*	222	266	42	13	42	33-03, 41-10	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR, URY
	88.2H	*D. mawsoni*	146	166	26	8	26	33-03, 41-10	AUS, CHL, ESP, FRA, GBR, JPN, KOR, NAM, NZL, RUS, UKR, URY
	Total	*D. mawsoni*	1116	1384					
88.3	88.3_1	*D. mawsoni*	13	10	1	0.5	1	24-05	KOR, UKR
	88.3_2	*D. mawsoni*	20	20	3	1	3	24-05	KOR, UKR
	88.3_3	*D. mawsoni*	38	30	4	1	4	24-05	KOR, UKR
	88.3_4	*D. mawsoni*	38	30	4	1	4	24-05	KOR, UKR
	88.3_6	*D. mawsoni*	43 (15 sets)	52	8	2	8	24-05	KOR, UKR
	88.3_11[3]	*D. mawsoni*	-	23 (30 sets)	3	1	3	24-05	KOR, UKR
	88.3_12[3]	*D. mawsoni*	-	23 (30 sets)	3	1	3	24-05	KOR, UKR

Subarea/ division	Fishing area	Target species	Catch limit		*Macrourus* spp.	Skates and rays	Other species	Conservation measure	Notified Members
			2023/24	2024/25					
	Total	*D. mawsoni*	233	188	-	-	-		

[1] Consensus could not be reached on catch limits for *D. eleginoides* in Subarea 48.3.
[2] Catch limit for effort-limited research fishing as per WG-FSA-IMAF-2024/25.
[3] Catch limit for effort-limited research fishing as per WG-FSA-IMAF-2024 paragraph 4.183.

Table 5: Catch allocation options in the Ross Sea region. SRZ – special research zone

Area		Method 1	Method 2	Method 3
		Method consistent with CM 24-01 and CM 91-05	Method used in 2017/18–2018/19	Method used in 2019/20–2023/24
North of 70° S		601	604	623
South of 70° S		2 087	2 098	2 163
SRZ		492	477	393
Shelf Survey		99	99	99
Total	3 278	3 278	3 278	3 278
N70	Skates (5%)	30	30	31
	Macrourids (16%)	96	96	99
	Other (5%)	30	30	31
S70	Skates (5%)	104	104	108
	Macrourids (388 t)	316	316	316
	Other (5%)	104	104	108
SRZ	Skates (5%)	24	23	19
	Macrourids (388 t)	72	72	72
	Other (5%)	24	23	19
Total	*Macrourids*	484	484	487

Table 6: Annotated table of **WG-ASAM** workplan updated for 2024. Yellow highlight indicates areas progressed during WG-ASAM 2024. CEMP – CCAMLR Ecosystem Monitoring Program, DSAG – Data Services Advisory Group, SISO – Scheme of International Scientific Observation.

Theme	Topic/task	Timeframe	Contributors	Secretariat participation
1. Target Species	(a) Develop methods to estimate biomass for krill			
	(i) Survey design standards for regional and synoptic surveys	Short	ASAM members	
	(ii) Develop methods to use fishing fleets as monitoring platforms:			
	Task 1: Methods for calibrating echosounders on fishing vessels	Short	Dr Macaulay, Dr Fielding	
	Task 2: Survey design for fishing fleets	Short	Linked to 1.a.i	
	Task 3: Develop the use of krill length frequency data in the estimation of target strength and krill weight for biomass estimates	Short	Dr Cox, Dr Zhao	
	Task 4: Develop protocols and timeline for delivering krill biomass estimates from surveys for inclusion in krill fishery management approach			
	(iii) Data collection – SISO, vessels and CEMP Specification for sample size and the use of krill length frequency data	Short	Annex 4, Table 2, 1.a.ii and 1.a.iv.4	Yes
	(iv) Acoustic data storage and processing			
	(1)(A) Identify metadata	Short	ASAM	Yes
	(B) Acoustic raw data storage requirements and processing			
	(2) Automated data processing of acoustic data from fishing vessels, including frequency of updates to biomass updates	Long	Dr Menze, Dr Wang, Dr Fielding	
	(3) Standardised procedures to check and verify acoustic data	Medium	Dr Macaulay	
	(4) Develop the use of krill length frequency data in the estimation of target strength and krill weight for biomass estimates, including seasonal and regional effects of developmental stage	Medium	Dr Cox, Dr Wang	Yes
	(5) Submission of acoustic data and the inclusion of metadata by Members in the repository held by the Secretariat	Annual	Annex 4, Table 2, 1.a.iv.1	
	(6) Develop statistical approaches to acoustic data emerging from new acoustic observation platforms	Long	Dr Reiss, Dr Menze, Dr Dornan	
	(v) Biomass estimation			
	(4) Krill biomass estimate in Division 58.4.1	Long	Dr Cox, Dr Murase	
	(5) Krill biomass estimate in Division 58.4.2	Long		
	(b) Develop stock assessments to implement decision rules for krill			
	(i) Krill management approach (biomass estimates)			
	(1) Subarea 48.1	Short		
	(2) Subarea 48.2 etc.	Short	ASAM	

Theme	Topic/task	Timeframe	Contributors	Secretariat participation
	(ii) Develop diagnostic tools			
	(iii) Develop ecosystem indicators to inform risk assessment framework			
	(iv) Methods to account for uncertainty in stock status			
	(1) Movement of krill (flux)	Medium	Dr Kasatkina	
	(2) Spatial structure within subareas		Dr Ying	
	(3) Interannual variability			
	(v) Review data collection programmes to ensure adequate to detect change in species distribution			
	(c) Develop methods to estimate biomass for finfish			
	(i) Survey design	Medium	Dr Kasatkina	
	(ii) Data collection – SISO and vessels			
	(iii) Improve biomass estimation methods	Long	Dr Wang	
	(iv) Assess research plans related to this objective			
2. Ecosystem impacts	(a) Ecosystem monitoring (Second Performance Review, recommendation 5)			
	(i) Structured ecosystem monitoring programs (CEMP, fishery)			
	(1) CEMP			
	(2) Fishery via SISO			
	(3) Research surveys			
	(b) Monitoring and adaptation to effects of climate change (see Table 2. SC-CAMLR-41/10)	Medium		
	(i) Develop methods to detect change in ecosystems given variability and uncertainty			
	(1) autonomous platforms		Dr Dornan	
Administrative topics	(a) Advise on database facilities required throughout DSAG	Annex 4, Table 2, 1.a.iv		
	(b) Advise on quality control and assurance processes for data provided to and supplied by the Secretariat	Annex 4, Table 2, 1.a.iv		
	(c) Refine SISO across all fisheries	Annex 4, Table 2, 1.a.iv		
	(d) Further develop data management systems	Annex 4, Table 2, 1.a.iv		
	(e) Communication of progress, internal and external			
	(f) Working group terms of reference	2022		
	(g) Scientific Committee Symposium in 2027			

Table 7: Annotated table of WG-SAM workplan updated for 2024. Timeframe periods are: short = 1–2 years, medium = 3–5 years and long = 5+ years. Items tasked to WG-SAM from the Scientific Committee Strategic Plan (SC-CAMLR-41, Table 6). Numbers following level of urgency indicates the stated value in the box which replaced 'X', i.e., the year. CEMP – CCAMLR Ecosystem Monitoring Program, MSE – management strategy evaluation, SISO – Scheme of International Scientific Observation. Grey indicates specific tasks identified.

Theme	Priority research topic	Timeframe			Contributors	Secretariat participation
		Global	2025	2026		
1. Target species	(a) Develop methods to estimate biomass for krill					
	(iii) Data collection – SISO and vessels and CEMP					
	Task 1: Effective sampling to estimate length-frequency distribution	Short	X		Ms Robson, Dr Kawaguchi	
	(b) Develop stock assessments to implement decision rules for krill					
	Task 2: Development of integrated stock assessment for krill	Medium	X	X	Mr Mardones, Dr Watters	
	(c) Develop methods to estimate biomass for finfish					
	(i) Survey design					
	Task 3: Gear standardisation – tagging program	Medium	X	X	Dr Péron, Dr Masere, Dr Kasatkina	Yes
	(ii) Data collection – SISO and vessels					
	Task 4: Metrics of vessel tagging performance	Medium		X	Dr Péron, Dr Masere, Mr Dunn, Dr Hoyle	Yes
	Task 5: Recording selection of non-random biological data	Medium	X	X	Mr Gasco, Dr Massiot-Granier	Yes
	Conversion factors					
	Task 6: Develop protocol for conversion factors	Short	X		Mr Gasco, Dr Massiot-Granier, Mr Walker	Yes
	(iii) Improve biomass estimation methods					
	Task 7: Optimise tag-based study (spatial overlap)	Medium	X	X	Dr Masere, Dr Péron, Dr Devine	
	Task 8: Vessel configuration factors affecting tagging mortality	Medium	X	X	Dr Devine	Yes

(continued)

Table 7 (continued)

Theme	Priority research topic	Timeframe			Contributors	Secretariat participation
		Global	2025	2026		
	(iv) Data for stock assessment					
	Task 9: Determine the number of fish per age class needed to capture the variability needed for an adequate reference	Medium		X	Dr Devine, Dr Quiroz, Mr Sarralde	Yes
	Task 10: Examine the effect of age uncertainty on the stock assessment	Medium		X	Dr Devine	
	(d) Develop stock assessments to implement decision rules for finfish					
	(i) Research to develop new assessments					
	(1) Research plan evaluations:	Medium				
	Task 11: Research plan assessment				WG-SAM	
	48.2 Icefish		X	X		
	48.6 Antarctic toothfish		X			
	58.4.1–58.4.2 Antarctic toothfish		X	X		
	88.1 shelf survey Antarctic toothfish		X	X		
	88.3 Antarctic toothfish		X			
	(ii) Develop new assessment tools					
	(1) Casal2 development					
	T17-6: CC effect on recruitment	Medium			WG-FSA	
	T17-7: CC effect on parameters and processes	Medium			WG-FSA	
	(e) Management strategy evaluations for target species (Second Performance Review, Recommendation 8)					
		Short				
	Task: 12: Evaluation of the CCAMLR decision rules and potential alternative harvest control rules for assessed fisheries using MSE		X X	X X	Dr Ziegler, Mr Dunn, Dr Massiot-Granier, Dr Earl, Mr Somhlaba, Dr Masere	

	Task 13: Development and testing of data-limited fishery decision rules using MSE	Medium	X	X	Dr Ziegler, Mr Dunn, Dr Massiot-Granier, Dr Earl, Mr Somhlaba, Dr Masere	Yes
	(iii) Finfish management strategies that are robust to climate change	Long			Stock assessors	
	T17-8: Workflow with CC effect on management	Medium			WG-FSA	
	T17-22: CCAMLR Decision Rule with temporal change of recruitment	Medium			SC, WG-FSA	
	T18-10: Uncertainty relating CC in CCAMLR Decision Rule	Medium				

Table 7 (continued)

Theme	Priority research topic	Timeframe			Contributors	Secretariat participation
		Global	2025	2026		
2. Ecosystem impacts	(a) Ecosystem monitoring (Second Performance Review, Recommendation 5) Structured ecosystem monitoring programs (CEMP, fishery)					
	Task 14: effective sample size for fish by-catch monitoring in the krill fishery	Medium	X	X	Dr Jones	
	T18-20: Model to test long-term change in spatial distribution	Long				
3. Adminis-trative topics	(e) Communication of progress, internal and external:					
	Task 15: Diagnostic graphs on stock status	Short	X	X	Stock assessors	

Table 8: Annotated table of WG-EMM workplan updated for 2024. Timeframe periods are short = 1–2 years, medium = 3–5 years and long = 5+ years. Items tasked to WG-EMM from the Scientific Committee Strategic Plan (Annex 4 in SC-CAMLR-41). CEMP – CCAMLR Ecosystem Monitoring Program, SISO – Scheme of International Scientific Observation. Orange colour indicates the topic is in progress, red indicates not yet started, green indicates completed.

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
1. Target species	(a) Develop methods to estimate biomass for krill	(iii) Data collection – SISO, vessels, and CEMP, including climate change parameters. (WS-CC-23 Table 1 Recommendation 5) Urgency: High (2) Develop diagnostic approaches for data quality Urgency: High	Short	Dr Zhu Dr Kawaguchi Dr Collins Dr Meyer	Yes
		(iv) Acoustic data storage and processing Urgency: High (3) Develop the use of krill length frequency data in the estimation of target strength, and krill weight for biomass estimates Urgency: High	Medium	Dr Cox Dr Wang Dr Meyer	Yes
		(v) Biomass estimation methods Urgency: High (1) Establish Grym parameters for krill stock assessments in Areas 48 and 58 Urgency: High	Short	Dr Ying WG-ASAM Mr Johannessen Dr Lowther Mr Maschette	
		(vi) Account for spatial structure of krill Urgency: Medium	Short	Dr Schaafsma Dr Zhu	
	(b) Develop stock assessments to implement decision rules for krill	(i) Krill management approach (synthesis of krill recruitment, spatial scale, biomass estimates, predator risk) Urgency: High (1) Subarea 48.1 (2022) Urgency: High (2) Subareas 48.2, etc… (2023/24) Urgency: Medium	Short/medium	Dr Kawaguchi Dr Watters Dr Meyer WG-ASAM	
		(ii) Develop diagnostic tools Urgency: Medium	Short/medium	Mr Maschette	

(continued)

Table 8 (continued)

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
		(iii) Develop ecosystem indicators to inform Spatial Overlap Analysis framework (WS-CC-23 Table 1 Recommendation 9) Urgency: Low	Medium	Dr Warwick-Evans	
		(iv) Methods to account for uncertainty in stock status Urgency: Low (2) Spatial structure within subareas Urgency: High (3) Interannual variability Urgency: Low			
		(v) Develop krill management approach as a multiannual cycle Urgency: High		Dr Hill Dr Watters	
		(vii) Krill management strategies that are robust to climate change Urgency: Medium	Long	Dr Hill	
		(viii) Develop a framework for using climate models to drive ecological projections for AMLR and dependent and related species (WS-CC-23 Table 1 Recommendation 12)	Short	SCAR	
	(e) Management strategy evaluations for target species (Second Performance Review, Recommendation 8)	(iii) Finfish management strategies that are robust to climate change Urgency: Medium	Medium/Long	Dr Devine	
		(iv) MSE for krill	Medium	Mr Mardones Dr Lowther Mr Johannessen	
	(f) Krill Stock Hypothesis Information Collection Plan	See EMM-2023Table 1	See EMM-2023 Table 1	See EMM-2023 Table 1	

(continued)

Table 8 (continued)

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
2. Ecosystem impacts	(a) Ecosystem monitoring (Second Performance Review, Recommendation 5)	(i) Structured ecosystem monitoring programs (CEMP, fishery) (1) CEMP (i) Area 48	Short	Dr Collins Dr Hinke Dr Lowther Dr Hill Dr Waluda Dr Santos Dr Krüger Dr Van de Putte Dr Labrousse	Yes
		(ii) Other areas (58, 88)			
		(2) Fishery via SISO Urgency: Medium	Medium	Dr Labrousse Dr Van de Putte Dr Emmerson Dr J. Kim	
				Dr Makhado	
		(ii) Ecosystem modelling Urgency: Low	Long	Dr Schaafsma Dr Pinkerton Dr Hill Dr Kelly Dr Van de Putte	

(continued)

Table 8 (continued)

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
		(iii) Invasive species Urgency: Low	Long		
		(iv) Marine debris monitoring Urgency: Low	Long	Dr Waluda Dr Schaafsma Dr Makhado Dr Emmerson Dr Santos Mr Pardo	Yes
		(v) Cetaceans in CEMP and krill fishery management	Short	Dr Kelly Mr Johannessen	
		(vi) To develop distribution models of harvested and dependent species, and projections ?using future climate scenarios, to inform a risk assessment framework of the likely impacts of climate change (WS-CC-23 Table 1 Recommendation 9, 10, Table 2 Recommendation 20)	Medium		
		(viii) Ensure monitoring is adequate to detect significant changes in species life history parameters and distribution, and identify monitoring data to exchange with adjacent RFMOs e.g. to detect range shifts (WS-CC-23 Table 1 Recommendation 1, 2, 4, 5,)	Short		
		(ix) Identify specific climate variables and metrics useful in communicating the status of AMLR through time (health check). (WS-CC-23 Table 1 Recommendation 24)	short		
	Extreme events	(i) To develop a catalogue of the different types of extreme events, their time scales and the species and life stages that they are likely to affect and propose management responses (WS-CC-23 Table 1 Recommendation 13, 14)			
		(ii) To collate a list of important variables to be monitored following an extreme event (WS-CC-23 Table 1 Recommendation 15)	Medium		

(b) Spatial management	(i) Science advice on proposals for a Representative System of MPAs Urgency: High (1) Current proposals Urgency: High (2) Future proposals Urgency: Low	Short/Medium	Prof. Koubbi Dr Teschke Dr Krüger
	(ii) the harmonisation and/or integration of different spatial management initiatives within Subarea 48.1, including the ARK voluntary restricted zones and the D1MPA proposal (SC-CAMLR-41, paragraph 3.65) Urgency: High	Short	Dr Santos Mr Santa Cruz Dr Lowther Dr Krüger
	(ii) Research and monitoring plans Urgency: High	Medium/Long	Dr Devine et al
(c) By-catch risk assessment for krill and finfish fisheries	(i) Monitoring status and trends Urgency: High	Medium	Dr E. Kim Dr Chung
	(ii) By-catch species catch limits Urgency: High		Dr Devine

(continued)

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
	(d) Habitat protection from fishing impacts	(i) Habitat classification, bioregionalisation and monitoring Urgency: Low			
		(ii) VME identification and management Urgency: Medium		Dr Eléaume Dr Teschke Dr Devine et al.	
		(iii) Protection of biodiversity and ecosystems (Second Performance Review, Recommendation 7) Urgency: High (1) Ecosystem impacts from krill and finfish fishing, including analyses whether research and sampling design is able to detect such impacts Urgency: High (2) Physical disturbance of longline fishing on benthic ecosystems Urgency: Low (3) Suitability of reference areas for comparison between fished and unfished areas Urgency: Medium			
	(e) Monitoring and adaptation to effects of climate change	(i) Develop methods to detect change in ecosystems given variability and uncertainty (Second Performance Review, Recommendation 6) Urgency: Medium	Medium	Dr Schaafsma Dr Dahlgren Dr Hill Dr Collins Dr Emmerson Dr Waluda Mr Pardo Dr Cavanagh Dr Parker Dr Waluda	Yes
		Develop integrated ecosystem reporting (WG-EMM-2022, paragraph 2.18)	Medium	Mr Pardo Dr Cavanagh	Yes
		(iii) Develop mechanisms for integration in SC work			

(continued)

Table 8 (continued)

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
	Administrative topics	(a) Advise on database facilities required through DSAG Urgency: High		Dr Devine	Yes
		(b) Advise on quality control and assurance processes for data provided to and supplied by the Secretariat Urgency: High			Yes
		(c) Refine the scheme of international scientific observation (SISO) across all fisheries Urgency: Medium			Yes
		Further develop data management systems Urgency: Medium (1) Quality assurance Urgency: High (2) DOI Urgency: Medium (3) Data access Urgency: Low			Yes
		(e) Communication of progress, internal and external Urgency: Medium			Yes
		(f) Working group terms of reference Urgency: Low			
		(g) Scientific Committee Symposium in 2027 Urgency: High			
		(h) Develop a data collection plan for KFMA and D1MPA	Short	Dr Krüger Dr Santos Mr Santa Cruz Dr Lowther Dr Meyer Dr Zhu Dr Krause Dr Kasatkina WG-ASAM	

Table 9: Annotated table of **WG-IMAF** workplan updated for 2024. Timeframe periods are short = 1–2 years, medium = 3–5 years and long = 5+ years. AI = artificial intelligence, EM = electronic monitoring, MMED = marine mammal exclusion device.

Theme	Task	Timeframe	Contributors	Secretariat participation
1. Review of incidental mortality	1.1 Summary of incidental mortality and interactions at a fine scale (spatial and temporal)	Ongoing	Dr Favero, Mr Walker and Prof. Phillips	Yes
	1.2 Development of a web-based tool to allow examination of interactions and incidental mortality data across CCAMLR fisheries	Medium	Dr Favero, Mr Walker and Prof. Phillips	Yes
2. Marine mammals – incidental mortality	2.1 Refine design of additional data to be collected by observers and crew when whale entanglements occur (see list developed under paragraph 4.17)	Completed	Dr Kelly (IWC Collaboration) and Mr Pardo	Yes
	2.2 Investigate the use of underwater sensor/cameras attached to the net (and AI) to provide information on the occurrence of whale interactions and any subsequent entanglements/capture (continuous)	Short	Dr Kelly (IWC Collaboration), Dr Lowther and Dr Lindstrøm	-
	2.3 Development of data collection protocols for pinniped mortalities and training materials	Completed	Mr Pardo	Yes
	2.4 Review of Elephant seal incidental mortality (including additional information on abundance trends and foraging behaviour for populations affected)	Short	Dr Kelly	Yes
3. Seabirds and Marine mammals – risk assessment	3.1 Consider developing risk assessment and/or overlap analysis for seabirds and marine mammals	Medium	Dr Lindstrøm, Dr Kelly and Prof. Phillips	-
	3.2 Use a risk assessment framework to obtain an initial evaluation of the likely effects of climate change on dependent and bycaught species	Medium		Yes
4. Marine mammals – mitigation	4.1 Review designs of marine mammal exclusion devices and develop specifications for those in use in CCAMLR trawl fisheries (including consideration towards a convex shape to the exclusion mesh to deflect whales (and seals) away from the net mouth)	Ongoing	Dr Kelly (IWC Collaboration), Dr Lowther, Mr Pardo and Dr Lindstrøm	-

Theme	Task	Timeframe	Contributors	Secretariat participation
	4.2 Undertake experiments into effectiveness of different MMED designs (for various species) (including performance trials in flume tanks)	Medium	Dr Kelly (IWC Collaboration), Dr Lowther, Dr Lindstrøm and Dr Ying	-
5. Seabirds – incidental mortality	5.1 Power analysis of required observer sampling required for warp strikes	Update if required	Dr Kelly, Dr Hinke and Mr Walker	-
	5.2 Redesign the warp strike observation protocols	Completed	Dr Debski	Yes
	5.3 Exploration of approaches to undertake warp strike extrapolations (Note GAM approach recommended by WG-SAM)	Short	Dr Favero, Dr Hinke and Mr Walker	Yes
	5.4 Review required levels of observer sampling for seabird incidental mortality with longline fishery	Short	Mr Zhu, Dr Kawaguchi	Yes
	5.5 Determine composition of stick water resulting from different processing methods from krill trawlers	Short	Dr Favero	Yes
	5.6 Investigate the effect of stick water as an attractor in the immediate vicinity of the vessel	Medium	Dr Krüger	
	5.7 Develop trawl vessel classification based on deployment configurations of fishing gear, processing states and discharge positions to better understand bird strike variability	Short	Dr Krüger	Yes
6. Seabirds – mitigation	6.1 Consider performance of trawl warp/cable strike mitigation approaches utilised by continuous trawl vessels (including environmental conditions and other factors) including the improvement and specification development for the 'sock' design.	Short	Dr Debski and Dr Arata	-
	6.2 Review existing use of and consider mitigation requirements in conventional trawl vessels and develop specifications for suitable mitigation	Short	Dr Debski and Dr Arata	-
	6.3 Review developments in demersal longline mitigation	Update if required	Ms Livesey, Dr Debski and Mr Arangio/ Mr McNeill	-

Theme	Task	Timeframe	Contributors	Secretariat participation
7. Observer reports and data collection	7.1 Consider IMAF-related tasks for observers in the various CCAMLR fisheries	Ongoing	Mr Clark	Yes
	7.2 Consider use of EM and AI to improve the efficiency of data collection to aid observers	Medium/ Long	Mr Clark	-
8. Marine debris effects on seabird and marine mammals	8.1 Review information on the effect of marine debris on marine mammals and seabirds in the Convention Area	Short	Ms Livesey	Yes
9. Light pollution effect on seabirds	9.1 Consider options for the management of light pollution for vessels fishing in the Convention Area	Update if required	Ms Livesey	-

Table 10: Annotated table of **WG-FSA** workplan updated for 2024. Items tasked to WG-FSA from the Scientific Committee Strategic Plan (SC-CAMLR-41, Table 8). Numbers refer to the numbering in the original tables. DSAG – Data Services Advisory Group, SISO – Scheme of International Scientific Observation, AUS – Australia, CHN – People's Republic of China, ESP – Spain; FRA – France, JPN – Japan, KOR – Republic of Korea, NZ – New Zealand, ZAF – South Africa, UK – United Kingdom, USA – United States.

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
1. Target species	(a) Develop methods to estimate total fish by-catch for the krill fishery	(iii) Data collection – SISO, vessels Priority: High	2024–2025	Secretariat	Yes
	(b) Develop stock assessments to implement decision rules for krill (Deferred to SC-44 discussions)				
	(c) Develop methods to estimate biomass for finfish	(i) Data collection – SISO and vessels Priority: High			
		(1) Conversion factors Priority: mostly done	2025	Secretariat, FRA and NZ	Yes
		(2) Tagging protocols Priority: done	2023	Dr Jones/Mr Arangio	Yes
		(3) Ross Sea data collection program update Priority: Medium	2025	All involved Members (NZ Lead)	Yes
		(ii) Accounting for potential spatial bias in assessments. Priority: Urgent	2024–2025	WG-SAM and Members	
	(c.1) Connectivity of target and non-target species using new technologies	(i) Pop-up satellite tag investigations (ii) Otolith microchemistry (iii) Microsatellite markers and population genomic analyses (iv) Emerging technologies Priority: Low/Medium	2025–2028	All involved Members	

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
	(d) Develop stock assessments to implement decision rules for finfish target species	(i) Research to develop new assessments Priority: Low		WG-SAM	
		(1) Research plan evaluations Priority: Required	Annual	WG-SAM/WG-FSA	Yes
		(2) Subarea 88.2 fishery structure Priority: Low	2027 2023–2027	(NZ lead) All involved Members	Yes
		(3) Stock structure and connectivity (cross ref modelling of spatial structure, done in Areas 48, 58 and Subareas 88.1 and 88.2) Priority: Low		JPN/NZ/CHN/KOR/USA Members	Yes
		(ii) Develop new assessment tools			
		(1) Casal2 development Priority: done	2023–2025	NZ/All involved Members	
		(2) Casal2 data limited assessment. Priority: high	2024-2025	ZAF, ESP, JPN and other Members	Yes
		(iii) Provide precautionary catch limits Priority: Required	Annual	WG-FSA regular updates	Yes
		(iv) Developing sex disaggregated assessment models for areas with combined sex assessments Priority: Medium	2026	Members	
	(e) Management strategy evaluations for target species (Second Performance Review,	(ii) Development and testing of data-limited fishery decision rules Priority: Medium	2024–2025	Interested Members (WG-FSA-2024, paragraph 7.2)	Yes

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
	Recommendation 8 independent review)	(iii) Finfish management strategies that are robust to climate change Priority: Urgent	2024	AUS/NZ/UK Interested Members	Yes
		(iv) Analysis of current and alternative decision rules Priority: High (see also WG-SAM-2024 Table 2, then 1, task (e)(i))	2024	Members and WG-SAM-2024	Yes
	(f) Refine stock assessment procedures	i) Improve methods for inclusion of ageing data, e.g.: • Determining the CVs on the age compositions and effective sample sizes Priority: Medium • Determining the effect of different target levels of precision for age determination, Priority: Medium	2024–2028	WG-SAM	
		ii) Incorporating environmental and ecosystem parameters in toothfish population models Priority: Medium	2024–2025		
		iii) Investigate the impact of covarying productivity parameters. Priority: Medium	2026–2027		

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
		iv) Continuing development of stock assessment diagnostics Priority: ongoing	2026–2027		
		v) Developing methods to validate and pool multimember age data • Determining how differences in toothfish growth over time impacts the interpretation of age from otoliths Priority: ongoing	2026–2027		Y
	(g) Develop methods to estimate climate change effects on harvested species	(i) to identify data-sharing needs with adjacent RFMOs to detect effects of climate change, e.g. species range shifts (WS-CC-23 Table 1 Recommendation 1, 2) Priority: high	2024–2025	Secretariat/Some Members	Yes
		(ii) Identify any non-target species within the CAMLR Convention Area likely to increase in commercial importance. (WS-CC-23 Table 1 Recommendation 4) Priority: high	2024–2025	Members who are fishing	Yes
		(iii) To develop methods to incorporate the effects of projected climate change on assumed recruitment patterns or uncertainty for harvested species recruitment into assessment projections. (WS-CC-23 Table 1 Recommendation 6) Priority: medium	2026–2027	All Members conducting assessments	Yes

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
		(iv) Develop appropriate parameters for all exploited species (e.g., WS-CC-2023/20 Table 1/WG-FSA-2023 Table 5) to monitor the effects of climate variability/change on parameters and processes relevant to stock assessments. (WS-CC-23 Table 1 Recommendation 7) Priority: high			
2. Ecosystem impacts	(a) Ecosystem monitoring (Second Performance Review, Recommendation 5)	(i) Structured ecosystem monitoring programs (CEMP, fishery) (2) Fishery via SISO Priority: Medium (3) Research surveys Priority: Medium / High (iii) Invasive species Priority: Low		Regular monitoring Members fishing under CM-24-01 Surveys	Yes
	(c) By-catch risk assessment for krill and finfish fisheries	(i) Monitoring status and trends Priority: High	Annual	Secretariat	
		(ii) By-catch species catch limits Priority: High	2026	Members	
		(iii) Review of by-catch decision rules Priority: Medium	2027		
		(iv) By-catch mitigation methods Priority: Low	2026	Members	
		(v) Improving species identification Priority: High • Identification guides • Identification data	Annual	Members	
		(vi) Biological parameters of by-catch species Priority: High	2026	SCARFISH Members	
	(d) Habitat protection from fishing impacts	(i) Habitat classification, bio-regionalisation and monitoring Priority: Low			
		(ii) VME identification and management Priority: Low	2025	Members	Yes

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
		(iii) Protection of biodiversity and ecosystems (Second Performance Review, Recommendation 7) (1) Ecosystem impacts from krill and finfish fishing, including analyses whether research and sampling design is able to detect such impacts Priority: Low (2) Physical disturbance of longline fishing on benthic ecosystems Priority: Low (3) Suitability of reference areas for comparison between fished and unfished areas Priority: Medium	2027	Members and WG-EMM	Yes
	(e) Monitoring and adaptation to effects of climate change, including acidification	(i) Develop methods to detect change in ecosystems given variability and uncertainty (Second Performance Review, Recommendation 6) Priority: Medium		Members and WG-EMM	
Administrative topics	(a) Advise on database facilities required through DSAG Priority: ongoing		Annual	DSAG	Yes
	(b) Advise on quality control and assurance processes for data provided to and supplied by the Secretariat Priority: ongoing		Annual	DSAG	Yes

Theme	Priority research topic	Priority research topic task	Timeframe	Contributors	Secretariat participation
	(c) Refine the scheme of international scientific observation (SISO) for: (1) finfish Priority: Medium/ High (2) krill Priority: High		2027 2024–2025		Yes
	(d) Further develop data management systems Priority: Medium	(1) Quality assurance Priority: ongoing	Annual	DSAG	Yes
		(2) DOI Priority: Low		DSAG	Yes
		(3) Review Data access rules Priority: Low		DSAG	Yes
	(e) Communication of progress, internal and external Priority: ongoing		Annual	Convener	Yes
	(f) Working group terms of reference Priority: Done		2022	SC-CAMLR-41	Yes
	(g) Scientific Committee Symposium in 2027 (Include annual review) Priority: Medium		2027	SC Chair	Yes

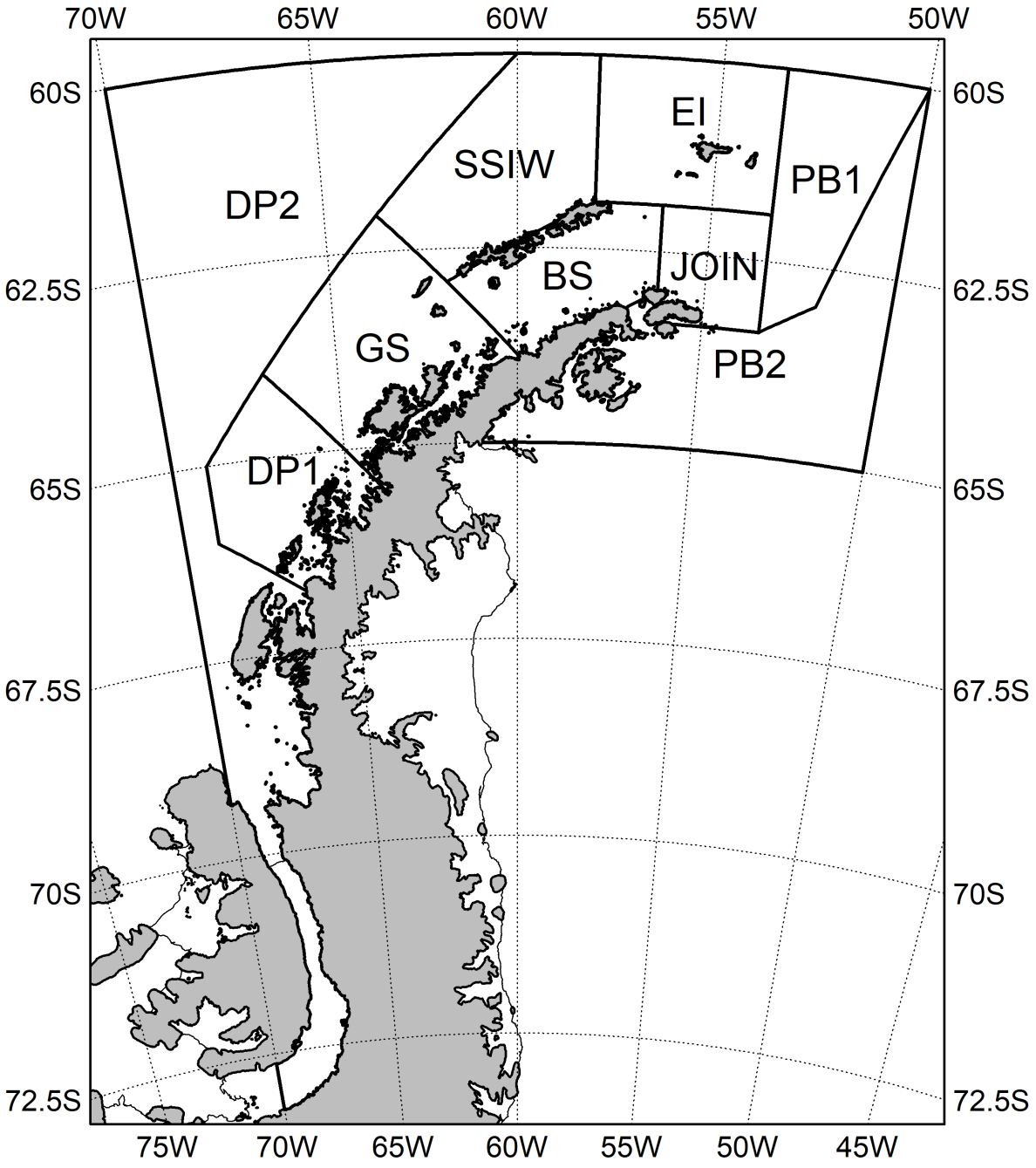

Figure 1: Candidate Management Units after update. EI: Elephant Island, JOIN: Joinville, BS: Bransfield Strait, SSIW: South Shetland Islands West, GS: Gerlache Strait, DP: Drake Passage, PB: Powell Basin. Sources: CCAMLR/UK Polar Data Centre/BAS and Natural Earth. Projection: EPSG 6932 (rotated).

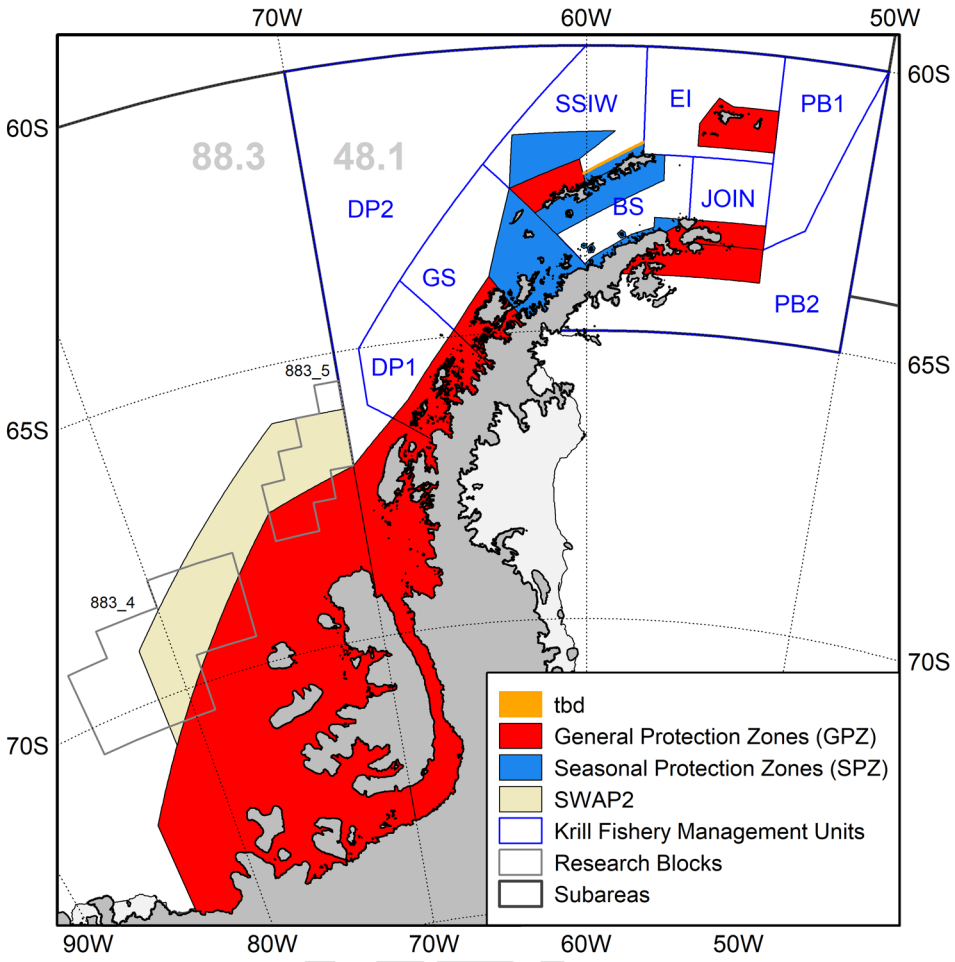

Figure 2: Spatial structure of management units, seasonal protection zones (SPZs, which are closed for part of the year), general protection zones (GPZs, which are closed year-round) and a Southwest Antarctic Peninsula GPZ (SWAP2, which includes fewer restrictions than other GPZs in subareas 48.1 and 88.3 as recommended by the Harmonisation Symposium (CCAMLR-43/29). EI: Elephant Island, JOIN: Joinville, BS: Bransfield Strait, SSIW: South Shetland Islands West, GS: Gerlache Strait, DP: Drake Passage, PB: Powell Basin. Sources: CCAMLR/UK Polar Data Centre/BAS and Natural Earth. Projection: EPSG 6932 (rotated).

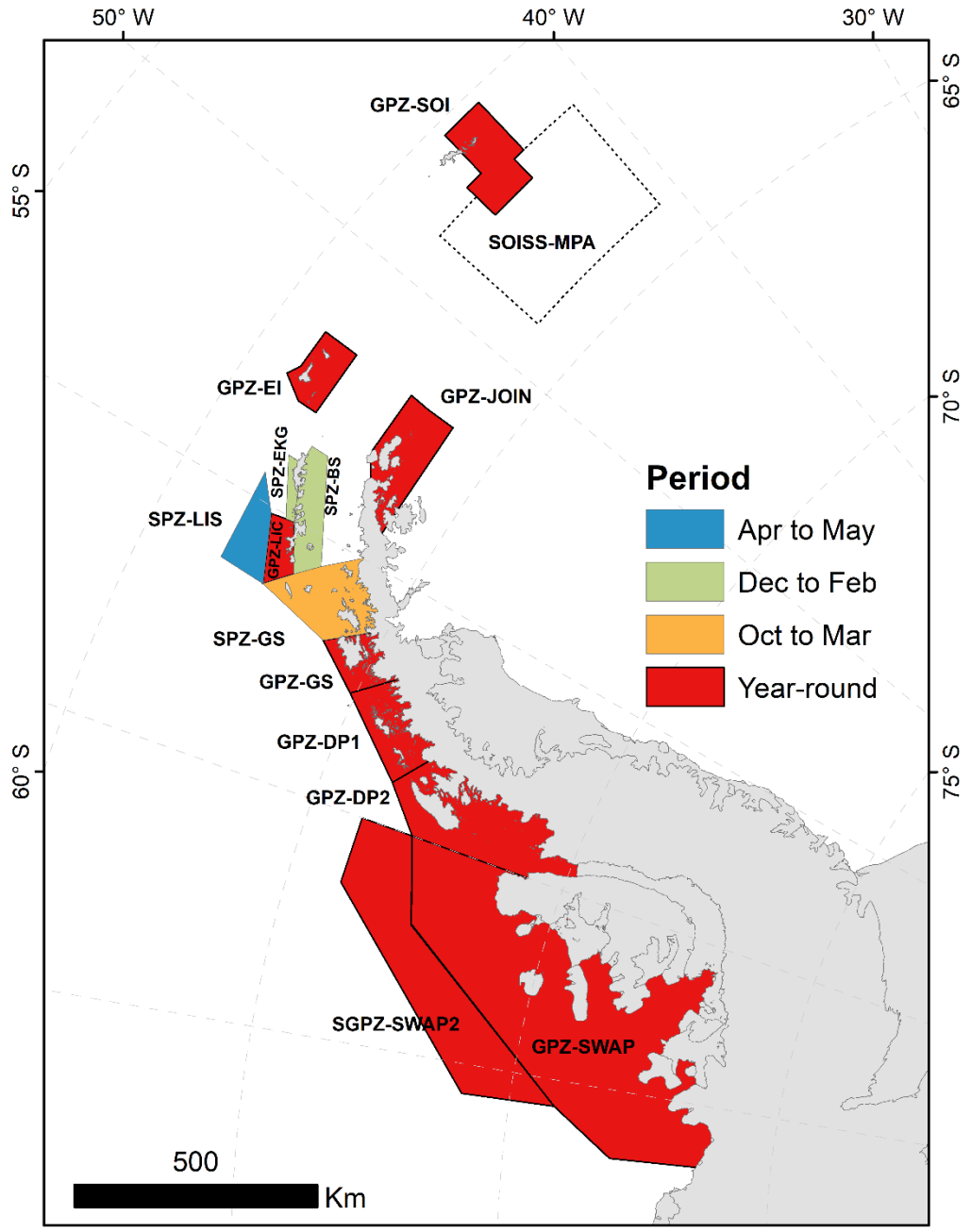

Figure 3: Design of the Domain 1 Marine Protected Area in CCAMLR-43/37 with implementation of the GPZ-SOI (South Orkney Island) on a later stage to be determined during Comission.

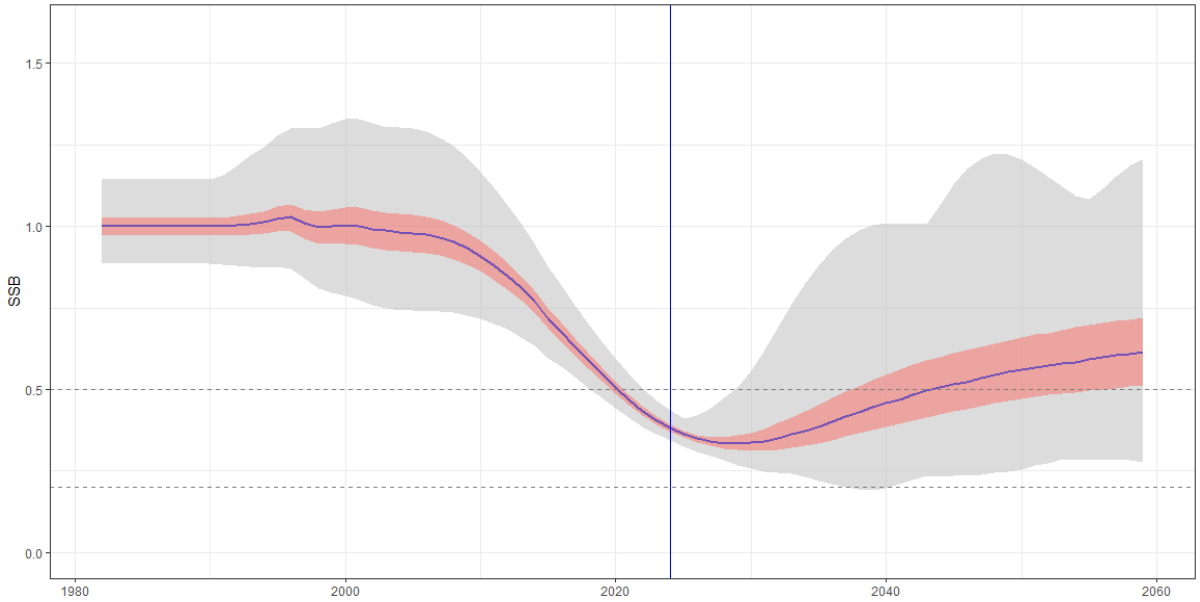

Figure 4: Projected SSB status relative to B_0 for the 2024 base-case stock assessment Model and a constant future catch of 2120 tonnes using MCMC samples for D. eleginoides in Division 58.5.2. The YCS period from 1986-2019 was used to generate random lognormal recruitment from 2020-2059. Shown are median (blue line), 100% confidence bounds (light grey) and 80% confidence bounds (dark red). Horizontal dotted lines show the 50% and 20% status levels used in the CCAMLR decision rules, the vertical blue line indicates the current year.

Annex 1

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List of Documents

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SC-CAMLR-43/01	2024 review of the South Orkney Islands Southern Shelf Marine Protected Area Delegations of the United Kingdom, Argentina, the European Union and its Member States, Norway and Uruguay
SC-CAMLR-43/02	Information about a Workshop for Training Russian Scientific Observers and Inspectors to Work in Fisheries in the CCAMLR Convention Area (Kaliningrad, Russia, 3 – 7 June 2024) Kasatkina, S.
SC-CAMLR-43/03	Proposed Improvements for the CCAMLR Statistical Bulletin CCAMLR Secretariat
SC-CAMLR-43/04	Precautionary catch limits for *Euphausia superba* in Divisions 58.4.1 and 58.4.2: Addressing comments from SC-CAMLR-42 Delegations of Australia and Japan
SC-CAMLR-43/05	Proposals on the revision of CM 51-01 and CM 51-07 as a first trail of the revised krill management approach in 2024 Delegation of the People's Republic of China
SC-CAMLR-43/06	Priority Elements for scientific research and monitoring in support of the Weddell Sea Marine Protected Area Phase 2 Delegations of Norway and the United Kingdom
SC-CAMLR-43/07	Data collection plan for the krill management and the proposed MPA in Subarea 48.1 Delegation of Australia
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SC-CAMLR-43/09	The status of the South Orkney Islands Southern Shelf Marine Protected Area (SOISS MPA) Delegation of the Russian Federation
SC-CAMLR-43/10	Progress with recommendations from the CCAMLR Workshop on Climate Change Delegations of the United Kingdom and New Zealand

SC-CAMLR-43/11	Report of the Working Group on Acoustic Survey and Analysis Methods (WG-ASAM-2024) (Cambridge, UK, 20 to 24 May 2024)
SC-CAMLR-43/12	Report of the Working Group on Statistics, Assessment and Modelling (WG-SAM-2024) (Leeuwarden, The Netherlands, 24 to 28 June 2024)
SC-CAMLR-43/13	Report of the Working Group on Ecosystem Monitoring and Management (WG-EMM-2024) (Leeuwarden, The Netherlands, 1 to 12 July 2024)
SC-CAMLR-43/14	Report of the Working Group on Fish Stock Assessment and Incidental Mortality Associated with Fishing (WG-FSA-IMAF-2024) (Hobart, Australia, 30 September to 11 October 2024)
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SC-CAMLR-43/BG/01	Catches of target species in the Convention Area CCAMLR Secretariat
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SC-CAMLR-43/BG/05 Rev. 1	Secretariat science support for the Scientific Committee in 2024 CCAMLR Secretariat
SC-CAMLR-43/BG/06	CEMP Special Fund activities 2024 CEMP Special Fund Management Panel
SC-CAMLR-43/BG/07	CCAMLR Scientific Scholarship Scheme review panel recommendations in 2024 CCAMLR scientific scholarship scheme review panel

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SC-CAMLR-43/BG/09	Addressing the Recommendations from SC-CAMLR-42 and WG-EMM-2024 on the Science Supporting the Proposal for the Weddell Sea Marine Protected Area Phase 2 Delegation of Norway and the United Kingdom
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SC-CAMLR-43/BG/13	Long term trends in Patagonian toothfish populations in Subarea 48.3 Delegation of the United Kingdom
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SC-CAMLR-43/BG/18	Development of an Adélie Penguin monitoring site under the CCAMLR Ecosystem Monitoring Program in Seaview Bay of Inexpressible Island Delegations of China, Italy and the Republic of Korea
SC-CAMLR-43/BG/19	Antarctic science requires a protected Antarctica and the Southern Ocean ASOC
SC-CAMLR-43/BG/20	Antarctic fur seals as bioindicators of seasonal and ocean basin scale variation in the Southern Ocean food web Friscourt, N.
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SC-CAMLR-43/BG/24	Introduction to the SCAR Action Group on Fish (SCARFISH) SCAR
SC-CAMLR-43/BG/25	Progress report on high priority scientific issues for the Scientific Committee CCAMLR Scientific Committee Bureau
SC-CAMLR-43/BG/26	Mapping present day polynya ecosystem value from phytoplankton to penguins ASOC
SC-CAMLR-43/BG/27	Preliminary results for identifying potential Antarctic krill spawning and advection pathways of larval krill along the western Antarctic Peninsula and future harmonization plans ASOC
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SC-CAMLR-43/BG/31 Rev. 1	Subsidizing the Deep Blue: An Introductory Analysis of Southern Ocean Fishery Subsidies and the Economics of Distant Water Fleets ASOC
SC-CAMLR-43/BG/32	The SCAR Antarctic Biodiversity Portal update 2024 Delegation of Belgium, SCAR and SCOR
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SC-CAMLR-43/BG/35	2024 Annual Report to the Scientific Committee of CCAMLR CEP Observer to SC-CAMLR-43 Dr A. Titmus (USA)
SC-CAMLR-43/BG/36	FAO Deep-sea Fisheries Under an Ecosystem Approach Project (2022–2027). FAO
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SC-CAMLR-43/BG/38	Commercial and Scientific Observer Tagging Manual Finfish Fisheries Version 2024 Williamson, M and C. Heinecken
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CCAMLR-43/06	Performance Review 2 – summary of outcomes CCAMLR Secretariat
CCAMLR-43/10	Cooperation with other organisations CCAMLR Secretariat
CCAMLR-43/22	Comments on the harmonisation of the implementation of the revised Krill Fishery Management Approach (KFMA) and the establishment of the Domain 1 MPA in Subarea 48.1 Delegation of the Russian Federation

CCAMLR-43/24	Comments on revising the Conservation Measure CM 51-07 Delegation of the Russian Federation
CCAMLR-43/29	Conveners Report of the Symposium on Harmonisation of Conservation and Krill Fishery Management Initiatives in the Antarctic Peninsula Region Watters, G and J.R. Kim
CCAMLR-43/30	Draft Memorandum of Understanding between CCAMLR and the Government of Peru CCAMLR Secretariat and the Government of Peru
CCAMLR-43/31	Proposal for a third CCAMLR performance review Delegations of the European Union and its Member States
CCAMLR-43/37	Revised proposal for a Conservation Measure establishing a Marine Protected Area in Domain 1 (Western Antarctic Peninsula and South Scotia Arc) Delegations of Argentina and Chile
CCAMLR-43/38	Proposed new Annex to Conservation Measure 21-02 for finfish research proposals for exploratory fisheries Delegations of Australia, Japan and the Republic of Korea
CCAMLR-43/46	Proposed revision to CM 25-03 Delegation of Norway
CCAMLR-43/48	Suggestions for establishing Marine Protected Areas in the CCAMLR Convention Area: regulation of the uniform process for establishing MPAs and the Commission's management of MPAs Delegation of the Russian Federation
CCAMLR-43/BG/02 Rev. 1	COLTO Gear Workshop - Final Report COLTO
CCAMLR-43/BG/07	Practical implementation of the harmonised Krill Fishery Management Approach CCAMLR Secretariat
CCAMLR-43/BG/09 Rev. 1	Fishery Notifications 2024/25 CCAMLR Secretariat
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CCAMLR-43/BG/27	2024 Report to SC-CAMLR-43 and CCAMLR-43 by the Association of Responsible Krill harvesting companies (ARK) ARK
CCAMLR-43/BG/33 Rev. 1	Implementation of electronic monitoring systems (EMS) in Chile to control discards, incidental bycatch and fishing regulation Delegation of Chile
CCAMLR-43/BG/34	ASOC Report to CCAMLR ASOC
CCAMLR-43/BG/35	Benefits of large-scale marine protected areas Delegation of the European Union and its Member States
CCAMLR-43/BG/36	The Scientific Committee on Antarctic Research (SCAR) Annual Report to CCAMLR 2023/24 SCAR
CCAMLR-43/BG/44	Priorities for next steps on the D1 MPA and krill fisheries management ASOC
CCAMLR-SM-III/09	Comments and suggestions on the draft Ross Sea region MPA Research and Monitoring Plan Delegation of the Russian Federation

Annex 3

Agenda for the Forty-third Meeting
of the Scientific Committee

Agenda for the Forty-third Meeting of the Scientific Committee for the Conservation of Antarctic Marine Living Resources

1. Opening of the meeting

    1.1 Adoption of the agenda
    1.2 Chair's report

2. Harvested species: Krill

    2.1 Statistical Area 48
        2.1.1 Progress towards acoustic biomass estimates
        2.1.2 Progress towards a stock assessment
        2.1.3 Progress towards a spatial overlap assessment
        2.1.4 Ecosystem effects of the krill fishery
        2.1.5 Report on the Harmonisation Symposium

    2.2 Statistical Area 58

3. Harvested species: Finfish

    3.1 Statistical Area 48
        3.1.1 Icefish
        3.1.2 Toothfish

    3.2 Statistical Area 58

        3.2.1 Icefish
        3.2.2 Toothfish

    3.3 Statistical Area 88

        3.3.1 Toothfish

4. Non-target catch

    4.1 Fish and invertebrate by-catch

    4.2 Incidental mortality of seabirds and marine mammals associated with fisheries

    4.3 Bottom fishing and vulnerable marine ecosystems

5. Ecosystem monitoring and management

6. Spatial management of impacts on the Antarctic ecosystem

    6.1 Existing marine protected areas, including research and monitoring plans for MPAs

    6.2 Review of the scientific elements of proposals for new MPAs

6.3 Other spatial management issues

7. Climate change

8. Illegal, unreported and unregulated (IUU) fishing in the Convention Area

9. CCAMLR Scheme of International Scientific Observation

10. Cooperation with other organisations

10.1 Cooperation within the Antarctic Treaty System

10.2 Reports of observers from other international organisations

10.3 Reports of representatives at meetings of other international organisations

10.4 Future cooperation

11. Scientific Committee activities

11.1 Science Fund reporting

11.2 CCAMLR Scientific Scholarships Scheme

11.3 Scientific Committee strategic plan and working group priorities

11.4 SC-CAMLR supported working group meetings and workshops for 2024/2025

11.5 Invitation of experts and observers to meetings of working groups and workshops

11.6 Election of Scientific Committee Vice chair

11.7 Next meeting

12. Secretariat supported activities

13. Budget for 2024/25 and advice to SCAF

14. Other business

15. Adoption of report of the Forty-third Meeting

16. Close of meeting