

INCIDENTAL MORTALITY

5.1 The Scientific Committee reviewed the report of ad hoc WG-IMAF. It endorsed the report and its conclusions and the plan of intersessional work (Annex 5, Appendix D), subject to the comments set out below, and drew these to the attention of the Commission.

Incidental Mortality of Seabirds during Regulated Longline Fishing in the Convention Area in 2002

5.2 The Scientific Committee noted that:

- (i) for Subarea 48.3 only six birds were reported killed; the total estimated seabird by-catch in 2002 was only 27 birds at a rate of 0.0015 birds/thousand hooks, very similar to the values of the last two years (Annex 5, paragraph 6.9 and Table 6.3);
- (ii) no observed seabird by-catch was reported from within the South African EEZ in Subareas 58.6 and 58.7, a substantial reduction from the estimated 199 birds last year (Annex 5, paragraph 6.10). The causes of this marked improvement are unknown, although fishing effort was greatly reduced (Annex 5, paragraphs 6.11 and 6.12); and
- (iii) no incidental mortality of seabirds was observed in Subarea 88.1 for the fourth successive year, nor in Subarea 88.2, due to strict compliance with conservation measures (Annex 5, paragraph 6.13).

5.3 The Scientific Committee noted that, based on reported data, levels of seabird by-catch in the Convention Area had been the lowest ever recorded. It thanked all those involved in conducting and managing fishing operations for their efforts in achieving this excellent result.

5.4 It expressed concern at the absence of data from the French EEZs in Subarea 58.6 and Division 58.5.1 in 2002, especially given the very high rates of by-catch of white-chinned petrels reported from these areas for the 2000 and 2001 seasons (Annex 5, paragraphs 6.14 and 6.15).

5.5 Prof. Duhamel indicated that French scientists continued to address this issue in the manner described last year (SC-CAMLR-XX, paragraph 4.34), but the problem of by-catch of white-chinned petrels persisted. He indicated that the data for 2002 would be submitted in time for the meeting of WG-IMAF next year and that an appropriate expert from France would attend the meeting.

5.6 On behalf of WG-IMAF, Prof. Croxall welcomed this response. He noted that the strict application of Conservation Measure 29/XIX now appeared to have reduced seabird by-catch to very low levels in the South Africa EEZ in Subarea 58.6, which also involved fishing during the times of year of highest risk of seabird by-catch. If France could provide information on the precise details of the seabird mitigation measures in use on their vessels, then it should be possible for appropriate experts within the WG-IMAF group to collaborate in identifying ways in which seabird by-catch could be reduced to levels comparable with

those in other parts of the Convention Area. It was hoped that this interaction might take place during the intersessional period so that the outcome could be discussed at next year's meeting.

Compliance with Conservation Measure 29/XIX

5.7 The Scientific Committee noted that, overall, compliance with this conservation measure this year, compared to last year, was substantially improved in all subareas and divisions and was again complete in Subarea 88.1. In Subarea 48.3, one vessel fully complied with all elements of this measure at all times and eight other vessels were at least 95% compliant with all elements of this conservation measure (Annex 5, paragraph 6.28).

5.8 It noted that this overall improvement involved better compliance with streamer line design (though some vessels still did not use them on all sets) (Annex 5, paragraphs 6.18 and 6.212(ii)); that only 1% of line setting had occurred during daytime (Annex 5, paragraph 6.21), and that there had been major improvements in line weighting, whereby compliance in Subareas 48.3 and 58.6/58.7 respectively had improved from zero in 2000 to 21% and 18% in 2001 and to 63% and 66% in 2002 (Annex 5, paragraph 6.24).

5.9 The Scientific Committee recognised that, for the first time, most vessels longline fishing in the Convention Area had managed to comply (at least at the 95% level) with Conservation Measure 29/XIX. Furthermore, full compliance could easily have been achieved with small improvements to operational practice.

Research into and Experience with Mitigating Measures

5.10 The Scientific Committee noted:

- (i) significant progress with the development of integrated weights for autoline vessels in achieving the sink rates required under Conservation Measure 216/XX; and that tests under operational conditions are due in November 2002 (Annex 5, paragraphs 6.50 and 6.51);
- (ii) mixed results from the tests of the underwater setting chute (Annex 5, paragraphs 6.60 to 6.64);
- (iii) important advice concerning offal retention and discharge (Annex 5, paragraph 6.65); and
- (iv) that based on successful experiences outside the Convention Area, paired streamer lines and boom-and-bridle design streamer lines should be used in the Convention Area (Annex 5, paragraphs 6.71 to 6.75).

5.11 It recognised that the research to develop integrated weights for longlines, involving collaboration between Australia, New Zealand and a major manufacturer of longline fishing gear from Norway, had potentially worldwide implications for improving the efficiency of mitigation measures based on achieving rapid initial sinking of longlines.

5.12 The information that in 82 days of longline fishing by one vessel in Subarea 48.3 an estimated total of 15 828 fish heads was discarded with fish hooks still in them (Annex 5, paragraph 6.67) was viewed with great concern. The Scientific Committee recommended that a requirement to remove fish hooks from discarded material should be added to Conservation Measure 29/XIX when it is next revised (Annex 5, paragraph 6.69); it commended the initiative on Chilean vessels of a bounty scheme for retrieving hooks (Annex 5, paragraph 6.70) and encouraged the emulation of this as widely as possible.

5.13 Noting the importance of experimental research to determine the most appropriate mitigation measures for use on vessels employing the Spanish longlining method (Annex 5, paragraph 6.76), the Scientific Committee was disappointed that the detailed proposal to address this (WG-FSA-02/30) had been unsuccessful in acquiring sufficient funding. It recollected the Commission's strong support for this experiment (CCAMLR-XX, paragraph 6.26) and urged Members to assist in facilitating the financing and undertaking of this study.

5.14 The Scientific Committee endorsed the need to ensure that when new longline fishing vessels are built, their design should take account of features which would ensure or facilitate reduced levels of incidental mortality of seabirds. It drew the Commission's attention to detailed advice in this regard (Annex 5, paragraph 6.84) and endorsed the request to France to provide relevant information on the design of its five newly commissioned vessels (Annex 5, paragraph 6.85).

Revision of Conservation Measure 216/XX

5.15 The Scientific Committee recommended a minor revision to the bottle test element of this measure as set out in Annex 5, paragraph 6.81.

Revision of Conservation Measure 29/XIX

5.16 The Scientific Committee noted the advice that full proposals for revision of several elements of this measure (those relating to streamer lines, line weighting for autoliners and hooks in offal) are likely to be developed next year (Annex 5, paragraph 6.82); some specific indications of likely proposals, together with recommendations for data collection that would assist the revision of this conservation measure, are set out in Annex 5, paragraph 6.83.

Assessment of Incidental Mortality of Seabirds during IUU Longline Fishing in the Convention Area

5.17 The Scientific Committee noted that:

- (i) the estimates of potential IUU seabird by-catch by area for 2002 (Annex 5, paragraph 6.219(i); SC-CAMLR-XXI/BG/23) were:

Subarea 48.3:	10–20 to 50–70 seabirds;
Subareas 58.6 and 58.7:	5 900–8 000 to 10 800–14 400 seabirds;
Divisions 58.5.1 and 58.5.2:	24 300–32 600 to 43 900–59 100 seabirds;
Division 58.4.4:	8 100–10 900 to 14 700–19 700 seabirds; and
Subarea 88.1:	100–200 seabirds;

- (ii) the overall estimated total for the whole Convention Area in 2002 (Annex 5, paragraph 6.96) of potential seabird by-catch in the IUU fishery was 39 000–52 000 (lower level) to 70 000–93 000 birds (higher level). This is broadly consistent with values from previous years (see Annex 5, Figure 6.2; SC-CAMLR-XXI/BG/23); and
- (iii) since 1996 the overall total estimated potential seabird by-catch is 278 000–700 000 seabirds, comprising 74 000–144 000 albatrosses, 13 000–24 000 giant petrels and 203 000–378 000 white-chinned petrels (Annex 5, paragraph 6.99).

5.18 It noted that although the figure in the Working Group report (Annex 5, Figure 6.2) gave a clear illustration of the potential by-catch levels in each of the last seven years, it would be improved by also showing the estimates of cumulative potential seabird by-catch across the same period. It requested that these data be added to the figure and the result incorporated into the Scientific Committee's report (Figure 5). The Scientific Committee also requested WG-IMAF to consider how such cumulative data might be presented in the future.

5.19 The Scientific Committee drew the attention of the Commission to these data, endorsing the statement of the Working Group that such levels of mortality remain entirely unsustainable for populations of albatrosses, giant petrels and white-chinned petrels breeding in the Convention Area (Annex 5, paragraph 6.100), many of which are declining at rates where extinction is possible (SC-CAMLR-XX, paragraph 4.53). It requested the Commission to take even more stringent measures to combat IUU fishing in the Convention Area (Annex 5, paragraph 6.101).

5.20 The Scientific Committee emphasised the importance of assessing the effect of the removal by IUU fishing of these large numbers of seabirds on the populations of albatrosses, giant petrels and white-chinned petrels breeding in the Convention Area. The Scientific Committee recommended that WG-IMAF examine this issue at its next meeting.

5.21 Because the seabird mortality through potential IUU by-catch will affect juvenile as well as adult birds, the consequences, in terms of measurable changes in breeding populations, will continue to be evident for at least another decade (because of the long-delayed sexual maturity of these species), even if IUU fishing ceased next year. The potential effect of this is that IUU fishing is creating potential changes in seabird populations which are currently unlikely to be redressed, without prompt, effective and comprehensive action within the time span prescribed under Article II of the Convention.

5.22 It was also noted that it was possible that future reductions in estimated by-catch rates of seabirds might simply be attributable to the reduced size of the populations of seabirds at risk, rather than to genuine improvements in fishing practice.

Incidental Mortality of Seabirds during Longline Fishing outside the Convention Area

5.23 The Scientific Committee noted that:

- (i) reports were received from Argentina, Chile, Falkland/Malvinas Islands, South Africa and Uruguay on rates of seabird by-catch observed in longline fisheries operating in areas adjacent to the Convention Area (Annex 5, paragraphs 6.103 to 6.107) and that these rates were generally at least an order of magnitude greater than those prevailing in regulated longline fisheries in the Convention Area; and
- (ii) a review of the spatio-temporal trends of longline fishing effort in the Southern Ocean concluded that a combination of the consistently high effort (250 million hooks per annum) in the regulated fisheries and the substantial increase in IUU fishing, threatens the long-term viability of many Southern Ocean seabird species (Annex 5, paragraph 6.108).

5.24 The Scientific Committee noted that few, if any, Members had responded to SC CIRC 02/07 (COMM CIRC 02/22) requesting summary data relating to longline fishing in areas adjacent to the Convention Area, on:

- (i) longline fishing effort (at least at the scale of FAO area) in each type of longline fishery;
- (ii) rates of incidental mortality of seabirds associated with each longline fishery and details of the species involved;
- (iii) mitigating measures in use in each fishery and the extent to which any of these are voluntary or mandatory; and
- (iv) the nature of observer programs, including observer coverage, associated with each fishery.

5.25 Although Japan had not responded to this request, its example, in introducing the mandatory use of streamer lines on its vessels targeting southern bluefin tuna (SC-CAMLR-XX, paragraph 4.66) was commended. Members were urged to follow this example in this and other longline fisheries where Convention Area seabirds are killed and to implement other mitigating measures (such as those in Conservation Measure 29/XIX) in such fisheries.

5.26 The Scientific Committee endorsed the recommendation of the Working Group that responses should continue to be sought on seabird by-catch levels, mitigation measures in use (and whether voluntary or mandatory) and observer programs from all Members and other countries conducting or permitting longline fishing in areas where seabirds from the CCAMLR Convention Area are killed (Annex 5, paragraph 6.109).

Research into the Status and Distribution of Seabirds at Risk

5.27 The Scientific Committee endorsed the recommendation that Members continue to submit data on:

- (i) size and trends of populations of albatross species and of *Macronectes* and *Procellaria* petrels vulnerable to interactions with longline fisheries;
- (ii) the foraging ranges of populations of these species adequate to assess overlap with areas used by longline fisheries;
- (iii) genetic research relevant to determining the origin of birds killed in longline fisheries; and
- (iv) information on the extent and location of their seabird by-catch collections to facilitate the development of collaborative research to investigate the origins of birds killed (Annex 5, paragraphs 6.125 and 6.126);

in order that SC-CAMLR-XXI/BG/22 may be updated and a comprehensive review of these topics undertaken by the Working Group at next year's meeting (Annex 5, paragraphs 6.110 and 6.112 to 6.115).

5.28 It noted that information submitted this year indicated that:

- (i) potential increases in the population of black-browed albatrosses at Heard Island had occurred over the last 50 years (Annex 5, paragraph 6.116);
- (ii) survival rates of adult wandering albatrosses breeding at Marion Island were negatively correlated with the Japanese longline fishing effort in relevant parts of the Southern Ocean (Annex 5, paragraph 6.117);
- (iii) albatrosses breeding in Chile forage in the Convention Area at certain times of year (Annex 5, paragraphs 6.118 to 6.121); and
- (iv) studies of population size, trends and foraging ranges are still inadequate for many seabird species in the Convention Area threatened by longline fishing mortality, especially white-chinned petrels (Annex 5, paragraph 6.122).

International and National Initiatives relating to Incidental Mortality of Seabirds in relation to Longline Fishing

5.29 The Scientific Committee noted:

- (i) that the USA was hosting a second IFF meeting, to address issues of seabird (and turtle) by-catch in fisheries, in November 2002, following the successful inaugural meeting in New Zealand in 2000. It encouraged Members to support this meeting by facilitating attendance of fishers and fishery managers; and

- (ii) the expectation that the Agreement on the Conservation of Albatrosses and Petrels (ACAP) might enter into force in 2003 (SC-CAMLR-XXI/BG/20); it encouraged all relevant Members who have not done so to sign and/or ratify the agreement as soon as possible.

5.30 The Scientific Committee noted that last year the Commission agreed that the greatest threats confronting the conservation at sea of albatrosses and petrels breeding in the Convention Area are the levels of mortality likely to be associated with IUU longline fishing inside the Convention Area and with longline fishing for species other than *Dissostichus* in areas adjacent to the Convention Area (CCAMLR-XX, paragraph 6.33). In relation to the latter element, CCAMLR made a particular effort to contact intersessionally all relevant RFMOs (Annex 5, paragraphs 6.140 to 6.141) in order to acquire information on the steps they were taking in respect of seabird by-catch mitigation that would, *inter alia*, reduce the mortality of Convention Area seabirds.

5.31 The Scientific Committee noted that responses received to date had been limited and rather unsatisfactory (Annex 5, paragraphs 6.142 to 6.151 and 6.225). It recognised that the primary obligation of RFMOs managing fisheries in areas adjacent to the Convention Area was to ensure the sustainable use of the relevant fish stocks; however it expressed concern that for some of these bodies the issue of by-catch in general (and of seabird by-catch in particular) received no consideration at their formal meetings, nor did mechanisms exist for some of these bodies to acquire relevant data on the topic. This was viewed as potentially inconsistent with the proper responsibilities of such RFMOs, and unlikely to be appropriate in relation to obligations set out under the newly ratified UNFSA.

5.32 ASOC expressed surprise at the difficulties that the Scientific Committee had experienced obtaining data from these RFMOs, given that many CCAMLR Members were also members of these bodies. It noted that, in addition to the legitimate interest of CCAMLR, Antarctic Treaty States also had obligations under the Protocol on Environmental Protection to the Antarctic Treaty in relation to ‘dependent and associated ecosystems’ – which seem reasonably to include at least parts of the areas of application of these RFMOs. ASOC hoped that the Scientific Committee would report to the Commission on these difficulties, and seek its action at a political level to improve the prospects of acquiring the information sought from the relevant RFMOs.

5.33 The Scientific Committee encouraged CCAMLR members of and observers to relevant RFMOs to continue reporting on activities relating to seabird by-catch and to press for inclusion of this topic on RFMO agendas (Annex 5, paragraph 6.154).

5.34 It noted that some indication of a potential positive response to the intersessional provision of documentation to observers had been received from ICCAT (Annex 5, paragraphs 6.143 and 6.144), which had received resolutions to address incidental mortality of seabirds from Brazil, China, European Community, Japan and the Republic of Korea. It encouraged all Members of CCAMLR who are represented at ICCAT to strengthen and support these proposals.

5.35 The Scientific Committee also noted the very slow progress in the development of NPOAs under FAO’s IPOA-Seabirds and even slower progress in implementation (Annex 5, paragraph 6.244(iii)).

5.36 It again requested Members, especially Argentina, Brazil, Chile, European Community (whose plan is apparently still only at the preliminary draft proposal stage), France (in respect of overseas territories) and Uruguay to submit reports on their progress towards developing and implementing NPOAs with particular reference to actions that would mitigate by-catch of seabirds from the Convention Area (Annex 5, paragraphs 6.135 to 6.138).

5.37 It welcomed the news that Japan was considering a general review of the seabird by-catch problem in advance of the COFI meeting in 2003 (see Annex 5, paragraph 6.137(iv)).

Incidental Mortality of Seabirds in relation to New and Exploratory Fisheries

5.38 The Scientific Committee noted that:

- (i) Of the 24 exploratory longline fisheries approved for 2001/02, only two, in Subareas 88.1 and 88.2, were operational in 2001/02; no seabird by-catch was reported in either of these fisheries (Annex 5, paragraphs 6.166 and 6.167).
- (ii) 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 in SC-CAMLR-XXI/BG/21. There were no changes to this advice in relation to levels of risk of seabird by-catch for any part of the Convention Area. However, the potential for exemptions for daylight setting in areas of lower risk to seabirds has been incorporated into the advice (Annex 5, paragraphs 6.171 to 6.174).
- (iii) The 21 proposals by five Members for new and exploratory longline fisheries in eight subareas/divisions of the Convention Area in 2002/03 were addressed in respect of issues relating to seabird incidental mortality, taking account of the advice in SC-CAMLR-XXI/BG/21 and Annex 5, Table 6.9.

5.39 The Scientific Committee noted that the only potential problems apparently needing to be resolved (Annex 5, paragraphs 6.170 and 6.176 to 6.178 and Table 6.9) were:

- (i) to check that Russia intends to comply with Conservation Measures 235/XX and 236/XX in Subareas 88.1 and 88.2;
- (ii) the need to define the nature and status of birds caught in relation to the limits on seabird by-catch (Annex 5, paragraph 6.176); and
- (iii) the potential need to specify appropriate levels of observation to detect accurately low levels of bird by-catch (Annex 5, paragraphs 6.177 and 6.178).

5.40 Russia indicated its intention to comply fully with Conservation Measures 235/XX and 236/XX in Subareas 88.1 and 88.2. This response, and the other two recommendations in paragraph 5.39, were drawn to the attention of the Commission.

Other Incidental Mortality

5.41 The Scientific Committee noted that in the Convention Area in 2002:

- (i) there were no reports of marine mammal mortality in the longline fishery;
- (ii) one southern elephant seal was reported killed by a trawl vessel in Division 58.5.2 (Annex 5, paragraphs 6.179 and 6.184);
- (iii) one penguin was found dead in the net of a krill trawler in Subarea 48.2 (Annex 5, paragraph 6.182); and
- (iv) no instances of incidental mortality of marine mammals or seabirds had been recorded in the pot fishery for crabs in Subarea 48.3 (Annex 5, paragraph 6.183).

5.42 In respect of trawl fishing for icefish in Subarea 48.3 in 2002, the Scientific Committee noted that:

- (i) 125 seabirds were entangled, at least 73 fatally, three times the estimated total seabird by-catch mortality for all regulated longline fishing in Subarea 48.3 in 2002 (Annex 5, paragraphs 6.185 to 6.190);
- (ii) all vessels engaged in the fishery caught seabirds; detailed observations indicate that seabirds were caught when they became entangled in the large mesh at the mouth of the midwater trawls (Annex 5, paragraphs 6.198 and 6.200); and
- (iii) despite vessel-specific differences in levels of seabird by-catch the main problem appears to be gear-related and associated with the use of midwater trawls during the period from December to March in Subarea 48.3 (Annex 5, paragraphs 6.199, 6.201 and 6.204).

5.43 It recollected that last year, in order to restrict seabird by-catch in this fishery to low levels, pending the collection of data to propose appropriate mitigation measures, the Commission decided that an interim precautionary seabird by-catch limit of 20 birds per vessel trawl fishing for icefish in Subarea 48.3 would be appropriate (CCAMLR-XX, paragraphs 6.38 and 6.39).

5.44 It noted that seabird by-catch levels in 2002 were similar to those last year (132 entangled, 92 fatally). In 2002 two vessels appeared to have reached the by-catch limit and a third vessel closely approached it (Annex 5, paragraph 6.189).

5.45 It endorsed the recommendations of the Working Group that:

- (i) further data be collected to try to define appropriate mitigating measures for the icefish trawl fisheries in Subarea 48.3, continuing the work recommended by the Commission last year (CCAMLR-XX, paragraph 6.37);
- (ii) unless the levels of seabird by-catch in the icefish fishery can be more effectively mitigated, consideration should be given to restricting the fishing season, at least during the main chick-rearing period of black-browed albatrosses and white-chinned petrels (January–March) (Annex 5, paragraph 6.206); and

- (iii) there is a need to define precisely what is meant by the number of birds caught and to take account of this in any review of the seabird by-catch limit (Annex 5, paragraph 6.207).

5.46 The Scientific Committee noted the recommendation (relating to Annex 5, paragraph 6.215(iii)) that it may be appropriate to reconsider the need to continue to prohibit the use of bottom trawl gear in Subarea 48.3 (Annex 5, paragraph 6.202).

5.47 It was recollected that this conservation measure was originally enacted to provide protection for populations of finfish species, notably by-catch species, which had been reduced to low levels. Nowadays, issues relating to by-catch of non-target species are customarily addressed in conservation measures by some combination of catch limits and 'move-on' rules.

5.48 However, it was noted that by-catch species, with the exception of rays, skates and macrourids in certain areas, have not been assessed for 10 years, a subject to which WG-FSA may need to give timely attention.

5.49 The use of bottom trawl gear also raises concerns of damage to benthos, although appropriate configuration of fishing gear may reduce this (Annex 5, paragraphs 5.191 to 5.194).

5.50 The Scientific Committee agreed that, taking the above issues into account, it would be appropriate to review relevant conservation measures and to develop advice on the use of bottom trawl gear, taking into account issues relating to the by-catch of seabirds and non-target fish species, and potential damage to benthos.

Advice to the Commission

5.51 This section attempts to distinguish between general advice (which the Commission may wish to note and/or endorse) and specific advice (which includes requests to the Commission for action or advice, as well as topics which may contain the potential for action now or in the near future).

General Advice

5.52 The Commission is requested to note:

- (i) levels and rates of seabird by-catch in regulated longline fisheries in the Convention Area in 2002 (paragraphs 5.2 and 5.3);
- (ii) levels of compliance with Conservation Measure 29/XIX in 2002 (paragraphs 5.7 to 5.9);
- (iii) progress with research on mitigation measures relevant to Conservation Measure 29/XIX (paragraph 5.10);

- (iv) estimates of potential seabird by-catch associated with IUU longline fishing in the Convention Area in 2002 (paragraphs 5.17, 5.21 and Figure 5); and
- (v) levels of seabird by-catch in fisheries other than longline fisheries in the Convention Area in 2002 (paragraphs 5.41 and 5.42).

5.53 The Commission is requested to endorse:

- (i) reaffirmation of support for – and encouragement of Members’ contributions towards – a key experiment concerning mitigation measures for the Spanish system of longline fishery (paragraph 5.13);
- (ii) renewed attempts to acquire data from Members involved in longline fishery operations in areas adjacent to the Convention Area (paragraphs 5.24 to 5.26) and requests to Members to develop provisions for the mandatory use of mitigation measures in such fisheries, following the example of Japan (paragraph 5.25);
- (iii) the need for continued submission by Members of data on seabird population sizes, foraging ranges and provenance of by-catch (paragraph 5.27);
- (iv) support for forthcoming international initiatives, especially IFF2 and ACAP (paragraph 5.29); and
- (v) renewed attempts to obtain progress reports on the development and implementation of FAO NPOAs from Members with responsibilities for areas adjacent to the Convention Area or conducting fisheries in these areas (paragraph 5.35 to 5.37).

Specific Advice

5.54 The Commission is requested to provide advice, and consider taking action, as appropriate, in respect of:

- (i) suggested revisions to Conservation Measure 216/XX (paragraph 5.15);
- (ii) outline of potential revisions to Conservation Measure 29/XIX (paragraphs 5.12 and 5.16; Annex 5, paragraph 6.83);
- (iii) guidance, in respect of consideration of mitigation measures for seabird by-catch, for the construction of new longline vessels (paragraph 5.14; Annex 5, paragraph 6.84);
- (iv) taking even more stringent measures to combat IUU fishing in the Convention Area in order to protect populations of seabirds at serious risk (paragraph 5.19);
- (v) further steps to request RFMOs, with competences in areas adjacent to the Convention Area, to take action in respect of mitigation of seabird by-catch (paragraphs 5.30 to 5.35);

- (vi) advice in relation to proposals for new and exploratory longline fisheries in the Convention Area in 2002 (paragraphs 5.38 to 5.40);
- (vii) advice concerning the conduct of trawl fisheries for icefish in Subarea 48.3 (paragraph 5.45); and
- (viii) advice concerning conservation measures relating to the use of bottom trawl gear (paragraphs 5.46 to 5.49).

Other By-catch Species

5.55 At last year's meeting, the Scientific Committee identified a number of key issues relating to by-catch species that needed urgent attention (SC-CAMLR-XX, paragraph 5.101). These included:

- assessment of the status of by-catch species or groups, particularly macrourids and skates and rays;
- assessment of the impact of fisheries on by-catch species; and
- consideration of mitigation measures.

5.56 Annex 5, paragraphs 5.154 to 5.163 deal with attempts to estimate a potential yield for a number of important by-catch species and areas. Sufficient biological data were available to make a preliminary estimate of γ (an estimate of the proportion of the pre-exploitation biomass that would be available for harvesting) for *Macrourus whitsoni* in Subarea 88.1 and for *M. carinatus* in Division 58.5.2.

5.57 For the former, the estimate of γ was 0.022, which would result in a median escapement of 0.74 and a probability of depletion of 0.10; and for the latter γ was estimated at 0.032, representing a median escapement of 0.51 and a probability of depletion of 0.10.

5.58 To estimate a precautionary yield requires an estimate of pre-exploitation biomass (B_0) as well as a value of γ . There is no estimate of B_0 for *M. whitsoni* in Subarea 88.1, and so it was not possible to estimate a precautionary yield. For *M. carinatus* in Division 58.5.2, however, B_0 could be estimated by pro-rating the density of *M. carinatus* on the neighbouring BANZARE Bank to the area within a suitable depth range in Division 58.5.2. Using this estimate of B_0 and applying the value of γ calculated above, gave an estimate of long-term annual yield of 465 tonnes. The Scientific Committee noted, however, that the value of natural mortality (M) may be too low and suggested that sensitivity tests of the assessment to variations of M and other parameters be conducted intersessionally for *M. carinatus* in Division 58.5.2 and *M. whitsoni* in Subarea 88.1.

5.59 Dr Constable noted that WG-FSA had been unable to undertake any assessments on skates and rays because of a lack of new data on biological parameters. He noted that at last year's meeting (SC-CAMLR-XX, paragraph 5.112) it was agreed that an interim measure to regulate by-catch of skates and rays for the forthcoming year would be 5% of the catch limit of the target species. The Scientific Committee noted that it was unable to provide new advice. It was also recalled that the application of by-catch limits is to provide adequate

protection for by-catch species, with the understanding that the fishery takes steps to reduce by-catch rates. These limits with their attendant uncertainties should not be used as an indication of long-term sustainable yield. For Division 58.5.2 it was recalled that at the 1997 meeting the long-term yield for skates and rays was estimated at 120 tonnes (SC-CAMLR-XVI, paragraphs 5.119 to 5.121).

Estimated Total Removals

5.60 Estimates of total removals of by-catch species are discussed in Annex 5, paragraphs 5.170 to 5.179. The modified observers logbook and forms as recommended in SC-CAMLR-XX, paragraph 5.97, were not uniformly used in the 2001/02 season. The Scientific Committee reiterated its recommendation that all observers consistently use the current logbook and forms, and that by-catch is reported by fishing season instead of split-year.

5.61 Data on total removals of macrourids and skates and rays were available for the trawl fisheries in Division 58.5.2 and the longline fisheries in Subareas 58.6, 58.7 and 88.1 and Division 58.5.1. In Division 58.5.2 a total of 95 tonnes of by-catch was caught in the *D. eleginoides* fishery and 46 tonnes in the *C. gunnari* fishery between the 1996/97 and 2001/02 split-years, representing 1% and 2% respectively of the total catch weight in these fisheries. In the 2001/02 split-year, 5 tonnes of macrourids and 2 tonnes of skates and rays were caught in both fisheries.

5.62 In Subareas 88.1 and 88.2 the percentage of macrourids and skates and rays has ranged from 1 to 27% and 1 to 15% respectively between years and SSRUs. In the 2001/02 season *M. whitsoni* and skates and rays accounted for 12 and 2% respectively of the total catch.

5.63 Annex 5, Table 5.25 summarises the by-catch of macrourids and skates and rays by subarea or division for the 2001/02 season. Macrourids constitute about 10% of total catch in most areas, and skates and rays less than 10%. The higher figure in Subarea 58.7 is due to the low catch of target species. Total removals could not be estimated for Subarea 48.3 because reliable observer data on by-catch were not available for the whole fleet.

5.64 The Scientific Committee noted that the seabed area in Division 58.5.1 is roughly comparable to that in Division 58.5.2, and that the estimate of total removals of macrourids in Division 58.5.1 approaches the estimate of yield calculated for *M. carinatus* for Division 58.5.2. It further noted that the by-catch levels in Division 58.5.2 which are low in the current trawl fishery may increase if longlining proceeds in this division during the next fishing season.

Comparison of By-catch Datasets

5.65 The Scientific Committee noted that the reporting by observers of skates and rays either discarded from the vessel or cut off the longline before coming on board is inconsistent, and reiterated that complete information on by-catch of skates and rays should be reported, as provided for in the format of the current observer logbook and forms. Also, the STATLANT

data appear to substantially underestimate by-catch in most fisheries and the quality of by-catch information from fine-scale catch and effort datasets (Form C2) is variable. These factors lead to sometimes large inconsistencies between data from observer reports, Form C2 and STATLANT.

Operation of Precautionary Measures

5.66 Conservation measures include two types of provisions to limit the level of by-catch: limits on the total removal of by-catch species by area, and 'move-on' provisions whereby a vessel must leave an area for a defined period if a specified amount of by-catch is exceeded in a single haul. The number of times the 'move-on' rule was triggered in Subarea 88.1 and Division 58.5.2 was evaluated.

5.67 In Subarea 88.1 during the 2001/02 season, total by-catch limits per fine-scale rectangle were not exceeded, and the 'move-on' rule was triggered by macrourids in up to 20% of longline sets, and by skates and rays in up to 4% of sets. Alternative trigger rates were examined, but the current trigger level of one tonne per haul was agreed to be still appropriate. In Division 58.5.2 the 'move-on' rule was only triggered on two occasions over the last four fishing seasons, in line with the low reported levels of by-catch, and does not hinder fishing operations unduly.

Measures to Reduce By-catch

5.68 The Scientific Committee agreed that the potential impact of fishing operations on benthic habitats is important for future consideration, and encouraged the quantitative reporting of benthic invertebrate by-catch in all fisheries in order to improve available information.

5.69 In this respect the Scientific Committee appreciated reports that benthos by-catch can be substantially reduced in trawl fisheries, for example, by using rubber discs instead of steel bobbins on the ground gear.

5.70 The Scientific Committee also noted that tagging experiments in Subarea 88.1 suggest that skates survive return to the water after capture and their mouth parts can heal from hook damage. The Scientific Committee would welcome further reports from tagging of skates and rays and on the survivorship of skates and rays following capture and release in the fisheries (Annex 5, paragraph 5.193).

5.71 It was also suggested that setting longline hooks a few metres above the seabed could reduce by-catch of skates and rays in some cases. Prof. C. Moreno (Chile), however, suggested that such a proposal could compromise the line-weighting regime necessary to minimise incidental mortality of seabirds, and careful thought would be necessary before such a measure was put into effect.

Management Advice

5.72 Estimates of γ for *M. whitsoni* and *M. carinatus* suggest that these species have relatively low productivity and may be vulnerable to overexploitation.

5.73 In order to undertake assessments for by-catch species, more information is required, especially for macrourids and skates and rays, on:

- estimates of standing stock;
- taxonomic descriptions of important species;
- length–mass relationships;
- age and growth parameters;
- reproductive information; and
- tagging studies on as many species as possible, where appropriate.

5.74 The estimate of precautionary yield for *M. carinatus* in Division 58.5.2 (465 tonnes) should be taken as the precautionary by-catch limit.

5.75 The precautionary by-catch limit of 120 tonnes should be adopted for skates and rays in Division 58.5.2.

5.76 In the SSRUs for other statistical areas, the by-catch of skates and rays should be set at 5% of the catch limit for *Dissostichus* spp. in that area, or 50 tonnes, whichever is the greater. Biological data should be submitted as soon as possible in order to evaluate more scientifically based by-catch limits at next year's WG-FSA meeting.

5.77 It is important to report the level of by-catch, including discarded skates, as accurately as possible in all forms of data submission.

5.78 Whenever possible during longlining operations, live skates and rays should be cut from the line while still in the water, and vessels should be encouraged to develop methods to minimise by-catch of these species.