ANNEX 5

REPORT OF THE WORKING GROUP ON FISH STOCK ASSESSMENT

(Hobart, Australia, 9 to 20 October 2006)

CONTENTS

[1] Appendices F to R have been published only in electronic format. For these reports, please refer to www.ccamlr.org/pu/E/e_pubs/fr/drt.htm.

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OPENING OF THE MEETING

1.1 The meeting of WG-FSA was held in Hobart, Australia, from 9 to 20 October 2006. The Convener, Dr S. Hanchet (New Zealand), opened the meeting and welcomed participants.

1.2 The Working Group paused in memory of Dr Geoff Kirkwood (UK), colleague and long-serving participant of CCAMLR. The Working Group acknowledged Dr Kirkwood's major contributions to the development of assessment methods, the evaluation of fish stocks and the management of fisheries.

ORGANISATION OF THE MEETING AND ADOPTION OF THE AGENDA

Organisation of the meeting

Meeting documents

2.1 Dr Hanchet advised that there were a number of meeting papers which had been submitted after the deadline and without prior notification (see Part II, paragraph 9, Guidelines for the Submission of Papers to Meetings of SC-CAMLR Working Groups); these papers were not considered during the meeting.

2.2 The Working Group reconsidered last year's decision that all meeting documents should be distributed as locked pdf files (SC-CAMLR-XXIV, paragraph 12.15). Locked documents prevented rapporteurs and subgroup coordinators from extracting electronically essential information and text from meeting papers. It was agreed that meeting documents should be made available on the CCAMLR website and on the meeting server as unlocked pdf files.

Agenda

2.3 The agenda of the meeting was discussed and adopted with the addition of subitem 3.3.7 on depredation (Appendix A). The Working Group noted the Commission's request to review the effectiveness of the new move-on rule for by-catch (Conservation Measure 33-03, paragraph 5) in reducing by-catch in Subareas 88.1 and 88.2 in 2005/06 (CCAMLR-XXIV, paragraph 11.39).

Report restructure

2.4 The Working Group noted that the Scientific Committee (SC-CAMLR-XXIV, paragraphs 13.18 to 13.25) and the Commission (CCAMLR-XXIV, paragraphs 4.70 to 4.75) had acknowledged the significant improvements arising from the recent restructure of the

report, but had agreed that the size of the 2005 report was untenable. That report (including the appendices) had resulted in a budget overrun in translating and publishing costs and had severely stretched the Secretariat resources.

2.5 WG-FSA agreed to reduce the size of its 2006 report through extensive editing and cross-referencing to other reports, avoiding duplication of text, and following the guidelines in the rapporteurs notes.

2.6 The possibility of non-translation of some or all appendices, and of not updating/translating Fishery Reports where the assessments and resulting yield estimates are similar to last year, was also considered (see paragraphs 13.23 to 13.25).

2.7 The report was prepared by the participants, and includes the Agenda (Appendix A), List of Participants (Appendix B), List of Documents considered at the meeting (Appendix C), Report of ad hoc WG-IMAF (Appendix D) and Fishery Reports (Appendices F to R).

REVIEW OF AVAILABLE INFORMATION

Data requirements specified in 2005

Development of the CCAMLR database

3.1 The Data Manager, Dr D. Ramm, provided an update on recent developments in managing CCAMLR's data. During the intersessional period, the Secretariat had further developed procedures and data forms at the request of the Scientific Committee and its working groups. This work included:

(i) revising data forms used for reporting scientific observer data, fine-scale data and catch and effort reports (CCAMLR-XXIV, paragraph 4.50; SC-CAMLR-XXIV, paragraphs 4.192 to 4.200). The revisions were outlined in WG-FSA-06/4 and the data forms are available on the CCAMLR website: www.ccamlr.org/pu/e/sc/fish/forms.htm; www.ccamlr.org/pu/e/sc/obs/logbooks.htm;

(ii) developing a manual on the procedures for the extraction and mathematical manipulation of data used by WG-FSA (SC-CAMLR-XXIV, paragraph 4.17 and Annex 5, paragraph 3.7). The manual was available on the meeting server;

(iii) developing an electronic reference library of relevant meeting documents (SC-CAMLR-XXIV, paragraph 12.19). At the time of the meeting, the reference library contained all documents from the meetings of WG-FSA since 1995. Documents from meetings of other working groups will be added as Secretariat resources become available. The library was available on the meeting server, and documents were available generally to meeting participants under the Rules for Access and Use of CCAMLR Data;

(iv) conducting an initial validation of assessments involving CASAL, immediately prior to WG-FSA, using the input parameter files and associated papers submitted to WG-FSA (WG-FSA-06/6, paragraphs 6.1 and 6.2). These

assessments were for *Dissostichus* spp. in Subareas 48.3, 88.1 and 88.2 and Division 58.5.2. The work involved the validation of the input parameter files submitted, and the validation that the assessment results as quoted in the accompanying papers can be reproduced using those input files. The validation steps and results were reported in a document which was available on the meeting server;

(v) extending the time series of catch-weighted length frequencies for *D. eleginoides* in Subarea 48.3 (SC-CAMLR-XXIV, Annex 5, Appendix G, paragraph 6 and Table 13.1, Task 50) by reviewing the procedure used and revising the available catch and length data (see WG-FSA-SAM-06/4 and WG-FSA-06/4). As a result, catch-weighted length frequencies for *D. eleginoides* in Subarea 48.3 were now available for the seasons 1984/85 to 1988/89 and from 1990/91 to the present (22 seasons including 2005/06).

Data processing

3.2 The Secretariat had processed fishery and observer data from the 2005/06 season which had been submitted prior to the meeting, and these data were available for analyses at the meeting. However, data from fishing conducted in September 2006 were not yet available and some data were overdue. Those data, and data from the remainder of the season, would be submitted later in the year.

3.3 In addition, the Secretariat had processed available fine-scale and observer data from the fishery in the South African EEZ around Prince Edward and Marion Islands (Subareas 58.6 and 58.7 and Area 51) in 2005/06, and data from the French EEZs in Division 58.5.1 (Kerguelen Islands) and Subarea 58.6 (Crozet Island) in 2005/06 (to August 2006).

3.4 The Secretariat began preliminary validation of data from 2005/06 prior to the meeting, and this procedure will be extended and completed in the forthcoming intersessional period.

3.5 The Working Group noted that Mr A. Dunn (New Zealand), in association with the Secretariat, had undertaken validation of tagging data held in the observer database with position data from the fine-scale data from Subareas 88.1 and 88.2 in preparation for the analysis reported in WG-FSA-06/34. A number of discrepancies and errors in reporting east/west positional data about longitude 180° had been detected, i.e. positions reported in fine-scale data were in the opposite hemisphere to corresponding positions reported by the scientific observers. Some errors were clear to identify and correct, while others required an arbitrary decision on the accuracy of the different datasets. The corrections applied had resulted in changes in the interpretation of the observer data (including tag returns, and age- and length-frequency data), and their implication in stock assessment.

3.6 The Working Group requested that the Scientific Committee and Commission consider the feasibility of using VMS data to validate positional data reported in fine-scale and observer data. Flag States and scientific observers were also urged to check the reported positions in the data, especially near longitudes 0° (Subarea 48.6) and 180° (Subarea 88.1).

Fishery plans

3.7 The Secretariat has maintained the database which holds the information on Fishery Plans and updated data from 2005/06 to the time series prior to the meeting.

Fisheries information

Catch, effort, length and age data reported to CCAMLR

3.8 Under the conservation measures in force in 2005/06, fishing took place in 13 fisheries targeting icefish (*Champsocephalus gunnari*), toothfish (*D. eleginoides* and/or *D. mawsoni*) and krill (*Euphausia superba*):

- fishery for *C. gunnari* in Subarea 48.3
- fishery for *C. gunnari* in Division 58.5.2
- fishery for *D. eleginoides* in Subarea 48.3
- fishery for *D. eleginoides* in Subarea 48.4
- fishery for *D. eleginoides* in Division 58.5.2
- exploratory fishery for *Dissostichus* spp. in Subarea 48.6
- exploratory fishery for *Dissostichus* spp. in Division 58.4.1
- exploratory fishery for *Dissostichus* spp. in Division 58.4.2
- exploratory fishery for *Dissostichus* spp. in Division 58.4.3a
- exploratory fishery for *Dissostichus* spp. in Division 58.4.3b
- exploratory fishery for *Dissostichus* spp. in Subarea 88.1
- exploratory fishery for *Dissostichus* spp. in Subarea 88.2
- fishery for *E. superba* in Area 48.

3.9 In addition, four other managed longline fisheries targeting toothfish were conducted in the Convention Area in 2005/06:

- fishery for *D. eleginoides* in the French EEZ in Division 58.5.1
- fishery for *D. eleginoides* in the French EEZ in Subarea 58.6
- fishery for *D. eleginoides* in the South African EEZ in Subarea 58.6
- fishery for *D. eleginoides* in the South African EEZ in Subarea 58.7.

3.10 Catches of target species by region and gear reported from fisheries conducted in the CAMLR Convention Area in the 2005/06 fishing season are summarised in Table 1.

3.11 The Working Group noted the Secretariat's work in monitoring fisheries in 2005/06 (CCAMLR-XXV/BG/3).

3.12 The Secretariat updated the catch-weighted length frequencies for *C. gunnari* taken in fisheries in Subarea 48.3 and Division 58.5.2, *D. eleginoides* taken in fisheries in Subareas 48.3 and 58.7 and Division 58.5.2, and *D. mawsoni* taken in fisheries in Subareas 88.1 and 88.2 (WG-FSA-06/4).

3.13 The Secretariat updated the catch histories for target species and by-catch species with catch limits in the Convention Area (WG-FSA-06/4). Catch histories for *Dissostichus* spp. included estimates of IUU catches (see below).

3.14 The Working Group noted the developments in longline fishing methods used in exploratory fisheries for *Dissostichus* spp. by Japan in Subarea 48.6, and Russia in the Ross Sea (WG-FSA-06/15 and 06/5 respectively). These developments were also considered by ad hoc WG-IMAF (paragraphs 7.37 to 7.41, see also paragraph 6.52).

3.15 The developments resulted in similar gear configurations consisting of a single main line with vertical branch lines (12–22 m in length) with weights and hooks. This configuration allowed the rapid deployment of the longlines, with hooks sinking rapidly to the extent of the branch lines. Hooks in the Japanese system were spaced at various intervals along the branch lines, while the hooks in the Russian system were bunched together on the branch lines.

3.16 The height of hooks above the sea floor was adjustable in the Japanese system, and it was reported that this height above the sea floor could be set to reduce by-catch. The Russian system was also reported to reduce by-catch and it was thought that *Dissostichus* spp. caught by the bunched hooks deterred by-catch species from approaching the baits.

3.17 The Working Group welcomed developments in gear configuration and mitigation methods, and urged Members to conduct statistical evaluation of new methods, using rigorous experimental design, to assess the performance of new gear, its selectivity and impact on ecosystem components (paragraph 6.52). The Working Group also encouraged Members where possible to collaborate to obtain comparative data from vessels fishing side-by-side.

Estimates of catch and effort from IUU fishing

3.18 WG-FSA reviewed estimates of IUU catches in the Convention Area for 2005/06 prepared by the Secretariat and based on information submitted by 1 October 2006 (Table 2 and WG-FSA-06/11 Rev. 2). The deterministic method presently used by the Secretariat to estimate IUU fishing effort was the same method as used in previous years. This method used information on the number of vessels sighted/apprehended and reports of port inspections. Ancillary information on fishing trips and catch rates is derived from CCAMLR data on licensed vessels. The Working Group endorsed these estimates for use in stock assessment.

3.19 WG-FSA also considered the developments in the estimation of IUU catches which had been made following the 2006 meeting of JAG. This included estimating the probability of IUU events based on the reliability of the sightings, vessel identifications, information sources and vessel activities, and the vulnerability of the area fished (SCIC-06/9). These matters were discussed under Item 8.

Catch and effort data for toothfish fisheries in waters adjacent to the Convention Area

3.20 Catches of *Dissostichus* spp. in the Convention Area which were reported to the Secretariat in STATLANT data and the catch and effort reporting system, and catches outside

the Convention Area reported in the CDS in 2004/05 and 2005/06 are summarised in Table 3. The catch of *Dissostichus* spp. outside the Convention Area in 2004/05 and 2005/06 was reported mostly from Areas 41 and 87.

3.21 Based on the historic fishing and trading patterns of vessels participating in the CDS, the Secretariat advised that catches reported outside the Convention Area in 2004/05 and 2005/06 indicated legitimate fishing activities and that there was no evidence to suggest that any misreporting had occurred.

3.22 The Working Group requested that Members provide information on the sustainability of the *Dissostichus* resource on the Scotia Ridge in order to develop advice on the possible impact of fishing in Area 41 on the *Dissostichus* resource in the western section of Subarea 48.3. It was noted that the western section of Subarea 48.3 was excluded from the region currently considered in the assessment of *D. eleginoides* in that subarea (Management Areas A, B, C).

3.23 The Working Group noted the scientific observations conducted on board a Ukrainian-flagged longliner fishing for *D. eleginoides* in Area 41 (WG-FSA-06/13). Observations included biological data on the target species and by-catch species, and information on the fishing gear. The Working Group thanked the author for providing detailed biological information.

Scientific observer information

3.24 Scientific observers appointed under the CCAMLR Scheme of International Scientific Observation were deployed on all vessels targeting finfish in the Convention Area, and some vessels targeting krill. Scientific observers have participated in 54 cruises so far in 2005/06: 49 cruises on vessels targeting *Dissostichus* spp. or *C. gunnari* (37 cruises on longliners; 9 cruises on trawlers and 3 cruises on pot vessels); and 5 cruises on vessels fishing for *E. superba* (WG-FSA-06/36 Rev. 2 to 06/39 Rev. 1). Scientific observations were discussed under Items 7 and 11.

Inputs for stock assessment

Catch-at-length/age from fisheries

3.25 Scaled length-frequency data for all fisheries were presented in WG-FSA-06/4 and 06/29. Mr Dunn reported the results described in WG-FSA-06/29 and the process of data validation which uncovered previously undetected location errors in observer data mostly due to observers failing to include a negative sign for longitudes west of 180°.

3.26 Although fewer length-frequency data were collected in 2005/06 than in previous years, due to the change in sampling methodology, the data for 2005/06 were more representative of the fishery as a whole.

Research surveys

3.27 The USA conducted a bottom trawl survey in the region of the northern Antarctic Peninsula part of Subarea 48.1, including the previous fishing grounds for the icefish *Chaenodraco wilsoni* exploited between 1978 and 1987 (WG-FSA-06/14). The report from the survey incorporated a species inventory of the region, information on the biomass of the most abundant demersal species, their distribution, size and maturity composition and their dietary patterns. In the area, two ichthyofaunal elements overlap: the low-Antarctic and the high-Antarctic fauna. In contrast to the South Shetland Islands further north, high-Antarctic elements of the fish fauna become more dominant, in particular among icefish. The species with the highest biomass was *Gobionotothen gibberifrons*. However, biomass of all finfish species in that region is currently not at a level which would allow a reopening of the fishery.

3.28 A trawl survey in Division 58.5.2 of *D. eleginoides* and *C. gunnari* was described in WG-FSA-06/42 Rev. 1, and a review of the use of data from the time series of trawl surveys was presented in WG-FSA-06/44 Rev. 1. It was noted that the decision to exclude some shots from analysis of earlier surveys because they were 'unrepresentative' could be revisited by down-weighting them using their estimated variance rather than totally excluding them, and that this could be examined intersessionally. The Working Group considered whether a core series of surveys could be specified giving a reasonable time series of representative abundance estimates for juvenile fish. It was noted that survey group 1, consisting of the 2001, 2002, 2004, 2005 and 2006 surveys, was considered to be the best possible 'core' series available. Some surveys should be excluded because they did not adequately cover the total potential habitat of juvenile fish, in particular, some of the strata covering deeper (>500 m) water, were not sampled in these years.

3.29 The results of the UK groundfish survey for Subarea 48.3 carried out in January 2006 were given in WG-FSA-06/51. This survey, which included both demersal trawls and a limited acoustic survey, targeted *C. gunnari*. The Working Group was interested in the degree to which icefish and krill could be distinguished in acoustic surveys. Dr M. Belchier (UK) noted that acoustic marks for icefish can be determined by their 'stick' shape seen in acoustic plots, while krill tend to form more dense clusters near the surface in these plots. This was validated by targeted net tows. The Working Group noted that the results showed a strong cohort of 2-year-old fish and an unusually high number of older (50 cm) icefish.

CPUE analyses

3.30 Updated standardisation analyses of CPUE data for Subarea 88.1 and SSRUs 882A–B were given in WG-FSA-06/47. The Working Group noted that these analyses indicated an increase of close to 50% in recent seasons relative to the start of the fishery. There was some concern that the method, which includes vessels as fixed effects in the generalised linear mixed model (GLMM), could give underestimates of the coefficient of variation for each fishing season's estimate of CPUE. Mr Dunn noted that even if this were the case, the incorporation of process error for the CPUE series in the CASAL assessment will adequately quantify the uncertainty in the CPUE series and thus the relative amount of statistical weight this data should be given in the estimation procedures in CASAL.

3.31 The Working Group considered the validity of including the standardised CPUE series in the CASAL assessment given the conclusions of WG-FSA-06/47 that the series cannot be considered as a realistic index of abundance, but has been influenced largely by changes in fisher behaviour and learning. It was agreed that, where possible, all available data should be included in assessments.

3.32 A comprehensive description of the development of the Subarea 48.3 fishery with respect to its influence on standardised CPUE indices is detailed in WG-FSA-06/53.

3.33 From the information presented, the conclusion can reasonably be made that there were two distinct periods of relatively stable fishing behaviour (pre-1993 and post-1997), with a period of fairly rapid change in the fleet and its behaviour in the intervening period, particularly with regard to the transition from summer to winter and from day to night setting. The observed discontinuity in the standardised CPUE series between the 1993 and 1997 years and the relatively stable series post-1997 cannot be fully explained simply with a hypothesis of unrecorded IUU. It is most likely to be the result of a combination of factors, including changes in fleet composition, area, time and depth of operations and the introduction of new management requirements including observers (WG-FSA-06/53).

3.34 The Working Group considered the usefulness of the CPUE series for years prior to 1998 given that many vessels in this period only fished for one or two seasons. It was agreed that splitting the series into a pre- and post-1998 series was a reasonable approach for the current assessment. However, the Working Group recommended that the selection of vessels to be used in the analysis should be reviewed in the future.

Tagging studies

3.35 WG-FSA-06/32 presented results from the skate tagging program for the Ross Sea. Over 9 000 skates have been tagged and released over a period of seven years, and 47 (0.5%) have been recaptured. The paper reported that there was no recorded movement between SSRUs, and the maximum distance travelled was less than 70 km. The distance travelled by tagged skates did not increase with increased period at liberty. The paper concluded that some skates survive being caught on longlines, and tagged and released, for up to four years, and that they appeared to make only small-scale movements along depth contours.

3.36 WG-FSA-06/34 reported on the toothfish tagging program in the Ross Sea. A total of 10 775 *D. mawsoni* have been released and 225 recaptured, and 818 *D. eleginoides* released and 25 recaptured. In 2006, New Zealand vessels had increased the size of toothfish being tagged so that, for the first time, the size distribution of the tagged fish in the Ross Sea was very close to the size composition of the catch.

3.37 WG-FSA-06/56 reported on tagging in Subarea 48.4. Tagging has been carried out since 2004/05 season, and in 2005/06 a total of 134 *D. eleginoides* and 10 *D. mawsoni* were tagged and released during fishing operations. This represented a tagging rate of seven fish per tonne of catch. The paper noted that the UK proposes to continue the mark–recapture experiment in Subarea 48.4 over the 2006/07 and 2007/08 fishing seasons, and recalled that the objective of the experiment will be to assess toothfish population structure and size once a suitable number of tags had been released and recovered.

3.38 WG-FSA-06/64 reported toothfish tag–release and recapture data used in a CASAL assessment model for Division 58.5.2. Dr Constable noted that Australia was maintaining a mark–recapture program for *D. eleginoides* and skates in Division 58.5.2, and that it was concentrating on distributing tags across a wider spatial area than had been done in the past. He also noted that it was tagging at a rate greater than one tag per tonne of toothfish caught.

3.39 WG-FSA-06/53 reported that the South Georgia tagging program continued this year. Since 2000, 13 162 toothfish have been tagged and 364 toothfish were recovered in 2006. Dr D. Agnew (UK) also reported that the tagging program has been extended to rays, with 389 fish tagged in 2006.

3.40 In 2005/06, 4 451 toothfish were tagged in exploratory fisheries (Tables 7 and 8) and 113 tagged fish were recaptured. Toothfish were tagged at an average rate greater than the required one per tonne, although some Flag States in some SSRUs failed to achieve the required level (see Fishery Reports: Appendices F to R). In established fisheries, 4 660 toothfish were tagged in Subarea 48.3, 144 in Subarea 48.4, 1 825 in Division 58.5.2, 1 240 in Subarea 58.6 and approximately 500 during a survey in Division 58.5.1.

3.41 The Working Group noted that C2 and observer data could now be linked on the vessel haul number, which considerably assisted the interpretation of tagging data. However, there was some confusion over submission of the data. The Working Group recalled that tagging in exploratory fisheries was a responsibility of the Flag State, but recognised the value in having scientific observers undertake tagging and record tagging data in the observer database.

3.42 The Working Group suggested, as a solution, that:

(i) observers continue to collect and record tag data in their logbook forms, and periodically provide the vessel with the data on request;

(ii) vessels report tag data to the Secretariat along with their monthly fine-scale data;

(iii) the Secretariat treat the tag data in the observer database as their primary source of data, using the vessel-reported data only when the observer data are unavailable or unreported.

3.43 The following amendments to Conservation Measure 41-01, Annex C, are required:

1. The responsibility for ensuring the progress of tagging, tag recovery and correct reporting shall lie with the Flag State. The CCAMLR scientific observer, in cooperation with the fishing vessel, shall normally be expected ~~required~~ to undertake the tagging program.

3. All relevant tag data and any data recording tag recaptures shall be reported electronically in the CCAMLR format[1] to the Executive Secretary (i) by the vessel every month along with its monthly C2 reports, and (ii) by the observer as part of the data reporting requirements for observer data ~~within three months of the vessel departing the exploratory fisheries~~.

3.44 Since each Flag State is operating its own tagging program, there are currently a large number of different types of tags in the fishery. It has sometimes proven difficult to

understand whether a non-matching tag–return record arises from a previously unknown run of deployed tags, or is a typographical error. The Working Group agreed that a solution to this issue would be to ask observers and/or the vessel to take a photographic record of all returned tags in exploratory fisheries and attach this to the database. An alternative solution is to require that all returned tags are forwarded to a central depositary at the Secretariat.

3.45 The Working Group recommended that for a trial period of one year, observers/vessels take time-stamped photographs of all returned tags and forward them to the relevant tagging program coordinator and the Secretariat.

3.46 It was further noted that New Zealand has been acting as the tagging program coordinator for the Ross Sea, but that now the exploratory fisheries tagging programs have been extended to a number of new areas outside the Ross Sea. To ensure efficient coordination of all these programs, the Working Group asked the Secretariat to investigate the feasibility of it becoming the tagging program coordinator for all exploratory fisheries. This would entail maintaining a supply of tags and tagging equipment in the Secretariat, keeping an accurate record of all tags supplied and recalling all unused tags, and holding all returned tags physically at the Secretariat. Flag States would request tags, or a tagging kit, from the Secretariat prior to embarking on an exploratory fishery.

3.47 It will not be possible for this change to be implemented in time for the start of the 2006/07 exploratory fishery fishing season, however it should be fully implemented in time for the start of the 2007/08 fishing season. The cost of setting up the tagging scheme will be recovered through Members purchasing the tags, and or tagging kits, from the Secretariat. The Working Group requested the Scientific Committee to identify with SCAF what funds from the 2007 budget would be available for the initial purchase of tags by the Secretariat. The Secretariat is requested to notify Members once tags and kits are available for purchase.

3.48 Dr K. Shust (Russia) expressed concern at the low recapture rate of tags in Subareas 88.1 and 88.2. He suggested that using mark–recapture data as a major input for the CASAL model of the assessments in Subareas 88.1 and 88.2 could result in substantial uncertainty about the catch limit if the assumptions about tagging parameters were not met (WG-FSA-06/60, Table 6). Uncertainty might arise from:

(i) a high mortality level of tagged fish;

(ii) annual and seasonal variations in ice- and fishing-fleet distribution within the Ross Sea that influence heavily the possibility of fish tagging and recapturing;

(iii) the current subdivision of the Ross Sea into SSRUs, some of which are closed to the fishery and, consequently, tagging.

3.49 In Dr Shust's opinion, the following issues should be investigated:

(i) The tagging-induced mortality rate (10%) estimated for *D. eleginoides* in Subarea 48.3 (Agnew et al., 2006) should not necessarily be applied to another species (*D. mawsoni*) and other subareas (88.1 and 88.2). This rate should be quantified through a special tagging study on *D. mawsoni* in the Ross sea.

(ii) Uncertainty dependent on the variability of fishing fleet distribution, position of the tagging releases and recaptures should be evaluated both for particular years and the observation period in general.

(iii) Tagging of toothfish should be carried out also in those SSRUs that are currently closed for the fishery.

3.50 Regarding paragraph 3.48(i), the Working Group agreed that more tag-induced mortality experiments, particularly on large fish, should be undertaken.

3.51 Regarding paragraph 3.48(iii), the Working Group noted that research in SSRUs in Subareas 88.1 and 88.2 that were otherwise closed to fishing (Conservation Measures 41-09 and 41-10) had provided valuable data and allowed the opportunity to undertake additional tagging studies. It agreed that these areas should continue to carry an allowance for 10 tonnes of research catch limited to a single fishing vessel per season.

3.52 In 2005/06, vessels undertaking tagging within closed SSRUs in Subareas 88.1 and 88.2 under the 10-tonne research provision had achieved tagging rates of four to six fish per tonne. In order to advance CCAMLR's tagging program, the Working Group recommended that the tagging rate for single vessels operating 10-tonne research catches in closed SSRUs in Subareas 88.1 and 88.2 should be raised to a minimum of three tags per tonne, with a target level of up to 10 fish per tonne of retained catch. The Working Group emphasised that only fish in good condition should be tagged, that fish should be tagged in proportion to their presence in the catch, and that tagged fish do not count against a catch limit.

Management advice

3.53 The Working Group recommended that Conservation Measure 41-01, Annex C, be amended to clarify the roles and responsibilities of the vessel and observers (paragraph 3.43).

3.54 In exploratory fisheries, for a single trial year (2006/07), observers should take a photographic record of all tags recovered and forward these photographs to the Secretariat.

3.55 The Secretariat should take responsibility for coordinating the tagging programs in new and exploratory fisheries starting from the 2007/08 season. All tags used by Members in exploratory fisheries should be purchased from the Secretariat for use in the 2007/08 season onwards. The Scientific Committee and SCAF should identify funds required by the Secretariat, which will be recovered through the sale of tags and tagging kits to Members undertaking exploratory fisheries.

3.56 The requirement for tagging in those SSRUs in Subareas 88.1 and 88.2 which are closed but carry a 10-tonne research exemption for a single vessel in a single season, should be increased from one tag per tonne to a minimum of three tags per tonne and a target of 10 tags per tonne.

Biological parameters

3.57 A review of biological parameters for two species of Ross Sea skates was provided in WG-FSA-06/31. The Working Group noted that estimates of most parameters were still uncertain and encouraged further work.

3.58 The estimation of maturity for *D. eleginoides* in Subarea 48.3 was given in WG-FSA-06/53. Mr Dunn asked whether the depletion level in SSB in the CASAL model was sensitive to changes in the maturity ogive; he also asked whether (i) a sex-specific maturity ogive for Subarea 48.3 *D. eleginoides* should be used, and (ii) is such a strong apparent disparity between male and female maturity expected. The Working Group noted that the initial assessment results suggested that estimated levels of depletion were reasonably insensitive. There was not sufficient time for construction and analysis of a two-sex model at this meeting, but this should be done in future work.

3.59 Dr S. Candy (Australia) noted that when interpreting maturity-at-age from maturity-at-length, via a given growth curve and distribution and level of estimation uncertainty, the estimation error level and distribution needed to be taken into account. He was willing to supply the code that could effect this corrected calculation of maturity-at-age.

3.60 Estimates of natural and fishing mortality from tag–recapture data were reported in WG-FSA-06/54. The Working Group noted that this method could only estimate natural mortality over the exploited age range. It also noted that reliable estimates of M were probably not important for younger unexploited fish in CASAL, but were important for older fish, given the problems when estimating natural mortality and selectivity with dome-shaped selectivity patterns.

3.61 Dr Constable asked whether the estimated lower value of natural mortality in WG-FSA-06/54 was feasible, given the apparent lack of older fish in the population. It was noted that a value of natural mortality that is higher than is currently assumed on the younger fish, but at the level estimated in the paper on the selected age range, could result in the same population structure in the older fish as is seen assuming the current single-valued natural mortality-at-age.

3.62 The Working Group agreed that the analysis of mark–recapture data from all tagging programs might be useful in singular analyses, outside the integrated stock assessment framework, such as estimating natural mortality or movement patterns.

Stock structure and management areas

3.63 The prevalence of a copepod ectoparasite on *D. mawsoni* in the Ross Sea was examined to evaluate its use as a stock marker (WG-FSA-06/28). The small-scale regional differences identified by this method suggested it had limited use for stock discrimination.

3.64 Two papers examined stock structure using otolith microchemistry (WG-FSA-06/P1 and 06/P2). The Working Group considered that some small-scale regional differences identified in WG-FSA-06/P1 were unlikely to reflect stock structure. Dr A. Constable (Australia) remarked that Australia was looking into otolith analysis, with respect to stock

structure, in the Indian Ocean, in relation to identifying potential spawning migrations from Division 58.5.2 to other areas, and encouraged the idea of using such analyses to these ends.

3.65 The Working Group encouraged further work on stock structure, but noted that the results in these three papers made no change to the stock assessments being carried out at this meeting.

Depredation

3.66 In recalling the advice of the Scientific Committee (SC-CAMLR-XXIV, paragraph 3.77) to develop a system to quantify the interactions between marine mammals and the longline fishery, the Working Group considered several papers on depredation submitted to the meeting.

3.67 The Working Group noted the apparent ad hoc nature of the depredation estimate for the toothfish resource in the South African EEZ in Subareas 58.6 and 58.7 given in WG-FSA-06/58 (based on WG-FSA-SAM-05/15). Dr Agnew reported that in Subarea 48.3 depredation has been estimated using CPUE analyses and indicated much lower estimates of depredation than in Subareas 58.6 and 58.7. He also reported that including depredation in the initial assessment models for toothfish in Subarea 48.3 made little change in the calculated long-term yield.

3.68 The Working Group noted that interpreting depredation as pure removals from the population, at lower levels, would have little effect, but when included in CPUE calculations, it may become influential. It also noted that depredation is likely to be a learning process, and that static assumptions, with respect to catch removals, will not apply. The Working Group noted that the selectivity of the depredation needs to be quantified.

3.69 The Working Group noted that incorporation of depredation estimates in evaluating yields could be very difficult, given the likelihood that levels of future depredation may change over time. It noted that the approach used for IUU catches was perhaps applicable. It further noted that measures to counteract depredation used by legal and IUU vessels, would likely be different, given the lack of the need of IUU vessels to adhere to strictures regarding the discouraging of depredation.

3.70 Estimates of depredation for Crozet and Kerguelen Islands based on CPUE were given in WG-FSA-06/63. It was noted that remains of toothfish left on the line was insufficient as a marker of depredation in some cases, as it would appear that removal of the whole fish could be effected. The Working Group noted the variation of depredation between vessels. It suggested that vessel noise production and the length of the line could be factors.

3.71 An instance of depredation of *D. mawsoni* by giant squid in the Ross Sea was reported in WG-FSA-06/P3. It was noted that scarring, due to giant squid, was found on toothfish and that this was a reasonably common event. Mr J. Fenaughty (New Zealand) noted that killer and sperm whales were occasionally seen in the Ross Sea, but that he could only recall a single instance when cetacean depredation had occurred.

3.72 The Working Group was unable to make any strong assertions on levels of removals due to depredation, based on currently employed methods. With respect to observers,

although not a strict requirement, studies are being made where depredation occurs. The Working Group recommended that protocols be developed within the Scheme of International Scientific Observation so that levels of depredation in the *Dissostichus* spp. fisheries in the CAMLR Convention Area can be estimated.

3.73 The Working Group noted that a general research program for WG-FSA-SAM was needed to approach the issue in a stock assessment sense. It also noted that a depredation conference occurred recently, and that the proceedings from this could form a useful background for WG-FSA-SAM discussions.

PREPARATION FOR ASSESSMENTS AND ASSESSMENT TIMETABLE

Report of SG-ASAM

4.1 The second meeting of SG-ASAM which was held in Hobart, Australia, in March 2006 (Annex 6) was convened by Dr R. O'Driscoll (New Zealand). The meeting's terms of reference were limited to issues with respect to the conduct of acoustic surveys and the identification of *C. gunnari* (SC-CAMLR-XXIV, paragraphs 13.28 and 13.29).

4.2 The Working Group considered the findings of the second meeting of SG-ASAM. These findings were also considered by WG-FSA-SAM (WG-FSA-06/6, paragraphs 3.5 to 3.7).

4.3 SG-ASAM's recommendations regarding the development of acoustic methods for *C. gunnari*, acoustic survey design and documentation, and archiving of data were endorsed by the Working Group.

4.4 The Working Group encouraged SG-ASAM to develop a comprehensive echogram library (Annex 6, paragraph 62) for use in characterising acoustic marks and identifying species. This should include detailed information on the morphology of the marks.

4.5 SG-ASAM's proposal to hold a third meeting in 2007 (Annex 6, paragraphs 65 to 69) was supported by the Working Group, and it recommended that the terms of reference for that meeting be extended to take account of future work identified by WG-FSA (see Item 13). However, the Working Group also noted that the survey design and methodology for the proposed CCAMLR-IPY synoptic survey of krill in 2008 may also become a priority for SG-ASAM in 2007.

4.6 The Working Group thanked Dr O'Driscoll, the invited experts and other participants of SG-ASAM for their contribution to the further development of acoustic methodology.

Report from WG-FSA-SAM

4.7 The third meeting of WG-FSA-SAM was held immediately prior to WG-EMM-06, from 10 to 14 July 2006, at the Pelican Bay Hotel, Walvis Bay, Namibia. WG-FSA-SAM was tasked to examine three priority areas of work: (i) estimation of parameters; (ii) continued

development and evaluation of methods; and (iii) review of stock assessment methods for WG-FSA-06. The meeting was convened by Dr C. Jones (USA). The full report of WG-FSA-SAM is provided in WG-FSA-06/6.

4.8 The Working Group noted that no formal terms of reference had been adopted for WG-FSA-SAM during previous WG-FSA meetings, and that proposed terms of reference had been drafted by consensus during the 2006 meeting of WG-FSA-SAM. These proposed terms are listed in WG-FSA-06/6, and were endorsed by WG-FSA.

4.9 WG-FSA-SAM held discussions primarily relevant to advancements in assessment methods for *Dissostichus* spp. and reviews of preliminary stock assessments.

4.10 With respect to model inputs and estimation of parameters, the Working Group noted that WG-FSA-SAM had considered topics relevant to recruitment indices derived from trawl surveys, survey design, biomass and numbers-at-age/length, CPUE indices, tag–recapture experiments, commercial catch-at-length, catch-at-age, age and growth, natural mortality, stock-recruit relationship (steepness) and recruitment variability, selectivity, movement and length–weight relationships (WG-FSA-06/6, paragraphs 2.1 to 2.48).

4.11 The Working Group considered advice and recommendations for revision of parameter estimates for the WG-FSA-06 assessments as set out by WG-FSA-SAM. The Working Group agreed a natural mortality (M) value of 0.13, a steepness (h) value of 0.75, and a recruitment variability (σ_R) value of 0.60 be used for *Dissostichus* spp. when no other data are available.

4.12 The Working Group noted that the principal integrated assessment methods considered by WG-FSA-SAM were the ASPM and CASAL (WG-FSA-06/6, paragraphs 2.49 to 2.85), as well as general issues that are common to both integrated approaches.

4.13 The Working Group agreed with WG-FSA-SAM's recommendation that integrated assessments should use common default values for parameters for a given species where specific data were unavailable to inform a choice for a specific assessment. However, some members felt that a common approach to determining the relative data weightings may not be appropriate across all integrated assessments.

4.14 The Working Group noted that WG-FSA-SAM had reviewed preliminary integrated assessments for *Dissostichus* spp. for the Ross Sea (Subarea 88.1) and Division 58.5.2. The Working Group thanked Members who had made provisional assessments available and had made progress advancing integrated methods during the intersessional period.

4.15 No major new developments of the ASPM approach were presented to WG-FSA-SAM. The Working Group agreed that a method for including tagging data in the ASPM approach remains a priority.

4.16 The Working Group endorsed the recommendations of WG-FSA-SAM that integrated assessments be developed for toothfish in Subareas 48.3, 58.6/58.7, 88.1 and 88.2 and Division 58.5.2, and noted the specific recommendations for each assessment (WG-FSA-06/6, paragraphs 6.1 to 6.16).

4.17 The Working Group encouraged Members to continue exploring alternative assessment methods for *Dissostichus* spp., *C. gunnari*, and other harvested species in these and other parts of the Convention Area, and presenting these alternative methods for evaluation during future meetings of WG-FSA-SAM.

4.18 The Working Group agreed that MSEs, which provide a mechanism for measuring efficacy of methods toward achieving management objectives, should be considered a high priority during future meetings of WG-FSA-SAM.

4.19 The Working Group agreed that it may not be necessary to conduct full assessments of *Dissostichus* spp. each year. If a stock should require a new assessment, methodologies would have the opportunity to be developed during meetings of WG-FSA-SAM prior to their implementation. Should information suggest that there were significant errors in model assumptions, there should be the possibility of revising an assessment in an intermediate year. The Working Group recommended that in preparation for considering this proposal, simulations should be conducted during the intersessional period to explore the consequences of such an assessment timetable on the management of the target species and the fishery.

Summary of the report from the invited expert to WG-FSA-SAM-06

4.20 Dr M. Maunder (IATTC) attended the WG-FSA-SAM meeting as an invited outside assessment modelling expert. His report was submitted to WG-FSA (WG-FSA-06/8). Dr Maunder was requested to provide advice in the following areas:

> Review and evaluate use of alternative approaches for the assessment of toothfish in the Convention Area, including:
>
> (i) CASAL
> (ii) mark–recapture approaches
> (iii) other models or quantitative methodologies.

4.21 Dr Maunder gave favourable remarks to the general process adopted by WG-FSA-SAM. WG-FSA-06/8 adequately addressed all terms of reference. The Working Group reviewed and endorsed the majority of recommendations provided by Dr Maunder.

4.22 The Working Group agreed that Dr Maunder's invitation and participation in WG-FSA-SAM was worthwhile and valuable toward the work of WG-FSA.

Review of preliminary stock assessment papers

4.23 Preliminary stock assessments were presented to the Working Group for the following toothfish and icefish fisheries:

- South Georgia (Subarea 48.3) – *D. eleginoides*
- Heard Island and McDonald Islands (Division 58.5.2) – *D. eleginoides* and *C. gunnari*
- Prince Edward Island (Subareas 58.6 and 58.7) – *D. eleginoides*
- Ross Sea (Subareas 88.1 and 88.2) – *Dissostichus* spp.

4.24 Presentations of preliminary assessments were given to the Working Group, which provided detail beyond what was included in the WG-FSA papers, including an exploration of model inputs, diagnostics and sensitivities and decision-making processes for the preliminary assessments that were tabled.

Preliminary assessments of *Dissostichus* spp.

4.25 Two preliminary assessment approaches for *D. eleginoides* in Subarea 48.3 were examined by the Working Group. A preliminary CASAL integrated assessment (WG-FSA-06/53) considered both length-based and age-based models, and 10 different scenarios incorporating suggestions made by WG-FSA-SAM. The Working Group noted that in most scenarios there was no substantial effect on precautionary catch limits.

4.26 The Working Group noted that there was a trend in residuals when fitting tagging data using the CASAL integrated approach in Subarea 48.3, and recommended that reasons and consequences of this be explored. The Working Group acknowledged that there was a range of possible explanations for this pattern, including unaccounted trends in tag mortality, natural mortality, and selectivity with age/size. These problems are likely to be very complex. The Working Group recommended that optimal numbers of tag releases and recaptures to accommodate the model, as well as sensitivity to extending time in water before expecting recapture, be examined for tagging assessments in general.

4.27 Dr P. Martinez (Argentina) reported on progress made in updating the ASPM for *D. eleginoides* in Subarea 48.3 (WG-FSA-06/59) fitting standardised CPUE, total annual catches, and catch-proportions-at-length and presented some preliminary results. As in the previous version of the model (WG-FSA-SAM-05/5 and WG-FSA-05/73), interannual recruitment variability is included in the model by fitting the steepness parameter h and the annual recruitment vector ε_y through the stock-recruitment function.

4.28 The Working Group suggested that this model could be greatly improved if a method for incorporating mark–recapture data was established, as was recommended during WG-FSA-05. The Working Group also noted that issues raised relating to the model structure, data weighting and recruitment detailed in the WG-FSA-SAM report (WG-FSA-06/6) remain to be addressed. The Working Group also suggested that these aspects of the ASPM approach should be pursued during the intersessional period, and results and technical discussion taken up during WG-FSA-SAM.

4.29 Preliminary assessments for *D. eleginoides* in Division 58.5.2 were presented using the GYM and CASAL modelling approaches (WG-FSA-06/45 Rev. 1 and 06/64 respectively). The GYM approach was similar to that used in previous years, updated with information from the 2005/06 trawl survey as presented in WG-FSA-06/42 Rev. 1. A CASAL integrated assessment was presented for Division 58.5.2 which was based on the preliminary model presented at WG-FSA-SAM. The Working Group noted that it gave similar results to the GYM assessment under the same conditions.

4.30 The Working Group discussed the available survey information for Division 58.5.2 (WG-FSA-06/44 Rev. 1), and agreed that the 1992 and 2000 surveys were of little value to the assessment. They agreed that all other trawl surveys for *D. eleginoides* would be appropriate for incorporation into the assessment for Division 58.5.2.

4.31 Use of mark–recapture information as a means of providing biomass estimates of *D. eleginoides* for Division 58.5.2 was discussed by the Working Group. Dr Constable presented a summary of tag releases and recaptures by area. The Working Group agreed that there were problems with the mark–recapture data accurately estimating biomass levels in this division, owing to the fact that most releases took place in a relatively small area, and there was little mixing. Hence, biomass levels reflected only localised abundance and were likely underestimated across the whole area using these data.

4.32 A presentation on the assessment of the Prince Edward Island (South African EEZ in Subareas 58.6 and 58.7) *D. eleginoides* fishery using the ASPM was given by Dr M. Haddon (Australia) on behalf of South African colleagues who were not present. The preliminary assessment (WG-FSA-06/58) incorporated recommendations as set out by WG-FSA-SAM. The Working Group noted that the model demonstrated reasonable fits to the data. However, there was some concern expressed that the model may not represent the true dynamics, given the large drop in CPUE and the large spikes in recruitment. The Working Group recommended that it would be valuable in future assessments to examine potential area and depth interactions, as well as selectivity by year.

4.33 The estimates of catch limits for Subareas 58.6 and 58.7 provided in WG-FSA-06/58 did not appear to be calculated using established CCAMLR decision rules. The Working Group did not explore this further, as the authors were not present to address this issue. The Working Group requested that South Africa provide the source code and data for the assessment that can then be validated by the Secretariat prior to the next WG-FSA meeting.

4.34 The Working Group thanked the authors for incorporating the recommendations of WG-FSA-SAM in this assessment. The Working Group added that it would be beneficial to have stock assessment scientists from South Africa at future meetings of WG-FSA to allow for further discussion and refinement of Prince Edward Island assessments.

4.35 Preliminary assessments for *Dissostichus* spp. in Subareas 88.1 and 88.2 were presented in WG-FSA-06/48, 06/50 and 06/60.

4.36 WG-FSA-06/60 presented a CASAL integrated assessment of the Ross Sea fishery (Subarea 88.1 and SSRUs 882A and B) that updated the 2005 assessment using new parameter estimates along with revised catch, CPUE, catch-at-age and tag–recapture data. A suite of sensitivity scenarios requested by WG-FSA-SAM was included in the preliminary assessment.

4.37 The Working Group noted that in this assessment the model fits-to-age distribution becomes poor in later years for the shelf area fishery. The Working Group was unclear as to why this was happening, since fits-to-age distribution were far better within the slope and northern fisheries. The Working Group recommended that the influence of individual datasets on the assessment be examined to better determine which components effect model fitting and identify potential flaws in the data. For this reason, it recommended that the model using only the New Zealand vessels be used for providing management advice.

4.38 WG-FSA-06/50 reported the development of an alternative preliminary assessment of the Ross Sea *Dissostichus* spp. fishery by means of a Triple Instantaneous Separable VPA (TSVPA). This assessment method has been used by ICES and is applied to the Ross Sea fishery using, primarily, catch-at-age data and the time series of standardised CPUE. The

results of the paper suggest a pre-exploitation spawning biomass of 910 608 tonnes, a current biomass (2005) of 1 520 660 tonnes and a possible yield according to the CCAMLR decision rules of 55 000 tonnes.

4.39 The Working Group noted that the model estimates of spawning stock biomass were very large, and input data used for the analysis should be verified for possible errors. The Working Group also noted that spawning stock biomass was estimated in the model to increase as the fishery developed, and suggested this may be the result of the effect of increasing CPUE due to the fishing industry developing and improving fishing methods in this fishery. It was requested that these issues be explored in the intersessional period.

4.40 The Working Group thanked the authors for presenting this alternative assessment method, and recommended that technical aspects of this new methodology be presented and reviewed by WG-FSA-SAM for potential future use in assessing the Ross Sea toothfish fishery. They also recommended that the use of tag data incorporated into this approach be explored.

4.41 Dr Shust noted that work should also be undertaken to review whether the tagging data are sufficient for estimating stock abundance in this fishery.

4.42 A preliminary assessment of SSRU 882E was presented in WG-FSA-06/48. This consisted of an update of the 2005 assessment with revised catch, CPUE, catch-at-age and tag–recapture data from New Zealand and all vessels. The Working Group agreed that the reference case described in the paper was an appropriate scenario to proceed with for the assessment.

Preliminary assessments for *C. gunnari*

4.43 A preliminary assessment for the estimation of precautionary yield of icefish in the vicinity of Heard Island (Division 58.5.2) for the 2006/07 CCAMLR season was presented in WG-FSA-06/43 Rev. 1. This paper provided a preliminary assessment of yield based on new survey results (WG-FSA-06/42 Rev. 1) using standard short-term projection assessment methods previously employed for icefish in this division.

4.44 The Working Group noted that the small cohort predicted during last year's assessment was identified in the 2006 survey described in WG-FSA-06/43 Rev. 1. The lack of strong year classes recruiting to the population has resulted in a large decrease in estimated biomass of *C. gunnari*. The Working Group noted that this dynamic is typical of this stock and agreed that the reference case described in the paper was an appropriate scenario to proceed with for the assessment.

4.45 No preliminary assessments were provided to the Working Group for *C. gunnari* in Subarea 48.3. However, the Working Group reviewed the results of a trawl survey in Subarea 48.3 (WG-FSA-06/51), and agreed that information from this survey should be used for an assessment of this stock for the 2006/07 and 2007/08 fishing seasons.

Assessments to be carried out and assessment timetable

4.46 Assessment issues addressed during the course of WG-FSA were identified by the Scientific Committee during the previous year's CCAMLR meeting, the WG-FSA-SAM meeting, papers available to WG-FSA, and assessment subgroup discussions during WG-FSA.

4.47 With regard to the assessment of *D. eleginoides* in Subarea 48.3, the Working Group noted that papers using two approaches (CASAL and ASPM) had been discussed. The Working Group noted the decision reached last year by the Scientific Committee (SC-CAMLR-XXIV, paragraphs 4.55 to 4.57), and the requests by WG-FSA (SC-CAMLR-XXIV, Annex 5, paragraph 12.13) and WG-FSA-SAM (WG-FSA-06/6, paragraph 2.75) that tag data be included in the ASPM. Because tag data cannot currently be incorporated into the ASPM, the Working Group agreed that only the integrated assessment using CASAL be used to provide management advice for the 2006/07 fishing season for *D. eleginoides* in Subarea 48.3.

4.48 Two assessment papers for *Dissostichus* spp. in the Ross Sea (Subarea 88.1 and SSRUs 882A and B) were discussed (CASAL and TSVPA). The Working Group recommended that the TSVPA model should be reviewed and evaluated by WG-FSA-SAM. The Working Group agreed that the integrated assessment using CASAL be used to provide management advice for the 2006/07 fishing season for *Dissostichus* spp. in the Ross Sea.

4.49 With regard to the assessment of *D. eleginoides* in Division 58.5.2, the Working Group noted that two potential approaches (GYM and CASAL) were available. Although the Working Group concluded that both approaches provide similar results under the same conditions, it considered that the CASAL approach offered an advantage over the GYM, since the integrated approach allows for the inclusion of more available data in the assessment process. The Working Group agreed that only the integrated assessment using CASAL be used to provide management advice for the 2006/07 fishing season for *D. eleginoides* in Division 58.5.2.

4.50 The Working Group agreed that an assessment of *C. gunnari* in Subarea 48.3 be undertaken for the 2006/07 and 2007/08 fishing seasons using the short-term projection approach as has been employed in previous assessments of this stock.

4.51 All assessment work was undertaken by primary authors of preliminary assessments, and reviewed independently. Tasks of independent reviewers are listed in WG-FSA-06/6, paragraph 6.3. The outcomes of the assessments were reported in the Fishery Reports.

4.52 Fishery Reports that have been revised or developed as a result of analyses and deliberations during the course of WG-FSA-06 are:

(i) Subarea 48.3 – *D. eleginoides* and *C. gunnari*
(ii) Division 58.5.1 – *D. eleginoides*
(iii) Division 58.5.2 – *D. eleginoides* and *C. gunnari*
(iv) Subareas 58.6 and 58.7 – *D. eleginoides* (South African EEZ)
(v) Subarea 58.6 – *D. eleginoides* (French EEZ)
(vi) Subarea 88.1 and SSRU 882E – *Dissostichus* spp.

4.53 The Working Group assigned a number of scenarios and sensitivity analyses to be undertaken for stock assessments prior to determining the case that will be taken forward for estimating precautionary catch limits. These are described within the individual Fishery Reports.

ASSESSMENTS AND MANAGEMENT ADVICE

New and exploratory fisheries in 2005/06 and notifications for 2006/07

5.1 In 2005 the Commission agreed to seven exploratory longline fisheries for *Dissostichus* spp. in the 2005/06 season (Conservation Measures 41-04, 41-05, 41-06, 41-07, 41-09, 41-10 and 41-11), and no new fisheries had been notified for 2005/06. Activities in the exploratory fisheries are outlined below and summarised in Table 4.

5.2 Notifications for exploratory fisheries in 2006/07 are summarised in Table 5. Twelve Members submitted paid notifications for exploratory longline fisheries for *Dissostichus* spp. in Subareas 48.6, 88.1 and 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b. There were no notifications for new fisheries, and no notifications were received for fisheries in closed areas.

5.3 The Working Group agreed that it would not attempt to determine whether the notifications for exploratory fisheries satisfied the requirements of the notification procedure (Conservation Measure 21-02); this, it believed, should be done by SCIC.

5.4 Unstandardised CPUE data for *Dissostichus* spp. caught in exploratory longline fisheries between 1996/97 and 2005/06 are summarised in Table 6.

5.5 Under Conservation Measure 41-01, each longline vessel fishing in exploratory fisheries for *Dissostichus* spp. is required to tag and release *Dissostichus* spp. at the rate of one toothfish per tonne of green weight caught throughout the season. In 2005/06, 4 451 *Dissostichus* spp. were reported to have been tagged and released in exploratory fisheries (Table 7) and 113 tags were recovered (Table 8).

Progress towards assessments of new and exploratory fisheries

5.6 The Working Group noted for the second year that substantial progress had been made in assessing stocks of D*issostichus* spp. in Subareas 88.1 and 88.2 (see Appendix F and paragraphs 5.54 to 5.62) to develop management advice.

5.7 For the other subareas and divisions in which exploratory fisheries are conducted, the Working Group was unable to develop management advice based on assessments of yield and was therefore unable to provide any new advice on catch limits for these fisheries. The reported catches in these fisheries are summarised in Table 9.

5.8 Given the large number of notifications for 2006/07, the Working Group reiterated the urgent need to develop a means for estimating abundance and providing assessments of stock status in exploratory fisheries other than in Subareas 88.1 and 88.2.

General management advice for new and exploratory fisheries

5.9 The Working Group reiterated the necessity for Members fishing in exploratory fisheries for *Dissostichus* spp. to conduct the fishery-based research outlined in Conservation Measure 41-01, and submit data to the Secretariat in a timely manner.

5.10 In addition, the Working Group reiterated the importance for Members to conduct tagging and to submit data as part of the Research and Data Collection Plan (Conservation Measure 41-01). Members should also be urged to emphasise to their vessels the need to look out for tagged fish and submit accurate tag–recapture data to the Secretariat in a timely manner (see also paragraphs 3.5 and 3.6).

5.11 The Working Group did not attempt to determine whether the notifications for exploratory fisheries satisfied the requirements of Conservation Measure 21-02.

5.12 With the exception of Subareas 88.1 and 88.2, the Working Group was unable to provide any new advice on catch limits for *Dissostichus* spp. or any by-catch species in any of the exploratory fisheries.

5.13 For the other areas and divisions in which exploratory fisheries are conducted, the Working Group reiterated the urgent need to develop a means for estimating abundance and providing assessments of stock status for all exploratory fisheries. In this context, it noted that with the continuing tagging programs in a number of areas, in the medium to long term it may be possible to obtain mark–recapture estimates of abundance provided that sufficient tags are deployed each year.

5.14 The Working Group drew the attention of the Scientific Committee to the fact that there are significant differences in the tagging rates achieved by different Members in some areas, and not in others. It is important to understand whether this is due to operational constraints which might suggest differences in mark–recapture model parameters, or to other reasons.

5.15 There are similar differences in by-catch rates between Members, and between different areas which need to be understood (paragraphs 5.41 to 5.46).

Dissostichus spp. Subarea 48.6

5.16 One vessel (Japan) fished in the exploratory fishery in Subarea 48.6 in 2005/06. The precautionary catch limit for *Dissostichus* spp. was 900 tonnes and the total catch was 137 tonnes. Information on this fishery is summarised in Appendix G.

5.17 The fishery has operated predominantly in SSRU A and the main species caught is *D. eleginoides* over the course of the fishery, although 46% of the catch in 2005/06 was *D. mawsoni.* The Working Group noted that there is uncertainty in the spatial distribution of the two species of *Dissostichus* in SSRU A. This requires further investigation over the intersessional period to help with reviewing this fishery.

5.18 There is no information on sightings or landings available to estimate the level of IUU fishing in Subarea 48.6.

5.19 A total of 205 *D. eleginoides* and seven *D. mawsoni* (total 212 fish) have been tagged and released, mostly in SSRU A, and three fish (all *D. eleginoides*) have been recaptured.

5.20 Four Members (Japan, Republic of Korea, New Zealand and Norway) and a total of five vessels notified their intention to fish for *Dissostichus* spp. in Subarea 48.6 in 2006/07.

Management advice for Subarea 48.6

5.21 The Working Group recommended that all the requirements of the fishery, including fishery-based research (Conservation Measure 41-01), by-catch limits (Conservation Measure 33-03) and associated measures, be carried forward to the 2006/07 season.

Dissostichus spp. Subarea 58.4

Dissostichus spp. Division 58.4.1

5.22 Five Members (Chile, Republic of Korea, New Zealand, Spain and Uruguay) and six vessels fished in the exploratory fishery in Division 58.4.1 in 2005/06. The precautionary catch limit for *Dissostichus* spp. was 600 tonnes and the reported catch was 425 tonnes. The closure of SSRUs C (15 February 2006) and G (27 January 2006) was triggered by the catch of *Dissostichus* spp. and the Working Group noted that the over-run of the catch limit in SSRU C (by 50 tonnes) was partly attributed to an amendment to the reported catch which was submitted to the Secretariat after the closure of the fishery (CCAMLR-XXV/BG/3). Information on this fishery is summarised in Appendix H.

5.23 The fishery targets *D. mawsoni* and has operated in SSRUs C, E and G. Information on IUU activities indicated that approximately 689 tonnes of *Dissostichus* spp. was taken in 2005/06. The Working Group noted that most of the catch reported in 2005/06 was taken in SSRUs C and G and that it was possible that these SSRUs were also the focus of IUU fishing. If this were the case, then the total extraction of *Dissostichus* spp. from these SSRUs in 2005/06 was higher than the precautionary catch limit, and may not be sustainable.

5.24 A total of 908 *D. mawsoni* and 23 *D. eleginoides* (total 931 fish) have been tagged and released; there are no reports of recaptures. Most of the fish tagged and released were from SSRUs C (427 fish), E (180 fish) and G (324 fish).

5.25 Six Members (Australia, Republic of Korea, Namibia, New Zealand, Spain and Uruguay) and a total of nine[1] vessels notified their intention to fish for *Dissostichus* spp. in Division 58.4.1 in 2006/07.

[1] Revised number of vessels following advice from New Zealand that one vessel has been withdrawn (COMM CIRC 06/114).

Dissostichus spp. Division 58.4.2

5.26 Three Members (Chile, Republic of Korea and Spain) and four vessels fished in the exploratory fishery in Division 58.4.2. The precautionary catch limit for *Dissostichus* spp. was 780 tonnes and the reported catch was 164 tonnes. Information on this fishery is summarised in Appendix I.

5.27 The fishery targets *D. mawsoni* and has operated in SSRUs A, C and E in recent seasons. Information on IUU activities indicated that approximately 221 tonnes of *Dissostichus* spp. was taken in 2005/06.

5.28 A total of 463 *D. mawsoni* and 15 *D. eleginoides* (total 478 fish) have been tagged and released; there are no reports of recaptures. Most of the fish tagged and released were from SSRUs A (237 fish) and E (190 fish). The fishery appears to have caught small and large fish in the early years but the smaller length mode has not been caught in more recent years.

5.29 The Working Group noted that the catch of macrourids reported in 2004/05, when fishing was concentrated in SSRU A, was relatively higher (22% of the catch of *Dissostichus* spp.) than in other seasons (2–10% of the catch of *Dissostichus* spp.) when fishing was concentrated in SSRU E.

5.30 Six Members (Australia, Republic of Korea, Namibia, New Zealand, Spain and Uruguay) and a total of nine vessels notified their intention to fish for *Dissostichus* spp. in Division 58.4.2 in 2006/07. The Working Group drew the attention of the Scientific Committee to the likely doubling of fishing effort by Members in this division. There was also a rapid increase in IUU fishing in this division (paragraphs 5.94 to 5.105).

Dissostichus spp. Division 58.4.3a

5.31 Two vessels (Spain) fished in the exploratory fishery in Division 58.4.3a. The precautionary catch limit for *Dissostichus* spp. was 250 tonnes and the reported catch was 89 tonnes. Information on this fishery is summarised in Appendix J.

5.32 The fishery targets *D. eleginoides* and the Working Group noted that the catch-weighted length frequencies for this species were similar to those reported for *D. eleginoides* taken by longline in Division 58.5.2 (see Appendix N). Information on IUU activities indicated that approximately 98 tonnes of *Dissostichus* spp. were taken in 2004/05; there was no information on IUU fishing in 2005/06.

5.33 A total of 303 *D. eleginoides* have been tagged and released and six fish have been recaptured.

5.34 Three Members (Japan, Republic of Korea and Spain) and a total of four vessels notified their intention to fish for *Dissostichus* spp. in Division 58.4.3a in 2006/07.

Dissostichus spp. Division 58.4.3b

5.35 Three Members (Chile, Spain and Uruguay) and four vessels fished in the exploratory fishery in Division 58.4.3b. The precautionary catch limit for *Dissostichus* spp. was 300 tonnes and the reported catch was 361 tonnes. The fishery targets *D. mawsoni* and fishing took place outside the prescribed season, in accordance with Conservation Measure 41-07. The closure of the fishery (13 March 2006) was triggered by the catch of *Dissostichus* spp. and the Working Group noted that the over-run of the catch limit (61 tonnes) was partly attributed to an amendment to the reported catch which was submitted to the Secretariat after the closure of the fishery (CCAMLR-XXV/BG/3). Information on this fishery is summarised in Appendix K.

5.36 Information on IUU activities indicated that approximately 1 015 tonnes of *Dissostichus* spp. was taken in 2004/05, and 1 808 tonnes in 2005/06. The Working Group expressed concern that the total extraction of *Dissostichus* spp. in the 2004/05 and 2005/06 seasons exceeded the precautionary catch limit by a factor of 4.4 and 7.2 respectively. The Working Group agreed that such extractions were unlikely to be sustainable.

5.37 A total of 392 *D. mawsoni* and 14 *D. eleginoides* (total 406 fish) have been tagged and released and seven fish have been recaptured.

5.38 The Working Group noted that tagging rates by vessels in this area have apparently been much lower than tagging rates by the same vessels in other areas. The Working Group requested information from the vessels and observers operating in Subarea 58.4 on the reasons for this lower tagging rate which may be due to operational constraints or the poor condition of toothfish caught.

5.39 The Working Group recalled that a trawl survey conducted by Australia in 1999 (SC-CAMLR-XVIII, Annex 5, paragraph 3.79) had not found evidence for juvenile *Dissostichus* spp. in this division, and noted that the catch-weighted length frequencies from the fishery support the survey findings.

5.40 Six Members (Australia, Japan, Republic of Korea, Namibia, Spain and Uruguay) and a total of eight vessels notified their intention to fish for *Dissostichus* spp. in Division 58.4.3b in 2006/07. The Working Group noted that if all these vessels fished, this would represent a doubling of the number of vessels which fished in 2005/06.

Overview of *D. mawsoni* fisheries in Subarea 58.4

5.41 The Working Group noted the increasing levels of fishing activity occurring in the range of *D. mawsoni* in the Indian Ocean sector (notably in Divisions 58.4.1, 58.4.2 and 58.4.3b), particularly the attention being given to the region between 60°E and 110°E along the margins of the continental shelf of Antarctica and BANZARE Bank. The estimated total removal from these divisions in 2005/06 was 3 668 tonnes (this total comprised 74% IUU). Given the proximity of these fisheries to one another, the Working Group agreed that the separation of these fisheries may prove to be inappropriate once there is an understanding of stock structure in the region. In light of this, the combined scale of these removals is greater than the catch limit for Subarea 88.1, which is based on assessments of stock status and long-term annual yield.

5.42 On the basis of the Fishery Reports for these divisions, the Working Group also noted that:

(i) by-catch rates, particularly for *Macrourus* spp., seem unusually low, especially when compared to rates experienced in comparable areas in Subareas 88.1 and 88.2 and to the common occurrence of these fish in an earlier trawl survey of BANZARE Bank (SC-CAMLR-XVIII, Annex 5, paragraph 3.79; van Wijk et al., 2000);

(ii) the total number of tagged fish released in these divisions is 1 815, but it is unclear how many of these fish have survived because the Working Group was advised that observers in the fishery have reported a great difficulty in tagging these large fish and that many of them do not recover from the process of tag and release, remaining on the surface after release and becoming vulnerable to predators, such as being attacked by giant petrels;

(iii) the tagging rate in Division 58.4.3b, which is the region for which most catch is taken, has not reached the required level of one fish per tonne in the last two seasons.

5.43 The Working Group recalled that a 1999 Australian survey had not detected any young *Dissostichus* spp. in Division 58.4.3b. Commercial data (see Fishery Report) confirm that the *D. mawsoni* found in this area are on average about 140 cm long with a minimum at about 100 cm. The absence of smaller fish and the relatively small area of BANZARE Bank and low CPUE compared to Subareas 88.1 and 88.2 suggest a small stock size, whilst the dynamics, including stock structure and productivity, are completely unknown. On the basis of information available and the outcomes of the Ross Sea assessment, which is for a much larger area, extractions of *Dissostichus* spp. at the level of 2 000 tonnes a year are unlikely to be sustainable.

5.44 The Working Group had similar concerns about the productivity of the populations of *D. mawsoni* in Divisions 58.4.1 and 58.4.2, although there appear to be some young fish in Division 58.4.2.

5.45 Given the comparatively high level of total removals across these divisions, that the low level of reporting on removals (the available data are only for 26% of the total estimated catch), and the potential unreliability of the tagging program, the Working Group considered that there was an urgent need to review how to acquire information on the status of the stocks in the region, including stock structure, such as through otolith-based studies, and how to assess productivity and yield, such as through more structured experimental fishing. This will not be possible until the meeting of WG-FSA in 2007.

5.46 The Working Group agreed that the tagging program should be accelerated. Some vessels fishing in these three divisions have achieved tagging rates of three fish per tonne and greater. Tagging rates in Division 58.4.3b have been low, none reaching one per tonne over the last two years. The Working Group recommended that tagging rates in Divisions 58.4.1 and 58.4.2 should be raised to three fish per tonne.

Management advice for *D. mawsoni* in Subarea 58.4

5.47 The Working Group recommended urgent consideration of how to acquire appropriate data for assessments of stock status and yield of *D. mawsoni* in the Indian Ocean sector because of (i) the lack of progress towards assessments in these divisions, and (ii) a rapidly escalating catch in the region.

5.48 The Working Group requested submissions by Members on stock structure, biological parameters (e.g. growth, length–weight relationship, maturity), recruitment and methods for assessment of these stocks.

5.49 The Working Group recommended that tagging rates in Divisions 58.4.1 and 58.4.2 should be raised to three fish per tonne.

Dissostichus spp. Subareas 88.1 and 88.2

5.50 Six Members (Argentina, New Zealand, Norway, Russia, UK and Uruguay) and 13 vessels fished in the exploratory fishery in Subarea 88.1. The precautionary catch limit for *Dissostichus* spp. was 2 964 tonnes and the total catch was 2 952 tonnes. The fishery was closed on 6 February 2006 (CCAMLR-XXV/BG/3), and the following SSRUs were closed during the course of fishing:

- SSRUs B, C G closed 3 January, triggered by the catch of *Dissostichus* spp. (total catch 343 tonnes; 99% of the catch limit);
- SSRUs H, I K closed 19 January, triggered by the catch of *Dissostichus* spp. (total catch 1 976 tonnes; 104% of the catch limit);
- SSRU J closed 5 February, triggered by the catch of *Dissostichus* spp. (total catch 548 tonnes; 99% of the catch limit).

The IUU catch for the 2005/06 season was estimated to be zero tonnes. Information on this fishery and management advice is summarised below (paragraphs 5.54 to 5.70).

5.51 Nine Members (Argentina, Republic of Korea, New Zealand, Norway, Russia, South Africa, Spain, UK and Uruguay) and a total of 21 vessels notified their intention to fish for *Dissostichus* spp. in Subarea 88.1 in 2006/07.

5.52 Five Members (Argentina, New Zealand, Norway, Russia and the UK) and seven vessels fished in the exploratory fishery in Subarea 88.2. The precautionary catch limit for *Dissostichus* spp. was 487 tonnes and the total catch was 465 tonnes. The fishery was closed on 15 February 2006 (CCAMLR-XXV/BG/3). The IUU catch for the 2005/06 season was estimated to be 15 tonnes. Information on this fishery and management advice is summarised below (paragraphs 5.54 to 5.70).

5.53 Seven Members (Argentina, New Zealand, Norway, Russia, Spain, UK and Uruguay) and a total of 16 vessels notified their intention to fish for *Dissostichus* spp. in Subarea 88.2 in 2006/07.

5.54 The Fishery Report for *Dissostichus* spp. in Subareas 88.1 and 88.2 is in Appendix F.

5.55 In 2005 the Working Group recommended that Subareas 88.1 and 88.2 be split into two areas for stock assessment purposes: (i) the Ross Sea (Subarea 88.1 and SSRUs 882A, B), and (ii) SSRU 882E.

5.56 The catch limits for Subarea 88.1 and 88.2 SSRUs in the Ross Sea were changed as part of a three-year experiment (SC-CAMLR-XXIV, paragraphs 4.163 to 4.166). To assist administration of the SSRUs, the catch limits for SSRUs 881B, C and G were amalgamated into a 'north' region and those for SSRUs 881H, I and K were amalgamated into a 'slope' region. Within Subarea 88.2, SSRU 882E was treated as a separate SSRU with its own catch limit, whilst SSRUs 882C, D, F and G were amalgamated with a single catch limit.

5.57 The length frequency of *D. mawsoni* ranged from 50 to 180 cm. In all years, there has been a broad mode of adult fish at about 120–170 cm. In 2005/06, there was also a strong mode at about 60 cm in Subarea 88.2, with the smaller fish predominantly from the edge of the continental shelf in SSRUs 882F and G.

5.58 The standardised CPUE analysis of *D. mawsoni* on the three main fishing grounds in the Ross Sea (Subarea 88.1 and SSRUs 882A–B) showed no significant trend from 1998/99 to 2002/03, a decline in 2003/04, and a sharp increase in 2004/05 and 2005/06 (WG-FSA-06/47). Overall, the indices have increased about 50% since the beginning of the time series. The decline in 2003/04 was thought to be related to a combination of extreme ice conditions and effects from a large number of vessels operating in a confined area. These factors were not present in 2004/05 or 2005/06. The Working Group considered that favourable ice conditions, fisher learning and experience, and improvements in gear were the most likely explanations for the increase in CPUE indices.

5.59 Under Conservation Measure 41-01 each longline vessel fishing in exploratory fisheries for *Dissostichus* spp. is required to tag and release *Dissostichus* spp. at a rate of one toothfish per tonne of green weight caught throughout the season.

5.60 In 2005/06, all but five vessels achieved a tagging rate of more than one toothfish per tonne of toothfish landed. The vessels that failed to achieve the required tagging rate were the *Antartic II* (Argentina), *Volna* (Russia) and *Yantar* (Russia) in Subareas 88.1 and 88.2; the *Viking Sur* (Uruguay) in Subarea 88.1; and the *Frøyanes* (Norway) in Subarea 88.2.

5.61 Since 2000/01, more than 11 000 *Dissostichus* spp. have been tagged in Subareas 88.1 and 88.2 (WG-FSA-06/34), and 250 tagged fish recaptured. Since 2000/01, a total of 5 678 *D. mawsoni* have been tagged by New Zealand vessels in the Ross Sea (Subarea 88.1 and SSRUs 882A–B) and 94 of these were recaptured by New Zealand vessels. The New Zealand vessel data were used as inputs for the base-case model, as complete data (i.e. some release data for 2004) for other vessels were unavailable for the assessment (WG-FSA-06/34).

5.62 The CASAL model, using catch-at-age, CPUE, tag–recapture data, and *D. mawsoni* biological parameters was used to estimate the current and initial population size, and to calculate the long-term annual yield that would satisfy the CCAMLR decision rules.

Management advice for *Dissostichus* spp. in Subareas 88.1 and 88.2

5.63 The constant catch for which there was median escapement of 50% of the median pre-exploitation spawning biomass level at the end of the 35-year projection period for the Ross Sea (Subarea 88.1 and SSRUs 882A–B) was 3 072 tonnes. At this yield there is a less than 10% chance of spawning biomass dropping to less than 20% of the initial biomass. A yield of 3 072 tonnes is therefore recommended.

5.64 For SSRU 882E, assuming a future fishing selectivity equal to the maturity ogive, the constant catch for which there was a 10% chance of spawning biomass dropping to less than 20% of the initial biomass was 353 tonnes. At this yield, the median escapement of 50% of the pre-exploitation spawning biomass level at the end of the 35-year projection period was 61%. A yield of 353 tonnes is therefore recommended.

5.65 For SSRUs 882C, D, F and G the Working Group could provide no new advice, but noted that the catches in these areas had provided some useful biological data for toothfish. Therefore, the Working Group recommended the current catch limits in these SSRUs be continued for the 2006/07 season.

5.66 The Working Group recommended that the allocation method used to set the 2005/06 catch limits for SSRUs in Subarea 88.1 be continued for the 2006/07 season.

5.67 The Working Group agreed that the current designations of SSRUs in Subareas 88.1 and 88.2 are almost certainly not optimal, but a detailed revision of these would require, at least, a consolidated movement model for fish in these subareas, which is not yet available. Such a revision should take account not only of the principal target species, but also of by-catch species and ecosystem considerations.

5.68 The Working Group recommended that tagging be continued as part of the Research and Data Collection Plan (Conservation Measure 41-01) and urged all Members to continue to tag fish at the required rate.

5.69 The Working Group also considered that the introduction of more structured research plans for exploratory fisheries may lead to a more effective and efficient collection of research data. It therefore recommended that development of such plans should be considered during the intersessional period.

5.70 The Working Group recommended that there should continue to be provision for a 10-tonne research exemption in all SSRUs in Subareas 88.1 and 88.2 having a zero catch limit so as to provide additional opportunities for research and tagging in areas where, often, data are scarce. However, paragraphs 12 and 13 of Conservation Measures 41-09 and 41-10, should be revisited in order to:

- clarify that a 10-tonne research exemption will be granted only for a single vessel in a single SSRU, not one vessel per Member. This will limit the total catch in a closed SSRU to 10 tonnes. On receipt of a notification under Conservation Measure 24-01, Annex A, from a Member that it intends to undertake research under the 10-tonne research exemption in a particular SSRU, the Secretariat will notify all Members of this fact and will not allow additional notifications for that SSRU in that season;

- clarify that paragraphs 12 and 13 of Conservation Measures 41-09 and 41-10 override the normal interpretation of Conservation Measure 24-01 in respect of multiple notifications by Members in a single SSRU;

- clarify that there is an allowance for the retention of 10 tonnes green weight of *Dissostichus* spp.;

- clarify that by-catch and *Dissostichus* spp. that are tagged and returned do not count against the 10-tonne limit. The retained catch of toothfish should count against the overall catch limit for the larger area within which the SSRU lies;

- increase the required tagging rate under the 10-tonne research exemptions to a minimum of three fish per tonne and a target rate of 10 fish per tonne (paragraph 3.48). This will also require a change to Conservation Measure 41-01, Annex C, paragraph 2(i).

Interim prohibition on the use of gillnets in the Convention Area

5.71 The Working Group was asked to provide comments on a proposal to prohibit deep-sea gillnet fishing in the Convention Area (WG-FSA-06/46). Gillnets considered in the document are those described by FAO which include trammel nets. The Working Group noted information exists that fishing vessels with gillnets have been observed in the Convention Area. The Working Group agreed that gillnets are non-selective fishing devices and if not utilised correctly could take mobile species indiscriminately. In addition, gillnets may have adverse impacts if dragged along the bottom and have the potential to 'ghost' fish over long time periods when lost or discarded. The Working Group agreed that it would be reasonable to have an interim prohibition of deep-sea gillnetting in the Convention Area until the Scientific Committee has investigated and reported on the potential impacts of this gear in the Convention Area and the information has been reviewed by the Commission.

5.72 The Working Group also noted that the suggested interim prohibition would apply only to commercial vessels and not for research purposes. At present some Members utilise gillnets in inshore areas to sample fish populations. These programs have been conducted using approved methods for a number of years. If Members wished to initiate new research programs using gillnets, the Scientific Committee should be notified in order that the proposals be reviewed and approved before being undertaken. The Working Group noted that action with respect to regulating the use of gillnets in the Convention Area should not jeopardise existing research programs in coastal waters.

Dissostichus eleginoides South Georgia (Subarea 48.3)

5.73 The Fishery Report for *D. eleginoides* in Subarea 48.3 is contained in Appendix L.

5.74 In 2005, Subarea 48.3 was subdivided into areas, one containing the South Georgia–Shag Rocks (SGSR) stock and other areas, to the north and west, that do not include the

SGSR stock. Within the SGSR area, three management areas (A, B and C) were defined (Conservation Measure 41-02/A). Catch limits for the areas to the north and west were set at zero for 2005/06.

5.75 The catch limits for *D. eleginoides* in the 2005/06 season for areas A, B and C were 0, 1 067 and 2 489 tonnes respectively, with an overall catch for SGSR of 3 556 tonnes. The total declared catch was 3 534 tonnes. There was no recorded IUU catch for the 2005/06 season. Catches in areas A, B and C were 10, 983 and 2 541 tonnes respectively.

5.76 The standardised GLMM CPUE analyses were updated. Standardised CPUE (for the whole SGSR fishery) showed a slight increase between 2005 and 2006. The CPUE data display high levels of variability up to 1995, and lower variability from 1996 to the present, the apparent discontinuity arising during a period of major and rapid change in the structure of the fleet and management of the fishery. Major changes occurring between 1993 and 1996 include changes in the spatial distribution of fishing, a change in the nationalities fishing, the introduction of 100% observer coverage and a shift to night setting and a winter fishery.

5.77 The Working Group agreed that the three periods of the fishery (1985–1992, 1993–1996, 1997–2006) had very different characteristics, and that interpreting the CPUE as a single series was not possible. Accordingly, the two-fleet CASAL model developed last year was used for the basic assessment model this year.

5.78 During 2005/06, a further 4 660 tagged *Dissostichus* spp. have been released in SGSR, bringing the total number of tagged fish released to around 13 000. In 2006, 364 recaptures of tagged fish were reported.

5.79 The Working Group agreed on a single CASAL assessment model, which was structurally similar to that presented at WG-FSA-05. A simple update of that assessment (which included both low $M = 0.13$ and low $L_\infty = 152.8$ cm) resulted in a reduced estimate of B_0, principally due to the influence of the 2006 tag returns. Revisions were made to some input parameters, following the advice of WG-FSA-SAM-06, including new parameter values for steepness, recruitment variability and maturity-at-age. Table 8 in Appendix L outlines the data and parameters used in the assessment model, as well as the structure of the model.

5.80 Likelihood profiles were calculated for the reference case. Recent CPUE, the length-frequency data, and the tag data are consistent in their information on a minimum level of B_0 (around 70 000 tonnes). It is clear that the tag data are the primary data source with respect to information on likely upper limits of B_0 (and, consequently, absolute levels of abundance) and give a consistent estimate of current, and, hence, historic abundance. It is also clear from the likelihood profiles that, as the number of releases and recaptures increases, so does the amount of information held in the tagging data on absolute levels of abundance.

5.81 Sensitivity to IUU was analysed in WG-FSA-06/53. Hypothesising an additional 10 000 tonnes of IUU in 2005 led to a 10% reduction in current biomass and made only a 1% difference to the calculated long-term yield.

5.82 Stock status and the long-term yield were calculated using the MCMC samples for the assessment model, as was done last year, with the appropriate long-term yield being 3 554 tonnes. The critical decision rule was the requirement that spawning biomass at the end

of a 35-year projection period should be 50% of the initial spawning biomass. This rule was implemented following the new recommended procedure outlined in the Fishery Reports for the assessments for toothfish in Subarea 48.3, the Ross Sea and Division 58.5.2.

5.83 As outlined in the Fishery Report (Appendix L), there were some trends in the fits to the mark–recapture data which may be due to complex interactions between the various assumptions about natural mortality-at-age, tagging parameters, growth and selectivity. Investigation of the driving factors behind these trends should be undertaken intersessionally. It was acknowledged that the results of this investigation may have implications for all current assessments.

Management advice

5.84 The Working Group recommended that the catch limit for toothfish in Subarea 48.3 (SGSR stock) should be 3 554 tonnes for the 2006/07 fishing season.

5.85 The catch limits for management areas A, B and C should be adjusted in a pro-rata manner to 0, 1 066 and 2 488 tonnes respectively. By-catch limits for skates/rays and macrourids should be similarly revised to 177 and 177 tonnes respectively.

Dissostichus eleginoides Kerguelen Islands (Division 58.5.1)

5.86 The Fishery Report for *D. eleginoides* in Division 58.5.1 is contained in Appendix M.

5.87 The catch of *D. eleginoides* reported for this division to 31 August 2006 was 3 045 tonnes. Only longlining is currently permitted in the fishery. The estimated IUU catch for the 2005/06 season was zero inside the French EEZ. Some IUU fishing may occur outside the EEZ as reported in WG-FSA-06/11 Rev. 2.

5.88 GLMM analyses show a general decreasing trend in the standardised CPUE up until 2003 followed by a period up to the current year for which the CPUE estimates are relatively constant. The trend in decreasing standardised average weight with fishing season continued for the 2005/06 season and probably indicates that the older age classes are less numerous in the exploited stock.

5.89 The survey being conducted on the FV *Austral* at Kerguelen from 30 August to mid-October 2006 has so far completed 205 trawls and 500 toothfish have been tagged. The Working Group looked forward to considering the results of the survey and encouraged further tagging.

5.90 By-catch removals are important for this fishery and the majority of the catch is processed but no stock assessment is available for evaluation of the impact on affected populations.

Management advice

5.91 The Working Group encouraged the estimation of biological parameters for Kerguelen. The Working Group also noted that a preliminary stock assessment could be carried out if CPUE, catch-weighted length frequencies and biological parameters were available.

5.92 The Working Group recommended that, where possible, all unprocessed rajids should be cut from the line while still in the water, except on the request of the observer. Avoidance of fishing in zones of specific high rates of abundance in by-catch should also be considered.

5.93 No new information was available on the state of fish stocks in Division 58.5.1 outside areas of national jurisdiction. The Working Group therefore recommended that the prohibition of directed fishing for *D. eleginoides*, described in Conservation Measure 32-13, remain in force.

Dissostichus eleginoides Heard Island (Division 58.5.2)

5.94 The Fishery Report for *D. eleginoides* in Division 58.5.2 is contained in Appendix N.

5.95 The catch limit of *D. eleginoides* in Division 58.5.2 west of 79°20'E for the 2005/06 season was 2 584 tonnes (Conservation Measure 41-08) for the period from 1 December 2005 to 30 November 2006. The catch of *D. eleginoides* reported for this division as of 5 October 2006 was 1 825 tonnes. Of this, 1 097 tonnes (60%) was taken by trawl and the remainder by longline. The estimated IUU catch for the 2005/06 season, 112 tonnes, was the lowest since IUU fishing began in 1995/96.

5.96 The length-at-age vector from 2005 was revised using a two-segment linear model as discussed in 2005. The new vector better estimates the size of young fish. Young fish (<6 years old) are fast-growing. Fish older than 6 years are slower growing than previously estimated. Natural mortality was assumed to be 0.13 $year^{-1}$ as for the other toothfish assessments.

5.97 Additional length-at-age samples for fish of age >20 years can be obtained from the longline fishery. WG-FSA encouraged the collection of these data in order to improve the ability of the growth model to accurately predict mean length-at-age for these older fish.

5.98 The Working Group adopted a new assessment based on the CASAL model applied in Subareas 48.3 and 88.1 and SSRU 882E. This assessment has a number of differences to those assessments including:

- the use of survey data as observations of young fish;
- tagging data are unable to be used in the assessment because of the underestimation of biomass that would arise from the current localised concentration of tag releases and recaptures;

- recruitment is modelled without assuming a stock-recruitment relationship, and variability in recruitment is estimated from the vector of year-class strengths estimated in the model.

5.99 The Working Group also noted that the assessment of yield can be sensitive to the number of age classes in the population and agreed that the assessment be based on a population with the plus class at 35 years rather than 50 years because of the absence of evidence that the fish grow appreciably after 35 years.

5.100 The CASAL assessment used abundance-at-length estimated from the surveys, catch-at-length from the fisheries and standardised CPUE time series to estimate current and initial population size and year-class strengths since 1981. These results were then used in projections to estimate the long-term annual yield that satisfies the CCAMLR decision rules for toothfish.

5.101 Sensitivity trials were undertaken to determine how best to use the core series of surveys (2001, 2002, 2004, 2005, 2006) in conjunction with other surveys for which there were sufficient differences in survey design and data to indicate that the results from these surveys were unlikely to accurately reflect abundances of juvenile fish as in the core series. The scenario adopted for providing advice on yield was to assume that the core series provided a greater accuracy of abundance of juvenile fish ($q = 1$) and to allow the bias in the other surveys (1990, 1993, 1999, 2003) to be estimated via the catchability coefficient, q. Results showed that the 1990, 1993 and 2003 surveys were likely to have underestimated the abundance of fish while the 1999 survey was likely to be an overestimate.

5.102 Long-term annual yield was estimated to be 2 427 tonnes giving 50% escapement with a probability of depletion of 0.06.

5.103 The Working Group noted the successful progress in developing an integrated assessment of *D. eleginoides* in CASAL. It agreed that further work could be undertaken to refine this assessment including examining:

(i) the relative weighting of different datasets;

(ii) whether or how the 2003 survey should remain being used in the assessment;

(iii) the appropriate population structure, including the number of age classes to be used in the model and whether the model could be developed as a two-sex model;

(iv) whether improvement in the model structure can be made to allow the inclusion of tagging data in the assessment;

(v) the relationships between the estimated parameters, including the potential interaction between the catchabilities, q, of the different datasets, particularly the surveys, and the other parameters.

5.104 The Working Group also recommended that:

(i) given the lack of defined modes in the length-density data, it would be useful to use age–length keys, if possible, as an alternative method for estimating densities of cohorts;

(ii) studies on optimal sampling schemes for establishing age–length keys should be encouraged.

5.105 The Working Group encouraged the evaluation of the assessment and harvest strategy in Division 58.5.2 along with the further development and evaluation of management strategies for toothfish fisheries considered in general by the Working Group (section 12). It noted the estimated status of spawning stock at the beginning of the time series (B_0) is greater than the pre-exploitation median spawning biomass (i.e. status is greater than 1 in Appendix L, Figure 11), the latter of which is estimated from a lognormal distribution of recruitments based on mean recruitment, R_0, and the recruitment variability determined from the estimated time series of year-class strengths. This highlights how the quantities in decision rules may be different from the objectives. The Working Group encouraged evaluation of these alternative reference points in the decision rules (using estimates of B_0 or the pre-exploitation median spawning biomass as used here) to determine their robustness for meeting the underlying objectives of the Commission.

Management advice

5.106 The Working Group recommended that the catch limit for toothfish in Division 58.5.2 west of 79°20'E should be 2 427 tonnes for the 2006/07 fishing season.

Dissostichus eleginoides Crozet Islands (Subarea 58.6)

5.107 The Fishery Report for *D. eleginoides* in Subarea 58.6 (French EEZ) is contained in Appendix O.

5.108 The catch of *D. eleginoides* reported for this subarea to 31 August 2006 was 641 tonnes. Only longlining is currently permitted in the fishery. The estimated IUU catch for the 2005/06 season was zero inside the French EEZ. Some IUU fishing may occur outside the EEZ as reported in WG-FSA-06/11 Rev. 2.

5.109 Depredation on toothfish catches by killer whales is becoming a major problem for this longline fishery.

5.110 GLM analyses show a general decreasing trend in standardised CPUE to 2002/03 with a subsequent slight increase in 2003/04 and 2004/05 and a substantial increase for the 2005/06 season. The trend of decreasing standardised average weight from 1998/99 to 2004/05 showed a slight upturn in 2005/06.

5.111 During the season, 1 240 toothfish were tagged by observers on board commercial vessels. The Working Group encouraged France to continue with its tagging program.

5.112 By-catch removals are important for the longline fishery and the majority of the catch is processed but no stock assessment is available for evaluation of the impact on affected populations.

Management advice

5.113 The Working Group encouraged the estimation of biological parameters for *D. eleginoides* at Crozet Island. It also noted that a preliminary stock assessment could be carried out if CPUE, catch-weighted length frequencies and biological parameters were available.

5.114 Estimated total removals have declined steadily over the last eight seasons and are at substantially lower levels than those taken before then. Standardised CPUE fell substantially from 1999/2000 to 2002/03 but has since increased. In the absence of a stock assessment, the Working Group agreed that it was unable to recommend appropriate levels of catch for this fishery.

5.115 The Working Group recommended that, where possible, all unprocessed rajids should be cut from the line while still in the water, except on the request of the observer. Avoidance of zones of specific high by-catch abundance should also be considered.

5.116 No new information was available on the state of fish stocks in Subarea 58.6 outside areas of national jurisdiction. The Working Group therefore recommended that the prohibition of directed fishing for *D. eleginoides* described in Conservation Measure 32-13 remain in force.

Dissostichus eleginoides Prince Edward and Marion Islands
(Subareas 58.6 and 58.7)

5.117 The Fishery Report for *D. eleginoides* in Subareas 58.6 and 58.7 inside the South African EEZ is contained in Appendix P.

5.118 The catch limit of *D. eleginoides* in the South African EEZ for the 2005/06 season was 450 tonnes for the period from 1 December 2005 to 30 November 2006. The catch reported for Subareas 58.6 and 58.7 as of 5 October 2006 was 46.6 tonnes, all of which was taken by longlines. The IUU catch for the 2005/06 season was assumed to be equal to the IUU catch in 2004/05 at 156 tonnes.

5.119 Cetacean depredation of longline catches is reported to be significant, implying that total removals are greater than just the estimated fishery catches. It was noted that the pot fishery which avoided depredation was discontinued.

5.120 The CPUE series was updated for the meeting and the biological parameters altered to match those used in Subarea 48.3.

5.121 An augmented ASPM that used catches, standardised CPUE, and catch-at-length data was used to estimate a long-term annual yield. The results from the model were only slightly

sensitive to whether or not cetacean depredation was included in the calculations and whether or not year-specific weights were used with the CPUE indices. The model estimated the spawning biomass of the resource to be between 36 and 44% of its average pre-exploitation level, although significant uncertainties remain in the assessment.

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

5.122 In 2005, the Scientific Committee noted that the advice on the appropriate levels of future catch provided in WG-FSA-05/58 (see also WG-FSA-06/58) was not based on the CCAMLR decision rules. Therefore it was unable to provide management advice for the fishery in the South African EEZ at the Prince Edward Islands. The Scientific Committee recommended that CCAMLR decision rules also be used in estimating yields for this fishery and that the concerns of WG-FSA over the sensitivity of the ASPM to weightings used for different data sources and the estimation of recruitment levels for forward projections be noted.

5.123 The Scientific Committee also noted the recommendations by ad hoc WG-IMAF with respect to mitigation of seabird mortalities (SC-CAMLR-XXIII, Annex 5, paragraphs 5.289 and 5.290).

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

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

Champsocephalus gunnari South Georgia (Subarea 48.3)

5.125 The Fishery Report for *C. gunnari* for South Georgia (Subarea 48.3) is contained in Appendix Q.

5.126 In the 2005/06 fishing season the catch limit set for *C. gunnari* in Subarea 48.3 was 2 244 tonnes. During the 2005/06 season the fishery caught 2 171 tonnes. The fishery opened on 15 November 2005 and was closed on advice of the Secretariat on 30 September 2006.

5.127 In January 2006, the UK undertook a random stratified bottom trawl survey of the South Georgia and Shag Rocks shelves (WG-FSA-06/51). The raw swept-area biomass estimates from surveys suggest that icefish stock size was between 20 000 and 50 000 tonnes throughout the 1990s (with the exception of the very large stock seen in 1990), and has steadily increased since 2000 to about 117 000 tonnes in 2006 (WG-FSA-06/51).

5.128 The catch-weighted length frequencies obtained from the commercial fishery and trawl surveys (WG-FSA-06/4 and 06/51 respectively) indicated that the population was dominated by a strong cohort of fast growing 2+ fish that were considerably larger (23.6 cm TL compared with 19.8 cm TL) than expected.

5.129 The Working Group agreed that a short-term assessment should be implemented in the GYM, using the one-sided bootstrap lower 95% confidence bound of total biomass from the 2006 survey.

5.130 Most input parameters for the assessment remained unchanged from 2005 except for an update of the length–weight parameters derived from the latest survey data and a change of selectivity function. A linear selectivity vector was used for *C. gunnari*, starting at and being fully selected by 2 years. This is a greater selectivity on 2-year olds than is usually chosen (normally a selectivity of 0.5 on 2-year-old fish is assumed). Full selectivity was assumed this year because the fish were larger than usual for 2-year olds (see paragraph 5.128).

5.131 Some concern was expressed that the fishery had been catching 2-year-old fish, which are not generally assumed to be mature. Mesh size regulations and a move-on rule for large catches of fish smaller than 24 cm applies in this fishery, and should protect most 2-year-old fish (which normally have a modal length of about 20 cm). In 2005/06 the fish were larger than usual, which resulted in them being selected by the fishery. Concern was expressed that the fishery might also catch significant numbers of 2-year-old fish in the 2006/07 fishing season, if they were again unusually large. There is no information on the abundance or size of these recruits. On the other hand, if next year's recruits are normal sized the fishery will, as usual, only partially select them.

5.132 The issue of future fishing on cohorts that have not been assessed, and for which there is no other estimate of recruitment, was raised in 2005 and remains a point of uncertainty in setting catch levels for icefish stocks (SC-CAMLR-XXIV, Annex 5, Appendix L, paragraph 30). The Working Group recommended that more work be directed at understanding this issue.

Management advice

5.133 The Working Group recommended that the catch limit for *C. gunnari* should be set at 4 337 tonnes in 2006/07 and 2 885 tonnes in 2007/08 based on the outcome of the short-term assessment.

5.134 All other components of Conservation Measure 42-01 should remain with an appropriate pro rata catch limit for catch taken in the period 1 March to 31 May (1 084 tonnes).

Champsocephalus gunnari Heard Island (Division 58.5.2)

5.135 The Fishery Report for *C. gunnari* in Division 58.5.2 is contained in Appendix R.

5.136 The catch limit of *C. gunnari* in Division 58.5.2 for the 2005/06 season was 1 210 tonnes for the period from 1 December 2005 to 30 November 2006. The catch reported for this division as of 5 October 2006 was 263 tonnes.

5.137 Catch-weighted length frequencies in the 2005/06 season were dominated by a single year class of 4+ fish. This cohort was observed to dominate the population in the survey undertaken in May–June 2006.

5.138 The short-term assessment was implemented in the GYM, using the one-sided bootstrap lower 95% confidence bound of total biomass from the 2006 survey. All other parameters were the same as in previous years.

Management advice

5.139 The Working Group recommended that the catch limit for *C. gunnari* in 2006/07 be no more than 42 tonnes.

5.140 The Working Group recommended that the Scientific Committee consider the following in providing advice to the Commission on Conservation Measure 42-02:

(i) Prior patterns in population dynamics of *C. gunnari* in Division 58.5.2 are such that the dominant 4+ age class is unlikely to be available to the fishery in 2006/07. Therefore the Working Group supported a scenario where projected yields were estimated only for classes <4+. As these year classes are low in abundance, the estimated yield is low, at 42 tonnes in the coming season, and 44 tonnes in the 2007/08 season. Yield in the second year is slightly increased due to the recruitment to the fishery in 2007/08 of the small 1+ age class evident in the 2006 survey. In considering this scenario, the Working Group noted that a low yield estimate was not unexpected, as:

  (a) the catch limit for 2005/06 was set in 2005 with the expectation that the dominant 4+ cohort would be unavailable to the fishery in 2006/07;

  (b) the absence of any indication of a strong 1+ or 2+ year class in the 2006 survey indicates that yields are likely to be low in future until a cohort as large as the 1+ cohort detected in the 2003 survey becomes evident.

(ii) A catch limit as low as 42 tonnes may be difficult to be targeted commercially without over-catch. There is also a small risk that the trawl fishery for *D. eleginoides* in Division 58.5.2 might take *C. gunnari* as by-catch. However, the Working Group noted that the by-catch of *C. gunnari* in the trawl fishery targeting *D. eleginoides* in Division 58.5.2 has never been large (<0.1 tonnes in 2005/06; WG-FSA-06/37 Rev. 1, Table 5).

5.141 The Working Group recommended that other measures in the conservation measure be retained.

5.142 The Working Group recommended that further work on developing a management procedure for *C. gunnari* is a high priority (SC-CAMLR-XXIV, Annex 5, Appendix M, paragraph 26).

Assessment and management advice for other areas and species in the Atlantic Ocean

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

5.143 CCAMLR closed commercial finfishing in the Antarctic Peninsula (Subarea 48.1) and the South Orkney Islands (Subarea 48.2) after the 1989/90 season. Both subareas should only be reopened to commercial exploitation if scientific surveys had demonstrated that the condition of fish stocks had improved to the extent which would allow commercial harvesting.

5.144 Little information has come to bear with respect to fish stocks in one of the two subareas: Argentina reported on a long-term study conducted on juvenile *Notothenia rossii*, on *G. gibberifrons* and *N. coriiceps* in Potter Cove (King George Island, Subarea 48.1) from 1983 to 2006 (WG-FSA-06/25). The abundance of *N. coriiceps* fluctuated with no apparent trend while *N. rossii* declined following fishing in Subarea 48.1 in 1979/80 until the late 1990s and has been steadily increasing in abundance since then. Abundance of *G. gibberifrons* has been declining steadily over the years. Their numbers have remained close to zero for several years.

5.145 The USA conducted a bottom trawl survey in the region of the northern Antarctic Peninsula part of Subarea 48.1 including the previous fishing grounds for icefish (*C. wilsoni*) exploited between 1978 and 1987 (WG-FSA-06/14) (paragraph 3.27). The Working Group concluded that biomass of all finfish species in that region is currently not at a level which would allow a reopening of the fishery.

Management advice

5.146 The Working Group recommended that the existing Conservation Measures 32-02 and 32-04 on the prohibition of finfishing in Subareas 48.1 and 48.2 respectively, remain in force.

South Sandwich Islands (Subarea 48.4)

5.147 During the 2004/05 season, one UK-flagged vessel started a tagging program on *D. eleginoides* in Subarea 48.4. Preliminary results from the survey were presented in WG-FSA-05/57. Two vessels from the UK and New Zealand fished in the area in 2005/06 and continued the tagging program. *Dissostichus eleginoides* formed 99% of the toothfish caught. A total of 134 *D. eleginoides* and 10 *D. mawsoni* were tagged over the northern shelf. The UK proposed to continue the mark–recapture experiment in Subarea 48.4 over the

2006/07 and 2007/08 fishing seasons in order to assist in the assessment of the toothfish population structure and size in accordance with Conservation Measure 41-03 (WG-FSA-06/56).

5.148 The Working Group welcomed this proposal and reiterated its comments from last year (SC-CAMLR-XXIV, Annex 5, paragraphs 5.143 to 5.145).

Management advice

5.149 The Working Group recommended that the mark–recapture program for *Dissostichus* spp. be continued for the next three to five years in Subarea 48.4 with a catch limit for *D. eleginoides* of 100 tonnes per season (Conservation Measure 41-03), noting the comments in SC-CAMLR-XXIV, Annex 5, paragraphs 5.143 to 5.145, and the need to ensure that the experiment is not affected by other fishing activities.

Stone crabs (*Paralomis* spp.) (Subarea 48.3)

5.150 Stone crabs were not exploited in the 2005/06 season. No proposal for the harvest of crabs has been received by CCAMLR for the 2006/07 season.

Management advice

5.151 Stone crabs are subject to Conservation Measures 52-01 and 52-02 regulating the fishery and experimental harvest of crabs. The Working Group recommended that these conservation measures remain in force.

Squid (*Martialia hyadesi*) (Subarea 48.3)

5.152 The exploratory fishery on *M. hyadesi* was subject to Conservation Measure 61-01. No new information on the species was available. No new request has been submitted to CCAMLR to continue exploratory fishing on this species in 2006/07.

Management advice

5.153 The Working Group recommended that the existing Conservation Measure 61-01 remain in force.

FISH AND INVERTEBRATE BY-CATCH

6.1 The long-term status of by-catch taxa has been identified as an issue for urgent attention by the Scientific Committee (SC-CAMLR-XXI, Annex 5, paragraphs 5.151 to 5.153). The key issues that need to be addressed are:

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

6.2 Issues of potential mutual interest and importance to WG-FSA and ad hoc WG-IMAF identified by the Working Group in 2004 (SC-CAMLR-XXIII, Annex 5, paragraph 6.38) included:

(i) assessment of the status of by-catch species and groups;

(ii) estimation of by-catch levels and rates;

(iii) by-catch reporting;

(iv) assessment of risk, both in terms of geographical areas and population demography;

(v) mitigation measures.

A work plan was agreed which addressed these issues as described below.

6.3 It was agreed that consideration of by-catch issues in the krill fishery for 2005/06 would not be considered by the Working Group but would be dealt with under section 10 – Considerations of ecosystem management.

Assessment of the status of by-catch species or groups

6.4 There were no new assessments of by-catch species or recommendations for revised catch limits in 2006.

6.5 The priority by-catch taxa for which assessments of status are required are macrourids and rajids (SC-CAMLR-XXI, Annex 5, paragraphs 5.151 to 5.154).

Rajidae

Rajid spp. in the Ross Sea (Subareas 88.1 and 88.2)

6.6 WG-FSA-06/31 presented details of updated biological parameters for *Amblyraja georgiana* and *Bathyraja* cf. *eatonii*, the two main species of rajid taken as by-catch in the Ross Sea *Dissostichus* spp. fishery. Parameter estimates were provided for length–weight and length-at-maturity for both species, and of growth, longevity and natural mortality for *A. georgiana*. The authors noted that there was still considerable need to resolve the

uncertainty surrounding the taxonomy of skates before comparisons of biological parameters between regions could be undertaken reliably. The Working Group encouraged further work on estimating biological parameters of skates in the Convention Area.

6.7 WG-FSA-06/32 provided an update on the skate tagging program undertaken in the Ross Sea. Further details are given in paragraph 3.35. The Working Group thanked New Zealand for continuing with the skate tagging program in the Ross Sea. Australia and the UK informed the Working Group of their continuing skate tagging programs in Division 58.5.2 and Subarea 48.3 respectively. Further details are provided in paragraphs 3.37 to 3.39.

6.8 The UK and New Zealand informed the Working Group that they planned to initiate preliminary stock assessments of rajids during the intersessional period.

Macrourus spp.

6.9 No new information was made available at the meeting upon which any new assessments of *Macrourus* spp. could be based.

Estimation of by-catch levels and rates

6.10 Fine-scale data (haul-by-haul) estimates of total removals of by-catch species from longline and trawl fisheries from within the CAMLR Convention Area are shown in Tables 10 and 11 respectively.

6.11 By-catch rates for macrourids (as a percentage of *Dissostichus* spp. catch) for the 2005/06 fishing season ranged from 0.8 to 20.8% and were broadly similar to those obtained during the 2004/05 season.

6.12 Total catch of macrourids only exceeded the catch limit in Subarea 88.2 (Table 10) (see also paragraphs 6.42 to 6.50).

6.13 The Working Group noted that the by-catch rate of macrourids in Subarea 88.1 was considerably reduced during the 2005/06 season. Mr Fenaughty indicated that the relaxation of some of the requirements governing research sets (SC-CAMLR-XXIV, paragraph 4.173) had contributed greatly to the observed reduction. He considered that vessels were now no longer forced into areas of known high macrourid density by minimum line spacing, hook numbers, and by area restrictions caused by ice and other vessels. It was noted that none of the SSRUs in Subarea 88.1 had been closed due to exceeding the by-catch limit in 2005/06 as had been the situation in 2004/05. The Working Group agreed that the threat of the new move-on rule in Conservation Measure 33-03 had also helped (paragraphs 6.42 to 6.50).

6.14 Reported rajid by-catch (as a percentage of *Dissostichus* spp. catch) in longline fisheries within the Convention Area in 2005/06 was low except in those areas where almost all rajids are retained and processed (Division 58.5.1 and Subarea 58.6) as highlighted in SC-CAMLR-XXIV, Annex 5, Appendix N, paragraph 22. It was again noted that rajid by-catch rates were likely to be underestimated in other areas as they did not include those animals cut off or lost from longlines.

6.15 Estimates of by-catch rates of other species were generally lower than observed in 2004/05. The morid *Antimora rostrata* made up the majority of the catch of other species.

6.16 The Working Group noted that no fine-scale haul-by-haul by-catch data were available from Subareas 58.6 and 58.7 (South African EEZ).

6.17 Low levels of by-catch were recorded from all trawl fisheries operating within the Convention Area in 2005/06 (Table 11). By-catch rates were considerably lower than observed in the longline fisheries. The major by-catch species in trawl fisheries were *Channichthys rhinoceratus* in fisheries for *D. eleginoides* and *C. gunnari* in Division 58.5.2, *Pseudochaenichthys georgianus* in the fishery for *C. gunnari* in Subarea 48.3 and *C. gunnari* in the trawl fishery for krill in Subarea 48.3.

Reporting of by-catch

6.18 In order to adequately assess by-catch levels and rates it is necessary to have accurate reporting of information on the total removals of by-catch taxa at a fishery level.

Information from scientific observers

6.19 Observer by-catch data were extracted by the Secretariat for each fishery for the 2005/06 fishing season and summarised in WG-FSA-06/36 Rev. 2 (longline fisheries) and 06/37 Rev. 1 (trawl fisheries). These documents include tables of the species composition of the observed catch and biological data collected.

6.20 The Working Group recalled that during the 2005 meeting of WG-FSA, estimates of total removals of by-catch using observer data had proved to be very difficult to calculate (SC-CAMLR-XXIV, Annex 5, Appendix N, paragraph 39). Analysis of data from Subareas 88.1 and 88.2 demonstrated that the most common recurring problem was incomplete fields in observer data. Of particular concern had been the inability to 'scale-up' total removals as information on 'Estimated percentage of haul observed for by-catch' was often found to be incomplete. In addition, the recording of retained and discarded fish was inconsistent between vessels and trips in the observer data.

6.21 The Scientific Committee recommended that the catch composition form L5 be modified by adding fields for recording 'number of hooks observed for by-catch' and the total estimated number and weight of each species retained or discarded during longline hauling (i.e. observed numbers and weights, scaled in proportion to the number of hooks observed). These additional fields would assist in the validation and checking of by-catch records (SC-CAMLR-XXIV, paragraph 4.192).

6.22 In order to assess whether changes to the L5 catch composition form and associated observer reporting had led to greater consistency between fine-scale and observer data for by-catch, it was necessary for the Working Group to examine the 2005/06 L5 observer data in greater detail.

6.23 Table 12 provides an overview of by-catch rates for selected species extracted from the L5 observer data. The mean number of hooks observed for by-catch varied greatly between statistical areas ranging from 16.8% in Division 58.5.2 to 58.4% in Subarea 58.4. Estimates of total green-weight removals from observer data, obtained from a variety of sources (e.g. factory estimates, vessel logbooks, weighing all retained by-catch etc.) (column 'a') was compared with extrapolated estimates of total removals (column 'b') obtained by scaling the mass of by-catch observed on hooks during by-catch observation periods to the fraction of the total number of hooks observed.

6.24 For macrourids, rajids and 'other' by-catch, there was reasonable agreement between the values for total removals estimated by the different methods (Table 3). Consistency was greatest in those areas where few vessels had been operating thereby reducing the between-vessel/observer variability. Dr Agnew noted that it was likely that the variance around any scaled estimate of the mass of total removals (column 'b') was likely to encompass the value of total removals estimated by observers (column 'a') as there was considerable variability in percentage of hooks observed for by-catch within statistical areas throughout the season.

6.25 Dr Belchier noted that it had been impossible to accurately assess the variance around the mean number of hooks observed for by-catch from the information supplied in the L5 database for the whole fleet in each fishery. It was clear that there were still missing values, and incomplete fields within the database and inconsistency between vessels and trips in the observer data.

6.26 The Working Group noted that there was less agreement between the different observer estimates of rajid by-catch than for the other taxa (Table 12). The inability to accurately record rajid by-catch in those fisheries where it is a requirement to cut free caught rajids at the sea surface was highlighted by WG-FSA in 2005 (SC-CAMLR-XXIV, Annex 5, Appendix N, paragraph 42). As a result of these concerns the Working Group had reiterated the need for observers to fill out L11 forms correctly. The greater discrepancy observed between the two observer-derived estimates of rajid by-catch suggests that there are still issues to be resolved relating to the accurate recording of rajid by-catch (see also paragraphs 6.28 to 6.34).

6.27 There was broad agreement between macrourid by-catch rates derived from fine-scale catch-and-effort data and scaled observer data, particularly when the likely variance around the mean was considered (see paragraph 6.24). The lack of consistency between the recorded rates again highlighted the current difficulties associated with the accurate recording of rajid by-catch.

Rajid cut offs

6.28 Following concerns raised at WG-FSA-05 about the inconsistency in observer reporting of rajid by-catch, the Working Group recommended that additional information on skate by-catch (and in particular cut-offs) be collected by vessels on the fine-scale C2 form (SC-CAMLR-XXIV, Annex 5, Appendix N, paragraph 51). It was anticipated that this new information would provide a useful check given the inconsistent reporting of cut-offs through observer forms.

6.29 Fine-scale C2 information was available to the meeting for the first time. The Working Group agreed that this was a significant and welcome development and will greatly assist in assessing the levels of rajid by-catch.

6.30 A preliminary comparison of fine-scale vessel-derived C2 estimates of rajid by-catch was made with those derived from observer data, including information derived from both the L11 (rajid data) and L5 (by-catch) datasets.

6.31 Considerable inconsistencies were observed both within the observer-derived datasets and between observer and fine-scale (C2) data in all fisheries for which information was available. Specific causes of the observed inconsistencies were not identified by the Working Group. However, the Working Group agreed that the most likely underlying cause was inexperience with the new data reporting requirements. It was noted that this was the first year for which such data were available and it was likely to take time for the new reporting requirements for rajid by-catch, required of both vessels and observers, to bed-down.

6.32 The possible confusion surrounding the categorisation of the 'fate' of rajids (i.e. cut off line, retained, landed then discarded etc.) was highlighted as an area of concern. Inconsistencies between the categorisation of the fate of caught rajids in the C2 and observer data were considered to be likely reasons for the observed differences in the databases.

6.33 The Secretariat confirmed that the new four-category scale for assessing rajid release condition had been adopted by observers (SC-CAMLR-XXIV, Annex 5, Appendix N, paragraph 87).

6.34 It was suggested that survivorship experiments could be conducted by returning caught rajids to the sea floor in large cages to assess survivorship. It was agreed that the possibility of moving towards biennial assessments would free up time to undertake further intersessional work on rajids and other by-catch issues.

Improvements to by-catch data collection

6.35 The observations described in the paragraphs above have highlighted the ongoing difficulties encountered by observers in accurately collecting data on levels of by-catch in the longline fishery. The Working Group agreed that the requirements for observers to collect data have become considerable and data-entry forms have become complex. Confusion surrounding the recording of by-catch may have contributed to the observed inconsistencies in the by-catch data. Of particular concern was the additional number of fields that are now required in form L5.

6.36 The Working Group recommended that the requirement to obtain a total weight for each by-catch taxa for each set should be relaxed. It was noted that this information was already available from the C2 vessel data.

6.37 It was also recommended that collection of by-catch data be simplified. The period assigned for observation of hooks for bird by-catch should also be assigned as the tally/counting period for fish and invertebrate by-catch. It was agreed that it remained useful to record a tally of the target species during this period. This period should be used only to record counts of by-catch and not to collect additional biological information.

6.38 Mean weight of by-catch species should be obtained from observations made during the biological sampling period and not the tally period. It was noted that it was most appropriate for mean weights obtained from biological observations immediately prior to or after the tally period to be used to scale up catch weights from tally counts of by-catch. It was also noted that it was unlikely that accurate information on release condition of rajids could be obtained during the tally period (particularly in bad weather) and recommended that at least one observation period every 48 hours would still be required as recommended in the past (SC-CAMLR-XXIV, paragraph 4.204).

6.39 A summary of the recommended simplification of the instructions to observers with respect to sampling longlines for by-catch are as follows:

Tally period –

- 25% of hooks should be observed for tally counts each day
- the tally period may be broken up into several periods each day
- tally period includes counts of fish, fish by-catch, birds and mammal interactions.

Biological data –

- Biological sampling periods should be done adjacent to the tally periods.

Rajids –

- Skate and ray observations should be conducted at least once every 48 hours and, if possible, should cover approximately 10% of the hooks hauled.

6.40 Incomplete recording of by-catch by observers may be due to uncertainty surrounding data recording protocols. The Working Group recommended that observers be thoroughly briefed by technical coordinators, and guidelines for recording by-catch data be followed as closely as possible. In addition, the Working Group reiterated the importance of using the most up-to-date forms.

Management advice

6.41 Management advice resulting from discussions concerning the reporting of by-catch are considered under section 11.

Mitigation measures

By-catch move-on rule

6.42 In Subarea 88.1 in 2004/05 the by-catch limits for macrourids were exceeded in SSRUs I and K, and closures of SSRUs G, I, J and K were triggered by the by-catch limits for *Macrourus* spp. These closures were, in some cases, the result of high by-catch levels being made by only a few fishing vessels. In an attempt to avoid this situation in future, the Commission adopted a new by-catch move-on rule for the 2005/06 fishing season:

Conservation Measure 33-03, paragraph 5:

> If the catch of *Macrourus* spp. taken by a single vessel in any two 10-day periods in a single SSRU exceeds 16% of the catch of *Dissostichus* spp. by that vessel in that SSRU in those periods, the vessel shall cease fishing in that SSRU for the remainder of the season.

6.43 The Commission has requested that the Scientific Committee provide it with an analysis of the effectiveness of this rule in reducing by-catch in Subareas 88.1 and 88.2 in the 2005/06 fishing season (CCAMLR-XXIV, paragraph 11.39).

6.44 None of the SSRUs in Subarea 88.1 were closed on by-catch or exceeded their by-catch limit in 2005/06. However, in Subarea 88.2 the by-catch limit was exceeded in SSRUs C, D, E, F and G, and the closure of SSRUs C, D, F and G was triggered by the macrourid by-catch limit. The macrourid by-catch for Subarea 88.1 as a whole was 88% of the macrourid catch limit in 2004/05 and 54% of the macrourid catch limit in 2005/06. The macrourid by-catch exceeded the catch limit for Subarea 88.2 as a whole. Thus the new move-on rule appears to have helped to reduce by-catch levels and the number of closures in Subarea 88.1 but not in Subarea 88.2, probably because of the different configuration of SSRUs in Subarea 88.2 allowing fewer options for moving between SSRUs, and the requirement that more research be done in this area.

6.45 The move-on rule allows for the by-catch of macrourids to be greater than 16% of the catch of *Dissostichus* spp. for two 10-day periods before the vessel has to move. The first time that catch goes above 16% therefore acts as a warning sign. The Working Group analysed the number of times that individual vessels caught more than 16% of macrourids in a 10-day period, for each SSRU of exploratory fisheries in 2004/05 and 2005/06.

6.46 Over all exploratory fisheries (Subareas 48.6, 88.1, 88.2, Divisions 58.4.1, 58.4.2, 58.4.3a) the 'warning' first 10-day period was triggered 25 times in 2004/05 and 23 times in 2005/06. If this particular by-catch rule had been applicable in 2004/05, individual vessels would have experienced SSRU closures on 14 occasions. In 2005/06 the actual closure of an SSRU to an individual vessel occurred only seven times.

6.47 Considering Subarea 88.1 alone, the warning first 10-day period was triggered 19 and 13 times in 2004/05 and 2005/06 respectively. A closure would have been, or was, triggered 12 and 3 times in 2004/05 and 2005/06 respectively.

6.48 This represents a reduction in the proportion of 'warning' periods that would have, or did, trigger a closure of an SSRU to a vessel and demonstrates that vessels were actively seeking to avoid triggering a closure.

6.49 The Working Group concluded that the new by-catch move-on rule was proving to have some effectiveness both in reducing by-catch and the number of times SSRUs were closed because of by-catch.

6.50 Some vessels had experienced the problem of arriving in an SSRU towards the end of a 10-day period and had experienced high by-catch levels on grounds where fishing had not, as yet, taken place during a season and knowledge of the species mix was yet to be obtained. This curtailed their ability to adequately research low by-catch areas within the SSRU. It was

for this reason that a 'warning' period was built into the design of the move-on rule, so that vessels were not immediately excluded from an area after one 'hit' of by-catch. The precautionary response of most vessels has been to avoid arriving in a new SSRU at the end of a 10-day period but circumstances such as area closures and ice coverage do not always enable this flexibility. If this difficulty persists, some revision of the by-catch rule might be appropriate, such as only including 10-day periods as qualifying 'warning' periods if a vessel had fished in the SSRU for more than two days in that period.

Management advice

6.51 The Working Group recommended that the rule remain unmodified for a further year, and be the subject of review at WG-FSA-07. It requested that the Secretariat provide the data for the analysis of by-catch (Tables 10 to 12) for the start of the meeting.

New fishing methods

6.52 WG-FSA-06/5 and 06/15 described modified bottom longline fishing gears that have been deployed by Russian and Japanese vessels respectively fishing for *Dissostichus* spp. in the Convention Area. By-catch rates of macrourids were reportedly much less than obtained by conventional 'Spanish' type longlines. However, the Working Group noted the need for experimental trials to determine the significance of the reduction in by-catch rates. Further discussion of the methodologies is provided in paragraph 3.14.

6.53 The Working Group noted that in addition to the new gear described in paragraph 6.52, several trials of seabird mitigation measures have been suggested in paragraphs 7.37 to 7.41.

6.54 The Working Group agreed that during the development of new gear, including mitigation measures, it is important that the impact of fishing on all species be monitored (target species, fish and invertebrate by-catch as well as marine mammals and birds) (Appendix D, paragraphs 113 and 186).

INCIDENTAL MORTALITY OF MAMMALS AND SEABIRDS ASSOCIATED WITH FISHING
(see also Appendix D)

Advice to the Scientific Committee

General
(see also Appendix D, paragraphs 1 to 5)

7.1 The plan of intersessional work for 2006/07 (SC-CAMLR-XXV/BG/28) summarises requests to Members and others for information of relevance to the work of the Working Group (Appendix D, paragraphs 1 to 4). Members are particularly invited to review the

membership of the Working Group, to suggest additional members and to facilitate attendance of their representatives at meetings especially technical coordinators and South American Members (Appendix D, paragraph 5).

Incidental mortality of seabirds and marine mammals in fisheries in the Convention Area (see also Appendix D, paragraphs 6 to 62)

Seabirds in longline fisheries

7.2 The total number of observed seabird mortalities in longline fisheries was one, a white-chinned petrel in Division 58.4.3b. The total extrapolated longline mortality for 2005/06 was two birds (Table 3). This compared to 97 birds estimated killed in 2004/05 (Appendix D, paragraph 11). When seabird mortalities reported from EEZs within the Convention Area are included, the total extrapolated seabird mortalities during longline fishing operations in 2005/06 were estimated to be 2 589. This estimate includes 235 birds in Subarea 58.6 and 2 352 birds in Division 58.5.1. For the first time no albatrosses were observed captured in longline fisheries in the Convention Area (Appendix D, Table 8; WG-FSA-06/36 Rev. 2, Table 3).

7.3 The total number of seabirds observed caught and released uninjured was 32 (Appendix D, Table 1). The Working Group noted that the incidence of birds being caught injured and uninjured (i.e. birds that are caught on the haul) accounted for 97% of seabird captures in 2005/06 (Appendix D, Table 1). As last year, this proportion of seabirds caught on the haul suggests that an increased focus on haul mitigation measures is required (SC-CAMLR-XXIV, Annex 5, paragraph 7.3; Appendix D, paragraph 12).

French EEZs in Subarea 58.6 and Division 58.5.1

7.4 In 2005/06, data were available from 20 cruises in Subarea 58.6 and 27 cruises in Division 58.5.1. The proportion of hooks observed was 25 and 24% respectively (Appendix D, paragraph 13). In 2005/06 the total reported seabird mortality from observers for Subarea 58.6 and Division 58.5.1 was 57 and 592 birds respectively (Appendix D, Table 4). The corresponding incidental mortality rates were 0.0362 and 0.092 birds/thousand hooks. The extrapolated total seabird mortalities for Subarea 58.6 and Division 58.5.1 were 235 and 2 352 respectively (Appendix D, Table 5). All vessels in the French EEZs were autoliners using 50 g/m IWLs in 2005/06, compared with one such vessel in the previous season. Two-thirds of the birds were caught by two vessels in Subarea 58.6, and in Division 58.5.1, 72% of captures were by three vessels. This may indicate that there are individual vessel effects that need to be examined to effectively reduce further seabird captures in these areas (Appendix D, paragraph 14).

7.5 Similar to last year, the Working Group noted that 28% of seabirds captured were caught alive (30% in 2004/05), indicating that they were taken on the haul (Appendix D, Table 4). This emphasises a need to focus on haul mitigation measures to reduce the remaining seabird by-catch in longline fisheries in the Convention Area (Appendix D, paragraph 16).

7.6 The Working Group noted that France continues to reduce its total seabird by-catch by about one half each year (77 and 57% of the previous seasons' rates respectively in Subarea 58.6 and Division 58.5.1) (Appendix D, paragraphs 15 and 19). However, the level of seabird captures during longline fishing in the French EEZ remains far above that recorded elsewhere in the Convention Area. Seasonal differences in the fishing patterns between areas may account for the differences in catch rates between the French EEZ and other areas, with no longline fishing conducted in equivalent high-risk areas during the higher-risk summer period.

7.7 The Working Group acknowledged that some of its recommendations regarding future research and monitoring of the French seabird captures were addressed in 2005 and noted that the following remain for 2006 (Appendix D, paragraph 17). The Working Group recommended that:

(i) consideration be given to increasing the proportion of hooks observed (e.g. to 40–50%) (Appendix D, paragraph 17);

(ii) a thorough analysis of data be undertaken for the 2003/04 to 2005/06 seasons (Appendix D, paragraph 17);

(iii) provision of additional information on the nature of captures, the factors affecting captures, and details of mitigation devices used (Appendix D, paragraph 18);

(iv) all relevant raw by-catch data be submitted, as is done for other Convention Area subareas and divisions, to allow reporting on the total seabird by-catch for the entire Convention Area (Appendix D, paragraph 20).

Seabirds in trawl fisheries

7.8 The percentage of trawl effort observed in 2005 for the Subarea 48.3 icefish fishery, Division 58.5.2 toothfish/icefish fishery, and the Area 48 krill fishery was 78% (100% of vessels), 100% (100% of vessels), and 15% (43% of vessels) respectively (Appendix D, paragraphs 22, 25 and 27). The Working Group reiterated its 2005 recommendation that coverage of the krill fishery be increased to allow for adequate and representative sampling across all trawl fisheries for monitoring of by-catch and efficacy of mitigation measures (Appendix D, paragraphs 31, 60 and 121).

7.9 The Working Group noted a continuing general downward trend in seabird mortalities reported in the icefish fishery in Subarea 48.3 (Appendix D, paragraph 23). In 2005, 33 seabirds, including albatross and petrel species, were observed killed in the Subarea 48.3 icefish trawl fishery, and another 89 released alive and uninjured (Appendix D, Table 12). The mortalities included 11 black-browed albatrosses, 20 white-chinned petrels, 1 grey-headed albatross and 1 unknown petrel species and were reported from four vessels. This compares to 11 bird mortalities (and 14 released alive) in 2005 and 87 bird mortalities (and 132 entanglements) in 2004. The rate of mortality in this subarea in 2006 was 0.07 birds per trawl compared to 0.14, 0.37 and 0.20 in 2005, 2004 and 2003 respectively (Appendix D, paragraph 24 and Table 14). There were no seabird mortalities observed in the Division 58.5.2 trawl fishery (Appendix D, Table 12).

7.10 The Working Group noted that no seabird mortality was recorded on the *Saga Sea* while fishing with continuous trawls in Subarea 48.1. Similarly, no mortalities were recorded on the *Atlantic Navigator* using either continuous trawl or traditional pelagic trawl methods in Subarea 48.1 (Appendix D, paragraph 28).

Seabirds in pot fisheries

7.11 No incidental seabird mortalities were recorded during three cruises targeting *D. eleginoides* in Divisions 58.5.1 and 58.5.2 and Subarea 48.3 (Appendix D, paragraph 32).

Marine mammals in longline, trawl and pot fisheries

7.12 There were no reports of incidental mortality of marine mammals in longline gear (WG-FSA-06/36 Rev. 2). This differs from 2004/05, when both pinnipeds (5 animals) and cetaceans (2 animals) were reported caught (Appendix D, paragraph 33). Two marine mammals were reported entangled and released alive in longline fisheries (one Antarctic fur seal in Division 58.5.2 and one southern elephant seal in Subarea 88.1/88.2; WG-FSA-06/38, Table 2) (Appendix D, paragraph 33).

7.13 In 2005/06, one Antarctic fur seal was reported caught and killed in the krill trawl fishery in Subarea 48.1 (Appendix D, Table 12). The Working Group noted that this level of mortality is greatly reduced from 2004/05, when 96 Antarctic fur seals were observed caught during krill fishing operations in the same area (Area 48). The Working Group noted that no marine mammal mortality was reported on the *Saga Sea* while fishing continuous trawls in Subarea 48.1 in 2005/06 (Appendix D, paragraph 34). Methods reported deployed to avoid marine mammal capture were net barriers and a seal-exclusion device (WG-FSA-06/37 Rev. 1). The Working Group encouraged the continued reporting of use and experiences with mitigation measures as it is useful to make annual comparisons along with the capture rates of associated gear, with a view to identifying potentially effective methods over time (Appendix D, paragraph 35).

7.14 One leopard seal was caught and killed in the Division 58.5.2 toothfish trawl fishery (compared to one Antarctic fur seal in 2004/05) (Appendix D, paragraph 36 and Table 12).

7.15 There were no reports of incidental mortality of marine mammals in pot fisheries (Appendix D, paragraph 37; WG-FSA-06/39 Rev. 1).

Information relating to the implementation of Conservation Measures 25-01, 25-02 and 25-03

7.16 This year the level of reported performance was improved with 100% implementation for nearly all measures, with streamer line design and use and the discard of hooks in offal being the exceptions. With respect to Conservation Measure 25-02, this is summarised as follows:

(i) line weighting (Spanish system) – 100% reported compliance in all subareas and divisions (Appendix D, paragraph 40 and Table 10);

(ii) line weighting (autoline system) – all vessels fishing in Subareas 88.1 and 88.2 and Division 58.4.2 south of 60°S in daylight met the requirement to achieve a consistent minimum line sink rate as described in Conservation Measure 24-02. As in previous years this line-weighting requirement has been fully achieved by all vessels. For 2005/06, the Working Group noted that only one vessel (*Protegat* in Subarea 48.3), using a variation on the autoline method, used clip-on weights to achieve the sink rate requirements. All other autoline vessels were now using IWLs. The Working Group noted that the *Shinsei Maru No. 3*, using a trot-line system, met the sink rate requirements in Subarea 48.6 (Appendix D, paragraph 40);

(iii) night setting and offal discharge – 100% compliance with night setting, and also for offal discharge in all areas where this was required (Subareas 48.3, 48.4, 58.6, 58.7, 88.1 and 88.2) (Appendix D, paragraph 41 and Table 10);

(iv) discard of hooks – hooks were present in discards on 6 of 36 longline cruises; on three of these this was reported as a rare event. However, the observer reports for the *Globalpesca I* in Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b, the *Protegat* in Subarea 48.3, and the *Punta Ballena* in Subareas 88.1/88.2 indicated that this was a daily occurrence (Appendix D, paragraph 42; WG-FSA-06/38, Table 1);

(v) streamer lines – the number of cruises complying with streamer line specifications has increased from 74 to 80% this year (Appendix D, Table 9), although this is not as high as the 92% (34 of 37 cruises) in 2003. However most of the non-compliant vessels had only minor deviations from the requirement. The cruises where streamer lines did not comply failed on streamer lengths (5 cruises), total streamer line length (3 cruises, but only one of these deviated by more than 3 m from the required length) and branched streamer spacing (1 cruise). Four vessels failed on one different streamer line specification (*Globalpesca II*, *Insung No. 2* and *Galaecia* in Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b; *Frøyanes* in Subareas 88.1/88.2) and two vessels failed on two specifications (*Koryo Maru No. 11* in Subareas 58.6/58.7; *Viking Sur* in Subareas 88.1/88.2). There was 100% compliance with attachment height (Appendix D, paragraphs 43 and 44 and Table 9);

(vi) haul-scaring devices – in Subarea 48.3, four vessels (*Protegat* (78%), *Jacqueline* (46 %), *Argos Georgia* (90%) and *Viking Bay* (98%)) did not use haul-scaring devices on all hauls. In Division 58.5.2, two trips by the *Janas* were reported with 100 and 94% compliance with this requirement respectively. In Subareas 58.6 outside the French EEZ and 58.7 there was 100% compliance (one vessel fished) (Appendix D, paragraph 46 and Table 9).

7.17 The Working Group noted a reported increase in the discharge of gear debris, which occurred on three vessels, one in Subarea 48.3, and two in Divisions 58.4.1, 58.4.2, 58.4.3a

and 58.4.3b. There was 100% compliance with inorganic garbage discharge requirements for longline vessels, though one trawl vessel discharged inorganic discharge in Subarea 48.3. No vessels discharged oil (Appendix D, paragraph 47; WG-FSA-06/38, Table 1).

7.18 The Working Group reiterated its concern that care was needed to ensure accurate reporting of data by observers because inaccurate reporting may have consequences for reviewing the performance of vessels in fisheries (Appendix D, paragraph 49).

7.19 Conservation Measure 25-01 prohibits the use of plastic packaging bands to secure bait boxes. The use of other plastic packaging bands is restricted to those vessels with on-board incineration facilities and all bands must be cut and disposed of using this facility. Information from observer reports indicated 100% implementation of this measure, compared to non-compliance indicated by observer reports on 1 of 10 vessels in 2005 (Appendix D, paragraph 39; WG-FSA-06/38, Table 1).

7.20 With respect to Conservation Measure 25-03, 1 of 9 trawl vessels in the Convention Area (11%) did not comply with the prohibition of discharge of offal during the shooting or hauling of trawl gear in Subarea 48.3 (Appendix D, paragraph 56; WG-FSA-06/38, Table 5). This level of compliance is higher than in 2005, when 2 of 8 (22%) vessels discharged offal.

7.21 Three vessels were reported as having used net sonde cables (*Cabo de Hornos* and *Betanzos* in Subarea 48.3; *Konstruktor Koshkin* in Subarea 48.1). It was unclear whether these were net sonde cables or paravanes, as had been the case in previous years, and the Working Group requested additional information from scientific observers (Appendix D, paragraph 48).

7.22 The Working Group noted observer reports suggesting that the reduced level of seabird mortality recorded during shooting operations was due to improved mitigation measures, including net cleaning, and a combination of weight added to the net and net binding. Detailed reporting on net binding was only recorded in two cruise reports from Subarea 48.3. This may have been partly due to the lack of a specific field in the scientific observer logbook to record the use of the method. The Working Group developed recommended changes to the logbook to collect these data in future (Appendix D, paragraphs 51 and 58).

7.23 The consistency of reporting on the adoption of mitigation measures in the icefish trawl fishery varied considerably. The Working Group recommended changes to the observer logbook to improve the collection of these data (Appendix D, paragraph 57).

7.24 The Working Group strongly recommended the use of net binding in the *C. gunnari* fishery in Subarea 48.3, and other pelagic trawl fisheries in the Convention Area, as appropriate, and provided guidelines to assist in a uniform uptake of this mitigation measure (Appendix D, paragraph 59).

7.25 The Working Group recommended that an advisory note be added to Conservation Measure 42-01 to assist in the uptake of this mitigation measure as follows (Appendix D, paragraph 60):

Add the following sentence to 'mitigation' paragraph 7:

Vessels are encouraged to use net binding as a means to reduce seabird interactions. See SC-CAMLR-XXV, Annex 5, Appendix D, paragraph 59 for guidelines for net binding.

7.26 Noting the success to date of net binding in the icefish fishery (Appendix D, paragraphs 54 and 58), the Working Group will review future data, such as that obtained from the recommended increased observer coverage in the krill fisheries (Appendix D, paragraph 31), to assess the utility of this mitigation measure in other pelagic trawl fisheries (Appendix D, paragraph 61).

7.27 The Working Group acknowledged the continued decline of seabird and marine mammal by-catch in the Convention Area, but several areas of concern remain regarding seabirds caught: in the French EEZ of Subarea 58.6 and Division 58.5.1, during longline haul operations in Subareas 48.3, 58.6 and 58.7, and during icefish trawl operations in Subarea 48.3. The Working Group's recommendations address each of these areas and generally involve continued vigilance with improved monitoring and reporting. The ongoing success in minimising and mitigating by-catch of seabirds in longline fisheries in the Convention Area has resulted from an ongoing and adaptive approach to application of mitigation measures. The success and uptake of this approach has been contingent on the sustained very high level (100%) of observer coverage in the Convention Area (Appendix D, paragraph 63).

Incidental mortality of seabirds outside the Convention Area
(see also Appendix D, paragraphs 64 to 75)

Longline

7.28 As requested in 2005 (SC-CAMLR-XXIV/BG/28), New Zealand provided new data on mortality of seabirds outside the Convention Area relevant to fisheries and/or seabirds within the Convention Area. Cruises on New Zealand domestic vessels were observed in 2003/04 and 2004/05, and species from the Convention Area were among those captured (Appendix D, paragraphs 64 and 65).

7.29 The Working Group noted that despite its request, no other Members reported on longline seabird by-catch from outside the Convention Area. The Working Group encouraged reporting of new information in 2006.

Trawl

7.30 New Zealand and South Africa provided new data on mortality of seabirds outside the Convention Area relevant to fisheries and/or seabirds within the Convention Area (Appendix D, paragraphs 67 and 68). The data provided suggest that the levels of mortality of Convention Area seabirds outside the Convention Area are much greater in magnitude than

those reported within the Convention Area and are a cause for serious concern. The South African data included black-browed albatrosses likely to be predominantly Convention Area seabirds breeding at South Georgia.

7.31 The cryptic nature of seabird warp-strike mortality and the need for specifically tasked seabird observers to record and quantify this type of mortality has been noted in recent years (Appendix D, paragraph 71). The Working Group re-emphasised the need for effective mitigation of seabird by-catch in trawl fisheries (Appendix D, paragraph 70), recommended expanded data collection by dedicated seabird observers to determine the extent of the interaction (Appendix D, paragraphs 62, 71 and 73) and noted that restricting offal discharge during trawl operations would significantly reduce the observed by-catch in this fishery.

Development of a trawl warp cable data collection protocol for inside the Convention Area

7.32 The Working Group developed forms and a protocol to collect seabird trawl warp-strike data and recommended that they are used in all trawl fisheries in the Convention Area. The objective is to assess the extent of seabird interactions with trawl warp cables in Convention Area fisheries and is to be undertaken in three stages (Appendix D, paragraph 74). The first stage recommended for 2006/07, requiring sampling across a high proportion of vessels in trawl fisheries, is to document if seabird interactions with trawl warp cables are occurring in the Convention Area fisheries (Appendix D, paragraph 75).

Incidental mortality of seabirds during unregulated longline fishing in the Convention Area (see also Appendix D, paragraphs 76 to 87)

7.33 The overall estimated total for the whole Convention Area in 2005/06 indicates a potential seabird by-catch in the unregulated fishery of 4 583 (95% CI range of 3 756 to 12 237) seabirds (SC-CAMLR-XXV/BG/27). The values for this and previous years are summarised in respect of different parts of the Convention Area in Appendix D, Table 17 (Appendix D, paragraph 81).

7.34 In comparison with estimates for previous years, calculated in identical fashion, the overall catch for 2005/06 is similar to the overall catch estimated for 2003/04 (SC-CAMLR-XXIV/BG/27). These are the lowest reported values since estimates started in 1996. This presumably reflects a commensurate reduction in toothfish removals and/or changes in the areas from where IUU fishing occurs (Appendix D, paragraph 82).

7.35 The Working Group noted that grey petrels have comprised between 5 and 11% of the catch in the regulated fishery in Division 58.5.1 over the last three years and undertook to examine methods of estimating the by-catch of this species by IUU vessels as an intersessional task with a view to assessing the level of take of grey petrels in future years (Appendix D, paragraph 84).

7.36 Nevertheless, the Working Group reiterated its conclusions of recent years that even these levels of incidental mortality of seabirds arising from IUU fishing were of substantial concern and likely unsustainable for some of the populations concerned (Appendix D, paragraph 86). The Commission was encouraged to continue to take action in respect of incidental mortality of seabirds caused by IUU fishing (Appendix D, paragraph 87).

Research into and experience with mitigation measures
(see also Appendix D, paragraphs 88 to 115)

Longline

7.37 Noting the success to date within the Convention Area in reducing seabird by-catch, the Working Group recalled that the mitigation measures used continue to require refinement to potentially allow for fishing at any time of day without seasonal closure of fishing grounds (SC-CAMLR-XIX, paragraphs 4.40 and 4.41). Further, as CCAMLR mitigation measures and practices have been held up as a role model outside the Convention Area and successfully exported to some of those fisheries, research into mitigation measure refinement remains a priority to support the export of best-practice mitigation (Appendix D, paragraph 89).

7.38 The Working Group noted research under way to further develop improvements to the line-weighting regimes and use of streamer lines for both Spanish system and autoline vessels (Appendix D, paragraphs 89 to 102). Ultimately, the Working Group expects that a suite of best-practice seabird by-catch mitigation for Spanish system longline vessels (Appendix D, paragraph 90) and autoline vessels (Appendix D, paragraph 102) can be developed.

7.39 With respect to future improvements to Conservation Measures 24-02 and 25-02, the Working Group recommended:

(i) test the efficacy of the new Spanish longline system line-weighting regime as a seabird deterrent and for operational characteristics (Appendix D, paragraph 89);

(ii) further research on utility and cost of mechanised streamer line systems (Appendix D, paragraph 97);

(iii) testing the effectiveness of paired streamer lines in Southern Ocean conditions with common seabird assemblages (Appendix D, paragraph 102);

(iv) observer logbook and cruise report modifications to improve data collections for longline haul mitigation, longline sink rates and estimation of access windows (vessel speed, sink rate and aerial extent of streamer lines).

7.40 With respect to the *Shinsei Maru No. 3* bottom-line system, the Working Group determined that the threats to Convention Area seabirds during line-setting operations would be minimal and potentially lower than with the traditional Spanish system and that continued reporting of this methodology would provide valuable information on its performance in relation to seabird by-catch (Appendix D, paragraphs 92 to 94; paragraphs 6.52 to 6.54).

7.41 Given the continued high percentage of seabirds caught during longline haul operations in the Convention Area in 2005/06 (97% of seabird interactions) (Appendix D,

paragraph 12 and Table 1), the Working Group noted two effective mitigation devices – the 'moon pool' and the Brickle curtain (Appendix D, paragraphs 113 and 114). The Working Group encouraged technical coordinators to instruct observers to collect information on haul mitigation devices used in the Convention Area (Appendix D, paragraphs 107 and 109).

Observer data collection
(see also Appendix D, paragraphs 117 to 124)

7.42 The Working Group reviewed data collection needs relative to several areas of seabird and marine mammal interaction and mitigation and recommended additions or changes to logbooks and cruise reports including:

(i) improved reporting on the use of net sonde cables (Appendix D, paragraph 48);

(ii) net binding (Appendix D, paragraphs 51 and 58);

(iii) the adoption of mitigation measures in the icefish trawl fishery (Appendix D, paragraph 57);

(iv) a warp-strike protocol (Appendix D, paragraphs 62, 71, 122 and 123);

(v) information on haul mitigation devices used in the Convention Area (Appendix D, paragraph 107);

(vi) improved reporting for estimating longline access windows (the distance astern at which longlines sink beyond the reach of seabirds; pertinent data are vessel speed, longline sink rate and aerial extent of streamer line) (Appendix D, paragraphs 105, 118 and 119).

Research into the status and distribution of seabirds
(see also Appendix D, paragraphs 125 to 130)

7.43 The Working Group welcomed a report on albatross and petrel populations from ACAP. The Working Group reiterated that such information is best compiled and reviewed by ACAP and noted that the summary documents provided this year had been invaluable (Appendix D, paragraph 125).

7.44 A report from ACAP outlined a proposal for the development of Species Conservation Assessments for all the ACAP-listed species. It was proposed that these Species Assessments would be web-based and housed on the ACAP website, and thereby readily available for consideration by CCAMLR Members. Consideration of this proposal will be progressed at the ACAP Meeting of Parties to be held in New Zealand in November 2006. The Working Group is encouraged by the proposal for Species Conservation Assessments and agreed they would be useful for the work of ad hoc WG-IMAF (Appendix D, paragraph 126).

7.45 New distribution data on southern and northern giant petrels foraging from Macquarie Island were incorporated into the assessments of risk for the CCAMLR subareas (Appendix D, paragraph 130; SC-CAMLR-XXV/BG/26).

Incidental mortality of seabirds in relation to new and exploratory fisheries
(see also Appendix D, paragraphs 131 to 148)

7.46 The assessment of potential risk of interactions between seabirds and longline fisheries for all statistical areas in the Convention Area was reviewed, revised and provided as advice to the Scientific Committee and Commission (SC-CAMLR-XXV/BG/26). There were no changes to levels of risk this year (Appendix D, paragraphs 131 to 134).

7.47 The Working Group noted a tabled description of the ad hoc WG-IMAF risk assessment and considered that it would be useful to develop this paper further, with a view to making the methodology and approaches more accessible to groups outside CCAMLR seeking to undertake similar processes, particularly those with fishery management responsibilities where Convention Area seabirds are taken outside the Convention Area. The paper would be developed intersessionally by the Working Group (Appendix D, paragraphs 135 to 137).

7.48 Of the 39 applications for exploratory longline fisheries for 2005/06, 22 were undertaken (Appendix D, paragraph 138). No incidental mortality of seabirds was observed in fisheries in Subareas 48.6, 88.1 and 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b. One seabird mortality was observed in Division 58.4.3b (Appendix D, paragraph 139).

7.49 The 41 proposals by 12 Members for exploratory fisheries in seven subareas/divisions of the Convention Area in 2006/07 were addressed in relation to the advice in Appendix D, Figure 2 and Table 18, and SC-CAMLR-XXV/BG/26. The results, summarised in Appendix D, Table 19, involve two categories: those that provide sufficient information and are assessed as conforming with advice relating to incidental mortality of seabirds (Appendix D, paragraph 143(i)), and those that contain insufficient information to be certain that they conform with advice relating to incidental mortality of seabirds (Appendix D, paragraph 143(ii)). Applications by Argentina (CCAMLR-XXV/17), Republic of Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) fall into the latter category. The Working Group noted that as for last year (SC-CAMLR-XXIV, paragraph 5.33) these inconsistencies should be able to be resolved during the Scientific Committee meeting (Appendix D, paragraphs 140 to 144).

7.50 The Working Group welcomed improvements in notifications this year and requested that Members take greater care in future submissions to ensure the intent to comply with relevant seabird by-catch measures was clear (Appendix D, paragraph 145).

7.51 The Working Group welcomed CCAMLR-XXV/29 which proposed further improvements to the pro forma and checklist prepared to assist Members in fulfilling notification requirements, and noted that the proposed approach should improve the information available to the Working Group in future. The Working Group recommended that the one-page summary of notifications should also include a four-part checklist to

address Members' intentions to comply with the four assessed elements: Conservation Measure 25-02; Conservation Measure 24-02 if an exemption is sought from setting longlines at night, or fish outside specified fishing seasons; specified seabird by-catch levels; and scientific observer requirements (Appendix D, paragraph 147).

7.52 The Working Group reiterated its recommendation that any vessel operating under the provisions of Conservation Measure 24-02, and which catches a total of three (3) seabirds, as defined in SC-CAMLR-XXII, Annex 5, paragraphs 6.214 to 6.217, shall revert to night setting in accordance with Conservation Measure 25-02 (Appendix D, paragraph 148).

International and national initiatives relating to incidental mortality of seabirds in relation to longline fishing (see also Appendix D, paragraphs 149 to 177)

7.53 Information was reported on current international initiatives under the auspices of:

(i) ACAP – items of particular relevance to CCAMLR (Appendix D, paragraph 150);

(ii) FAO (NPOA-Seabirds) – noting the completion of plans by Brazil and Chile, a developing plan by Uruguay, and awaiting finalisation of South Africa's plan (Appendix D, paragraphs 153 to 155);

(iii) RFMOs – response received to CCAMLR Resolution 22/XXIII from IOTC; progress with IATTC, IOTC, SEAFO and WCPFC (Appendix D, paragraphs 163 to 173);

(iv) NGOs – an update on BirdLife International's Albatross Task Force (Appendix D, paragraph 59) and its NPOA-Seabirds initiative (Appendix D, paragraph 156);

(v) a mitigation workshop held in Hobart, Australia, to assist in refining an experimental program for identifying and developing effective seabird mitigation measures for pelagic longline fisheries (Appendix D, paragraph 158).

7.54 The Working Group noted the considerable progress made at WCPFC, SEAFO, IOTC, IATTC and ICCAT, and opportunities to work cooperatively with CCAMLR. However, it was recognised that for pelagic longline gear types in particular, there is at present no best-practice mitigation strategy that has been rigorously tested and is available for widespread uptake by the major RFMOs operating within the ranges of seabirds that breed and forage in the CCAMLR Convention Area (Appendix D, paragraph 174). The development of proven pelagic longline mitigation measures and their uptake outside the Convention Area should remain a high priority for CCAMLR (Appendix D, paragraphs 158 and 175) and the Working Group recommended that Members that are also members of WCPFC participate in the WCPFC's deliberations in December 2006 regarding the adoption of appropriate seabird mitigation measures for adoption within the WCPFC (Appendix D, paragraphs 171 and 175).

7.55 Given the by-catch impacts of adjacent RFMO fisheries to birds that breed and forage in the Convention Area, the Working Group recommended that ACAP Parties and CCAMLR

Members should be proactive in engaging with RFMOs and in promoting information exchange and strengthening their input into RFMO meetings by including seabird experts on Member State delegations. It was also agreed that a critical role of Parties and Members was to become involved in the development and implementation of seabird resolutions and other measures to reduce by-catch of albatrosses and petrels within RFMO jurisdictions. (Appendix D, paragraph 151).

7.56 The Working Group recommended that CCAMLR and its Members support a BirdLife International initiative at COFI-27 to advance best-practice guidelines for NPOA-Seabirds (Appendix D, paragraph 156).

7.57 The Working Group recommended to the Scientific Committee that the Commission be represented at the January 2007 tuna RFMOs meeting in Kobe, Japan, and that the Secretariat develop a paper describing the scientific and other processes CCAMLR has followed in developing and implementing effective seabird by-catch mitigation measures. That paper would, *inter alia*, emphasise the requirement for extensive and sustained scientific observer coverage in addition to applied and adaptive mitigation research in any effort to reduce seabird mortality associated with fishing operations (Appendix D, paragraph 176).

Streamlining the work of the Scientific Committee
(see also Appendix D, paragraphs 181 to 197)

7.58 Ad hoc WG-IMAF noted that streamlining its agenda for this year's meeting was a useful step forward, made additional recommendations for future agenda improvements (Appendix D, paragraph 181) and noted that regular review of its agenda and a move to completing some tasks on a biennial and triennial basis would allow further streamlining of the agenda in future (Appendix D, paragraph 182).

7.59 Noting that the current interactions with WG-FSA allowed the transfer of useful knowledge on fishing technologies and practices, ongoing dialogue on matters of mutual interest and a useful element of peer review during meetings, ad hoc WG-IMAF recommended that it could conduct its work most effectively if it retained its linkage with WG-FSA (Appendix D, paragraphs 183 and 184). It noted the shared areas of interest between WG-IMAF and WG-EMM and encouraged ongoing dialogue between the two groups (Appendix D, paragraph 187). The Working Group agreed that having one stream of advice to the Scientific Committee was preferable over the potential for the presentation of conflicting advice if this interaction did not occur, and noted that this interaction contributed to streamlining the work of the Scientific Committee.

7.60 Ad hoc WG-IMAF noted the proposals for the restructure of the Scientific Committee's working groups (paragraphs 14.1 to 14.9) and further noted its support for the proposals (Appendix D, paragraph 185), along with the need for ongoing dialogue between working groups with respect to future change and the content of the research plans of other working groups (Appendix D, paragraph 187).

7.61 The Working Group noted the very positive results over the last few years with respect to minimising seabird and marine mammal by-catch throughout the Convention Area. It recommended that despite the continuing reductions in by-catch in the Convention Area, there

was a need to remain vigilant with monitoring of by-catch and the implementation of conservation measures and to continue to strive to minimise seabird and marine mammal by-catch in all Convention Area fisheries (Appendix D, paragraphs 188 to 190).

7.62 The Working Group noted the opportunity to focus on the by-catch of Convention Area seabirds and marine mammals outside the Convention Area given CCAMLR's responsibility for these Antarctic marine living resources (Convention Article I). To date, CCAMLR measures and practices have been held up as a role model outside the Convention Area and the mitigation measures adopted within the Convention Area have been, or are in the process of being, adopted by neighbouring RFMOs (Appendix D, paragraph 191).

7.63 Ad hoc WG-IMAF reviewed its original terms of reference (SC-CAMLR-XII, paragraph 10.19). The Working Group discussed proposed revisions to the terms of reference and made additional suggestions for consideration during the intersessional period with a view to WG-IMAF recommending revised terms of reference in 2007 (Appendix D, paragraph 192).

7.64 The Working Group recommended the development of a medium-term research plan for ad hoc WG-IMAF as an intersessional task for the group and noted that in future it may be possible to conduct short workshops in association with the annual WG-IMAF meeting to address critical items in the plan. The use of invited experts at such workshops was highlighted by the Working Group as likely being crucial to their success (Appendix D, paragraphs 193 to 195).

7.65 The Working Group discussed the time required to undertake the core work of ad hoc WG-IMAF and noted that at present it required the allotted five days to conduct its work program; however, the Working Group indicated its intention to further review the required duration of the meeting in 2007 (Appendix D, paragraphs 196 and 197).

Other business
(see also Appendix D, paragraphs 198 to 212)

Australian proposal on extending fishing season in Division 58.5.2 for longline vessels

7.66 Australia requested consideration of a proposal to extend the fishing season in Division 58.5.2 by seven months for longline vessels. This request was made on the basis that the vessel limit for seabird by-catch coupled with the remaining mitigation measures specified in relevant conservation measures would be sufficient to achieve the level of mitigation required. The Working Group noted that:

(i) current mitigation measures in the absence of season limits are unlikely to adequately mitigate capture of white-chinned petrels during the summer season in higher-risk areas;

(ii) where season extensions are under consideration they should be undertaken in a stepwise manner to allow review of results and appropriate responses;

(iii) two observers are needed so that seabird mortality limits can be monitored accurately;

(iv) a season extension into the austral spring was preferable as white-chinned petrels are less susceptible to by-catch at this time (Appendix D, paragraphs 202 to 204).

7.67 The Working Group noted that a three-seabird limit had previously been introduced as a precautionary measure to extend the fishing season for one month in Division 58.5.2 (Conservation Measure 41-08, paragraph 3). However, this did not automatically mean that this was the appropriate mechanism for mitigating incidental seabird mortality in this fishery over an additional seven-month season extension (Appendix D, paragraph 205).

7.68 The Working Group noted that the vessel may catch in excess of three seabirds in a single set during the breeding season and as longline vessels typically undertake several sets before beginning to haul lines, the potential for a substantial increase in seabird incidental mortality in Division 58.5.2 exists as a result of this proposal (Appendix D, paragraphs 206 to 208).

7.69 The Working Group noted that its preference would be for a closely monitored and stepwise roll-back in the season in Division 58.5.2 rather than a one-step move to fishing throughout the year (Appendix D, paragraph 210).

7.70 The Working Group noted that it would be preferable if a paper was submitted to facilitate consideration of the risks that the additional fishing might entail to seabirds, and how these might be mitigated, including:

- an assessment of the likely outcome in terms of bird mortality, including supporting information for that assessment detailing the likely seabird by-catch rates and totals;

- what additional measures (if any) and their likely efficacy, could be deployed to mitigate the additional risk of mortality to seabirds (Appendix D, paragraph 211).

Line sink rate testing proposal for Subarea 48.6

7.71 With respect to the Japanese proposal seeking dispensation from leaving the Convention Area to conduct longline sink rate tests when fishing at the end of one season and into the subsequent season in Subarea in 48.6 (CCAMLR-XXV/32), the Working Group noted that the proposal did not pose any additional risk to seabirds provided the standard sink rate, as detailed in Conservation Measure 24-02, is achieved (Appendix D, paragraph 212).

General

7.72 The Working Group noted that the quality of advice it could provide was enhanced when detailed technical documents were submitted in support of proposed changes on

conservation measures in advance of the meeting. Further, where supporting technical documents were not tabled, insufficient information may mean that the Working Group needs to defer the provision of advice until the following year.

EVALUATION OF THREATS ARISING FROM IUU ACTIVITIES

Current estimate of IUU catches

8.1 The Working Group examined the calculations of IUU catches made by the Secretariat for the 2005/06 season (WG-FSA-06/11 Rev. 2). As in previous years, and subject to further development of a new methodology proposed by JAG (CCAMLR-XXV, Annex 6; SCIC-06/9), the estimation of IUU catches was made using the standard methodology. It is based on information supplied to the Secretariat by Members on the number of IUU vessels active in an area, estimates of the duration of a fishing trip likely to be undertaken by an IUU vessel in that area, the number of fishing trips represented by the sighting, and the likely IUU catch rate in that area.

8.2 The Working Group agreed to use the data presented in Tables 2 and 13 in its assessments. In accordance with the agreement at WG-FSA-05 (SC-CAMLR-XXIV, Annex 5, paragraph 8.3), the Working Group only considered estimates of IUU fishing using data up to September 2006, and did not present extrapolations of these data to the end of the fishing season. It noted that estimates of IUU fishing in 2004/05, presented at WG-FSA-05 up to 30 September 2005, had been updated using information submitted between 30 September and 30 November 2005. This affected only Division 58.4.3b, adding 100 tonnes of IUU catch. The initial estimate of 336 tonnes of unattributed undocumented landings was reduced by 70 tonnes after reconsideration of the timing of one incident.

8.3 At the time of the meeting Australia released the details of the FV *Taruman* logbook, seized on 6 September 2005. The logbook indicated that 145 tonnes had been taken, remarkably similar to the Secretariat's original estimate of 144 tonnes (SC-CAMLR-XXIV, Annex 5, Table 3.2), but that this was mostly caught outside the Convention Area. Therefore, the estimation of IUU catches for the 2005/06 season was amended to include 28 tonnes of *D. eleginoides* taken by the vessels from Subarea 88.1 (Table 3).

Development of a new methodology for estimation of IUU catches

8.4 JAG had suggested two changes to the CCAMLR IUU assessment methodology: the inclusion of a factor expressing the confidence that various types of sightings represent actual IUU activity; and the introduction of distributions rather than point estimates of some of the parameters used in the assessment, for instance the number of days per cruise and catch per day (CCAMLR-XXV, Annex 6, paragraphs 4.1 to 4.11). The Working Group noted that there is currently no better way of estimating a third component of the methodology, that of understanding the relationship of confirmed sightings to unsighted IUU activity, than that proposed by Agnew and Kirkwood (2005) and Ball (2005). However, it was noted that the methodology could provide robust estimates of unsighted activities on a certain but not yet defined level of surveillance activity in the area concerned.

8.5 Progress has been made on both former issues. SCIC-06/9 presented an initial application of the proposed confidence ranking of sightings data, including some suggested changes to the category definitions. Applying the resultant weightings to the estimated IUU catch resulted in reductions in estimated IUU catch of between 4 and 33% for the tested areas and years. The Working Group noted that such reductions would be appropriate only to statistically estimated values. It recommended that SCIC consider whether the weightings of individual categories was appropriate, whether the number of levels in each category was correct and whether there were other useful categories that might be used without overly complicating the analysis.

8.6 The Working Group recalled its repeated requests (SC-CAMLR-XXIV, Annex 5, paragraph 8.10) and that of JAG (CCAMLR-XXV, paragraph 4.13) that SCIC determine the vulnerability of different areas to IUU fishing, basing this assessment on the level, type and quality of surveillance in the fishery, attractiveness/accessibility of fishing opportunities and the presence of deterrents. The Working Group suggested that SCIC-06/9 could provide SCIC with the template needed to complete this task.

8.7 The Working Group briefly investigated the data (catch per day and days per trip) available to move to a statistical description of uncertainty in the form of a distribution of likely catch rates of IUU vessels. It concluded that the most appropriate method for deriving distributions of such data for use in IUU estimation was to bootstrap existing data on CPUE within days fishing per trip. Unfortunately, the areas of most importance to the Commission now (Divisions 58.4.1, 58.4.2, 58.4.3) are those for which good data are least abundant. Some extrapolation can be made between subareas/divisions, but this is limited to the comparability of the different areas in terms of latitude, climate, toothfish density and other factors. There are some circumstances under which IUU CPUE could be expected to be lower than licensed CPUE (when IUU vessels are wary of being apprehended) or higher than licensed CPUE (when they are able to ignore restrictive conservation measures such as a requirement for night setting).

8.8 The Working Group agreed that the objective of undertaking this work on uncertainty was to try and describe credible ranges of possible IUU catch that captured the real level of such catches. Rather than asking WG-FSA-SAM to determine the level of uncertainty in IUU estimates that would lead to significant impacts on the assessment, it would be more appropriate to present the ranges determined from IUU estimation to the assessment groups and ask them to determine whether these ranges would have a significant impact on the assessments.

8.9 Such an approach was adopted by WG-FSA-06/53 and 06/45 Rev. 1 which had investigated the effect of uncertainty in IUU catches in Subarea 48.3 and Division 58.5.2 respectively. These investigations showed that the addition or subtraction of uncertain amounts of IUU in the mid- and late 1990s had a relatively small impact on estimated biomass and calculations of sustainable yield.

Review of historical trends in IUU activity

8.10 The Working Group noted that the level of IUU fishing around sub-Antarctic islands continues to decline. However, it expressed great concern at the increase in IUU activity in

Division 58.4.3b (which has increased by 62% since 2004/05) and adjacent to the continent in Divisions 58.4.1 (689 tonnes in 2005/06, 0 tonnes in 2004/05) and 58.4.2 (221 tonnes in 2005/06, 86 tonnes in 2004/05).

8.11 The Working Group is developing a program of work which should lead to assessments of all new and exploratory fisheries. Fishing and tagging effort has been restricted to only a few SSRUs in Divisions 58.4.1 and 58.4.2, and future analyses are likely to concentrate on these areas where fishing and tagging data are available. Consequently any analysis of these data must also have access to information on IUU fishing at the same spatial resolution.

8.12 The Working Group asked SCIC to provide advice on precisely where, in Divisions 58.4.1 and 58.4.2, IUU fishing is occurring.

8.13 Given the situation with IUU fishing in these three areas, the Working Group considered that there was an urgent need to review its research program in the area. This will not be possible until its meeting in 2007. Nevertheless, the Working Group agreed that the tagging program should be accelerated.

Management advice

8.14 The Working Group recommended further development of the new methodology proposed by JAG with the following actions:

(i) SCIC should consider whether the weightings of individual categories were appropriate, whether the number of levels in each category was correct and whether there were other useful categories that might be used without overly complicating the analysis.

(ii) The Working Group requested SCIC to determine the vulnerability of different areas to IUU fishing, for instance using the template provided by SCIC-06/9.

(iii) The Working Group will develop distributions of likely catch rates of IUU vessels by area using data from licensed vessels. The attention of the Scientific Committee and SCIC is drawn to the fact that data are currently most limiting in the areas which have highest levels of IUU fishing.

8.15 In future, determination of credible ranges for IUU estimates should be followed by investigation of the consequences of this uncertainty for the assessments.

BIOLOGY, ECOLOGY AND DEMOGRAPHY OF TARGET AND BY-CATCH SPECIES

Summary of biological information contained in WG-FSA papers

9.1 In addition to information which was pertinent to the assessment of stocks and dealt with in Fishery Reports and paragraphs 3.57 to 3.73, a large number of papers contained

substantial biological information on target and non-target species which was not directly relevant to the assessments. This information, however, helped considerably in further improving the biological understanding of these species. Summaries of those working documents containing biological information will be available in the *CCAMLR Scientific Abstracts* and so are not repeated here. The papers address the following subject areas:

- maturity stages observed in *D. mawsoni* in the Ross Sea (WG-FSA-06/9);
- species composition of fish found in the stomachs of *D. mawsoni* in the Ross Sea, with *M. whitsoni* as the dominant prey fish species (WG-FSA-06/10);
- diet of *D. mawsoni* in the Ross Sea (WG-FSA-06/17, 06/27);
- the ectoparasite load of *D. mawsoni* in the Ross Sea (WG-FSA-06/28);
- biology of *D. eleginoides* from outside CCAMLR waters in FAO Area 41 (WG-FSA-06/13);
- the mercury content of *D. eleginoides* in the Pacific, Indian and Atlantic Ocean basins (WG-FSA-06/24);
- the standing stock, spatial distribution and biological features of the demersal fish fauna off the tip of the Antarctic Peninsula (WG-FSA-06/14);
- the status of nearshore *N. rossii*, *G. gibberifrons* and *N. coriiceps* from the South Shetland Islands (WG-FSA-06/25);
- spawning condition and feeding of icefish from the 2006 groundfish survey around South Georgia (WG-FSA-06/51);
- biological parameters of Ross Sea skates (WG-FSA-06/31);
- movement of Ross Sea skates from a tagging program (WG-FSA-06/32).

Matters arising from biology and ecology papers

9.2 (i) The mercury content of *D. eleginoides* in three different ocean basins of the Southern Ocean. Mercury content in the Pacific and Indian Ocean basins was high and in the range commonly found in shark, swordfish or king mackerel. In contrast, *D. eleginoides* found in the Atlantic Ocean basin had a low content (WG-FSA-06/24). In response, the Working Group cautioned that sample sizes were small and from too small an area for broad generalisations to ocean-wide patterns in mercury in *D. eleginoides* tissue to be made. The hypothesis of the Antarctic Convergence as a barrier to mercury is worthy of further study, however it is not substantiated by the experimental design used in the study described in WG-FSA-06/24. Unpublished data from toothfish from the Australian fishery in Division 58.5.2 suggest that levels of mercury in *D. eleginoides* ~60 cm in length range from 0.10–0.33 ppm, which is considerably lower than those derived from the study in question, for fish from the lower end of lengths measured.

(ii) The status of nearshore *N. rossii*, *G. gibberifrons* and *N. coriiceps* derived from a long-term monitoring program (1983–2006) at Potter Cove (South Shetland Islands). *Notothenia rossii* and *G. gibberifrons* declined in the 1980s and first half of the 1990s. Since then, *N. rossii* increased in numbers while *G. gibberifrons* remained close to zero. *Notothenia coriiceps* remained stable over the whole period of investigation (WG-FSA-06/25).

(iii) Reviewed biological parameters of Ross Sea skates – the taxonomy of several skate species in the Southern Ocean, such as *A. georgiana* and *B. eatonii*, needs clarification. Considerable differences in biological parameters, such as length–weight relationships and length-at-maturity, exist in individuals of one species from vastly different areas, such as the Ross Sea and South Georgia (WG-FSA-06/31).

9.3 In order to place more emphasis on knowledge gaps and to allow a more focused discussion in the future, the Working Group proposed three topics for discussion during the meeting of WG-FSA in 2007. It noted that this should not preclude the submission of other biological papers. These are:

- reproduction in toothfish
- stock structure in toothfish
- taxonomy in Antarctic skates.

Species profiles

9.4 Species profiles for *Dissostichus* spp. and *C. gunnari* were developed by Dr I. Everson (UK) in the early 2000s, and at last year's WG-FSA meeting three species profiles were identified for preparation:

- *D. mawsoni* (Dr Hanchet)
- *D. eleginoides* (Drs M. Collins (UK) and Belchier)
- *C. gunnari* (Drs K.-H. Kock (Germany) and Belchier).

9.5 Work on the species profile of *D. mawsoni* has been completed and the Working Group thanked Dr Hanchet for its preparation during the intersessional period. The work on *D. eleginoides* and *C. gunnari* is likely to be completed in early 2007 and should be available for review from mid-2007. The Working Group encouraged profiles on macrourids and rajids.

9.6 The Working Group decided to restrict species profiles to a compilation and analysis of biological parameters to the species in question. All information required for stock assessment is contained in the Fishery Report of the particular species and does not need repetition in the species profiles. Species profiles should then be published in *CCAMLR Science* and further disseminated to the public domain through 'Fishbase' and other means to ascertain a distribution as wide as possible. The species profiles will be updated continuously by the Working Group once new information is available. Focusing discussions on biological parameters in the Working Group will help to provide updates from one annual meeting to the

next. The Working Group noted that care should be taken to ensure authors of working group papers and unpublished reports are appropriately acknowledged following the usual rules of data access.

CCAMLR Otolith Network

9.7 No new information had been obtained by the CON during the intersessional period on issues of inter-laboratory variability in age estimates of *D. eleginoides*. Dr Belchier suggested that a reference set of otoliths should be circulated between interested laboratories to assess the precision of age estimates between those laboratories that routinely age toothfish but to also include those that may do so in the future.

9.8 A workshop on the ageing of *C. gunnari* was held at AtlantNIRO in Kaliningrad, Russia, from 19 to 23 June 2006 (WG-FSA-06/7). The workshop concluded that a further intercalibration exercise (otolith exchange) was required on fresh otoliths before the precision of the method for reading whole otolith could be fully assessed. Following the workshop, fresh otoliths from the UK survey around South Georgia in January 2006 (WG-FSA-06/51) were sent to AtlantNIRO in Russia and Instituto Español de Oceanografía in Spain for further analysis. These otoliths will form the basis for a future otolith exchange between all laboratories participating in the otolith exchange.

Report of the Second Workshop on Estimating Age of Mackerel Icefish, *Champsocephalus gunnari*

9.9 The Second Workshop on Estimating Age of Mackerel Icefish, *Champsocephalus gunnari*, was hosted by AtlantNIRO, Kaliningrad, Russia, from 19 to 23 June 2006. The workshop focused on South Georgia, including Shag Rocks, given that otolith material was only available from that region. The aims of the workshop were agreed at WG-FSA-05 and are detailed in paragraph 4.33 of SC-CAMLR-XXIV. The glossary of common terms used to describe the structures and features within *C. gunnari* otoliths and the quality control issues closely follow the definitions used for *D. eleginoides* otoliths with minor modification and simplification (SC-CAMLR-XX, Annex 5, Appendix H; *FAO Fisheries Report*, No. 685, 2001). The workshop report is provided as WG-FSA-06/7.

9.10 The time constraints during the workshop only allowed the use of whole otoliths to determine age. However, the workshop outlined that further plausible methods exist for age validation in the species which have been either used already (see Annexes 3 and 4 of WG-FSA-06/7) or need more detailed exploration in the future:

- length-frequency analysis
- progression of strong year classes
- progression of discrete length modes sampled for age structure
- marginal increment analysis
- daily increment analysis
- numerical integration of daily growth increment widths.

The biological characteristics of *C. gunnari* make the use of tagging and rearing studies to estimate and validate ageing in the species unlikely.

9.11 A 1 July birthdate, as used before, was confirmed as the most appropriate for the majority of the South Georgia *C. gunnari* population. In order to determine precision in age estimates between readers, a routine intercalibration exercise was undertaken. There was considerable discussion as to whether otoliths should be read 'blind', i.e. with no prior knowledge of individual fish lengths and other biological information. *A priori* knowledge of length provides useful information that would assist the reader to assign 'plausible' ages to fish. The participants of the workshop eventually agreed that for the purposes of the assessment of the precision exercise and in order to be consistent with the age determination workshop for *D. eleginoides* (SC-CAMLR-XX, Annex 5, Appendix H), otoliths would be read 'blind'.

9.12 In summary, the results of the intra-reader analysis (WG-FSA-06/7, paragraphs 4.2.5 to 4.2.8) demonstrated the expected differences between the precision of age readings made by experienced and inexperienced readers of icefish otoliths. The most experienced reader had 85% agreement between consecutive readings while there was only 30% total agreement between successive readings of the least experienced reader. There was good agreement between readers in locating the position of the first and second annuli. Good agreement between readings of the youngest year classes was observed but increased discrepancy with increasing age was evident.

9.13 The workshop agreed that given the age of collection of the available otoliths and the decreasing readability of *C. gunnari* otoliths with increasing storage time, a further intercalibration exercise (otolith exchange) was required on fresh otoliths before the precision of the method for reading whole otoliths could be fully assessed. For the time being, Dr Belchier agreed to circulate new otoliths obtained from the most recent South Georgia surveys to participating laboratories. The otoliths used in the intercalibration exercise would be retained as a reference set to maintain precision over time and to assist with the training of new and inexperienced otolith readers. Further analyses (as described in WG-FSA-06/7, paragraph 4.2.4) would be initiated on completion of age readings by all institutes.

9.14 The workshop agreed that Dr Z. Frolkina (AtlantNIRO, Kaliningrad, Russia) would work closely with Dr Belchier in order to develop a comprehensive protocol for the reading of whole otoliths that would include images of otoliths to assist with identification of annual structures. It was suggested that prior to the otolith exchange, a sub-sample of new otoliths from the recent UK survey around South Georgia in January–February 2006 should be sent to AtlantNIRO where otoliths would be read and annotated photographs taken showing the location of annual structures. Otoliths would then be sent to the other laboratories taking part in the exchange where the procedure would be repeated. Images and age information should be exchanged between participating institutes and areas of disagreement discussed and resolved prior to a full otolith exchange program. The five institutes represented at the workshop expressed a desire to be involved in the otolith exchange program and other institutes would be able to participate as appropriate.

9.15 For the collection of otoliths for growth studies, the workshop recommended that, where possible, at least 10 otoliths should be collected per 1 cm length bin for each sex. In light of the apparent growth and/or spawning differences observed between Shag Rocks and South Georgia, it is recommended that this sampling protocol be applied separately to each region. It was recognised that for the larger size classes this may prove difficult, therefore as

many otoliths should be collected as possible. For sampling from the commercial fishery, the standard CCAMLR protocol should be continued (see *CCAMLR Scientific Observers Manual*).

9.16 The integration of all available information on *C. gunnari* growth, including larval and juvenile growth, information on spawning time and location and the possible use of information available year-round from higher predator studies, was strongly recommended to assist with the provision of plausible growth models for this species.

9.17 The Working Group was grateful to AtlantNIRO for hosting the workshop and thanked the Russian hosts for their neverending support in the course of the workshop.

The presence of exploitable stocks of sharks in the Convention Area

9.18 JAG noted reports on the use of gillnets by non-Contracting Parties in Subarea 58.6 and Division 58.4.3 (CCAMLR-XXV, Annex 6, paragraphs 5.12 to 5.15). Gillnet fishing vessels have been reported to catch sharks in addition to toothfish. There is no information on the shark species targeted nor their catch rates. JAG suggested that WG-FSA might consider, in the light of information available in the scientific literature, whether exploitable stocks of sharks do occur in the Convention Area.

9.19 Five shark species (*Lamna nasus*, *Somniosus antarcticus*, *Etmopterus cf. granulosus*, *Centroscymnus coelolepis* and *Squalus acanthias*) are known to occur in the northern part of the Convention Area around South Georgia, Crozet Islands (Subarea 58.6) and around Kerguelen Islands (Division 58.5.1). The identification of a sixth species (*Halaelurus canescens*) from observer reports at South Georgia has yet to be confirmed. Only the first three species listed above appear to be abundant enough to have the potential to attract commercial interest (Duhamel et al., 2005). No sharks have yet been reported from Division 58.4.3.

9.20 Given the limited information available on sharks in the Convention Area, the Working Group felt unable to further assess their potential for commercial exploitation.

CONSIDERATION OF ECOSYSTEM MANAGEMENT

Continuous krill trawling

10.1 The Working Group discussed the recording of larval and juvenile fish by-catch in the krill fishery (WG-FSA-06/24, 06/57) that utilises the krill pumping technology (WG-FSA-06/20). It was pointed out that at present there are no data available addressing the impact of continuous trawl systems on larval/juvenile fish and krill. It was recognised that larval/juvenile fish by-catch is likely to be heavily influenced by the time of year, time of day, area and depth of fishing, all of which complicates any comparative analysis. Although some data on larval fish by-catch have been acquired in the past (e.g. Iwami et al., 1996), these are not sufficient for either fully characterising the catch or estimating its level across the fleet.

10.2 Although the krill fishery is currently at a low level compared with its catch limits, concerns about its likely rise have led to efforts in WG-EMM to increase research efforts towards the understanding of the ecosystem effects of such rise, and to develop management procedures to cope with it. This increase in effort has not yet been extended to understanding the effect of an increased krill fishery on fish population dynamics, particularly of exploited fish species, such as *C. gunnari*.

10.3 The Working Group recommended that the Scientific Committee require Members to increase the level of scientific observer coverage across the krill fleet, and to develop objectives for such monitoring to include both the target species and by-catch. To facilitate the correct recording of larval fish by-catch, the Working Group requested the Secretariat to contact all CCAMLR technical coordinators to compile a standard methodology for sampling fish by-catch and an identification guide for larval/juvenile fish likely to be found in krill trawls.

Ecological interactions

Benthos by-catch

10.4 In the course of the US survey at the northern part of the Antarctic Peninsula (WG-FSA-06/14), by-catch from each haul was sorted into 44 feasible taxonomic groups, weighed and counted in continuation of work conducted in the South Shetland Islands since 2001 (WG-FSA-01/33 Rev. 1, 03/38). With the exception of some of the deeper hauls, stations along the Antarctic Peninsula shelf, and those directly north of Joinville–D'Urville Islands, show considerable quantities of benthos biomass, indicating long and well established communities. In contrast, stations further north and offshore of Joinville Island were sparsely populated.

10.5 The broad pattern in the density of benthic communities is likely to lie within the influence of changes in oceanographic regimes in that area. Stations far north are likely to be more influenced by Weddell Sea water and the number of icebergs carried with them which, when stranding, may lead to a considerable impact on the benthos. Regions in Bransfield Strait support impressive sponge communities. In particular, the massive hexactinellid (glass) sponges are indicative of a stable environment. The dominance of sponges on many stations is such that it obscured the contribution of other taxa to these communities. Vast and diverse communities of tunicates were encountered on shelf stations along the northern Antarctic Peninsula.

By-catch of juvenile fish in the krill fishery

10.6 The last review on the by-catch issue of post-larval and juvenile fish in the krill fishery was provided in 1996 (WG-FSA-96/19). Since then, only limited information has been provided to CCAMLR.

10.7 New information on the fish by-catch was obtained on board the four fishing vessels in the 2004 season (WG-EMM-06/7). Most hauls (67%) contained small fish, and the assemblage varied independently with locality, time of day and water depth but not fishing depth or krill density. Fish by-catch included *C. gunnari*, *Lepidonotothen larseni*, muraenolepidids and the myctophids *Krefftichthys anderssoni* and *Gymnoscopelus nicholsi* occurred in the greatest number of hauls with mean catches of 7–26 x 10^{-5} individuals m^{-3}.

10.8 Given the potentially substantial by-catch of juvenile fish, the Working Group recommended that data from the krill fishery should be collected more extensively in the future to allow a better assessment on the impact of the krill fishery on fish species.

Marine mammal–longline fisheries interactions

10.9 CCAMLR has not yet developed and introduced a system to quantify the interactions between marine mammals and longline fisheries. Reports summarising cetacean interactions (primarily killer whales and sperm whales) were provided in Purves et al. (2004) and Kock et al. (2005). New information became available from the Crozet and Kerguelen fishing grounds from 2003 to 2005 (WG-FSA-06/63) (paragraphs 3.66 to 3.73). The by-catch of Antarctic fur seals had been an issue for a number of years. By-catch in 2005/06 was only one seal.

Development of ecosystem models

10.10 The Working Group noted the further development of a carbon-budget trophic model for investigating the ecosystem effects of the *D. mawsoni* fishery in the Ross Sea (WG-EMM-06/14) reported by WG-EMM (Annex 4, paragraphs 6.8 to 6.11). WG-EMM noted that conclusions on the effects of fishing for *D. mawsoni* on the ecosystem cannot yet be made. However, it encouraged further work on this model to provide insights into the dynamics of the Ross Sea system and to identify the important trophic linkages through which fisheries may indirectly affect the food web of the region.

10.11 Dr Constable reported that an ecosystem model was currently being developed to examine the ecosystem effects of the *C. gunnari* and *D. eleginoides* fisheries within Division 58.5.2. Dr Belchier noted that a substantial amount of work had been carried out in the past on the trophodynamic role of *C. gunnari* in Subarea 48.3. Substantial input data were now available to inform the development of ecosystem effects of fishing models for this subarea.

10.12 The Working Group agreed that it would be useful to bring together the different groups working on effects of finfish fishing models to discuss common approaches and ways to further develop these models. In particular, such work should focus on methods and approaches of using single-species assessment models to inform the ecosystem models and vice versa.

10.13 The Working Group recommended that a one-day workshop should be held to discuss approaches to developing models to examine the effects of finfish fisheries on the ecosystem. It noted that the workshop should focus on *C. gunnari* as a typical prey species and

D. eleginoides and *D. mawsoni* as typical predator species. The Working Group recommended the workshop take place in July 2007 between the proposed WG-FSA-SAM and WG-EMM meetings. This timing would allow the opportunity for participants from both meetings to come together and would encourage useful collaboration and interaction.

SCHEME OF INTERNATIONAL SCIENTIFIC OBSERVATION

11.1 In accordance with CCAMLR's Scheme of International Scientific Observation, scientific observers were deployed on all vessels in all finfish fisheries in the Convention Area.

11.2 Information collected by scientific observers was summarised in WG-FSA-06/36 Rev. 2, 06/37 Rev. 1, 06/38 and 06/39 Rev. 1.

11.3 Thirty-seven longline cruises were conducted during the 2005/06 season, with scientific observers (international and national) on board all vessels. Ten cruises were undertaken in Subarea 48.3 by 10 vessels, two cruises were undertaken in Subarea 48.4 by two vessels, two cruises were undertaken by one vessel in Subarea 48.6, six cruises were undertaken by five vessels in Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b, two cruises were conducted by one vessel in Division 58.5.2, two cruises were conducted by one vessel in Subareas 58.6 and 58.7 and 13 cruises were undertaken in Subareas 88.1 and 88.2 by 13 vessels.

11.4 During the 2005/06 fishing season, six vessels conducted nine trawl cruises targeting finfish. All trawlers fishing for finfish carried scientific observers. In total, three national and five internationally designated scientific observers participated in these operations. In addition, five scientific observation programs were conducted by one national and four internationally designated scientific observers on board krill vessels operating in the Convention Area (43% of vessels).

11.5 Three pot cruises were conducted during the 2005/06 season, all targeting *D. eleginoides*. Two cruises were undertaken in Division 58.5.2 by the Australian-flagged vessel *South Princess*, with national scientific observers on board, and one cruise was undertaken in Subarea 48.3 by the Uruguayan vessel *Punta Ballena* with an international scientific observer on board.

11.6 The quality of submitted observer logbook data was high. The Working Group commended all observers who worked in the CAMLR Convention Area in 2005/06 for their hard work, and the Secretariat for the careful collection and compilation of the data.

11.7 The Working Group considered that the Scheme of International Scientific Observation could be used to help determine levels of reporting and detection of tag–recapture events on board fishing vessels. It recommended that work be carried out by Members in the intersessional period to determine whether methods could be developed in which the scheme could be used for this purpose.

11.8 The Working Group suggested changes to the logbook to facilitate the monitoring of depredation in the *Dissostichus* spp. fisheries in the CAMLR Convention Area. These changes include provision within the logbook for observers to record the number and type of marine mammals observed during tally counts and whether the mammals were observed interacting with the fishing operation.

11.9 The Working Group noted that the workload of observers is continuing to increase and that it would be useful to review all the tasks that the observers are required to do. It noted that if the observers were required to perform too many tasks, then the quality of the data produced might decrease.

11.10 The Working Group was informed that France has developed a photographic database to assist observers with the identification of seabirds and fish in the Convention Area. This database will be available for download from the observer section of the CCAMLR website early next year.

11.11 Additional issues related to the Scheme of International Scientific Observation are contained in various areas in this report. These include:

(i) depredation (paragraphs 3.66 to 3.72);

(ii) by-catch (paragraphs 6.35 to 6.40);

(iii) incidental mortality in fisheries (paragraphs 7.8 and 7.42 and Appendix D, paragraphs 117 to 124);

(iv) krill trawling (paragraph 10.3);

(v) tagging (paragraph 3.41).

Advice to the Scientific Committee

11.12 Advice provided to the Scientific Committee by the Working Group on the areas outlined above was as follows:

(i) The Working Group recommended that protocols be developed within the Scheme of International Scientific Observation so that levels of depredation in the *Dissostichus* spp. fisheries in the CAMLR Convention Area can be estimated (paragraph 3.72):

(a) This includes provision within the logbook for observers to record the number and type of marine mammals observed during tally counts and whether the mammals were observed interacting with the fishing operation (paragraph 11.8).

(ii) The instructions to observers with respect to sampling longlines for by-catch be simplified as follows (paragraph 6.39):

(a) Tally period –

- 25% of hooks should be observed for tally counts each day
- the tally period may be broken up into several periods each day
- tally period to include counts of fish, fish by-catch, birds and mammal interactions.

(b) Biological data

- Biological sampling periods should be done adjacent to the tally periods.

(c) Rajids

- Skate and ray observations should be conducted at least once every 48 hours and, if possible, should cover approximately 10% of the hooks hauled.

(iii) Observers should be thoroughly briefed by technical coordinators, and guidelines for recording by-catch data be followed as closely as possible. In addition, the Working Group reiterated the importance of using the most up-to-date forms (paragraph 6.40).

(iv) The Working Group reiterated its 2005 recommendation that coverage of the krill fishery be increased to allow for adequate and representative sampling across all trawl fisheries for monitoring of by-catch and efficacy of mitigation measures (paragraph 7.8).

(v) The Working Group reviewed data collection needs relative to several areas of seabird and marine mammal interaction and mitigation and recommended additions or changes to logbooks and cruise reports as detailed in paragraph 7.42.

(vi) The Working Group recommended that the Scientific Committee require Members to increase the level of scientific observer coverage across the krill fishing fleet, and to develop objectives for such monitoring to include both the target species and by-catch. To facilitate the correct recording of larval fish by-catch, the Working Group requested the Secretariat to contact all CCAMLR technical coordinators to compile a standard methodology for sampling fish by-catch and an identification guide for larval/juvenile fish likely to be found in krill trawls (paragraph 10.3).

(vii) The Working Group recommended that observers continue to collect and record tag data on their logbook forms, and periodically provide the vessel with the data on request (paragraph 3.42).

(viii) The Working Group recommended that work be carried out by Members in the intersessional period to determine whether methods could be developed in which the scheme could be used to determine levels of reporting and detection of tag–recapture events on board fishing vessels (paragraph 11.7).

FUTURE ASSESSMENTS

12.1 The Working Group considered future assessment work in light of the discussion and outcomes of this year's meeting. Items for future work agreed by the Working Group are listed below. These include general items which will contribute to the development of WG-FSA's work and items identified to develop specific assessments.

12.2 In identifying future work, the Working Group considered matters of importance to develop the assessment process, data inputs and what was required to be done before an assessment method would be used by WG-FSA to help provide advice on harvest strategies, including catch limits, to the Scientific Committee.

12.3 The Working Group confirmed its earlier advice (SC-CAMLR-XXIV, Annex 5, paragraphs 12.2 and 12.3) that all new assessment methods must be reviewed by WG-FSA-SAM prior to consideration by the Working Group.

General research toward advancing assessments

12.4 The Working Group agreed that the following items would contribute to the general development of assessment methods:

- development of a pro forma for the presentation of stock assessments in the Fishery Reports;
- development of approaches to describing the current status of a stock in relation to where it would be had there been no fishing. This description may be used to identify trends in the productivity of populations, and for providing advice to the Scientific Committee on the status of stocks. Such a method may also be generalised to examine the relative impacts of different fisheries on a stock (WG-FSA-06/6, paragraph 7.2);
- further development of operating models to generate future simulation data for testing candidate management procedures and developing future advice on catch limits;
- development of additional sensitivity runs in all assessment approaches that examine structural assumptions of growth, natural mortality and fishing selectivities;
- development of other methods for estimating natural mortality;
- examination of data-weighting methods used in the current assessments;

- submission to the Secretariat of parameter files and a complete model code or documentation of assessment models presented to WG-FSA-SAM;

- development of a long-term management procedure for *C. gunnari.*

Development of management strategy evaluations

12.5 The Working Group agreed that evaluation of the toothfish assessment procedures is a high priority. Frameworks for management strategy evaluation have been considered both inside and outside CCAMLR (e.g. ICES 1999 special issue; SC-CAMLR-XXI, Annex 5, paragraphs 9.6 and 9.7; WG-FSA-02/80). The Working Group encouraged Members to evaluate management strategies for toothfish (harvest control rules, data acquisition and assessments) and to submit their analyses to WG-FSA-SAM.

12.6 The Working Group encouraged the evaluation of the assessment and harvest strategy along with the further development and evaluation of management strategies for toothfish fisheries considered in general by the Working Group (paragraph 5.105). It noted that in the assessment for Division 58.5.2, the estimated status of spawning stock at the beginning of the time series (B_0) is greater than the pre-exploitation median spawning biomass (i.e. status is greater than 1), the latter of which is estimated from a lognormal distribution of recruitments based on mean recruitment, R_0, and the recruitment variability determined from the estimated time series of year-class strengths. This highlights how the quantities in the decision rules may be different from the objectives. The Working Group encouraged evaluation of these alternative reference points in the decision rules (using estimates of B_0 or the pre-exploitation median spawning biomass as used here) to determine their robustness for meeting the underlying objectives of the Commission.

12.7 The Working Group noted that further work may be possible in refining operational objectives for managing fisheries in the Convention Area. It encouraged submissions based on the accumulated knowledge of the Antarctic marine ecosystem since the early discussions on these issues. It also noted that discussions on developing operational objectives and performance measures by the Commission's Working Group on Developing Approaches to Conservation (1986–1988) and the development of the decision rules for krill (prey species) and toothfish (top predators) by WG-Krill and WG-FSA respectively, would be useful background to this work.

Subarea 48.3 – *D. eleginoides*

12.8 The Working Group agreed that the following items would contribute to the further development of the assessment of *D. eleginoides* in Subarea 48.3:

- further development of assessment models using catch-at-age;

- reliable estimation of year-class strength;

- exploration of the feasibility of using a two-sex model;

- investigation of a pseudo-spatial fishery model, separating South Georgia and Shag Rocks;

- further investigation and refinement of data to obtain a core subset of catch and effort data with which to generate the standardised CPUE indices.

Division 58.5.2 – *D. eleginoides*

12.9 The Working Group noted the successful progress in developing an integrated assessment of *D. eleginoides* in CASAL. It agreed that further work could be undertaken to refine this assessment, including examining:

(i) the relative weighting of different datasets;

(ii) whether or how the 2003 survey should remain being used in the assessment;

(iii) the appropriate population structure, including the number of age classes to be used in the model and whether the model could be developed as a two-sex model;

(iv) the relationships between the estimated parameters, including the potential interaction between the catchabilities, q, of the different datasets, particularly the surveys, and the other parameters.

12.10 The Working Group also recommended that:

(i) given the lack of defined modes in the length-density data, it would be useful to use age–length keys, if possible, as an alternative method for estimating densities of cohorts;

(ii) studies on optimal sampling schemes for establishing age–length keys should be encouraged.

Subareas 88.1 and 88.2 – *D. mawsoni*

12.11 The Working Group agreed that the following items would contribute to the further development of the assessment of *D. mawsoni* in Subareas 88.1 and 88.2:

- further investigation and appropriateness of inclusion of the tag and recapture data from all countries fishing in Subareas 88.1 and 88.2;

- consideration of movement and stock structure;

- evaluation of the robustness of the CASAL assessment to recruitment and equilibrium assumptions;

- evaluation of the relative importance of tagging data to the assessments;

- evaluation of the relative importance of catch-at-age and CPUE data to the assessments;
- presentation and review of TSVPA to WG-FSA-SAM. Evaluation of technical aspects and data inputs of the TSVPA model. This includes effects of increasing CPUE (with development of the fishery) and effects on estimates of spawning stock biomass.

Other exploratory fisheries – *Dissostichus* spp.

12.12 The Working Group agreed that the following items would contribute to the development of the assessments in other exploratory fisheries for *Dissostichus* spp. (paragraphs 5.41 to 5.49):

- examination of the effect of tagging efforts in SSRUs, and the development of schemes of tagging that may lead to assessments of SSRUs;
- estimation of biological parameters and potential productivity of stocks in Subareas 58.4 (all divisions) and 48.6;
- development of work which will lead to a greater understanding of the stock structure of *D. mawsoni*, particularly in the Indian Ocean sector;
- exploration of methods other than tagging that may lead to information on stock status and population dynamics;
- identify minimum data requirements that may lead to assessments.

Subarea 48.3 – *C. gunnari*

12.13 The Working Group agreed that the following items would contribute to the further development of the assessment of *C. gunnari* in Subarea 48.3:

- investigation of the consequences and solutions to setting catch limits which might result in high harvesting rates on small, unassessed, recruiting year classes;
- further development of the acoustic protocol for assessing biomass;
- continued assessment of accuracy and precision of otolith-based age estimates.

Division 58.5.2 – *C. gunnari*

12.14 The Working Group agreed that the following item would contribute to the further development of the assessment of *C. gunnari* in Division 58.5.2:

- review of biological parameters and cohort progression based on survey and catch data.

FUTURE WORK

Intersessional work

13.1 Future work identified by the Working Group is summarised in Table 14 and SC-CAMLR-XXV/BG/28, together with the persons or subgroups identified to take the work forward and references to sections of this report where the tasks are described. The Working Group noted that these summaries list the tasks identified at the meeting or associated with established meeting procedures, and do not include ongoing tasks undertaken by the Secretariat, such as data processing and validation, publications and routine preparations for meetings.

13.2 The Working Group reviewed the activities of subgroups in 2005/06. These subgroups, with the support of the Secretariat, had produced valuable work and information that had contributed to the assessments and review of information available at this meeting, as well as the meeting of WG-FSA-SAM. The Working Group thanked all subgroup coordinators for their efforts, and in particular Dr Jones for convening WG-FSA-SAM and providing significant guidance to the development of assessment models.

13.3 WG-FSA encouraged the subgroups to continue their work in the forthcoming intersessional period, focusing where possible on a small number of key issues identified at the meeting. In addition, the subgroups provide a conduit for information on a wide range of related research. The Working Group reminded participants that membership to the subgroups was open to all participants.

13.4 The Working Group agreed to the following intersessional work plan for the subgroups (coordinators are listed in brackets):

- WG-FSA-SAM (Dr Jones) will review and further develop assessment methods and preliminary assessments (see below).

- Subgroup on By-catch (Dr Belchier) will review and further develop the assessment of the status of by-catch species and groups, estimation of by-catch levels and rates, assessment of risk both in terms of geographical areas and population demography, estimation of by-catch limits and mitigation measures.

- Subgroup on Tagging (Mr Dunn, Drs Agnew and D. Welsford (Australia) and the Secretariat) will review and further develop the tagging programs and the treatment of tagging data, the structure of the tagging database and the tagging protocol, and the development of a characterisation of tagging programs in the Convention Area, including skates and rays and tagging in EEZs. The subgroup was also tasked with guiding the implementation of the proposed Secretariat-based coordination of tagging efforts in exploratory fisheries.

- Subgroup on the Observer Program (Drs E. Balguerías (Spain) and I. Ball (Australia)) will review and further develop the observer protocols, the *Scientific Observers Manual* and priorities for scientific observers in various fisheries.

- Subgroup on Biology and Ecology (Drs Collins and Kock) will review the literature, identify gaps in knowledge and update and coordinate the development of species profiles and the further development of CON.

- Subgroup on Ecosystem Interactions (Dr Kock) will review the literature and develop a work plan for the subgroup and one for the intersessional workshop (paragraphs 13.12 to 13.14).

- Subgroup on IUU Fishing (Dr Agnew, Mr Dunn and the Secretariat) will review and further develop approaches for improved estimation of IUU fishing and total removals and develop the time series of catches estimated from IUU fishing.

13.5 Each subgroup was requested to develop a work plan for the intersessional period, in consultation with the appropriate colleagues, members of WG-EMM where appropriate, the Convener of WG-FSA and the Chair of the Scientific Committee.

13.6 In addition, the Working Group assigned other tasks to the Secretariat and/or Members.

13.7 The responsibilities for coordinating the intersessional activities of ad hoc WG-IMAF are set out in SC-CAMLR-XXV/BG/28.

Meeting of WG-FSA-SAM

13.8 The Working Group agreed to hold a one-week meeting of WG-FSA-SAM in 2007, in association with the meeting of WG-EMM. The general work plan for WG-FSA-SAM was outlined in Section 12, and the Working Group recognised that this plan may be expanded subject to the proposed reorganisation of the work of the Scientific Committee and the proposed re-structure of WG-FSA-SAM (paragraphs 14.1 to 14.9).

13.9 The Working Group agreed that an external expert be invited to the 2007 WG-FSA-SAM meeting. The terms of reference for the participation of the invited expert were as follows:

(i) review and evaluate use of alternative approaches for the assessment of toothfish in CCAMLR waters, including:

  (a) CASAL
  (b) mark–recapture approaches
  (c) other models or quantitative methodologies;

(ii) provide input to approaches for evaluating management strategies.

13.10 The Working Group reviewed the procedure for selecting an invited expert. It was agreed that the Convener of WG-FSA-SAM would identify a suitable candidate in consultation with the Convener of WG-FSA, the Chair of the Scientific Committee and participants of WG-FSA-SAM.

13.11 The Working Group noted that the Scientific Committee will need to consider a budget for the invited expert in 2007.

Workshop on developing methods of incorporating ecosystem models in finfish fishery assessments

13.12 The Working Group agreed to hold a one-day workshop on developing methods of incorporating ecosystem models in finfish fishery assessments in association with the meetings of WG-FSA-SAM and WG-EMM in 2007 (paragraphs 10.12 and 10.13).

13.13 It was envisaged that the workshop would attract participants from WG-FSA, WG-FSA-SAM and WG-EMM. Therefore, the Working Group deferred the development of the workshop objectives and the appointment of a convener to the Scientific Committee.

13.14 The Working Group agreed that invited experts would not be required at this workshop.

Meeting of SG-ASAM

13.15 The Working Group noted progress made by SG-ASAM in issues with respect to acoustic methods for *C. gunnari* (paragraphs 4.1 to 4.6).

13.16 The Working Group recommended that the Scientific Committee should again consider the following terms of reference for SG-ASAM, which were proposed by WG-FSA in 2005 (SC-CAMLR-XXIV, Annex 5, paragraph 13.9):

(i) to develop, review and update as necessary, protocols on:

  (a) the design of acoustic surveys to estimate the abundance index of nominated species;

  (b) the analysis of acoustic survey data to estimate the biomass of nominated species, including estimation of uncertainty (bias and variance) in those estimates;

  (c) the archiving of acoustic data, including data collected during acoustic surveys, acoustic observations during trawl stations, and *in situ* target strength measurements;

(ii) to evaluate results of acoustic surveys carried out in the CAMLR Convention Area in previous years;

(iii) to estimate target strength and its statistical characteristics for key species in the CAMLR Convention Area;

(iv) to use data from acoustic surveys to investigate ecological interactions and produce information for ecosystem monitoring and management.

13.17 The Working Group noted that the focus of SG-ASAM regarding the work of WG-FSA should remain with resolving difficulties identified with the estimation of icefish abundance. However, it also recognised that estimates of the abundance and distribution of pelagic species are needed (namely, *Pleuragramma* spp., myctophid spp.), when developing ecosystem models (SC-CAMLR-XXIII, Annex 4, paragraph 6; SC-CAMLR-XXIV, Annex 4, Appendix D).

13.18 The Working Group recommended that an immediate issue for WG-FSA to be further addressed by SG-ASAM is the acoustic protocol for assessing *C. gunnari* in Subarea 48.3, including:

(i) classification of volume backscattering strength attributed to *C. gunnari* versus other taxa with special attention to multiple-frequency acoustic methods;

(ii) further improvements in target strength estimates for *C. gunnari* using a variety of methods including physics-based and empirical models, *in situ* measurements and *ex situ* measurements;

(iii) combination of trawl and acoustic indices for stock assessment;

(iv) uncertainty assessments for *C. gunnari* biomass and abundance indices from combining trawl and acoustic surveys;

(v) protocols for archiving data.

13.19 The Working Group recommended that the issues relevant to the application of acoustic methods for pelagic finfish estimates should be addressed to SG-ASAM, including:

(i) frequency-specific definition of myctophid spp. target strength;

(ii) classification of volume backscattering strength of myctophid spp. versus other taxa with special attention to multiple-frequency acoustics methods.

13.20 The Working Group noted that ICES WGFAST is meeting in Dublin, Ireland, from 23 to 27 April 2007 (with associated subgroup meetings on 21–22 and 28–29 April). The Working Group recommended that the Scientific Committee investigate the possibility of holding the third meeting of SG-ASAM in conjunction with the ICES WGFAST meeting. Representatives of several Members will already be attending ICES WGFAST.

13.21 The Working Group recommended that the Scientific Committee consider inviting experts to the meeting, and that the terms of reference for these experts be the same as those used in 2006 (SC-CAMLR-XXIV, paragraph 13.31).

13.22 The Working Group recommended that the CCAMLR Data Manager should attend future meetings of SG-ASAM, and that the Secretariat cost associated with attending meetings away from Hobart should be included in the Scientific Committee's budget.

Fishery Reports

13.23 The Working Group reviewed its procedure for developing and updating the Fishery Reports. As part of future preparation for meetings of WG-FSA, the Secretariat was tasked with updating the tables, figures and text of the reports, to the extent possible, prior to each meeting.

13.24 The Working Group agreed that Fishery Reports adopted at its meeting and forwarded to the Scientific Committee for consideration, would not include the section on management advice. Instead, management advice for each fishery would be included in the main body of the Working Group's report. However, the Working Group agreed that the section on management advice should be copied to the Fishery Reports prior to the reports being published on the CCAMLR website.

13.25 The Working Group requested that WG-FSA-SAM consider:

(i) what the minimum requirements should be within an individual Fishery Report for reporting an integrated assessment using CASAL;

(ii) to what extent a common language could be used in this regard to assist translation.

OTHER BUSINESS

Reorganisation of the Scientific Committee working groups

14.1 Dr Holt reported on the work of the Steering Committee on the Review of the Structure of the Working Groups of the Scientific Committee. In 2005/06 the Committee had worked by correspondence and had met in association with the meetings of WG-FSA-SAM and WG-EMM.

14.2 The Committee had:

(i) reviewed information and proposals on the reorganisation of the work of the Scientific Committee;

(ii) agreed that both short- and long-term needs of the Scientific Committee must be accommodated in any plausible reorganisation scheme;

(iii) agreed that it would be preferable for the reorganisation of the working groups to evolve from the existing framework used by the Scientific Committee and its working groups;

(iv) recognised that some aspects of the reorganisation may be introduced in the short term to address the present needs of the Scientific Committee, however the process is likely to require considerable time to be fully implemented;

(v) recognised that any reorganisation should not increase the total meeting time from the present five weeks (two weeks for WG-FSA including ad hoc WG-IMAF, two weeks for WG-EMM, and one week for WG-FSA-SAM) and that no increase in resources be required from the Secretariat.

14.3 The Steering Committee agreed that implementation of future requirements will need modifications of the present way the Scientific Committee does business. For example, it is anticipated that the Scientific Committee will be required to provide advice to the Commission with respect to matters such as marine protected areas, predator–prey–fishery models, stock assessment models, icefish and krill acoustic measurements, conservation status of seabirds and destructive fishing practices. In addition, it was recognised that some items presently on the working groups' agendas may be considered at multi-year intervals instead of annually, or not at all.

14.4 The Steering Committee recognised that the present working group structure could, with appropriate modification, address present and future needs. In particular, the role of WG-FSA-SAM could be expanded to serve as a technical group to address issues relevant to all three existing working groups (WG-FSA, WG-EMM, ad hoc WG-IMAF). Under this scenario, WG-FSA-SAM would be used by all three groups to address technical assessment and modelling issues, including fish stock assessment issues (of interest to WG-FSA), krill, seal and seabird stock assessment issues (of interest to WG-EMM), and estimation of the status of seabirds (of interest to WG-IMAF).

14.5 In order to address issues of interest to all working groups, the Steering Committee proposed that the Scientific Committee establish WG-FSA-SAM as a working group ('WG-SAM'), and develop a long-term science plan so that tasks may be prioritised. This would allow long-term planning by WG-SAM so that the appropriate experts could be present at the appropriate meetings. In addition, WG-SAM would need to be fluid in its composition, duration of meeting time and issues addressed. For example, the group might meet during two weeks to consider both fish and krill–predator–prey issues or one week, for example, to consider only fish stock assessment issues. Conversely, WG-EMM may need to meet for one or two weeks depending on its workload for that year. Further, the duration of the meetings of WG-FSA may vary as its work becomes more established and some assessments are conducted at multi-year intervals instead of annually using standard models.

14.6 The Steering Committee proposed that the Scientific Committee establish a steering group to develop, and keep under review, a long-term science plan which would guide the work of its working groups, including WG-SAM. Membership of the steering group may be open to all Scientific Committee representatives, and would include the Chair of the Scientific Committee and the conveners of the working groups.

14.7 The proposal for reorganising the work of the Scientific Committee, and in particular the work of WG-FSA-SAM, was considered by WG-FSA-SAM (WG-FSA-06/6, paragraphs 8.2 to 8.4). The subgroup agreed that it could serve as a common umbrella under which the development of assessment methodologies of various types may be examined. This would provide a forum where the required expertise could be assembled for short concentrated periods of time. This format would also enhance the subgroup's ability to assemble a critical mass of expertise needed to address its assigned tasks.

14.8 WG-FSA endorsed this proposal for the reorganisation of the work of the Scientific Committee and restructuring of WG-FSA-SAM. In doing so, the Working Group agreed that:

(i) a technical working group would allow the Scientific Committee to address a range of methodological issues using a common pool of experts. This would provide consistency in the approaches developed by the working groups;

(ii) the Scientific Committee would need to establish a long-term science plan which incorporated flexibility to address other important issues as these arose. It was recognised that the proposed restructure would require considerable time to be implemented, and that further changes may be required;

(iii) the introduction of multi-year assessments and reviews would allow WG-FSA to devote more time to other important matters such as biological and ecosystem processes. This multi-year approach may also be implemented by the other working groups, thereby allowing those groups to consider in detail other matters of importance to their work (e.g. technical developments in the krill fishery; impact of fishing outside the Convention Area on Antarctic species).

14.9 The Working Group noted that ad hoc WG-IMAF had also endorsed the proposed restructure (paragraph 7.60). In addition, WG-IMAF had reviewed its own structure and terms of reference, and identified some core intersessional tasks to further streamline its work (paragraphs 7.63 to 7.65). WG-IMAF had also confirmed that the existing linkage with WG-FSA remained appropriate, and facilitated the development of integrated advice on the management of fisheries.

CCAMLR's contribution to FIRMS

14.10 The Working Group recalled that the Commission agreed to participate in the partnership of leading regional organisations which are contributing to the development of FIRMS (CCAMLR-XXIV, paragraphs 15.24 to 15.27). The partnership agreement was signed in February 2006.

14.11 The main component of CCAMLR's and other partners' contribution to FIRMS is the development of 'fact sheets' which present fishery and resource information of interest to FIRMS in a format which is common to all partners. The fact sheets are web-based and may contain keywords and related information which can be searched using tools developed in XML (Extensible Markup Language). Four types of fact sheets are being developed to provide general information on: FIRMS partners (institution fact sheet), fishery resources (resource fact sheet), fisheries (fishery fact sheet) and selected species (species fact sheet).

14.12 In due course, each FIRMS partner will develop fact sheets on the resources, fisheries and key species within their jurisdictional responsibility. Each partner will retain ownership of its fact sheets and will be responsible for developing and updating their contents.

14.13 The Secretariat has proposed the following guidelines for developing CCAMLR fact sheets:

(i) fact sheets will be developed in accordance with the Rules for Access and Use of CCAMLR Data;

(ii) fact sheets will be based, where possible, on information published by CCAMLR;

(iii) to the extent possible, fact sheets will serve a dual purpose: (a) contribute to FIRMS; and (b) provide a public library of general information on the CCAMLR website.

14.14 The Secretariat presented an example fact sheet on the toothfish fishery in Subarea 88.1. Based on the example presented, the Working Group agreed that the fact sheets would make a useful contribution to the general information available on the CCAMLR website.

14.15 The Working Group agreed that the fact sheets developed for FIRMS must be developed in accordance with CCAMLR's data access rules. The Working Group reiterated that any data requested by FIRMS, or for the purpose of other global assessments, must only be released with the prior approval of the data owners (paragraphs 2b and 9 of the Rules for Access and Use of CCAMLR Data).

14.16 The Working Group also noted that the Species Profiles (paragraphs 9.4 to 9.6) would provide helpful contributions to the development of resource fact sheets.

Continuous krill trawling

14.17 In the 2006 fishing season, the Norwegian-flagged vessel *Saga Sea* started fishing operations for krill in the Convention Area. The vessel used the continuous trawling technology, which has been previously developed by the *Atlantic Navigator*. At its 2005 meeting, the Scientific Committee agreed that this new technology would not be considered a 'new and exploratory fishery' 'if there is an adequate description of the selectivity of the method for krill, a characterisation of the haul (or catch rate) and information on the location of krill catches. In particular, because haul duration can extend for several days, there existed the potential for single hauls to occur in several different SSMUs'. Finally, 'there might be considerable potential for this type of fishing gear to impact other elements of the ecosystem either through by-catch, particularly of larval fish, or through incidental mortality of either immature krill, or other small pelagic species' (SC-CAMLR-XXIV, paragraphs 4.8 and 4.9).

14.18 The Scientific Committee had called for papers describing the continuous trawling method and analysing its impacts, and for WG-EMM to advise it on the issue. Unfortunately, at the time that WG-EMM met, the *Saga Sea* had not been fishing for long enough in the 2005/06 season for there to be sufficient data to analyse. WG-EMM therefore asked WG-FSA to 'examine the catalogued data at their 2006 meeting to assess the difference between the two types of krill fishing and to provide a commentary to the Scientific Committee' (Annex 4, paragraph 3.61).

14.19 This topic does not normally fall within the remit of WG-FSA. WG-FSA undertook this work in the spirit of providing a service for the Scientific Committee, acknowledging the limits of its expertise and knowledge of krill fishing.

14.20 Accordingly, WG-FSA convened a subgroup to consider this issue. The report of the subgroup is appended as Appendix E. The Working Group also forwarded papers submitted on this topic for direct consideration by the Scientific Committee (WG-FSA-06/20, 06/23, 06/57 and WG-EMM-06/7).

14.21 The Working Group reached no conclusion on whether the available data constituted 'an adequate description of the selectivity of the method for krill, a characterisation of the haul (or catch rate) and information on the location of krill catches' or whether 'there might be considerable potential for this type of fishing gear to impact other elements of the ecosystem'.

14.22 The Working Group submitted the report of its subgroup for consideration by the Scientific Committee.

Other

14.23 Dr E. Marschoff (Argentina) pointed out that in WG-FSA-06/51 and 06/22 *inter alia*, references are made to alleged authorities which the Argentine Republic does not recognise. Reference is also made to inspections carried out on a unilateral basis by the UK in the Convention Area. This infringes the multilateral system of the Commission, which is the only legal mechanism applicable within the waters surrounding South Georgia. He recalled that the Malvinas Islands, South Georgia and South Sandwich Islands and the surrounding waters are an integral part of the Argentine national territory. These islands being illegally occupied by the UK, are subject to a sovereignty dispute between the two countries which is recognised by several international organisations. Therefore, Dr Marschoff rejects references to those alleged authorities and inspections carried out unilaterally by the UK, as well as incorrect references to the territory and status of the Malvinas Islands, South Georgia and South Sandwich Islands and the surrounding waters made in documents at this Working Group.

ADOPTION OF THE REPORT

15.1 The report of the meeting and associated background documents SC-CAMLR-XXV/BG/26, BG/27 and BG/28 were adopted.

CLOSE OF MEETING

16.1 In closing the meeting, the Dr Hanchet thanked the subgroup coordinators, rapporteurs and all other participants for their contributions and participation in the meeting, as well as the intersessional activities. This work had resulted in the revision of the integrated assessments

for toothfish in Subareas 48.3, 88.1 and 88.2, and the development of a new integrated assessment for toothfish in Division 58.5.2. The investigation of exploratory fisheries for toothfish in Subareas 48.6 and 58.4 was also initiated.

16.2 Drs Agnew and Constable, on behalf of the Working Group, thanked Mr Dunn for sharing his expertise in CASAL, and for providing remote-access computers during the meeting. The Working Group thanked Dr Hanchet for guiding its work. The assessments were becoming increasingly complex and Dr Hanchet's leadership had ensured the success of the meeting. The Working Group thanked the Secretariat for its assistance.

16.3 The meeting was closed.

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Table 1: Total reported catches (tonnes) of target species in fisheries in the Convention Area in the 2005/06 season. Source: catch and effort reports submitted by 5 October 2006 unless otherwise indicated.

Target species	Region	Fishery	Fishing season		Conservation measure	Catch (tonnes) of target species		Reported catch (% limit)
			Start	End		Reported	Limit	
Champsocephalus gunnari	48.3	Trawl	15-Nov-05	30-Sep-06[1]	42-01 (2005)	2 171	2 244	97
	58.5.2	Trawl	01-Dec-05	30-Nov-06	42-02 (2005)	263	1 210	22
Dissostichus eleginoides	48.3	Longline and pot	01-May-06	31-Aug-06[1]	41-02 (2005)	3 534	3 556	99
	48.4	Longline	01-Apr-06	30-Sep-06	41-03 (2005)	18	100	18
	58.5.1	Longline in French EEZ[3]	ns	ns	ns	3 045	ns	-
	58.5.2	Longline and trawl	01-Dec-05	30-Nov-06	41-08 (2005)	1 825	2 584	71
	58.6	Longline in French EEZ[3]	ns	ns	ns	641	ns	-
	58.6	Longline in South African EEZ	ns	ns	ns	7	ns	-
	58.7	Longline in South African EEZ	ns	ns	ns	41	ns	-
Dissostichus spp.	48.6	Exploratory longline	01-Dec-05	30-Nov-06	41-04 (2005)	137	910	15
	58.4.1	Exploratory longline	01-Dec-05	30-Nov-06	41-11 (2005)	425	600	71
	58.4.2	Exploratory longline	01-Dec-05	30-Nov-06	41-05 (2005)	164	780	21
	58.4.3a	Exploratory longline	01-May-06	31-Aug-06	41-06 (2005)	89	250	35
	58.4.3b	Exploratory longline	01-May-06	13-Mar-06[1,4]	41-07 (2005)	361	300	120
	88.1	Exploratory longline	01-Dec-05	06-Feb-06[1]	41-09 (2005)	2 952	2 964	100
	88.2	Exploratory longline	01-Dec-05	15-Feb-06[1]	41-10 (2005)	465	487	96
Euphausia superba	48	Trawl	01-Dec-05	30-Nov-06	51-01 (2002)	105 084	4 000 000	3
	58.4.1	Trawl	01-Dec-05	30-Nov-06	51-02 (2002)	0	440 000	0
	58.4.2	Trawl	01-Dec-05	30-Nov-06	51-03 (2002)	0	450 000	0
Lithodidae	48.3	Pot	01-Dec-05	30-Nov-06	52-01 (2005)	2[2]	1 600	0
Martialia hyadesi	48.3	Exploratory jig	01-Dec-05	30-Nov-06	61-01 (2005)	0	2 500	0

[1] Fishery closed on advice from the Secretariat
[2] By-catch in fishery for *D. eleginoides*
[3] Data reported by France for fishing to August 2006
[4] Exemption to prescribed season in accordance with conservation measures
ns Not specified by CCAMLR

Table 2: Estimated effort, catch rates and total catches from IUU fishing for *Dissostichus* spp. in the Convention Area in the 2005/06 season. Detailed calculations are in WG-FSA-06/11 Rev. 2 (see also SC-CAMLR-XXIII, Annex 5, Table 3.3).

Subarea/ division	Estimated start of IUU fishing	No. of vessels sighted	No. of IUU fishing vessels otherwise reported	Total no. vessels reported	Additional no. vessels extrapolated to 30 Nov 2006	Estimated no. of IUU fishing vessels	Estimated number of days fished (not extrapo-lated)	Estimated number of days fished (extrapolated)	Mean catch rate (tonnes/day)	Estimated IUU catch to 1 Sep 2006 (not extrapo-lated)
		1	2	3	4	5	6	7	8	9
48.3	1991			0	0		0		2.1	0
58.4.1	2005	4		4	1.2	5.2	246	320	2.8	689
58.4.2	2002	2		2	0.6	2.6	123	160	1.8	221
58.4.3a	2003			0		0	0	0	0.8	0
58.4.3b	2003	14		14	4.2	18.2	861	1 119	2.1	1 808
58.4.4a	1996			0		0	0	0	2.0	0
58.5.1	1996	1		1	0.3	1.3	57	74	3.7	211
58.5.2	1997	1		1	0.3	1.3	59	77	1.9	112
58.6	1996	1		1	0.3	1.3	40	52	0.6	24
58.7	1996			0		0	0	0	0.5	0
88.1	2002			0		0	0	0	4.8	0
88.2 (attributed to SSRU E)	2006	1		1	0.3	1.3	5	5	2.9	15
Total		24								3 080
Undocumented landings which cannot be attributed to individual sightings or subareas										266

Notes on columns 1 to 9:

1. From reports of vessel sightings submitted by Members.
2. From information reported via other sightings, port inspections or fishing vessels/traders. No such reports were used in 2006.
4. Calculated pro rata for 1 September to 30 November 2006.
6. Estimates of the duration of fishing trips for IUU vessels have been agreed and used by WG-FSA for a number of years.
8. Mean catch rates per day taken from catch and effort reports, where available. CDS data used otherwise.

Other notes:

Three sightings of gillnetters have not been included in this assessment.

Names of vessels sighted:

58.4.1 *West Ocean* (2), *East Ocean*, *North Ocean*
58.4.2 *Condor*, *Typhoon I*
58.4.3b *Odin* (2), *South Ocean*, *Condor*, *Sargo*, *Ross*, *Hammer*, *East Ocean*, *Perseverance* (2), *Tropic*, *Gale* (2), *Gold Dragon*
58.5.1 *Black Moon*
58.5.2 *North Ocean*
58.6 *Typhoon I*
88.2 *Volna* – 5 days fishing only allocated

Table 3: Reported catch (tonnes) of *Dissostichus* spp. and estimated catch from IUU fishing in the Convention Area, and catch reported in the CDS in areas outside the Convention Area in the 2004/05 and 2005/06 seasons.

2004/05 season

Inside	Subarea/division	Reported catch	IUU catch	Total CCAMLR	*Catch limit*
	48.3	3 039	23	3 062	*3 050*
	48.4	27		27	*28*
	48.6	51		51	*910*
	58.4.1	480		480	*600*
	58.4.2	127	86	213	*780*
	58.4.3 (a and b)	406	1 114	1 520	*550*
	58.4.4	0	220	220	*0**
	58.5.1	5 065	268	5 333	*0**
	58.5.2	2 744	265	3 009	*2 787*
	58.6	637	12	649	*0**
	58.7	142	60	202	*0**
	88.1	3 120	28	3 143	*3 250*
	88.2	411		411	*375*
	88.3	2			*0***
	Total inside	16 250	2 076	18 321	
Outside	Area	CDS catch EEZ	CDS catch high seas	Total outside CCAMLR	
	41	3 736	3 327	7 063	
	47		78	78	
	51	8	33	41	
	81	54		54	
	87	5 226	385	5 611	
	Total outside	9 024	3 823	12 847	
Global total				31 168	

2005/06 season (to 5 October 2006)

Inside	Subarea/division	Reported catch	IUU catch	Total CCAMLR	*Catch limit*
	48.3	3 534		3 534	*3 556*
	48.4	18		18	*100*
	48.6	137		137	*910*
	58.4.1	426	689	1 115	*600*
	58.4.2	164	221	385	*780*
	58.4.3 (a and b)	449	1 808	2 257	*550*
	58.5.1	3 045	211	3 256	*0**
	58.5.2	1 825	112	1 937	*2 584*
	58.6	648	24	672	*0**
	58.7	41		41	*0**
	88.1	2 952		2 952	*2 964*
	88.2	465	15	480	*487*
	Total inside	13 704	3 080	16 784	

(continued)

Table 3 (continued)

Outside	Area	CDS catch EEZ	CDS catch high seas	Total outside CCAMLR
	41	2 131	1 750	3 881
	47		231	231
	51	3		3
	81		407	407
	87	3 309	217	3 526
	Total outside	5 443	2 605	8 048
	Global total			25 967

* Outside EEZ ** closed to fishing, research permitted in accordance with Conservation Measure 24-01

Reported Catch: 2004/05 from STATLANT data
2005/06 catch and effort reports to 5 October 2006, except data for France reported to August 2006

IUU Catch: From WG-FSA-06/11 Rev. 2

CDS Catch: Data submitted to the CDS by 5 October 2006. The allocation between EEZ and high seas is based on the Secretariat's knowledge of vessel activity, such as licence information, vessel size and trip duration.

Catch limits agreed by the Commission.

Table 4: Participation in exploratory fisheries for *Dissostichus* spp. in 2005/06. Source: WG-FSA-06/4.

Subarea/division	Participating Member	Number vessels fishing	*Dissostichus* spp. catch (tonnes)	
			Limit	Reported
Exploratory fisheries in Area 48 (Atlantic Ocean sector)				
48.6	Japan	1		
	New Zealand	-		
Total		1	910	137
Exploratory fisheries in Area 58 (Indian Ocean sector)				
58.4.1	Australia	-		
	Chile	2		
	Korea, Republic of	1		
	New Zealand	1		
	Spain	1		
	Uruguay	1		
Total		6	600	425
58.4.2	Australia	-		
	Chile	2		
	Korea, Republic of	1		
	New Zealand	-		
	Spain	1		
Total		4	780	164
58.4.3a	Australia	-		
	Chile	-		
	Korea, Republic of	-		
	Spain	2		
Total		2	250	89
58.4.3b	Australia	-		
	Chile	1		
	Korea, Republic of	-		
	Spain	2		
	Uruguay	1		
Total		4	300	361
Exploratory fisheries in Area 88 (Southwest Pacific sector)				
88.1	Argentina	1		
	Korea, Republic of	-		
	New Zealand	4		
	Norway	1		
	Russia	2		
	South Africa	-		
	Spain	-		
	UK	2		
	Uruguay	3		
Total		13	2964	2952

(continued)

Table 4 (continued)

Subarea/division	Participating Member	Number vessels fishing	*Dissostichus* spp. catch (tonnes)	
			Limit	Reported
88.2	Argentina	1		
	Korea, Republic of	-		
	New Zealand	1		
	Norway	1		
	Russia	2		
	Spain	-		
	UK	2		
	Uruguay	-		
Total		7	487	465

Table 5: Number of vessels notified in exploratory longline fisheries for *Dissostichus* spp. in the 2006/07 season (a), and corresponding number of participating Members, number of vessels and catch limits agreed in conservation measures in force in the 2005/06 season (b). Source: CCAMLR-XXV/16.

Member notifications	Number of vessels notified per subarea/division						
	48.6	58.4.1	58.4.2	58.4.3a	58.4.3b	88.1	88.2
(a) Exploratory longline fisheries for *Dissostichus* spp. in the 2006/07 season							
Argentina						2	2
Australia		1	1		1		
Japan	2			1	1		
Korea, Republic of	1	2	3	2	3	3	
Namibia		1	1		1		
New Zealand	1	4	2			4	4
Norway	1					1	1
Russia						2	2
South Africa						1	
Spain		1	1	1	1	1	1
UK						2	2
Uruguay		1	1		1	5	4
Number of Members	4	6	6	3	6	9	7
Number of vessels	5	9[1]	9	4	8	21	16
(b) Conservation measures in force in the 2005/06 season							
Number of Members	2	6	5	4	5	9	8
Number of vessels	1[2]	11	8	1[2]	1[2]	21	17
Target species catch limit (tonnes)	910	600	780	250	300	2 964	487

[1] Revised number of vessels following advice from New Zealand that one vessel has been withdrawn (COMM CIRC 06/114).

[2] Maximum number per country at any one time.

Table 6: Unstandardised CPUE (kg/hook) of *Dissostichus* spp. in exploratory longline fisheries reported between 1996/97 and 2005/06. Source: fine-scale data from commercial and fishery-based research hauls. SSRUs as defined in Conservation Measure 41-01.

Subarea/ division	SSRU	Season									
		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
48.6	486A								0.04	0.07	0.16
	486E									0.08	
58.4.2	5842A									0.08	0.08
	5842C							0.10		0.07	0.17
	5842D							0.19	0.06		
	5842E							0.21	0.11	0.14	0.22
58.4.3a	5843A									0.05	0.05
58.4.3b	5843B								0.09	0.16	0.16
88.1	881A	0.01				0.02		0.16			0.08
	881B	0.05	0.03			0.16	0.25	0.27	0.11	0.55	0.07
	881C					0.44	0.87	0.58	0.31	0.53	1.07
	881E		0.07	0.06		0.03		0.05	0.08	0.28	
	881F		0.00					0.03			
	881G		0.06	0.02		0.13	0.12	0.16	0.12	0.15	0.63
	881H		0.17	0.26	0.38	0.41	0.72	0.47	0.21	0.73	0.59
	881I		0.37	0.23	0.28	0.28	0.43	0.20	0.16	0.44	0.39
	881J			0.09	0.18	0.04			0.04	0.22	0.36
	881K		0.32	0.15	0.39		0.45		0.01	0.32	0.50
	881L					0.12			0.10	0.13	0.15
88.2	882									0.38	
	882A						0.82		0.11	0.44	0.54
	882B								0.06		
	882D										0.43
	882E							0.35	0.42	0.70	0.34
	882F										0.26
	882G										0.03

Table 7: Number of *Dissostichus* spp. tagged and released in exploratory longline fisheries. Source: scientific observer data submitted to CCAMLR.

Subarea/ division	Season						
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	Total
48.6	0	0	0	4	62	146	212
58.4.1	0	0	0	0	462	469	931
58.4.2	0	0	0	0	342	136	478
58.4.3a	0	0	0	0	199	104	303
58.4.3b	0	0	0	0	231	175	406
88.1	326	756	1 068	1 752	3 221	2 977	10 100
88.2	0	12	94	433	341	444	1 324

Table 8: Number of tagged *Dissostichus* spp. recaptured in exploratory longline fisheries. Source: scientific observer data submitted to CCAMLR.

Subarea/ division	Season						
	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	Total
48.6	0	0	0	0	0	3	3
58.4.1	0	0	0	0	0	0	0
58.4.2	0	0	0	0	0	0	0
58.4.3a	0	0	0	0	0	6	6
58.4.3b	0	0	0	0	1	6	7
88.1	1	4	13	40	77	70	205
88.2	0	0	0	10	17	28	55

Table 9: Reported catch of *Dissostichus* spp. in exploratory fisheries in Subareas 48.6, 88.1 and 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b. Source: STATLANT data to 2004/05 and catch and effort reports in 2005/06.

Season	Reported catch (tonnes) of *Dissostichus* spp. in exploratory fisheries							
	48.6	58.4.1	58.4.2	58.4.3a	58.4.3b	88.1	88.2	All exploratory fisheries
1996/97						<1	<1	<1
1997/98						42	<1	42
1998/99						297		297
1999/00						751	<1	751
2000/01			<1			660	<1	660
2001/02						1 325	41	1 366
2002/03			117			1 831	106	2 055
2003/04	7		20		7	2 197	375	2 605
2004/05	51	480	127	110	297	3 120	411	4 594
2005/06	137	425	164	89	361	2 952	465	4 592
Total	194	905	427	198	664	13 173	1 398	16 960

Table 10: Catches for macrourids, rajids and other species taken as by-catch from longline fisheries in 2005/06, and reported in fine-scale data. Catches are given in tonnes and as a percentage of the catch of *Dissostichus* spp. (TOT). (Rajids cut from the longlines and released are not included in these estimates.) * – no by-catch data available from Subarea 58.6 South African EEZ. na – not applicable.

Subarea/ division	Target catch (tonnes)	Macrourids			Rajids			Other		
		Catch (tonnes)	% TOT	Catch limit	Catch (tonnes)	% TOT	Catch limit	Catch (tonnes)	% TOT	Catch limit
48.3	3 522	136	3.9	177	7	0.2	177	44	1.2	
48.4	19	5	26	na	1	6.6	na	1	7.3	na
48.6	137	8	5.8	50	0	0		2	1.5	20
58.5.2	656	26	4	360	17	2.5	120	20	3	50
58.5.1 French EEZ	3 045	339	12.7	na	435	16.3	na	42	1.4	na
58.6 French EEZ	641	132	11.7	na	163	14.4	na	28	4.3	na
58.6 South African EEZ*	41			na			na			na
58.7 South African EEZ	27	4	13.7	na	0	0	na	0	0.9	na
58.4.1	421	15	3.6	96	0	0	50	1	0.1	20
58.4.2	158	4	2.8	124	0	0	50	1	0.6	20
58.4.3a	89	1	0.8	26	7	8	50	8	9.3	20
58.4.3b	365	8	2.2	159	1	0.3	50	1	0.3	20
88.1	2 951	258	8.8	474	5	0.2	148	18	0.8	160
88.2	442	92	20.8	78	0	0	100	12	2.8	100

Table 11: Catches (tonnes) of target species and by-catch from trawl fisheries in 2005/06, and reported in fine-scale data. (ANI – *Champsocephalus gunnari*; GRV – *Macrourus* spp.; KRI – *Euphausia superba*; LIC – *Channichthys rhinoceratus*; NOR – *Notothenia rossii*; NOS – *Notothenia squamifrons*; SGI – *Pseudochaenichthys georgianus*; SRX – *Rajid* spp.; SSI – *Chaenocephalus aceratus*; TOP – *Dissostichus eleginoides*; TOT – *Dissostichus* spp.).

Subarea/ division	Target species	Total (tonnes)	ANI	GRV	KRI	LIC	NOR	NOS	SGI	SRX	SSI	TOT	Other
48.3	ANI	1 825	1 817		<1		1		6		<1		<1
58.5.2	ANI	279	260	<1		17		<1		<1		1	<1
48.1	KRI	47 521	9		47 512		<1		<1		<1		<1
48.2	KRI	2 801			2 802								
58.5.2	TOP	1 102	3	<1		<1		2		<1			<1

Table 12: Comparison of observer-reported catches obtained from scientific observer data (L5). Column ‘a’ shows totals derived from a range of sources (factory log etc.); column ‘b’ are scaled totals from line observations. GRV – *Macrourus* spp.; SRX – *Rajid* spp.; ANT – *Antimora rostrata*.

Subarea/ division	Mean % hooks observed	GRV		SRX		ANT	
		a	b	a	b	a	b
48.3	36.4	135	145	77	58	35	30
48.4	42.5	5	4.5	2.8	4.3	0.07	0.07
48.6	50.1	2.7	2.8			0.6	0.6
58.5.2	16.7	20.2	12.7	16	46.6	0.3	0.2
88.1	51.4	290	303.7	4	6.1	12.1	13
58.4	65.8	23.3	5.8	0.7	2.5	1.3	0.5

Table 13: Revised estimated effort, mean catch rates and total catches by subarea/division in the unregulated fishery for *Dissostichus* spp. in the 2004/05 season.

Subarea/ division	Estimated start of unregulated fishery	No. of vessels sighted	No. of unregulated vessels otherwise reported	Total no. vessels reported	Estimated no. of vessels fishing illegally 2005	Estimated no. of days per fishing trip	No. trips per year	Estimated effort days fished, no extrapolation	Mean catch rate per day (tonnes) (2)	Estimated IUU catch to 1 Dec 2005
		1	2	3	5	6	7	8	10	11
48.3	1991	1		1	1	15	1.0	15	1.6	23
58.4.2	2002		2	2	2	41	1.5	123	0.7	86
58.4.3a	2003	2		2	2	41	1.5	123	0.8	98
58.4.3b	2003	7	4	11	11	41	1.5	677	1.5	1 015
58.4.4a	1996	2		2	2	40	2.5	200	1.1	220
58.5.1	1996		1	1	1	30	1.9	57	4.7	268
58.5.2	1997		1	1	1	30	2.0	59	4.5	265
58.6	1996	1		1	1	40	1.0	40	0.3	12
58.7	1996	2		2	2	40	1.5	120	0.5	60
88.1	2002	1		1	1	7.7	1.0	7	3.6	28
88.2										0
Total										2 076
Undocumented landings of toothfish which cannot be attributed to a sighting or an area										508

Notes on columns 1 to 11:

1. From reports of vessel sightings submitted by Members.
2. From information reported via other sightings, port inspections or fishing vessels/traders.
6. Estimates of the duration of fishing trips for IUU vessels have been agreed and used by WG-FSA for a number of years.
10. Mean catch rates per day taken from the catch and effort database where available. CDS data used otherwise.

Names of sighted vessels where known:

48.3 *Elqui*
58.4.2 *Sargo*/*Keta*
58.4.3a *Hammer* (2)
58.4.3b *Condor*, *Koko*, *Jian Yuan*, *Kang Yuan* (2), *Ross* (2), *North Ocean*
58.4.4a *Condor*, *Red Lion* (sighted in Division 58.4.4b but advised that it intended to fish in Division 58.4.4a)
58.5.1 *Condor*
58.5.2 *Condor*
58.6 *Sea Storm*
58.7 *Aldabra*
88.1 *Taruman* (145 tonnes unloaded, 28 tonnes reported caught in Subarea 88.1)

Plus five separate sightings of unknown vessels (four in Division 58.4.3b, one in Subarea 58.7)

Table 14: List of tasks identified by WG-FSA for the 2006/07 intersessional period. Tasks identified by ad hoc WG-IMAF are listed in SC-CAMLR-XXV/BG/28. The paragraph numbers (Ref.) refer to this report. E – established practice. Priority: high priority (1); general request (2).

	Task	Ref.	Priority	Action required	
				Members/Subgroups	Secretariat
	Organisation of the meeting				
1.	Submit papers to WG-FSA-07 in accordance with the guidelines.	E	1	Members to implement	Coordinate and implement
2.	Circulate list of documents with agenda items at start of meeting.	E	1	Convener to implement	Assist
	Review of available information				
3.	Submit data in a timely manner and using current CCAMLR formats.	E	1	Members to implement	Assist
4.	Process fishery, observer and survey data submitted to CCAMLR.	E	1		Implement
5.	Validate data and liaise with Members to resolve inconsistencies.	E	1	Members to assist	Implement
6.	To the extent possible, update the tables, figures and general text of data in the Fishery Reports.	13.23	1		Implement
7.	Update estimates of reported catches, catches from IUU fishing and total removals by season and area within the Convention Area.	E	1	Members to provide information on IUU fishing by 1 October	Implement
8.	Update estimates of catches reported in CDS data by season and area outside the Convention Area.	E	1		Implement
9.	Update information on scientific observations.	E	1		Implement
10.	Update Fishery Plans.	E	2		Implement
11.	Notify research surveys.	E	1	Members to implement	
12.	Conduct statistical evaluation of new methods to assess the performance of new gear, its selectivity and impact on ecosystem components.	3.17, 6.52	1	Members to implement	
13.	Provide information of the sustainability of the *Dissostichus* resource on the Scotia Ridge.	3.22	2	Members to implement	Archive
14.	Report tag data to the Secretariat along with monthly fine-scale data.	3.42	1	Members to implement	Archive

	Task	Ref.	Priority	Action required	
				Members/Subgroups	Secretariat
	Assessments and management advice				
15.	Review and provide additional information for Fishery Reports.	E	2	Members to implement	Update
16.	Conduct simulations to explore the consequences of a multi-year assessment on the management of the target species and the fishery.	4.19	1	Members to implement	
17.	Conduct general research toward advancing assessments.	12.4	2	Members to implement	
18.	Develop management strategy evaluations.	12.5–12.7	1	Members to implement	
	Fish and invertebrate by-catch				
19.	Cut all rajids from fishing lines while still in the water, except on the request of the observer during biological sampling periods.	E	1	Members to implement	
20.	Provide data for the analysis of by-catch (Tables 1 to 3) for the start of the 2007 meeting.	6.51		Members to implement	Update
	Evaluation of threats arising from IUU activities				
21.	Further develop estimation methods.	8.4–8.9, 8.14	1	SCIC to consider, Members to implement	Coordinate and implement
	Biology, ecology and demography of target and by-catch species				
22.	Publish the Species Profiles in *CCAMLR Science* and further disseminate to the public domain through 'Fishbase' and other means to ascertain a distribution as wide as possible.	9.6		Subgroup to coordinate	Assist
23.	Collect data from the krill fishery more extensively in the future to allow a better assessment of the impact of the krill fishery on fish species.	10.8		Members to implement	Assist
	Consideration of ecosystem management				
24.	One-day workshop should be held to discuss approaches to developing models to examine the effects of finfish fisheries on the ecosystem.	10.13	1	Members to contribute	Assist

	Task	Ref.	Priority	Action required	
				Members/Subgroups	Secretariat
	New and exploratory fisheries				
25.	Conduct the fishery-based research outlined in Conservation Measure 41-01, and submit the data to the Secretariat in a timely manner.	5.9		Members to implement	Archive
26.	Look out for tagged fish and submit accurate tag–recapture data to the Secretariat in a timely manner.	5.10		Members to implement	Archive
27.	Further develop the assessment of *D. mawsoni* in Subareas 88.1 and 88.2.	12.11		Members to implement	Assist
28.	Develop a means for estimating abundance and providing assessments of stock status in exploratory fisheries other than in Subareas 88.1 and 88.2.	5.8	1	Members to implement	Assist
29.	Develop the assessments in other exploratory fisheries for *Dissostichus* spp.	12.12		Members to implement	Assist
	Scheme of International Scientific Observation				
30.	Use only current versions of CCAMLR data forms.	E	1	Members to implement	Assist
31.	Update the *Scientific Observers Manual* and data forms.	E	1		Implement
32.	Change the logbook to facilitate the monitoring of depredation in the *Dissostichus* spp. fisheries in the CCAMLR Convention Area.	11.8			Implement
33.	Make available a photographic database to assist observers with the identification of seabirds and fish in the Convention Area.	11.10		France to submit	Implement
34.	During a trial period of one year, observers/vessels to take time-stamped photographs of all returned tags and forward them to the relevant tagging program coordinator and the Secretariat.	3.45	1	Members to implement	Archive
35.	Investigate the feasibility of it becoming the tagging program coordinator for all exploratory fisheries.	3.46–3.47	1	Tagging Subgroup to provide guidance	Implement
36.	Implement the instructions to observers with respect of sampling longlines for by-catch.	6.39		Members to implement	Assist

	Task	Ref.	Priority	Action required	
				Members/Subgroups	Secretariat
37.	Develop methods to help determine levels of reporting and detection of tag–recapture events on board fishing vessels.	11.7		Members to implement	Assist
38.	Review all tasks that observers are required to do.	11.9		Members to implement	Assist
	Future assessments				
39.	Further develop the assessment of *D. eleginoides* in Subarea 48.3.	12.8		Members to implement	Assist
40.	Further develop the assessment of *D. eleginoides* in Division 58.5.2.	12.9–12.10		Members to implement	Assist
41.	Further develop the assessment of *C. gunnari* in Subarea 48.3.	12.13		Members to implement	Assist
42.	Further develop the assessment of *C. gunnari* in Division 58.5.2.	12.14		Members to implement	Assist
43.	Develop a subgroup work plan for the intersessional period.	13.5		Subgroup coordinators to implement	Assist
44.	Hold a meeting of WG-FSA-SAM in 2007.	13.8–13.11		Convener to coordinate	Assist
45.	Hold a workshop on developing methods of incorporating ecosystem models in finfish fishery assessments.	13.12–13.14		Convener to coordinate	Assist

APPENDIX A

AGENDA

Working Group on Fish Stock Assessment
(Hobart, Australia, 9 to 20 October 2006)

1. Opening of the meeting

2. Organisation of the meeting and adoption of the agenda

    2.1 Organisation of the meeting
    2.2 Size of the WG-FSA report

3. Review of available information

    3.1 Data requirements specified in 2005
        3.1.1 Development of the CCAMLR database
        3.1.2 Data processing
        3.1.3 Fishery plans

    3.2 Fisheries information
        3.2.1 Catch and effort data reported to CCAMLR
        3.2.2 Estimates of catch and effort from IUU fishing
        3.2.3 Catch and effort data for toothfish fisheries in waters adjacent to the Convention Area
        3.2.4 Scientific observer information

    3.3 Inputs for stock assessment
        3.3.1 Catch-at-length/age from fisheries
        3.3.2 Research surveys
        3.3.3 CPUE analyses
        3.3.4 Tagging studies
        3.3.5 Biological parameters
        3.3.6 Stock structure and management areas
        3.3.7 Depredation

4. Preparation for assessments and assessment timetable

    4.1 Report from the Subgroup on Acoustic Survey and Analysis Methods (SG-ASAM)
    4.2 Report from the Subgroup on Assessment Methods (WG-FSA-SAM)
    4.3 Review of preliminary stock assessment papers
    4.4 Assessments to be carried out and assessment timetable

5. Assessments and management advice

5.1 New and exploratory fisheries in 2005/06 and notifications for 2006/07
- 5.1.1 New and exploratory fisheries in 2005/06
- 5.1.2 New and exploratory fisheries notified for 2006/07
- 5.1.3 Update Fishery Report for Subareas 88.1 and 88.2
- 5.1.4 Progress towards assessments of other exploratory fisheries

5.2 Update Fishery Reports for the following assessed fisheries
- 5.2.1 *Dissostichus eleginoides* South Georgia (Subarea 48.3)
- 5.2.2 *Dissostichus eleginoides* Kerguelen Islands (Division 58.5.1)
- 5.2.3 *Dissostichus eleginoides* Heard Island (Division 58.5.2)
- 5.2.4 *Dissostichus eleginoides* Crozet Islands (French EEZ in Subarea 58.6)
- 5.2.5 *Dissostichus eleginoides* Prince Edward and Marion Islands (South African EEZ in Subareas 58.6 and 58.7)
- 5.2.6 *Champsocephalus gunnari* South Georgia (Subarea 48.3)
- 5.2.7 *Champsocephalus gunnari* Heard Island (Division 58.5.2)

5.3 Assessment and management advice for other fisheries
- 5.3.1 Antarctic Peninsula (Subarea 48.1) and South Orkney Islands (Subarea 48.2)
- 5.3.2 South Sandwich Islands (Subarea 48.4)
- 5.3.3 *Electrona carlsbergi* South Georgia (Subarea 48.3)
- 5.3.4 Crabs (*Paralomis spinosissima* and *P. formosa*) (Subarea 48.3)
- 5.3.5 *Martialia hyadesi* (Subarea 48.3)

6. Fish and invertebrate by-catch

6.1 Assessment of the status of by-catch species and groups
6.2 Estimation of by-catch levels and rates
6.3 By-catch reporting
6.4 Assessment of risk
6.5 Mitigation measures

7. Incidental mortality of mammals and seabirds associated with fishing (ad hoc WG-IMAF Report)

8. Evaluation of the threats arising from IUU activities

8.1 Development of approaches for estimating total removals of toothfish
8.2 Review of historical trends in IUU activity

9. Biology, ecology and demography of target and by-catch species

9.1 Review information available to the meeting
9.2 Species profiles
9.3 CCAMLR otolith network
9.4 Ageing workshop of *C. gunnari* in 2006

10. Considerations of ecosystem management

    10.1 Ecological interactions (e.g. multi-species, benthos etc.)
    10.2 Interactions with WG-EMM
    10.3 Development of ecosystem models

11. Scheme of International Scientific Observation

    11.1 Summary of information extracted from observer reports and/or provided by technical coordinators

    11.2 Implementation of the scientific observer program
        11.2.1 *Scientific Observers Manual*
        11.2.2 Sampling strategies
        11.2.3 Priorities

12. Future assessments

13. Future work

    13.1 Organisation of intersessional activities in subgroups
    13.2 Intersessional meetings

14. Other business

    14.1 Reorganisation of Scientific Committee working groups
    14.2 CCAMLR's contribution to FIRMS

15. Adoption of the report

16. Close of the meeting.

APPENDIX B

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(Hobart, Australia, 9 to 20 October 2006)

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APPENDIX C

LIST OF DOCUMENTS

Working Group on Fish Stock Assessment
(Hobart, Australia, 9 to 20 October 2006)

WG-FSA-06/1	Provisional Agenda and Provisional Annotated Agenda for the 2006 Meeting of the Working Group on Fish Stock Assessment (WG-FSA)
WG-FSA-06/2	List of participants
WG-FSA-06/3	List of documents
WG-FSA-06/4	CCAMLR fisheries: 2006 update Secretariat
WG-FSA-06/5	Use of a deep-water longline of the Spanish type and its modifications in the Russian research of Ross Sea toothfish during the season 2004/05–2005/06 N.V. Kokorin and I.G. Istomin (Russia)
WG-FSA-06/6	Report of the WG-FSA Subgroup on Assessment Methods (Walvis Bay, Namibia, 10 to 14 July 2006)
WG-FSA-06/7	Report of the Second Workshop on Estimating age of Mackerel Icefish, *Champsocephalus gunnari* (AtlantNIRO, Kaliningrad, Russia, 19 to 23 June 2006)
WG-FSA-06/8	Report from invited expert to WG-FSA-SAM-06
WG-FSA-06/9	On maturity level of gonads of Antarctic toothfish *Dissostichus mawsoni* from the southern Ross Sea (Subarea 88.1) in December 2005–February 2006 V.G. Prutko (Ukraine)
WG-FSA-06/10	Species composition of fish from Antarctic toothfish *Dissostichus mawsoni* stomachs of the Ross Sea A.V. Balushkin (Russia) and V.G. Prutko (Ukraine)
WG-FSA-06/11 Rev. 2	Estimation of IUU catches in the Convention Area in the 2005/06 fishing season Secretariat

WG-FSA-06/12	Comparison of census methods for black-browed albatrosses breeding at the Ildefonso Archipelago, Chile G. Robertson, K. Lawton (Australia), C.A. Moreno (Chile), R. Kirkwood (Australia) and J. Valencia (Chile)
WG-FSA-06/13	Brief report on scientific observation on the fishery vessel *Mellas* (FAO Statistical Area 41, January to July 2006) S. Usachev (Ukraine)
WG-FSA-06/14	Standing stock, spatial distribution and biological features of demersal finfish from the 2006 US AMLR bottom trawl survey of the northern Antarctic Peninsula and Joinville–D'Urville Islands (Subarea 48.1) C.D. Jones (USA) and K.-H. Kock (Germany)
WG-FSA-06/15	Report of new longline system in the exploratory fisheries for *Dissostichus* spp. in 2005/06 Delegation of Japan
WG-FSA-06/16	VACANT
WG-FSA-06/17	The results of investigations of the feeding of Antarctic toothfish *D. mawsoni* in the Ross Sea in 2005/06 A.F. Petrov (Russia)
WG-FSA-06/18	Notes on the Second Meeting of the WCPFC – Ecosystem and Bycatch Specialist Working Group, Manila, 10 August 2006 C. Small (BirdLife International)
WG-FSA-06/19	Distribution of albatrosses and petrels in the WCPFC Convention Area and overlap with WCPFC longline fishing effort C. Small (BirdLife International)
WG-FSA-06/20	*Saga Sea* krill harvesting and production T. Williksen (Norway)
WG-FSA-06/21	Recommended changes to Conservation Measure 25-02 pertaining to the Spanish system of longline fishing G. Robertson (Australia) and C. Moreno (Chile)
WG-FSA-06/22	Best practice seabird by-catch mitigation for Spanish-rig longline vessels with emphasis on line weighting regimes G. Robertson (Australia), C.A. Moreno (Chile), B. Wienecke (Australia), P. Gandini (Argentina), G. McPherson (Australia) and J.-P. Seco Pon (Argentina)
WG-FSA-06/23	On possible impact of new continuous krill fishing technology on juvenile fish and larvae S.M. Kasatkina

WG-FSA-06/24	Mercury concentrations in Patagonian toothfish, *Dissostichus eleginoides* Smitt 1898, among three distinct ocean basins K. Dawson Guynn and M.S. Peterson (USA)
WG-FSA-06/25	Information on the status of fjord *Notothenia rossii*, *Gobionotothen gibberifrons* and *Notothenia coriiceps* in the lower South Shetland Islands derived from a long-term monitoring program (1983–2006) at Potter Cover E.R. Barrera-Oro and E.R. Marschoff (Argentina) (*CCAMLR Science*, submitted)
WG-FSA-06/26	Species profile for Antarctic toothfish (*Dissostichus mawsoni*) S.M. Hanchet (New Zealand)
WG-FSA-06/27	Stomach contents of sub-adult Antarctic toothfish (*Dissostichus mawsoni*) from the western Ross Sea, Antarctica D.W. Stevens (New Zealand)
WG-FSA-06/28	Preliminary analyses of an ectoparasite *Eubrachiella antarctica* as a marker for stock discrimination of Antarctic toothfish in the Ross Sea P.J. Smith, A. McKenzie and L. Tubbs (New Zealand)
WG-FSA-06/29	A characterisation of the toothfish fishery in Subareas 88.1 and 88.2 from 1997/98 to 2005/06 S.M. Hanchet, M.L. Stevenson and A. Dunn (New Zealand)
WG-FSA-06/30	Towards a seabird mortality risk assessment: distribution of seabirds in the WCPFC Convention Area and potential overlap with fisheries S. Waugh (New Zealand)
WG-FSA-06/31	Review of biological parameters for Ross Sea skates M.P. Francis (New Zealand)
WG-FSA-06/32	Summary of Ross Sea skate tagging programme results S.L. Ballara, A. Dunn and M.P. Francis (New Zealand)
WG-FSA-06/33	Some thoughts on the CCAMLR risk assessment for seabird–fishery interactions S. Waugh (New Zealand)
WG-FSA-06/34	An updated descriptive analysis of the toothfish (*Dissostichus* spp.) tagging programme in Subareas 88.1 and 88.2 up to 2005/06 A. Dunn and S.M. Hanchet

WG-FSA-06/35	Estimating fishing gear selectivity for trawlers using length-frequency data from concurrent commercial trawl and longline fishing for Patagonian toothfish in Division 58.5.2 and the ratio of their hazard functions S.G. Candy (Australia)
WG-FSA-06/36 Rev. 2	A summary of observations on board longline vessels operating within the CCAMLR Convention Area during the 2005/06 season Secretariat
WG-FSA-06/37 Rev. 1	Summary of observations aboard trawlers operating in the Convention Area during the 2005/06 season Secretariat
WG-FSA-06/38	A summary of scientific observations related to Conservation Measures 25-01 (1996), 25-02 (2005), and 25-03 (2003) Secretariat
WG-FSA-06/39 Rev. 1	Summary of an observation aboard a pot vessel operating in the Convention Area during the 2005/06 season Secretariat
WG-FSA-06/40	Report of ACAP Working Group on Status and Trends Agreement on the Conservation of Albatrosses and Petrels – Status and Trends Working Group
WG-FSA-06/41	Interactions between seabirds and deep water hake trawl gear: an assessment of impacts in South African waters 2004/05 B.P. Watkins, S.L. Petersen and P.G. Ryan (South Africa)
WG-FSA-06/42 Rev. 1	Report on a random stratified trawl survey to estimate distribution and abundance of *Dissostichus eleginoides* and *Champsocephalus gunnari* conducted in the Heard Island region (Division 58.5.2), May–June 2006 G.B. Nowara, R. Williams and T. Lamb (Australia)
WG-FSA-06/43 Rev. 1	Preliminary assessment of mackerel icefish, *Champsocephalus gunnari*, in the vicinity of Heard Island and McDonald Islands (Division 58.5.2), based on a survey in May–June 2006 using the Generalised Yield Model D.C. Welsford (Australia)
WG-FSA-06/44 Rev. 1	Review of the use of survey data and length-at-age models in the assessment of *Dissostichus eleginoides* in the vicinity of Heard Island and McDonald Islands (Division 58.5.2) D.C. Welsford, A.J. Constable and G.B. Nowara (Australia) (*CCAMLR Science*, submitted)

WG-FSA-06/45 Rev. 1	Preliminary assessment of Patagonian toothfish, *Dissostichus eleginoides*, in the vicinity of Heard Island and McDonald Islands (Division 58.5.2), based on a survey in May–June 2006 using the Generalised Yield Model D.C. Welsford, A.J. Constable, T. Lamb and T. Robertson (Australia)
WG-FSA-06/46	A proposal to adopt a conservation measure seeking an interim prohibiting on deep sea gillnet fishing in the Convention Area Delegation of Australia
WG-FSA-06/47	Standardised CPUE analysis of the Antarctic toothfish (*Dissostichus mawsoni*) fishery in the Ross Sea for the years 1997/98 to 2005/06 A. Dunn and S.M. Hanchet (New Zealand)
WG-FSA-06/48	Assessment models for Antarctic toothfish (*Dissostichus mawsoni*) in SSRU 882E including data from the 2005/06 season A. Dunn and S.M. Hanchet (New Zealand)
WG-FSA-06/49	The use of CCAMLR Statistical Subareas 88.1 and 88.2 and Division 58.4.1 by Macquarie Island giant petrels R. Trebilco, R. Gales, B. Baker and A. Terauds (Australia)
WG-FSA-06/50	Antarctic toothfish stock assessment for the Ross Sea by means of the TSVPA separable cohort model D. Vasilyev and K. Shust (Russia)
WG-FSA-06/51	Report of the South Georgia groundfish survey (Subarea 48.3) in January 2006 M.A. Collins, C. Jones, J. Clark. S. Fielding, J. Slakowski, T. North, W. Reid and J. Watts (United Kingdom)
WG-FSA-06/52	Integrated weight longlines with paired streamer lines – best management practice for demersal longline fisheries: preliminary results K. Dietrich, E. Melvin and L. Conquest (USA)
WG-FSA-06/53	Assessment of toothfish in Subarea 48.3, 2006 D.J. Agnew, R. Hillary, M. Belchier, J. Clark and J. Pearce (United Kingdom)
WG-FSA-06/54	Estimates of natural and fishing mortality from toothfish mark–recapture and catch-at-age data at South Georgia R.M. Hillary and D.J. Agnew (United Kingdom) (*CCAMLR Science*, submitted)
WG-FSA-06/55 Rev. 1	WITHDRAWN

WG-FSA-06/56	Results of the tagging experiment for *D. eleginoides* in Subarea 48.4 A. Payne and D.J. Agnew (United Kingdom)
WG-FSA-06/57	Analysis of krill catch data from continuous and conventional trawls by the *Saga Sea* and *Atlantic Navigator* D.J. Agnew, A. Payne, J. Hooper and J. Roe (United Kingdom)
WG-FSA-06/58	2006 assessment of the toothfish (*Dissostichus eleginoides*) resource in the Prince Edward Islands vicinity A. Brandão and D.S. Butterworth (South Africa)
WG-FSA-06/59	A proposal methodology to assess the Patagonian toothfish stock abundance at CCAMLR Subarea 48.3 using ASPM O.C. Wöhler and P.A. Martínez (Argentina)
WG-FSA-06/60	Assessment models for Antarctic toothfish (*Dissostichus mawsoni*) in the Ross Sea including data from the 2005/06 season A. Dunn and S.M Hanchet (New Zealand)
WG-FSA-06/61	Seabird warp-strike form Ministry of Fisheries (New Zealand)
WG-FSA-06/62	Seabird warp-strike measurement protocol for observers in New Zealand trawl fisheries Ministry of Fisheries (New Zealand)
WG-FSA-06/63	Marine mammals and demersal longlines fishery interactions in Crozet and Kerguelen Exclusive Economic Zones: an assessment of the depredation level C. Roche, N. Gasco, G. Duhamel and C. Guinet (France) (*CCAMLR Science*, submitted)
WG-FSA-06/64	An integrated stock assessment for the Patagonian toothfish (*Dissostichus eleginoides*) in Division 58.5.2 using CASAL A. Constable, S. Candy, T. Lamb and I. Ball (Australia) (*CCAMLR Science*, submitted)

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WG-FSA-06/P1	Ashford, J.R., C.M. Jones, E. Hofmann, I. Everson, C. Moreno, G. Duhamel and R. Williams. 2005. Can otolith elemental signatures record the capture site of Patagonian toothfish (*Dissostichus eleginoides*), a fully marine fish in the Southern Ocean? *Can. J. Fish. Aquat. Sci.*, 62: 2832–2840.
WG-FSA-06/P2	Ashford, J.R., A.I. Arkhipkin and C.M. Jones. 2006. Can the chemistry of otolith nuclei determine population structure of Patagonian toothfish *Dissostichus eleginoides*? *J. Fish Biol.*, 69: 708–721.

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CCAMLR-XXV/16	Summary of notifications for new and exploratory fisheries in 2006/07 Secretariat
CCAMLR-XXV/17	Notifications of Argentina's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Argentina
CCAMLR-XXV/18	Notifications of Australia's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Australia
CCAMLR-XXV/19	Notifications of Japan's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Japan
CCAMLR-XXV/20	Notifications of the Republic of Korea's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of the Republic of Korea
CCAMLR-XXV/21	Notifications of Namibia's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Namibia
CCAMLR-XXV/22	Notifications of New Zealand's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of New Zealand
CCAMLR-XXV/23	Notifications of Norway's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Norway
CCAMLR-XXV/24	Notifications of Russia's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Russia
CCAMLR-XXV/25	Notification of South Africa's intention to conduct an exploratory longline fishery for *Dissostichus* spp. in 2006/07 Delegation of South Africa
CCAMLR-XXV/26	Notifications of Spain's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Spain

CCAMLR-XXV/27	Notifications of the United Kingdom's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of the United Kingdom
CCAMLR-XXV/28	Notifications of Uruguay's intention to conduct exploratory longline fisheries for *Dissostichus* spp. in 2006/07 Delegation of Uruguay
CCAMLR-XXV/32	Proposal for revising Conservation Measure 41-04 (2005) – Limits on the Exploratory Fishery for *Dissostichus* spp. in Statistical Subarea 48.6 in the 2005/06 Season Delegation of Japan
CCAMLR-XXV/BG/3	Implementation of fishery conservation measures in 2005/06 Secretariat
CCAMLR-XXV/BG/4	Summary of current conservation measures and resolutions in force 2005/06 Secretariat
SC-CAMLR-XXV/BG/1 Rev. 2	Catches in the Convention Area in the 2004/05 and 2005/06 seasons Secretariat
SC-CAMLR-XXV/BG/2	Report of the Second Meeting of the Subgroup on Acoustic Survey and Analysis Methods (Hobart, Australia, 23 and 24 March 2006)
SC-CAMLR-XXV/BG/17	Évaluation de la biomasse et campagne de marquage Délégation française
SCIC-06/9	New methodology for estimating IUU catches Secretariat
WG-EMM-06/7	By-catch of small fish in a sub-Antarctic krill fishery K.A. Ross, L. Jones, M. Belchier and P. Rothery (United Kingdom)
WG-FSA-SAM-06/1	Provisional Agenda and Annotated Provisional Agenda for the 2006 Meeting of the WG-FSA Subgroup on Assessment Methods (WG-FSA-SAM)
WG-FSA-SAM-06/2	List of participants
WG-FSA-SAM-06/3	List of documents
WG-FSA-SAM-06/4	Extending the time series of catch-weighted length frequencies Secretariat

WG-FSA-SAM-06/5	Proposed trawl survey report format R.L. O'Driscoll (New Zealand) (Appendix 1: O'Driscoll, R.L. and N.W. Bagley. 2006. Trawl survey of hoki, hake and ling in the Southland and sub-Antarctic areas, November–December 2004 (TAN0414). *New Zealand Fisheries Assessment Report* 2006/2: 60 pp.)
WG-FSA-SAM-06/6	Using mark-recapture and catch-age data to estimate fishing and natural mortality for the Patagonian toothfish at South Georgia R.M. Hillary and D.J. Agnew (United Kingdom)
WG-FSA-SAM-06/7	A Von Bertalanffy growth model for Division 58.5.2 fitted to length-at-age data and a comparison of predicted with observed growth from mark–recapture data S.G. Candy, A.J. Constable, T. Lamb and R. Williams (Australia)
WG-FSA-SAM-06/8	Revised estimates of the biological parameters for Antarctic toothfish (*Dissostichus mawsoni*) in the Ross Sea A. Dunn, P.L. Horn and S.M. Hanchet (New Zealand)
WG-FSA-SAM-06/9	A descriptive analysis of the toothfish (*Dissostichus* spp.) tagging programme in the Ross Sea up to 2005/06 A. Dunn and S.M. Hanchet (New Zealand)
WG-FSA-SAM-06/10	Developments towards an investigation of potential bias from the analysis of tag–release and recapture data in Ross Sea Antarctic toothfish abundance estimates A. Dunn (New Zealand)
WG-FSA-SAM-06/11	Preliminary assessment models of Antarctic toothfish (*Dissostichus mawsoni*) in the Ross Sea including data from the 2005/06 season A. Dunn and S.M. Hanchet (New Zealand)
WG-FSA-SAM-06/12	An update on the development of a management procedure for the toothfish (*Dissostichus eleginoides*) resource in the Prince Edward Islands vicinity A. Brandão and D.S. Butterworth (South Africa)
WG-FSA-SAM-06/13	Review of some assumptions for modelling Patagonian toothfish dynamics at CCAMLR Subarea 48.3 A. Aubone, P.A. Martínez and O.C. Wöhler (Argentina)
WG-FSA-SAM-06/14	An investigation of integrated stock assessment methods for the Patagonian toothfish (*Dissostichus eleginoides*) in Division 58.5.2 using CASAL A. Constable, S. Candy and I. Ball (Australia)

WG-FSA-SAM-06/15	Review of the use of survey data and length-at-age models in the assessment of *Dissostichus eleginoides* in the vicinity of Heard Island and McDonald Islands (Division 58.5.2) D.C. Welsford, A.J. Constable and G.B. Nowara (Australia)
WG-FSA-SAM-06/16	Application of continuous time Markov chains to modelling animal movement: estimation of movement rates and retention times for Patagonian toothfish C. Wilcox, M. Bravington and D. Peel (Australia)

APPENDIX D

REPORT OF THE AD HOC WORKING GROUP ON INCIDENTAL MORTALITY ASSOCIATED WITH FISHING (AD HOC WG-IMAF)

CONTENTS

REPORT OF THE AD HOC WORKING GROUP ON INCIDENTAL MORTALITY ASSOCIATED WITH FISHING (AD HOC WG-IMAF)
(Hobart, Australia, 9 to 13 October 2006)

Intersessional work of ad hoc WG-IMAF

The Secretariat reported on the intersessional activities of ad hoc WG-IMAF according to the agreed plan of intersessional activities for 2005/06 (SC-CAMLR-XXIV/BG/28). The report contained records of all activities planned and is available on the IMAF page of the CCAMLR website.

2. The Working Group thanked the Science Officer for his work on the coordination of IMAF intersessional activities and the technical coordinators of national observer programs for their extensive support. It also thanked the Scientific Observer Data Analyst for his work on the processing and analysis of data submitted to the Secretariat by international and national observers during the course of the 2005/06 fishing season.

3. The Working Group concluded that most tasks planned for 2005/06 had been successfully implemented. During the intersessional period a number of documents with new data and information were received from Members and international organisations. In addition, much of the information requested intersessionally had been presented to the Working Group in papers submitted to the meeting. In particular, the Working Group noted new information on seabird mitigation activities undertaken by regional fisheries management organisations – IOTC, SEAFO, IATTC and WCPFC (see details in paragraphs 160 to 173). The list of current intersessional tasks was reviewed and a number of changes were agreed in order to consolidate specific tasks in future plans. The Working Group agreed that the plan of intersessional activities for 2006/07, compiled by the Co-conveners and the Science Officer, be appended to its report (Table 20).

4. The Working Group especially welcomed to the meeting Mr I. Hay (Australia) and Mr C. Heinecken (South Africa) who were attending the meeting for the first time. The Working Group continued to appreciate Mr M. McNeill's (New Zealand) expert advice on operational aspects of fishing and encouraged analogous input from other Members, including in relation to trawl fisheries. Members were asked to review their representation on WG-IMAF intersessionally, to suggest additional members and to facilitate the attendance of their representatives at the meetings.

5. The Working Group greatly appreciated the participation of a national technical coordinator, Mr Heinecken. His perspective gained from training, briefing and debriefing many CCAMLR scientific observers over several years was invaluable as the Working Group addressed numerous observer-related and data collection issues. In addition to the continued participation of technical coordinators at future meetings, WG-IMAF would also benefit from the participation of South American Members.

Incidental mortality of seabirds and marine mammals
in fisheries in the Convention Area

6. The total extrapolated seabird mortalities during longline fishing for *Dissostichus* spp. outside EEZs in the Convention Area were estimated to be two from Division 58.4.3b. When seabird mortalities reported from EEZs within the Convention Area are included, the total extrapolated seabird mortalities during longline fishing operations in 2005/06 were estimated to be 2 589. This estimate includes 235 birds in Subarea 58.6 and 2 352 birds in Division 58.5.1. For the first time no albatrosses were observed captured in longline fisheries in the Convention Area.

7. Observers reported 33 seabird mortalities, including both albatrosses and petrels, during trawling for finfish in Subarea 48.3. No seabird mortalities were reported during trawling for krill or during pot fishing.

Seabirds in longline fisheries

8. Data were available from all 37 longline cruises conducted within the Convention Area during the 2005/06 season (WG-FSA-06/36 Rev. 2).

9. The Working Group noted that the proportions of hooks observed were similar to those observed for last year for Subarea 48.3 (29% (range 18–39) compared with 31% (range 20–62)); and slightly reduced for Subareas 88.1 and 88.2 (45% (range 20–74) compared with 51% (range 23–100)); Division 58.5.2 (33% (range 31–41) compared with 36% (range 31–41)); and Subareas 58.6 and 58.7 (35% (one vessel) compared with 65% (one vessel)). For other areas the observation rates and ranges increased from last year: Subarea 48.6, 50% compared with 31%; Subarea 58.4, 70% (range 47–100) compared with 56%.

10. As usual, the total observed seabird by-catch rate was calculated using the total number of hooks observed and the total seabird mortality observed (Table 1). The estimated total by-catch of seabirds by vessel was calculated using each vessel's observed catch rate multiplied by the total number of hooks set.

11. The total number of observed mortalities was one, a white-chinned petrel in Division 58.4.3b. The total extrapolated mortality for 2005/06 was two birds (Table 2). This compared to 97 birds estimated killed in 2004/05.

12. The total number of seabirds observed caught and released uninjured was 32 (Table 1). The Working Group noted that the incidence of birds being caught injured and uninjured (i.e. birds that are caught on the haul), accounted for 97% of seabird captures in 2005/06 (Table 1). As last year, this proportion of seabirds caught on the haul suggests that an increased focus on haul mitigation measures is required (SC-CAMLR-XXIV, Annex 5, paragraph 7.3).

French EEZs in Subarea 58.6 and Division 58.5.1

13. Data were available from 20 cruises in Subarea 58.6 and 27 cruises in Division 58.5.1. The proportion of hooks observed was 25 and 24% respectively (Table 4).

14. In 2005/06 the total reported seabird mortality from observers for Subarea 58.6 and Division 58.5.1 was 57 and 592 birds respectively (Table 4). The corresponding incidental mortality rates were 0.0362 and 0.092 birds/thousand hooks. The extrapolated total seabird mortalities for Subarea 58.6 and Division 58.5.1 were 235 and 2 352 respectively (Tables 5 and 6). All vessels in the French EEZs were autoliners using 50 g/m IWLs in 2005/06, compared with one such vessel in the previous season. Two-thirds of the birds were caught by two vessels in Subarea 58.6, and in Division 58.5.1, 72% of captures were by three vessels. This may indicate that there are individual vessel effects that need to be examined to effectively reduce further seabird captures in these areas.

15. Comparing the 2004/05 and 2005/06 seasons, observed incidental mortality rates decreased to 77 and 57% of the previous seasons' rates respectively in Subarea 58.6 and Division 58.5.1 (Table 7).

16. As for 2005, the Working Group noted that the reports of seabirds being caught injured and uninjured indicate that seabirds are being caught on the haul; this accounted for at least 28% of seabird captures in 2005/06 and 30% in 2004/05 (Table 4) (SC-CAMLR-XXIV, Annex 5, paragraph 7.10). This indicates that a much greater need to focus on haul mitigation measures is required to reduce the remaining seabird by-catch in longline fisheries in the Convention Area.

17. In 2005, the Working Group made recommendations regarding future research and monitoring of the French seabird captures (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 39 to 43). Some of these recommendations were addressed in 2005 and the following remain for 2006. The Working Group recommended that:

- consideration be given to increasing the proportion of hooks observed (e.g. to 40–50%);

- a thorough analysis of data be undertaken for the 2003/04 to 2005/06 seasons, similar to that carried out by Delord et al. (2005). Such analyses should include consideration of the effects of time of year, area, moon phase, hour, sink rates, setting speed, bird abundance, streamer line configuration, fishing gear configuration, hook type, line colour, line-weighting regime, offal discharge, sea state and wind, observer and vessel, and special attention should be given to the circumstances associated with sets and hauls where a large number of birds are caught.

18. The Working Group requested that France supply additional information on the nature of captures (such as where in their body seabirds are hooked), the factors affecting captures (such as line hook-ups or other operational difficulties that may expose the line to bird attacks), and details of mitigation devices used, such as streamer line specifications (e.g. aerial extent, length and spacing of streamers, attachment height, number of streamers, towed device, use across sets and number of streamer lines deployed). This information, in combination with data describing where in their body seabirds are hooked, can indicate how to apply further mitigation or changes in fishing practice to reduce seabird by-catch.

19. The Working Group noted that France continues to reduce its total seabird by-catch by about one half each year. However, the total seabird captures during longline fishing in the French EEZs remains far above that recorded elsewhere in the Convention Area. Seasonal

differences in the fishing patterns between areas may account for the differences in catch rates between the French EEZs and other areas, with no longline fishing conducted outside the EEZs during the summer period, which is considered a high-risk time for seabird captures.

20. The Working Group recommended that all relevant raw data describing by-catch in the French EEZ fisheries (Subarea 58.6 and Division 58.5.1), as submitted from all subareas and divisions within the Convention Area, be submitted to CCAMLR to allow the Working Group to report on total seabird by-catch for the entire Convention Area.

Seabirds in trawl fisheries

21. A total of 33 bird mortalities were recorded in trawl fisheries in the Convention Area. These were all recorded in the icefish fishery in Subarea 48.3. In addition, 89 seabird entanglements with the seabirds released alive were recorded in the same fishery (Table 12).

Subarea 48.3 icefish

22. Data were available from all five trawl cruises conducted within Subarea 48.3 during the 2005/06 season (WG-FSA-06/37 Rev. 1, Table 1). The Working Group noted that there was 100% observer coverage of fishing vessels in this fishery with 78% of tows observed.

23. For 2005/06, 33 bird mortalities (11 black-browed albatross, 20 white-chinned petrels, 1 grey-headed albatross and 1 unknown petrel species) were reported in the Subarea 48.3 icefish fishery from four vessels; in addition 89 birds were released alive, uninjured (Table 12). This compares to 11 bird mortalities (and 14 released alive) in 2005 and 87 bird mortalities (and 132 entanglements) in 2004. The rate of mortality in this subarea in 2006 was 0.07 birds per trawl compared to 0.14, 0.37 and 0.20 in 2005, 2004 and 2003 respectively (Table 14).

24. The Working Group noted that there continued to be a general downward trend in the seabird mortality rate in this fishery (Table 14). However, it is difficult to compare between the level of mortality in 2005 and 2006 as the reduced level of mortality in 2005 was thought to be at least partially due to lower seabird abundance associated with reduced icefish catches (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 204). It was also noted that all recorded seabird mortalities, except one, occurred on the haul.

Division 58.5.2 toothfish/icefish

25. Data were available from all three trawl cruises conducted within Division 58.5.2 during the 2005/06 season (WG-FSA-06/37 Rev. 1, Table 1). The Working Group noted that there was 100% observer coverage of fishing vessels in this fishery with 100% of tows observed.

26. No seabird mortalities were recorded in the trawl fishery in Division 58.5.2. Observer reports from three cruises on board the *Southern Champion* indicated that no bird-scaring devices were deployed but the mitigation measures used were in full compliance with Conservation Measure 25-03.

Krill

27. Data were available from five trawl cruises conducted within Area 48 during the 2005/06 season (Table 1). The Working Group noted that there was not 100% observer coverage of fishing vessels in this fishery and only 15% of tows were observed.

28. The Working Group noted that no seabird mortality was recorded on the *Saga Sea* while fishing with continuous trawls in Subarea 48.1. Similarly, no mortalities were recorded on the *Atlantic Navigator* using either continuous trawl or traditional pelagic trawl methods in Subarea 48.1 (WG-FSA-06/57).

29. There were no recorded incidents of seabird mortality or entanglements in the krill fishery in Area 48, with two cruises in Subarea 48.1 and three cruises in Subarea 48.3, noting that one cruise is incomplete with the vessel still being at sea (WG-FSA-06/37 Rev. 1).

30. In 2005, the Working Group recommended increasing coverage in the krill fishery to 100% of vessels (SC-CAMLR-XXIV, Annex 5, paragraphs 7.55 and 7.56).

31. The Working Group reiterated its advice from 2005 and recommended that the observation of fishing effort in the krill fishery be increased from the current 15% of total effort on a few vessels to 30–50% of effort on 100% of vessels to allow for adequate and representative sampling across all trawl fisheries. This is especially important for the cryptic mortality known to be associated with trawl warp strike (paragraph 75) and for monitoring the ability to use net binding as a mitigation measure for seabirds during net deployment (paragraphs 54 and 59).

Seabirds in pot fisheries

32. During pot fishing in 2005/06, no seabird mortalities were recorded during three cruises targeting *D. eleginoides* in Divisions 58.5.1 and 58.5.2 and Subarea 48.3 (WG-FSA-06/39 Rev. 1).

Marine mammals in longline fisheries

33. There were no reports of incidental mortality of marine mammals in longline gear (WG-FSA-06/36 Rev. 2). This differs from 2004/05, when both pinnipeds (five animals) and cetaceans (two animals) were reported caught (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 196 to 198). In addition, two marine mammals were reported entangled (one Antarctic fur seal in Division 58.5.2, one southern elephant seal in Subareas 88.1/88.2) (WG-FSA-06/38, Table 2).

Marine mammals in trawl fisheries

Krill

34. In 2005/06, and with 15% of total fishing effort observed, one Antarctic fur seal was reported caught and killed (Table 12). The Working Group noted that this level of mortality is greatly reduced from 2004/05, when 96 Antarctic fur seals were observed caught during krill fishing operations in the same area (Area 48) (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 217). The Working Group noted that no marine mammal mortality was reported on the *Saga Sea* while fishing continuous trawls in Subarea 48.1 in 2005/06.

35. Methods deployed to avoid marine mammal capture in 2005/06 were net barriers and a seal exclusion device (WG-FSA-06/37 Rev. 1). The Working Group considered it useful to compare mitigation measures used between years, and the capture rates of associated gear, with a view to identifying potentially effective methods over time.

Finfish

36. In Subarea 48.3, no marine mammal entanglements were recorded with 78% of trawls observed. One leopard seal was caught and killed in the Division 58.5.2 toothfish trawl fishery (compared to one Antarctic fur seal in 2004/05), with 100% observer coverage (Table 14). No mitigation methods were reported.

Marine mammals in pot fisheries

37. There were no reports of incidental mortality of marine mammals in pot fisheries (WG-FSA-06/39 Rev. 1).

Information relating to the implementation of Conservation Measures 25-01, 25-02 and 25-03

38. Information from observer reports relating to the implementation of Conservation Measures 25-01, 25-02 and 25-03 in 2005/06 were provided by the Secretariat in WG-FSA-06/38.

Conservation Measure 25-01 'Regulation of the use and disposal of plastic packaging bands on fishing vessels'

39. Conservation Measure 25-01 prohibits the use of plastic packaging bands to secure bait boxes. The use of other plastic packaging bands is restricted to those vessels with on-board incineration facilities and all bands must be cut and disposed of using this facility. Information from observer reports indicated 100% compliance with this measure, compared to non-compliance indicated by observer reports on one of 10 vessels in 2005 (WG-FSA-06/38, Table 1).

Conservation Measure 25-02 'Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area'

Line weighting

40. For Spanish system vessels there was 100% reported compliance with the line-weighting regime in all subareas and divisions, as for 2005 (WG-FSA-06/38, Table 4). For autoline vessels, all vessels fishing in Subareas 88.1 and 88.2 and Division 58.4.2 south of 60°S in daylight met the requirement to achieve a consistent minimum line sink rate as described in Conservation Measure 24-02. As in previous years, this line-weighting requirement has been fully achieved by all vessels. For 2005/06, the Working Group noted that only one vessel (*Protegat* in Subarea 48.3), using a variation on the autoline method, used clip-on weights to achieve the sink rate requirements. All other autoline vessels were now using IWLs. The Working Group noted that the *Shinsei Maru No. 3*, using a trot-line system, met the sink rate requirements in Subarea 48.6.

Night setting and offal discharge

41. There was 100% compliance with night setting, and also for offal discharge in all areas where this was required (Subareas 48.3, 48.4, 58.6, 58.7, 88.1 and 88.2) (WG-FSA-06/38, Table 4).

Discard of hooks

42. Observers reported hooks being present in discards on 6 of 36 longline cruises; on three of these this was reported as a rare event. However, the observer reports for the *Globalpesca I* in Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b, the *Protegat* in Subarea 48.3, and the *Punta Ballena* in Subareas 88.1/88.2, indicated that this was a daily occurrence (WG-FSA-06/38, Table 1).

Streamer lines

43. Compliance with streamer line design has increased from 74% (28 of 44 cruises) in 2004/05 to 80% (29 of 36 cruises) this year (WG-FSA-06/38, Table 3), although this is not as high as the 92% (34 of 37 cruises) in 2003. However most of the non-compliant vessels had only minor deviations from the requirement.

44. The cruises where streamer lines did not comply failed on streamer lengths (five cruises), total streamer line length (three cruises, but only one of these deviated by more than 3 m from the required length) and branched streamer spacing (1 cruise). Four vessels failed on one different streamer line specification (*Globalpesca II*, *Insung No. 2* and *Galaecia* in Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b; *Frøyanes* in Subareas 88.1/88.2) and two vessels did not comply on two specifications (*Koryo Maru No. 11* and *Viking Sur*). There was 100% compliance with attachment height.

Haul-scaring devices

45. Conservation Measure 25-02 (paragraph 8) requires that a device designed to discourage birds from accessing baits during the haul of longlines (haul-scaring devices) shall be employed in those areas defined by CCAMLR as average-to-high or high (level of risk 4 or 5) in terms of risk of seabird by-catch. These areas are currently Subareas 48.3, 58.6 and 58.7 and Divisions 58.5.1 and 58.5.2.

46. In Subarea 48.3, four vessels (*Protegat* (78%), *Jacqueline* (46%), *Argos Georgia* (90%) and *Viking Bay* (98%)) did not use haul-scaring devices on all hauls. In Division 58.5.2, two trips by the *Janas* were reported with 100 and 94% compliance with this requirement respectively. In Subarea 58.6 outside the French EEZ and Subarea 58.7 there was 100% compliance (one vessel fished).

Gear debris and garbage

47. The Working Group noted a reported increase in the discharge of gear debris, which occurred on three vessels, one in Subarea 48.3, and two in Divisions 58.4.1, 58.4.2, 58.4.3a and 58.4.3b. This included fishing gear, small sections of line, snoods and plastics. The Working Group noted that this may have additional negative effects on seabirds and marine mammals which could not be quantified at this time. There was 100% compliance with inorganic garbage discharge requirements for longline vessels, though one trawl vessel discharged inorganic discharge. No vessels discharged oil.

Net sonde cables

48. Three observer reports noted that vessel used net sonde cables (*Cabo de Hornos* and *Betanzos* in Subarea 48.3; *Konstruktor Koshkin* in Subarea 48.1). It was unclear whether these were net sonde cables or paravanes, as had been the case in previous years. The Working Group developed a description for incorporation into the scientific observer logbook to clarify the distinction between the two devices and submitted that material directly to the Scientific Observer Data Analyst (paragraph 121).

49. The Working Group reiterated its concern that care was needed to ensure accurate reporting of data by observers because inaccurate reporting may have consequences for reviewing the performance of vessels in fisheries.

Conservation Measure 25-03 'Minimisation of the incidental mortality of seabirds and marine mammals in the course of trawl fishing in the Convention Area'

50. A range of mitigation measures was used on board icefish vessels in Subarea 48.3 and compliance with Conservation Measure 25-03 was generally good. The *Argos Pereira* covered the upper parts of mesh ranging from 135–400 mm with a 'jacket' of 90 mm mesh net. The effectiveness of the panel was not discussed in the observer's report, but it was noted

that this was the only vessel to record no seabird mortalities or entanglements. However, the Working Group recalled that black-browed albatross mortality has been recorded in mesh sizes up to 800 mm (WG-FSA-03/79).

51. Observer reports suggested that the reduced level of seabird mortality recorded during shooting operations was due to improved mitigation measures, including net cleaning, and a combination of weight added to the net and net binding; the latter is described in WG-FSA-05/59 and SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 207. Detailed reporting on net binding was only recorded in two cruise reports from Subarea 48.3. This may have been partly due to the lack of a specific field in the observer logbook to record the use of the method. The Working Group developed recommended changes to the scientific observer logbook to collect these data in future (paragraphs 121 to 124).

Net binding

52. The Working Group noted that the *Insung Ho* used a synthetic netting material to tie slipknots around 150–400 mm sections of the mesh, as opposed to organic sisal string tied to the net as recommended in SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 207. The observer report also indicated that the slipknots frequently opened before the doors were paid away, causing the net to loft on the surface.

53. Net weighting was added to the net to reduce the surface time of the net during shots and hauls on two vessels. The *Cabo de Hornos* reported that 2 x 150 kg chains were stitched along the edges of the codend, and the *Argos Pereira* added two chains of 200 kg each.

54. On the *Cabo de Hornos*, in response to seven mortalities in a single shot in the 100–120 mm mesh, this section of the net was replaced with 150–200 mm mesh. While the effectiveness of this measure was not reported, it was noted that a total of only seven mortalities were recorded on this vessel (i.e. implying all coming from the smaller mesh). Observer reports indicated that two vessels used 'Brady Bafflers' and a third vessel deployed a pair of booms astern of the trawl ramp with net and rope hanging around 2 m seaward. Observers noted that both devices were of little use in preventing net entanglements with seabirds.

55. Similar to reports from last year (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 207) observer data from 2005/06 indicated that streamer lines appeared ineffective during the haul, as tension could not be maintained in the lines to keep them aloft as the vessel slowed, stopped or went in reverse during hauling.

56. The Working Group noted that the *Insung Ho* was non-compliant with the prohibition of offal discharge during shooting and hauling in Subarea 48.3 as prescribed in Conservation Measure 25-03 on 10 occasions (5.9%). Observer reports also indicated a failure to comply with deck lighting restrictions on board three vessels. The Working Group noted that no information on mitigation measures was recorded on the *Sil* (Table 10).

57. The consistency of reporting on the adoption of mitigation measures in the icefish trawl fishery varied considerably. The Working Group recommended changes to the observer logbook to improve the collection of these data (paragraphs 120 to 124).

58. Only a single seabird mortality was recorded during net shooting in the icefish fishery in Subarea 48.3. The Working Group recalled reports of the effective use of net binding to reduce seabird interactions with trawl nets in the *Champsocephalus gunnari* fishery in Subarea 48.3 (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 207; 2004/05 Cruise Reports). Preliminary trials conducted in 2004 and two subsequent seasons of operational experience indicate that binding the net is a highly effective and easily accomplished mitigation measure. There is increasing evidence from observer reports and anecdotal information from fishing companies and technical coordinators (Mr Heinecken and Dr D. Agnew, UK) that in combination with net cleaning and weighting, net binding may be largely responsible for reductions in seabird mortality during shooting operations.

59. The Working Group strongly recommended the use of net binding in the *C. gunnari* fishery in Subarea 48.3, and other pelagic trawl fisheries in the Convention Area, as appropriate. The following guidelines are provided to assist in a uniform uptake of this mitigation measure:

(i) When the net is on the deck, prior to shooting, the application of 3-ply sisal string (which typically has a breaking strength of around 110 kg), or a similar inorganic material, at intervals of approximately 5 m prevents the net from spreading and lofting at the surface. Net binding should be applied to mesh ranging from 120–800 mm. These mesh sizes have been shown to cause the majority of entanglements for white-chinned petrels and black-browed albatrosses, which are the most vulnerable species to this form of mortality in Subarea 48.3.

(ii) When applying the 'string', tie an end to the net to prevent the string from slipping down the net and ensure that it can be removed when the net is hauled.

(iii) Added weights to the codend should be used in conjunction with net binding to increase the sink rate of the net and increase the angle of the net's ascent during hauling, therefore reducing surface net time.

(iv) Net cleaning should be used in conjunction with added weight and net binding to reduce seabird captures during shooting operations.

60. The Working Group recommended that an advisory note be added to Conservation Measure 42-01 to assist in the uptake of this mitigation measure. Accordingly, the Working Group recommended that Conservation Measure 42-01 be revised as follows:

Add the following sentence to 'mitigation' paragraph 7:

Vessels are encouraged to use net binding as a means to reduce seabird interactions. See SC-CAMLR-XXV, Annex 5, Appendix D, paragraph 59 for guidelines for net binding.

61. The Working Group will review the use of net binding to assess the efficacy of this mitigation measure in all pelagic trawl fisheries.

62. The Working Group noted that no information is currently collected about seabird interactions with trawl warp cables. The Working Group strongly recommended that data be collected to assess and evaluate the nature and extent of such interactions. Data collection protocols, revisions to observer logbooks and cruise reports have been developed and will be incorporated by the Secretariat for 2006/07 fisheries (paragraphs 74, 122 and 123).

General

63. The Working Group reflected that the ongoing success in minimising and mitigating by-catch of seabirds in longline fisheries in the Convention Area has resulted from an ongoing and adaptive approach to application of mitigation measures. The success and uptake of this approach has been contingent on the sustained very high level (100%) of observer coverage in the Convention Area.

Incidental mortality of seabirds outside the Convention Area

Longline

New Zealand

64. Dr S. Waugh (New Zealand) noted that in New Zealand fisheries in 2003/04, observers reported the capture of the following seabird species that breed in the Convention Area: black-browed albatross (1), light-mantled albatross (1), grey petrel (3) and white-chinned petrel (4) caught in tuna longline fisheries, white-chinned petrel (31), Cape petrel (1) in autoline fisheries for ling. An additional 37 seabird captures of unidentified species were recorded by observers. Where estimation of total captures was possible, 514 seabirds were estimated in 2003/04 New Zealand longline fisheries.

65. For 2004/05 New Zealand fisheries, observers reported the capture of the following seabird species that breed in the Convention Area: grey petrel (2), white-chinned petrel (3) and southern giant petrel (2) caught in tuna longline fisheries, white-chinned petrel (10), grey petrel (1) and common diving petrel (1) caught in ling autoline fisheries, an additional 160 seabird captures of unidentified species were also reported. Where estimation of total captures was possible, 329 seabirds were estimated in the 2004/05 New Zealand longline fisheries.

Other areas

66. No other Members reported on longline seabird by-catch from outside the Convention Area.

Trawl

New Zealand

67. Dr Waugh reported that for observed trawl fisheries in New Zealand for 2003/04, estimated total captures of seabirds were 338 birds (34% CV) in hoki trawl fisheries and 845 birds (8% CV) in squid trawl fisheries. An additional 190 unidentified seabirds were recorded by observers. For 2004/05 there were 395 birds estimated caught (23% CV) in hoki trawl fisheries and 1 454 birds (7% CV) in squid trawl fisheries, with an additional 77 unidentified seabirds.

South Africa

68. Mr Heinecken reported on WG-FSA-06/41 which provided estimates of the incidental mortality of seabirds in South Africa's deep-water hake trawl fishery. Observations of seabird interactions with gear were made on 331 trawls during 20 trips on 14 vessels between mid-2004 and the end of 2005. Shy and black-browed albatross were killed most frequently and low numbers of white-chinned petrels, Cape gannets and sooty shearwaters were also killed. Mortalities were greater in winter, when more seabirds attended fishing vessels, primarily when offal was being discharged. The total extrapolated annual seabird mortality was approximately 18 000 (95% CI 8 000–31 000), of which 85% were killed on trawl warp cables and 15% entangled in nets. Of the birds killed, approximately 5 000 (95% CI 3 000–12 500) were black-browed albatrosses. Based on satellite-tracking data, these birds are likely to be predominantly Convention Area birds breeding in South Georgia.

69. The Working Group noted that the data collection protocols for warp cable strikes were similar to those used in the Falkland/Malvinas Islands (WG-FSA-04/79) and New Zealand (WG-FSA-05/41), with the exception that due to closely trimmed warp cable splices resulting in few birds being hauled on board, a new data field was added to estimate the number of birds that were observed to be dragged under water and not to surface. A proportion of these events were verified by post-hoc analysis of video recordings. The Working Group recognised that these estimates were based on a small observed sample and viewed the extrapolation with caution. However, the level of estimated seabird mortality remains a serious conservation concern.

70. As reported in previous studies of seabird mortality associated with warp cable strikes, the highest level of mortality was associated with periods of offal discharge (WG-FSA-04/79 and 05/41). Studies suggest that large-winged birds such as albatrosses and giant petrels (WG-FSA-04/79) are more susceptible to having their wings wrap around warp cables and being dragged underwater. It was noted that in July 2006, streamer lines became mandatory in the South Africa hake trawl fishery, as a means to deter seabirds from warp cable collisions. The Working Group encouraged the development of a more effective and operationally simple design of streamer lines that would be supported by the industry and deployed by the crew.

71. Mr Heinecken noted the cryptic nature of seabird warp-strike mortalities, not normally seen unless specific observations of bird contacts with warps are undertaken. The cryptic nature of this mortality and the need for specifically tasked seabird observers to record and

quantify this type of mortality has been noted in recent years (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 211; WG-FSA-04/79 and 05/41). The Working Group re-emphasised the need for effective mitigation of seabird by-catch in trawl fisheries, recommended expanded data collection by dedicated seabird observers to determine the extent of the interaction and noted that restricting offal discharge during trawl operations would significantly reduce the observed by-catch in this fishery.

Development of a trawl warp cable data collection protocol for inside the Convention Area

72. Dr Waugh reported on the development of data collection protocols (WG-FSA-06/62) to record seabird strikes and mortality on trawl warps in the New Zealand squid fishery and on intersessional work (WG-FSA-06/61) to develop a data collection protocol to investigate seabird and warp cable strikes in trawl fisheries in the Convention Area.

73. The levels of seabird mortality of Convention Area seabirds in trawl fisheries in New Zealand and South Africa are a conservation concern. Taken together with the seabird mortalities reported in the *C. gunnari* trawl fishery in Subarea 48.3 this year as well as past years (Table 14), the Working Group reiterated the need to monitor seabird strikes with trawl warp cables in the Convention Area (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 210 to 212).

74. Thus, the Working Group developed forms and a protocol and recommended that they are used in all trawl fisheries in the Convention Area. The objective is to assess the extent of seabird interactions with trawl warp cables in Convention Area fisheries. This would be undertaken in three stages:

(i) document if seabird interactions with trawl warp cables are occurring in the Convention Area fisheries;

(ii) if detected, examine the nature and extent of seabird mortalities, including the vessel type, seabird species concerned and operational factors of the fishery that may contribute to the interactions;

(iii) examine mitigation options to reduce mortality of seabirds in these fisheries.

75. The Working Group recommended that the first stage occur in 2006/07, requiring sampling across a high proportion of vessels and fisheries (paragraphs 22, 25, 27 and 31).

Incidental mortality of seabirds during unregulated longline fishing in the Convention Area

76. As no information is available on rates of incidental mortality of seabirds from the unregulated fishery, estimates of the incidental mortality of seabirds during IUU fishing within the Convention Area present a number of difficulties, requiring various assumptions to be made.

77. In previous years, the Working Group has prepared estimates using both the average catch rate for all cruises from the appropriate period of the regulated fishery in a particular area and the highest catch rate for any cruise in the regulated fishery for that period. Justification for using the worst catch rate from the regulated fishery is that unregulated vessels accept no obligation to use any of the mitigation measures prescribed in CCAMLR conservation measures. Therefore catch rates, on average, are likely to be considerably higher than in the regulated fishery.

78. As no information is available on rates of incidental mortality of seabirds from the unregulated fishery, estimates have been made by bootstrapping the observed catch rates from fishing operations in 1996/97. The fleet in 1996/97 implemented relatively few mitigation measures and has been considered to provide the best estimate the Working Group has of likely catch rates in the unregulated fishery. The method used to prepare estimates of the incidental mortality of seabirds during IUU fishing within the Convention Area is described in full in SC-CAMLR-XXV/BG/27 and in SC-CAMLR-XXII, Annex 5, paragraphs 6.112 to 6.117.

79. The Working Group agreed that the following values should be applied to the toothfish removals data to estimate seabird by-catch in IUU *Dissostichus* spp. fisheries in the Convention Area in 2006 (SCIC-06/9), and also agreed that these values should be used to generate similar estimates for previous years. The resulting median and 95% confidence intervals for seabird incidental mortality rates (birds/thousand hooks) for the unregulated fishery are shown below. It should be noted that where incidental mortality rates are not available for a regulated fishery within a statistical area, the rate for an adjacent area of similar level of risk (SC-CAMLR-XXV/BG/26) has been used.

Subarea/division	Season	Lower 95%	Median	Upper 95%
48.3	Summer	0.39	0.741	11.641
	Winter	0	0	0.99
58.6, 58.7, 58.5.1, 58.5.2	Summer	0.45	0.55	1.45
	Winter	0.01	0.01	0.07
58.4.2, 58.4.3, 58.4.4	Summer	0.27	0.33	0.87
	Winter	0.006	0.006	0.042
88.1, 88.2	Summer	0.27	0.33	0.87
	Winter	Not applicable, access not possible in winter		

80. The estimates of potential unregulated seabird by-catch in the Convention Area in 2004/05 and comparison with estimates for previous years are provided in detail in SC-CAMLR-XXV/BG/27.

81. The estimated total for the whole Convention Area in 2005/06 indicates a potential incidental mortality of seabirds in the unregulated fishery of 4 583 (95% CI 3 756–12 237) seabirds. The values for this and previous years are summarised in respect of different parts of the Convention Area in Table 17.

82. In comparison with estimates for previous years, calculated in identical fashion, the value for 2005/06 is similar to the values estimated for 2003/04 (SC-CAMLR-XXIII/BG/23)

and 2004/05 (SC-CAMLR-XXIV/BG/27). These are the lowest reported values since estimates started in 1996. This presumably reflects a commensurate reduction in toothfish removals or changes in the areas from where IUU fishing occurs.

83. Based on the data since 1996 (SC-CAMLR-XXIV/BG/27), an estimated total of 185 716 (95% CI 151 187–543 319) seabirds have been killed by these vessels. Of these:

(i) 41 590 (95% CI 33 647–131 451) were albatrosses, including individuals of four species listed as globally threatened using the IUCN threat classification criteria (BirdLife International, 2004);

(ii) 7 359 (95% CI 6 011–20 597) were giant petrels, including one globally threatened species;

(iii) 116 478 (95% CI 94 973–333 776) were white-chinned petrels, a globally threatened species.

84. The Working Group also noted that grey petrels, a winter-breeding species that is another globally threatened species, have comprised between 5 and 11% of the catch in the regulated fishery in Division 58.5.1 over the last three years, and that some of the estimated 454 to 1 478 birds taken in the IUU fishery this year may have been of this species. The Working Group undertook to examine methods of estimating the by-catch of this species by IUU vessels within Division 58.5.1 as an intersessional task with a view to assessing the level of take of grey petrels in future years.

85. As in previous years, it was emphasised that these values are very rough estimates (with potentially large errors). The present estimates should only be taken as indicative of the potential levels of seabird mortality occurring in the Convention Area due to unregulated fishing and should be treated with caution.

86. Nevertheless, even taking this into account, the Working Group endorsed its conclusions of recent years that:

(i) the levels of loss of seabirds from the populations of these species and species groups are still broadly consistent with such data as exist on the population trends of these taxa, including deterioration in conservation status as measured through the IUCN criteria;

(ii) although considerably reduced from previous years, such levels of mortality probably still continue to be unsustainable for some of the populations of albatrosses and giant and white-chinned petrels breeding in the Convention Area.

87. Many albatross and petrel species are facing potential extinction as a result of fishing operations. The Working Group again requested the Commission to continue to take action to prevent further incidental mortality of seabirds by unregulated vessels in the forthcoming fishing season.

Research into and experience with mitigation measures

Longline

88. Dr G. Robertson (Australia) presented WG-FSA-06/22 and reported results of an experiment on a chartered Spanish system longline vessel to examine a range of factors that affect the sink rate of longlines to improve seabird deterrent capabilities. This work was proposed in 2005 (WG-FSA-05/12; SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 65 to 71) and endorsed by the Scientific Committee (SC-CAMLR-XXIV, paragraph 5.16) and the Commission (CCAMLR-XXIV, paragraph 5.1).

89. The research produced a range of recommendations, including a new line-weighting regime, aimed at improving sink rates to depths beyond where seabirds can access baited hooks. As outlined in WG-FSA-05/12, the next steps are to test the new line-weighting regime operationally in 2007 and its effectiveness as a seabird deterrent. The ongoing research will involve comparing the differences in sink rates between traditional Spanish system weights (bags of rocks) and elliptical steel weights. The objective of this trial is to determine the mass of steel weight that will sink gear at the same rate as the traditional weights (8.5 kg at 40 m) in Conservation Measure 25-02. The elliptical steel weights will be smaller and lighter, easier to handle and less likely to snag on the seabed (and hence result in less gear lost and less 'ghost' fishing).

90. Following final stages of research, the Working Group recommended that a suite of best-practice seabird by-catch mitigation measures for Spanish system longline vessels be developed.

91. The Working Group also noted the recommendation in WG-FSA-06/22 that Spanish system vessels could reduce line tension events that occur during setting and can often lead to seabird mortality events by reducing the number of hooks that become snagged on both the setting table and setting boxes. The use of a marine-grade stainless steel to manufacture a steel apron on the setting table and stainless steel sleeves in all hook boxes was considered to be an important step to ensuring the continued high level of performance of Spanish system vessels.

Shinsei Maru No. 3 bottom-line system

92. Based on the requested information received about the *Shinsei Maru No. 3* bottom-line system on the structure of the gear, the weight of line weights, estimated sink rates, and an accounting of any seabird interactions with the gear (WG-FSA-06/15; SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 81; WG-FSA-05/26), the Working Group determined that the threats to Convention Area seabirds during line-setting operations would be minimal and potentially lower than with the traditional Spanish system. The cruise report noted that no birds were hooked either in line setting or line hauling and a bird-scaring device was used during line hauling.

93. The Working Group noted with interest this gear design and weighting regime and agreed that continued reporting of this methodology would provide valuable information on its performance in relation to seabird by-catch.

94. The Working Group also noted with interest the comparatively high target species catch rates for the *Shinsei Maru No. 3* bottom-line system compared to the traditional Spanish system, although the source of the latter data was not provided in the paper (WG-FSA-06/15).

Integrated weight lines

95. The Working Group noted that previous trials on the sink rate of IWLs had investigated the sink rate of lines with 50 g/m of lead for a range of line diameters (9.0–11.5 mm). But it was noted that at the time of these trials that IWLs were only manufactured by a single company (Fiskevegn). Due to the success of IWLs in reducing seabird mortality and the widespread support for their operational characteristics, several other manufacturers are now producing IWLs.

96. The Working Group agreed that it was critical that IWLs produced by other manufacturers needed to strictly comply with the 50 g/m specification and to ensure that the operational characteristics of IWLs conformed with Conservation Measure 25-02. IWLs that are developed to being greater than 12 mm diameter would need to undergo independent sink rate tests to ensure that they meet the 0.2 m/sec sink rate, as required in Conservation Measure 24-02.

Streamer lines

97. The Working Group noted the recommendation in WG-FSA-06/22 that mechanised streamer line systems could greatly assist in their retrieval and agreed that further research was required into the utility and cost of such systems. Several key characteristics of streamer lines were identified as critical for such trials. These included the length of the mainline, the nature of the tension device (towed object), aerial extent, the material of the mainline and streamers and the attachment position and height.

Streamer lines and integrated weight line

98. Mr E. Melvin (USA) reported on WG-FSA-06/52, which described the results of research comparing the performance of 50 g/m IWLs to unweighted longlines (UWLs) both with and without paired streamer lines (PS) in the 2005 Bering Sea fishery for Pacific cod (*Gadus macrocephalus*). Performance measures included seabird mortality, abundance and behaviour, fish catch rates of target and non-target fish, an assessment of relative sink rates and 2 m access windows, as well as practical matters of relative handling and breaking strength.

99. All mitigation technologies dramatically decreased seabird by-catch rates, while having little to no effect on fish catch rates – target or by-catch species. Mitigation was more effective for surface foraging seabirds (91–100%) than for diving seabirds (79–97%). Shearwater seabird catch rates were significantly less for IWL-PS than for UWL-PS, reducing by-catch rates by 97% compared to no deterrent (UWLs). IWLs and UWL-PS performed

similarly reducing shearwater by-catch rates by 88 and 79% respectively. For surface foragers IWLs, UWL-PS and IWL-PS performed similarly reducing catch by 91, 98 and 100% respectively.

100. The substantial reductions in seabird mortality when using IWLs alone (91% for shearwaters and 88% for surface foragers) occurred despite the lack of a concomitant decrease in seabird attack rate or abundance. The Working Group concluded that attack rates alone are a poor indicator of seabird mortality and consequently a poor measure of success in seabird mitigation research programs. Seabird attack rates on longlines were significantly reduced within 60 m – the aerial extent of streamer lines – when PS were used. Functionally, IWLs reduced the 2 m access window by nearly half compared to UWLs. Sink rates and access windows varied between vessels. This variation was a function of deployment of gear relative to rotation of the propeller and vessel speed.

101. The paper recommended revisions to Conservation Measures 24-02 and 25-02 based on these results. Proposed revisions to Conservation Measure 24-02 included measuring sink rates to a depth of 2 m (in addition to or instead of 10 m or 15 m) and estimating the 2 m access window (seconds to 2 m x speed in m/s) for each set where sink rates are measured. Proposed revisions to Conservation Measure 25-02 included requiring two streamer lines instead of one during line setting and requiring 50 g/m (minimum weighting) IWLs for autoline vessels fishing in the Convention Area.

102. The need for revisions to conservation measures was discussed generally, noting that the number of seabirds taken in the Convention Area, not including the French EEZ, was near zero in 2005/06. However, the Working Group noted that while these findings indicated that the use of two streamer lines and 50 g/m IWLs constituted the best seabird mitigation practice for autoline longline fisheries in Alaska, that the effectiveness of two streamer lines compared to single lines need to be tested in Southern Ocean conditions in a fishery with similar seabird assemblages to those encountered within the Convention Area. This would ideally include a mix of *Thalassarche* and *Diomedea* albatrosses, *Procellaria* petrels and *Puffinus* shearwaters. The Working Group recommended that such tests are conducted.

Sink rates and access windows

103. The Working Group reviewed a data extract from 2005/06 sets with sink rate data for both Spanish gear and autoline vessels to examine sink rates achieved in Convention Area fisheries and to evaluate 2 m access windows relative to the aerial extent of streamer lines. All sink rate data were generated using the 10 m bottle line test – no TDRs were used to measure sink rates in the Convention Area. All autoline sets were made using IWLs, but the Working Group noted one exception. The *Protegat* fishing in Subarea 48.3 was categorised as an autoline vessel by the observer and had IWLs on board, but IWLs were not used and the gear that was set would best be described as Spanish gear (double-line system).

104. The Working Group noted that most sink rates (Figure 1) and streamer line aerial extent estimates (Table 11) greatly exceeded those documented through extensive TDR data collection activities for both IWLs and Spanish system gear. This observation led to questions regarding the methodology by which sink rates and streamer line aerial extent are measured by fishery observers. Estimates of the 2 m access window based on the available

sink rate data yielded a mean of 23 m for IWLs and 20 m for Spanish system gear. Mean streamer line aerial extent was 73 m for IWLs and 84 m for Spanish system gear. The Working Group recommended several observer logbook and cruise report modifications to address these points (paragraphs 118 and 119).

Longline bait

105. Dr T. Micol (France) reported results of a comparison made on board one French vessel on white-chinned petrel responses to treated mackerel baits (spicy) versus untreated baits. The petrels readily consumed all untreated baits. However, birds almost never swallowed treated baits immediately and they sometimes ignored them completely. While preliminary, these results suggest that treated baits could be effective in reducing seabird attacks on longline baits, and consequently reducing seabird capture on baited hooks. The Working Group looks forward to receiving a working paper detailing this research.

Longline hauling

106. Given that 32 birds were observed caught and uninjured during the haul, compared to a single mortality during line setting (WG-FSA-06/36 Rev. 2, Table 2), the Working Group reiterated that priority should be given to reducing the number of birds caught during line hauling (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 11 and 84 to 86). Conservation Measure 25-02, paragraph 8, requires that a device designed to discourage birds from accessing baits during line hauling be used in high-risk areas for seabirds (Subareas 48.3, 58.6 and 58.7 and Divisions 58.5.1 and 58.5.2).

107. The Working Group noted that it was not possible to develop prescribed standards for the refinement of Conservation Measure 25-02 (SC-CAMLR-XXIV, Appendix O, paragraph 84), as the level of detail reported by observers on the design of devices currently used was insufficient to determine the most appropriate device to recommend. The Working Group recommended that the observer logbooks be updated to collect the required information in the 2006/07 season. Recommended changes were provided to the Secretariat (paragraph 120).

Longline hauling mitigation measures

108. A total of 312 birds were reported caught and released alive during line hauling operations in the 2005/06 season in Subareas 48.3, 48.4, 58.6 and 58.7 and Division 58.5.1 (WG-FSA-06/36 Rev. 2, Tables 2 and 6.1). In all the other areas where longline fishing operations occurred no birds were caught while hauling. No haul mitigation measures were reported for Subarea 58.6 and Division 58.5.1 where 280 of the 312 seabirds were caught during hauling.

109. For areas where haul mitigation measures were reported, the catch rates (birds/thousand hooks) for Subareas 48.3 and 48.4, and the South Africa EEZ areas (Subareas 58.6 and 58.7) were 0.003, 0.005 and 0.015 respectively.

110. A comparison of the catch rate by gear type indicates 0.001 birds/thousand hooks for autoline gear and 0.004 birds/thousand hooks for Spanish system gear.

111. Haul mitigation devices were reported in use at the hauling station for 78 to 100% sets (paragraph 22). Three haul mitigation designs were described in the observer reports:

(i) A single boom extending 3–5 m perpendicular from the side of the vessel, approximately 1–2 m aft of the hauling station. From the end of the boom, a single line was suspended with a buoy attached to the end of the line so that it just touched the water surface. With the rolling of the vessel, the buoy swung around in an erratic manner in front of the hauling station. The movement and size of the buoy distracted and scared any birds approaching the 'swing' area of the buoy.

(ii) A single boom extending 3–5 m perpendicular from the side of the vessel, approximately 1–2 m forward of the hauling station. From the boom, multiple sets of paired streamers were attached that reached down to the surface of the water.

(iii) A 'Brickle curtain', consisting of two booms, approximately 6 m in length, that extend out over the water ahead and aft of the hauling station. A rope was extended from the rail to the end of the first boom, across to the end of the second boom and back to the rail on the other side. Long bright orange streamers suspended from this rope at short (approximately) half a metre intervals that hung down into the water. Weights were attached to the ends of the streamers so that they extended below the surface of the water. The overall effect was a curtain of streamers that completely enclosed the line-hauling point. The device reportedly proved to be extremely effective in deterring birds from approaching close to the hauling point. However, a number of disadvantages to this system were noted. The close proximity of the streamers resulted in them getting tangled and hooked on exposed hooks on the line being retrieved. The resultant procedure of having to retrieve the system to unhook the line and then re-deploy it resulted in the crew becoming more and more reluctant to keep it in place. One vessel used three booms and the curtain of streamers extended down the starboard side of the vessel from a point forward of the hauling station to the stern.

112. A fourth system described where no birds were caught was a 'moon pool' where the line was hauled inside the vessel and not exposed on the surface outside the vessel.

113. The Working Group noted that the use of a moon pool poses the optimum mitigation efficacy against catching birds while hauling. From the results where seabirds were caught, the Brickle curtain was the most effective mitigation described. The single boom and suspended buoy was the least effective measure. It also noted that the greatest numbers of birds were caught during the southern summer season (September to April) in Subareas 58.6/58.7 (South African EEZ) where the single boom/buoy technique was used.

114. The Working Group noted that the Brickle curtain is a highly effective haul mitigation device for longline vessels. The Working Group encouraged technical coordinators to instruct observers to collect information on haul mitigation devices used in the Convention Area.

Trawl

115. WG-FSA-06/41 did not report data on mitigation trials; however, the authors reported that a pair of short streamer lines set over the warps in initial trials prevented seabirds from entering the danger zone where warps enter the water. Their use was recommended based on these initial trials and subsequently became a permit requirement starting in the second half of 2006. The authors also suggested that vessels should manage offal discharge to minimise seabird interactions.

General

116. The Working Group noted the need for seabird mitigation research to explore effects on target species and the by-catch of other taxa of new and additional mitigation measures.

Observer data collection

117. The Working Group reviewed data collection needs relative to several areas of seabird interactions and mitigation and proposed additions or changes to logbooks and cruise reports.

Longline

118. A review of sink rate data from the fishery for both Spanish gear and autoline gear (WG-FSA-06/38, Table 6) suggested that additional data would be useful to interpret anomalously high sink rates especially with Spanish longline gear. The Working Group suggested simple additions to the logbook to indicate the placement of bottle test attachment lines relative to added weights, how gear is set relative to the direction of the propeller, and if weight spacing during a bottle line test matches the spacing used typically during fishing.

119. As with sink rate data, aerial extent data on streamer lines varied greatly (Table 11), suggesting that instructions to fishery observers could be improved. Consequently, the cruise report illustration of aerial extent was revised to better match the illustration in Conservation Measure 25-02. Form modifications were developed to allow information to be collected on the distribution of streamers along the aerial extent of the streamer line. Details were provided describing how to better estimate the placement of streamer lines relative to the entry point of the hookline. In addition, specific instructions will be provided to technical coordinators on collecting these data where night-time setting is required.

120. Recognising that for the past two years most seabirds were caught during the haul and unspecified haul mitigation is being used in the Convention Area, data fields were added to the cruise report to improve reporting of haul mitigation being used in the Convention Area.

Trawl

121. To address the extent to which net binding is used during the shot, specific data fields were added to the logbook to indicate when net binding is used, if the most hazardous meshes are bound, and to report the spacing and nature of binding materials being used. In addition, data fields were added to allow observers to better determine if net sonde cables are being used. Changes include a specific illustration to help differentiate between paravanes and net sonde cables.

122. Several papers in recent years have documented the cryptic nature of seabird warp strikes, which can result in high levels of seabird mortality in trawl fisheries outside the Convention Area. The papers included protocols to measure these interactions and described methods to mitigate them (WG-FSA-03/91, 04/79, 04/46, 05/36, 05/41, 05/46, 05/P8, 06/41 and 06/61). The Working Group suggested that a warp-strike interaction protocol be developed for Convention Area trawl fisheries (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 212 and 215). This protocol was developed intersessionally by the Working Group and was incorporated into scientific observer data collection instructions by the Secretariat during the meeting to allow data to be collected beginning in the 2006/07 fishery. The protocol includes collecting behavioural data on four classes of seabirds (albatrosses, giant petrels, white-chinned petrels and other petrels) and data on the abundance of total seabirds in a specified area near a warp, as well as selected operational data designed to explain the nature and extent of warp interactions.

123. The data collected by scientific observers using the protocol will be reviewed by the Working Group in 2007 to assess the threat posed by trawl warp strikes in the Convention Area and to determine if targeted mitigation methods need to be developed.

124. To improve the ability of the Working Group to assess seabird mortality reporting during trawl hauls, the current data collection protocol was augmented to include the extent to which the haul was monitored and to record seabirds found on warp cables.

Research into the status and distribution of seabirds

125. ACAP addresses all Procellariiform seabirds occurring in the Convention Area. ACAP was requested in 2005 to submit summary information detailing the population trends of albatrosses and petrels (SC-CAMLR-XXIV, Annex 5, paragraph 7.37), and this information was provided in WG-FSA-06/40. Summarised assessments of the population status and trends of the ACAP-listed species were provided to the meeting from which it is evident that for populations for which data are available:

(i) population size estimates of high–medium quality are available for 68% of all populations, 32% of populations having either low quality or no estimates of population size;

(ii) population trend information is only available for 40% of all populations of ACAP-listed species. For the populations for which trend data are available, 27% are increasing, 30% are stable and 43% are declining;

(iii) the availability of vital demographic parameters for these populations remains limited, with estimates of adult survival available for only 18% of populations, and immature recruitment/survival available for only 11% of populations;

(iv) overall, the level of information on population status and trends is limited for the *Procellaria* petrel group.

126. The report from ACAP (WG-FSA-06/40) outlined a proposal for the development of Species Conservation Assessments for all ACAP-listed species. These assessments would include a basic description of each species including such information as taxonomy, breeding locations, foraging distribution and overlap with fisheries. These data would include summaries of known threats at each breeding site, current population sizes and population trend data. It was proposed that these Species Assessments would be web-based and housed on the ACAP website, and thereby readily available for consideration by CCAMLR Members. Consideration of this proposal will be progressed at the ACAP Meeting of Parties to be held in New Zealand in November 2006. The Working Group was encouraged by the proposal for Species Conservation Assessments and agreed they would be useful for WG-IMAF's work.

127. Dr Waugh reported on the progress of the ACAP Breeding Sites Working Group. The group is actively collating site data, as well as developing assessments of land-based threats and best-practice island management guidelines.

128. WG-FSA-06/12 reported the results of a comparison in 2002 of census methods for black-browed albatrosses at the Ildefonso archipelago, a major breeding site for this species of albatross. Of the methods tested – ground-truthed air photography, boat-based photography, ground counts, point distance sampling and quadrat sampling – air photography was considered to be the most accurate method for this breeding site. Compared to air photography the other methods underestimated mortality by 9–55%. Air photography yielded a total of 47 000 breeding pairs of black-browed albatrosses at Ildefonso, representing the fourth largest population of this species of albatross in the world.

129. Dr Micol reported on preliminary results of a study that assessed the possible impact of longline fishing on the population dynamics of white-chinned petrels on the Crozet Islands. The breeding population on Crozet archipelago was found to be 35 000–51 000 pairs, an estimate extrapolated from surveys conducted on Possession Island. The comparison of the breeding population of white-chinned petrels on Possession Island between 1983 and 2004 indicated a decline of 41% in 20 years, at an annual rate of decrease of 2.6% per year. Modelling analysis showed that this decline was attributable both to environmental factors and to fisheries. More detailed results, including Kerguelen data, will be submitted to the next meeting of WG-IMAF.

130. The distribution of southern and northern giant petrels foraging from Macquarie Island was examined via satellite telemetry during the 2005/06 breeding season (WG-FSA-06/49). Four adults and two fledglings of each species were tracked and the time spent in CCAMLR areas was assessed for each species. Adult southern giant petrels, tracked during their incubation phase, spent 37% of their time at sea in Division 58.4.1, and 14% in Subarea 88.1. Adult northern giant petrels, tracked during chick rearing, spent less time in CCAMLR waters, only traversing waters in Division 58.4.1. Both southern and northern giant petrel fledglings traversed the Pacific Ocean, travelling east towards the South American

Continental Shelf. Southern giant petrel chicks took a more southerly route, traversing Subareas 88.1 and 88.2 along this course, while the more northerly route taken by the northern giant petrel fledglings did not take them through CCAMLR waters. This new distribution data was welcomed by the Working Group and was incorporated into the assessments of risk for CCAMLR subareas (SC-CAMLR-XXV/BG/26).

Incidental mortality of seabirds in relation to new and exploratory fisheries

Assessment of risk in CCAMLR subareas and divisions

131. As in previous years, the Working Group assessed the numerous proposals for new and exploratory fisheries and the potential for these fisheries to lead to increases in seabird incidental mortality.

132. In order to address these concerns, the Working Group reviewed its assessments for relevant subareas and divisions of the Convention Area in relation to:

(i) timing of fishing seasons
(ii) need to restrict fishing to night time
(iii) magnitude of general potential risk of by-catch of albatrosses and petrels.

133. Comprehensive assessments of the potential risk of interaction between seabirds and longline fisheries for all statistical areas in the Convention Area are carried out each year and have been combined into a background document for use by the Scientific Committee and Commission (SC-CAMLR-XXV/BG/26).

134. This year additional information from a satellite-tracking study was provided on the at-sea distribution of southern and northern giant petrels that breed on Macquarie Island (WG-FSA-06/49). A CCAMLR observer report from a fishing cruise in Subarea 48.6 provided valuable distributional data on grey petrel, great shearwater, sub-Antarctic skua and southern fulmar from this infrequently visited area (Elcimo Pool, unpublished CCAMLR observer report, *Shinsei Maru No. 3*, 19 December 2005 to 3 April 2006). A record of Buller's albatross from this area was not considered at this stage because of concerns that this subarea was well outside the known distribution of this species. The revised assessments incorporating new information made available at the meeting (with changes/additions underlined) have been issued as SC-CAMLR-XXV/BG/26.

135. The Working Group noted a tabled description of the WG-IMAF risk assessment (WG-FSA-06/33) that represented progress towards full documentation of the process used for defining risk ratings within the Convention Area. This description identified several key data types used in the risk assessment (breeding distributions, and inferred and known foraging ranges of seabird species and their threat status). The process includes precautionary approaches in the face of data gaps, assignment of appropriate mitigation measures through specification of conservation measures, and the use of an expert group with a diversity of expertise in seabird population ecology and mitigation and operational aspects of fisheries.

136. The Working Group discussed whether seabird mortality information should be added to the assessments. It was considered that the current information described adequately the intrinsic risk to seabirds of fishing activities within a prescribed area. This rating would be

valid irrespective of fishing practice and changes in operation that might occur through time. Therefore the assessments provided a baseline against which relative risk and appropriate mitigation response by fisheries could be measured.

137. The Working Group considered that it would useful to develop this paper further, with a view to making the methodology and approaches more accessible to groups outside CCAMLR seeking to undertake similar processes, particularly those with fishery management responsibilities where Convention Area seabirds are taken outside the Convention Area. This would be developed intersessionally by the Working Group. Links to the ACAP Seabird Bycatch Working Group were identified as a key to coordination and dissemination of effective seabird by-catch management into other international regional fora.

New and exploratory longline fisheries operational in 2005/06

138. Of the 39 proposals last year for new and exploratory longline fisheries in seven subareas and divisions, only 22 were actually undertaken (SC-CAMLR-XXV/BG/1 Rev. 2).

139. One white-chinned petrel in Division 58.4.3b was the only reported incidental seabird mortality in new and exploratory fisheries in 2005/06 (paragraph 11). Clearly, the strict adherence to the specific requirements set out in Conservation Measures 24-02 and 25-02 with respect to line-weighting regimes, combined with fishing in areas of average-to-low and average risk, has proven successful in achieving zero or extremely low by-catch of seabirds.

New and exploratory longline fisheries proposed for 2006/07

140. The assessment of the risk to seabirds posed by new and exploratory longline fisheries in the Convention Area is incorporated into the revised assessment in SC-CAMLR-XXV/BG/26 (an update of SC-CAMLR-XXIV/BG/26) and summarised in Figure 2 and Table 18, and also includes an assessment of recommended levels of observer coverage.

141. Forty-one applications for exploratory longline fisheries, submitted by 12 countries, were received by CCAMLR in 2006. No applications for new longline fisheries were received. The areas for which these proposals were received were:

Subarea 48.6	Japan, Republic of Korea, New Zealand, Norway
Division 58.4.1	Australia, Republic of Korea, Namibia, New Zealand, Spain, Uruguay
Division 58.4.2	Australia, Republic of Korea, Namibia, New Zealand, Spain, Uruguay
Division 58.4.3a	Japan, Republic of Korea, Spain
Division 58.4.3b	Australia, Japan, Republic of Korea, Namibia, Spain, Uruguay
Subarea 88.1	Argentina, Republic of Korea, New Zealand, Norway, Russia, South Africa, Spain, UK, Uruguay
Subarea 88.2	Argentina, New Zealand, Norway, Russia, Spain, UK, Uruguay.

142. All the areas listed above were assessed in relation to the risk of seabird incidental mortality according to the approach and criteria set out in SC-CAMLR-XXV/BG/26. A

summary of risk level, risk assessment, the Working Group's recommendations relating to mitigation measures, including fishing season and any inconsistencies between these and the proposals for new and exploratory longline fisheries in 2006, is set out in Table 19.

143. Applications fell into two categories:

(i) Those that provided sufficient information to indicate that the proposals fully comply with relevant seabird by-catch minimisation conservation measures (Conservation Measures 24-02 and 25-02, and the relevant measures in the 41-series) and do not conflict with the IMAF assessment. Applications submitted by Australia (CCAMLR-XXV/18), Japan (CCAMLR-XXV/19), Namibia (CCAMLR-XXV/21), New Zealand (CCAMLR-XXV/22), Norway (CCAMLR-XXV/23), Russia (CCAMLR-XXV/24), South Africa (CCAMLR-XXV/25), Spain (CCAMLR-XXV/26) and the UK (CCAMLR-XXV/27) were assessed as being fully compliant.

(ii) Those that contain insufficient information to be certain that the proposals fully comply with relevant seabird by-catch minimisation conservation measures, but which express sufficient sentiment to indicate that this is the intention. Applications by Argentina (CCAMLR-XXV/17), Republic of Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) fall into this category.

144. Applications in the second category usually state intent to comply with relevant conservation measures but then indicate elsewhere that their fishing plans do not comply. Typical examples include:

(i) fishing seasons simply stated as '2005/06', and not acknowledging that seasonal restrictions apply to some of the divisions and subareas;

(ii) stating an intent to fish outside fishing seasons without seeking a derogation by meeting the line sink rate requirements prescribed in Conservation Measure 24-02;

(iii) stating an intent to fish during the day without seeking a derogation from paragraph 4 of Conservation Measure 25-02 through implementation of the provisions of Conservation Measure 24-02;

(iv) stating an intent to have only one observer on board the vessel in areas where two are required.

145. The Working Group welcomed the improvements in notifications this year and in particular that only three (25%) of the notifications were now assessed in the insufficient information category compared with six (46%) in 2005. Members were requested to take greater care in future submissions to ensure the intent to comply with relevant seabird by-catch measures was clear.

146. Members who have submitted applications falling into the second category should be requested to confirm with the Secretariat that their proposals fully comply with relevant seabird by-catch minimisation conservation measures and do not conflict with the IMAF assessment for the subareas and divisions in which they wish to fish.

147. In 2005 the Working Group developed a checklist to assist Members when completing their notifications (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 193). The Secretariat used this information in developing a pro forma and checklist to assist Members in fulfilling notification requirements in 2006. The Working Group welcomed CCAMLR-XXV/29 which proposes further improvements to this approach and should improve the information available to the Working Group in future. The Working Group recommended that the one-page summary of notifications should also include a four-part checklist to address Members' intentions to:

(i) comply with the requirements of Conservation Measure 25-02 in order to minimise seabird by-catch;

(ii) comply fully with measures specified in Conservation Measure 24-02 if an exemption is sought from setting longlines at night, or fish outside specified fishing seasons (if applicable);

(iii) comply fully with measures specified in Conservation Measures 41-04, 41-05, 41-06, 41-07, 41-09, 41-10 and 41-11 (as applicable to the relevant subarea or division) if specified seabird by-catch levels are reached when fishing during daytime setting and/or fishing outside normal fishing seasons;

(iv) comply with scientific observer requirements specified in Conservation Measures 41-04, 41-05, 41-06, 41-07, 41-09, 41-10 and 41-11.

148. Setting of longlines within the Convention Area during daylight hours or outside normal fishing seasons using currently approved fishing gear still represents a risk for seabirds, even in areas of low to average risk. In all instances where the provisions of Conservation Measure 24-02 are applied, there remains the need for continued review of performance with respect to incidental mortality of seabirds during fishing operations. The Working Group reiterated its recommendation that any vessel operating under the provisions of this conservation measure, and which catches a total of three (3) seabirds, as defined in SC-CAMLR-XXII, Annex 5, paragraphs 6.214 to 6.217, shall revert to night setting in accordance with Conservation Measure 25-02. Similar provisions were specified in previous years.

International and national initiatives relating to incidental mortality of seabirds in relation to longline fishing

ACAP

149. Mr W. Papworth provided an update on recent developments within ACAP. The second meeting of the Advisory Committee of ACAP was held in Brasilia, Brazil, from 5 to 8 June 2006. The meeting was preceded by workshops of the Breeding Sites Working Group and the Status and Trends Working Group. Six Parties were represented: Australia, Chile, France, New Zealand, South Africa and the UK. In addition, two Signatory States: Argentina and Brazil; one range State: the USA; and BirdLife International were represented. During proceedings, Argentina announced that its Government had ratified the Agreement; bringing the total number of ACAP Parties to 10. Brazil also notified the meeting that its ratification

process was well advanced and that it expected this would be completed by the second Meeting of the Parties in November this year. A full report of the meeting is available at www.acap.aq/.

150. Items of particular relevance to CCAMLR included:

(i) the review of data relevant to assessments of status and trends of albatross populations by the ACAP Status and Trends Working Group (WG-FSA-06/40);

(ii) development of a database by the Working Group on Breeding Sites for the collection and collation of data on breeding sites of ACAP species, including management activities and threats present at the sites. Analyses are proposed to contribute to the reporting format of the Status and Trends Working Group;

(iii) the establishment of a Seabird Bycatch Working Group (SBWG) to address issues related to fisheries interactions;

(iv) advice from ACAP's Taxonomic Working Group that available data do not warrant the recognition of Gibson's and Antipodean albatrosses or Buller's and Pacific albatrosses at the specific level, and to adopt a subspecific nomenclature for these taxa; and that data suggest shy and white-capped albatrosses are divergent and diagnosable and therefore warrant recognition at the specific level.

151. There was a substantial discussion on the incidental mortality of albatrosses and petrels in fisheries and how to further action that would improve the conservation status of seabirds that breed and forage in the Convention Area. The Working Group agreed that ACAP Parties and CCAMLR Members should be proactive in engaging with RFMOs and in promoting information exchange and strengthening their input into RFMO meetings by including seabird experts on Member State delegations. It was also agreed that a critical role of Parties and Members was to become involved in the development and implementation of seabird resolutions and other measures to reduce by-catch of albatrosses and petrels within RFMO jurisdictions. Further, Parties and Members should take steps beyond the current scope of IPOA-Seabirds and NPOA-Seabirds or similar plans should be developed for fisheries with a known seabird by-catch problem and assessments conducted for all other fisheries operating within their EEZs.

Relationship between CCAMLR and ACAP

152. ACAP's recently established SBWG was still seeking to agree to terms of reference and associated strategy. The Working Group agreed that it would be beneficial if WG-IMAF and SBWG maintained a close cooperative relationship, particularly with respect to technology transfer of best-practice mitigation measures. The work of both groups was seen as complementary. It was noted that many of the WG-IMAF members were also members of SBWG, and it would be useful to consider conducting frequent technical workshops around the WG-IMAF/WG-FSA meeting to ensure the best-practice measures developed by CCAMLR over the last 10 years can be readily transferred to other fisheries where Convention Area birds are currently being impacted by fisheries interactions.

FAO IPOA-Seabirds

153. The Secretariat reported on intersessional advice reporting further substantial progress in the development of the Chilean and Brazilian NPOA-Seabirds. Brazil had informed CCAMLR that in June 2006 it had finalised its NPOA-Seabirds and had begun implementing elements of the plan. The plan's main objective is to reduce seabird by-catch in Brazilian waters and to protect breeding colonies of Procellariiformes. Actions have already been developed to achieve the objective, including research on seabird by-catch and development of new technologies to avoid the by-catch. The Brazilian Government is promoting tests of seabird by-catch mitigation measures and awareness of the fishing sector with fishing practices compatible with seabird conservation.

154. Chile informed the Secretariat that the Chilean Subsecretary of Fisheries had begun the process of public consultations required to adopt the Chilean NPOA-Seabirds.

155. South Africa advised that, unfortunately, there had been not much progress achieved this year on the finalisation of the South African NPOA-Seabirds. The Working Group was also informed that Uruguay was in the early stages of developing a draft NPOA-Seabirds.

156. It was noted that there were now a number of NPOA-Seabirds developed and that the standard of these documents varied considerably. Dr B. Sullivan (UK) informed the meeting that guidelines for a model or best-practice NPOA had been developed by BirdLife International with the intent of strengthening the implementation of IPOA-Seabirds and securing support of national governments and RFMOs for this initiative at FAO. The Working Group supported this initiative and recommended its support by CCAMLR and CCAMLR Members at COFI-27.

Other international organisations and initiatives,
including non-governmental organisations

157. The Working Group was informed that the 4th International Fishers' Forum would be held in Costa Rica in November 2007. The Working Group hoped that the forthcoming meeting would continue the trend of previous meetings and provide outreach to fishers and encouragement to take practical steps to greatly reduce interactions with seabirds.

158. Mr Melvin provided information on a pelagic mitigation workshop that he will hold on 15 October 2006. The meeting had been set up to take advantage of the expertise present at the WG-IMAF meeting to assist in refining an experimental program for pelagic fisheries. The Working Group recalled previous advice to the Scientific Committee that many of the seabirds breeding in the Convention Area were being impacted by pelagic tuna fisheries that operate in the migratory ranges of these seabirds (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 63). Development of mitigation measures for pelagic longline fishers, although not of direct relevance to Convention Area demersal longline fisheries, was therefore still considered a high priority and encouraged the participation at the workshop of all WG-IMAF members.

159. Dr Sullivan updated the Working Group on the implementation of the BirdLife International Albatross Task Force, formerly known as Operation Ocean Task Force (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraph 154), which works at sea and in

onshore workshops to demonstrate the adoption of mitigation measures, and to collect baseline by-catch data, where required. The Task Force currently has three full-time mitigation instructors working in South Africa, two focusing on pelagic longline fisheries and one on the hake trawl fishery. There are also two employees working in pelagic fisheries in Brazil. There are also plans to have two people based in Chile by the end of 2006, and negotiations are under way to have a further four to six people working in South America and southern Africa in 2007/08.

RFMOs, tuna commissions and international governmental organisations and implementation of Resolution 22/XXIII

160. At the Twenty-third Annual Meeting of the Commission, CCAMLR adopted Resolution 22/XXIII seeking international actions to reduce the incidental mortality of seabirds arising from fishing. This resolution followed from great concern that, even though seabird by-catch had been substantially reduced within CCAMLR fisheries through implementation of conservation measures, populations of seabirds that breed and forage within CCAMLR waters continue to be threatened by IUU fishing and in trawl and longline fisheries in waters outside the Convention Area.

161. In particular, the resolution urges Members that are also members of other RFMOs to identify those mitigation measures that would be most effective at reducing or eliminating such mortality and to require such measures to be implemented in the relevant fisheries.

162. Appreciable progress had been made in terms of communication on seabird by-catch issues with RFMOs (SC-CAMLR-XXIV, Annex 5, Appendix O, paragraphs 161 to 168) as reported below.

CCSBT

163. No data were reported to CCAMLR this year. However, Mr B. Baker (Australia) reported CCSBT's ERSWG had met in February this year, but the report from that meeting had not been accepted by the CCSBT Commission as yet. The CCSBT Commission meeting was running concurrently with WG-FSA and it was hoped the report from the meeting would be considered at this time, and hence released for consideration by CCAMLR at the soonest possible time.

IATTC

164. IATTC's Stock Assessment Working Group met in the USA from 15 to 19 May 2006 and recommended that IATTC coordinate with WCPFC, and other tuna RFMOs as appropriate, in its implementation of seabird resolutions and the development of scientific information and reports that support this implementation. This could include practical areas of cooperation on the mitigation of seabird by-catch. Further, it also recommended that IATTC should develop, in coordination with the other RFMOs, a strategy to mitigate by-catches in the different fisheries involved. The program should include standardisation of

data collection (whenever possible), discussion of research programs and activities to be undertaken in each, and a mechanism for the timely sharing of results. This item could be included in the agenda of the upcoming meeting in Kobe, Japan.

165. The IATTC's Bycatch Working Group met in the Republic of Korea on 24 June 2006. It noted the following:

(i) Information indicates that longline fisheries in the IATTC area may have both direct and indirect impacts on some seabird populations. The level of the impact is currently not known.

(ii) Remote-tracking data and at-sea observations highlight the importance of the IATTC area for foraging and breeding of waved and Laysan albatrosses, foraging of black-footed and black-browed albatrosses, and several other albatross species from New Zealand which migrate across the Pacific to forage in the Humboldt Current.

(iii) Observer data from US pelagic longline fisheries indicate by-catch of Laysan and black-footed albatrosses in the Northeast Pacific. No comparable data exist from industrial longline fleets in the central and southeast Pacific.

(iv) Plots of seabird distributions overlaid on pelagic longline effort revealed several areas of potential vulnerability to by-catch.

(v) Seabird by-catch mitigation measures have been developed which have effectively reduced seabird by-catch in longline fisheries, and more gear research is ongoing.

IOTC

166. IOTC's Working Party on Bycatch held its second meeting in the Seychelles on 1 August 2006. Prior to the meeting, IOTC had passed a seabird resolution (Resolution 06-04) in June which, *inter alia*, requires the use of tori lines below 30°S, but with an exemption for vessels targeting swordfish using the 'American longline system' (defined as monofilament line plus light sticks). Originally the resolution included prescribed by-catch limits as a performance indicator, but the deletion of this and the exemption of tori lines for swordfish was the result of lobbying by some industry representatives present at the meeting.

167. IOTC's Working Party on Bycatch discussed the resolution and its implications for the work of IOTC. There was general agreement that the derogation for swordfish in the resolution appeared to be scientifically unsupportable and should be removed. BirdLife International presented a paper to the meeting to support removal of the derogation. During the meeting a paper was developed that recommended the introduction of 20% observer coverage over a limited period of two years to assess the observer coverage rates necessary to characterise by-catch in IOTC fisheries in the longer term. However, agreement on the introduction of such a level of cover was not reached.

ICCAT

168. Dr Sullivan noted that ICCAT's Standing Committee on Research and Statistics (SCRS) accepted a UK proposal this year to conduct an assessment of the impact of incidental catch of seabirds resulting from vessels fishing in the ICCAT area. The assessment is called for in ICCAT's seabird resolutions (02-14). The UK's proposal received support from Brazil, the European Community, South Africa, Uruguay and the USA. ICCAT's Commission will address this SCRS recommendation at its annual meeting in Croatia in November 2006. The Working Group agreed that this news was encouraging and demonstrated increased progress with RFMOs actively addressing seabird by-catch.

SEAFO

169. WG-IMAF was informed that the recently concluded meeting of SEAFO had adopted a conservation measure (05/06) requiring the development within one year of effective mechanisms to collect data and report on seabird interactions to the SEAFO Commission. Further, the conservation measure called for all longline vessels operating south of 30°S to use bird-scaring lines, and for all vessels to set lines at night.

WCPFC

170. Dr Sullivan introduced WG-FSA-06/18 reporting on the Second Meeting of the WCPFC's Ecosystem and Bycatch Specialist Working Group, held in August 2006 in Manila, the Philippines. The meeting was presented with a range of discussion papers on ecological modelling and risk assessment for the WCPFC, distributional data from BirdLife International's *Procellariiform* Tracking Database (WG-FSA-06/19; see next paragraph), and mitigation measures available that could assist WCPFC Parties. The WCPFC working group drafted a resolution responding to an earlier WCPFC resolution 2005-01 that will be considered by the WCPFC Commission meeting in December 2006. The new resolution calls on Commission Members, *inter alia*, to require longline vessels to use at least two mitigation measures, one which must include side setting with a bird curtain, night setting or tori lines and one from a recommended suite of measures when operating south of 30°S and north of 23°N. The recommended mitigation measures include weighted branch lines, blue-dyed bait, line-shooters, bait casters, underwater-setting chutes and offal discharge management procedures.

171. The Working Group strongly encouraged Parties to ensure the participation of appropriately experienced mitigation practitioners to contribute to the December 2006 meeting of WCPFC. Their participation would ensure that the most appropriate mitigation measures are considered for adoption for application within WCPFC. Mitigation practitioners within the Working Group could assist in the provision of the appropriate advice.

172. WG-FSA-06/19 provided distributional data from BirdLife International's *Procellariiform* Tracking Database showing the overlap between a number of albatross and petrel species and the jurisdictional area of WCPFC. The *Procellariiform* Tracking Database includes distribution data for Pacific populations of 14 of the 16 albatross species that breed in the region. The WCPFC Convention Area overlaps with 41% of the global breeding

distribution of the 23 species of albatrosses and petrels for which there are data in the database, making it one of the most important RFMOs for albatrosses. Distribution in the WCPFC area is concentrated south of 30°S (mostly below 35°S) and north of 20°N. Some species spend a significant proportion (>40%) of their time in the high-seas areas. Key high-seas areas include the Tasman Sea and areas north of the Hawaiian Islands. The distribution of seabirds in high-seas areas emphasises the importance of WCPFC in bringing about a collaborative approach to reducing seabird by-catch.

173. WG-FSA-06/30 provided additional information on the distribution of albatrosses and petrels overlapping with the WCPFC Convention Area. This information complemented that in WG-FSA-06/19, and was preliminary to developing a risk assessment for the WCPFC fishery.

General

174. The Working Group was encouraged by the progress made by several RFMOs since the last meeting towards the mitigation of seabird by-catch in their fisheries. It noted with satisfaction the considerable progress made at WCPFC, SEAFO, IOTC and ICCAT, and their strong desire to work cooperatively with CCAMLR. However, it was recognised that for pelagic longline gear types in particular, there is at present no best-practice mitigation strategy that has been rigorously tested and available for widespread uptake by the major RFMOs operating to the north of the CAMLR Convention Area.

175. The Working Group expressed concern that some RFMOs may be considering adopting measures such as bait-casting machines, side-setting and deep-setting line shooters on the basis of information that lacked robust evaluation through controlled experiments on their effectiveness to mitigate seabird by-catch on a wide array of species. Development of proven pelagic mitigation measures and their uptake outside the Convention Area should remain a high priority for CCAMLR.

176. The Working Group also noted the high and persistent seabird by-catch outside the Convention Area of species found in the Convention Area. It recommended to the Scientific Committee that the Commission be represented at the January 2007 tuna RFMOs meeting in Kobe, Japan, and that the Secretariat develop a paper describing the scientific and other processes CCAMLR has followed in developing and implementing effective seabird by-catch mitigation measures. That paper would, *inter alia*, emphasise the requirement for extensive and sustained scientific observer coverage in addition to applied and adaptive mitigation research in any effort to reduce seabird mortality associated with fishing operations.

177. The Working Group noted that the successful uptake and transfer of operational and technical mitigation measures refined in the Convention Area, with the concomitant success in reducing seabird by-catch, to other areas and RFMOs is contingent, in part, upon sufficiently adequate levels of observer coverage in those RFMO fisheries such that the nature and extent of seabird by-catch, as well as the effectiveness of mitigation measures, can be accurately monitored.

Fishery reports

178. The Working Group reviewed the fishery reports developed by WG-FSA (Agenda Items 5.1 and 5.2) and the information relating to the by-catch of seabirds and marine mammals contained within the reports.

179. The Working Group updated the fishery reports based on the information contained in SC-CAMLR-XXIV, Annex 5, Appendix O, and the information contained in WG-FSA-06/36 Rev. 2, 06/37 Rev. 1, 06/38 and 06/39 Rev. 1.

180. The Working Group recommended that this process of updating fishery reports continue and noted that this process provided constructive interaction with WG-FSA and contributed to the streamlining of the work of Scientific Committee's working groups.

Streamlining the work of the Scientific Committee

Streamlining of agenda

181. Ad hoc WG-IMAF noted that streamlining its agenda for this year's meeting was a useful step forward. Based on the experiences at this meeting, the Working Group developed additional recommendations for future agenda improvements, including:

(i) update of the risk assessment only when new information is tabled;

(ii) the continued request for compilation of detailed information on various agenda items by ACAP;

(iii) a focus on the impacts of captures and by-catch of Convention Area seabirds and marine mammals outside the Convention Area;

(iv) improved data submission and data compilation prior to the start of the meeting.

182. The Working Group noted that regular review of its agenda and a move to completing some tasks on a biennial and triennial basis where appropriate would allow further streamlining of the agenda in future.

Interaction with WG-FSA

183. The Working Group noted that the current interactions with WG-FSA allowed the transfer of useful knowledge on fishing technologies and practices, ongoing dialogue on matters of mutual interest and a useful element of peer review during meetings.

184. The Working Group therefore agreed that it could conduct its work most effectively if it retained its linkage with WG-FSA.

185. Ad hoc WG-IMAF noted the proposed restructure of WG-FSA (SC-CAMLR-XXIV, Annex 5, paragraphs 14.1 to 14.9) and noted its support for the proposals, along with the need for ongoing dialogue with respect to future change and the content of the research plans of other working groups.

186. With respect to the development of new seabird and marine mammal mitigation devices, ad hoc WG-IMAF recognised that it was important to also consider the impact of such devices on other taxa (paragraph 116). The Working Group requested that where WG-FSA was aware of such interactions, the matter be raised so as to allow cooperative efforts to resolve them in a timely manner.

Interaction with WG-EMM

187. The Working Group noted the shared areas of interest between WG-IMAF and WG-EMM and encouraged ongoing dialogue between the two groups on matters of joint interest (e.g. marine mammal population status, interactions with fisheries).

Future focus of the work of ad hoc WG-IMAF

188. The Scientific Committee established ad hoc WG-IMALF in 1993. In 2001 it decided that its scope should be expanded to cover fishing other than by longlines and the group was renamed ad hoc WG-IMAF. The Working Group noted the very positive results in 2005/06 with respect to seabird and marine mammal by-catch throughout the Convention Area.

189. The Working Group agreed that despite the continuing reductions in by-catch in the Convention Area, there was a need to remain vigilant with our monitoring of by-catch and the implementation of conservation measures and to continue to strive to minimise seabird and marine mammal by-catch in all Convention Area fisheries.

190. Noting that time delays in responding to changing fishery dynamics and by-catch rates could have serious consequences for the conservation of seabirds and marine mammals, and that a biennial meeting of ad hoc WG-IMAF may mean three-year delays between the recognition of a problem and the development of a solution, the Working Group recommended that annual meetings continue.

191. The Working Group noted the opportunity to focus on the by-catch of Convention Area seabirds and marine mammals outside the Convention Area given CCAMLR's responsibility for these Antarctic marine living resources (Convention Article I) and the positive results being obtained within the Convention Area. To date CCAMLR measures and practices have been held up as a role model outside the Convention Area (paragraph 177) and the mitigation measures adopted within the Convention Area have been, or are in the process of being, adopted by neighbouring RFMOs.

192. As a result of the discussions detailed in paragraphs 188 to 191, ad hoc WG-IMAF reviewed its original terms of reference (SC-CAMLR-XII, paragraph 10.19). The Working

Group discussed proposed revisions to the terms of reference and made additional suggestions for consideration during the intersessional period with a view to ad hoc WG-IMAF recommending revised terms of reference in 2007.

Future research plan

193. The Working Group discussed the development of a medium-term research plan for ad hoc WG-IMAF. The Working Group noted that the current agenda required the meeting to be conducted without the benefit of detailed technical discussion of some items due to time constraints and the need to address all agenda items each year (noting that the move to undertaking some agenda items at multi-year intervals may alleviate this problem to some extent in the future).

194. The Working Group recommended the development of a medium-term research plan as an intersessional task for the group.

195. The Working Group noted that in future it may be possible to conduct short workshops in association with the annual ad hoc WG-IMAF meeting to address critical items in the medium-term research plan. The use of invited experts at such workshops was highlighted by the Working Group as likely being crucial to their success. A series of appropriate workshop subjects could be incorporated into the research plan during the intersessional period.

Duration of the meeting

196. Ad hoc WG-IMAF discussed the time required to conduct its core work and noted that at present it required the allotted five days to conduct its work program.

197. The Working Group noted that the revised terms of reference and results of intersessional work were unlikely to allow a reduction in required time in 2007; however, the Working Group indicated its intention to further review the required duration of the meeting in 2007.

Other business

Australian proposal on extending fishing season in Division 58.5.2 for longline vessels

198. Mr Baker and Mr Hay presented and sought advice from the Working Group on an Australian proposal to further extend the fishing season in Division 58.5.2 for longline vessels from the current 1 September to 30 September (Conservation Measure 41-08, paragraph 3) to 1 September to 30 April. If three seabirds are caught during the season extension by a vessel (between 1 September and 30 April), fishing would cease for that vessel.

199. Mr Baker and Mr Hay noted that Australian vessels have been fishing using longlines in the division since 2003 during the specified season, in compliance with the one-month season extension detailed in Conservation Measure 41-08, paragraph 3, since 2005 and to date have only caught one seabird in the fishery.

200. Further, they noted that the same company has been involved in the fishery throughout that period and has been involved in pioneering the development of IWLs.

201. The Working Group noted that in recent years it had only considered such proposals when a detailed technical document in support of the proposed change had been tabled in advance of the meeting (e.g. WG-FSA-04/73 from Australia proposing to undertake daytime setting subject to line-weighting requirements in Division 58.5.2).

202. The current advice for Division 58.5.2 from WG-IMAF (SC-CAMLR-XXV/BG/26) is that it is a Risk Level 4 area (average-to-high risk; prohibit longline fishing within the breeding season of the main albatross and petrel species (September to April) and ensure strict compliance with Conservation Measure 24-02).

203. Accordingly, the proposal appears to be contrary to the current advice of the Working Group. The proponents of the proposal noted that the implementation of a seabird by-catch limit during the extended season effectively means that a seasonal control is redundant (a duplication of measures).

204. The Working Group recalled its previous detailed deliberations on the extension of the fishing season in Subarea 48.3 in 2002 (SC-CAMLR-XXI, Annex 5, paragraphs 6.30 to 6.46) and 2003 (SC-CAMLR-XXII, Annex 5, paragraphs 6.46 to 6.54). A vessel took up the option of commencing fishing during the last two weeks of April 2003. The vessel commenced fishing on 15 April 2003, killed three seabirds on 20 April 2003 and then ceased fishing until the regular fishing season commenced on 1 May 2003 (SC-CAMLR-XXII, Annex 5, paragraph 6.50). With respect to the current proposal, of particular concern is that current mitigation measures are unlikely to adequately mitigate capture of white-chinned petrels during the summer season in higher-risk areas, that where season extensions are under consideration they should be undertaken in a stepwise manner to allow review of results and appropriate responses, that two observers are needed so that seabird mortality limits can be monitored accurately and that a season extension into the austral spring was preferable as white-chinned petrels are less susceptible to by-catch at this time (Nel et al., 2002).

205. The Working Group noted that a three-seabird limit had previously been introduced as a precautionary measure to extend the fishing season for one month in Division 58.5.2 (Conservation Measure 41-08, paragraph 3). However, this did not automatically mean that this was the appropriate mechanism for mitigating incidental seabird mortality in this fishery over an additional seven-month season extension.

206. The current closed season excludes fishing during the periods when local breeding seabirds (black-browed albatross, light-mantled albatross and southern giant petrel) are most active in this area. White-chinned petrels from Kerguelen are also inferred visitors to the area in the breeding season and the species recognised as being most difficult to mitigate against in longline fisheries. The removal in its entirety of a seasonal restriction in this area will allow fishing in the period assessed as having the greatest risk of seabird by-catch (the breeding season).

207. The Working Group noted that the vessel may catch in excess of three seabirds in a single set during the breeding season, as has been observed in other areas of similar risk where fishing has occurred during the white-chinned petrel breeding season. Further, as longline vessels typically undertake several sets before beginning to haul lines, and typically it is only during hauling that seabird mortalities are detected, the potential for a substantial increase in seabird incidental mortality in Division 58.5.2 exists as a result of this proposal.

208. Dr Micol reported observations from the Kerguelen longline fishery (Division 58.5.1) during the 2005 breeding season. From one night's fishing activity (three sets) a total of 41 white-chinned petrels were observed caught by a single vessel with 20 of those seabirds caught on a single set. This autoline vessel used IWLs (50 g/m), withheld offal during line setting, was fishing in full compliance with Conservation Measure 25-02 and also used additional streamer lines. The fishery in Division 58.5.1 is closed from mid-February to mid-March as an additional by-catch avoidance measure, to avoid periods of the year when white-chinned petrel captures have historically been at highest rates.

209. The Working Group noted that even with the use of measures additional to those under Conservation Measure 25-02, there is potential for a single multiple-capture event of more than three seabirds.

210. The Working Group noted that its preference would be for a closely monitored and stepwise roll-back in the season in Division 58.5.2 rather than a one-step move to fishing throughout the year. The Working Group had previously agreed to recommend extensions to the end of fishing seasons (i.e. September) rather than the early part of the season when birds are chick-rearing and risk of capture is higher due to their restricted foraging ranges and added nutritional requirements related to chick rearing.

211. The Working Group noted that the proposal did not contain information that allowed an assessment of the risks that the additional fishing might entail to seabirds, nor how these might be mitigated. It noted that the proposal would involve fishing in the breeding period for several species of seabirds vulnerable to mortality in longline fishing and thus posed much higher risk of seabird mortalities than current fishing outside the breeding season. The Working Group requested more timely and comprehensive information that would allow detailed and specific analysis of the risk of the proposal and how risks could be mitigated. Such information should include:

- an assessment of the likely outcome in terms of bird mortality, including supporting information for that assessment detailing the likely seabird catch rates and totals;

- what additional measures (if any) and their likely efficacy, could be deployed to mitigate the additional risk of mortality to seabirds.

Line sink rate testing proposal for Subarea 48.6

212. CCAMLR-XXV/32, submitted by Japan, requested dispensation from leaving the Convention Area to conduct longline sink rate tests when fishing at the end of one season and into the subsequent season in Subarea in 48.6. The Working Group reviewed the proposal, and noted that as the same vessel, gear and crew would be involved and that the vessel would

have undertaken regular line sink rate testing during the previous season, the proposal did not pose any additional risk to seabirds provided the standard sink rate, as detailed in Conservation Measure 24-02, is achieved.

Management advice

213. Management advice is provided in section 7 of the main text of WG-FSA's report.

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Nel, D.C., P.G. Ryan and B.P. Watkins. 2002. Seabird mortality in the Patagonian toothfish longline fishery around the Prince Edwards Islands. *Ant Sci*., 14: 151–161.

Table 1: Observed incidental mortality of seabirds in the longline fisheries for *Dissostichus* spp. in Subareas 48.3, 48.4, 58.6, 58.7, 88.1, 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3 and 58.5.2 during the 2005/06 season, including related mitigation information. Sp – Spanish method; A – autoliner; N – night-time setting; D – daytime setting (including nautical dawn and dusk); O – opposite side to hauling; S – same side as hauling; * – information obtained from cruise report.

Vessel	Dates of fishing	Method	Sets deployed				No. of hooks observed (thousands)			No. of birds observed caught[1]						Observed seabird mortality (includes injured birds)[1] (birds/thousand hooks)			Streamer line in use %		Offal discharge during		
			N	D	Total	%N	Obs.	Set	% observed	Dead		Injured		Uninjured		N	D	Total	N	D	Set (%)	Haul	(%)
										N	D	N	D	N	D								
Subarea 48.3																							
Insung No. 22	1/5–18/6/06	Sp	97	0	97	100	242.1	994.7	24	0	0	0	0	0	0	0	0	0	100		(0)	O	(92)
Jacqueline	1/5–26/8/06	Sp	223	0	223	100	474.0	1760.5	26	0	0	0	0	4	0	0	0	0	100		(0)	O	(96)
Argos Helena	1/5–31/8/06	A	266	0	266	100	735.7	2187.0	33	0	0	0	0	0	0	0	0	0	100		(0)	O	(0)
Koryo Maru No. 11	2/5–22/7/06	Sp	156	0	156	100	338.1	1416.7	23	0	0	0	0	7	0	0	0	0	100		(0)	O	(96)
Polarpesca I	12/5–14/8/06	Sp	247	0	247	100	233.2	1278.9	18	0	0	0	0	1	0	0	0	0	99.6		(0)	O	(98)
Protegat	1/5–27/6/06	A	134	0	134	100	175.4	766.1	22	0	0	0	0	5	0	0	0	0	99		(0)	O	(0)
Punta Ballena	15/5–23/8/06	A	97	0	97	100	166.0	718.8	23	0	0	0	0	0	0	0	0	0	100		(0)	O	(0)
San Aspiring	1/5–27/8/06	A	236	0	236	100	770.5	1957.5	39	0	0	0	0	1	0	0	0	0	100		(0)	O	(0)
Viking Bay	1/5–16/8/06	Sp	216	0	216	100	349.1	1200.5	29	0	0	0	0	3	0	0	0	0	100		(0)	O	(100)
Argos Georgia	1/5–31/8/06	A	305	0	305	100	562.8	1835.7	30	0	0	0	0	0	0	0	0	0	100		(0)	O	(0)
Total						100	4046.9	14116.4	28.7							0	0	0					
Subarea 48.4																							
Argos Helena	7/4–15/4/06	A	30	0	30	100	54.3	113.4	47	0	0	0	0	0	0	0	0	0	100		(0)	O	(0)
San Aspiring	10/4–25/4/06	A	41	0	41	100	81.8	208.9	39	0	0	0	0	1	0	0	0	0	100		(0)	O	(0)
Total						100	136.1	322.3	42							0	0	0					
Subarea 48.6																							
Shinsei Maru No. 3	15/4–17/5/06	A	28	33	61	46	139.3	276.2	50	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Shinsei Maru No. 3	5/1–29/3/06	A	59	125	184	32	346.2	702.1	49	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Total						36	485.5	978.3	50							0	0	0					
Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b																							
Globalpesca I	22/12–21/2/06	Sp	2	86	88	2	318.5	541.5	58	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Tronio	15/12–10/3/06	Sp	12	131	143	8	879.4	1848.4	47	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(48)
Globalpesca II	21/12–22/1/06	Sp	0	44	44	0	261.4	422.2	61	0	0	0	0	0	0	0	0	0		100	(0)	O	(0)
Insung No. 2	4/1–4/3/06	Sp	8	104	112	7	683.2	882.5	77	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Galaecia	2/12–22/2/06	Sp	11	93	104	11	776.7	1305.0	59	0	1	0	0	0	0	0	0.001	0.001	100	100	(0)	O	(81)
Galaecia	5/4–5/7/06	Sp	66	47	113	58	1830.4	1830.4	100	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Total						16	4749.6	6830.0	70							0	<0.001	<0.001					
Division 58.5.2																							
Janas	25/7–13/9/06	A	92	74	166	55	226.1	744.4	30	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Janas	7/5–27/6/06	A	64	63	127	50	322.3	923.4	34	0	0	0	0	0	0	0	0	0	100	100	(0)	O	(0)
Total						53	548.4	1667.8	33							0	0	0					
Area 51, Subareas 58.6, 58.7																							
Koryo Maru No. 11	19/2–30/3/06	Sp	68	0	68	100	242.4	676.1	35	0	0	0	0	10	0	0	0	0	100		(0)	O	(100)
Total						100	242.4	676.1	35							0	0	0					

(continued)

Table 1 (continued)

Vessel	Dates of fishing	Method	Sets deployed				No. of hooks observed (thousands)			No. of birds observed caught[1]						Observed seabird mortality (includes injured birds)[1] (birds/thousand hooks)			Streamer line in use %		Offal discharge during	
			N	D	Total	%N	Obs.	Set	% observed	Dead		Injured		Uninjured		N	D	Total	N	D	Set (%)	Haul (%)
										N	D	N	D	N	D							
Subareas 88.1, 88.2																						
Avro Chieftain	2/12–13/1/06	A	0	38	38	0	115.2	232.8	49	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Punta Ballena	2/1–5/2/06	A	0	81	81	0	109.5	538.9	20	0	0	0	0	0	0	0	0	0		100	(0)	(0)
San Aotea II	16/12–16/2/06	A	0	125	125	0	273.7	672.4	40	0	0	0	0	0	0	0	0	0		100	(0)	(0)
San Aspiring	2/12–15/2/06	A	0	93	93	0	295.2	637.8	46	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Viking Sur	6/1–5/2/06	A	0	90	90	0	316.9	425.8	74	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Antartic II	1/12–6/2/06	A	0	119	119	0	496.8	674.6	73	0	0	0	0	0	0	0	0	0		100	(0)*	(0)*
Argos Georgia	15/1–12/2/06	A	0	88	88	0	147.1	325.2	45	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Argos Helena	11/12–10/2/06	A	4	156	160	3	316.0	729.9	43	0	0	0	0	0	0	0	0	0	100	100	(0)	(0)
Frøyanes	8/12–7/2/06	A	3	186	189	2	342.2	796.4	42	0	0	0	0	0	0	0	0	0	100	100	(0)	(0)
Janas	14/12–8/2/06	A	0	117	117	0	234.5	564.5	41	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Volna	17/12–15/2/06	Sp	0	60	60	0	274.2	590.0	46	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Yantar	17/12–15/2/06	Sp	0	66	66	0	116.6	527.8	22	0	0	0	0	0	0	0	0	0		100	(0)	(0)
Paloma V[2]	5/12–11/3/06	Sp	5	128	133	4	525.0	1256.4	41	0	0	0	0	0	0	0	0	0	100	100	(0)	(0)
Total						1	3562.9	7972.5	45							0	0	0				

[1] Bird ‘caught’ as defined by the Commission at CCAMLR-XXIII, paragraphs 10.30 and 10.31.

[2] *Paloma V* also conducted a small amount of fishing in Divisions 58.4.1 and 58.4.3b during this cruise.

Table 2: Extrapolated incidental mortality of seabirds, for those vessels upon which incidental mortalities of seabirds were observed in Division 58.4.3b during the 2005/06 season.

Vessel	Hooks observed (thousands)	Hooks set (thousands)	Percentage of hooks observed	% Night sets	Extrapolated number of incidental seabird mortalities		
					Night	Day	Total
Galaecia	776.7	1305.0	59	11	0	2	2

Table 3: Total extrapolated incidental mortality of seabirds and observed mortality rates (birds/thousand hooks) in longline fisheries in Subareas 48.3, 48.4, 48.6, 58.6, 58.7, 88.1 and 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b and 58.5.2 from 1997 to 2006 (- indicates no fishing occurred).

Subarea	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Subarea 48.3										
Extrapolated mortality	5755	640	210*	21	30	27	8	27	13	0
Observed mortality rate	0.23	0.032	0.013*	0.002	0.002	0.0015	0.0003	0.0015	0.0011	0
Subarea 48.4										
Extrapolated mortality	-	-	-	-	-	-	-	-	0	0
Observed mortality rate	-	-	-	-	-	-	-	-	0	0
Subarea 48.6										
Extrapolated mortality	-	-	-	-	-	-	-	0	0	0
Observed mortality rate	-	-	-	-	-	-	-	0	0	0
Subareas 58.6, 58.7										
Extrapolated mortality	834	528	156	516	199	0	7	39	76	0
Observed mortality rate	0.52	0.194	0.034	0.046	0.018	0	0.003	0.025	0.149	0
Subareas 88.1, 88.2										
Extrapolated mortality	-	0	0	0	0	0	0	1	0	0
Observed mortality rate	-	0	0	0	0	0	0	0.0001	0	0
Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b										
Extrapolated mortality	-	-	-	-	-	-	-	0	8	2
Observed mortality rate	-	-	-	-	-	-	-	0	<0.001	0.0002
Division 58.5.2										
Extrapolated mortality	-	-	-	-	-	-	0	0	0	0
Observed mortality rate	-	-	-	-	-	-	0	0	0	0
Total seabird mortality	6589	1168	366	537	229	27	15	67	97	2

* Excluding *Argos Helena* line-weighting experiment cruise.

Table 4: Observed incidental mortality of seabirds in the longline fisheries for *Dissostichus* spp. in Subarea 58.6 and Division 58.5.1 within the French EEZ during the 2005/06 season (September–August). A – autoliner; N – night-time setting; D – daytime setting (including nautical dawn and dusk).

Vessel	Dates of fishing	Method	Sets deployed				No. of hooks observed (thousands)			Hooks baited (%)	No. of birds observed caught						Observed seabird mortality (includes injured birds) (birds/thousand hooks)			Streamer line in use %		Offal discharge during haul
			N	D	Total	%N	Obs.	Set	% observed		Dead		Injured		Uninjured							
											N	D	N	D	N	D	N	D	Total	N	D	
Subarea 58.6																						
Ship 3	17/9–3/10/05	A	34	0	34	100	96.7	390.6	24.7	NC	0	0	0	0	1		0	0	0	100	0	0
Ship 7	11/10–13/12/05	A	40	0	40	100	59.7	395.9	15.1	NC	1	0	0	0	0	0	0.0168	0	0.0168	100	0	0
Ship 1	30/10–2/11/05	A	50	0	50	100	74.7	297.5	25.1	NC	3	0	0	0	0	0	0.0401	0	0.0401	100	0	0
Ship 2	14/11–18/11/05	A	30	0	30	100	24.3	119.0	20.4	NC	0	0	0	0	0	0	0	0	0	100	0	0
Ship 11	14/11–25/11/05	A	14	0	14	100	43.0	180.0	23.9	NC	0	0	0	0	0	0	0	0	0	100	0	0
Ship 11	21/12–6/1/06	A	49	0	49	100	91.1	276.0	33.0	81	1	0	0	0	1	0	0.0110	0	0.0110	100	0	0
Ship 7	17/1–18/2/06	A	103	0	103	100	188.5	700.5	26.9	NC	4	0	0	0	22	0	0.0212	0	0.0212	100	0	0
Ship 11	28/1–7/2/06	A	37	0	37	100	53.5	197.0	27.2	NC	2	0	0	0	0	0	0.0374	0	0.0374	100	0	0
Ship 3	2/2–21/2/06	A	43	0	43	100	97.5	405.3	24.1	NC	13	0	0	0	6	0	0.1333	0	0.1333	100	0	0
Ship 1	4/2–25/2/06	A	52	0	52	100	111.2	447.8	24.8	NC	8	0	0	0	7	0	0.0719	0	0.0719	100	0	0
Ship 2	4/2–13/2/06	A	19	0	19	100	41.3	158.4	26.1	NC	0	0	0	0	1	0	0	0	0	100	0	0
Ship 6	5/2–23/2/06	A	45	0	45	100	96.0	393.8	24.4	NC	6	0	2	0	8	0	0.0833	0	0.0833	100	0	0
Ship 5	6/2–25/2/06	A	39	0	39	100	96.1	397.8	24.2	88	3	0	1	0	6	0	0.0416	0	0.0416	100	0	0
Ship 11	16/4–14/5/06	A	92	0	92	100	114.8	461.5	24.9	92	1	0	0	0	1	0	0.0087	0	0.0087	100	0	0
Ship 2	4/5–21/5/06	A	56	0	56	100	80.3	364.7	22.0	NC	0	0	0	0	1	0	0	0	0	100	0	0
Ship 1	22/5–19/6/06	A	76	0	76	100	122.5	527.3	23.2	86	11	0	1	0	0	0	0.0980	0	0.0980	100	0	0
Ship 5	9/6–25/6/06	A	53	0	53	100	96.7	392.4	24.6	NC	0	0	0	0	1	0	0	0	0	100	0	0
Ship 6	17/6–28/6/06	A	43	0	43	100	48.2	193.5	24.9	NC	0	0	0	0	0	0	0	0	0	100	0	0
Ship 3	25/6–28/6/06	A	11	0	11	100	19.0	87.2	21.8	NC	0	0	0	0	0	0	0	0	0	100	0	0
Ship 2	4/8–7/8/06	A	8	0	8	100	19.9	82.6	24.1	90	0	0	0	0	0	0	0	0	0	100	0	0
Total			894			100	1574.9	6468.6	24.3		53		4		55		0.0362		0.0362			

(continued)

Table 4 (continued)

Vessel	Dates of fishing	Method	Sets deployed				No. of hooks observed (thousands)			Hooks baited (%)	No. of birds observed caught						Observed seabird mortality (includes injured birds) (birds/thousand hooks)			Streamer line in use %		Offal discharge during haul
			N	D	Total	%N	Obs.	Set	% observed		Dead		Injured		Uninjured							
											N	D	N	D	N	D	N	D	Total	N	D	
Division 58.5.1																						
Ship 11	1/9–8/11/05	A	184	0	184	100	277.4	1181.0	23.5	NC	9	0	0	0	2	0	0.0324	0	0.0324	100	0	0
Ship 5	2/9–8/11/05	A	194	0	194	100	414.7	1375.2	30.2	NC	5	0	0	0	7	0	0.0121	0	0.0121	100	0	0
Ship 6	6/9–29/11/05	A	226	0	226	100	500.6	2007.0	24.9	NC	25	0	0	0	1	0	0.0499	0	0.0499	100	0	0
Ship 1	9/9–30/10/05	A	151	0	151	100	317.5	1270.5	25.0	NC	35	0	0	0	7	0	0.1102	0	0.1102	100	0	0
Ship 7	15/9–3/10/05	A	170	0	170	100	392.1	1549.1	25.3	NC	66	0	0	0	18	0	0.1683	0	0.1683	100	0	0
Ship 2	17/9–8/11/05	A	143	0	143	100	325.1	1297.0	25.1	NC	7	0	0	0	12	0	0.0215	0	0.0215	100	0	0
Ship 3	7/10–6/12/05	A	121	0	121	100	392.1	1420.7	27.6	NC	126	0	0	0	7	0	0.3213	0	0.3213	100	0	0
Ship 2	7/12–31/1/06	A	155	0	155	100	320.4	1201.0	26.7	93	3	0	0	0	5	0	0.0094	0	0.0094	100	0	0
Ship 5	14/12–30/1/06	A	119	0	119	100	279.8	1141.2	24.5	86	10	0	1	0	27	0	0.0393	0	0.0393	100	0	0
Ship 1	31/12–29/1/06	A	72	0	72	100	167.5	710.3	23.6	NC	4	0	1	0	13	0	0.0299	0	0.0299	100	0	0
Ship 11	10/1–23/1/06	A	34	0	34	100	63.5	234.0	27.1	NC	0	0	0	0	0	0	0	0	0	100	0	0
Ship 3	12/1–30/1/06	A	39	0	39	100	110.7	444.2	24.9	NC	1	0	0	0	0	0	0.0090	0	0.0090	100	0	0
Ship 6	14/1–31/1/06	A	47	0	47	100	104.7	423.0	24.8	98	5	0	0	0	1	0	0.0478	0	0.0478	100	0	0
Ship 5	28/2–7/3/06	A	23	0	23	100	51.3	207.0	24.8	NC	13	0	0	0	4	0	0.2532	0	0.2532	100	0	0
Ship 1	1/3–15/3/06	A	38	0	38	100	90.9	387.0	23.5	NC	36	0	0	0	17	0	0.3961	0	0.3961	100	0	0
Ship 3	1/3–4/4/06	A	65	0	65	100	238.7	952.4	25.1	94	32	0	0	0	1	0	0.1341	0	0.1341	100	0	0
Ship 6	1/3–2/4/06	A	88	0	88	100	192.2	784.5	24.5	NC	14	0	0	0	0	0	0.0728	0	0.0728	100	0	0
Ship 7	1/3–28/3/06	A	63	0	63	100	167.7	729.2	23.0	NC	30	0	0	0	2	0	0.1789	0	0.1789	100	0	0
Ship 2	4/3–29/4/06	A	151	0	151	100	371.0	1526.3	24.3	87	3	0	0	0	5	0	0.0081	0	0.0081	100	0	0
Ship 11	8/3–13/4/06	A	90	0	90	100	125.3	507.6	24.7	91	42	0	0	0	5	0	0.3353	0	0.3353	100	0	0
Ship 5	14/4–4/6/06	A	136	0	136	100	325.0	1344.6	24.2	87	16	0	0	0	28	0	0.0492	0	0.0492	100	0	0
Ship 1	21/4–18/5/06	A	64	0	64	100	156.9	663.0	23.7	89	34	0	11	0	0	0	0.2868	0	0.2868	100	0	0
Ship 7	4/5–2/7/06	A	138	0	138	100	379.0	1490.3	25.4	93	30	0	5	0	27	0	0.0923	0	0.0923	100	0	0
Ship 3	11/5–20/6/06	A	78	0	78	100	264.2	1063.7	24.8	NC	14	0	0	0	4	0	0.0530	0	0.0530	100	0	0
Ship 6	14/5–12/6/06	A	72	0	72	100	159.8	648.0	24.7	NC	7	0	0	0	0	0	0.0438	0	0.0438	100	0	0
Ship 2	9/6–31/7/06	A	80	0	80	100	187.2	743.7	25.2	89	7	0	0	0	9	0	0.0374	0	0.0374	100	0	0
Ship 11	16/6–2/7/06	A	39	0	39	100	58.2	234.0	24.9	NC	0	0	0	0	1	0	0	0	0	100	0	0
Total			2780			100	6433.4	25535.2	25.0		574		18		203		0.0920		0.0920			

NC Not collected

Table 5: Estimated total seabird mortality in Subarea 58.6 and Division 58.5.1 within the French EEZ during the 2005/06 season.

Vessel	Hooks observed (thousands)	Hooks set (thousands)	Percentage of hooks observed	% Night sets	Estimated number of birds caught dead		
					Night	Day	Total
Subarea 58.6							
Ship 3	96.7	390.6	24.7	100	0	0	0
Ship 7	59.7	395.9	15.1	100	7	0	7
Ship 1	74.7	297.5	25.1	100	12	0	12
Ship 2	24.3	119.0	20.4	100	0	0	0
Ship 11	43.0	180.0	23.9	100	0	0	0
Ship 11	91.1	276.0	33.0	100	3	0	3
Ship 7	188.5	700.5	26.9	100	15	0	15
Ship 11	53.5	197.0	27.2	100	7	0	7
Ship 3	97.5	405.3	24.1	100	54	0	54
Ship 1	111.2	447.8	24.8	100	32	0	32
Ship 2	41.3	158.4	26.1	100	0	0	0
Ship 6	96.0	393.8	24.4	100	33	0	33
Ship 5	96.1	397.8	24.2	100	17	0	17
Ship 11	114.8	461.5	24.9	100	4	0	4
Ship 2	80.3	364.7	22.0	100	0	0	0
Ship 1	122.5	527.3	23.2	100	52	0	52
Ship 5	96.7	392.4	24.6	100	0	0	0
Ship 6	48.2	193.5	24.9	100	0	0	0
Ship 3	19.0	87.2	21.8	100	0	0	0
Ship 2	19.9	82.6	24.1	100	0	0	0
	1 574.9	6 468.6	24.3%		235		235
Division 58.5.1							
Ship 11	277.4	1 181.0	23.5	100	38	0	38
Ship 5	414.7	1 375.2	30.2	100	17	0	17
Ship 6	500.6	2 007.0	24.9	100	100	0	100
Ship 1	317.5	1 270.5	25.0	100	140	0	140
Ship 7	392.1	1 549.1	25.3	100	261	0	261
Ship 2	325.1	1 297.0	25.1	100	28	0	28
Ship 3	392.1	1 420.7	27.6	100	457	0	457
Ship 2	320.4	1 201.0	26.7	100	11	0	11
Ship 5	279.8	1 141.2	24.5	100	45	0	45
Ship 1	167.5	710.3	23.6	100	21	0	21
Ship 11	63.5	234.0	27.1	100	0	0	0
Ship 3	110.7	444.2	24.9	100	4	0	4
Ship 6	104.7	423.0	24.8	100	20	0	20
Ship 5	51.3	207.0	24.8	100	52	0	52
Ship 1	90.9	387.0	23.5	100	153	0	153
Ship 3	238.7	952.4	25.1	100	128	0	128
Ship 6	192.2	784.5	24.5	100	57	0	57
Ship 7	167.7	729.2	23.0	100	130	0	130
Ship 2	371.0	1 526.3	24.3	100	12	0	12
Ship 11	125.3	507.6	24.7	100	170	0	170
Ship 5	325.0	1 344.6	24.2	100	66	0	66
Ship 1	156.9	663.0	23.7	100	190	0	190
Ship 7	379.0	1 490.3	25.4	100	138	0	138
Ship 3	264.2	1 063.7	24.8	100	56	0	56
Ship 6	159.8	648.0	24.7	100	28	0	28
Ship 2	187.2	743.7	25.2	100	28	0	28
Ship 11	58.2	234.0	24.9	100	0	0	0
	6 433.4	25 535.2	25.2%		2 352		2 352

Table 6: Total estimated seabird by-catch and by-catch rate (birds/thousand hooks) in longline fisheries in Subarea 58.6 and Division 58.5.1 within the French EEZ in 2005/06.

Subarea/ division		Season 2005/06
Subarea 58.6		
	Estimated by-catch	235
	By-catch rate	0.0362
Division 58.5.1		
	Estimated by-catch	2 352
	By-catch rate	0.0920

Table 7: Total estimated seabird by-catch and by-catch rate (birds/thousand hooks) in longline fisheries in Subarea 58.6 and Division 58.5.1 within the French EEZ from 2000 to 2005.

Subarea/ division	Season					
	2000/01*	2001/02*	2002/03*	2003/04*	2004/05	2005/06
Subarea 58.6						
Estimated by-catch		1 243	720	343	242	235
By-catch rate		0.1672	0.1092	0.0875	0.0490	0.0362
Division 58.5.1						
Estimated by-catch	1 917	10 814	13 926	3 666	4 387	2 352
By-catch rate	0.0920	0.9359	0.5180	0.2054	0.1640	0.0920

* The number of observed hooks has not been collected and the values given are from the total number of hooks set.

Table 8: Species composition of birds killed in longline fisheries in Subarea 58.6 and Division 58.5.1 within the French EEZ during the 2005/06 season (September to August). N – night-time setting; D – daytime setting (including nautical dawn and dusk); PRO – white-chinned petrel; MAH – sub-Antarctic giant petrel; PCI – grey petrel; DAC – Cape petrel; PND – petrel non determined; EC – rockhopper penguin; () – % composition.

Vessel	Dates of fishing	No. of birds killed by group								Species composition (%)											
		Albatross		Petrels		Penguins		Total													
		N	D	N	D	N	D	N	D	WCP		PCI		DAC		MAH		PND		EC	
Subarea 58.6																					
Ship 3	17/9–3/10/05	0	0	0	0	0	0	0	0												
Ship 7	11/10–13/12/05	0	0	0	0	1	0	1	0											1	(100.0)
Ship 1	30/10–2/11/05	0	0	3	0	0	0	3	0	3	(100.0)										
Ship 2	14/11–18/11/05	0	0	0	0	0	0	0	0												
Ship 11	14/11–25/11/05	0	0	0	0	0	0	0	0												
Ship 11	21/12–6/1/06	0	0	1	0	0	0	1	0	1	(100.0)										
Ship 7	17/1–18/2/06	0	0	4	0	0	0	4	0	4	(100.0)										
Ship 11	28/1–7/2/06	0	0	2	0	0	0	2	0	2	(100.0)										
Ship 3	2/2–21/2/06	0	0	13	0	0	0	13	0	13	(100.0)										
Ship 1	4/2–25/2/06	0	0	8	0	0	0	8	0	8	(100.0)										
Ship 2	4/2–13/2/06	0	0	0	0	0	0	0	0												
Ship 6	5/2–23/2/06	0	0	8	0	0	0	8	0	6	(75.0)					2	(25.0)				
Ship 5	6/2–25/2/06	0	0	4	0	0	0	4	0	4	(100.0)										
Ship 11	16/4–14/5/06	0	0	1	0	0	0	1	0			1	(100.0)								
Ship 2	4/5–21/5/06	0	0	0	0	0	0	0	0												
Ship 1	22/5–19/6/06	0	0	12	0	0	0	12	0					11	(91.7)			1	(8.3)		
Ship 5	9/6–25/6/06	0	0	0	0	0	0	0	0												
Ship 6	17/6–28/6/06	0	0	0	0	0	0	0	0												
Ship 3	25/6–28/6/06	0	0	0	0	0	0	0	0												
Ship 2	4/8–7/8/06	0	0	0	0	0	0	0	0												
		0	0	56	0	1	0	57	0	41	(71.9)	1	(1.8)	11	(19.3)	2	(3.5)	1	(1.8)	1	(1.8)

(continued)

Table 8 (continued)

Vessel	Dates of fishing	No. of birds killed by group								Species composition (%)											
		Albatross		Petrels		Penguins		Total													
		N	D	N	D	N	D	N	D	WCP		PCI		DAC		MAH		PND		EC	
Division 58.5.1																					
Ship 11	1/9–8/11/05	0	0	9	0	0	0	9	0	7	(77.8)	2	(22.2)								
Ship 5	2/9–8/11/05	0	0	5	0	0	0	5	0	4	(80.0)	1	(20.0)								
Ship 6	6/9–29/11/05	0	0	25	0	0	0	25	0	21	(84.0)	4	(16.0)								
Ship 1	9/9–30/10/05	0	0	35	0	0	0	35	0	22	(62.9)	13	(37.1)								
Ship 7	15/9–3/10/05	0	0	66	0	0	0	66	0	66	(100.0)										
Ship 2	17/9–8/11/05	0	0	7	0	0	0	7	0	5	(71.4)	2	(28.6)								
Ship 3	7/10–6/12/05	0	0	126	0	0	0	126	0	125	(99.2)	1	(0.8)								
Ship 2	7/12–31/1/06	0	0	3	0	0	0	3	0	3	(100.0)										
Ship 5	14/12–30/1/06	0	0	11	0	0	0	11	0	10	(90.9)					1	(9.1)				
Ship 1	31/12–29/1/06	0	0	5	0	0	0	5	0	4	(80.0)					1	(20.0)				
Ship 11	10/1–23/1/06	0	0	0	0	0	0	0	0												
Ship 3	12/1–30/1/06	0	0	1	0	0	0	1	0	1	(100.0)										
Ship 6	14/1–31/1/06	0	0	5	0	0	0	5	0	5	(100.0)										
Ship 5	28/2–7/3/06	0	0	13	0	0	0	13	0	13	(100.0)										
Ship 1	1/3–15/3/06	0	0	36	0	0	0	36	0	36	(100.0)										
Ship 3	1/3–4/4/06	0	0	32	0	0	0	32	0	32	(100.0)										
Ship 6	1/3–2/4/06	0	0	14	0	0	0	14	0	14	(100.0)										
Ship 7	1/3–28/3/06	0	0	30	0	0	0	30	0	30	(100.0)										
Ship 2	4/3–29/4/06	0	0	3	0	0	0	3	0	3	(100.0)										
Ship 11	8/3–13/4/06	0	0	42	0	0	0	42	0	42	(100.0)										
Ship 5	14/4–4/6/06	0	0	16	0	0	0	16	0							16	(100.0)				
Ship 1	21/4–18/5/06	0	0	45	0	0	0	45	0					34	(75.6)			11	(24.4)		
Ship 7	4/5–2/7/06	0	0	35	0	0	0	35	0			30	(85.7)			5	(14.3)				
Ship 3	11/5–20/6/06	0	0	14	0	0	0	14	0	1	(7.1)	13	(92.9)								
Ship 6	14/5–12/6/06	0	0	7	0	0	0	7	0							7	(100.0)				
Ship 2	9/6–31/7/06	0	0	7	0	0	0	7	0			7	(100.0)								
Ship 11	16/6–2/7/06	0	0	0	0	0	0	0	0												
		0	0	592	0	0	0	592	0	444	(75.0)	73	(12.3)	34	(5.7)	30	(5.1)	11	(1.9)	0	(0.0)
Total (%)		0	0	648	0	1	0	649	0	485	(74.7)	74	(11.4)	45	(6.9)	32	(4.9)	12	(1.8)	1	(0.2)

Table 9: Compliance, as reported by observers, of streamer lines and haul scaring devices with the minimum specifications set out in Conservation Measure 25-02 (2005) during the 2005/06 season. Sp – Spanish method; A – autoliner; Y – yes; N – no; - – no information; MP – moon pool; * – conservation measure not applicable in this area.

Vessel name (Nationality)	Dates of fishing	Fishing method	Compliance with CCAMLR specifications	Compliance with details of streamer line specifications				Length of streamers (m)	Streamer line in use % setting		Haul scaring device used %
				Attachment, height above water (m)	Total length (m)	No. of streamers per line	Spacing of streamers per line (m)		Night	Day	
Subarea 48.3											
Insung No. 22	1/5–18/6/06	Sp	Y	Y (7.5)	Y (253)	10	Y (5)	Y (6.5)	100		100
Jacqueline	1/5–26/8/06	Sp	Y	Y (7.6)	Y (158)	9	Y (5)	Y (6.5)	100		46
Argos Helena	1/5–31/8/06	A	Y	Y (7.3)	Y (154)	13	Y (5)	Y (8)	100		MP
Koryo Maru No. 11	2/5–22/7/06	Sp	Y	Y (8)	Y (150)	10	Y (5)	Y (8)	100		100
Polarpesca I	12/5–14/8/06	Sp	Y	Y (8)	Y (150)	7	Y (5)	Y (7)	99.6		100
Protegat	1/5–27/6/06	A	Y	Y (8)	Y (150)	30	Y (5)	Y (6.5)	99		78
Punta Ballena	15/5–23/8/06	A	Y	Y (7)	Y (150)	7	Y (5)	Y (1–7)	100		100
San Aspiring	1/5–27/8/06	A	Y	Y (8)	Y (240)	22	Y (5)	Y (12)	100		100
Viking Bay	1/5–16/8/06	Sp	Y	Y (7)	Y (150)	9	Y (5)	Y (10)	100		98
Argos Georgia	1/5–31/8/06	A	Y	Y (7.6)	Y (155)	7	Y (5)	Y (7)	100		90
Subarea 48.4											
Argos Helena	7/4–15/4/06	A	Y	Y (7.3)	Y (154)	13	Y (5)	Y (1–8)	100		MP
San Aspiring	10/4–25/4/06	A	Y	Y (8)	Y (220)	22	Y (5)	Y (1–8)	100		100
Subarea 48.6											
Shinsei Maru No. 3	15/4–17/5/06	A	N	Y (7.5)	N (146)	6	Y (5)	Y (4.4–6.8)	100	100	100
Shinsei Maru No. 3	5/1–29/3/06	A	Y	Y (10)	Y (164)	6	Y (5)	Y (4.5–7.2)	100	100	100
Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b											
Globalpesca I	22/12–21/2/06	Sp	Y	Y (7)	Y (150)	7	Y (5)	Y (1–7)	100	100	0
Tronio	15/12–10/3/06	Sp	Y	Y (10)	Y (167)	12	Y (5)	Y (1–6.5)	100	100	100
Globalpesca II	21/12–22/1/06	Sp	N	Y (7)	Y (150)	6	Y (5)	N (1–6)		100	0
Insung No. 2	4/1–4/3/06	Sp	N	Y (7)	Y (150)	10	Y (5)	N (1–4.5)	100	100	100
Galaecia	2/12–22/2/06	Sp	N	Y (8)	Y (150)	8	Y (5)	N (1.5–5)	100	100	0
Galaecia	5/4–5/7/06	Sp	Y	Y (7)	Y (150)	9	Y (5)	Y (1–6.5)	100	100	0
Division 58.5.2											
Janas	25/7–13/9/06	A	Y	Y (7)	Y (175)	24	Y (5)	Y (1.3–7)	100	100	100
Janas	7/5–27/6/06	A	Y	Y (7)	Y (150)	15	Y (3)	Y (1–7)	100	100	94
Subareas 58.6, 58.7											
Koryo Maru No. 11	19/2–30/3/06	Sp	N	Y (7.7)	Y (161)	12	N (5.7)	N (1.6–4.2)	100		100

(continued)

Table 9 (continued)

Vessel name (Nationality)	Dates of fishing	Fishing method	Compliance with CCAMLR specifications	Compliance with details of streamer line specifications				Length of streamers (m)	Streamer line in use % setting		Haul scaring device used %
				Attachment, height above water (m)	Total length (m)	No. of streamers per line	Spacing of streamers per line (m)		Night	Day	
Subareas 88.1, 88.2											
Avro Chieftain	2/12–13/1/06	A	Y	Y (7.7)	Y (204)	24	Y (3)	Y (1–8.8)		100	MP
Punta Ballena	2/1–5/2/06	A	Y	Y (7)	Y (160)	7	Y (5)	Y (1–7)		100	0
San Aotea II	16/12–16/2/06	A	Y	Y (7)	Y (210)	13	Y (4.5)	Y (1–6.5)		100	0
San Aspiring	2/12–15/2/06	A	Y	Y (8)	Y (220)	20	Y (5)	Y (1–8)		100	0
Viking Sur	6/1–5/2/06	A	N	Y (7)	N (100)	10	Y (5)	N (1–6)		100	0
Antartic II	1/12–6/2/06	A	Y	-	-	-	-	-		100	0
Argos Georgia	15/1–12/2/06	A	Y	Y (7)	Y (155)	7	Y (5)	Y (1–7)		100	0
Argos Helena	11/12–10/2/06	A	Y	Y (8)	Y (150)	13	Y (4)	Y (1–9)	100	100	0
Frøyanes	8/12–7/2/06	A	N	Y (7.2)	N (147)	18	Y (4.5)	Y (1–6.5)	100	100	0
Janas	14/12–8/2/06	A	Y	Y (8)	Y (150)	19	Y (5)	Y (0.5–7.5)		100	0
Volna	17/12–15/2/06	Sp	Y	Y (7)	Y (150)	8	Y (5)	Y (1–6.5)		100	0
Yantar	17/12–15/2/06	Sp	Y	Y (7)	Y (150)	8	Y (5)	Y (1–6.5)		100	0
Paloma V[1]	5/12–11/3/06	Sp	Y	Y (7)	Y (150)	12	Y (5)	Y (1–6.5)		100	0

[1] *Paloma V* also conducted a small amount of fishing in Divisions 58.4.1 and 58.4.3b during this cruise.

Table 10: Summary of scientific observations relating to compliance with Conservation Measure 25-02 (2005), based on data from scientific observers from the 1996/97 to the 2005/06 seasons. Values in parentheses are the percentage of complete observer records. na – not applicable.

Subarea/season	Line weighting (Spanish system only)			Night setting (% night)	Offal discharge (%) opposite haul	Streamer line compliance (%)										Total catch rate (birds/thousand hooks)	
	Compliance %	Median weight (kg)	Median spacing (m)			Overall		Attached height		Total length		No. of streamers		Distance apart		Night	Day
Subarea 48.3																	
1996/97	0 (91)	5.0	45	81	0 (91)	6	(94)	47	(83)	24	(94)	76	(94)	100	(78)	0.18	0.93
1997/98	0 (100)	6.0	42.5	90	31 (100)	13	(100)	64	(93)	33	(100)	100	(93)	100	(93)	0.03	0.04
1998/99	5 (100)	6.0	43.2	80[1]	71 (100)	0	(95)	84	(90)	26	(90)	76	(81)	94	(86)	0.01	0.08[1]
1999/00	1 (91)	6.0	44	92	76 (100)	31	(94)	100	(65)	25	(71)	100	(65)	85	(76)	<0.01	<0.01
2000/01	21 (95)	6.8	41	95	95 (95)	50	(85)	88	(90)	53	(94)	94	94	82	(94)	<0.01	<0.01
2001/02	63 (100)	8.6	40	99	100 (100)	87	(100)	94	(100)	93	(100)	100	(100)	100	(100)	0.002	0
2002/03	100 (100)	9.0	39	98	100 (100)	87	(100)	91	(100)	96	(100)	100	(100)	100	(100)	<0.001	0
2003/04	87 (100)	9.0	40	98	100 (100)	69	(94)	88	(100)	93	(94)	[7]		100	(100)	0.001	0
2004/05	100 (100)	9.5	45	99	100 (100)	75	(100)	88	(100)	88	(100)	[7]		100	(100)	0.001	0
2005/06	100 (100)	10.0	40	100	100 (100)	100	(100)	100	(100)	100	(100)	[7]		100	(100)	0	0
Subarea 48.4																	
2005/06	Auto only	na	na	100	100 (100)	100	(100)	100	(100)	100	(100)	[7]		100	(100)	0	0
Subarea 48.6																	
2003/04	100 (100)	7.0	20	41[6]	No discharge	0	(100)	100	(100)	100	(100)	[7]		0	(100)	0	0
2004/05	100 (100)	6.5	19.5	29[6]	No discharge	100	(100)	100	(100)	100	(100)	[7]		0	(100)	0	0
2005/06	Auto only	na	na	36[6]	No discharge	50	(100)	100	(100)	50	(100)			100	(100)	0	0
Divisions 58.4.1,58.4.2, 58.4.3a, 58.4.3b																	
2002/03	Auto only	na	na	24[5]	No discharge	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
2003/04	Auto only	na	na	0[5]	No discharge	100	(100)	100	(100)	100	(100)	[7]		100	(100)	0	0
2004/05	33[9] (100)	7.9	40	26[5]	No discharge	88	(100)	100	(100)	100	(100)	[7]		88	(100)	0	<0.001
2005/06	16[9] (100)	7.2	48	16[5]	No discharge	100	(100)	100	(100)	100	(100)			100	(100)	0	<0.001
Division 58.4.4																	
1999/00	0[9] (100)	5	45	50	0 (100)	0	(100)	100	(100)	0	(100)	100	(100)	100	(100)	0	0
Division 58.5.2																	
2002/03	Auto only	na	na	100	No discharge	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
2003/04	Auto only	na	na	99	No discharge	100	(100)	100	(100)	100	(100)	[7]		100	(100)	0	0
2004/05	Auto Only	na	na	50[8]	No discharge	100	(100)	100	(100)	100	(100)	[7]		100	(100)	0	0
2005/06	Auto Only	na	na	53[8]	No discharge	100	(100)	100	(100)	100	(100)	[7]		100	(100)	0	0

(continued)

Table 10 (continued)

Subarea/season	Line weighting (Spanish system only)			Night setting (% night)	Offal discharge (%) opposite haul	Streamer line compliance (%)										Total catch rate (birds/thousand hooks)	
	Compliance %	Median weight (kg)	Median spacing (m)			Overall		Attached height		Total length		No. of streamers		Distance apart		Night	Day
Subareas 58.6 and 58.7																	
1996/97	0 (60)	6	35	52	69 (87)	10	(66)	100	(60)	10	(66)	90	(66)	60	(66)	0.52	0.39
1997/98	0 (100)	6	55	93	87 (94)	9	(92)	91	(92)	11	(75)	100	(75)	90	(83)	0.08	0.11
1998/99	0 (100)	8	50	84[2]	100 (89)	0	(100)	100	(90)	10	(100)	100	(90)	100	(90)	0.05	0
1999/00	0 (83)	6	88	72	100 (93)	8	(100)	91	(92)	0	(92)	100	(92)	91	(92)	0.03	0.01
2000/01	18 (100)	5.8	40	78	100 (100)	64	(100)	100	(100)	64	(100)	100	(100)	100	(100)	0.01	0.04
2001/02	66 (100)	6.6	40	99	100 (100)	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
2002/03	0 (100)	6.0	41	98	50 (100)	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	<0.01	0
2003/04	100 (100)	7.0	20	83	100 (100)	50	(100)	50	(100)	100	(100)	[7]		100	(100)	0.03	0.01
2004/05	100 (100)	6.5	20	100	100 (100)	0	(100)	100	(100)	100	(100)	[7]		0	(100)	0.149	0
2005/06	100 (100)	9.1	40	100	100 (100)	0	(100)	100	(100)	100	(100)	100	(100)	0	(100)	0	0
Subarea 88.1, 88.2																	
1996/97	Auto only	na	na	50	0 (100)	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
1997/98	Auto only	na	na	71	0 (100)	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
1998/99	Auto only	na	na	1[3]	100 (100)	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
1999/00	Auto only	na	na	6[4]	No discharge	67	(100)	100	(100)	67	(100)	100	(100)	100	(100)	0	0
2000/01	1 (100)	12	40	18[4]	No discharge	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
2001/02	Auto only	na	na	33[4]	No discharge	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
2002/03	100 (100)	9.6	41	21[4]	1 incidence by 1 vessel	100	(100)	100	(100)	100	(100)	100	(100)	100	(100)	0	0
2003/04	89 (100)	9	40	5[4]	24% by 1 vessel	59	(100)	82	(100)	86	(100)	[7]		100	(100)	0	<0.01
2004/05	33[9] (100)	9.0	45	1[4]	1% by 1 vessel	64	(100)	100	(100)	100	(100)	[7]		64	(100)	0	0
2005/06	100[9] (100)	9.2	35	1[4]	No discharge	85	(92)	100	(92)	85	(92)	[7]		100	(92)	0	0

[1] Includes daytime setting – and associated seabird by-catch – as part of line-weighting experiments on *Argos Helena* (WG-FSA-99/5).
[2] Includes some daytime setting in conjunction with use of an underwater-setting funnel on *Eldfisk* (WG-FSA-99/42).
[3] Conservation Measure 169/XVII allowed New Zealand vessels to undertake daytime setting south of 65°S in Subarea 88.1 to conduct a line-weighting experiment.
[4] Conservation Measures 210/XIX, 216/XX and 41-09 (2002, 2003, 2004) permit daytime setting south of 65°S in Subarea 88.1 if able to demonstrate a sink rate of 0.3 m/s.
[5] Conservation Measure 41-05 (2002, 2003, 2004) permits daytime setting in Division 58.4.2 if the vessel can demonstrate a sink rate of 0.3 m/s.
[6] Conservation Measure 41-04 (2003, 2004) permits daytime setting in Subarea 48.6 if the vessel can demonstrate a sink rate of 0.3 m/s.
[7] Conservation Measure 25-02 (2003) was updated and the requirement for a minimum of 5 streamers per line was removed.
[8] Conservation Measure 41-08 (2004) permits daylight setting with the use of an integrated weighted line of at least 50 g/m.
[9] Conservation Measure 24-02 (2004) exempts vessels from line-weighting requirements if they comply with sink rates or have an integrated weighted line of 50 g/m.

Table 11: Aerial extent of streamer lines reported by observers during the 2005/06 season. Sp – Spanish method; A – autoliner.

Vessel name	Dates of fishing	Fishing method	Average setting speed (knots)	Aerial extent of streamer line
Subarea 48.3				
Insung No. 22	1/5–18/6/06	Sp	7.8	25
Jacqueline	1/5–26/8/06	Sp	9.4	50
Argos Helena	1/5–31/8/06	A	7.6	45
Koryo Maru No. 11	2/5–22/7/06	Sp	6.7	20
Polarpesca I	12/5–14/8/06	Sp	6.1	150
Protegat	1/5–27/6/06	A	6.0	40
Punta Ballena	15/5–23/8/06	A	6.3	30
San Aspiring	1/5–27/8/06	A	6.6	100
Viking Bay	1/5–16/8/06	Sp	8.0	60
Argos Georgia	1/5–31/8/06	A	7.1	40
Subarea 48.4				
Argos Helena	7/4–15/4/06	A	6.0	45
San Aspiring	10/4–25/4/06	A	6.0	100
Subarea 48.6				
Shinsei Maru No. 3	15/4–17/5/06	A	7.6	34
Shinsei Maru No. 3	5/1–29/3/06	Auto	7.6	60
Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b				
Globalpesca I	22/12–21/2/06	Sp	6.7	45
Tronio	15/12–10/3/06	Sp	8.9	65
Globalpesca II	21/12–22/1/06	Sp	8.2	110
Insung No. 2	4/1–4/3/06	Sp	8.1	145
Galaecia	2/12–22/2/06	Sp	8.2	45
Galaecia	5/4–5/7/06	Sp	7.9	125
Division 58.5.2				
Janas	25/7–13/9/06	A	5.7	51
Janas	7/5–27/6/06	A	5.9	30
Subareas 58.6, 58.7				
Koryo Maru No. 11	19/2–30/3/06	Sp	7.4	52
Subareas 88.1, 88.2				
Avro Chieftain	2/12–13/1/06	A	5.1	50
Punta Ballena	2/1–5/2/06	A	6.0	150
San Aotea II	16/12–16/2/06	A	6.1	59
San Aspiring	2/12–15/2/06	A	6.6	100
Viking Sur	6/1–5/2/06	A	6.9	40
Antartic II	1/12–6/2/06	A	6.8	
Argos Georgia	15/1–12/2/06	A	6.0	40
Argos Helena	11/12–10/2/06	A	7.7	50
Frøyanes	8/12–7/2/06	A	8.0	75
Janas	14/12–8/2/06	A	5.1	100
Volna	17/12–15/2/06	Sp	7.7	120
Yantar	17/12–15/2/06	Sp	7.2	50
Paloma V[1]	5/12–11/3/06	Sp	7.9	75

[1] *Paloma V* also conducted a small amount of fishing in Divisions 58.4.1 and 58.4.3b during this cruise.

Table 12: Observed incidences of seabird and marine mammal entanglements with trawl gear for the 2005/06 season. DIC – *Diomedea chrysostoma*; DIM – *Diomedea melanophrys*; DIX – *Diomedea exulans*; MAI – *Macronectes giganteus*; PDM – *Pterodroma macroptera*; PRO – *Procellaria aequinoctialis*; SEA – *Arctocephalus gazella*; SLP – *Hydrurga leptonyx*; * – data from cruise report.

Vessel	Dates of fishing	Area	Species	Total observed	
				Mortality (dead or injured)	Released alive (uninjured)
Betanzos	22/3–22/4/06	48.3	DIC		1
			DIM		12
			PRO	7	35
Cabo de Hornos	3/2–9/3/06	48.3	DIM	4	1
			PDM	1	1
			PRO	2	
Argos Pereira	25/12–19/1/06	48.3			
Sil	1/1–18/2/06	48.3	DIM	2	
			DIX		1
			MAI		1
*Insung Ho**	3/2–13/2/06	48.3	DIC	1	1
			DIM	5	18
			PRO	11	18
Southern Champion	11/3–31/3/06	58.5.2			
Southern Champion	29/4–23/6/06	58.5.2	SLP	1	
Southern Champion	22/7–16/9/06	58.5.2			
Niitaka Maru	26/6–5/7/06	48.3			
Niitaka Maru	10/7–28/7/06	48.3			
Saga Sea	17/6–11/8/06	48.1			
Konstruktor Koshkin	15/4–26/5/06	48.1	SEA	1	

Table 13: Seabird mortality totals and rates (BPT – birds/trawl) and species composition, recorded by observers in the CAMLR Convention Area trawl fishery during the 2005/06 season. ANI – *Champsocephalus gunnari;* DIC – grey-headed albatross; DIM – black-browed albatross; KRI – *Euphausia superba*; PRO – white-chinned petrel; PTZ – unknown petrel; TOP – *Dissostichus eleginoides*.

Area	Vessel (target species)	Cruise dates	Trawls		BPT	Dead				Total dead	Alive (combined)
			Set	Observed		DIC	DIM	PRO	PTZ		
48.1	*Saga Sea* (KRI)	17/6–11/8/06	550	550	0.00					0	0
	Konstruktor Koshkin (KRI)	15/4–26/5/06	577	289	0.00					0	0
	Total		1127	839	0.00					0	0
48.3	*Betanzos* (ANI)	22/3–22/4/06	70	63	0.11			7		7	48
	Cabo de Hornos (ANI)	3/2–9/3/06	138	101	0.07		4	2	1	7	2
	Argos Pereira (ANI)	25/12–19/1/06	71	35	0.00					0	0
	Sil (ANI)	1/1–18/2/06	137	137	0.01		2			2	2
	Insung Ho (ANI)	3/2–13/2/06	169	121	0.14	1	5	11		17	37
	Total		585	457	0.07	3%	33%	61%	3%	33	89
48.3	*Niitaka Maru* (KRI)	26/6–5/7/06	191	56	0.00					0	0
	Niitaka Maru (KRI)	10/7–28/7/06	204	125	0.00					0	0
	Total		395	181	0.00					0	0
58.5.2	*Southern Champion* (ANI/TOP)	11/3–31/3/06	143	143	0.00					0	0
	Southern Champion (ANI/TOP)	29/4–23/6/06	425	425	0.00					0	0
	Southern Champion (ANI/TOP)	22/7–16/9/06	518	518	0.00					0	0
	Total		1086	1086	0.00					0	0

Table 14: Seabird mortality totals and rates (BPT – birds/trawl) and species composition of by-catch, recorded by observers in the CAMLR Convention Area trawl fisheries over the last six seasons. DAC – Cape petrel; DIC – grey-headed albatross; DIM – black-browed albatross; MAI – southern giant petrel; MAH – northern giant petrel; PRO – white-chinned petrel; PTZ – unknown petrel; PWD – Antarctic prion.

Season	Area	Target species	Trips observed	Trawls		BPT	Dead								Total dead	Alive (combined)
				Set	Observed		DIC	DIM	PRO	MAH	PWD	PTZ	DAC	MAI		
2001	48.1	*E. superba*	2	485	427	0									0	0
	48.3	*C. gunnari*	6	381	350	0.26	5	46	41						92	40
	58.5.2	*D. eleginoides*	7	1441	1387	<0.10									0	0
		C. gunnari														
2002	48.3	*E. superba*	5	992	755	<0.10									0	0
	48.3	*C. gunnari*	5	460	431	0.16		18	49		1				68	52
	58.5.2	*D. eleginoides*	6	904	850	<0.10									0	1
		C. gunnari														
2003	48.3	*E. superba*	6	1928	1073										0	0
	48.3	*C. gunnari*	3	184	182	0.20	1	7	28						36	15
	58.5.2	*D. eleginoides*	8	1311	1309	<0.10		2	2				2		6	11
		C. gunnari				5										
2004	48	*E. superba*	1	334	258	<0.10									0	0
	48.3	*E. superba*	6	1145	829	<0.10									0	0
	48.3	*C. gunnari*	6	247	238	0.37	1	26	59					1	87	132
	58.5.2	*D. eleginoides*	5	1218	1215	<0.10									0	13
		C. gunnari														
2005	48.2	*E. superba*	2	391	285	<0.10							1		1	0
	48.3	*C. gunnari*	7	337	277	<0.14		9	1	1					11	14
	48.3	*E. superba*	5	1451	842	<0.10									0	0
	58.5.2	*D. eleginoides*	6	1303	1301	<0.11		5	3						8	0
		C. gunnari														
2006	48.1	*E. superba*	2	1127	839	0.00									0	0
	48.3	*C. gunnari*	5	585	457	0.07	1	11	20			1			33	89
	48.3	*E. superba*	2	395	181	0.00									0	0
	58.5.2	*D. eleginoides*	3	1086	1086	0.00									0	0
		C. gunnari														

Table 15: Seal mortality totals and rates (SPT – seals/trawl) and species composition, recorded by observers in the CAMLR Convention Area trawl fisheries during the 2005/06 season. ANI – *Champsocephalus gunnari;* KRI – *Euphausia superba*; SEA – Antarctic fur seal; SLP – leopard seal; TOP – *Dissostichus eleginoides*.

Area	Vessel (target species)	Cruise dates	Trawls		SPT	Dead		Total dead	Alive (combined)
			Set	Observed		SLP	SEA		
48.1	*Saga Sea* (KRI)	17/6–11/8/06	550	550	0.00			0	0
	Konstruktor Koshkin (KRI)	15/4–26/5/06	577	289	0.003		1	1	0
	Total		1127	839	0.001			1	0
48.3	*Betanzos* (ANI)	22/3–22/4/06	70	63	0.11			0	0
	Cabo de Hornos (ANI)	3/2–9/3/06	138	101	0.07			0	0
	Argos Pereira (ANI)	25/12–19/1/06	71	35	0.00			0	0
	Sil (ANI)	1/1–18/2/06	137	137	0.01			0	0
	InsungHo (ANI)	3/2–13/2/06	169	121	0.14			0	0
	Total		585	457	0.07			0	0
48.3	*Niitaka Maru* (KRI)	26/6–5/7/06	191	56	0.00			0	0
	Niitaka Maru (KRI)	10/7–28/7/06	204	125	0.00			0	0
	Total		395	181	0.00			0	0
58.5.2	*Southern Champion* (ANI/TOP)	11/3–31/3/06	143	143	0.00			0	0
	Southern Champion (ANI/TOP)	29/4–23/6/06	425	425	0.002	1		1	0
	Southern Champion (ANI/TOP)	22/7–16/9/06	518	518	0.00			0	0
	Total		1086	1086	0.001			1	0

Table 16: Seal mortality totals and rates (SPT – seals/trawl) and species composition of by-catch, recorded by observers in the CAMLR Convention Area trawl fisheries over the last six seasons. SEA – Antarctic fur seal; SES – southern elephant seal; SLP – leopard seal.

Season	Area	Target species	Trips observed	Trawls		SPT	Dead			Total dead	Alive (combined)
				Set	Observed		SLP	SEA	SES		
2001	48.1	*E. superba*	2	485	427	0.00				0	0
	48.3	*C. gunnari*	6	381	350	0.00				0	0
	58.5.2	*D. eleginoides* *C. gunnari*	7	1441	1387	0.001		1		1	2
2002	48.3	*E. superba*	5	992	755	0.00				0	0
	48.3	*C. gunnari*	5	460	431	0.00				0	0
	58.5.2	*D. eleginoides* *C. gunnari*	6	904	850	0.001		1		1	0
2003	48.3	*E. superba*	6	1928	1073	0.03		27		27	15
	48.3	*C. gunnari*	3	184	182	0.00				0	0
	58.5.2	*D. eleginoides* *C. gunnari*	8	1311	1309	0.003		2	2	4	2
2004	48	*E. superba*	1	334	258	0		0		0	0
	48.3	*E. superba*	6	1145	829	0.17		142		142	12
	48.3	*C. gunnari*	6	247	238	0				0	0
	58.5.2	*D. eleginoides* *C. gunnari*	5	1218	1215	0.002		3		3	0
2005	48.2	*E. superba*	2	391	285	0.06		16		16	8
	48.3	*C. gunnari*	7	337	277	0.00		0		0	2
	48.3	*E. superba*	5	1451	842	0.006		5		5	64
	58.5.2	*D. eleginoides* *C. gunnari*	6	1303	1301	0.00				0	1
2006	48.1	*E. superba*	2	1127	839	0.001		1		1	0
	48.3	*C. gunnari*	5	585	457	0.00				0	0
	48.3	*E. superba*	2	395	181	0.00				0	0
	58.5.2	*D. eleginoides* *C. gunnari*	3	1086	1086	0.00	1			1	0

Table 17: Estimated total potential seabird by-catch in unregulated longline fisheries in the Convention Area from 1996 to 2006.

Subarea/ division	Year	Extrapolated potential incidental mortality of seabirds		
		Lower	Median	Upper
48.3	2006	0	0	0
	1996–2005	1 835	3 486	56 766
58.4.2	2006	264	322	861
	1996–2005	707	863	2 305
58.4.3	2006	2 821	3 442	9 191
	1996–2005	1 747	2 131	5 691
58.4.4	2006	0	0	0
	1996–2005	3 886	4 741	12 659
58.5.1	2006	454	554	1 478
	1996–2005	48 327	58 965	157 442
58.5.2	2006	107	130	348
	1996–2005	32 657	39 845	106 391
58.6	2006	102	124	331
	1996–2005	44 927	54 817	146 366
58.7	2006	0	0	0
	1996–2005	12 856	15 686	41 884
88.1	2006	0	0	0
	1996–2005	489	598	1 578
88.2	2006	9	11	28
	1996–2005	0	0	0
Totals	2006	3 756	4 583	12 237
	1996–2005	147 431	181 133	531 082
Total		151 187	185 716	543 319

Table 18: Summary of IMAF assessment of risk to seabirds posed by new and exploratory longline fisheries in the Convention Area (see also Figure 1).

Risk level	Mitigation requirements	Observer coverage
1 – low	• Strict compliance with standard seabird by-catch conservation measure[1]. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirement[2]. • No offal dumping.	20% of hooks hauled 50% of hooks set
2 – average to low	• Strict compliance with standard seabird by-catch conservation measure[1]. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirements and seabird by-catch limits. • No offal dumping.	25% of hooks hauled 75% of hooks set
3 – average	• Strict compliance with standard seabird by-catch conservation measure[1]. • Restrict longline fishing to period outside at risk species breeding season where known/relevant unless line sink rate requirement is met at all times. • Daytime setting permitted subject to strict line sink rate requirements and seabird by-catch limits. • No offal dumping.	40% of hooks hauled[2] 95% of hooks set
4 – average to high	• Strict compliance with standard seabird by-catch conservation measure[1]. • Restrict longline fishing to the period outside any at risk species breeding season(s). • Strict line sink rate requirements at all times. • No daytime setting permitted. • No offal dumping.	45% of hooks hauled[2] 95% of hooks set
5 – high	• Strict compliance with standard seabird by-catch conservation measure[1]. • Restrict longline fishing to period outside at risk species breeding season. • Closed areas as identified. • Strict line sink rate requirements at all times. • No daytime setting permitted. • Strict seabird by-catch limits in place. • No offal dumping.	50% of hooks hauled[2] 100% of hooks set

[1] Conservation Measure 25-02 with the possibility of exemption to paragraph 4 as provided by Conservation Measure 24-02.
[2] This is likely to require the presence of two observers.

Table 19: Summary of IMAF risk assessment in relation to proposed new and exploratory longline fisheries in 2006/07 (five-point risk scale as defined in SC-CAMLR-XXV/BG/26).

Area	Risk scale	Mitigation requirements	Proposal assessment
48.6 north of ca. 55°S	2 – average to low	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposal from Korea (CCAMLR-XXV/20) does not contain sufficient information to be certain that it does not conflict with the IMAF assessment. Proposals from Japan (CCAMLR-XXV/19), New Zealand (CCAMLR-XXV/22) and Norway (CCAMLR-XXV/23) do not conflict with the IMAF assessment.
48.6 south of ca. 55°S	1 – low	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirement. • No offal dumping at any time.	Proposal from Korea (CCAMLR-XXV/20) does not contain sufficient information to be certain that it does not conflict with the IMAF assessment. Proposals from Japan (CCAMLR-XXV/19), New Zealand (CCAMLR-XXV/22) and Norway (CCAMLR-XXV/23) do not conflict with the IMAF assessment.
58.4.1	2 – average to low	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposals from Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) do not contain sufficient information to be certain that they do not conflict with the IMAF assessment. Proposals from Australia (CCAMLR-XXV/18), Namibia (CCAMLR-XXV/21), New Zealand (CCAMLR-XXV/22) and Spain (CCAMLR-XXV/26) do not conflict with the IMAF assessment.
58.4.2	2 – average to low	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposals from Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) do not contain sufficient information to be certain that they do not conflict with the IMAF assessment. Proposals from Australia (CCAMLR-XXV/18), Namibia (CCAMLR-XXV/21), New Zealand (CCAMLR-XXV/22) and Spain (CCAMLR-XXV/26) do not conflict with the IMAF assessment.

(continued)

Table 19 (continued)

Area	Risk scale	Mitigation requirements	Proposal assessment
58.4.3a	3 – average	• Strict compliance with standard seabird by-catch conservation measure. • Restrict longline fishing to May to August (outside the September through April albatross, giant petrel and white-chinned petrel breeding season) unless line sink rate requirements met at all times. • Daytime setting permitted subject to strict line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposal from Korea (CCAMLR-XXV/20) does not contain sufficient information to be certain that it does not conflict with the IMAF assessment. Proposals from Japan (CCAMLR-XXV/19) and Spain (CCAMLR-XXV/26) do not conflict with the IMAF assessment.
58.4.3b	3 – average	• Strict compliance with standard seabird by-catch conservation measure. • Restrict longline fishing to May to August (outside the September through April albatross, giant petrel and white-chinned petrel breeding season) unless line sink rate requirements met at all times. • Daytime setting permitted subject to strict line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposals from Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) do not contain sufficient information to be certain that they do not conflict with the IMAF assessment. Proposals from Australia (CCAMLR-XXV/18), Japan (CCAMLR-XXV/19), Namibia (CCAMLR-XXV/21) and Spain (CCAMLR-XXV/26) do not conflict with the IMAF assessment.
88.1 north of 65°S	3 – average	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season, but line sink rate requirements to be met at all times. • Daytime setting permitted subject to strict line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposals from Argentina (CCAMLR-XXV/17), Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) do not contain sufficient information to be certain that they do not conflict with the IMAF assessment. Proposals from New Zealand (CCAMLR-XXV/22), Norway (CCAMLR-XXV/23), Russia (CCAMLR-XXV/24), South Africa (CCAMLR-XXV/25), Spain (CCAMLR-XXV/26), and UK (CCAMLR-XXV/27) do not conflict with the IMAF assessment.

(continued)

Table 19 (continued)

Area	Risk scale	Mitigation requirements	Proposal assessment
88.1 south of 65°S	1 – low	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposals from Argentina (CCAMLR-XXV/17), Korea (CCAMLR-XXV/20) and Uruguay (CCAMLR-XXV/28) do not contain sufficient information to be certain that they do not conflict with the IMAF assessment. Proposals from New Zealand (CCAMLR-XXV/22), Norway (CCAMLR-XXV/23), Russia (CCAMLR-XXV/24), South Africa (CCAMLR-XXV/25), Spain (CCAMLR-XXV/26), and the UK (CCAMLR-XXV/27) do not conflict with the IMAF assessment.
88.2	1 – low	• Strict compliance with standard seabird by-catch conservation measure. • No need for restriction of longline fishing season. • Daytime setting permitted subject to line sink rate requirements and seabird by-catch limits. • No offal dumping at any time.	Proposals from Argentina (CCAMLR-XXV/17) and Uruguay (CCAMLR-XXV/28) do not contain sufficient information to be certain that they do not conflict with the IMAF assessment. Proposals from New Zealand (CCAMLR-XXV/22), Norway (CCAMLR-XXV/23), Russia (CCAMLR-XXV/24), Spain (CCAMLR-XXV/26), and the UK (CCAMLR-XXV/27) do not conflict with the IMAF assessment.

Table 20: Intersessional work plan for ad hoc WG-IMAF for 2006/07.

The Secretariat will coordinate the intersessional work of the IMAF group. An interim review of work will be conducted in May 2007 and advised to ad hoc WG-IMAF in advance of WG-EMM/WG-SAM (July 2007). The outcome of the intersessional work will be reviewed in September 2007 and reported as a tabled paper to WG-IMAF in October 2007.

[1] In addition to work coordinated by the Science/Compliance Officer (Secretariat) * SODA: Scientific Observer Data Analyst

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
1.	**Planning and coordination of work:**				
1.1	Circulate materials on IMAF matters as contained in reports of current meetings of CCAMLR.	Standing request		Dec 2006	Place all relevant sections of CCAMLR-XXV on IMAF page of CCAMLR website and notify IMAF group members, and technical coordinators and (via them) scientific observers.
1.2	Acknowledge work of technical coordinators and scientific observers.	Standing request		Dec 2006	Commend technical coordinators and all observers for their efforts in the 2005/06 fishing season.
1.3	Review new and exploratory fishery notifications.	Standing request	Mr Smith and Dr Waugh	At submission deadline	Transmit e-copies of notifications and adopted 2006 e-version of Table 19 to Dr Waugh and Mr Smith to prepare initial draft of IMAF table.
1.4	Prepare new and exploratory notification checklist relating to IMAF risk assessment.		Science Officer, Mr Smith	Mar 2007/ Aug 2007	Needs to be distributed to Mr Smith and Dr Waugh for review prior to circulation to Members in time for 2007 notifications of new and exploratory fisheries.
1.5	Prepare agenda for IMAF-07.		Science Officer, Co-Conveners	Feb 2007/ Aug 2007	Science Officer to forward e-version of last year's annotated agenda to Co-Conveners for revision prior to distribution to WG-IMAF for comments on revised structure, final version to be circulated later in year.
1.6	Prepare tables and figure formats for 2007 meeting.	Standing request	SODA*, Co-Conveners, IMAF members	May 2007, comments by mid-June 2007	SODA to forward e-version of all last year's tables and figures and agreed modifications to Co-Conveners for revision prior to distribution to WG-IMAF.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
1.7	Membership of WG-IMAF.	Standing request	Members	Nov 2006/ as required	Request nomination of new members to IMAF, especially technical coordinators from those Members that deploy the greatest number of observers in the Convention Area, Members not currently involved and request all Members to send their representatives to the next IMAF meeting.
1.8	Submission of papers for IMAF-07.		Members, IMAF members, SODA	By 0900 24 Sep 2007	Submit papers specifically relevant to agenda items.
1.9	Allocation of submitted papers to agenda items and assignment of rapporteuring tasks.	Standing request	Co-Conveners	Before meeting	Prepare list, circulate to confirmed attendees and post on website.
2.	**Members' research and development activities:**				
2.1	Request Members provide updated information on national research programs on albatrosses, giant petrels and white-chinned petrels to ACAP in relation to status and trends of populations and foraging range and distribution, genetic profiles and the numbers and nature of by-catch specimens and samples.	Standing request	Members, IMAF members, technical coordinators, nominated scientists	Nov 2006/ Sep 2007	Explicit reminder to IMAF members in March 2007.
2.2	Risk assessment of seabird by-catch in the Convention Area.	Standing request	IMAF members	Nov 2006/ Sep 2007	Further work as appropriate to update SC-CAMLR-XXV/BG/26 for the Scientific Committee. Circulate any new tabled papers relating to seabird at-sea distributions to Co-Conveners and Dr Gales – and to other WG-IMAF members as requested.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
2.3	Further develop draft manuscript describing CCAMLR's risk assessment process.		Drs Waugh and Gales, Mr Baker	Dec 2006/ Feb 2007	Review further developed draft manuscript (WG-FSA-06/33); circulate to IMAF intersessionally and receive comments by February 2007; intent for publication in peer-reviewed journal.
2.4	Request BirdLife International to provide summary data on distribution of Southern Ocean seabirds from its tracking database if accumulation of data warrants. Plan with BirdLife for the three-year review of tracking database.	Standing request	Science Officer, BirdLife International, Co-Conveners	Jul 2007	Request information. Circulate any new information to WG-IMAF. Co-conveners to liaise with BirdLife International with respect to three-year review.
2.5	Information on the development and use of fisheries-related methods of the avoidance of incidental mortality of seabirds. In particular, information is sought on the following: • optimum configuration of line-weighting regimes and equipment; • experiences with IWL, especially the practicality of the gear in conjunction with a line-shooting device; • haul mitigation devices and experiences with their use; • tests of/experiences with streamer lines, especially with respect to paired vs single lines; • trawl haul mitigation and the use of net binding; • determination of appropriate 'access windows' for Convention Area seabirds and fisheries.	Standing request	Members, IMAF members, technical coordinators	Nov 2006/ Sep 2007	Request information, collate responses for IMAF-07, members to submit papers where possible.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
2.6	Methods for preventing seal mortality or injury associated with krill trawl fishing.	Standing request	Members as appropriate, scientific observers, IMAF members	As soon as report available	Further testing of and continued reporting on effectiveness of various mitigation methods and devices; report to IMAF-07.
2.7	Continued experimental trials of mitigation measures in French EEZ.	Standing request	France, IMAF scientists	As soon as reports available	Report available results to IMAF-07, in particular details of multiple streamer lines and a repeat of the earlier modified DeLord analysis including all additional available data.
2.8	Information on modifications to standard longline gear.		IMAF	Sep 2007	Provide reports describing in detail hybrid longline methods, how they are deployed and retrieved, via a paper on these matters for IMAF-07.
2.9	Request data acquired from newly developed protocols for: seabird trawl warp strike observation, longline haul, and longline access window (sink rate, vessel speed, and aerial extent of streamer lines).	7.32 (App. D 74)	Drs Waugh and Sullivan and Mr Melvin, IMAF members	Aug 2007	Review data-to-date from new protocols developed at IMAF-06. Data extract in early August to allow paper to be drafted.
3.	**Information from outside the Convention Area:**				
3.1	Information on longline fishing effort in the Southern Ocean outside the Convention Area.	Standing request	Members, non-Contracting Parties, international organisations	Sep 2007	Request information intersessionally from those Members known to be licensing fishing vessels in areas adjacent to the CCAMLR Convention Area (e.g. Argentina, Brazil, Chile, UK, South Africa, Uruguay, New Zealand and Australia); review situation at IMAF-07. Request information from other Parties – Members and non-Contracting Parties (e.g. People's Republic of China, Japan, Republic of Korea)and review at IMAF-07.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
3.2	Information on incidental mortality outside the Convention Area of seabirds breeding within the area.	Standing request	Members, IMAF members	Sep 2007	Repeat request to all IMAF members, especially to those relevant to item 3.1 above; review at IMAF-07.
3.3	Reports on use and effectiveness of mitigation measures outside the Convention Area.	Standing request	Members, non-Contracting Parties, international organisations	Sep 2007	Request information on use/implementation of mitigating measures, especially provisions in Conservation Measures 25-02, 24-02 and 25-03, as under item 3.1 above; review responses at IMAF-07.
4.	**Cooperation with international organisations:**				
4.1	Cooperation with ICCAT, IATTC, WCPFC, CCSBT, SEAFO and IOTC on specific issues regarding incidental mortality of seabirds.	Standing request	Co-Conveners, Science Officer	Nov 2006/ Sep 2007	Brief CCAMLR observers on desired feedback on IMAF matters (seabird by-catch levels and mitigating measures).
4.2	Collaboration and interaction with all tuna commissions (ICCAT, IATTC, IOTC, CCSBT, WCPFC, SEAFO) and regional fishery management organisations with responsibility for fisheries in areas where Convention Area seabirds are killed.		Relevant Members, CCAMLR observers	Nov 2006 and at specific meetings	Request information on: (i) annual data on distribution level of longline fishing effort; (ii) existing data on levels and rates of seabird by-catch; (iii) measures currently in use and whether voluntary or mandatory; (iv) nature and coverage of observer program; (v) scientific information supporting proposed or adopted mitigation measures. Support regulations for use of proposed or adopted mitigating measures at least as effective as Conservation Measure 25-02.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
4.3	Tuna RFMO Meeting in Japan in Jan 2007.	7.57	Science Officer, Co-Conveners, Members	Dec 2006	Request members to support incidental mortality related initiatives at the meeting as referred to in CCAMLR Resolution 22/XXV.
4.4	Progress with NPOAs in respect of FAO IPOA-Seabirds.	Standing request	Relevant Members, IMAF members	By Sep 2007	Solicit reports to CCAMLR on progress for information and make review.
4.5	Support for ACAP attendance at AC/MOP meetings.	Standing request	Members as appropriate; Australia		Support the work of the Advisory Committee, implementation of its Action Plan, and coordinating activities between CCAMLR and ACAP. Report to IMAF-07.
4.6	IUCN Red List: Seabirds	Standing request	Secretariat	Aug 2007	Obtain from BirdLife International, circulate to IMAF members and table for SC-CAMLR-XXVI, any revisions to the conservation status of albatross, *Macronectes* and *Procellaria* species.
4.7	BirdLife International	Standing request	Science Officer, BirdLife International	Sep 2007	Request information from BirdLife International about its activities of relevance to IMAF, in particular its Seabird Program and 'Albatross Task Force'. BLI submission of updated report on RFMO evaluation to IMAF-07.
4.8	Southern Seabird Solutions	Standing request	New Zealand	Sept 2007	Report on progress to IMAF-07.
5.	**Data acquisition and analysis:**				
5.1	Acquisition from EEZs and elsewhere as appropriate, of seabird incidental mortality data for trawl fisheries.	Standing request	Members	Nov 2006/ Sep 2007	Request Members for appropriate data.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
5.2	Acquisition of original data in CCAMLR format on seabird incidental mortality for French EEZs in Subarea 58.6 for 2000/01 and in Subarea 58.6 and Division 58.5.1 for 2006/07.	7.7 (App. D 17)	France	2001/02 data – as soon as possible, 2006/07 data – Sep 2007	Request France to submit reports and data logbooks prepared by national observers for the current and past fishing seasons, preferably using CCAMLR reporting formats.
5.3	Analysis of 2003/04 to 2005/06 vessel-specific by-catch information.	7.7 (App. D 17)	France	As soon as possible	Request analysis of the 2003/04 to 2005/06 by-catch data to identify factors contributing to high levels of by-catch via a paper for IMAF-07.
5.4	Status report on implementation of IMAF recommendations re: mitigation research programs, observer coverage and implementation of mitigation measures.	Standing request	France, IMAF	Sep 2007	Report to IMAF-07.
5.5	Provision of data by Brazil on by-catch of Convention Area seabirds in Brazilian waters.	Standing request	Brazil	As soon as possible	Report to IMAF-07.
5.6	Estimates of IUU take of seabirds.	Standing request	Secretariat	Before IMAF-07	Prepare 2007 estimates of IUU seabird by-catch.
5.7	Request updated information on distribution, status and trends of albatross and petrel populations from ACAP.	Standing request	Science Officer	Jul 2007	Request information. Submit paper to IMAF-07 by deadline.
6.	**Scientific observer issues:**				
6.1	Preliminary analysis of data from 2006/07 fisheries, including extrapolations for all fisheries (trawl and longline) where incidental mortalities (seabird and marine mammal) occur.	Standing request	SODA	IMAF meeting	Produce draft tables equivalent to Tables 1 to 19 of the FSA-06 report for IMAF-07 as soon as possible.

(continued)

Table 20 (continued)

	Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
6.2	Changes to current seabird and marine mammal data collection included in the scientific observer cruise reports and logbooks for all fisheries.		SODA, IMAF, technical coordinators		IMAF follow through with Secretariat and with technical coordinators to assure that these changes are incorporated into observer forms and into training/briefing protocols used by technical coordinators.
6.3	Vessel operators reminded of exceeding minimum streamer line specifications and haul mitigation requirements in CM 25-02 and other seabird-related CMs.	Standing request	Members, technical coordinators	Nov 2006	Vessel operators advised to exceed standards to prevent compliance failures.
6.4	Review priorities and protocols for observers in the cruise logbooks, cruise reports and the *Scientific Observers Manual* and address identified issues especially to determine if data collections meet data requirements.	Standing request	IMAF	Sept 2007	Intersessional IMAF task group to be established to complete work. Report, as necessary, to IMAF-07.
7.	**Revision of seabird and marine mammal related conservation measures:**				
7.1	Research areas: (i) revaluate streamer line colours; (ii) relationship of line sink rate to values that include both vessel speed and sink rate; (iii) integrated weight line efficacy; (iv) methods for monitoring individual vessel compliance; (v) comparison of steel elliptical weights versus traditional Spanish system weights;	Standing request App. D 89, 102)	IMAF	Sep 2007	Continued research to allow a more informed revision of conservation measures, with the intention of combining related conservation measures if possible.

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Table 20 (continued)

Task/Topic	Paragraphs of WG-FSA report	Members' Assistance[1]	Start/ Completion deadlines	Action
7.1 (continued)				
(vi) efficacy of 'new' Spanish line-weighting regime as a seabird deterrent;				
(vii) efficacy of paired streamer lines in Southern Ocean conditions;				
(viii) development of best management practice in Spanish system;				
(ix) development of best management practice in autoline gear.				

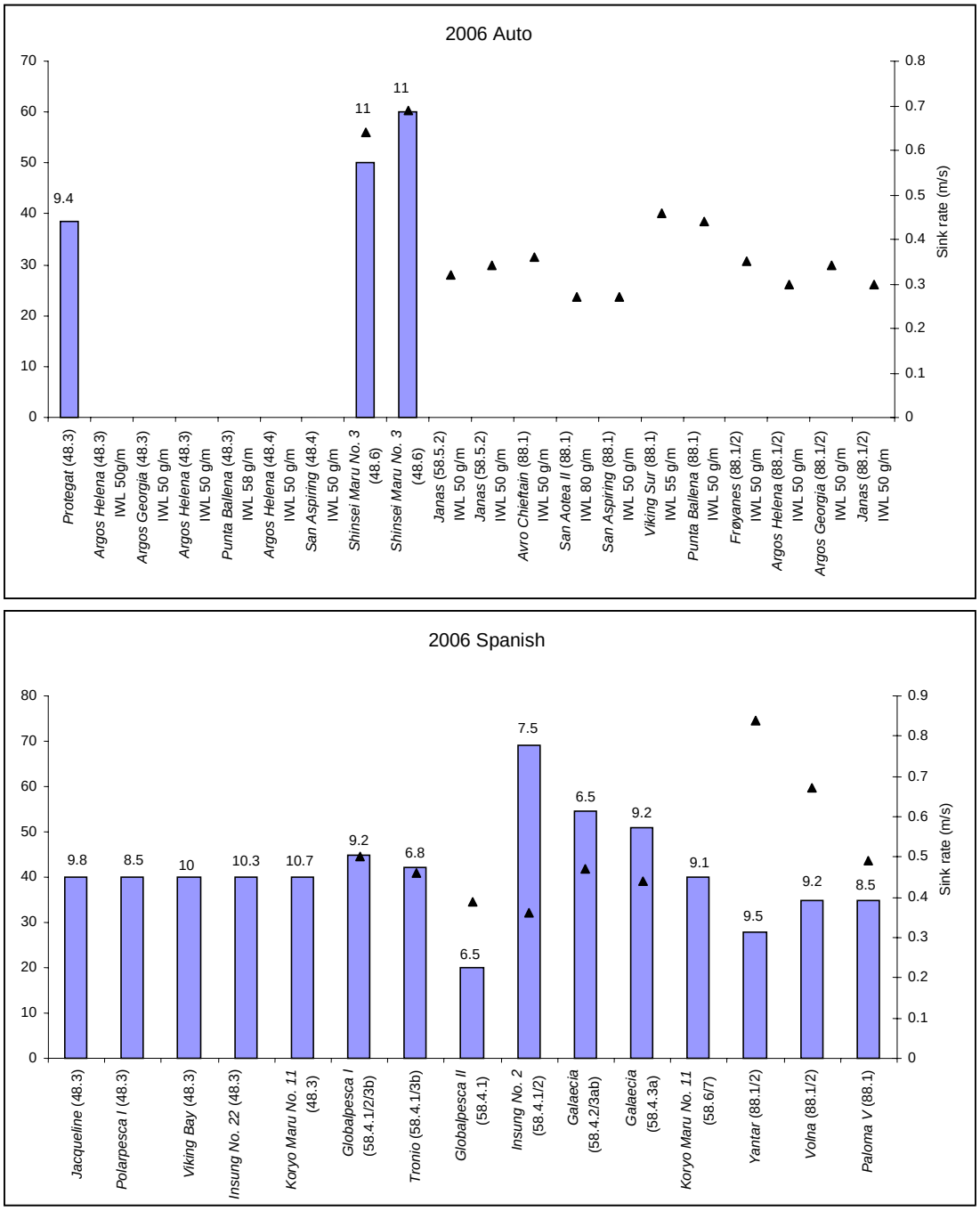

Figure 1: Longline weight spacing (y-axis in metres) and weights used (kilograms) by Spanish and autoline systems during the 2005/06 season. ▲: Sink rate (metres/second); IWL: Integrated Weighted Line (grams/metre).

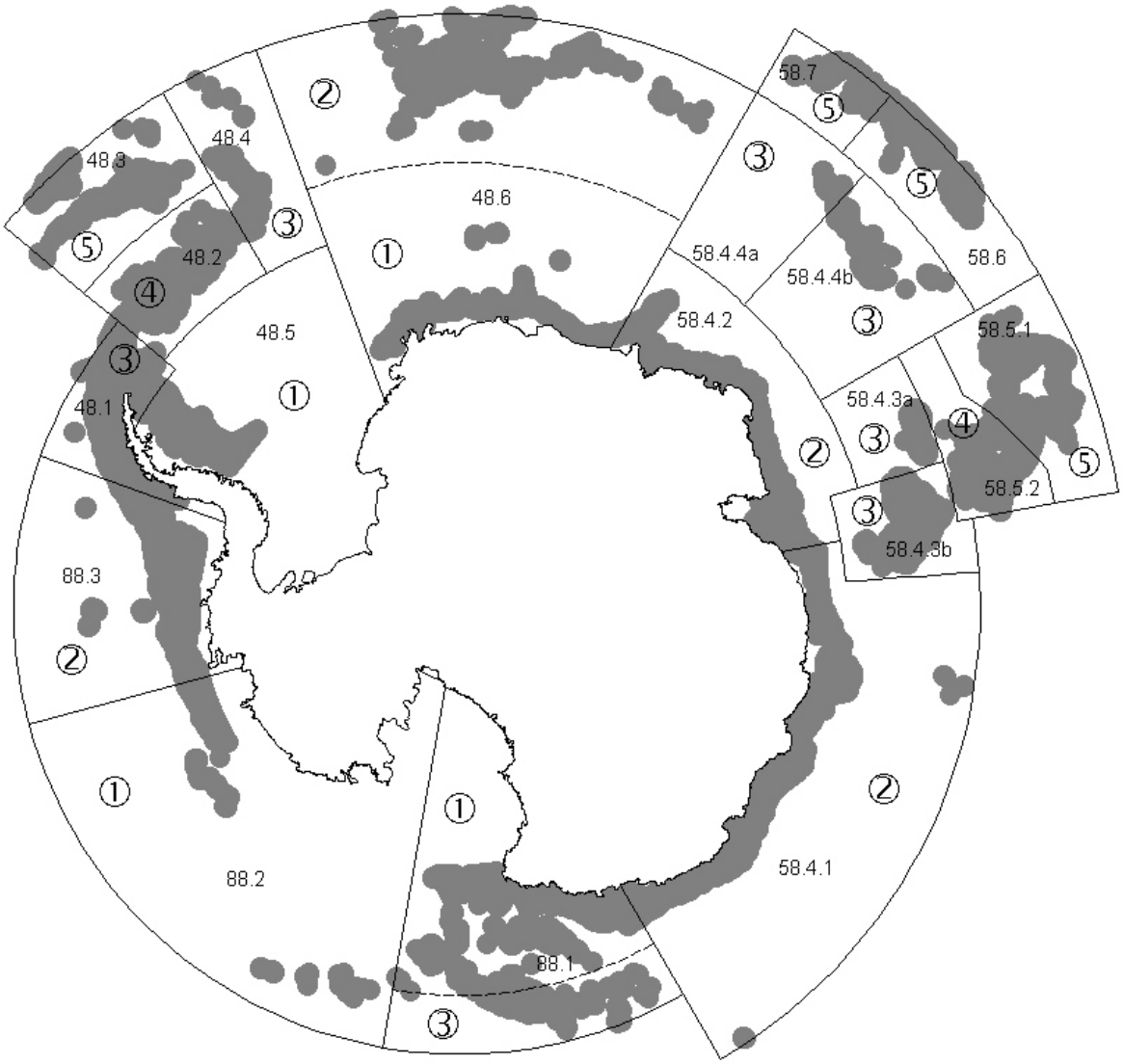

Figure 2: Assessment of the potential risk of interaction between seabirds, especially albatrosses, and longline fisheries within the Convention Area. 1: low, 2: average to low, 3: average, 4: average to high, 5: high. Shaded patches represent seabed areas between 500 and 1 800 m.

APPENDIX E

REPORT OF THE SUBGROUP ON CONSIDERATION OF CONTINUOUS TRAWLING FOR KRILL

REPORT OF THE SUBGROUP ON CONSIDERATION OF CONTINUOUS TRAWLING FOR KRILL

In the 2006 fishing season the Norwegian-flagged vessel *Saga Sea* started fishing operations for krill in the Convention Area. The vessel used the continuous trawling technology, which has been previously developed by the *Atlantic Navigator*. At its 2005 meeting, the Scientific Committee agreed that this new technology would not be considered a 'new and exploratory fishery' if there is an adequate description of the selectivity of the method for krill, a characterisation of the haul (or catch rate) and information on the location of krill catches. In particular, because haul duration can extend for several days, there existed the potential for single hauls to occur in several different SSMUs. Finally, there might be considerable potential for this type of fishing gear to impact other elements of the ecosystem either through by-catch, particularly of larval fish, or through incidental mortality of either immature krill, or other small pelagic species (SC-CAMLR-XXIV, paragraphs 4.8 and 4.9).

2. The Scientific Committee had called for papers describing the continuous trawling method and analysing its impacts, and for WG-EMM to advise it on the issue. Unfortunately, at the time that WG-EMM met, the *Saga Sea* had not been fishing for long enough in the 2005/06 season for there to be sufficient data to analyse. WG-EMM therefore asked WG-FSA to 'examine the catalogued data at their 2006 meeting to assess the difference between the two types of krill fishing and to provide a commentary to the Scientific Committee' (Annex 4, paragraph 3.68).

3. This topic does not normally fall within the remit of WG-FSA. Nevertheless a subgroup considered the issue as was requested by WG-EMM-06.

4. The subgroup noted that up to now only one observer report on the *Atlantic Navigator* for 2003/04 had been submitted to the Secretariat, by the UK observer. Pin et al. (2005) presented a document to WG-EMM-05 (WG-EMM-05/12) based on data from four Uruguayan observers on the *Atlantic Navigator* for the 2003/04 and 2004/05 seasons. Some of these data have been submitted to the Secretariat, but no official observer report has been submitted by Uruguay. The UK observer report and data on the *Saga Sea* fishing in 2005/06 were submitted to the Secretariat according to the required deadlines. These data were analysed and reported in WG-FSA-06/57 but the subgroup did not have sufficient time to review them directly. A description of the technology of continuous krill fishing was presented to WG-FSA by Norway in WG-FSA-06/20. Some confusion about the method (specifically the presence of bubbles in the net), which had arisen through apparent misunderstandings by scientific observers on the *Atlantic Navigator*, appeared now to be resolved.

5. The subgroup noted that the *Saga Sea* had 100% observer coverage in the 2005/06 fishing season, and encouraged Norway to ensure 100% scientific observer coverage on the *Saga Sea* in 2006/07.

Adequate description of the selectivity of the method for krill

6. There are two questions regarding selectivity that need to be resolved:

(i) Does the addition of the pumping system lead to changes in the selectivity of trawls in relation to krill?

(ii) Does the use of continuous trawling lead to different fishing patterns in fleets using continuous versus conventional methods that could result in different fleet selectivity?

7. Two papers had been submitted to WG-FSA. WG-FSA-06/23 examined existing reports and concluded that the pumping system had the potential to capture all animals in the codend of the net, regardless of size, and that there was higher potential for smaller krill to be caught than with conventional trawls. WG-FSA-06/57 examined data reported by the observer on the *Atlantic Navigator*, collected with identical nets operated in both continuous and conventional modes, and data reported by the observer on the *Saga Sea*, collected with nets operated in continuous mode only. Based on these data, WG-FSA-06/57 concluded that there was no evidence for the continuous trawling method selecting smaller-sized krill than the conventional method.

8. The data available on by-catch and size composition of krill trawls are currently inadequate to allow a comprehensive comparison of selectivity between continuous and conventional trawl systems. In particular, there were no comparable trawls from the *Saga Sea* (which in its 2005/06 fishing season used only continuous trawls). Research to estimate the selectivity of krill in any trawl and to estimate the non-landed mortality of krill would be useful in this analysis. Nevertheless, the available data suggest that the simple addition of a pump to a trawl is unlikely to change the selectivity of krill.

9. The subgroup recommended that the Scientific Committee call for further data collection to resolve this issue.

10. Regarding paragraph 6(ii), the analysis of selectivity by fleets requires comprehensive length-frequency data from fleets operating closely adjacent to each other, both spatially and temporally. In the absence of full observer coverage on the krill fleet, this question will remain difficult to resolve. A possible source of data is the observer coverage of all krill vessels fishing in Subarea 48.1 in the 2005/06 fishing season (including the *Saga Sea*), but these data have only just arrived at the Secretariat and were unavailable for analysis by the subgroup. The subgroup recognised that Norway has indicated that the *Saga Sea* will have a scientific observer in the 2006/07 fishing season, but the provision of sufficient data for a full analysis of the issue at WG-EMM-07 will require increased observer coverage of conventional krill fishing vessels.

11. The subgroup recommended that the Scientific Committee require scientific observer coverage on the entire krill fleet in the 2006/07 fishing season.

12. Dr S. Kasatkina (Russia) pointed out that the data provided from the *Saga Sea* do not include information on the selectivity of continuous trawl systems in relation to krill larval

and immature stages. There might be considerable potential for this type of fishing gear to impact krill larval and immature stages on known krill spawning grounds in Subareas 48.1 and 48.2.

Characterisation of the haul (or catch rate) and
information on the location of krill catches

13. WG-FSA-06/20, 06/57 and the Secretariat's analysis (SC-CAMLR-XXV/BG/16) reported on the current and future plans for characterisation of catch rates. This issue was complicated on the *Saga Sea* by the fact that in 2005/06 krill were pumped into holding tanks and from there into the factory, and there were occasions on which two trawls were deployed simultaneously.

14. Norway and the Secretariat devised a method of recording catch and effort details (position, time, depth, tonnes) on a two-hourly basis which would deal with these problems. However, while it was possible to record effort two-hourly (position, time, depth), because of the way the vessel processed its catch, total catch could only be measured over a 24-hour period and was then allocated equally to each effort two-hour period (WG-FSA-06/20, 06/57). This is probably adequate for determining daily catch, effort and catch rate but not adequate for accurately determining two-hourly catch rates. The subgroup recognised that from 2007 Norway plans to deploy a *Flow Scale* weight measurement device to weigh the krill catches continuously (WG-FSA-06/20) which may resolve the problem of correct attribution of catches to two-hourly intervals, but might not help in quantifying the catch and catch rates from each net when two nets are towed simultaneously.

15. Another problem arising with the continuous trawling system is accurate attribution of the location of catches. SC-CAMLR-XXV/BG/16 identified several instances where a continuous trawl lasting for several days had traversed the boundary of an SSMU one or more times. Characterisation of the haul or catch rate and information on the location of catches is possible, but not ideal, with the current recording systems. The methods used are able to attribute position and depth on a two-hourly basis, but are not adequate for correctly attributing catches to two-hourly fishing periods.

16. Whether the resolution of the haul, catch rate and location data are sufficient for the Scientific Committee's purposes will depend on the use to which the data are to be put. The subgroup regarded this to be a matter for consideration by the Scientific Committee.

Impact on other ecosystem components

17. WG-FSA-06/57 reported an analysis of juvenile fish by-catch in continuous trawling versus conventional trawling. There are very few data from conventional trawling, and none that are spatially and temporally comparable to those collected on the *Saga Sea*. Nevertheless, the paper concluded that catch rates from the *Saga Sea* appeared to be comparable with published data from conventional trawls fishing in the Atlantic sector.

18. The subgroup agreed that data are currently too limited to draw conclusions about this aspect.

19. More comprehensive data will be required from both continuous and conventional trawls to understand the issue, and the subgroup recommended that the Scientific Committee ensure increased levels of observer coverage in the krill fishery, preferably appointed in accordance with the Scheme of International Scientific Observation (main report, paragraphs 10.1 to 10.3).

20. Information on the interaction of seabirds and marine mammals with krill trawls is given in the main report, paragraphs 7.8 to 7.15.

21. Russian scientists expressed the opinion that none of the conditions specified by the Scientific Committee (SC-CAMLR-XXIV) concerning the continuous trawling have been adequately addressed during the 2005/06 season, namely: description of the selectivity of the new fishing method, a characterisation of the haul (or catch rate), information on krill catches and potential impact of the new fishing technique on the ecosystem.

Appendices F–R (Fishery Reports) are only available electronically at:
www.ccamlr.org/pu/e/e_pubs/fr/drt.htm