REPORT OF THE WORKING GROUP ON INCIDENTAL MORTALITY ASSOCIATED WITH FISHING

(This text was adopted as part of the WG-FSA report and has been extracted here as a separate document)

INCIDENTAL MORTALITY ARISING FROM LONGLINE FISHING

IMALF Intersessional Activities

7.1 The Secretariat reported on the intersessional activities of ad hoc WG-IMALF. The report was submitted as WG-FSA-98/5. The IMALF group worked in accordance with the plan of intersessional activities developed immediately after the completion of CCAMLR-XVI (November 1997) by the Secretariat in consultation with Prof. J. Croxall (UK) and other members of WG-IMALF. As in previous years, the intersessional work of the IMALF group was coordinated by the Secretariat's Science Officer.

7.2 The report of intersessional activities of WG-IMALF contained records of all activities planned and their results. It was considered item by item to evaluate outcomes and to decide which tasks were complete, which needed continuing or repeating, and which were in essence annual standing requests. Major items of future work would be considered later under that agenda item. The remaining tasks which needed intersessional work would appear in the plan of intersessional activities for 1998/99 (Appendix F).

7.3 The Working Group noted the large volume of work accomplished intersessionally by ad hoc WG-IMALF, details of which were presented in a number of WG-FSA papers. The Working Group thanked the Science Officer for his work on the coordination of IMALF activities. 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 1997/98 fishing season.

7.4 The membership of ad hoc WG-IMALF was reviewed intersessionally and a number of new members were added. The revised list of members is appended (Appendix E). WG-FSA welcomed new members and noted that some CCAMLR Member countries which are involved in longline fishing and/or seabird research in the Convention Area (e.g. Norway, Ukraine, Uruguay and USA) are not represented in WG-IMALF. It was agreed that technical coordinators and the Scientific Observer Data Analyst should be ex-officio members of ad hoc WG-IMALF. Members were asked to review their representation in ad hoc WG-IMALF intersessionally and to facilitate attendance of as many of their members as possible at the meeting.

7.5 The Chairman of the Scientific Committee suggested that taking into account the large volume of intersessional work, and especially the work of WG-IMALF during annual meetings of WG-FSA, the latter should consider the appointment of a scientist who would lead discussions at annual meetings and also be involved in the coordination of intersessional activities. Ad hoc WG-IMALF considered the proposal and decided to recommend Prof. Croxall and Mr Baker to act as Convener and Deputy Convener respectively of ad hoc WG-IMALF. It was also decided that, within the Secretariat, coordination of the intersessional work of ad hoc WG-IMALF should be continued by the Science Officer.

Research into Status of Seabirds at Risk

7.6 In response to CCAMLR's request for information on national research programs into the status of albatrosses, giant petrels and white-chinned petrels (SC-CAMLR-XVI, Annex 5, paragraphs 7.18 and 7.20; SC-CAMLR-XVI, paragraph 4.40), New Zealand tabled a

summary of research currently underway on New Zealand seabirds vulnerable to fisheries interactions, and a list of papers resulting from this work which have either been published or are in press (WG-FSA-98/28). Three other seabird research papers which provide interim results were also tabled (SC-CAMLR-XVII/BG/8, BG/9 and BG/13).

7.7 The Working Group noted that of the eight species listed in the table in WG-FSA-98/28, there is evidence that four forage in the CCAMLR area. These are the Antipodean wandering albatross (Walker and Elliott, unpub. data), grey-headed albatross and Campbell albatross (Waugh, unpub. data) and southern royal albatross (Woehler et al., 1990). The usefulness of the summary table was noted. Similar summaries from other nations would enable the Working Group to carry out an overall review of research programs being carried out on albatrosses and petrels which either breed or forage in the CCAMLR area.

7.8 The Secretariat was requested to ask all Members to supply in advance of the next meeting, relevant summary data (in a format similar to WG-FSA-98/28, listing at least species, site, nature and duration of study, scientists responsible and publications) on their research programs into the status of albatrosses, giant petrels and *Procellaria* petrels. The highest priority should be accorded to acquiring information from France, the only Member known to be undertaking relevant programs which has so far failed to respond to all requests for information. The Working Group would review this information at its 1999 meeting.

Reports on Incidental Mortality of Seabirds during Longline Fishing in the Convention Area

1997 Data

7.9 At the 1997 meeting of WG-FSA, the data entry and analysis of the 1996/97 observer data for Subarea 58.7 was only partially completed. The task of entering and completing the analysis was given a high priority during the intersessional period; this is reported on in WG-FSA-98/10.

7.10 Of the 15 observer logbooks supplied for Subarea 58.7, only eight complied with the format of the CCAMLR Scientific Observers Logbook. An attempt was made to get the information required to calculate the seabird catch rates and numbers of hooks observed; however, this information was not collected and could not be calculated from the available data. Table 31 (which replaces SC-CAMLR-XVI, Annex 5, Table 41) summarises the available information on seabird catch rates and the numbers of birds observed; some information was obtained from the observer cruise reports.

7.11 The observed species composition for birds killed in the longline fishery for Subarea 58.7 during the 1996/97 season is given in Table 32 (which replaces SC-CAMLR-XVI, Annex 5, Table 42). White-chinned petrels (*Procellaria aequinoctialis*) (66%) and grey-headed albatrosses (*Diomedea chrysostoma*) (11%) were still the most common species killed. Of white-chinned petrels and grey-headed albatrosses, 83% and 86% respectively were males, increasing the potential significance of the mortality (Ryan and Boix-Hinzen, in press).

7.12 The estimated total incidental catch of seabirds for each vessel in Subarea 58.7 (Table 33) was calculated using the observed catch rate (birds/thousand hooks) for each vessel

multiplied by the total number of hooks set during the fishing season. For those vessels where catch rates could not be calculated, a total catch rate (average by-catch across all vessels for which by-catch rates were available) was used. The total catch rate was calculated from the total number of hooks observed and the total observed seabird mortality. The total seabird by-catch rate for Subareas 58.6 and 58.7 was 0.49 and 0.58 birds/thousand hooks for night and day setting respectively (Table 31). An estimated 696 birds were killed during night setting and 866 birds were killed during daylight setting. The total revised estimated seabird mortality (1 562 birds) for the 1997 season was then divided into species (Table 34) using the observed catch rates for each species (Table 32). This estimated total by-catch of 1 562 birds is 69% greater than the observed total mortality of 923 birds (see SC-CAMLR-XVI, Annex 5, paragraph 7.67). This reflects the difference between the number of dead birds actually seen by the observers and the estimated total which is the extrapolation to the complete haul from the proportion watched by observers.

1998 Data

Data Submission

7.13 As reported in WG-FSA-98/10 and paragraph 3.27, a total of 29 cruises of longline vessels was conducted within the Convention Area during the 1997/98 season, with scientific observers (international and national) on board all vessels. Comments on the quality and timeliness of observer data submissions are provided in paragraphs 3.43 and 3.44.

Data Validation

7.14 The reliability of data in the scientific observer database has been an issue in the past. With the current system there is insufficient time to validate recently-entered data in time for analysis at the meeting. Reconciling submitted data with information in the scientific observer reports is a critical part of the validation process. This and other validation procedures need to be completed before analysis is undertaken.

Data Analysis

7.15 As a result of the problems with data submission and validation, even preparing basic summaries of the submitted data on seabird by-catch is barely feasible by the end of the first week of the WG-FSA meeting.

7.16 Undertaking appropriate analyses (e.g. comparing by-catch rates in terms of vessel, season, area, year, species and mitigation measure) at the meeting is impossible under the present system. Such analyses are of fundamental importance for assessing the effectiveness of the existing CCAMLR measures and for identifying those measures (or elements thereof) which contribute to changes in seabird by-catch.

7.17 The Working Group therefore proposed that analyses involving the elements and addressing the topics outlined in paragraph 7.16 above, be undertaken as a priority element of the intersessional program.

7.18 Such analyses would not, therefore, be able to use the data for the current year as these will not be submitted in time. At the meeting, however, it should prove possible to summarise the current year's data at a level adequate to undertake a preliminary assessment and to identify for WG-FSA and Scientific Committee any topics of particular concern.

7.19 It would still be possible at WG-FSA to consider data analyses, and recommendations therefrom, contained in papers submitted to the meeting based on the current year's data.

7.20 Concern was raised that the assessments of seabird by-catch undertaken for WG-FSA were not comprehensive, in terms of covering all regulated longline fishing occurring in the Convention Area.

7.21 At present most, if not all data from Areas 48 and 88 are reported in full (i.e. logbook and scientific observer data) to the Secretariat and are thereby available for analysis and assessment.

7.22 Within Area 58, however, most of the current longline fishing is undertaken within the French and South African EEZs in Division 58.5.1 and Subareas 58.6 and 58.7. Only summarised observer data from the French EEZ are submitted to the Secretariat. Although all logbook and observer data from the South African EEZ are submitted to the Secretariat, a substantial proportion of this currently lacks data on the proportion of hooks observed, thereby precluding some analyses essential for overall estimates of seabird by-catch.

7.23 At present it is impossible, therefore, for WG-FSA to undertake any comprehensive analysis – and to make any comprehensive assessment – of seabird by-catch in Area 58 as a whole.

7.24 It was agreed to request appropriate French scientists to see if the detailed data on seabird by-catch, collected by observers, could be submitted to CCAMLR in a form consistent with that acquired from other longline fisheries.

Results

Subareas 48.1, 48.2 and 88.3

7.25 On the 52 hauls (24 in Subarea 48.1, 7 in Subarea 48.2 and 21 in Subarea 88.3, with a fish catch of <1 tonne in each), no seabird capture or mortality was reported (WG-FSA-98/19). During the fishing period (14 February to 18 March 1998) standard (10-minute) observations of seabirds around the ship during hauling recorded a total of 436 seabirds of 13 species, with black-browed albatross (47%), Wilson's storm petrel (18%), brown skua (9%) and grey-headed albatross (9%) predominating. Very few interactions (especially in Subarea 88.3) between seabirds and the vessel, even during hauling, were noted (WG-FSA-98/19).

Subarea 88.1

7.26 In the 43-day cruise in February/March 1998, 82 sets were made, 24 (29%) during the day. Observation of 18% of hooks produced no reports of seabird by-catch (WG-FSA-98/10).

Subarea 48.3

7.27 WG-FSA-97/10 Rev. 2 indicates that a total of 79 seabirds was observed killed (66 at night, 11 in daytime, 2 unknown) and 249 seabirds were caught alive (227 at night, 22 in daytime) on the 3 154 thousand hooks observed (24.4% of the total set) in Subarea 48.3 (Table 35).[1]

7.28 Although most seabird by-catch, whether of birds observed killed or caught alive, occurred at night, the by-catch rates in daytime (0.043 birds/thousand hooks) are nearly double those at night (0.023 birds/thousand hooks), with an overall rate of 0.025 birds/thousand hooks. Last year the equivalent values for Subarea 48.3 were 0.93 birds/thousand hooks in daytime, 0.18 birds/thousand hooks at night and 0.23 birds/thousand hooks overall.

7.29 Of the overall observed by-catch, 95% (75 birds) relates to only four vessels: *Koryo Maru 11* (42%), *Isla Sofía* (first cruise: 32%), *Argos Helena* (11%), *Tierra del Fuego* (first cruise: 10%). Similarly, of birds caught alive, 67% relate to two vessels; *Isla Sofía* (first cruise: 35%), *Argos Helena* (32%). All these vessels were fishing in April and May, all the seabird by-catch occurred in these months, 97% (77 birds) in April.

7.30 However, not all vessels fishing in April and May had high by-catch rates. Thus, on the *Illa da Rua* (first cruise) only one bird was killed and one caught alive, *Northern Pride* reported 20 birds caught but only one killed and *Arctic Fox* (first cruise) only killed one bird and caught three others.

7.31 Failure consistently to use streamer lines is likely to have been an important contributory factor to the high seabird mortality rate of *Isla Sofía* (no streamer lines used at night; used on only 75% of daytime sets) and *Argos Helena* (used on only 20% of daytime and 57% of night-time sets). However, this cannot explain the high by-catch rates on the *Koryo Maru 11* and *Tierra del Fuego* which used streamer lines comprehensively.

7.32 The high rates of live capture of seabirds is likely particularly to be influenced by offal discharge on the same side as the haul. This was likely to be the case for the *Isla Sofía, Argos Helena* and *Tierra del Fuego*, but would not account for the relatively high catch rates of live birds by the *Koryo Maru 11* and *Northern Pride*.

1 All birds killed on sets which begin during daytime or night-time (as defined by CCAMLR in Conservation Measure 29/XVI, footnote 3) are defined as daytime or night-time for the purposes of these analyses. A small proportion of sets started at night continued into daytime and vice versa, resulting in some small amount of potential misallocation of birds.

7.33 The species comprising the observed by-catch (Table 36) were white-chinned petrel (83%), black-browed albatross (12%), southern giant petrel (3%), wandering albatross (1%)and southern fulmar (1%). Eight of the 10 albatrosses (80%) were killed during the day; 65 of the 66 white-chinned petrels (98%) were killed at night.

7.34 Using the observed by-catch data together with the proportion of hooks observed (Table 35) enables estimation of the overall seabird mortality in Subarea 48.3 in 1998 (Table 37). As last year, it should be emphasised that only a small proportion of hooks was observed on some vessels and cruises and therefore some quite large extrapolations are made from small original samples. This is particularly so for *Isla Sofía* and *Argos Helena*, with only 6% and 7% of hooks observed respectively and with substantial by-catch in the observed sample. Bearing this in mind, the overall estimated by-catch of 640 birds is still a very substantial reduction from the 5 755 birds estimated killed in 1997 in this subarea.

7.35 In comparison with 1997, in 1998, 5% fewer hooks were set, 6% fewer were set in daytime but 11% fewer were observed. There was only 12% of the seabird by-catch with daytime, night-time and overall by-catches reduced to 13%, 5% and 11% respectively of 1997 values. The proportion of albatrosses in the by-catch was reduced from 40% to 13% of the total, whereas the proportion of white-chinned petrels increased from 55% to 83% of the total.

7.36 Although there was some improvement in confining line setting to night-time and an improved use of streamer lines, it is likely that a major factor in reducing seabird by-catch in 1998 was the one-month delay (until 1 April) in the start of the fishing season. Thus in Subarea 48.3 in 1997, of 712 birds observed killed, 67% were caught in March, 30% in April and 3% in May to August. For 1998, of 79 birds observed killed, 97% were caught in April and 3% in May.

7.37 A comprehensive analysis is planned intersessionally into the relationships between vessel, daytime and night-time setting, time of year and seabird by-catch.

7.38 Overall, the Working Group noted that there had been a substantial (order of magnitude) improvement in the level and rate of seabird incidental mortality in Subarea 48.3 in 1998, compared with 1997. This is due to much higher levels of compliance with CCAMLR conservation measures.

Division 58.4.4

7.39 Two white-chinned petrels were caught by a Spanish longliner conducting a research cruise on Ob Bank in the period October to December 1997 (WG-FSA-98/48).

Division 58.5.1

7.40 CCAMLR-XVII/BG/41 includes summary reports of incidental mortality of seabirds on three cruises by two longliners. The *St Paul* reported no seabird by-catch from 30 sets (215 117 hooks) in December 1997. The *Reshetniak* reported 15 deaths (all white-chinned petrels; all but one at night) on 381 sets (962 400 hooks) in October to December 1997 and 11 deaths (all white-chinned petrels; all at night) on 285 sets (706 800 hooks) in

February 1998. The overall catch rate of seabirds by the *Reshetniak* is stated to be 0.016 birds/thousand hooks. In addition, data from the lines of two unregulated Mustad autoline vessels were obtained, one having caught six white-chinned petrels on a haul of c. 3 750 hooks, the other catching six white-chinned petrels, one black-browed albatross and one grey-headed albatross on a haul of c. 3 500 hooks. This gave a minimum by-catch rate of 1.93 birds/thousand hooks.

Subareas 58.6 and 58.7

7.41 The most comprehensive data for this subarea available at the meeting are those summarised in WG-FSA-98/42. This reports the results of 11 longline fishing trips for *D. eleginoides* to the Prince Edward Island EEZ during 1997/98 (Table 38). The total fishing effort was approximately 4.3 million hooks, up 13% from the 1996/97 season (WG-FSA-97/51).

7.42 Observers reported that 498 seabirds from five species were killed during 1997/98 (Table 39). White-chinned petrels comprised almost all birds killed (96% of the total), with smaller numbers of giant petrels (3%), yellow-nosed albatrosses, and crested penguins. The average catch rate was 0.117 birds/thousand hooks, but this varied greatly among trips (Table 38). Only three trips, by two vessels, had by-catch rates exceeding 0.1 birds/thousand hooks. Two vessels, *Aquatic Pioneer* and *Koryo Maru 11*, had catch rates exceeding 0.3 birds/thousand hooks when fishing in February/early March.

7.43 Most birds killed were reported to have sodden plumage when hauled aboard, suggesting they were killed during setting. No observers reported birds being killed during hauling, but one northern giant petrel was badly injured.

7.44 As in 1996/97 (WG-FSA-97/51), there was great variation in bird by-catch within and between trips. Most sets caught no birds (85%), whereas a few sets caught large numbers of birds (maximum 30, all white-chinned petrels). Twenty sets caught five or more birds, and although they comprised <2% of sets, they accounted for more than half (52%) of birds killed. Important sources of variation include: fishing season, time of setting, wind strength, moon phase, distance from the Prince Edward Islands and vessel.

7.45 Fishing season: Seabird by-catch occurred primarily during summer, with by-catch rates peaking during the chick-rearing period for white-chinned petrels (Figure 10). No white-chinned petrels were caught during July/August, and the by-catch rate for this species decreased markedly by mid-March (0.375 birds/thousand hooks for the first half of March compared with 0.047 for the second half of March). Only two were caught in April/May (by-catch rate 0.003). Most giant petrels were caught in November (87%), whereas all three yellow-nosed albatrosses were caught in February. The crested penguins were all caught by the *Koryo Maru 11* in three incidents on successive trips in January and February.

7.46 Time of setting: Although permit holders were supposed to set lines only at night, in accordance with Conservation Measure 29/XVI, 15% of sets (17% of hooks) were set during the day or spanned nautical dawn or dusk (Table 38). This is an improvement on the situation in 1996/97, when more than half the hooks were set during the day (WG-FSA-97/51), and probably is the single factor most responsible for the marked reduction in by-catch of

albatrosses and, to a lesser extent, giant petrels. During 1997/98 by-catch rate of giant petrels during day sets was almost 20 times greater than during night sets. White-chinned petrels are caught both during day and night sets, but the by-catch rate averaged higher for day sets (0.159 birds/thousand hooks) than night sets (0.102). The comparative by-catch rates for all other species combined were 0.0167 for day sets and 0.003 for night sets. Six of the 20 sets that caught five or more birds were made during the day. There was no clear pattern in by-catch rate during the night; the apparent peak in by-catch of white-chinned petrels three to four hours before dawn was strongly influenced by a small number of sets that caught >10 birds on the two trips with high by-catch rates (Figure 11). Surprisingly few birds were caught during sets around dawn compared with those around dusk (Figure 11).

7.47 Wind strength during setting: Seabird by-catch rates were considerably higher when there were gale force winds (ε force 8 on the Beaufort scale), and were reduced in calm or near calm conditions (force 0–1). These data are based on summer fishing effort only (November to March), but this pattern persists throughout the year, and is still apparent even if the two high catch rate trips are excluded (especially with regard to low by-catch during calm conditions). Of the 20 sets that caught five or more birds, all occurred at wind speeds ε force 3, with 12 ε force 5 and four ε force 8. Observers reported that streamer lines often were ineffective when setting in high winds, and in some cases could not be deployed when winds were very strong. Less than 10% of hooks were set in gale force winds.

7.48 Distance from the Prince Edward Islands: Most birds were caught within 100 km of the islands, where more than 60% of fishing effort took place. By-catch rates of white-chinned petrels decreased almost linearly with distance from the islands (0.151 at <100 km; 0.074 at 100–200 km; 0.003 at >200 km), but if the two high catch rate trips are excluded, the distinction between the <100 km (0.07) and 100–200 km (0.06) zones disappears. All giant petrels and penguins were caught within 100 km of the islands, whereas the three yellow-nosed albatrosses were caught 100 to 200 km from the islands.

7.49 Moon phase: The relationship between seabird by-catch and moon phase was not very strong. The greatest by-catch rate occurred during half moon conditions, but this was influenced by the two trips with high catch rates. Excluding these trips, summer by-catch rates showed a slight elevation for moon states above 0.2 (moonless = 0; full moon = 1). All three yellow-nosed albatrosses were caught on moonlit sets (moon phase 0.8–1.0), as were the giant petrels (0.4–0.8), but the four penguins were caught when there was little or no moonlight (0.0–0.3). Of the 20 sets that caught five or more birds, nine of the 14 night sets took place with at least some moonlight. However, six of these sets also occurred with strong winds, suggesting that moonlight alone may be insufficient to cause serious by-catch problems.

7.50 Differences between vessels: There were strong inter-vessel differences in seabird by-catch rates. All sets that caught four or more birds (n = 29 sets) were made by only two vessels (the *Aquatic Pioneer* and *Koryo Maru 11*). The two trips by the *Koryo Maru 11* and one of the four trips by the *Aquatic Pioneer* accounted for 87% of all birds caught, despite representing less than one third of all fishing effort (32% of hooks set). Inter-vessel differences were most marked during the period of high by-catches in February to mid-March. At this time three vessels were fishing in the area (Table 38), but despite similar fishing times and locations, the catch rate of one vessel, the *Eldfisk*, was four to six times less than that of the other two vessels.

7.51 OvAerall, as reported in WG-FSA-98/42, there was a marked reduction in observed seabird by-catch in the *Dissostichus* spp. fishery at the Prince Edward Islands compared with 1996/97 (WG-FSA-97/51). Excluding white-chinned petrels, the by-catch rate of all other seabird species decreased 15 fold, from 0.079 birds/thousand hooks to 0.005. The biggest change was among albatrosses, whose by-catch rates decreased by two orders of magnitude (from 0.066 to less than 0.001 birds/thousand hooks). Giant petrels showed a more modest three-fold decrease, from 0.011 to 0.004 birds/thousand hooks. The mortality of crested penguins was surprising, as penguins are seldom observed to be caught on longlines. At least some of the penguins caught had swallowed hooks, suggesting that they were foraging from the longline. Most of these reductions in seabird by-catch compared to 1996/97 probably result from the reduction in the amount of daylight setting. However, the creation of a fishery exclusion zone to a radius of 5 n miles from the Prince Edward Islands, may have also made a contribution.

7.52 White-chinned petrels remain the main seabird by-catch problem particularly because they are caught at night. Their by-catch rate in 1997/98 (0.111 birds/thousand hooks) was almost half that in 1996/97 (0.210; WG-FSA-97/51), irrespective of the difference in the proportion of day sets between the two periods. The decreased catch rate presumably results from the more widespread use of effective streamer lines in 1997/98. However, the exclusion zone (see paragraph 7.51) may also have contributed to this.

7.53 The authors of WG-FSA-98/42 were requested to undertake analysis to assess the relative contribution that the exclusion zone may have made to the reduction in by-catch rates between 1997 and 1998.

7.54 Three factors were obvious influences on the by-catch of white-chinned petrels. Season was the most important, with most birds caught during the end of the chick-rearing period in both 1996/97 and 1997/98. The marked decline in by-catch from mid-March occurs more than a month before adult birds leave the waters around the Prince Edward Islands, but corresponds with the end of chick feeding. Within the late chick-rearing period, wind strength (possibly by preventing the effective deployment of streamer lines) and differences between vessels appear to be most important factors determining by-catch.

7.55 In respect of these results, WG-FSA-98/42 recommended that the fishery be closed during February until mid-March; the Working Group endorsed the suggestion.

7.56 WG-FSA-98/42 also recommended that fishers should be discouraged from setting lines when winds exceed force 7. However, given that some vessels were able to avoid catching birds at this time, such a recommendation was felt to be inappropriate at this time.

7.57 The Working Group noted that data for Subareas 58.6 (outside the French EEZ) and 58.7 in WG-FSA-98/42 are, as in WG-FSA-97/51 from last year, based on the absolute numbers of birds observed killed. In addition to being underestimates because an unknown proportion of birds caught at the set are lost prior to hauling, not all hooks set are observed during hauling. Table 35 indicates that, in Subareas 58.6 (outside the French EEZ) and 58.7, for the five cruises with data, the average proportion of hooks observed was 61%. For four of these cruises, the observed total of 265 birds killed is 75% of the estimated total (for all hooks set) of 354 birds.

7.58 The Working Group thanked the authors of WG-FSA-98/42 for such a comprehensive report which addressed especially interactions between catch rates and other variables of interest to the Working Group.

7.59 It was noted that an important element of the IMALF intersessional work program would be to analyse existing by-catch data to evaluate the importance of various environmental, fishing and mitigation variables on seabird by-catch (paragraph 7.16).

7.60 The summarised results of observations on seabird by-catch on a single cruise in November 1997 are reported in CCAMLR-XVII/BG/41. On 77 sets (325 673 hooks) the *St Paul* killed four birds (two white-chinned petrels and two black-browed albatrosses) at an overall mortality rate of 0.012 birds/thousand hooks.

Compliance with Conservation Measure 29/XVI

7.61 This section summarises information on the extent to which there was compliance with the main elements of Conservation Measure 29/XVI in 1998 and compares this with the situation in 1997.

7.62 Thawed bait (Conservation Measure 29/XVI, paragraph 1). Last year (1997), there was no evidence of frozen bait being used but data reporting (in the reports of scientific observers) was incomplete or inconclusive. This year (1998), one vessel (*Sudur Havid*) reported using frozen bait. The completeness of reporting on this topic from other vessels is uncertain at present.

7.63 Line weighting (Conservation Measure 29/XVI, paragraph 2). Last year, no vessel using the Spanish method of longline fishing was in compliance with the conservation measure (see paragraph 7.145 and Figure 12). Data for this year show a similar pattern (Figure 12).

7.64 Night setting (Conservation Measure 29/XVI, paragraph 3). In Subareas 48.3 and 88.1, the proportion of sets commenced during daylight were 8% (126 of 1 557 sets) and 29% (24 of 52 sets) respectively (Table 35). This compares with values of 14% (173 of 1 214 sets) and 50% (one of two sets) for Subareas 48.3 and 88.1 respectively in 1997 (SC-CAMLR-XVI, Annex 5, Table 40). In Subareas 58.6 and 58.7, the proportion of sets commencing in daylight in 1998 was 15% (paragraph 3.53) compared with 55% in 1997 (SC-CAMLR-XVI, Annex 5, paragraph 7.67).

7.65 Offal discharge (Conservation Measure 29/XVI, paragraph 4). In 1998, the proportion of vessels discharging offal during the haul from the same side as line hauling (Table 35), i.e. failing to comply with the conservation measure, was 55% (six of 11 vessels; two holding offal on board during the haul) for Subarea 48.3, 0% (one vessel; holding offal on board during the haul), for Subarea 88.1 and 0% (three of three vessels, but information on two other vessels *Zambezi* and *Sudur Havid*, which discharged on the same side as hauling last year, is not available to the Secretariat at present) for Subareas 58.6 and 58.7. Equivalent values for 1997 are 90%, 0% and 33% for Subareas 48.3, 58.6/58.7 and 88.1, respectively (SC-CAMLR-XVI, Annex 5, Tables 38 to 40).

7.66 Live bird release and hook removal (Conservation Measure 29/XVI, paragraph 5). Observers provided information on whether hooks were removed from live birds caught on the haul for around half of the trips. On four trips, the crew removed hooks from all seabirds caught, while on three other trips hooks were only removed from a proportion of the seabirds.

7.67 Streamer lines (Conservation Measure 29/XVI, paragraph 6). In 1998, streamer lines were used on vessels in Subarea 48.3 on 61% of night-time and 81% of daytime hauls (Table 35). For 1997, comparable values were 37% and 27%. In Subareas 58.6 and 58.7, data (Table 35) suggest that streamer lines were set on about 80% of night-time hauls. Data for daytime hauls and for 1997 are insufficiently available in the database to make any estimates. In Subarea 88.1, streamer lines were used on 96% of night-time and 100% of daytime sets (100% for both in 1997).

7.68 These data on streamer lines simply reflect that such a line was used, rather than whether it complied with the specification in Conservation Measure 29/XVI. Table 40 summarises the specifications of streamer lines present on vessels, and shows whether the streamer lines meet the minimum standards described in Conservation Measure 29/XVI. The information was taken from both observer cruise reports and observer logbooks. See also further discussion on streamer line design in paragraphs 7.156 to 7.160.

7.69 Streamer lines which meet the specifications were present on vessels during nine of the 27 trips (33%). Streamer lines that fall short of the minimum specifications were present on 16 trips. No information was available for one trip, and no streamer line was present on another trip.

7.70 There was reasonable compliance (78%) with height above water of the attachment point of the streamer line to the vessel, but only 26% of trips had a streamer line which met the minimum length. Streamer lines on most trips had at least the minimum number of streamer lines (70%) and met the minimum number of spacings (67%), but compliance with minimum length of streamer lines was poor (33%). Eight observers noted that the vessel had spare streamer line material on board.

Incidental Mortality of Seabirds during Unregulated Longline Fishing in the Convention Area

7.71 The Working Group estimated the levels of seabird by-catch that might be associated with the unregulated longline fisheries in the Convention Area in 1997/98.

7.72 An estimate of total seabird by-catch for any fishery requires information on seabird by-catch rates from a sample of the particular fishery and an estimate of the total number of hooks deployed by the fishery. For unregulated fisheries information is not available either for seabird catch rate or for total hooks set. To estimate these parameters, catch rates of seabirds (Table 31) and *Dissostichus* spp. (Table 2) from the regulated fishery and estimates of total fish catches from the unregulated fishery have been used (Tables 3 to 10).

Seabird By-catch

7.73 As no information is available on seabird by-catch rates from the unregulated fishery, estimates have been made using both the average catch rate for all cruises from the appropriate period of the regulated fishery 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 are under no obligation to set at night, to use streamer lines or to use any other mitigation measure. Therefore catch rates, on average, are likely to be considerably higher than in the regulated fishery.

7.74 In view of the fact that:

(i) seabird by-catch rates in the regulated fishery were substantially lower in 1998 than 1997, due to much better compliance with CCAMLR conservation measures, including those relating to closed seasons; and

(ii) it is unreasonable to assume that the unregulated fishery made comparable improvements to the timing and practice of its operations;

the Working Group decided that it was more realistic to use the seabird by-catch rates from 1997.

7.75 This year, therefore, followed the identical procedure to that used last year. However, the seabird by-catch values used are revised totals following the incorporation of additional data not available at last year's meeting. Last year, the mean and maximum summer rates used (for Subareas 58.6 and 58.7) were 0.363 birds/thousand hooks and 1.446 birds/thousand hooks, respectively. The revised summer values for the complete 1997 dataset are 1.049 birds/thousand hooks and 1.88 birds/thousand hooks (Table 31). Winter mean and maximum values last year were 0.009 birds/thousand hooks and 0.02 birds/thousand hooks, respectively; the revised values are 0.017 birds/thousand hooks and 0.07 birds/thousand hooks.

Unregulated Effort

7.76 To estimate the number of hooks deployed by the unregulated fishery, it is assumed that the fish catch rate in the regulated and unregulated fisheries is the same. Estimates of fish catch rate from the regulated fishery and estimated total catch from the unregulated fishery can then be used to obtain an estimate for the total number of hooks using the following formula:

$$\text{Effort}(U) = \text{Catch}(U)/\text{CPUE}(R),$$

where U = unregulated and R = regulated.

Subarea 48.3

7.77 The Working Group identified no catch from unregulated fishing in this subarea this year, so no estimate of unregulated seabird by-catch is necessary (paragraphs 3.20 to 3.41).

Subareas 58.6 and 58.7

7.78 For this fishery, the year has been divided into two seasons, a summer season (S: September–April) and a winter season (W: May–August), corresponding to periods with substantially different bird by-catch rates. Fish catch rates are from South African and French data for their fisheries in Subareas 58.6 and 58.7 (Table 2). There is no empirical basis on which to split the unregulated catch into summer and winter components. Three alternative splits (80:20, 70:30 and 60:40) were used.

7.79 The seabird catch rates, from Table 31, were:

summer: mean 1.049 birds/thousand hooks; maximum 1.88 birds/thousand hooks; and
winter: mean 0.017 birds/thousand hooks; maximum 0.07 birds/thousand hooks.

Divisions 58.5.1 and 58.5.2

7.80 For the fisheries in these areas fishery catch rates are from the French data for their fisheries in Division 58.5.1 (Tables 1 and 2). The same alternative proportionate splits of catches and effort between summer and winter as in Subareas 58.6 and 58.7 were used.

7.81 The seabird by-catch rates used were the same values as used above for Subareas 58.6 and 58.7. There are two empirical values for this division, both from 1998 (CCAMLR-XVII/BG/41). One, of 1.93 birds/thousand hooks, is from a single set of two unregulated vessels; this value is very close to the value of 1.88 birds/thousand hooks used in Subareas 58.6 and 58.7. The other, of 0.016 birds/thousand hooks, is for a single cruise of a regulated vessel. It did not seem appropriate to use this value to represent the by-catch rate of unregulated vessels. Therefore analysis was confined to the use of the same values as for Subareas 58.6 and 58.7.

Results

7.82 The results of these estimations are shown in Table 41.

7.83 For Subareas 58.6 and 58.7, depending on the proportionate split of catches into summer and winter, estimates of the seabird by-catch in the unregulated fishery range from a lower level (based on the mean by-catch rate of regulated vessels) of 8 500 to 11 000 birds in summer (and 50 to 100 in winter) to a potential higher level (based on the maximum by-catch rate of regulated vessels) of 15 000 to 20 000 birds in summer (and 200 to 400 in winter).

7.84 For Divisions 58.5.1 and 58.5.2, depending on the proportionate split of catches into summer and winter, estimates of the seabird by-catch in the unregulated fishery range from a

lower level (based on the mean by-catch rate of regulated vessels) of 34 000 to 45 000 birds in summer (and 200 to 350 in winter) to a potential higher level (based on the maximum by-catch rate of regulated vessels) of 60 000 to 80 000 birds in summer (and 1 000 to 1 500 in winter).

7.85 The overall estimates of seabird by-catch are shown in Table 42.

7.86 As last year, it was emphasised that the values in Table 42 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.

7.87 Given the uncertainties involved, it cannot be concluded that there is any real difference between the lower/higher range of 50 000 to 89 000 birds potentially killed in 1998 compared with similar values of 31 000 to 111 000 birds potentially killed in 1997 (SC-CAMLR-XVI, Annex 5, paragraph 7.91 and Table 48). However, there is a probable change in the distribution of the potential bird by-catch in the unregulated fishery, which was mainly in Subareas 58.6 and 58.7 in 1997, whereas it is mainly in Divisions 58.5.1 and 58.5.2 in 1998.

7.88 On the basis of the species composition of the observed seabird by-catch in Subareas 58.6 and 58.7 in 1997 (63% white-chinned petrel, 22% albatross species (15% grey-headed albatross), 4% giant petrel species) the 1998 estimated potential by-catch in the unregulated fishery in the Convention Area would equate to 31 000 to 56 000 white-chinned petrels, 11 000 to 20 000 albatrosses and 2 000 to 4 000 giant petrels.

7.89 It was noted that these estimates are at least one order of magnitude higher than those reported to the Working Group for regulated fisheries in the same region.

7.90 For grey-headed albatrosses, for which accurate censuses are available of annual breeding populations (c. 21 500 pairs, but only about half the population breeds each year) for their breeding islands within Subareas 58.6, 58.7 and Divisions 58.5.1 and 58.5.2 (Gales, 1998), it may be roughly estimated that unregulated fishing in 1998 killed 9 to 15% of its breeding population.

7.91 For white-chinned petrels, available data are much less precise but the breeding populations at the Prince Edward, Crozet and Kerguelen Islands total less than 500 000 breeding birds (Croxall et al., 1984) so that an annual removal of 30 000 to 50 000 birds would have a substantial effect.

7.92 Breeding populations of giant petrels in Subareas 58.6, 58.7 and Divisions 58.5.1 and 58.5.2 total 20 000 breeding birds (WG-FSA-97/22), so that potential by-catch levels would equate to 10 to 20% of this.

7.93 The Working Group noted that levels of mortality in the unregulated fisheries will not be sustainable for these populations of petrel and albatross species breeding in the Convention Area.

7.94 With the estimated levels of seabird by-catch in the unregulated fisheries in the southern Indian Ocean in 1997 and 1998, it is likely that the local populations of white-chinned petrels, albatrosses and giant petrels would already be becoming reduced in numbers, perhaps to the extent that estimated seabird by-catch rates might be expected to decline from this cause alone.

7.95 The Working Group urged the Commission to take the strongest possible measures to address the problem of unregulated fishing in the Convention Area.

Assessment of Incidental Mortality of Seabirds in Relation to New and Exploratory Fisheries

Data from New and Exploratory Fisheries Proposed in 1997

7.96 The feasibility survey undertaken in Subareas 48.1, 48.2 and 88.3 between 14 January and 18 March 1998 all reported no seabird by-catch. Observations of birds around the vessel during the set (WG-FSA-98/19) indicated the highest index of relative abundance was in Subarea 48.1 (11.1 birds per haul; black-browed albatross commonest), followed by Subarea 48.2 (7.6 birds per haul; brown skua commonest) and Subarea 88.3 (5.0 birds per haul; Wilson's storm petrel and black-browed albatross commonest).

Streamer lines (albeit not those specified by CCAMLR) and thawed bait were used throughout. Offal was not discharged during the set; offal treatment at other times is not specified in the logbook or observers report. However, when fishing in Subarea 48.3, this vessel was discharging offal on the same side as the haul.

The assessments last year of seabird risk from longline in these areas (SC-CAMLR-XVII, Annex 5, paragraph 7.126) were:

Subarea 48.1 – average risk;
Subarea 48.2 – average to low risk; and
Subarea 88.3 – low risk.

These potential risks are broadly in line with the relative abundance of relevant species recorded in WG-FSA-98/19.

7.97 Similarly, in Subarea 88.1, no seabirds were observed caught during the hauls observed (19% of total hauls made). A total of 84% of total sets made were observed and no direct interactions between seabirds and baited hooks were recorded. During 75% of the settings observed the number of seabirds observed astern of the vessel was five or less. Albatrosses were only recorded in the northern part of the subarea. Bird counts during the day were generally higher than at night. The maximum number of seabirds observed around the vessel was 109, of which 98 were cape petrels. Other species observed in Subarea 88.1 included black-browed albatross, light-mantled sooty albatross, southern giant petrel and southern fulmar. These species were generally observed in low numbers.

The vessel made 29% of the sets during day, which is a contravention of Conservation Measure 29/XVI. These daytime sets were made because of the dangers associated with submerged icebergs. The vessel limited setting time to night time once it was made aware of

the contravention. A streamer line which met the minimum standards outlined in Conservation Measure 29/XVI was used at all times, and offal was not discharged during setting or hauling.

New and Exploratory Fisheries Proposed in 1998

7.98 In previous years concerns were raised relating to the numerous proposals for new fisheries and the potential for these new and exploratory fisheries to lead to substantial increases in seabird incidental mortality (SC-CAMLR-XVI, Annex 5, paragraph 7.118).

7.99 For assessment purposes advice was requested on known and potential interactions with seabirds, relating to the:

(i) timing of fishing seasons;
(ii) need to restrict fishing to night time; and
(iii) magnitude of general potential risk of by-catch of albatrosses and petrels.

7.100 Last year the Working Group undertook the first comprehensive assessment on this basis. It assessed new and exploratory fisheries for most subareas and divisions of the Convention Area. For comparison, it also undertook assessments of areas with established longline fisheries (Subarea 48.3 and Division 58.5.1) (SC-CAMLR-XVI, Annex 5, paragraphs 7.126 and 7.127).

7.101 This year, the Working Group reviewed and revised those assessments from last year for areas where new and exploratory fishery proposals had been received for 1998.

7.102 The Working Group believed that, ideally, all statistical subdivisions of the Convention Area should be subject to assessments of risk from longline fishing, so that prospective applicants for new and exploratory fisheries would have advance information on the nature of potential problems. Accordingly, Division 58.4.1, an area not assessed last year, was included in this process even though this year's proposal was for a trawl fishery.

7.103 In the light of the revisions to last year's assessments and the new assessment of Division 58.4.1, the Working Group, to maintain consistency overall, undertook interim revisions of all other assessments made last year and made preliminary assessments for Subarea 48.5 and Division 58.4.2, the only two areas remaining unassessed. Full details of all assessments relating to the new and exploratory fishing proposals are set out below; the overall risk classifications of these and of the reassessments and interim assessments are summarised in Figure 1.

7.104 The Working Group would expect to undertake reassessments annually, on the basis of new data on seabird distribution and especially taking account of data on seabird by-catch obtained from the new and exploratory fisheries.

7.105 As part of its intersessional work, ad hoc WG-IMALF intends to review the distribution of all seabirds known to be at risk of by-catch in longline fisheries in the Convention Area. Arising from this risk, assessments will be carried out for all CCAMLR subareas and divisions to provide the basis for future advice for new and exploratory fisheries.

7.106 The Working group noted that the need for such assessments would be largely unnecessary if all vessels were to adhere to all elements of Conservation Measure 29/XVI. It is considered that these measures, if fully employed, and if appropriate line weighting regimes can be devised, should permit longline fishing activities to be carried out in any season and area with negligible seabird by-catch. Nonetheless, the Working group carried out seabird risk assessments for all areas proposed for new and exploratory fisheries in 1999.

7.107 Last year, in addition to basic general reference material on the breeding and at-sea distribution of Southern Ocean seabirds, more specific information was provided on breeding, distribution and population sizes of albatrosses and petrels in WG-FSA-97/22, 97/23, 97/28 (now Gales, 1998) and on at-sea distribution from satellite-tracking studies in WG-FSA-97/56 (now Croxall, 1998). The species particularly at risk were assumed to be all species of albatross, both species of giant petrel and *Procellaria* petrels (in the Convention Area white-chinned petrel, *P. aequinoctialis* and, in some areas, grey petrel, *P. cinerea*). No further information on distribution at sea was tabled at the meeting this year. However, recently published information (Nicholls et al., 1997) indicates that the short-tailed shearwater, *Puffinus tenuirostris*, forages in CCAMLR waters. This species is now also considered to be at risk, together with the sooty shearwater, *P. griseus*.

7.108 The estimates of site-specific breeding populations and of total world breeding populations are principally derived from WG-FSA-97/22 and 97/28 (now Gales, 1998), together with data summarised in Croxall et al. (1984), Marchant and Higgins (1990), and Woehler et al. (1990).

7.109 In the assessments that follow, known potential for interaction was based exclusively on the known ranges of breeding birds determined by recent satellite-tracking studies. These are, therefore, minimum estimates of the home range of breeding populations. Within the Convention Area there have been no recent satellite-tracking studies of giant petrels. The only such data for white-chinned petrels are currently unpublished (Weimerskirch et al., in press) ; there are no data for grey petrels, but recent data for short-tailed shearwater (Nicholls et al., 1998).

Inferred potential for interaction is based on:

(i) ranges for breeding populations analogous to those determined by satellite-tracking at other breeding sites; and

(ii) at-sea distributions derived from seabird at-sea sightings during the breeding season as published in distribution atlases.

7.110 To assess distributions for ‘other species’ (see definition below), the following references were used: Abrams (1983), Brothers et al. (1997), Marchant and Higgins (1990), Tickell (1993) and Woehler et al. (1990). Advice was also sought from Mr T. Reid, an experienced Australian fisheries and seabird observer. For the areas under review the distributions are as follows:

wandering albatross	all, but only northern part of Subarea 88.1
Gibson’s albatross	no data
royal albatross	Subareas 58.5, 58.6 and 58.7 only
black-browed albatross	all, but only northeast part of Subareas 48.6, 88.1; rare in Division 58.4.4
Campbell albatross	Subarea 88.1 and Division 58.4.1 only
grey-headed albatross	all, but only northern part of Subarea 48.6
Indian yellow-nosed albatross	Subareas 58.5, 58.7 and Division 58.4.1
Atlantic yellow-nosed albatross	no data
shy albatross	Subareas 58.6 and 58.7, Divisions 58.4.1, 58.4.3, 58.5.1 and 58.5.2
white-capped albatross	no data
Salvin’s albatross	Subareas 58.6 and 88.1
Chatham albatross	Subarea 88.1
sooty albatross	Subareas 58.6 and 58.7, Divisions 58.4.1 and 58.4.4
light-mantled albatross	all
Amsterdam albatross	no data, no records for Division 58.4.1
Antipodean albatross	Subarea 88.1, no records for Division 58.4.1
southern giant petrel	all
northern giant petrel	all, but only northern half of Subareas 48.6 and 88.1,
white-chinned petrel	all, but only northeast half of Subarea 88.1; only extreme north of Subarea 48.6
grey petrel	all, but only northern part of Subareas 48.6 and 88.1
sooty shearwater	Subareas 48.6 and 88.1, Divisions 58.4.1, 58.4.2, 58.4.3 and 58.5.2
short-tailed shearwater	Subarea 88.1, Divisions 58.4.1, 58.4.2, 58.4.3, and 58.5.2

7.111 Some new data on bird populations and distributions contributed to the assessments and reassessments this year and influenced the advice provided. The Working Group requested that in future new information be highlighted and that assessments and advice that differ from previous years be so identified. It was noted that the proposed ad hoc WG-IMALF intersessional comprehensive assessment of all parts of the Convention Area should provide WG-FSA with a new benchmark for these assessments.

7.112 The overall assessments were made against a five-point scale of potential risk of interaction between seabirds, especially albatrosses, and longline fisheries. The five levels are:

(i) low (1);
(ii) average-to-low (2);
(iii) average (3);
(iv) average-to-high (4); and
(v) high (5).

7.113 For the purposes of these assessments the following definitions were applied:

(i) 'Breeding species in this area' means those seabird species considered to be at risk and which breed within the relevant area, subarea or division under consideration;

(ii) 'Breeding species known to visit this area' means seabird species which breed within CCAMLR waters and are considered to be at risk, and which are known to visit the relevant area, subarea or division under consideration, as determined by satellite tracking studies;

(iii) 'Breeding species inferred to visit this area' means seabird species which breed within CCAMLR waters and are considered to be at risk, and which are thought to visit the relevant area, subarea or division under consideration, as determined by at-sea distributions derived from either at-sea sightings during the breeding season, or as published in the scientific literature; and

(iv) 'Other species' means seabird species which breed outside CCAMLR waters and are considered to be at risk, and are known to occur in significant numbers in the relevant area, subarea or division under consideration.

7.114 An additional criterion, used in this year's (but not last year's) assessments, was the potential for longline fishing in an area, as deduced from inspection of bathymetric maps of the area in question. The map used (see Figure 13) was generally very helpful in making assessments. However, difficulties were encountered with areas with uneven distribution of potential fishing grounds. Areas which had been, or were being, considered as subdivided in respect of fishery assessments (e.g. Subareas 88.1 and 48.6) were therefore also assessed for seabird risk in relation to the subdivisions; comments on other areas are included as appropriate.

7.115 The advice section is based purely on consideration of reducing seabird by-catch by vessels operating under CCAMLR regulations (see SC-CAMLR-XVI, Annex 5, paragraphs 7.125 and 7.128).

7.116 The areas assessed were those where proposals for new and exploratory fisheries were received by CCAMLR in 1998:

Subarea 48.6	(South Africa)
Division 58.4.1	(Australia) - trawl
Division 58.4.3	(Australia, France)
Division 58.4.4	(South Africa, Spain, Uruguay, France)
Division 58.5.1	(France)
Division 58.5.2	(France)
Subarea 58.6	(France, South Africa)
Subarea 58.7	(France, South Africa)
Subarea 88.1	(New Zealand).

The French proposal for Divisions 58.5.1 and 58.5.2 was subsequently withdrawn.

(i) Subarea 48.6:

Breeding species in this area: southern giant petrel (until c. 1981).

Breeding species known to visit this area: none.

Breeding species inferred to visit this area: wandering albatross and light-mantled albatross from Prince Edward Islands; black-browed albatross, grey-headed albatross, sooty albatross, white-chinned petrel from elsewhere within the Convention Area.

Other species: shy albatross, sooty shearwater (Abrams, 1983).

Assessment: moderately well-known area in terms of visiting species. Its very large area, however, suggests interaction potential is probably underestimated. The northern part of the area (north of c. 55°S) contains extensive potential fishing grounds and is also the area in which most seabirds potentially at risk occur.

Advice: average to low risk (southern part of area (south of c. 55°S) of low risk); no obvious need for restriction of longline fishing season; apply Conservation Measure 29/XVI as a seabird by-catch precautionary measure.

It was noted that South Africa (CCAMLR-XVII/10) proposes to fish from 1 April to 31 August. This does not conflict with the above proposal.

(ii) Division 58.4.1:

Breeding species in this area: none.

Breeding species known to visit this area: light-mantled albatross.

Breeding species inferred to visit this area: all species breeding at Heard/McDonald Islands; wandering albatross, grey-headed albatross, yellow-nosed albatross, sooty albatross, light-mantled albatross, northern giant petrel, southern giant petrel, white-chinned petrel from Kerguelen; yellow-nosed albatross from Amsterdam Island.

Other species: short-tailed shearwater; sooty shearwater.

Assessment: although no breeding populations are within the area, this is a potentially important foraging area for five albatross species (two threatened, one near-threatened), southern giant petrel, northern giant petrel, white-chinned petrel and short-tailed shearwater from important breeding areas for the species concerned.

Advice: average risk; apply all elements of Conservation Measure 29/XVI.

It was noted that Australia (CCAMLR-XVII/11) is proposing only to trawl in this area, and that longline fishing is **not** currently proposed.

It was also noted that much of the risk to seabirds in this area arises in the region of the BANZARE Rise in the west of the region, adjacent to Division 58.4.3.

(iii) Division 58.4.3:

Breeding species in this area: none.

Breeding species known to visit this area: wandering albatross from Crozet Islands.

Breeding species inferred to visit this area: black-browed albatross, light-mantled albatross, southern giant petrel from Heard/Macdonald Islands; grey-headed albatross, black-browed albatross, light-mantled albatross, northern giant petrel, white-chinned petrel, grey petrel from Kerguelen; white-chinned petrel, grey petrel from Crozet Islands.

Other species: short-tailed shearwater, sooty shearwater.

Assessment: although no breeding populations are within the area, this is a potentially important foraging area for four albatross species (two threatened, one near-threatened), southern giant petrel and white-chinned petrel from important breeding areas for the species concerned.

Advice: average risk; prohibit longline fishing during the breeding season of albatrosses, giant petrels and white-chinned petrels (September–April); maintain all elements of Conservation Measure 29/XVI.

It was noted that France (CCAMLR-XVII/9) proposes to fish the whole of the 1998/99 season, and states that there is no scientific justification for closures. The proposal by Australia (CCAMLR-XVII/11) is for a trawl fishery only.

(iv) Division 58.4.4:

Breeding species in this area: none.

Breeding species known to visit this area: wandering albatross, light-mantled albatross from Crozet.

Breeding species inferred to visit this area: grey-headed albatross, yellow-nosed albatross, southern giant petrel, white-chinned petrel, grey petrel from Crozet; wandering albatross, grey-headed albatross, yellow-nosed albatross, light-mantled albatross, southern giant petrel, white-chinned petrel, grey petrel from Prince Edward Islands.

Other species: short-tailed shearwater, sooty shearwater.

Assessment: although no breeding populations are within the area, this is a potentially important foraging area for four albatross species (three threatened, one near-threatened), southern giant petrel, white-chinned petrel and grey petrel from very important breeding areas for the species concerned.

Advice: average risk; prohibit longline fishing during the main breeding season of albatrosses and petrels (September–April); maintain all elements of Conservation Measure 29/XVI.

It was noted that:

(a) France (CCAMLR-XVII/9) proposes to fish the whole of the 1998/99 season, and states that there is no scientific justification for closures;

(b) Spain (CCAMLR-XVII/12) and South Africa (CCAMLR-XVII/10) propose to fish from 1 April to 31 August. This will overlap the recommended season closure by one month; and

(c) Uruguay (CCAMLR-XVII/19) did not specify when it intended to fish, but indicated that it would comply with Conservation Measure 29/XVI.

(v) Division 58.5.1:

Breeding species in this area: wandering albatross (1 455 pairs; 17% world population), grey-headed albatross (7 900 pairs; 9% world population), black-browed albatross (3 115 pairs; 0.5% world population), yellow-nosed albatross (50 pairs; 0.1% world population), sooty albatross (c. 5 pairs), light-mantled albatross (c. 4 000 pairs; 19% world population), northern giant petrel (1 800 pairs; 17% world population), white-chinned petrel (100 000+ pairs – second most important site), grey petrel (5 000–10 000 pairs) at Kerguelen.

Breeding species known to visit this area: wandering albatross from Crozet Islands, black-browed albatross from Kerguelen, Amsterdam albatross from Amsterdam Island.

Breeding species inferred to visit this area: all the remaining species breeding at Kerguelen; most, if not all, species breeding at Heard/McDonald Islands; many species breeding at Crozet Islands.

Other species: unknown.

Assessment: important foraging area for six albatross species (four threatened, one near-threatened), southern giant petrel, white-chinned petrel and grey petrel, for several of which Kerguelen is a very important breeding site. Most albatross and petrel species breeding at Heard and McDonald Islands will also forage in this area, as will birds of many of the species breeding at Crozet.

Advice: high risk; prohibit longline fishing during the main albatross and petrel breeding season (i.e. September–April); ensure strict compliance with Conservation Measure 29/XVI.

(vi) Division 58.5.2:

Breeding species in this area: black-browed albatross (750 pairs; 0.1% world population), light-mantled albatross (c. 350 pairs; 1.5% world population), southern giant petrel (2 350 pairs; 7% world population) at Heard/McDonald Islands.

Breeding species known to visit this area: wandering albatrosses from Crozet; black-browed albatrosses from Kerguelen; Amsterdam albatross from Amsterdam Island.

Breeding species inferred to visit this area: all species breeding at Heard/McDonald Islands; wandering albatross, grey-headed albatross, yellow-nosed albatross, sooty albatross, light-mantled albatross, northern giant petrel, white-chinned petrel from Kerguelen; yellow-nosed albatross from Amsterdam Island.

Other species: short-tailed shearwater, sooty shearwater.

Assessment: important foraging area for six albatross species (four threatened, one near-threatened and including one of the only two albatross species which are critically endangered – Amsterdam albatross) and for both species of giant petrel and white-chinned petrels from globally important breeding sites at Kerguelen, Heard and Amsterdam Island.

Advice: average-to-high risk; prohibit longline fishing within the breeding season of the main albatross and petrel species (September–April). Ensure strict compliance with Conservation Measure 29/XVI.

It was noted that longline fishing is currently prohibited within the EEZ around Heard/McDonald Islands.

(vii) Subarea 58.6:

Breeding species in this area: wandering albatross (1 730 pairs; 20% world population), grey-headed albatross (5 950 pairs; 6% world population), black-browed albatross (1 000 pairs; 0.1% world population), Salvin's albatross (4 pairs), Indian yellow-nosed albatross (4 500 pairs; 12% world population), sooty albatross (1 200 pairs; 8% world population), light-mantled albatross (2 200 pairs; 10% world population), southern giant petrel (1 000 pairs; 3% world population), northern giant petrel (1 300 pairs; 13% world population), white-chinned petrel (thousands of pairs), grey petrel (thousands of pairs) at Crozet Islands.

Breeding species known to visit this area: wandering albatross, sooty albatross, light-mantled albatross from Crozet Islands.

Breeding species inferred to visit this area: in addition to all the Crozet Islands breeding species, wandering albatross from Prince Edward Islands and Kerguelen; black-browed, yellow-nosed, sooty, light-mantled albatrosses, northern giant petrel, southern giant petrel, white-chinned petrel, grey petrel from the Prince Edward Islands; grey-headed albatross, white-chinned petrel, grey petrel from Kerguelen.

Other species: unknown.

Assessment: known and potential interactions with seven species of albatross (five threatened, one near-threatened), for many of which Crozet is one of the most important world breeding sites, as it is for giant, white-chinned and grey petrels. Also substantial potential for fishery interactions with albatrosses and petrels from the Prince Edward Islands and albatrosses from a variety of other breeding sites in their non-breeding season. Even outside the French EEZ (within which commercial longline fishing is presently prohibited), this is one of the highest risk areas in the Southern Ocean.

Advice: high risk; prohibit longline fishing during the main albatross and petrel breeding season (i.e. September–April); ensure strict compliance with Conservation Measure 29/XVI.

It was noted that:

(a) France (CCAMLR-XVII/9) proposes to fish the whole of the 1998/99 season, and states that there is no scientific justification for closures;

(b) South Africa (CCAMLR-XVII/14) proposes to fish from 1 April to 31 August. This will overlap the recommended season closure by one month.

(viii) Subarea 58.7:

Breeding species in this area: wandering albatross (3 070 pairs, 36% world population – most important site), grey-headed albatross (7 720 pairs; 8% world population), yellow-nosed albatross (7 000 pairs; 19% world population), sooty

albatross (2 750 pairs; 18% world population), light-mantled albatross (240 pairs; 1% world population), southern giant petrel (1 750 pairs; 5% world population), northern giant petrel (500 pairs; 5% world population), white-chinned petrel (10 000+ pairs), grey petrel (thousands of pairs) at Prince Edward Islands.

Breeding species known to visit this area: wandering albatrosses from Crozet Islands.

Breeding species inferred to visit this area: all species breeding at the Prince Edward Islands; grey-headed albatross, black-browed albatross, yellow-nosed albatross, southern giant petrel, northern giant petrel, white-chinned petrel, grey petrel from Crozet Islands.

Other species: unknown.

Assessment: known and potential interactions with five species of albatross (four threatened), for most of which the Prince Edward Islands is one of the most important world breeding sites, as it is for giant petrels. Also substantial potential for fishery interactions with albatrosses and petrels from the Crozet Islands and albatrosses from various other breeding sites in their non-breeding season. This small area is one of the highest risk areas in the Southern Ocean. It should be noted that within South Africa's EEZ, commercial longline fishing is currently permitted all year.

Advice: high risk; prohibit longline fishing during the main albatross and petrel breeding season (September–April); ensure strict compliance with Conservation Measure 29/XVI.

It was noted that:

(a) France (CCAMLR-XVII/9) proposes to fish the whole of the 1998/99 season, and states that there is no scientific justification for closures; and

(b) South Africa (CCAMLR-XVII/14) proposes to fish from 1 April to 31 August. This will overlap the recommended season closure by one month.

(ix) Subarea 88.1:

Breeding species in this area: none.

Breeding species known to visit this area: Antipodean albatross from Antipodes Island, light-mantled albatross from Macquarie Island.

Breeding species inferred to visit this area: light-mantled albatross from Auckland, Campbell and Antipodes Islands; grey-headed albatross and Campbell albatross from Campbell Island; wandering albatross and black-browed albatross from Macquarie Island.

Other species: short-tailed shearwater, sooty shearwater.

Assessment: the northern part of this area lies within the foraging range of three albatross species (two threatened) and is probably used by other albatrosses and petrels to a greater extent than the limited available data indicate. The southern part of this subarea has potentially fewer seabirds at risk.

Advice: average risk overall. Average risk in northern sector (*D. eleginoides* fishery), average to low risk in southern sector (*D. mawsoni* fishery); longline fishing season limits of uncertain advantage; the provisions of Conservation Measure 29/XVI should be strictly adhered to (subject to any variation in respect of the proposal in paragraph 7.117).

New Zealand Proposal in respect of Subarea 88.1

7.117 The Working Group noted New Zealand's request for a variation from Conservation Measure 29/XVI for the exploratory fishery in Subarea 88.1 (CCAMLR-XVII/13 Rev. 1). New Zealand proposes line weighting as an alternative to night setting in the area south of 65°S. This is because during the austral summer (December–March), there are no periods of darkness at these latitudes. The Working Group recognised the need to develop alternative mitigation measures to provide fishers with more options with regard to minimisation of incidental capture of seabirds. This is particularly pertinent to high latitude fisheries. The Working Group noted that line weighting has the best potential as an alternative mitigation measure. Understanding of line weighting is in a developmental phase and additional information on longline sink rates and seabird interactions is urgently needed.

7.118 The Working Group was supportive of the variation but recommended an alternative performance measure than that proposed. Instead of using a sinking depth of 10 m at the end of the aerial section of the streamer line as a performance measure, the Working Group recommended that a sink rate be used, and proposed 0.4 m/sec as the target, with a minimum standard of 0.3 m/sec for all parts of the line. Results from experiments undertaken on an autoliner in the *D. eleginoides* fishery around the Falkland/Malvinas Islands showed that a sink rate greater than 0.3 m/sec will minimise incidental capture of black-browed albatrosses which are efficient at taking bait during line setting (WG-FSA-98/44). However, other species at risk, such as grey-headed albatross and white-chinned petrel, are more efficient bait-takers than black-browed albatross and no seabird mortality occurred when the line sink rate was maintained at or above 0.4 m/second on a vessel using the Spanish fishing system (Brothers, 1995).

7.119 The Working Group stressed that this variation to Conservation Measure 29/XVI should be treated as an experiment to progress knowledge of the relationship between line weighting and line sink rates. Target sink rates may alter in future as a better understanding of the relationship between seabird mortality and sink rates is developed. In addition, the Working Group noted that because line weighting is in an experimental phase, manual addition and removal of weights will probably be the means of achieving the target sink rate in the short term. More efficient and safe ways of weighting longlines need to be developed.

Reports on Incidental Mortality of Seabirds during
Longline Fishing outside the Convention Area

7.120 Many species of seabird, especially albatrosses, giant petrels and white-chinned petrels, breeding in the Convention Area are abundant and widely distributed outside the Convention Area, especially in adjacent areas to the north. They are regularly reported outside their breeding season, sometimes in substantial numbers, as by-catch in longline fisheries in these regions. Some species, especially wandering albatrosses and white-chinned petrels, forage widely outside the Convention Area, even when breeding within it; they are frequently caught in longline fisheries outside the Convention Area at this time.

7.121 In continuing recognition of the significance of the incidental mortality of seabirds from the Convention Area during longline fishing operations outside the Convention Area, CCAMLR has a standing request to Members to report on the details of the nature and magnitude of such information. The Working Group welcomed the information summarised below as supplied by South Africa, New Zealand and Australia. Such information was also supplied by Taiwan (via the Secretariat).

7.122 Mr Cooper reported that a comprehensive global review of seabird by-catch from longline fisheries produced for the FAO International Plan of Action on the Reduction of Incidental Catch of Seabirds in Longline Fishing (IPOA) and currently in draft form, highlights the paucity of information on by-catch for a number of nations close to the Convention Area, especially the South American countries of Argentina, Brazil, Chile and Uruguay, in whose waters species breeding in the CCAMLR area have been reported (Schiavini et al., 1998; Neves and Olmos, 1998; Stagi et al., 1998) or are thought to be at risk.

7.123 WG-FSA-98/25 provides summarised data collected between 1990 and 1997 regarding the by-catch in southern bluefin tuna and related tuna longline fisheries in the New Zealand 200 n mile EEZ. This annual review (as prepared for the 1998 meeting of CCSBT-ERSWG) briefly reviews the history of the southern bluefin tuna fisheries in the New Zealand EEZ, the protocols of fisheries monitoring and by-catch rates and species compositions of sharks and other non-target fish species, marine mammals and marine reptiles and seabirds.

7.124 The data from observed captures of seabirds during the tuna longline fishing operations in New Zealand are detailed in WG-FSA-98/25. A summary of one of the main datasets and of the composition of the seabird by-catch is provided in Tables 43 and 44. The mean by-catch rates for seabirds has varied greatly over the years for each fleet (domestic, foreign licensed and chartered fleet), particularly in the northern region. Highest by-catch rates for both fleets in this region however were recorded in 1996/97; for domestic vessels (1 453 929 hooks deployed) 82 seabirds were observed caught, at a mean by-catch rate of 1.10 birds/thousand hooks (s.e. = 0.19). Japanese vessels, operating under charter agreements, deployed 1 385 820 hooks in the northern region in 1996/97 and 178 seabirds were observed caught, a by-catch rate of 1.40 birds/thousand hooks (s.e. = 0.31). It was noted that a significant proportion of the 82 seabirds observed caught on the domestic vessels were caught during the haul and alive when brought aboard.

7.125 Data and analyses provided by Australia (WG-FSA-98/31) report on the rates and nature of seabird mortality in the Japanese tuna longline fishery around Australia between 1988 and 1995. Whilst Japanese fishing effort in the region has declined over the 1990s, the estimated catch rate of seabirds by this pelagic fleet during this time has been in the order of 0.15 birds/thousand hooks, equivalent to the deaths of 1 000 to 3 500 birds each year in the area. These estimates are underestimates as not all birds killed remain on hooks to be hauled aboard the vessels.

7.126 The observed seabird catch rate in the zone varied annually, seasonally and spatially. Most birds are killed during summer (even though most effort is expended during winter), in the southern regions of the zone, and when lines are set during daylight. Uncertainties in the observed and estimated catch rates prevent confident assessment of trends over time but seabird catch rates do not appear to be continuing to decrease. The authors conclude that the process of the incidental collection of seabird by-catch data (by observers who are primarily engaged to undertake fish sampling duties) renders the seabird by-catch data inadequate for reliable assessment of trends of total numbers of birds killed over time.

7.127 Of the birds retained by observers in the zone, 74% were albatrosses, the species composition of the by-catch varying with both season and area. Sixteen species of birds killed on longlines around Australia were identified, including black-browed, shy, grey-headed, yellow-nosed and wandering albatrosses, southern giant petrels, flesh-footed shearwaters and white-chinned petrels. Most species of birds killed were characterised by unequal representation of sex and age cohorts, and these unequal representations were not consistent between fishing grounds and season. The provenance of 55 birds was evident from band records, and 34 (62%) of these birds killed off the Australian coast, representing five species, originated from five islands within the CCAMLR Convention Area (South Georgia, South Shetland, Marion, Crozet and Kerguelen Islands). Information from satellite tracking of individuals breeding within the CCAMLR area also shows that several species, including wandering and black-browed albatrosses and white-chinned petrels, move to adjacent areas where they are at risk to longlining.

7.128 WG-FSA-98/30 provides a 1997 update of the seabird interactions with longline fishing in the Australian Fishing Zone (AFZ), for the Japanese and Australian domestic pelagic tuna fleets, as well as providing details of observations aboard a demersal autoliner operating off northern Tasmania. Whilst the data are sparse, domestic longline vessels continue to catch seabirds, at relatively high catch rates in some areas, although efforts to reduce rates of seabird catch included night setting with reduced deck lighting and use of bird poles. There were no observations of seabird deaths during the single voyage (60 500 hooks) aboard the demersal autoliner. The reasons for this lack of interactions are not clear; further investigation is under way.

7.129 The overall mean catch rate for the Japanese pelagic tuna fleet for the AFZ during 1997 was lower than in previous years (0.02 birds/thousand hooks) reflecting, among other factors, a shift in fishing to concentrate effort during the winter and in the northern regions. However, catch rates around Tasmania, an area of characteristically high catch rates, did not reflect a decrease from previous years. Four banded albatrosses were observed killed off Tasmania during 1997, two originating from islands within the Convention Area (Kerguelen and Marion Islands).

7.130 WG-FSA-98/32 reports on assessments of the influence of environmental variables and mitigation measures on the seabird catch rates in the Japanese tuna longline fishery within the AFZ. Logistic regression analyses were used to examine how the probabilities of birds being caught varied with factors associated with fishing tactics, equipment and weather conditions. In this zone, seabirds were most likely to be killed on longlines that were set during summer, in southern zones and during daylight hours. However, changes in catch rates resulting from changes in use of mitigation measures were problematic due to interrelationships between the measured factors. Interpretation and accurate assessments were further complicated by ongoing changes to fishing practices and equipment, and due to changes in the priority that fisheries observers placed on the collection of seabird data. The data for this fishery, in terms of assessments of ways to reduce seabird by-catch, are insufficiently robust to allow appropriate statistical analysis to examine the efficacy of mitigation measures.

7.131 The authors suggest that, for more confident determination of factors influencing seabird catch rates and assessments of methods aimed at reducing their capture rates, dedicated observations coupled with statistical assessments and manipulation of variables where possible and appropriate, are essential. Results of this approach suggest that appropriate use of bird lines, bait casting machines and thawed bait are effective in reducing seabird catch rates on longlines.

7.132 A synthesis of the information detailed in the above papers is provided in WG-FSA-98/29, which the Working Group recommended as an excellent overview for those interested in this topic. This document presents the experiences of a decade of seabird catch rates on Japanese longlines set within the AFZ since 1988 as a case study, together with a brief assessment of the efficacy of mitigation measures. The processes to accelerate the implementation of the effective mitigation measures are also documented together with brief details of other actions being pursued by the Australian Federal Government including the current Threat Abatement Plan, as well as international actions which complement the domestic actions.

7.133 As demonstrated, Australia is well advanced in its understanding of the nature of seabird by-catch in pelagic longline fisheries and also in its efforts to ameliorate the threat posed by this fishery. However, following the cessation of Japanese longline fishing in the AFZ in 1997 due to failure of the members of CCSBT (New Zealand, Japan and Australia) to reach agreement over tuna quota limits, the opportunities to maintain the advances made over the last 10 years are reduced. The implications of this to seabird conservation in other oceanic sectors, including the Convention Area, were noted with concern by the Working Group.

7.134 WG-FSA-98/43 presents data collected during fishing operations on both a Mustad autoliner and a Spanish longline vessel around the Falkland/Malvinas Islands between December 1997 and January 1998. For the Mustad vessel 200 000 hooks were observed deployed in 20 sets, during which 25 seabirds (24 black-browed albatrosses and one northern giant petrel) were killed. For the vessel using the Spanish system, no birds were seen to be killed during the three sets observed (30 000 hooks). The Working Group noted with regret that the UK had not provided CCAMLR with any data regarding incidental mortality during longline fishing operations in this area for the current year.

7.135 In 1997, WG-FSA noted that improved information on longline fishing effort and direct observations on by-catch rates of seabirds was needed for all longline fisheries to the

north of the Convention Area. In particular, attention was drawn to the magnitude of the reported effort by Taiwanese vessels in the Southern Ocean in recent years (SC-CAMLR-XVI, Annex 5, paragraph 7.109). Following approaches by the Secretariat in 1998, the Overseas Fisheries Development Council (OFCD) in Taipei provided information on the distribution of fishing effort to the north of the Convention Area and south of 35°S for the years 1993, 1994 and 1995 (WG-FSA-98/38). In these years, 50 565 930 hooks, 56 403 739 hooks and 26 443 679 hooks respectively, were set, probably not entirely in the area south of 35°S. It was noted with concern that the distribution of fishing effort was co-extensive with the foraging ranges of a number of threatened albatross species breeding within the Convention Area. This fishery may present a significant risk to these birds and more accurate fine-scale fishing effort statistics are required to estimate the potential magnitude of interactions. As noted last year (SC-CAMLR-XVI, Annex 5, paragraph 7.107), there remains no direct information on seabird by-catch rates for this fleet. Enhanced links and information exchange between the OFCD and CCAMLR are encouraged by the Working Group.

7.136 The Working Group noted with interest the seabird identification chart and Taiwanese translation of the booklet *Longline Fishing: Dollars and Sense* produced by the OFCD, which were available at the meeting. Mr Cooper reported that South Africa is producing an Afrikaans language translation of the booklet. The Working Group applauded these initiatives and encouraged the OFCD to collect and report on by-catch rates and their progress with implementation of mitigation measures.

Effectiveness of Mitigation Measures

7.137 The Working Group noted the existence of a draft technical paper for the FAO IPOA which reviewed longline mortality of seabirds worldwide and extensively reviewed mitigation measures. The Working Group expected to consider this paper, once it is published, at its 1999 meeting.

7.138 The Working Group reviewed new information relating to methods for mitigating seabird by-catch in longline fisheries, with special emphasis on those aspects and topics covered by Conservation Measure 29/XVI.

Offal Discharge

7.139 Several papers (e.g. WG-FSA-98/44) and observer reports documented that jettisoning offal close to line hauling sites can have serious consequences for by-catch of seabirds. Despite this practise being prohibited under Conservation Measure 29/XVI, many vessels fishing in the Convention Area are still failing to comply.

7.140 Analysis of the observer data and observer reports for trips undertaken in 1997 and 1998 shows that for all but one of the 12 trips where observers recorded a catch of live seabirds greater than 0.1 birds/thousand hooks, offal was discharged on the same side as the line was hauled. Only one of these vessels was known to retain offal on board during hauling. All of these vessels were using the Spanish longline fishing method. In contrast, for the

11 trips where no live seabirds were caught, five of the vessels were discharging on the opposite side to the haul. Of the six that had a discharge point on the same side, four retained their offal on board during hauling. Seven of these 11 trips were undertaken by autoliners.

7.141 The Working Group reconfirmed that paragraph 4 of Conservation Measure 29/XVI should be retained as it stands. It further recommended that vessels discharging offal during the haul on the same side as the line hauling site should no longer be allowed to fish in the Convention Area (see also SC-CAMLR-XVI, paragraph 4.5(iii)) – and drew this especially to the attention of those involved in licensing of vessels to fish in national EEZs.

7.142 It was noted that discharge of spilled bait from autoliners should not take place during line setting in order to reduce bird attraction.

7.143 The Working Group noted with approval the report by Mr Purves that the *Koryo Maru 11* had reconfigured its waste-pipe system so as to discharge on the opposite side of the vessel from the line haul site. This had achieved a substantial reduction in interactions with and mortality of seabirds.

7.144 The Working Group asked that the *Koryo Maru 11* be requested to make available an engineer's diagram of the reconfigured waste-pipe system (to divert offal discharge to the side opposite the line hauling site), to assist other vessels in reconfiguration to rectify offal discharge problems. All Members should be requested by the Secretariat to submit any other relevant information on similar vessel reconfigurations.

Line Weighting

7.145 Conservation Measure 29/XVI states that for vessels using the Spanish method of longline fishing, weights of at least 6 kg mass should be used, spaced at intervals of no more than 20 m. However, as WG-FSA-98/44 indicates, no vessel fishing in 1997 was complying with this element of the conservation measure; a similar situation prevailed in 1998 (paragraph 7.63; see Figure 12).

7.146 It is possible that the weighting regime specified for the Spanish method of longlining in Conservation Measure 29/XVI is close to the limit of what is possible operationally. However, further investigation of seabird by-catch rates with other weighting and spacing regimes is needed before any changes to the existing conservation measure could be recommended. Such information is unlikely to be acquired from analysis of data already in the scientific observer database. Therefore experimental work on longliners during fishing will be essential in order to indicate what combination of weighting and spacing could, using the Spanish method, eliminate seabird by-catch.

7.147 Similar experimentation on Mustad autoliners into appropriate line weighting and spacing to ensure line sink rates that would preclude seabird by-catch is also essential. This should take account of effects due to variations in vessel speed at setting.

7.148 It was noted that full compliance with an appropriate line weighting regime might enable vessels to have much greater flexibility in streamer line use and design and possibly to become exempt from night-setting requirements.

7.149 WG-FSA-98/44 and 98/51 presented information on line weighting regimes for autoline vessels. WG-FSA-98/51 found that the mid-section of the unweighted autoline took a mean time of 63 seconds to reach 10 m. The streamer line used on the vessel which met the minimum standards outlined in Conservation Measure 29/XVI covered the longline for a mean time of 26.3 seconds. When weights (either 2.5 or 5 kg) were added to the line at intervals of 400 m, there was no detectable affect on the sink rate. WG-FSA-98/44 showed that line sink rates varied with distance between weights on the line. Lines with weights at <50 m intervals on lines sank much faster (0.3–0.4 m/sec) than lines with weight spacings that exceeded 70 m (0.1–0.15 m/sec). Weight spacings of 4 kg every 40 m on the lines of the autoline vessel in question were thought to reduce the capture of black-browed albatrosses to near zero levels.

7.150 The Working Group noted that line weighting is potentially a very effective mitigating measure. Indeed, achieving rapid sinking of the baited longline is probably the measure which offers at present the best opportunity substantially to reduce, if not eliminate, seabird by-catch in longline fisheries. If an appropriate weighting and spacing regime can be used, no seabirds should be caught, even in daytime sets. However, at present, addition of weights to lines is a cumbersome process for fishers. The Working Group strongly encouraged longline gear manufacturers to develop automated methods for adding and removing weights to the line, or to manufacture longlines with weights incorporated within them.

7.151 The Working Group recognised that effective progress on these issues would require interaction and collaboration with fishing companies and fishers. It was agreed that technical coordinators were well placed to assist in developing appropriate dialogue.

7.152 Line floats are increasingly used as part of longline setting operations. They have the capacity to increase seabird catch rates substantially. Therefore, consideration should be given to adding a provision governing their use to Conservation Measure 29/XVI. Until it is possible to prescribe a minimum line sink rate that must be achieved, use of line floats should either be prohibited or permitted only with a prescribed minimum length of line attaching the float to the fishing line. A minimum buoy line length of c. 10 m is suggested, irrespective of individual float buoyancy capacity.

7.153 The Working Group agreed that the current Conservation Measure 29/XVI requirement for weighting regimes should remain unchanged for the time being.

Line Setter

7.154 Members of the Working Group were aware that Mustad had recently developed a line setter for autoline vessels. The line setter operates by pulling the main line through the baiting machine allowing slack line to enter the water. This differs from the present setting method where the drag of the line in the water and the forward movement of the vessel pull the line from the vessel under tension. The line setter has the potential to:

(i) decrease the time interval for which baited hooks are available to seabirds and improve the performance of a line weighting regime;

(ii) assist in minimising bait loss that may result as a consequence of weights being attached to the line and disruption of a smooth setting process; and

(iii) improve the operation of the Mustad underwater setting funnel by removing line wear problems and assisting in maintaining the line within the funnel during rough weather. The combined use of a line setter and a Mustad funnel has significant potential for assisting in reducing seabird mortality.

7.155 The Working Group noted that it would appreciate receiving information on the line setter from Mustad; the Secretariat was asked to pursue intersessionally. The importance of assessing the effect of line setters on line sink rate was emphasised.

Streamer Line

7.156 The Working Group noted information provided in WG-FSA-98/19 with regard to a proposal for a new streamer line design. The information presented covered data collected in 1997 when no seabirds were caught with the new streamer line design. However, the vessel using the new design was operating in areas where there are few seabirds susceptible to being caught. In the absence of rigorous statistical comparison of the new design and the CCAMLR design the Working Group saw no reason to change the existing specifications of the conservation measure.

7.157 Many scientific observers reported difficulties with the construction, deployment and effectiveness of streamer lines of the CCAMLR design. Tangling with fishing lines and lack of effectiveness in high winds were frequently mentioned as problems (see also SC-CAMLR-XVI, Annex 5, paragraph 7.132).

7.158 As last year (SC-CAMLR-XVI, Annex 5, paragraph 7.133), it was felt that many of the difficulties experienced were likely to result from some combination of incorrect construction and/or use of the streamer line, especially by inexperienced operators. It was re-emphasised that familiarity with the advice in WG-FSA-95/58 (concerning construction and use of CCAMLR-design streamer lines), which was the basis for the advice in the CCAMLR booklet *Fish the Sea Not the Sky*, was essential for correct use of these lines.

7.159 Overall, however, the Working Group agreed that the provisions provided in Conservation Measure 29/XVI relating to streamer line designs were adequate. It noted that there are specific provisions in the conservation measure for the testing of new streamer line designs.

7.160 Some flexibility in streamer line design (in respect of swivels) is already permitted in Conservation Measure 29/XVI (paragraph 6). Further relaxation of specifications was not thought desirable (or feasible to define) at this stage. If improvements in line sink rate are achieved through appropriate line weighting, then considerable scope for revising streamer line specification might exist.

Underwater Setting

7.161 There are a number of existing initiatives developing underwater setting devices for both pelagic and demersal operations. It was noted that both Norway and South Africa were undertaking testing of the Mustad underwater setting tube in terms of efficacy of reducing

bird by-catch. Ongoing South African testing is taking place on a commercial longliner in Subareas 58.6 and 58.7. To date, no birds have been caught during daytime sets when using the Mustad tube on this vessel. Mr Cooper indicated that preliminary results from a Norwegian vessel fishing in the North Sea are that birds continued to be caught when the tube is used. Available information on this methodology had been comprehensively reviewed as part of the draft background paper for the FAO IPOA.

7.162 The Working Group understood that design and operational improvements have been made to the Mustad underwater setting funnel and line setter and asked the Secretariat to solicit a report on the modifications and results of at-sea trials.

7.163 Progress on the development of underwater setting devices in New Zealand and Australia was noted (WG-FSA-98/24). These underwater setting devices are designed specifically for pelagic longline fishing and are not suitable at present for demersal longlining operations due to the short snood lengths utilised in demersal longlines. It was noted that one of the pelagic devices (underwater setting chute) has potential for modification to enable its use on demersal vessels. Results of at-sea trials are not yet available.

Timing of Setting

7.164 It was noted that there had been some improvement with night setting requirements this year, and that this, along with commencing the fishing season one month later than previously in many areas probably contributed to the reduction in the number of birds reported killed this year.

7.165 It was re-emphasised that effective line weighting regimes might remove the necessity for night setting.

General

7.166 Experiences reported in WG-FSA-98/44 suggested that research should be undertaken on the effects of artificial bait, snoodline colour and mainline colour on seabird capture potential.

7.167 The Working Group endorsed the suggestion in WG-FSA-98/45 that research should be undertaken to investigate bait taking by different seabird species in relation to bait depth, propeller wash turbulence and streamer lines.

7.168 The Working Group recommended that research on the effects of line sink rates (taking account of vessel speed) on seabird by-catch should be undertaken as a very high priority.

7.169 The Working Group recommended that Conservation Measure 29/XVI should be retained as it stands, especially its provisions in relation to offal discharge, night-time setting and line weighting, subject to any modification relating to the New Zealand proposal for Subarea 88.1 (see paragraphs 7.117 to 7.119).

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

FAO International Plan of Action (IPOA)

7.170 The Working Group noted the existence of a draft background paper reviewing the incidental catch of seabirds by longline fisheries on a worldwide basis, prepared as supporting information for the FAO IPOA (SC-CAMLR-XVII/BG/5; paragraph 7.122). The Working Group requested that the final published version of the background document be circulated for consideration at its next meeting.

7.171 Last year the Commission requested the Secretariat to arrange for comments from ad hoc WG-IMALF to be forwarded to FAO in time for consideration of the IPOA at the FAO Consultation, to be held in Rome from 26 to 30 October 1998 (CCAMLR-XVI, paragraph 12.4). In accordance with FAO's timetable, the revised IPOA will then be submitted for adoption at the next meeting of the FAO Committee on Fisheries (COFI), to be held in February 1999.

7.172 In consultation with the Chairman of the Scientific Committee it was decided that, taking into account the timing of various CCAMLR meetings, it would be possible to arrange for the intersessional comments of ad hoc WG-IMALF to be considered at WG-FSA and then sent to FAO. After consulting with Members of the Scientific Committee, Mr Cooper was nominated as CCAMLR observer at the FAO meeting (26 to 30 October 1998). Mr Cooper will inform FAO of recent CCAMLR activities in relation to the reduction of seabird by-catch in longline fisheries in the CCAMLR Convention Area and submit comments of CCAMLR scientists regarding the FAO IPOA. Mr Cooper will also try to report direct to the CCAMLR Scientific Committee, during its 1998 meeting, on the outcome of the FAO meeting.

7.173 The CCAMLR Scientific Committee and the Commission will take the opportunity to consider further the draft of the FAO IPOA during their forthcoming meetings with a view to sending their comments to FAO for consideration at the COFI meeting in February 1999.

7.174 By correspondence ad hoc WG-IMALF members had made comments on an earlier draft of the IPOA (WG-FSA-98/34). These comments were reviewed in the light of the revisions to the plan.

7.175 Support was expressed by the Working Group regarding the inclusion of timeframes in the draft IPOA and that nations produce Assessment Reports to ascertain whether there is a need to develop National Plans of Action. Additional comments from the Working Group on the draft FAO IPOA considered that the Assessment Reports and the subsequent National Plans of Action should be independently assessed to ensure consistency and appropriateness of decisions, particularly in relation to reviewing the initial Assessment Reports to determine whether or not National Plans of Action are required. It was also suggested that technical measures which are of unknown effectiveness be relegated to a separate section.

7.176 The Working Group supported suggestions that a Seabird Technical Advisory Group be formed to give FAO advice, in respect of the IPOA, concerning scientific, technical and educational matters relating to seabird populations and seabird by-catch issues, especially measures for by-catch mitigation.

7.177 All these suggestions were incorporated into the document to be forwarded to FAO at its meeting in Rome, Italy (WG-FSA-98/34 Rev. 2).

7.178 The Working Group recommended to the Commission that, once the IPOA is adopted, it encourages all nations which engage in longline fishing in CCAMLR waters to prepare Assessment Reports, and if justified, National Plans of Action, following the guidelines contained in the IPOA.

Convention on Migratory Species

7.179 The Working Group noted the progress outlined in WG-FSA-98/36 in relation to the development of a regional agreement for southern hemisphere albatrosses.

7.180 The Working Group commended the listing of all southern hemisphere albatrosses on the Appendices to the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and expressed support for the development of a regional agreement covering southern hemisphere albatrosses. The Working Group encouraged an early meeting in Chile of the proposed ad hoc working group to examine options for regional cooperation.

7.181 It was noted that the 6th Conference of Parties (CoP) for the CMS will be held in Capetown, South Africa, from 4 to 16 November 1999. The occurrence of the CoP in Capetown provides an excellent opportunity for further meetings focusing on the development of a regional agreement.

7.182 The CCAMLR Secretariat advised that they had contacted the CMS Secretariat intersessionally enquiring whether the data collected by CCAMLR would be useful to the CMS in their work. No response has been received as yet.

Australian Threat Abatement Plan

7.183 The Working Group noted the tabling of the Australian document *Threat Abatement Plan for the incidental catch (or by-catch) of seabirds during oceanic longline fishing operations*. The objective of Threat Abatement Plan is to reduce seabird by-catch in all fishing areas, seasons and fisheries to below 0.05 birds/thousand hooks, based on current fishing levels. This represents a reduction of up to 90% of seabird by-catch within the AFZ, and should be achievable within the five-year life of the plan. The ultimate aim of the threat abatement process is to achieve a zero by-catch of seabirds, especially threatened albatross and petrel species, in longline fisheries. However, using currently available mitigation methods, it is not possible to achieve this goal in the short term.

7.184 Specific actions in the plan prescribe the mitigation measures which must be used by domestic and foreign longline vessels in longline fisheries, fishing areas and fishing seasons in the AFZ to minimise the by-catch of seabirds. These include the following measures for pelagic longline fishing in the AFZ:

(i) night setting of hooks as one of three mandatory options available for selection by fishers;

(ii) use of lines which are sufficiently weighted to cause the baits to sink out of reach of diving birds immediately after they are set, as part of one of three mandatory options to be selected by fishers;

(iii) the use of thawed bait, as part of one of three mandatory options to be selected by fishers; and

(iv) a requirement that from 1998 all vessels operating in the AFZ will carry bird lines and use them when appropriate. Use of bird lines below 30°S will remain mandatory.

7.185 It should be noted that currently there are no commercial demersal longline operations for *Dissostichus* spp. occurring within the AFZ. However, the Threat Abatement Plan addresses the potential for this to occur in the future and includes appropriate actions. The plan states that if a new demersal fishery is to be established, particularly around sensitive areas such as Heard and McDonald Islands (which are within CCAMLR waters), then suitable mitigation measures will be developed before the fishery proceeds. It is intended that any mitigation measures developed will be, at a minimum, in accordance with current CCAMLR conservation measures.

Commission for the Conservation
of Southern Bluefin Tuna (CCSBT)

7.186 SC-CAMLR-XVII/BG/4 reports on the third meeting of the CCSBT Ecologically Related Species Working Group (ERSWG) which met in Japan from 9 to 12 June 1998. This working group was established to advise CCSBT on matters relating to ecologically-related species. The prime focus of this group to date has been the incidental mortality of seabirds in the southern bluefin tuna fishery. CCAMLR papers WG-FSA-98/25, 98/31, 98/32 and 98/33 were among the papers tabled at that meeting. As SC-CAMLR-XVII/BG/4 states, some of the key outcomes included a paper describing the member countries priorities for mitigation research, a paper describing ways to determine the effect of time of day on southern bluefin tuna catch, and a set of guidelines for the construction and deployment of streamer lines, for endorsement by CCSBT. The ad hoc WG-IMALF commented that the outcomes achieved at ERSWG may be of relevance to CCAMLR, and looked forward to receiving the full report once it had been considered by CCSBT.

Global Environment Facility (GEF)

7.187 The Working Group was informed by Mr Cooper of preliminary plans by BirdLife International to apply for funding from the Marine Topics program of GEF, a funding initiative emanating from the Convention on Biological Diversity, specifically to enable conservation actions in developing countries. Funding would be sought to hold an expert workshop in South Africa to assess the need and desirability of transferring relevant expertise on seabird by-catch to developing countries, such as on mitigation measures, observer programs and research needs and protocols. Such an initiative would support the FAO IPOA and follows directly from a recommendation made at the Workshop on Incidental Mortality of

Albatrosses in Longline Fisheries held in 1995. In this regard, the Working Group noted with approval the workshop held in Chile in March 1998 to train scientific observers (SCOI-98/8).

Approaches to Eliminating Seabird By-catch
in Longline Fisheries in the Convention Area

7.188 The Working Group briefly reviewed the practices and policies which can contribute to enhancing progress on this issue.

7.189 The Working Group believes that eliminating seabird by-catch associated with longline fisheries requires effective progress on a number of related topics. These include seabird research, fish research, fishing technology, education and legislation.

7.190 Important improvements can be achieved in the long term by the development of new fishing methods, particularly those involving underwater setting. When successful, such methods should remove the need for most, if not all, of the existing constraints on longline fishing arising from the need to use other types of mitigating measure (including closed seasons and areas) to protect seabirds.

7.191 In the meantime, however, research into improvements to, and better use of, existing mitigating measures is at least of equal importance. The highest priority should be given to devising line weighting arrangements that ensure line sink rates that will effectively preclude seabirds gaining access to baits.

7.192 Once such systems have been developed and implemented successfully, vessels using them would very likely be exempt from the use of other types of mitigating measure to protect seabirds, especially those relating to night setting and closed seasons and areas.

7.193 In most foreseeable circumstances, ensuring compliance in the use of mitigation measures will be an important part of the management of longline fisheries. The Working Group endorsed the suggestions of the Scientific Committee last year (SC-CAMLR-XVI, paragraph 4.52) that better compliance could be achieved through:

(i) access to the fishery only of vessels able and equipped to comply fully with CCAMLR conservation measures (e.g. constructed to allow offal discharge on the opposite side from the haul);

(ii) in-port inspection to ensure understanding by fishers of the relevant CCAMLR conservation measures and to ensure that vessels possess appropriate fishing and related gear to be able to comply with them;

(iii) preferential access to fisheries of vessels which have a good level of compliance with conservation measures (coupled with ready access to appropriate assistance to help vessels with a poorer record of compliance).

7.194 Complementary to many of these provisions is appropriate education of fishing companies, vessel captains, fishing masters and crew. Special training courses for these and for scientific observers and national technical coordinators would be valuable. Additional support involving specialists well-versed in the at-sea use of seabird mitigating measures

would be desirable. The Working Group recommended that CCAMLR and its Members should support initiatives to secure international funding to facilitate such undertakings.

7.195 The Working Group recommended that CCAMLR should review its own materials aimed at improving education of those involved in longline fishing. To address fishing crews may require simpler and more graphic material than currently provided, perhaps by means of posters or videos. To inform fishing gear manufacturers and fishing companies of the more technical and scientific issues, a periodic newsletter on relevant developments and issues might be appropriate (see WG-FSA-98/45, paragraph 10).

7.196 Further desirable complementary initiatives include developing national (e.g. the Australian Threat Abatement Plan; see paragraphs 7.183 to 7.185) and international plans of action or agreements to tackle the relevant issues. Important international agreements would include those currently being developed by FAO (see paragraphs 7.170 to 7.178) and under the CMS (see paragraphs 7.179 to 7.182).

7.197 One of the major problems in tackling issues relating to longline fishing is regulating activities on the high seas and by countries not signatory to relevant international instruments. Effective action (including investigating potential for trade sanctions) in relation to issues like fishing overcapacity (tackling national/regional subsidies for building longliners) and reflagging of vessels to avoid liability under national legislation, will need pursuing. In relation to these and to improve the management of longline fisheries, ratification (and entry into force) of the 1995 UN Agreement for the Implementation of Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNIA) should be afforded a high priority since this agreement aims to harmonise management measures on the high seas, especially when such measures have been promulgated by regional fisheries management bodies such as CCAMLR. In addition, both the FAO Compliance Agreement and Code of Conduct for Responsible Fisheries contain elements which are consistent with CCAMLR's objectives and which provide a global framework for successive international agreements on fisheries management consistent with the 1982 UN Convention on the Law of the Sea (UNCLOS) and the UNIA. The Working Group recommended that CCAMLR should encourage its Members and all other countries fishing in the Convention Area to ratify and promote the entry into force of these instruments as soon as possible.

Advice to the Scientific Committee

7.198 The Scientific Committee was requested to note the following recommendations/advice.

7.199 General:

(i) The appointment of Prof. Croxall as Convener and Mr Baker as Deputy Convener of ad hoc WG-IMALF (paragraph 7.5).

(ii) The intention of ad hoc WG-IMALF to review information on research programs into the status of albatrosses, giant petrels and *Procellaria* petrels at its 1999 meeting; to enable this, all Members were requested to submit relevant summary data intersessionally (paragraph 7.8).

(iii) International and national initiatives relating to reducing seabird by-catch in longline fisheries by FAO, CMS, CCSBT and Australia (paragraphs 7.170 to 7.187).

(iv) Comments on the draft FAO IPOA which are to be forwarded to the FAO (paragraphs 7.170 to 7.178 and WG-FSA-98/34 Rev. 2).

(v) A proposal to seek funding from the Global Environmental Facility (GEF) to facilitate reduction of bird by-catch in developing countries (paragraph 7.187).

7.200 Data on incidental mortality of seabirds during longline fishing in the Convention Area:

1997

Intersessional revision of results from Subareas 58.6 and 58.7 (paragraphs 7.9 to 7.12), showing that:

(i) Species most abundantly killed by regulated fisheries were white-chinned petrels (66%) and grey-headed albatrosses (11%) (paragraph 7.11 and Table 32).

(ii) Catch rate (birds/thousand hooks) was estimated as 0.49 and 0.58 for day and night setting, respectively, in Subareas 58.6 and 58.7 (paragraph 7.12 and Table 31).

(iii) An estimated 696 birds were killed during night setting and 866 during day setting. This total estimated mortality of 1 560 is 69% greater than the observed total mortality of 923 birds (paragraph 7.12 and Tables 33 and 34).

1998 – General

(iv) Continuing difficulties with timely data submission and validation preclude the undertaking of comprehensive analysis of the current year's data (paragraphs 7.15 and 7.16). The main analysis should be undertaken intersessionally (paragraphs 7.17, 7.37 and 7.59), complemented by preliminary assessment of the current year's data at the WG-FSA meeting (paragraphs 7.18 and 7.19).

(v) Request for all data for longline fisheries in the Convention Area in order to undertake comprehensive analysis and assessment (paragraphs 7.22 to 7.24).

(vi) Results from the 1998 fishing feasibility study in Subareas 48.1, 48.2, 88.1 and from the new fishery in Subarea 88.3 showed no by-catch of seabirds (paragraphs 7.25 and 7.26).

1998 – Results for Subarea 48.3:

(vii) 79 seabirds (83% white-chinned petrels, 12% black-browed albatross) were observed killed at an overall catch rate of 0.025 birds/thousand hooks (paragraphs 7.27, 7.28 and 7.33 and Tables 35 and 36), compared with 712 seabirds at a catch rate of 0.23 birds/thousand hooks in 1997.

(viii) An estimated 640 birds were killed, a substantial reduction (88% fewer) of the estimated 1997 kill of 5 755 (paragraph 7.34 and Table 37).

(ix) These results represent a major improvement compared with 1997, due to the much higher levels of compliance with CCAMLR conservation measures (paragraphs 7.35 and 7.40).

(x) The one-month delay (until 1 April) in the start of the fishing season is thought to be a major factor in reducing bird by-catch in 1998 (paragraph 7.36).

1998 – Results for Subareas 58.6 and 58.7

(xi) 498 seabirds of five species (mainly white-chinned petrels (96%)) were observed killed with an average catch rate of 0.117 birds/thousand hooks (paragraph 7.42 and Tables 38 and 39), compared with 834 seabirds at a catch rate of 0.52 birds/thousand hooks in 1997.

(xii) Important factors associated with higher rates of seabird by-catch were daytime setting (though reduced three-fold from last year), high winds, distance from breeding island, vessel and time of year (paragraphs 7.45 to 7.50 and Figure 10).

(xiii) By-catch occurred mainly during summer, peaking during February to mid-March, the chick-rearing period of white-chinned petrels (paragraph 7.45 and Figure 11).

(xiv) Seabird by-catch rates were considerably reduced compared with 1997; this was probably because of improved compliance with Conservation Measure 29/XVI, especially with respect to night setting and use of streamer lines (though the 5 n miles fishing exclusion zone around the Prince Edward Islands may have contributed) (paragraphs 7.51 and 7.52).

(xv) The fishery in Subarea 58.7 should be closed during February to mid-March during the chick-rearing period of white-chinned petrels (paragraph 7.55).

7.201 Compliance with Conservation Measure 29/XVI:

(i) No vessels were in compliance in respect of line weighting, for the second successive year (paragraph 7.63 and Figure 12).

(ii) Improvements in the prevalence of night setting, compared with 1997, were noted in all subareas (paragraph 7.64).

(iii) Despite some improvements since 1997 (principally relating to retaining offal during the haul) many vessels are still discharging offal during the haul on the same side as line hauling (paragraph 7.65).

(iv) Streamer lines were used on more vessels than last year, but most streamer lines do not meet CCAMLR specifications (paragraphs 7.67 to 7.70 and Table 40).

7.202 Assessment of potential levels of by-catch of seabirds in the Convention Area due to unregulated longline fishing:

(i) The estimate of potential seabird by-catch for 1998 (taken exclusively in the Indian Ocean sector) was between 50 000 and 89 000 seabirds (potentially comprising 31 000 to 56 000 white-chinned petrels, 11 000 to 20 000 albatrosses and 2 000 to 4 000 giant petrels) (Tables 41 and 42). This compares with estimated values for 1997 of 31 000 to 111 000 seabirds.

(ii) These levels of mortality would be unsustainable for the populations of these species breeding within the Convention Area in the southern Indian Ocean.

(iii) The Commission was asked to take the most stringent measures possible to combat unregulated fishing in the Convention Area.

7.203 Incidental mortality of seabirds in relation to new and exploratory fisheries:

(i) Fishing feasibility studies proposed in 1997 and undertaken in Subareas 48.1, 48.2, 88.1 and 88.3 resulted in no reported seabird by-catch (paragraphs 7.96 and 7.97).

(ii) Most statistical subdivisions of the Convention Area, including all with proposals this year for new and exploratory fisheries, were reassessed in terms of risk of by-catch of species and groups of seabirds at risk (paragraphs 7.101 to 7.116 and Figure 13). In respect of this year's proposals (paragraph 7.116) potential conflict between proposed fishing seasons and advice on seasons closed to fishing to protect seabirds was:

(a) minor for Division 58.4.4 (Spain and South Africa), Subarea 58.6 (South Africa) and Subarea 58.7 (South Africa);

(b) substantial for Divisions 58.4.3 (France), 58.4.4 (France), Subarea 58.6 (France) and Subarea 58.7 (France); and

(c) uncertain for Division 58.4.4 (Uruguay).

(iii) Detailed advice was provided in respect of the New Zealand request for a variation from Conservation Measure 29/XVI for exploratory fishing in Subarea 88.1 (paragraphs 7.117 to 7.119). Otherwise it was agreed that Conservation Measure 29/XVI should be retained for longline fisheries in all parts of the Convention Area.

7.204 Incidental mortality of seabirds during longline fishing outside the Convention Area:

(i) Information on seabird by-catch outside the Convention Area, especially that submitted by Australia and New Zealand, continues to indicate that substantial by-catch occurs of species and populations breeding within the Convention Area (paragraphs 7.122 to 7.134 and Tables 43 and 44).

(ii) Efforts to obtain information on fishing effort and on bird by-catch by Taiwanese pelagic longliners for tuna in the Southern Ocean were noted and further dialogue encouraged (paragraph 7.135).

7.205 Effectiveness of mitigation measures:

Ad hoc WG-IMALF considered new information relating to methods for mitigating seabird by-catch in longline fisheries and offered new advice relating to:

(i) offal discharge, including bait spillage and vessel reconfiguration (paragraphs 7.139 to 7.144);

(ii) the importance of adequate line weighting as potentially the most effective of existing mitigating measures (paragraph 7.150), the need to develop more efficient methods to weight lines and the high priority of research on effects of line sink rates (paragraph 7.168);

(iii) the potential need to add a provision to Conservation Measure 29/XVI governing the use of line floats (paragraph 7.152);

(iv) the need to investigate the use of line-setting devices (paragraph 7.154);

(v) development and testing of underwater setting tubes by Australia, New Zealand, Norway and South Africa was noted and encouraged (paragraphs 7.161 to 7.163);

(vi) the need for research into artificial bait, gear colour and bait-taking behaviour of seabirds (paragraphs 7.166 and 7.167).

7.206 Approaches to eliminate seabird by-catch in longline fisheries in the Convention Area:

The Working Group prepared a brief review of policies and practices (involving seabird and fish research, fishing gear development, education and legislation) which it believed essential to resolving this issue (paragraph 7.189) recommending:

(i) sustained development of underwater setting, as the likely medium- to long-term solution (paragraph 7.190);

(ii) enhanced work to develop line weighting regimes to ensure sink rates that will preclude seabirds accessing baits (paragraph 7.191) and the implications of this for exemption from other mitigating measures (paragraph 7.192);

(iii) improving compliance with the existing suite of mitigation measures (paragraph 7.193);

(iv) improved training and education of fishing companies, vessel captains, fishing masters, crew, scientific observers and technical coordinators (paragraph 7.194);

(v) development of a range of national and international plans of action, e.g. those under FAO, CMS and the Australian Threat Abatement Plan (paragraph 7.196); and

(vi) action relating to improved regulation of high seas fishing (especially through harmonisation of management measures) with CCAMLR encouraging Members (and other countries fishing in the Convention Area) to ratify and promote entry into force of instruments such as UNIA, FAO Compliance Agreement and Code of Conduct for Responsible Fisheries (paragraph 7.197).

Table 1: Catches (tonnes) by species and area reported for the split-year 1997/98 (1 July 1997 to 30 June 1998). Source: STATLANT data.

Species	Area/Subarea/Division										
	48	48.1	48.2	48.3	58.5.1	58.5.2	58.6	58.7	88.1	88.3	All Areas
A. rostrata				1				2			3
C. gunnari				6		68					74
C. rhinoceratus					1	5					6
D. eleginoides		<1	<1	3 258	4 741	2 418	175	576	<1	<1	11 168
D. mawsoni		1							41		42
E. superba	80 981										80 981
L. squamifrons						3					3
Macrourus spp.		<1	<1	21	12		15	22	9		79
Notothenidae		<1	<1	<1					<1	<1	<1
Osteichthyes spp.		1	<1	6				<1			7
M. hyadesi				53							53
Lithodidae				<1				<1	<1		<1
P. spinosissima				<1							<1
Rajiformes spp.		<1	<1	14	18	1	3	<1	4	<1	40
Total	80 981	2	<1	3 359	4 772	2 495	193	600	54	<1	92 456

Table 2 : Catches (tonnes) of *Dissostichus* spp. and *C. gunnari* by statistical areas and gear reported for the 1997/98 fishing season (i.e. the period between the end of the Commission meeting in 1997 and the time of the WG-FSA meeting in 1998).

Conservation Measure	Subarea/ Division	Location	Fishing Method	Catch Limit (tonnes)	Reported Catch (tonnes)
Dissostichus eleginoides: Established/Assessed fisheries:					
124/XVI	48.3	South Georgia	Longline	3 300	3 328
128/XVI	48.4	South Sandwich Is	Longline	28	0
131/XVI	58.5.2	Heard Island	Trawl	3 700	3 264[a]
-	58.5.1	Kerguelen EEZ	Trawl		3 624[b]
-	58.5.1	Kerguelen EEZ	Longline		1 118[c]
-	58.6	Crozet EEZ	Longline		88[b]
-	58.6	Prince Edward Is EEZ	Longline		140[d]
-	58.7	Prince Edward Is EEZ	Longline		674[d]
Exploratory fisheries:					
141/XVI	58.6	Outside EEZs	Longline	658	1.0
142/XVI	58.7	Outside EEZ	Longline	312	<1
Dissostichus spp.:					
143/XVI	88.1	North of 65°S	Longline	338	0
		South of 65°S	Longline	1 172	39
144/XVI	58.4.3		Trawl	963	0
New fisheries:					
134/XVI	48.1	North of 65°S	Longline	1 863	<1
		South of 65°S	Longline	94	<1 (Closed due to results of survey)
135/XVI	48.2	North of 65°S	Longline	429	<1
		South of 65°S	Longline	972	<1 (Closed due to results of survey)
136/XVI	48.6	North of 65°S	Longline	888	0
		South of 65°S	Longline	648	0
137/XVI	58.4.3	North of 60°S	Longline	1 782	0
		South of 60°S	Longline	0	0
138/XVI	58.4.4	North of 60°S (outside EEZ)	Longline	580	0
		South of 60°S	Longline	0	0
139/XVI	88.2	North of 65°S	Longline	25	0
		South of 65°S	Longline	38	0
140/XVI	88.3	North of 65°S	Longline	0	0
		South of 65°S	Longline	455	<1
Champsocephalus gunnari:					
123/XVI	48.3	South Georgia	Trawl	4 520	5[e]
130/XVI	58.5.2	Heard Island	Trawl	900	115[f]

[a] Advised by Australia at the time of the meeting. Expected to reach 3 700 tonnes (i.e. the catch limit) before the end of the Commission meeting in 1998.
[b] Catch reported by France for French vessels
[c] Catch reported by France for Ukrainian (997 tonnes) and French (121 tonnes) vessels
[d] Catch reported by South Africa for the period from the end of the Commission meeting in 1997 to 10 October 1998
[e] As reported in WG-FSA-98/53
[f] Advised by Australia at the time of the meeting

Table 3: Reported catches (in tonnes) of *D. eleginoides* and *D. mawsoni* by Members and Acceding States in EEZs and in the CCAMLR Convention Area, and estimates of unreported catches from the CCAMLR Convention Area by Members and Acceding States in the 1997/98 split-year. Catches for the 1996/97 split-year are given in brackets.

Member/ Acceding State	Outside CCAMLR Area Catch in EEZs		CCAMLR Area Reported Catch		CCAMLR Area Estimates of Unreported Catches by Members		Estimated Total Catch All Areas	
Chile	8 692	(6 796)	1 479[9]	(1 275)	5 640[12]	(17 600)[4]	15 811	(25 671)
Argentina	5 651	(9 395)	0	(0)	5 760[13]	(19 670)[5]	11 411	(29 065)
France	0	(0)	3 832	(3 674)	0	(0)	3 832	(3 674)
Australia	575[1]	(1 000)[1]	2 418	(837)	0	(0)	2 993	(1 837)
South Africa	0	(0)	1 149[11]	(2 386)[8]	1 200[14]	(0)	2 349	(2 386)
UK	1 624[6]	(1 164)[6]	590	(398)	0	(0)	2 214	(1 562)
Portugal (EC)	0	(0)	0	(0)	1 200[15]	(?)[7]	1 200	(?)
Uruguay	?	(?)	262[9]	(0)	800[16]	(0)	1 062	(?)
Ukraine	0	(0)	997[2]	(1 007)[2]	0	(0)	997	(1 007)
Spain	0	(0)	196[9]	(291)	0	(?)[7]	196	(291)
Rep. of Korea	0	(0)	170[9]	(425)	0	(0)	170	(425)
Peru	156	(4 000)	0	(0)	0	(0)	156	(4 000)
Japan	0	(0)	76[9]	(333)[3]	0	(?)[7]	76	(333)
New Zealand	0	(10)	41[10]	(<1)	0	(0)	41	(10)
USA	0	(0)	0	(0)	0	(?)[7]	0	(?)
Norway	0	(0)	0	(0)	0	(?)[7]	0	(?)
All countries	16 698	(22 365)	11 210	(10 626)	14 600	(37 270)	42 508	(70 261)

1 From Macquarie Island
2 From French EEZ in Division 58.5.1
3 From joint venture in French EEZ in Subarea 58.6
4 Based on the following estimates: 18 vessels sighted of 22 vessels departing Chile, 14 vessels fishing at any time, effort: 2 104 days fishing, mean daily catch rate: 8.56 tonnes
5 Based on the same catch and effort data as [4], but pro-rata by the number of Argentinian vessels sighted
6 From Falkland/Malvinas Islands
7 Vessels running the flag of the respective Member were sighted fishing in Area 58
8 From South African EEZ in Subareas 58.6 and 58.7
9 From Subarea 48.3
10 From Subarea 88.1; catch consisted mostly of *D. mawsoni*
11 From South African EEZ in Subareas 58.6 and 58.7 and from Subarea 48.3
12 Based on the following estimates: three vessels observed in Division 58.5.1, five vessels observed in Walvis Bay and Mauritius, assumed that eight vessels were fishing at some time during the season taking into account that some of these vessels were also involved in the regulated fishery in Subarea 48.3 for part of the year, effort: 940 days fishing, mean daily catch rate: 6 tonnes
13 Based on the following estimates: four vessels observed or arrested in Division 58.5.1, three vessels landing catches in Walvis Bay, assumed that seven vessels were fishing at some time during the season, effort: 960 days fishing, mean daily catch rate: 6 tonnes
14 Based on the following estimates: one vessel sighted in Division 58.5.1 probably fishing for the whole season, effort: 200 days fishing, mean daily catch rate: 6 tonnes
15 Based on the following estimates: two vessels sighted in Division 58.5.1 fishing for part of the season, effort: 200 days fishing, mean daily catch rate: 6 tonnes
16 Based on the following estimates: one vessel landing catch in Walvis Bay, assumed the vessel was fishing for part of the season when not involved in the regulated fishery in Subarea 48.3, effort: 133 days fishing, mean daily catch rate: 6 tonnes

Table 4: Estimated landings (in tonnes) of *D. eleginoides* in southern African ports and Mauritius in the 1996/97 split-year, the 1997/98 split-year and the beginning of the 1998/99 split-year.

Port	Product Weight 1996/97	Estimated Green Weight 1996/97	Product Weight 1997/98	Estimated Green Weight 1997/98	Product Weight Jul–Sep 1998	Estimated Green Weight Jul–Sep 1998
Walvis Bay	7 100[1]	1 2 070[1]	3 222[1]	5 477[1]	422[1]	717[1]
Cape Town	13 939[5]	23 696[1]	780[5]	1 326[1]	88[5]	150[1]
Unknown	3 199[1]	5 438[1]				
Mauritius	6 900[2]	11 730[1]	11 780[4]	20 026[1]	4 320[4]	7344[1]
Mauritius	9 000 –12 000[3]	15 300 – 20 400[1]				

1 Catches/landings conversion factor of product to green weight: 1.7
2 Information from Australian commercial sources. Catches mostly from Kerguelen Plateau
3 Information from Japanese Seafood Daily Newspaper, September 1997
4 Minimum estimate from known landings
5 Landings in Cape Town include catches from unregulated fishing up to the end of the 1996/97 split-year. Landings thereafter were from the licensed fishery only.

Table 5: Estimated effort, mean catch rates/day and total catches by subarea/division in the unregulated fishery on *D. eleginoides* in the 1997/98 split-year. Estimates for the 1996/97 split-year are given in brackets.

Area/ Subarea/ Division	Estimated Start of Unregulated Fishery	No. of Vessels Sighted in Unregulated Fishery[1]	No. of Vessels Surveilling	Estimated No. of Vessels Fishing	No. of Days Fishing per Fishing Trip	Estimated Effort in Days Fishing (1)	Mean Catch Rate per Day (tonnes) (2)	Estimated Unreported Catch (1) x (2)	Estimated Total Catch
48.6	No information								
48.3	1991	0	4	0	-	-	-	0	3 258 (2 389)
58.7	Apr/May 1996	8 (23)[2]	5 (5)	10 (32)[4]	40[4] (32)[4]	370 (1 540)	2.5[4] (7.7)[4]	925 (11 900)	1 501 (14 129)
58.6	Apr/May 1996	6 (35)	3 (3)	30–35[8] (40)	40 (40)	504 (2 700)	3.5 (7–10)	1 765 (18 900)[6]	1 940 (19 233)
58.5.1	Dec 1996	26 (7)	6 (6)	35–40[8] (40)	40 (40)	2 365 (270)	5 (7–10)	11 825 (2 000)	16 566 (6 681)
58.5.2	Feb/Mar 1997	3 (10)	2 (2)	30[8] (35)	40 (35)	1 400 (825–1 360)	5 (8–10) (8–15)	7 000 (7 200) (12 000)	9 418 (8 037)[7] (12 837)[7]
58.4.4 58	Sep 1996	0 40–50 (90)	0	2[9]	45	180	5	900	900

1 Double sightings in one zone not counted
2 Size of vessels ranging from 364 tonnes (39.7 m) to 1 103 tonnes (73.5 m)
3 Number of vessels actually seen fishing
4 Data from licensed operations
5 Some transhipment suspected, catch rates ranged from 2.8 to 23 tonnes/day
6 Minimum estimate based on vessels sighted and their landings
7 Based on lower and upper limit of the range of catch and effort estimates
8 Estimated number of vessels not in areas throughout period, but moving between areas
9 Industry sources

Table 6: Estimated total catch (in tonnes) by subarea/division of *D. eleginoides* and *D. mawsoni* in the CCAMLR Convention Area for the 1997/98 split-year.

Subarea/ Division	Estimated Total Catch	Reported Catch 1997/98	Estimated Unreported Catch	Unreported Catch in % of the Estimated Total Catch
48.3	3 258	3 258	Probably low	Probably low
58.7	1 501	576	925	61.6
58.6	1 940	175	1 765	91.0
58.5.1	16 566	4 741	11 825	71.4
58.5.2	9 418	2 418	7 000	74.3
88.1	41	41	Probably very low	Probably very low
58.4.4	900	0	900	Probably very low
48.1	<1	<1	Probably very low	Probably very low
48.2	<1	<1	Probably very low	Probably very low
88.3	<1	<1	Probably very low	Probably very low
All subareas	33 625	11 210	22 415	66.7

Table 7: A revision of total catch estimates of *D. eleginoides* taken in Subareas 58.6 and 58.7 for 1996 and 1997 and an estimation of total catch taken in 1998.

Subarea	November 1995 to September 1996	November 1996 to September 1997	November 1997 to September 1998
58.7	6 136	6 951	1 574
58.6	9 531	19 233	1 994

Table 8: Estimates of total catch of *D. eleginoides* taken in Subareas 48.3, 58.6 and 58.7 and Divisions 58.5.1 and 58.5.2 from November 1997 to September 1998.

Subarea/ Division	CCAMLR Area Reported Catch	Estimated Unreported Catch	Estimated Total Catch
48.3	3 328	0	3 328
58.7	674	900	1 574
58.6	229	1 765	1 994
58.5.1	4 741	11 825	16 566
58.5.2	3 264	520–3 500	3 784–6 764

Table 9: Imports of *D. eleginoides* (in tonnes) into Japan and USA for the 1997 calendar year. Market statistics were only available for some products and an estimation of the total market is based on comparisons with figures for the 1998 calendar year.

Source	Japan[1]	USA[2]	Total	% of Market	Estimated Total for Both Markets[3]
Chile	22 255	159	22 415	62	
Argentina	2 569	2 539	5 109	14	
South Africa	2 072	492	2 564	7	
China	1 449	0	1 449	4	
France	1 200	0	1 200	3	
Mauritius	13	856	869	2	
Namibia	178	274	453	1	
Panama	0	376	377	1	
Reunion	300	0	300	1	
Belize	4	285	289	1	
Spain	0	242	242	1	
Australia	61	146	207	1	
Falklands/Malvinas	115	0	115	0	
St Helena	3	100	102	0	
Uruguay	5	75	80	0	
Norway	0	61	61	0	
USA	43	0	43	0	
UK	20	0.5	21	0	
New Zealand	0	0.7	1	0	
Total	30 287	5 608	35 896		69 978

1 Market statistics only for fillets; conversion factor of 2.2 to convert product weight to green weight.

2 Market statistics only for possible toothfish products (not separated as HAG (headed and gutted) and fillets); product weight shown in table; no conversion factor applied yet.

3 Assumes that green weight of fillets is ca. 50% of the total Japanese market green weight for toothfish based on 1998 statistics. This would give an estimated total for the Japanese market of 60 574 tonnes green weight. It was also assumed that the proportion of fillets to HAG product on the US market was the same as for 1998 statistics. For 13.3% of product a conversion factor of 2.2 was used (as for fillets) and for 86.7% of product a conversion factor of 1.7 was used (as for HAG product). This would give an estimated total for the US market of 9 404 tonnes green weight.

Table 10: Imports of *D. eleginoides* (in tonnes) into Japan and USA for 1998 from different sources showing their market share.

Source	Japan[1]	USA[2]	Total[3]	% of Market
Chile	13 436	1 481	14 917	44.0
Mauritius	4 603	180	4 782	14.0
Argentina	1 606	1 456	3 062	9.0
France	2 514	0	2 514	7.0
Australia	1 225	228	1 453	4.0
South Africa	1 226	61	1 287	4.0
Namibia	552	451	1 003	3.0
Uruguay	790	209	999	3.0
Belize	773	41	814	2.0
Panama	506	157	663	2.0
Reunion	647	0	647	2.0
China	393	0	393	1.0
Norway	380	0	380	1.0
Falklands/Malvinas	232	0	232	1.0
Gambia	147	0	147	0.4
St Helena	138	0	138	0.4
Spain	94	0	94	0.3
Thailand	0	43	43	0.1
Maldives	0	41	41	0.1
Canada	37	0	37	0.1
USA	35	0	35	0.1
S Korea	34	0	34	0.1
Guinea-Bissau	0	31	31	0.1
Cayman Islands	0	27	27	0.1
Seychelles	0	23	23	0.1
Mauritania	14	0	14	0.04
Netherlands	10	0	10	0.03
New Zealand	6	0	6	0.02
Guyana	0	1	1	0.01
Total	29 396	4 428	33 825	

[1] Japanese market statistics for the period: January to August 1998

[2] USA market statistics for the period: January to June 1998

[3] Conversion factors of 1.7 was used for HAG (headed and gutted) and 2.2 for fillets to estimate product to green weight

Table 31: Incidental mortality of seabirds in the longline fisheries for *D. eleginoides* in Subarea 58.7 during the 1996/97 season. Fishing method: A – autoliner, Sp – Spanish; Offal discharge at haul: O – opposite side to hauling, S – same side as hauling; D – daytime setting (including nautical dawn and dusk), N – night-time setting.

Vessel Name	Dates of Fishing	Fishing Method	Streamer Line in Use (%)		Offal Discharge at Haul	Sets Deployed				Number of Hooks (1 000s)					Hooks Baited (%)	Number of Birds Observed Dead			Observed Catch Rates of Dead Birds (birds/1 000 hooks)		
										Observed			Set Total	% Observed							
			N	D		N	D	Total	%N	N	D	Total				N	D	Total	N	D	Total
*Aliza Glacial**	7/12/96–7/1/97	A			O	29	122	151	19				106.7			1	9	10			
*Aquatic Pioneer**	31/10–10/12/96	A			O	25	76	101	24				287.1					137			
Aquatic Pioneer	13/1–22/2/97	A	100	100	O	61	21	82	74	214	73	287	287	100		337	78	415	1.57	1.07	1.45
Aquatic Pioneer	26/4–11/6/97	A	11	71	O	88	21	109	81	313	75.5	388.5	388.5	100	80	0	4	4	0	0.05	0.01
Aquatic Pioneer	22/7–22/8/97	A	7	62	O	38	16	54	70	63.6	26.9	90.5	205.5	44	60	0	1	1	0	0.04	0.01
Garoya	5/4–10/5/97	Sp	29	65	O	17	29	46	36	8.6	14.3	22.9	147.1	15	68	6	37	43	0.69	2.59	1.88
*Koryo Maru 11**	10/11/96-5/1/97	Sp	100	100	S	29	19	48	60				248.1			14	28	42			
Koryo Maru 11	17/1–22/3/97	Sp	75	93	S	8	73	81	15	29.5	207	236.5	297.9	79	100	10	120	130	0.34	0.58	0.55
Mr B	22/10–28/11/96	A	0	0		10	35	45	22	3.9	20.6	24.5	58	42		2	9	11	0.51	0.44	0.45
*Mr B**	29/1–14/2/97	A	0	40		3	5	8	37				4.7			0	0	0	0	0	0
Sudur Havid	15/5–16/6/97	Sp	2	89	S	47	19	66	71	37.5	16.4	53.9	281.6	19	100	1	3	4	0.03	0.18	0.07
Sudur Havid	4/7–24/7/97	Sp	30	0	S	20	0	20	100	62.3	0	62.3	74	84	100	1	0	1	0.02	0	0.02
*Zambezi**	19/3–16/5/97	A	4	50	O	63	56	119	52				414		83	2	35	37			
*Zambezi**	28/5-12/7/97	A			O	3	0	3	100				11.6		85	0	0	0	0	0	0
*Zambezi**	25/7–29/9/97	A	44	33	O	63	3	66	95				165		71						
Total						504	495	999	56				2 976.8						0.49	0.58	0.52

* Fields missing due to incomplete logbook information

Table 32: Species composition of birds killed in longline fisheries in Subarea 58.7 during the 1996/97 season. D – daytime setting (including nautical dawn and dusk), N – night-time setting, ALZ – albatross unidentified, DCR – yellow-nosed albatross, DIC – grey-headed albatross, DIM – black-browed albatross, DIX – wandering albatross, MAH – northern giant petrel, MAI – southern giant petrel, PCI – grey petrel, PHE – light-mantled sooty albatross, PRO – white-chinned petrel, PTZ – petrels unidentified, SKZ – skuas, UNK – unknown.

Vessel Name	Dates of Fishing	Number Birds Killed by Group						Species Composition (%)												
		Petrels		Albatross		Total														
		N	D	N	D	N	D	DIX	DIM	DIC	DCR	PHE	ALZ	MAI	MAH	PCI	PRO	PTZ	SKZ	UNK
Aliza Glacial	7/12/96–7/1/97	0	4	1	5	1	9			2 (20)	2 (20)		2 (20)	1 (10)			3 (30)			
*Aquatic Pioneer**	31/10–10/12/96	112		25		137			2 (1)	15 (11)	8 (6)			3 (2)	1 (1)		108 (78)		1 (1)	
Aquatic Pioneer	13/1–22/2/97	336	75	0	3	336	78			2 (0.5)		1 (0.25)		6 (1)	2 (0.5)		403 (97)			1 (0.25)
Aquatic Pioneer	26/4–11/6/97	0	0	0	4	0	4			4 (100)										
Aquatic Pioneer	22/7-22/8/97	0	1	0	0	0	1							1 (100)						
Garoya	5/4–10/5/97	6	5	0	32	6	37	2 (5)		30 (70)				3 (7)	6 (14)	1 (2)	1 (2)			
Koryo Maru 11	10/11/96–5/1/97	14	13	0	15	14	28			11 (26)	4 (10)			7 (16)			20 (48)			
Koryo Maru 11	17/1-22/3/97	10	71	0	49	10	120						49 (38)	1 (1)			4 (3)	76 (58)		
Mr B	22/10–28/11/96	2	8	0	1	2	9						1 (9)		1 (9)		9 (82)			
Mr B	29/1–14/2/97	0	0	0	0	0	0													
Sudur Havid	15/5–16/6/97	1	3	0	0	1	3							3 (75)				1 (25)		
Sudur Havid	4/7–24/7/97	1	0	0	0	1	0							1 (100)						
Zambezi	19/3–16/5/97	2	5	0	30	2	35		1 (3)	29 (78)				1 (3)			6 (16)			
Zambezi	28/5–12/7/97	0	0	0	0	0	0													
*Zambezi**	25/7–29/9/97	0		0		0														
Total (%)		669		165		834		2 (0.2)	3 (0.4)	93 (11.1)	14 (1.7)	1 (0.1)	52 (6.2)	27 (3.2)	10 (1.2)	1 (0.1)	554 (66.3)	77 (9.2)	1 (0.1)	1 (0.1)

* Data obtained from observer cruise report

Table 33: Estimated seabird mortality by vessel for Subarea 58.7 during the 1996/97 season.

Vessel Name	Hooks Set (1 000s)	% Night Sets	Estimated Seabird Mortality during Line Setting		
			Night	Day	Total
*Aliza Glacial**	106.70	19.00	10	50	60
*Aquatic Pioneer**	287.10	24.00	34	127	160
Aquatic Pioneer	287.00	74.00	333	80	413
Aquatic Pioneer	388.50	81.00	0	4	4
Aquatic Pioneer	205.50	70.00	0	2	2
Garoya	147.10	36.00	37	244	280
*Koryo Maru 11**	248.10	60.00	73	58	130
Koryo Maru 11	297.90	15.00	15	147	162
Mr B	58.00	22.00	7	20	26
*Mr B**	4.70	37.00	0	0	0
Sudur Havid	281.60	71.00	6	15	21
Sudur Havid	74.00	84.00	1	0	1
*Zambezi**	414.00	52.00	105	115	220
Zambezi	11.60	100.00	0	0	0
*Zambezi**	165.00	95.00	76	5	81
Total	2 976.80	56.00	696	866	1562

* Estimates are based on the total observed catch rates

Table 34: Estimated seabird mortality by species for Subarea 58.7 during the 1996/97 season.

Species	Setting		
	Night	Day	Total
Wandering albatross	2	2	4
Black-browed albatross	2	3	6
Grey-headed albatross	77	96	174
Yellow-nosed albatross	12	15	26
Light-mantled sooty albatross	1	1	2
Albatross unidentified	43	54	97
Southern giant petrel	22	28	50
Northern giant petrel	8	10	19
White-chinned petrel	461	574	1 035
Grey petrel	1	1	2
Petrels unidentified	64	80	144
Skuas unidentified	1	1	2
Unidentified	1	1	2
Total	696	866	1 562

Table 35: Incidental mortality of seabirds in the longline fisheries for *D. eleginoides* in Subareas 48.1, 48.2, 48.3, 58.6, 58.7, 88.1 and 88.3 during the 1997/98 season. Fishing method: A – autoliner; Sp – Spanish; Offal discharge at haul: O – opposite side to hauling; S – same side as hauling; D – daytime setting (including nautical dawn and dusk); N – night-time setting.

Vessel Name	Dates of Fishing	Fishing Method	Sets Deployed				No. of Hooks (1 000s)			Hooks Baited (%)	No. of Birds Caught						Observed Seabird Mortality (Birds/1 000 hooks)			Streamer Line in Use (%)		Offal Discharge at Haul
											Dead		Alive		Total							
			N	D	Total	%N	Ob-served	Set	% Ob-served		N	D	N	D	N	D	N	D	Total	N	D	
Subareas 48.1, 48.2, 88.3:																						
*Tierra del Fuego**	9/2–23/3/98	Sp			52							0		0		0	0	0	0			
Subarea 48.3																						
Arctic Fox	7/5–26/6/98	Sp/A	156	3	159	98	155.4	1012.8	15	85	1	0	3	0	4	0	0.01	0	0.01	23	33	S
*Arctic Fox**	13/7–3/9/98	Sp/A	121	0	121	100	6.9	830.4	1	85	0		0		0		0	0	0			S
Argos Helena	2/4–21/8/98	Sp	170	5	175	97	104.2	1360.1	7	100	8	1	73	7	81	8	0.08	0.18	0.09	57	20	S
Illa de Rua	8/4–9/6/98	Sp	75	11	86	87	458.4	977.6	46	100	0	1	0	1	0	2	0	0.02	0.002	100	100	O
Illa de Rua	29/6–22/8/98	Sp	68	15	83	81	466.1	806.6	57	100	0	0	5	1	5	1	0	0	0	94	100	O
*Isla Camila**	26/3–8/6/98	Sp	90	0	90	100	317.6	654.2	49	100	2				2							S
Isla Camila	23/6–19/8/98	Sp	69	3	72	96	59.4	620.6	9	100	0	0	1	0	1	0	0	0	0	94	100	S
Isla Sofía	1/4–20/5/98	Sp	67	4	71	94	40.6	584.0	6	100	20	5	81	7	101	12	0.52	2.10	0.62	0	75	S
Isla Sofía	2/6–23/8/98	Sp	90	1	91	98	167.7	750.2	22	100	0	0	15	0	15	0	0	0	0	24	100	S
Jacqueline	28/5–22/8/98	Sp	81	3	84	96	276.8	841.5	32	100	0	0	3	1	3	1	0	0	0	77	100	S
Koryo Maru 11	3/4–29/6/98	Sp	86	1	87	99	402.0	1002.8	40	100	32	1	1	1	33	2	0.08	0.27	0.08	94	100	O
Magallanes III	7/8–18/8/98	Sp	49	31	80	61	12.0	573.6	2	98	0	0	2	0	2	0	0	0	0	8	90	S
Northern Pride	17/4–18/6/98	Sp	59	0	59	100	119.2	734.6	16	100	1	0	20	0	21	0	0.01		0.01	89		O
Northern Pride	8/7–12/8/98	A	32	4	36	89	29.2	607.5	4	100	0	0	1	0	1	0	0	0	0	96	75	O
*Sudur Havid**	6/4–6/6/98	Sp			37			500		100	2				2							S
Tierra del Fuego	1/4–2/6/98	Sp	129	24	153	84	424.0	767.0	55	100	4	4	11	4	15	8	0.01	0.05	0.02	96	95	S
Tierra del Fuego	17/6–7/8/98	Sp	89	21	110	80	114.5	761.3	15	100	0	0	11	1	11	1	0	0	0	5	52	S
Total						91%		13384.8									0.03	0.04	0.03			
Subareas 58.6, 58.7:																						
*Aquatic Pioneer**	9/11/97–16/1/98	A			143			532.7		80	11		0		11				0.02			O
*Aquatic Pioneer**	26/1–19/3/98	A			90			420.7		82	194				194				0.419			O
*Aquatic Pioneer**	26/3–22/5/98	A	95	0	95	100	326.6	365.2	56		1									100		O
*Aquatic Pioneer**	17/6–1/8/98	A			159			338.7		80			1		1							O
Eldfisk	9/1–12/2/98	A	164	0	164	100	136.2	312.8	43	82	18	0	0	0	18	0	0.13		0.13	50		O
Eldfisk	26/2–23/4/98	A	240	0	240	100	164.0	884.0	18	85	8	0	1	0	9	0	0.05	0	0.05	84		O
*Koryo Maru 11**	9/11/97–21/1/98	Sp	101	0	101	100	491.7	553.0	89	100	80								0.16			S
Koryo Maru 11	3/2–10/3/98	Sp	57	13	70	81	434.1	434.1	100	100	104	55	11	2	115	57	0.29	0.68	0.37	85	92	O
Total						96%		3842.4									0.20	0.68	0.32			
Subarea 88.1:																						
Lord Auckland	21/2–25/3/98	Auto	58	24	82	71	44.2	241.0	18	74	0	0	0	0	0	0	0	0	0	96	100	S

* Data obtained from observer cruise report

Table 36: Species composition of birds killed in longline fisheries in Subareas 48.3, 58.6 and 58.7, and adjacent areas during the 1997/98 season. D – daytime setting (including nautical dawn and dusk), N – night-time setting, DAC – cape petrel, DIC – grey-headed albatross, DIM – black-browed albatross, DIP – royal albatross, DIX – wandering albatross, FUG – southern fulmar, MAH – northern giant petrel, MAI – southern giant petrel, PHE – light-mantled sooty albatross, PHU – sooty albatross, PRO – white-chinned petrel, PTZ – petrels unidentified, UNK – unknown.

Vessel Name	Dates of Fishing	No. Birds Killed by Group						Species Composition (%)											
		Alba-tross		Petrels/ Fulmars		Total		DIX	DIP	DIM	DIC	PHU	PHE	MAI	PRO	MAH	DAC	PTZ	FUG	UNK
		N	D	N	D	N	D													
Subarea 48.3:																				
Arctic Fox	7/5–26/6/98	0	0	1	0	1	0							1 (100)						
Argos Helena	2/4–21/8/98	0	1	8	0	8	1			1 (11)					8 (89)					
Illa de Rua	8/4–9/6/98	0	1	0	0	0	1			1 (100)										
Isla Camila	23/6–19/8/98	0		0		0														
Isla Sofía	1/4–20/5/98	1	5	19	0	20	5	1 (4)		5 (20)				1 (4)	18 (72)					
Koryo Maru 11	3/4–29/6/98	1	0	31	1	32	1			1 (3)					32 (97)					
Northern Pride	17/4–18/6/98	0	0	1	0	1	0												1 (100)	
Northern Pride	8/7–12/8/98	0		0		0														
Tierra del Fuego	1/4–2/6/98	1	0	3	4	4	4			1 (12)					7 (88)					
Total %								1 (1)		9 (12)				2 (3)	65 (83)				1 (1)	
Subareas 58.6 and 58.7:																				
Eldfisk	9/1–12/2/98	0	0	18	0	18	0								18 (100)					
Eldfisk	26/2–23/4/98	0	0	8	0	8	0								8 (100)					
Koryo Maru 11	3/2–10/3/98	0	0	104	55	104	55								142 (89)			17 (11)		
Total %															168 (91)			17 (19)		

Table 37: Estimated seabird mortality by vessel for Subarea 48.3 during the 1997/98 season.

Vessel Name	Hooks Set (1 000s)	% Night Sets	Estimated Seabird Mortality during Line Setting		
			Night	Day	Total
Arctic Fox	1 012.80	98.00	10	0	10
*Arctic Fox**	830.40	100.00	20	0	20
Argos Helena	1 360.10	96.00	104	10	114
Illa de Rua	977.60	87.00	0	3	3
Illa de Rua	806.60	100.00	0	0	0
Isla Camila	620.60	96.00	0	0	0
*Isla Camila**	654.20	100.00	15	0	15
Isla Sofía	584.00	94.00	285	74	359
Isla Sofía	750.20	100.00	0	0	0
Jacqueline	841.50	100.00	0	0	0
Koryo Maru 11	1 002.80	99.00	79	3	82
Magallanes III	573.60	98.00	0	0	0
Northern Pride	734.60	100.00	7	0	7
Northern Pride	607.50	89.00	0	0	0
*Sudur Havid**	500.00	95.77	11	1	12
Tierra del Fuego	761.30	100.00	0	0	0
Tierra del Fuego	767.00	84.00	6	6	13
Total	13 384.80	96.00	544	96	640

* Estimates are based on the total observed catch rates

Table 38: Fishing cruises for *D. eleginoides* to the Prince Edward Islands EEZ (Subareas 58.6 and 58.7) from July 1997 to June 1998, reporting fishing effort, proportion of daytime sets, numbers of birds caught and bird by-catch rates. Data from WG-FSA-98/42. A – autoliner, Sp – Spanish.

Vessel Name	Fishing Method	Dates of Fishing	No. of Sets	No. of Hooks	% of Sets during the Day[1]	Number of Birds Killed	By-catch Rate (birds/1 000 hooks)
Aquatic Pioneer	A	15/11/97–9/1/98	143	533 205	18.2	11	0.021
Aquatic Pioneer	A	1/2–12/3/98	90	420 710	5.6	192	0.456
Aquatic Pioneer	A	1/4–14/5/98	95	341 560	15.8	0	0.000
Aquatic Pioneer	A	28/7–22/8/97	54	212 500	31.5	1	0.005
Eldfisk	A	9/1–13/2/98	164	496 181	5.5	38	0.077
Eldfisk	A	3/3–17/4/98	240	889 360	3.8	13	0.015
Koryo Maru 11	Sp	19/11/97–15/1/98	101	533 002	55.4[2]	81	0.152
Koryo Maru 11	Sp	3/2–10/3/98	70	434 100	20.0[2]	161	0.371
Sudurhavid	Sp	9–16/7/97	20	74 000	0.0	1	0.014
Zambezi	A	3–6/7/97	10	38 307	10.0	0	0.000
Zambezi	A	30/7–22/8/97	79	300 000	10.1	0	0.000
Total			1 066	4 272 925	15.0	498	0.117

[1] Defined as per CCAMLR regulations in terms of nautical twilight, with sets that spanned the twilight period being considered daylight sets.
[2] The proportion of daytime sets for the *Koryo Maru II* may have been overestimated because of slow setting speeds relative to single-line vessels.

Table 39: Seabirds killed in the longline fishery for *D. eleginoides* within the Prince Edward Islands EEZ (Subareas 58.6 and 58.7) during 1997/98, reported by fishery observers (see Table 35). Data from WG-FSA-98/42.

Species		n	%	By-catch Rate (birds/1 000 hooks)
White-chinned petrel	*Procellaria aequinoctialis*	476	95.6	0.111
Giant petrels	*Macronectes* spp.*	15	3.0	0.004
Crested penguins	*Eudyptes* spp.	4	0.8	0.001
Yellow-nosed albatross	*Thalassarche chlororhynchos*	3	0.6	0.001

* Both southern *M. giganteus* and northern *M. halli* giant petrels were reported, but species identifications are not all reliable.

Table 40: Summary of compliance in streamer line minimum specifications with Conservation Measure 29/XVI. Nationality: CHL – Chile, GBR – United Kingdom, NZL – New Zealand, URY – Uruguay, ZAF – South Africa; Fishing Method: A – autoliner, Sp – Spanish; Y – Yes, N – No, - no information.

Vessel Name (Nationality)	Fishing Method	Dates of Trips	Streamer Line Complied with CCAMLR Specifications (Y/N)	Compliance with Details of Streamer Line Specifications					Spare Streamer Line Material on Board (Y/N)
				Height Above Water of Attachment Point (m)	Total Length (m)	No. of Streamers per Line	Spacings of Streamers per Line (m)	Length of Streamers	
Subareas 48.1, 48.2, 88.3:									
Tierra del Fuego (CHL)	Sp	9/2–23/3/98	N	Y (11)	N (95)	Y (12)	N (6)	N	-
Subarea 48.3:									
Arctic Fox (ZAF)	A	13/7–3/9/98	No streamer line	nil	nil	nil	nil	nil	nil
Arctic Fox (ZAF)	A	1/5–6/7/98	N	Y (4)	N (50)	-	-	-	-
Argos Helena (GBR)	Sp	2/4–21/8/98	N	Y (5)	Y (150)	Y (7)	Y (5)	N	Y
Illa de Rua (URY)	Sp	8/4–11/6/98	Y	Y (4.5)	Y (160)	Y (5–7)	Y (5)	Y	-
Illa de Rua (URY)	Sp	29/6–22/8/98	Y	Y (4)	Y (150)	Y (5)	Y (5)	Y	Y
Isla Camila (CHL)	Sp	26/3–8/6/98	N	Y (>4.5)	-	-	Y (4)	Y	-
Isla Camila (CHL)	Sp	16/6–22/8/98	N	Y (8)	N (80)	-	-	N	Y
Isla Sofía (CHL)	Sp	1/4–20/5/98	N	N (3.95)	N (90)	Y (12)	Y (0.9–2.3)	N	-
Isla Sofía (CHL)	Sp	2/6–23/8/98	N	Y (4.89)	N (101)	Y (27)	Y (1.73–4.8)	Y	-
Jacqueline (GBR)	Sp	28/5–22/8/98	N	Y (5.5)	N (75)	Y (8–10)	Y (2.5)	N	Y
Koryo Maru 11(ZAF)	Sp	23/3–13/7/98	N	Y (5.2)	N (60)	Y (8)	Y (2.8–5.9)	Y	-
Magallanes III (CHL)	Sp	7/8–18/8/98	N	Y (4)	N (50)	Y (6–8)	Y (1–2)	N	-
Northern Pride (ZAF)	Sp	17/4–19/6/98	N	Y (6)	N (30)	Y (8)	Y (3)	N	-
Northern Pride (ZAF)	Sp	2/7–26/8/98	N	Y (5)	N (50)	Y (12)	Y (2)	Y	-
*Sudur Havid(*ZAF)	Sp	6/4–6/6/98	N	N (2)	N (30)	-	Y (2)	N	-
Tierra del Fuego (CHL)	Sp	25/3–8/6/98	N	Y (4)	Y (150)	Y (18)	Y (2)	N	-
Tierra del Fuego (CHL)	Sp	17/6–7/8/98	N	Y (4)	N (75)	Y (25)	Y (3)	N	-
Subareas 58.6, 58.7:									
Aquatic Pioneer (ZAF)	A	9/11/97–16/1/98	Y	Y (>4.5)	-	-	-	-	Y
Aquatic Pioneer (ZAF)	A	26/1–19/3/98	Y	-	-	-	-	-	-
Aquatic Pioneer (ZAF)	A	26/3–22/5/98	Y	-	N (80)	Y (6)	-	N	Y
Aquatic Pioneer (ZAF)	A	17/7–1/8/98	Y	Y (4.5)	Y (100–150)	Y (6–9)	Y (2.5)	-	Y
Eldfisk (ZAF)	A	10/1–10/2/98	Y	Y (4–5)	Y (150)	Y (5)	Y (5)	Y	Y
Eldfisk (ZAF)	A	26/2–23/4/98	N	Y (8)	N (80)	Y (6)	N (10)	-	-
Koryo Maru 11(ZAF)	Sp	9/11/97–21/1/98	-	-	-	Y (2)	-	-	-
Koryo Maru 11(ZAF)	Sp	29/1–16/3/98	Y	Y (6)	N (125)	Y (6)	Y (2.5)	Y	-
Subarea 88.1:									
Lord Auckland (NZL)	A	21/2–26/3/98	Y	Y (8)	Y (200)	Y (6)	Y (3)	Y	-

Table 41: Estimate of seabird by-catch in the unregulated *Dissostichus* spp. fishery in Subareas 58.6 and 58.7 and Divisions 58.5.1 and 58.5.2 in 1997/98. S – summer, W – winter.

Subarea/ Division	Total Unregulated Catch (tonnes)	Split S:W		Unregulated Catch (tonnes)		*Dissostichus* spp. Catch Rate (kg/hooks)	Unregulated Effort (1 000 hooks)		Seabird By-catch Rate (birds/1 000 hooks)				Estimated Total Unregulated Seabird By-catch			
									Mean		Max		Mean		Max	
		S	W	S	W		S	W	S	W	S	W	S	W	S	W
58.6, 58.7	2 690	80	20	2 152	538	0.2	10 760	2 690	1.049	0.017	1.88	0.07	11 287	46	20 229	188
58.6, 58.7	2 690	70	30	1 883	807	0.2	9 415	4 035	1.049	0.017	1.88	0.07	9 876	69	17 700	282
58.6, 58.7	2 690	60	40	1 614	1 076	0.2	8 070	5 380	1.049	0.017	1.88	0.07	8 465	91	15 172	377
58.5.1, 58.5.2	18 825	80	20	15 060	3 765	0.35	43 029	10 757	1.049	0.017	1.88	0.07	45 137	183	80 894	753
58.5.1, 58.5.2	18 825	70	30	13 178	5 648	0.35	37 650	16 136	1.049	0.017	1.88	0.07	39 495	274	70 782	1 130
58.5.1, 58.5.2	18 825	60	40	11 295	7 530	0.35	32 271	21 514	1.049	0.017	1.88	0.07	33 853	366	60 670	1 506

Table 42: Estimates of potential seabird by-catch in unregulated longline fishing in the Convention Area in 1998.

Subarea/ Division	Potential By-catch Level	Summer	Winter	Total
58.6, 58.7	Lower	8 500–11 000	100–50	8 600–11 050
	Higher	15 000–20 000	400–200	15 400–20 200
58.5.1, 58.5.2	Lower	34 000–45 000	350–200	34 350–45 200
	Higher	60 00 –80 000	1 500–1 000	61 500–81 000
Total	Lower	42 500–56 000	450–250	43 000–56 000*
	Higher	75 000–100 000	1 900–1 200	77 000–101 000*

* Rounded to nearest thousand birds

Table 43: Seabird by-catch rates calculated from observer data for domestic owned and operated vessels operating in the tuna longline fishery in New Zealand waters, 1990/91 to 1996/97. Data from WG-FSA-98/25.

Fishing Year	Total No. Hooks*	% Hooks Observed	No. Birds Observed Caught	Birds/ 1 000 Hooks	Standard Error
Northern area:					
1990/91	5 730	0.0	-	-	-
1991/92	279 988	7.0	3	0.133	0.094
1992/93	788 713	0.0	-	-	-
1993/94	1 256 075	0.0	-	-	-
1994/95	1 334 483	4.9	8	0.128	0.057
1995/96	1 531 056	4.2	23	0.400	0.091
1996/97	1 453 929	5.5	82	1.104	0.198
Southern area:					
1990/91	7 340	0.0	-	-	-
1991/92	22 660	0.0	-	-	-
1992/93	52 370	0.0	-	-	-
1993/94	152 665	1.6	0	0.000	
1994/95	789 530	11.0	14	0.159	0.058
1995/96	508 117	19.4	9	0.085	0.032
1996/97	342 547	40.0	4	0.034	0.020

* The total number of hooks do not include 148 160 hooks set during the years 1991/92 to 1996/97 which have invalid longitude values; most of these hooks were set in the northern area.

Table 44: Numbers of seabirds landed dead and returned for identification (699 birds in total), by species and area, for the licensed Japanese, chartered Japanese and New Zealand domestic owned and operated fleets, in tuna longline fisheries in New Zealand waters for 1988/89 to 1996/97. Data from WG-FSA-98/25.

Seabird Species		Number of Birds Returned for Identification						
		Japanese Licensed Vessels		Chartered Japanese Vessels		Domestic NZ Vessels		% Total
		Northern	Southern	Northern	Southern	Northern	Southern	
Albatross species:								
NZ white-capped albatross	*Diomedea cauta steadi*	1	5	6	89	1		15
NZ black-browed albatross	*Diomedea melanophrys impavida*	16	6	47	8	1	1	11
Antipodes I. wandering albatross	*Diomedea exulans antipodensis*	7		33	20			9
Southern Buller's albatross	*Diomedea bulleri bulleri*		17		33		3	8
Auckland I. wandering albatross	*Diomedea exulans gibsoni*	10		15	5		2	5
Southern black-browed albatross	*Diomedea melanophrys melanophrys*	11		17	1	1		4
Wandering albatross	*Diomedea exulans*	3	3		7			2
Salvin's albatross	*Diomedea salvini*	3		9				2
Southern royal albatross	*Diomedea epomophora epomophora*		3		6			1
Grey-headed albatross	*Diomedea chrysostoma*	1	5					1
Northern royal albatross	*Diomedea sanfordi*			1	1			<1
Snowy wandering albatross	*Diomedea exulans exulans*			1	1			<1
Chatham Is. albatross	*Diomedea cauta eremita*			1				<1
Light-mantled sooty albatross	*Phoebetria palpebrata*				39			6
Petrel species:								
Grey petrel	*Procellaria cinerea*	118	1	56	10	4		27
White-chinned petrel	*Procellaria aequinoctialis steadi*		2		47			7
Black petrel	*Procellaria parkinsoni*					4		1
Westland petrel	*Procellaria westlandica*		1					<1
Flesh-footed shearwater	*Puffinus carneipes*					6		1
Sooty shearwater	*Puffinus griseus*				3			<1
Northern giant petrel	*Macronectes halli*			5	1			1
Southern giant petrel	*Macronectes giganteus*	2						<1
Total of all seabird species		172	42	191	271	17	6	100

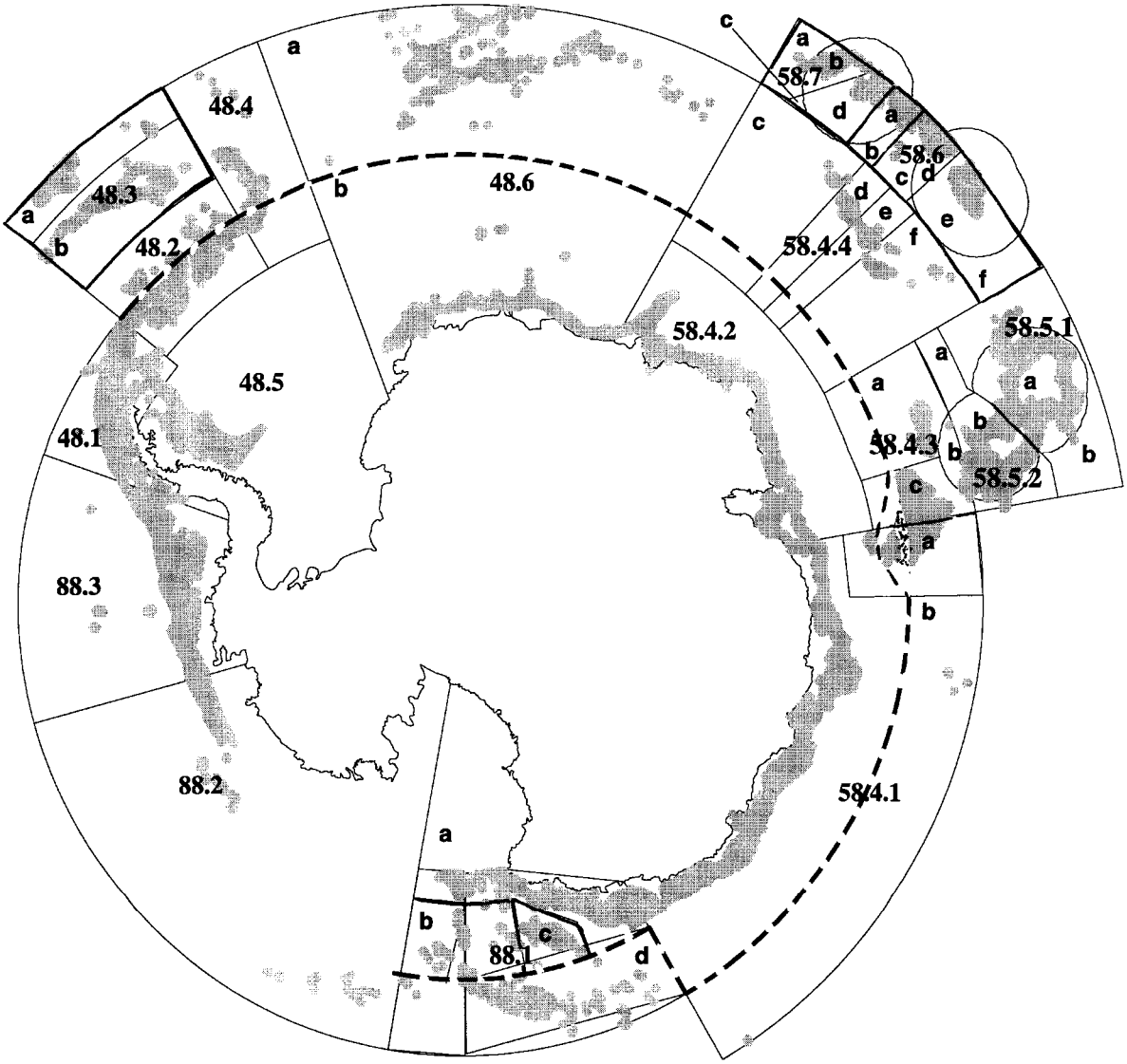


Figure 1: Delineation between *D. eleginoides* and *D. mawsoni* (dashed line), and bathymetric regions used in the analysis of catch limits for new and exploratory fisheries. The shaded patches represent seabed areas between 500 and 1 800 m. Corresponding seabed areas are given in Table 15. EEZ boundaries for Australia, France and South Africa are marked in order to address the new fisheries notified by France and the exploratory fishery notified by South Africa.

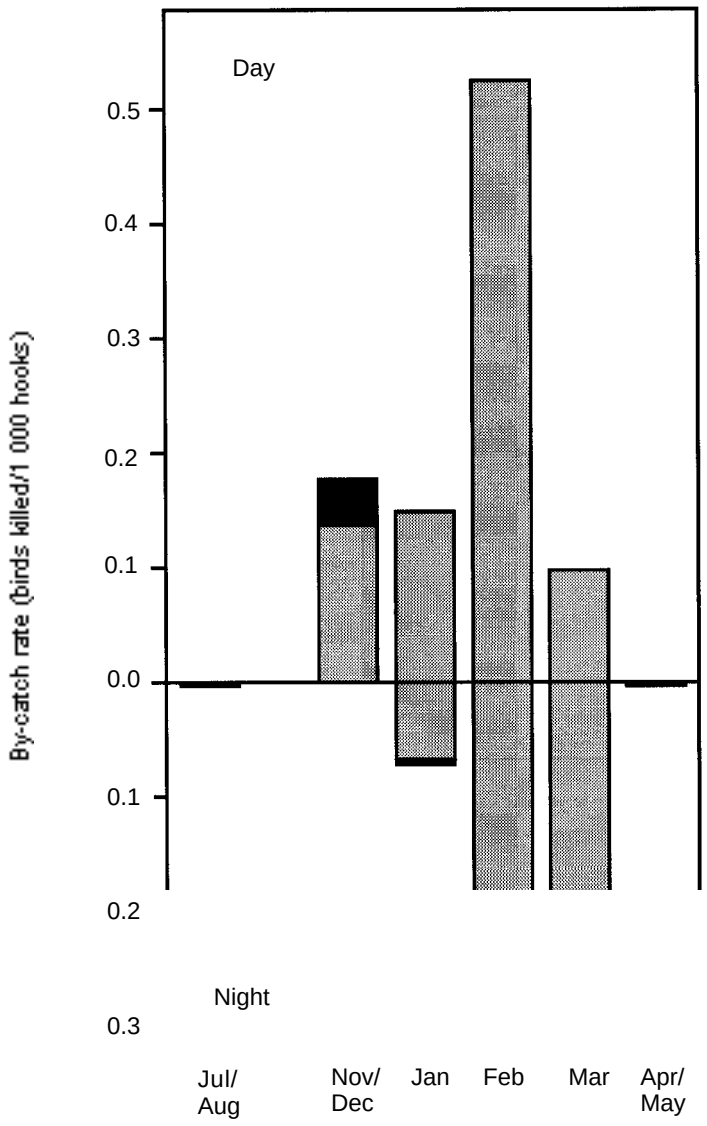


Figure 10: Seasonal differences in seabird by-catch in the longline fishery for *D. eleginoides* at the Prince Edward Islands, 1997/98. Data for day and night sets are shown: pale shading – white-chinned petrels, dark shading – all other species combined. Each period of one to two months represents at least 500 000 hooks set. Data from WG-FSA-98/42.

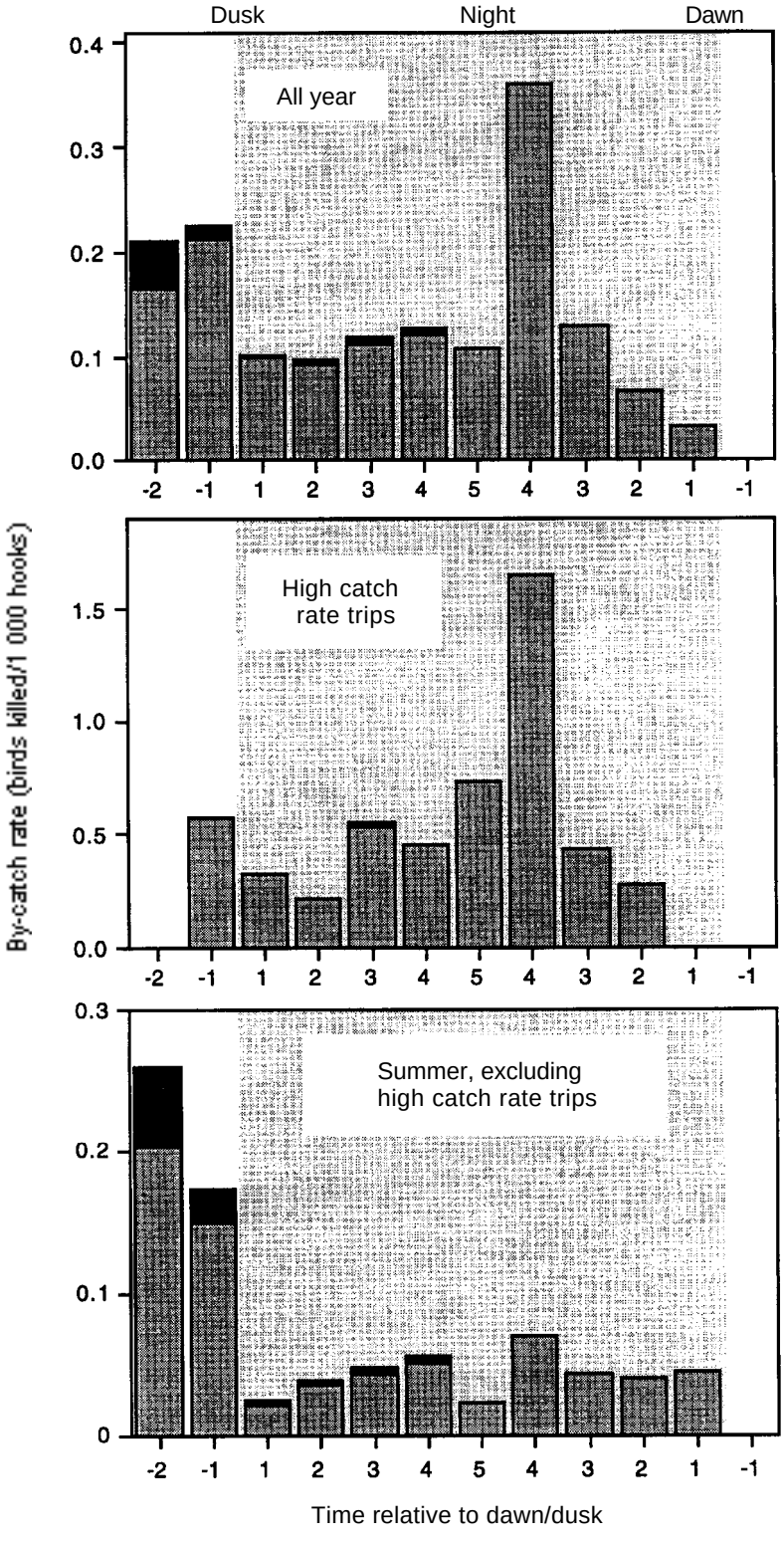
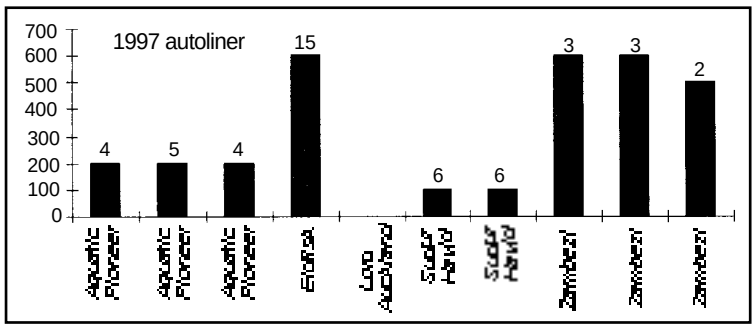
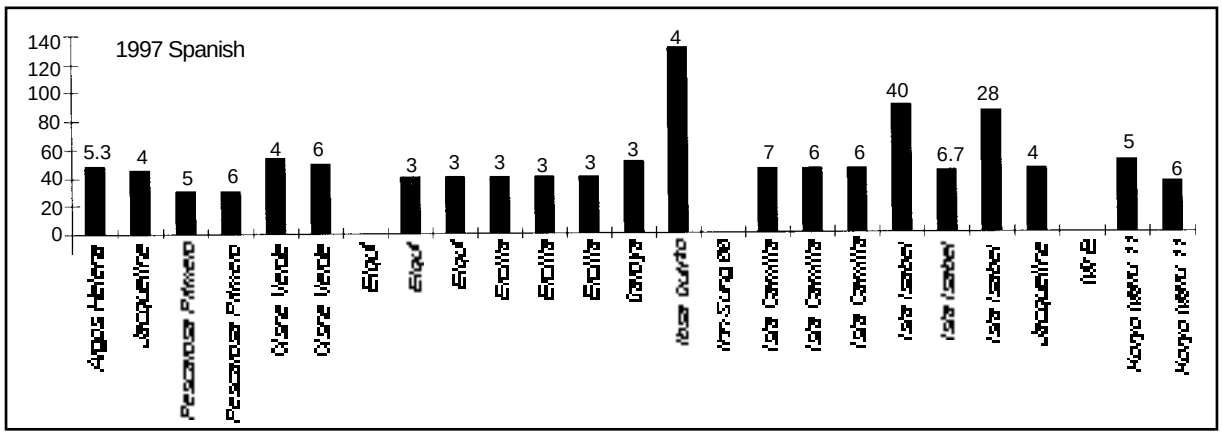
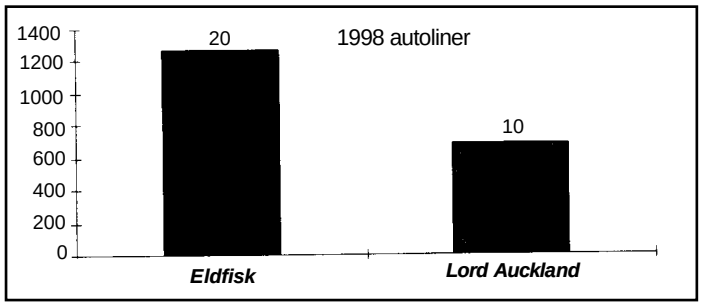


Figure 11: Seabird by-catch rate as a function of time of setting relative to local nautical dawn/dusk. Data for the whole of 1997/98 are presented, as well as two trips in February/March with high catch rates (>0.3 birds per 1 000 hooks) and comparative data from other summer trips (November to March). The shaded areas represent night sets; positive values are hours after dusk/before dawn; negative values hours before dusk/after dawn. Pale bars – white-chinned petrels, dark bars – all other species combined. Data from WG-FSA-98/42.







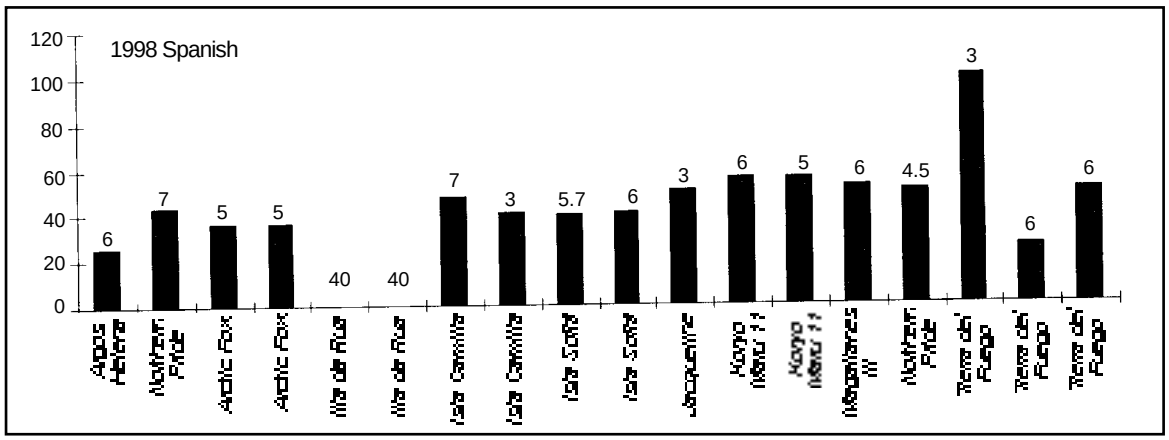


Figure 12: Summary of line weight spacings (y-axis in metres) and weights used (numbers over bars in kilograms) by Spanish and autoline vessels in the 1997 and 1998 fishing seasons. Conservation Measure 29/XVI requires a weighting regime 6 kg/20 m on longlines for Spanish system vessels.

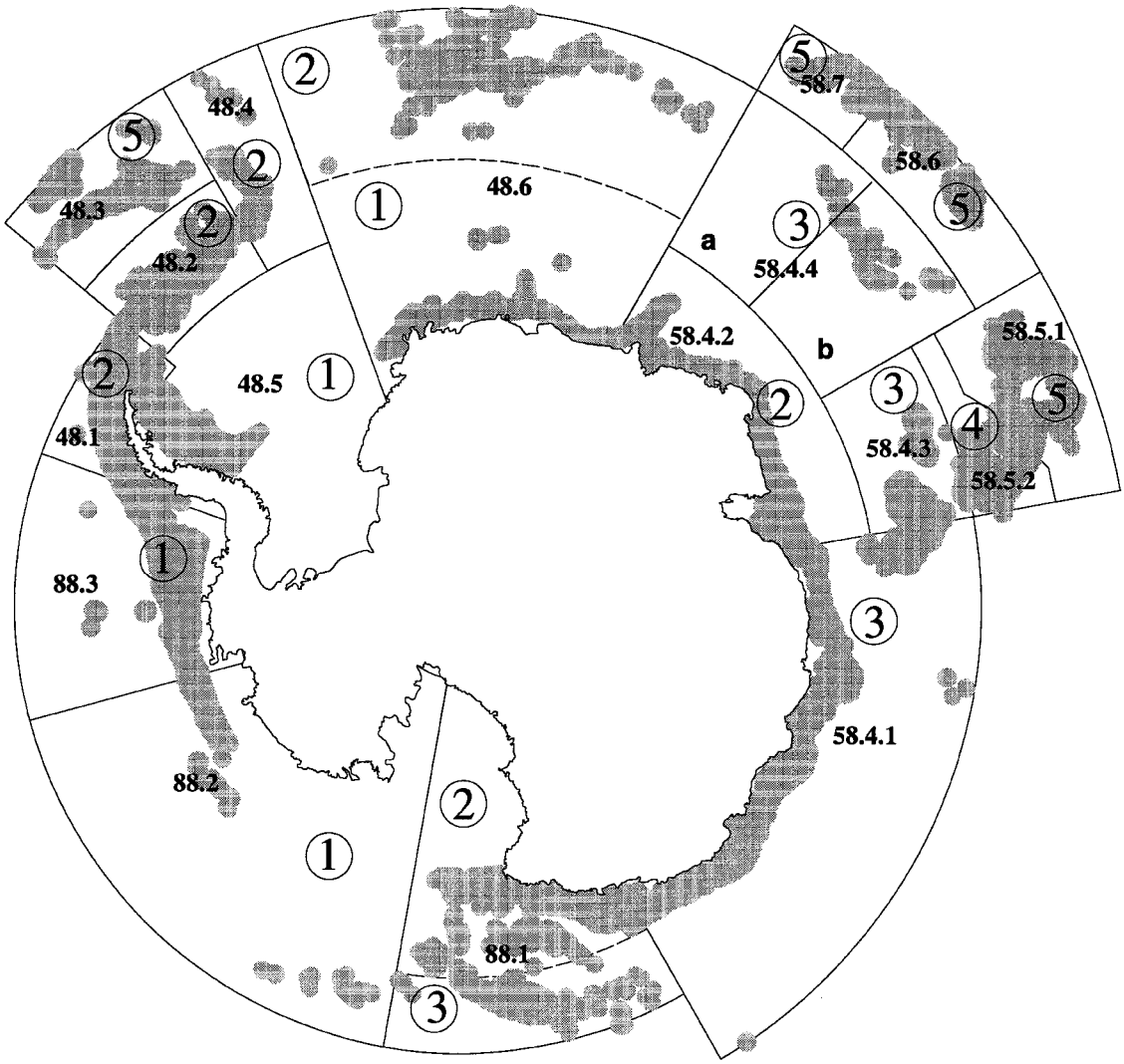


Figure 13: Assessment of the potential risk of interaction between seabirds, especially albatrosses, and longline fisheries within the Convention Area. 1 – low, 2 – average to low, 3 – average, 4 – average to high, 5 – high. Shaded patches represent seabed areas between 500 and 1 800 m.