

**FISHERY REPORT: EXPLORATORY FISHERY
FOR *DISSOSTICHUS* SPP. IN DIVISION 58.4.1**

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FISHERY REPORT: EXPLORATORY FISHERY FOR *DISSOSTICHUS* SPP. IN DIVISION 58.4.1

1. Details of the fishery

The exploratory longline fishery for *Dissostichus* spp. in Division 58.4.1 was first agreed by the Commission in 1998/99 (Conservation Measure 166/XVII), and licensed vessels first operated in this fishery in 2004/05.

2. In 2008/09, the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 was limited to Japanese, Korean, New Zealand, South African, Spanish and Uruguayan vessels using longlines only (Conservation Measure 41-11). The precautionary catch limit for *Dissostichus* spp. was 210 tonnes and the following limits applied to SSRUs: 100 tonnes in SSRU C; 50 tonnes in SSRU E and 60 tonnes in SSRU G (see Figure 1). Five other SSRUs (A, B, D, F and H) were closed to fishing. Fishing was prohibited in depths less than 550 m in order to protect benthic communities. The catch limits for by-catch species were defined in Conservation Measure 33-03. The fishing season was from 1 December 2008 to 30 November 2009.

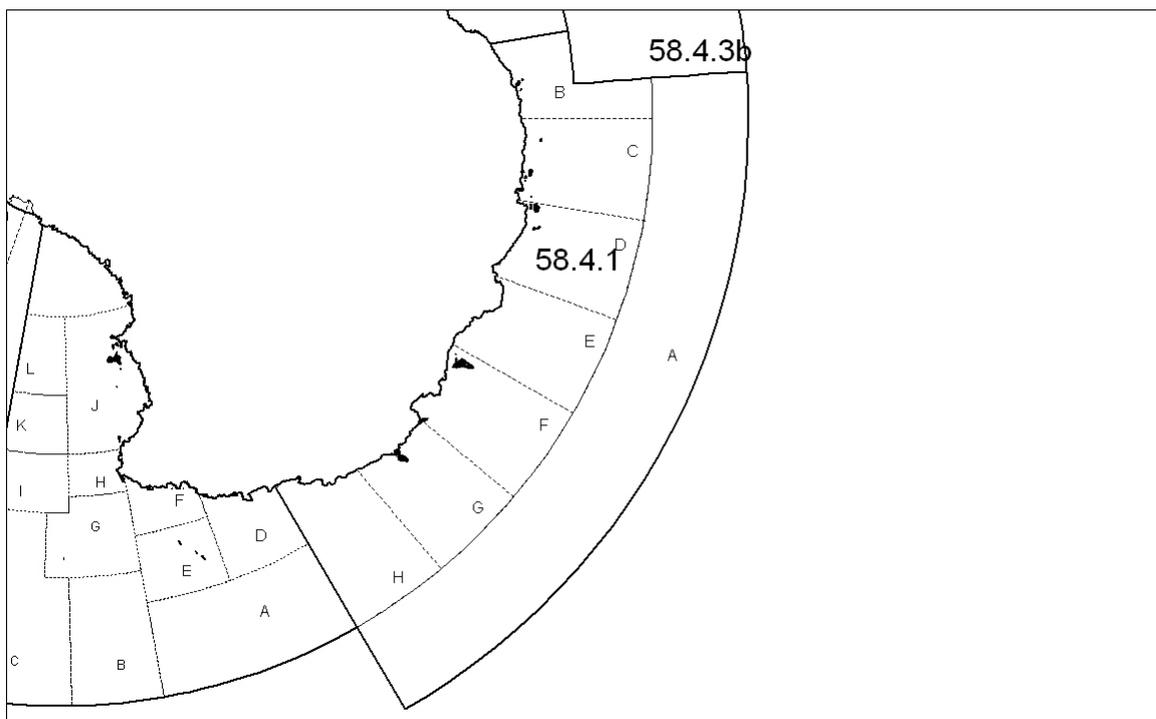


Figure 1: General map of Division 58.4.1 and location of SSRUs (A–H in that division).

1.1 Reported catch

3. Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 since 2004/05, and the target species is *D. mawsoni* (Table 1(a)). In 2008/09, three vessels fished in SSRUs C, E and G (Figure 1). SSRU G was closed on 2 February 2009 (catch limit for *Dissostichus* spp.: 60 tonnes; final reported catch: 60 tonnes). SSRU E was closed on 27 February 2009 (catch limit for *Dissostichus* spp.: 50 tonnes; final reported catch: 54 tonnes). SSRU C, and consequently the fishery, was closed on 12 March 2009 (SSRU C catch limit for *Dissostichus* spp.: 100 tonnes; final reported catch: 108 tonnes – whole fishery catch limit for *Dissostichus* spp.: 210 tonnes; final reported catch: 222 tonnes) (Table 1(b)).

4. Reported catches of *Dissostichus* spp. over the past six seasons peaked at 634 tonnes in 2006/07.

Table 1(a): Catch history for *Dissostichus* spp. in Division 58.4.1 (source: STATLANT data for past seasons, and catch and effort reports for current season, WG-FSA-09/5 Rev. 1 and past reports for IUU catch).

| Season | Regulated fishery | | | | | | Estimated IUU catch (tonnes) | Total removals (tonnes) |
|---------|----------------------------|----------|----------------------|--------------------------|-------------------|-------|------------------------------|-------------------------|
| | Effort (number of vessels) | | Catch limit (tonnes) | <i>Dissostichus</i> spp. | | | | |
| | Limit | Reported | | Reported catch (tonnes) | | | | |
| | | | | <i>D. eleginoides</i> | <i>D. mawsoni</i> | Total | | |
| 2003/04 | - | 0 | 800 | 0 | 0 | 0 | - | 0 |
| 2004/05 | 9 | 7 | 600 | 1 | 479 | 480 | - | 480 |
| 2005/06 | 11 | 6 | 600 | 0 | 421 | 421 | 597 | 1 018 |
| 2006/07 | 9 | 4 | 600 | 94 | 540 | 634 | 612 | 1 246 |
| 2007/08 | 16 | 6 | 600 | <1 | 410 | 410 | 93 | 503 |
| 2008/09 | 16 | 3 | 210 | 0 | 222 | 222 | 152 | 374 |

Table 1(b): Catch of *Dissostichus* spp. in Division 58.4.1 reported by SSRU (source: fine-scale data pro-rated by total reported catch in Table 1(a)).

| Season | <i>D. eleginoides</i> | | | | | | | | <i>D. mawsoni</i> | | | | | | | |
|---------|-----------------------|---|----|---|---|---|----|----|-------------------|---|-----|----|-----|---|-----|----|
| | A | B | C | D | E | F | G | H | A | B | C | D | E | F | G | H |
| 2004/05 | | | <1 | | | | <1 | | | | 182 | | 154 | | 143 | |
| 2005/06 | | | | | | | | | | | 249 | | 24 | | 148 | |
| 2006/07 | | | 69 | | 7 | | 18 | | | | 170 | | 178 | 4 | 188 | |
| 2007/08 | | | | | | | <1 | <1 | | | 178 | 10 | 15 | 3 | 195 | 10 |
| 2008/09 | | | | | | | | | | | 108 | | 54 | | 60 | |

1.2 IUU catch

5. IUU fishing in Division 58.4.1 has been detected since 2005/06, and high levels of IUU fishing in 2005/06 and 2006/07 resulted in the total removals being well in excess of the catch limits. Information on IUU fishing activities in 2008/09 indicated that approximately 152 tonnes of *Dissostichus* spp. had been taken (Table 1(a)). As a result, the total removals of *Dissostichus* spp. in 2008/09 were estimated at 374 tonnes.

1.3 Size distribution of catches

6. Most *D. mawsoni* caught in the fishery ranged from 100 to 170 cm in length, with a broad mode at approximately 120–160 cm (Figure 2).

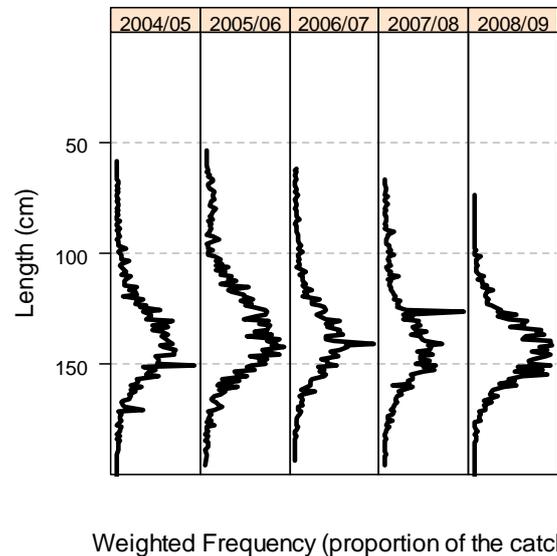


Figure 2: Catch-weighted length frequencies for *Dissostichus mawsoni* in Division 58.4.1 (source: observer, fine-scale and STATLANT data, and the length–weight relationship was taken from observations on *D. mawsoni* in Subarea 88.1).

2. Stocks and areas

7. The Working Group noted that the two-stock ‘east and west’ hypothesis presented in WG-FSA-08/43 could also be simply a differential immature/mature distribution of animals of one stock, as is seen in the Ross Sea. It was agreed that even though the (very low) number of tag-returns might support a two-stock hypothesis, the sample size is currently so low that both hypotheses are equally plausible.

8. The most likely areas where *D. mawsoni* spawn are the Pacific Antarctic Ridge north of the Ross Sea and the Amundsen Ridge in the Amundsen Sea. In the Cooperation Sea the most likely area of spawning is BANZARE Bank. Spawning occurs in winter and may extend into autumn or spring (WG-FSA-08/14).

9. The Working Group noted that the results in WG-FSA-08/43 and Figures 3 and 4 confirm the hypotheses that juvenile fish inhabit mostly the shelf, while larger fish live on the slope and pre-spawning fish are found either on their northward spawning migration or inhabit the deeper slope.

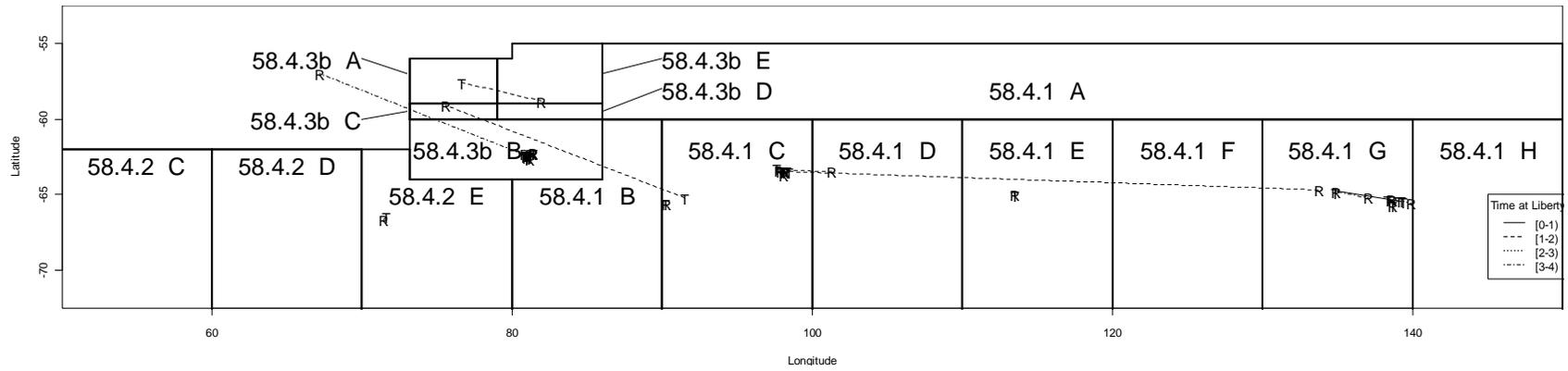


Figure 3: Plot of tag recaptures in Divisions 58.4.1, 58.4.2 and 58.4.3b recorded between 2003/04 and 2008/09. 'T' indicates the release location and 'R' indicates the recapture location.

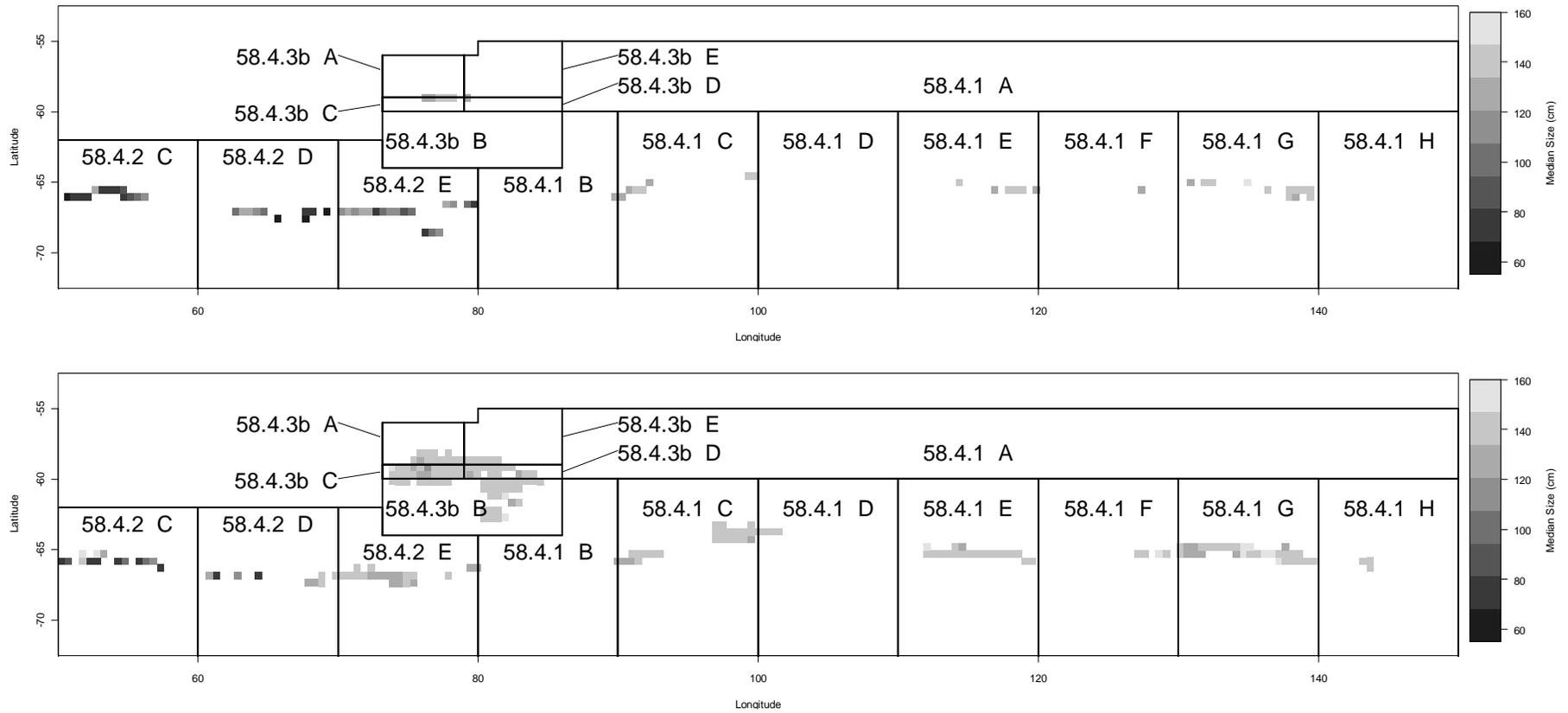


Figure 4: Plot of median lengths for longlines sampled in Divisions 58.4.1, 58.4.2 and 58.4.3b between 2003/04 and 2008/09, aggregated into 0.5° latitude x 0.5° longitude boxes. The upper panel shows data for fishing in depths shallower than 1 000 m, the lower panel for fishing in depths deeper than 1 000 m. Note darker squares indicate smaller median length; lighter squares indicate larger median length.

3. Parameter estimation

3.1 Observations

10. Vessels operating in this fishery are required to conduct fishery-based research in accordance with Conservation Measure 41-01. This includes the collection of detailed catch, effort and biological data (Annex 41-01/A), the setting of research lines (Annex 41-01/B) and participation in the tagging program (Annex 41-01/C).

11. Vessels, on first entry into an SSRU, are required to make 10 research longline hauls. The requirement for a further 10 research hauls during the course of fishing was removed in 2008 and in 2008/09 the starting position of research hauls was allocated by the Secretariat (see CCAMLR-XXVIII/BG/6). The number of research hauls reported in fine-scale data are summarised in Table 2.

12. Since 2006/07, vessels have been required to tag and release *Dissostichus* spp. at a rate of three fish per tonne of green weight caught (previously one fish per tonne), and a limit of 500 fish tagged per vessel applied until the end of 2006/07. A total of 4 397 *D. mawsoni* and 302 *D. eleginoides* (total 4 699 fish) have been tagged and released, and 17 *D. mawsoni* have been recaptured in that division (Table 3). Of the fish tagged and released, 1 628 were in SSRU C, 33 in SSRU D, 1 003 in SSRU E, 9 in SSRU F, 1 953 in SSRU G and 73 in SSRU H.

Table 2: Research I and commercial (C) longline hauls reported by vessels operating in the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 (source: fine-scale data).

| Season | Flag State | Vessel name | SSRU | Number of hauls | | |
|-----------------|--------------------|---------------------------|-------|-----------------|----|-------|
| | | | | R | C | Total |
| 2004/05 | Chile | <i>Globalpesca II</i> | 5841C | 2 | | 2 |
| | | <i>Globalpesca II</i> | 5841E | 20 | 11 | 31 |
| | | <i>Globalpesca II</i> | 5841G | 8 | | 8 |
| | Korea, Republic of | <i>Bonanza No. 707</i> | 5841C | 13 | | 13 |
| | | <i>Yeon Seong No. 829</i> | 5841C | 10 | 14 | 24 |
| | | <i>Yeon Seong No. 829</i> | 5841E | 10 | 3 | 13 |
| | | <i>Yeon Seong No. 829</i> | 5841G | 10 | 45 | 55 |
| | New Zealand | <i>Janas</i> | 5841C | 2 | | 2 |
| | | <i>San Aspiring</i> | 5841G | 20 | | 20 |
| | Spain | <i>Arnela</i> | 5841C | 5 | 24 | 29 |
| <i>Galaecia</i> | | 5841C | 20 | 53 | 73 | |
| <i>Galaecia</i> | | 5841E | 12 | 5 | 17 | |
| 2005/06 | Chile | <i>Globalpesca I</i> | 5841C | 20 | | 20 |
| | | <i>Globalpesca I</i> | 5841E | 10 | | 10 |
| | | <i>Globalpesca II</i> | 5841C | 20 | 3 | 23 |
| | | <i>Globalpesca II</i> | 5841G | 20 | 1 | 21 |
| | Korea, Republic of | <i>Insung No. 2</i> | 5841E | 15 | 6 | 21 |
| | | <i>Insung No. 2</i> | 5841G | 20 | 29 | 49 |
| | New Zealand | <i>San Aspiring</i> | 5841E | 1 | | 1 |
| | Spain | <i>Tronio</i> | 5841C | 20 | 54 | 74 |
| | Uruguay | <i>Paloma V</i> | 5841G | 5 | | 5 |

(continued)

Table 2 (continued)

| Season | Flag State | Vessel name | SSRU | Number of hauls | | | |
|----------------------|--------------------|------------------------|---------------------|-----------------|----|-------|----|
| | | | | R | C | Total | |
| 2006/07 | Korea, Republic of | <i>Insung No. 1</i> | 5841C | 8 | | 8 | |
| | | <i>Insung No. 1</i> | 5841E | 20 | 15 | 35 | |
| | | <i>Insung No. 1</i> | 5841G | 20 | 59 | 79 | |
| | Namibia | <i>Antillas Reefer</i> | 5841C | 17 | 7 | 24 | |
| | | Spain | <i>Tronio</i> | 5841C | 20 | 38 | 58 |
| | <i>Tronio</i> | | 5841E | 20 | 58 | 78 | |
| | Uruguay | | <i>Paloma V</i> | 5841C | 20 | 51 | 71 |
| | | <i>Paloma V</i> | 5841E | 21 | | 21 | |
| | | <i>Paloma V</i> | 5841G | 20 | 5 | 25 | |
| 2007/08 | Korea, Republic of | <i>Insung No. 1</i> | 5841C | 12 | 7 | 19 | |
| | | <i>Insung No. 1</i> | 5841E | 2 | | 2 | |
| | | <i>Insung No. 1</i> | 5841G | 20 | 55 | 75 | |
| | | <i>Insung No. 2</i> | 5841C | 41 | | 41 | |
| | | <i>Insung No. 2</i> | 5841E | 7 | | 7 | |
| | | <i>Insung No. 2</i> | 5841G | 20 | 42 | 62 | |
| | Namibia | <i>Antillas Reefer</i> | 5841C | 20 | 29 | 49 | |
| | | Spain | <i>Paloma V</i> | 5841G | 20 | 3 | 23 |
| | | | <i>Tronio</i> | 5841C | 14 | 2 | 16 |
| | <i>Tronio</i> | | 5841D | 13 | | 13 | |
| | Uruguay | <i>Tronio</i> | 5841E | 9 | | 9 | |
| | | <i>Tronio</i> | 5841F | 6 | | 6 | |
| | | <i>Tronio</i> | 5841G | 20 | 20 | 40 | |
| | | <i>Tronio</i> | 5841H | 7 | | 7 | |
| | | <i>Banzare</i> | 5841C | 10 | 6 | 16 | |
| | | <i>Banzare</i> | 5841E | 4 | | 4 | |
| | 2008/09 | Korea, Republic of | <i>Insung No. 1</i> | 5841C | 10 | 14 | 24 |
| | | | <i>Insung No. 1</i> | 5841E | 10 | 35 | 45 |
| <i>Insung No. 22</i> | | | 5841G | 10 | 85 | 95 | |
| Uruguay | | <i>Banzare</i> | 5841C | 10 | 33 | 43 | |

Table 3: Number of individuals of *Dissostichus* spp. tagged and released and the tagging rate (fish per tonne of green weight caught) reported by vessels operating in the exploratory fishery for *Dissostichus* spp. in Division 58.4.1. The number of *D. eleginoides* is indicated in brackets. The total number of tagged fish recaptured to date in Division 58.4.1 is also included. (Source: observer data and catch and effort reports)

| Season | Flag State | Vessel name | <i>Dissostichus</i> spp. tagged and released | | |
|-----------------|-----------------------|---------------------------|--|------|--------------|
| | | | Number of fish | | Tagging rate |
| 2004/05 | Chile | <i>Globalpesca II</i> | 94 | (1) | 0.65 |
| | Korea, Republic of | <i>Bonanza No. 707</i> | 17 | (0) | 1.40 |
| | | <i>Yeon Seong No. 829</i> | 167 | (1) | 1.08 |
| | | New Zealand | <i>Janas</i> | 1 | (0) |
| | <i>San Aspiring</i> | | 24 | (2) | 1.13 |
| | Spain | | <i>Arnela</i> | 25 | (0) |
| <i>Galaecia</i> | | 134 | (18) | 1.14 | |
| 2005/06 | | Chile | <i>Globalpesca I</i> | 12 | (0) |
| | <i>Globalpesca II</i> | | 23 | (0) | 0.62 |
| | Korea, Republic of | <i>Insung No. 2</i> | 182 | (0) | 1.16 |
| | New Zealand | <i>San Aspiring</i> | 1 | (0) | (no weight) |
| | Spain | <i>Tronio</i> | 249 | (0) | 1.13 |
| | Uruguay | <i>Paloma V</i> | 2 | (1) | 0.81 |

(continued)

Table 3 (continued)

| Season | Flag State | Vessel name | <i>Dissostichus</i> spp. tagged and released | | |
|---|--------------------|------------------------|--|-------|--------------|
| | | | Number of fish | | Tagging rate |
| 2006/07 | Korea, Republic of | <i>Insung No. 1</i> | 732 | (9) | (>500 fish) |
| | Namibia | <i>Antillas Reefer</i> | 3 | (0) | 0.13 |
| | Spain | <i>Tronio</i> | 502 | (5) | (>500 fish) |
| | Uruguay | <i>Paloma V</i> | 270 | (231) | 2.29 |
| 2007/08 | Korea, Republic of | <i>Insung No. 1</i> | 370 | (0) | 2.99 |
| | | <i>Insung No. 2</i> | 449 | (8) | 2.93 |
| | Namibia | <i>Antillas Reefer</i> | 56 | (0) | 1.23 |
| | | <i>Paloma V</i> | 47 | (5) | 3.38 |
| | Spain | <i>Tronio</i> | 202 | (7) | 3.03 |
| | Uruguay | <i>Banzare</i> | 10 | (0) | 1.03 |
| 2008/09 | Korea, Republic of | <i>Insung No. 1</i> | 418 | (0) | 3.77 |
| | | <i>Insung No. 22</i> | 533 | (14) | 8.89 |
| | Uruguay | <i>Banzare</i> | 176 | (0) | 3.44 |
| Total number of fish tagged and released | | | 4699 | (302) | |
| Total number of tagged fish recaptured in Division 58.4.1 | | | 17 | (0) | |

3.2 Fixed parameter values

13. None available for this fishery.

4. Stock assessment

14. WG-FSA-08/63 examined expected tag-recapture rates in new and exploratory *Dissostichus* spp. fisheries in the southern Indian Ocean sector. In particular, the paper considered the potential for tagging programs in new and exploratory fisheries to yield sufficient data to be of use in determining catch limits in the early stages of fishery development. Scenarios were developed using a range of tag-release rates, tag-detection rates, natural mortality, fish movement out of the fishery, and IUU removals in order to estimate the expected numbers of tag-returns. Even under 'worst-case' assumptions (e.g. lower detection rates, higher tag mortality, high levels of emigration and high IUU) tag-recaptures were still expected to be considerably higher than currently observed in Divisions 58.4.1 and 58.4.2. The paper concluded that if current tag-recapture rates continue, then tag-based assessments of stock status in Divisions 58.4.1 and 58.4.2 are likely to remain uncertain in the short to medium term, and fishing should remain focused in areas where tag-releases have been concentrated until these uncertainties can be addressed.

15. Progress on assessing the exploratory fishery in Divisions 58.4.1 and 58.4.2 was presented in WG-SAM-08/4 and a summary was provided in SC-CAMLR-XXVII, Annex 7, paragraphs 3.1 to 3.5. WG-SAM recommended that WG-FSA use the methods described in this paper to provide management advice for the *Dissostichus* spp. fishery in this division, once a number of modifications had been made (SC-CAMLR-XXVII, Annex 7, paragraph 4.3). WG-SAM also recommended that tagging be continued at the current rate in these divisions.

16. An updated assessment of the exploratory fisheries in Divisions 58.4.1 and 58.4.2, including the minor modifications requested by WG-SAM, was provided in WG-FSA-08/43. The authors compared estimates of abundance for these areas using four methods: comparative CPUE trends, local depletions, a constant recruitment model and mark–recapture data. Recapture rates were so low that a reliable stock assessment based on these data was not possible, and instead they presented estimates of the number of expected tag-returns given the estimated biomass. Estimates of biomass by SSRU were moderately consistent between CPUE comparisons and local depletion methods. However, the predicted estimates of tag-recaptures were much higher than those observed. The paper provided tentative estimates of precautionary yield from Divisions 58.4.1 and 58.4.2, noting that these are substantially lower than the existing catch limits.

17. The Working Group noted that the full uncertainty in the longline CPUE in the two areas had not been incorporated into the assessment. For the purposes of providing advice on potential catch limits for the open SSRUs in Divisions 58.4.1 and 58.4.2, a further analysis was carried out which incorporated the uncertainty in CPUE into the biomass estimates for the SSRUs obtained using the comparative CPUE method detailed in WG-FSA-08/43. SSRU-specific yield calculations were calculated assuming an exploitation rate of 0.05 (which appears to be a sustainable exploitation rate for the assessed *Dissostichus* spp.) multiplied by the biomass estimate. Estimates of yield were also made for SSRUs 5841C, 5842A and 5842E based on depletion-derived biomass estimates. These are the only SSRUs for which depletion estimates were available over several years, from which the most recent best-fit depletion was selected. Yields were calculated separately for the median, 25 percentile and 75 percentile biomass values for each SSRU. The results of the analysis are presented in Table 4.

18. WG-FSA-09/14 Rev. 1 presented an assessment of *D. mawsoni* in Division 58.4.1 using an age-structured TISVPA model and a dynamic Schaefer-production model. The analysis suggested that current biomass in the division was about 12 000 tonnes and initial stock biomass was 19 000 tonnes. The paper used these results to calculate yield based on a proportion of 3.75% of initial biomass as being 724 tonnes (main text, paragraphs 4.15 to 4.19).

Table 4: Yield estimates (tonnes) assuming a 5% exploitation rate by SSRU using the median, 25 percentile (25%), and 75 percentile (75%) biomass levels calculated using the comparative CPUE and depletion-derived methods. Estimates are relative to the 2006/07 fishing season.

| | SSRU | | | |
|---------------------|-------|-----------|--------|---------|
| | 5841C | | 5841E | 5841G |
| Method | CPUE | Depletion | CPUE | CPUE |
| Median | 98 | 95 | 43 | 51 |
| 25% | 58 | 90 | 4 | 13 |
| 75% | 138 | 100 | 83 | 88 |
| Current catch limit | | 200 | 200 | 200 |
| 2007/08 catch | | 177 | 16 | 197 |
| Range in catches | | 177–249 | 16–186 | 144–206 |

19. Dr L. Pshenichnov (Ukraine) noted that the estimation of fished areas of Divisions 58.4.1 and 58.4.2 has not been corrected for the closed SSRUs of Divisions 58.4.1

and 58.4.2. He noted that the assumption that CPUE is proportional to toothfish density is not correct for a longline fishery, and that this leads to an increase in the uncertainty of the analysis. He further noted that the biomass of toothfish was estimated by means of an unknown constant (the catchability) (WG-FSA-08/43). Catchability of longline as a whole, and longlining of toothfish in particular, is unknown and should not be used for biomass estimation. He also considered that catches of immature (1–4 years old) fish in Division 58.4.2 (WG-FSA-08/23) using bottom trawls are similar to those found in other subareas which suggests that recruitment and biomass of fish in this division is also similar to those subareas. This is inconsistent with the summary of WG-FSA-08/43.

20. The Working Group considered that although the estimates of yield from the analysis were uncertain, the results suggested that the size of the *Dissostichus* spp. population in these two divisions was likely to be small and that the current catch limits were unlikely to be sustainable. The Working Group therefore recommended that the catch limits be reduced in each of the open SSRUs in Divisions 58.4.1 and 58.4.2 to the estimates of yield based on the median biomass estimates provided in Table 4. The Working Group also recalled the work of WG-SAM which considered that catches of 10 tonnes were unable to provide useful information to enable the assessment of a stock except in circumstances of well-designed research programs testing clear hypotheses (SC-CAMLR-XXVII, Annex 7, paragraph 4.6). Therefore, the Working Group further recommended that SSRUs with a yield of less than 20 tonnes be closed to fishing.

21. The Working Group noted that Russia had begun research on *Dissostichus* spp. in this division (WG-FSA-09/14 Rev. 1). The Working Group encouraged the continuation of the work during the intersessional period and for the otolith readings to be verified by CON (main text, paragraphs 9.4 to 9.8) and for the results to be evaluated by WG-SAM (SC-CAMLR-XXVIII, Annex 6, paragraph 3.18).

5. By-catch of fish and invertebrates

5.1 By-catch removals

22. Catches of by-catch species groups (macrourids, rajids and other species) reported in fine-scale data, their respective catch limits, and number of rajids cut from lines and released alive are summarised in Table 5. The by-catch in this fishery consists predominantly of macrourids (up to 41 tonnes per season). The total reported catch of rajids has been low (<100 kg).

Table 5: Catch history for by-catch species (macrourids, rajids and other species), catch limits and number of rajids released alive in Division 58.4.1. Catch limits are for the whole fishery (see Conservation Measure 33-03 for details). (Source: fine-scale data)

| Season | Macrourids | | Rajids | | | Other species | |
|---------|----------------------|-------------------------|----------------------|-------------------------|-----------------|----------------------|-------------------------|
| | Catch limit (tonnes) | Reported catch (tonnes) | Catch limit (tonnes) | Reported catch (tonnes) | Number released | Catch limit (tonnes) | Reported catch (tonnes) |
| 2003/04 | 96 | 0 | 50 | 0 | - | 60 | 0 |
| 2004/05 | 96 | 17 | 50 | 0 | - | 60 | 1 |
| 2005/06 | 96 | 15 | 50 | 0 | - | 60 | 1 |
| 2006/07 | 96 | 41 | 50 | 0 | - | 60 | 2 |
| 2007/08 | 96 | 36 | 50 | 0 | - | 60 | 1 |
| 2008/09 | 33 | 8 | 50 | 0 | - | 60 | 0 |

5.2 Assessment of impacts on affected populations

23. None available for this fishery.

5.3 Identification of levels of risk

24. None available for this fishery.

5.4 Mitigation measures

25. In 2008, the Commission agreed that during the Year-of-the-Skate (CCAMLR-XXVII, paragraph 4.55):
- (i) all skates should be brought on board or alongside the hauler to be correctly identified, scanned for tags and for their condition to be assessed;
 - (ii) all skates that are likely to survive if released (condition 3 or 4) should be released by cutting the snood as close to the hook as possible or cutting the snood and removing the hook from the skate, providing this does not further injure the skate;
 - (iii) all skates which are dead or with life-threatening injuries (condition 1 or 2 in the logbook) should be retained by the vessels;
 - (iv) skates released alive should be doubled-tagged (i.e. two tags per skate) at a rate of one skate in every five skates caught in exploratory fisheries, up to a maximum of 500 skates per vessel;
 - (v) tagged skates should be identified to species, measured before they are released and that, where possible, tagging experiments be undertaken to compare different tag types and estimate tag-shedding rates;

- (vi) the tagging program will be coordinated by the Secretariat, which will be the repository for skate tagging kits;
- (vii) when skates are caught on a line, they should be randomly sampled by observers at a rate of three skates per thousand hooks for the purpose of collecting biological measurements;
- (viii) skates should not be sacrificed for biological sampling, and female maturity stage should only be recorded if the skate is dead or has sustained life-threatening injuries (conditions 1 and 2);
- (ix) all live skates which are part of the biological sampling, which have not sustained life-threatening injuries, should be handled with care and released after biological information has been recorded, if they are still suitable for release (i.e. still in condition 3 or 4).

6. By-catch of birds and mammals

6.1 By-catch removals

26. There have been no observed incidental mortalities of seabirds in Division 58.4.1 in the past four seasons (Table 6).

Table 6: Seabird by-catch limit, observed mortality rate and total estimated mortality of seabird by-catch in Division 58.4.1 (from SC-CAMLR-XXVIII, Annex 7, Table 4).

| Season | By-catch limit (number of birds) | Mortality rate (birds/thousand hooks) | Total estimated mortality (number of birds) |
|---------|-------------------------------------|--|--|
| 2004/05 | 3* | <0.001 | 8 |
| 2005/06 | 3* | 0 | 0 |
| 2006/07 | 3* | 0 | 0 |
| 2007/08 | 3* | 0 | 0 |
| 2008/09 | 3* | 0 | 0 |

* Per vessel during daytime setting.

27. No marine mammal interactions or mortalities were observed in 2008/09.

28. WG-IMAF assessed the risk level of seabirds in this fishery in Division 58.4.1 as category 2 (average to low) (SC-CAMLR-XXVIII, Annex 7, Table 14 and Figure 2).

6.2 Mitigation measures

29. Conservation Measure 25-02 applies to this fishery and in recent years has been linked to an exemption for night setting in Conservation Measure 24-02 and subject to a seabird by-catch limit. Offal and other discharges are regulated under Conservation Measure 26-01.

7. Ecosystem implications/effects

30. No evaluation available for this fishery.

8. Harvest controls and management advice

8.1 Conservation measures

31. The limits on the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 are defined in Conservation Measure 41-11. The limits in force and the Working Group's advice to the Scientific Committee for the forthcoming season are summarised in Table 7.

Table 7: Limits on the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 in 2008/09 (Conservation Measure 41-11) and advice to the Scientific Committee for 2009/10.

| Element | Limit in force | Advice for 2009/10 |
|-------------|---|--------------------|
| Catch limit | Precautionary catch limit for <i>Dissostichus</i> spp. was 210 tonnes, and catch limits for each SSRU was as follows: A – 0 tonnes; B – 0 tonnes; C – 100 tonnes; D – 0 tonnes; E – 50 tonnes; F – 0 tonnes; G – 60 tonnes; H – 0 tonnes. | Carry forward |
| Season | 1 December to 30 November | Same period |
| By-catch | Regulated by CM 33-03. | Carry forward |
| Mitigation | In accordance with CM 25-02, except paragraph 5 if requirements of CM 24-02 are met. | Carry forward |
| | Limit of three (3) seabirds per vessel during daytime setting. | Carry forward |
| Observers | At least two (2) scientific observers, one of whom shall be appointed in accordance with the CCAMLR Scheme of International Scientific Observation. | Carry forward |
| Data | Five-day catch and effort reporting | Carry forward |
| | Haul-by-haul catch and effort data | Carry forward |
| | Biological data reported by the CCAMLR scientific observer. | Carry forward |

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|--------------------------|--|---------------|
| Research | Fishery-based research in accordance with CM 41-01, including the collection of detailed catch, effort and biological data (Annex 41-01/A), setting of research hauls (Annex 41-01/B) and tagging (Annex 41-01/C). | Carry forward |
| | Toothfish tagged at a rate of at least three fish per tonne green weight caught. | Carry forward |
| | Skates tagged at a rate of at least one skate per five skates caught, up to a maximum of 500 skates per vessel. | Carry forward |
| Environmental protection | Regulated by CMs 26-01, 22-06 and 22-07. No offal discharge. Fishing prohibited in depths shallower than 550 m. | Carry forward |

8.2 Management advice

32. The Working Group recommended that the catch limits for Division 58.4.1 be retained for 2009/10. The Working Group recalled that the five-day catch and effort reporting system

used in this fishery is not well suited to the monitoring of catch limits below 100 tonnes, and recommend that the Scientific Committee consider this matter further (main text, paragraphs 3.14 and 3.15).

33. The Working Group agreed that measures in the research and data collection plans, including the requirement to tag toothfish at the rate of three toothfish per tonne and the requirement for research hauls as used in 2008/09 be retained for the exploratory fisheries in Division 58.4.1.

34. The Working Group agreed that for some vessels the size frequency of tagged fish showed very little overlap with the overall size frequency of fish caught and that this was having a serious impact on the efficacy of the tagging program. It recalled that a paper had been submitted to WG-FSA in 2007 which outlined methods by which large toothfish could be tagged in good condition (WG-FSA-07/36). The Working Group recommended that the Scientific Committee once again strongly urge Members to request their vessels to fully comply with all aspects of Conservation Measure 41-01, Annex C.

35. The Working Group discussed the network of open and closed SSRUs in the new and exploratory fisheries (main text, paragraphs 5.23 to 5.27). It agreed that it was important to have a good understanding of the distribution and abundance of *Dissostichus* spp. throughout the Convention Area, but noted that this had to be balanced against developing assessments for the fisheries which was best achieved by concentrating effort on a subset of SSRUs within the Convention Area. The Working Group was unable to provide consensus advice on the issue of maintaining the network of open and closed SSRUs in these subareas.

36. The Working Group reiterated its recommendation from last year that the relative merits of the different views on harvest strategies for toothfish in new and exploratory fisheries be evaluated using simulations. It recommended that such work be submitted to WG-SAM for review of the simulation methodologies before submitting the outcomes to WG-FSA for consideration.