

**FISHERY REPORT: EXPLORATORY FISHERY
FOR *DISSOSTICHUS* SPP. IN DIVISION 58.4.3B**

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FISHERY REPORT: EXPLORATORY FISHERY FOR *DISSOSTICHUS* SPP. IN DIVISION 58.4.3B

1. Details of the fishery

The longline fishery for *Dissostichus* spp. in Division 58.4.3 began as a new fishery in 1996/97 (Conservation Measure 113/XV). Following the Commission's decision that high levels of IUU fishing for *Dissostichus* spp. in the Convention Area had rendered it unrealistic to consider this fishery as 'new' (CCAMLR-XVIII, paragraph 10.14), and renewed interest in this fishery, the fishery was reclassified as exploratory in 2000. That year, the Commission agreed on four exploratory fisheries for *Dissostichus* spp. in this region in 2000/01: exploratory trawl fisheries on BANZARE Bank (Conservation Measure 203/XIX) and Elan Bank (Conservation Measure 205/XIX); and exploratory longline fisheries outside areas of national jurisdiction on BANZARE Bank (Conservation Measure 204/XIX) and Elan Bank (Conservation Measure 206/XIX).

2. In 2001, the boundaries of Division 58.4.3 were rearranged on the basis of ecological considerations, and two new divisions were formed: Division 58.4.3a (Elan Bank) and Division 58.4.3b (BANZARE Bank) (see Figure 1). The Commission agreed to exploratory fishery for *Dissostichus* spp. in each of these new divisions, outside areas of national jurisdiction.

3. In 2007/08, the exploratory fishery for *Dissostichus* spp. in Division 58.4.3b was limited to Australian, Japanese, Korean, Namibian, Spanish and Uruguayan vessels using longlines only, and no more than one vessel per country was permitted to fish at any one time (Conservation Measure 41-07). The division was divided into two SSRUs: A north of 60°S; and B south of 60°S (Figure 1). The precautionary catch limit for *Dissostichus* spp. in the fishery was 150 tonnes in SSRU A and SSRU B was closed to fishing. The catch limits for by-catch species were defined in Conservation Measure 33-03. The fishing season was from 1 May to 31 August 2008. Fishing was permitted outside the prescribed season provided that each vessel demonstrated its capacity to comply with the requirements for longline weighting outlined in Conservation Measure 24-02. In addition, fishing was not permitted from 16 March 2008 until the end of the notified research survey or 1 June 2008, whichever was sooner. An additional catch limit of 50 tonnes was provided for the research survey in SSRUs A and B.

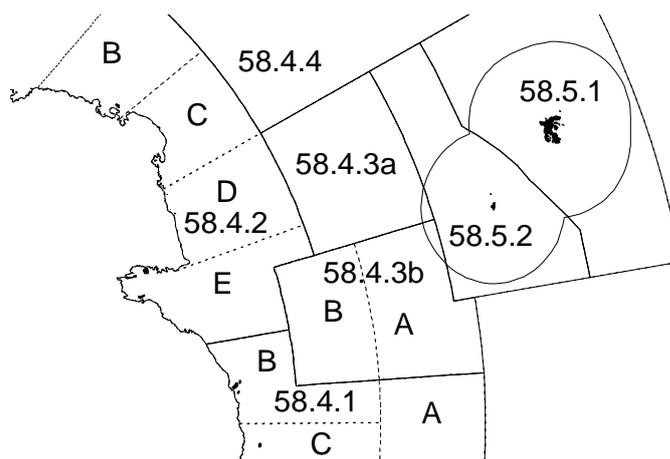


Figure 1: General map of Division 58.4.3b (BANZARE Bank). This division consists of two SSRUs A and B.

1.1 Reported catch

4. Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Division 58.4.3b since 2003/04, and the target species is *D. mawsoni* (Table 1). In 2007/08, three vessels fished and reported a total catch of 139 tonnes of *Dissostichus* spp. (93% of the precautionary catch limit for the fishery) and the fishery was closed on 20 February 2008, prior to the start of the notified research survey. The research survey (additional vessel) was conducted in May 2008 and a total of 2 tonnes of *Dissostichus* spp. was reported from SSRUs A and B (see also WG-FSA-08/57).

Table 1: Catch history for *Dissostichus* spp. in Division 58.4.3b (source: STATLANT data for past seasons, and catch and effort reports for current season, WG-FSA-08/10 Rev. 2 and past reports for IUU catch).

Season	Regulated fishery						Estimated IUU catch (tonnes)	Total removals (tonnes)
	Effort (number of vessels)		<i>Dissostichus</i> spp.					
	Limit	Reported	Catch limit (tonnes)	Reported catch (tonnes)				
				<i>D. eleginoides</i>	<i>D. mawsoni</i>	Total		
2003/04	6	1	300	1	6	7	246	253
2004/05	5	4	300	<1	297	297	1015	1 312
2005/06	5	4	300	44	317	361	1903	2 264
2006/07	6	4	300	74	176	251	2293	2 544
2007/08	6	4	150 (+50)	41	100	141	246	387

1.2 IUU catch

5. Information on IUU activities indicated high levels of IUU fishing, and the estimated catch of *Dissostichus* spp. exceeded 1 000 tonnes in 2004/05 and in 2005/06, exceeded 2 000 tonnes in 2006/07, and was estimated at approximately 246 tonnes in 2007/08 (Table 1). The total removals of *Dissostichus* spp. fell from 2 546 tonnes (8.5 times the catch limit) to 387 tonnes in 2007/08.

1.3 Size distribution of catches

6. Most *D. mawsoni* caught in the fishery ranged from 110 to 170 cm in length, with a broad mode at approximately 130–160 cm (Figure 2). *Dissostichus eleginoides* caught in 2006/07 and 2007/08 ranged from 50 to 180 cm in length, with a broad mode at approximately 120–130 cm (Figure 2).

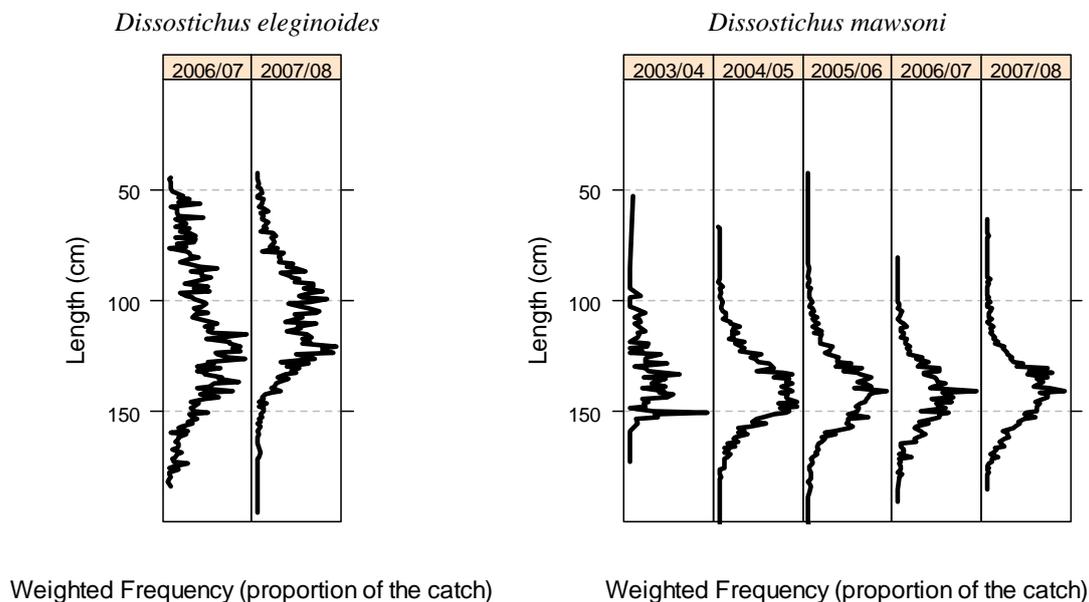


Figure 2: Catch-weighted length frequencies for *Dissostichus eleginoides* and *Dissostichus mawsoni* in Division 58.4.3b (source: observer, fine-scale and STATLANT data, and the length-weight relationships were taken from observations on *D. eleginoides* in Division 58.5.2 and *D. mawsoni* in Subarea 88.1).

2. Stocks and areas

7. 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).

8. The Working Group noted that results 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.

3. Parameter estimation

3.1 Observations

9. A demersal trawl survey has been undertaken in this area in 1999, which caught only two fish of *Dissostichus* spp. in 40 shots taken across the area (SC-CAMLR-XVIII, Annex 5, paragraph 3.79; WG-FSA-99/69).

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. A further 10 research hauls are required during the course of fishing. The number of research hauls reported in fine-scale data are summarised in Table 2.

12. Vessels are also required to tag and release *Dissostichus* spp. at a rate of three fish per tonne of green-weight catch. A total of 841 *D. mawsoni* and 271 *D. eleginoides* (total 1 112 fish) have been tagged and released and nine *D. mawsoni* have been recaptured in that division (Table 3).

13. The Working Group noted that tagging rates by vessels in this area have apparently been much lower than tagging rates by the same vessels in other areas in the past, however, all vessels reported tagging rates of one fish per tonne or above in 2006/07. The Working Group also noted that *D. eleginoides* tends to be tagged at a higher rate than *D. mawsoni* on particular vessels. The Working Group requested information from the vessels and observers operating in Subarea 58.4 on the reasons for this different tagging rate between species.

Table 2: Research (R) and commercial (C) longline hauls reported by vessels operating in the exploratory fishery for *Dissostichus* spp. in Division 58.4.3b (source: fine-scale data).

Season	Flag State	Vessel name	Number of hauls		
			R	C	Total
2003/04	Australia	<i>Eldfisk</i>	13	6	19
2004/05	Chile	<i>Globalpesca II</i>	10	9	19
	Korea, Republic of	<i>Yeon Seong No. 829</i>	10	6	16
	Spain	<i>Arnela</i>	30	67	97
		<i>Galaecia</i>	20	8	28
2005/06	Chile	<i>Globalpesca I</i>	11		11
	Spain	<i>Galaecia</i>	21	47	68
		<i>Tronio</i>	6	63	69
		<i>Paloma V</i>	23	20	43
2006/07	Japan	<i>Shinsei Maru No. 3</i>	20	128	148
	Namibia	<i>Antillas Reefer</i>	18	32	50
	Spain	<i>Tronio</i>	20	17	37
	Uruguay	<i>Paloma V</i>	20	27	47
2007/08	Japan	<i>Shinsei Maru No. 3</i>	20	114	134
	Namibia	<i>Antillas Reefer</i>	20	6	26
	Uruguay	<i>Banzare</i>	10	7	17

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 58.4.3b. The number of *D. eleginoides* is indicated in brackets. The total number of tagged fish recaptured to date in Division 58.4.3b 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
2003/04	Australia	<i>Eldfisk</i>	0	0
2004/05	Chile	<i>Globalpesca II</i>	13 (0)	0.33
	Korea, Republic of	<i>Yeon Seong No. 829</i>	1 (0)	0.08
	Spain	<i>Arnela</i>	206 (6)	0.93
2005/06		<i>Galaecia</i>	11 (4)	0.52
	Chile	<i>Globalpesca I</i>	0	0
	Spain	<i>Galaecia</i>	97 (2)	0.66
		<i>Tronio</i>	38 (0)	0.23
		<i>Paloma V</i>	40 (2)	0.85
2006/07	Uruguay	<i>Paloma V</i>	40 (2)	0.85
	Japan	<i>Shinsei Maru No. 3</i>	112 (37)	1.02
	Namibia	<i>Antillas Reefer</i>	49 (47)	2.06
	Spain	<i>Tronio</i>	81 (0)	1.00
	Uruguay	<i>Paloma V</i>	47 (43)	1.24
2007/08	Australia	<i>Janas</i>	15 (9)	6.45
	Japan	<i>Shinsei Maru No. 3</i>	346 (120)	3.19
	Namibia	<i>Antillas Reefer</i>	13 (1)	0.61
	Uruguay	<i>Banzare</i>	43* (0)*	4.53
Total number of fish tagged and released			1 112* (271)*	
Total number of tagged fish recaptured in Division 58.4.3b			9 (0)	

* Includes 43 *Dissostichus* spp. (species not identified).

3.2 Fixed parameter values

14. None available for this fishery.

4. Stock assessment

15. The catch limits in this fishery were agreed by the Commission based on advice provided by the Scientific Committee. Analysis provided in WG-FSA-07/44, based on fine-scale catch and effort data, indicates that CPUE data for BANZARE Bank show high levels of heterogeneity in catch and effort, making the production of a standardised CPUE series difficult. The Working Group concluded that the combination of high IUU and legal fishing focusing in small areas was resulting in severe decline in CPUE, indicating unsustainable depletion of toothfish in the main areas where fishing data are available.

16. A random longline survey was carried out in this division by Australia in May 2008 (WG-FSA-08/57). The paper concluded that catch rates of *Dissostichus* spp. were very low, consistent with toothfish being depleted to low densities across the surveyed area. It also noted that only very large *Dissostichus* spp. were present in the area. The precision of the average catch rate was not reported in WG-FSA-08/57 but was further calculated during the

Working Group meeting using the methods described in Candy (2004) which gave an approximate 95% confidence bound of between 17 and 60 kg/thousand hooks. This indicates that catch rates can be considered small relative to other areas such as Subarea 88.1.

17. The Working Group agreed research has shown the following:

- (i) Based on fishing information until last year, the fisheries across BANZARE Bank show that the preferred fishing grounds were depleted in the Southern Area (adopted by WG-FSA-07, resulted in the closure of the Southern Area).
- (ii) Based on the survey and fisheries across BANZARE Bank, there are very few fish apart from in the preferred fishing grounds.
- (iii) The fish found in the preferred fishing grounds are large and likely spawning, there are no small fish and fish are male dominated (79%).
- (iv) In the survey, the fish are large and mostly male.
- (v) Spawning fish in East Antarctica have only been found on BANZARE Bank (WG-FSA-07/44; SC-CAMLR-XXVII, Annex 5, paragraph 3.32).

18. The Working Group noted that only two of the three preferred fishing grounds in the area were covered by the random survey. However, the random nature of the survey implies the area was adequately covered. Japan noted it would have liked to see the third preferred fishing grounds surveyed and a larger number of stations sampled to provide a more robust estimate of biomass. The Working Group recommended that WG-SAM should look at how to design longline surveys and in particular with regards to how to deal with preferred fishing grounds, and how to reconcile datasets from different types of fishing gear.

19. The Working Group was unable to provide management advice on this division.

5. By-catch of fish and invertebrates

5.1 By-catch removals

20. 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 4. The by-catch in this fishery consists predominantly of macrourids (up to 17 tonnes per season). Catches of rajids have reached 6 tonnes per season.

21. Analyses of catch rates of macrourids and rajiformes presented in WG-FSA-07/44 indicate that they are highly variable. Attempts to analyse the population characteristics of the main by-catch groups were impossible due to a lack of reporting of biological data by observers from vessels that caught substantial amounts of by-catch (Table 5).

Table 4: Catch history for by-catch species (macrourids, rajids and other species), catch limits and number of rajids released alive in Division 58.4.3b. 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	159	0	50	0	-	20	0
2004/05	159	7	50	6	-	20	0
2005/06	159	8	50	1	-	20	0
2006/07	159	17	50	3	1267	20	1
2007/08	80	7	50	1	155	20	1

Table 5: By-catch reported in C2 data from BANZARE Bank (Division 58.4.3b) showing total weight (kg) of by-catch species by Flag State and vessel. Shaded cells show instances where catch of a species/group was reported in the C2 dataset, but no biological data was reported in the observer data. AUS – Australia; CHL – Chile; ESP – Spain; JPN – Japan; KOR – Republic of Korea; NAM – Namibia; URY – Uruguay.

Vessel number:	Flag State										Total
	AUS	CHL		ESP			JPN	KOR	NAM	URY	
	1	1	2	1	2	3	1	1	1	1	
By-catch species											
<i>Antimora rostrata</i> (ANT)	-	-	14	13	120	75	519	4	10	38	793
<i>Bathyraja mccaini</i> (BAM)	-	-	-	-	-	-	-	810	-	-	810
<i>Bathyraja</i> spp. (BHY)	-	-	-	-	-	-	-	-	-	1 395	1 395
<i>Macrourus</i> spp. (GRV)	131	40	478	1 955	5 337	4139	-	663	-	10 384	23 126
<i>Somniosus microcephalus</i> (GSK)	-	-	-	-	300	-	-	-	-	-	300
Channichthyidae (ICX)	-	-	-	2	-	-	-	-	4	-	6
Invertebrata (INV)	-	7	-	-	-	-	-	-	-	10	17
<i>Lithodes</i> spp. (KCX)	-	-	-	-	-	20	13	-	-	-	33
Lithodidae (KCZ)	-	-	-	-	-	-	-	-	-	13	13
<i>Lampris immaculatus</i> (LAI)	-	-	15	-	-	-	-	-	-	-	15
<i>Muraenolepis</i> spp. (MRL)	-	1	-	-	4	2	67	-	-	-	73
<i>Notothenia squamifrons</i> (NOS)	-	-	-	-	-	-	234	-	17	-	251
Octopodidae (OCT)	-	1	-	-	-	-	-	-	-	-	1
Rajiformes (RAJ)	-	42	-	-	-	-	-	-	-	-	42
<i>Salilota australis</i> (SAO)	-	-	-	-	-	-	-	-	-	35	35
<i>Raja Georgiana</i> (SRR)	-	-	-	-	4 328	1	-	-	-	-	4 328
<i>Raja</i> spp. (SRX)	114	-	365	533	-	319	-	-	1 452	354	3 137
<i>Macrourus whitsoni</i> (WGR)	-	-	-	-	-	-	7 764	-	671	-	8 435

5.2 Assessment of impacts on affected populations

22. The current by-catch limit for *Macrourus* spp. was estimated in 2003 using the precautionary approach adopted for krill (SC-CAMLR-XXII, Annex 5, paragraphs 5.250 to 5.252; van Wijk et al., 2003), where the estimate of B_0 was taken from the trawl survey in 1999 (van Wijk et al., 2000).

23. *Macrourus* spp. and *Raja taaf* were very common by-catch species during the survey conducted in May 2008 summarised in WG-FSA-08/57, indicating that previous by-catch records of rajids from the Northern Area of the division are likely to be *R. taaf*. The sex-specific size-at-maturity of *R. taaf* was estimated based on individuals caught in the survey, indicating that both

males and females have a median size-at-maturity of 755 and 795 mm (total length). The majority of the catch ranged between 400 and 900 mm, indicating that juvenile females may be more vulnerable to longline gear.

5.3 Identification of levels of risk

24. None available for this fishery.

5.4 Mitigation measures

25. The Commission has agreed that, where possible, vessels should release rays from the lines by cutting the snoods when the rays are still in the water, unless requested not to do so by the scientific observer during the biological sampling period (CCAMLR-XXIV, paragraph 4.51). The Commission has been requested to review this mitigation practice (see SC-CAMLR-XXVI, Annex 5, paragraph 5.53).

6. By-catch of birds and mammals

6.1 By-catch removals

26. Details of seabird by-catches are summarised in Table 6.

Table 6: Seabird by-catch limit, observed mortality rate and total estimated mortality of seabird by-catch in Division 58.4.3b (from SC-CAMLR-XXVII, Annex 6, Table 3).

Season	By-catch limit (number of birds)	Mortality rate (birds/thousand hooks)	Total estimated mortality (number of birds)
2003/04	3*	0	0
2004/05	3*	0	0
2005/06	3*	0.0002	2
2006/07	3*	0	0
2007/08	3*	0	0

* Per vessel during daytime setting.

27. No marine mammal interactions or mortalities were reported.

28. Ad hoc WG-IMAF assessed the risk level of seabirds in this fishery in Division 58.4.3b as category 3 (average) (SC-CAMLR-XXVI/BG/31).

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 58.4.3b are defined in Conservation Measure 41-07. 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 58.4.3b in 2007/08 (Conservation Measure 41-07) and advice to the Scientific Committee for 2008/09.

Element	Limit in force	Advice for 2008/09
Access	No more than one vessel per country at any one time.	Carry forward
Catch limit	Precautionary catch limit for <i>Dissostichus</i> spp. was 150 tonnes outside areas of national jurisdiction, and catch limits for each SSRU was as follows: A – 150 tonnes; B – 0 tonnes. An additional catch limit of 50 tonnes was provided for the research survey in SSRUs A and B notified in 2007/08.	review
Season	1 May to 31 August, with fishing permitted outside the prescribed season provided that each vessel demonstrated its capacity to comply with the requirements for longline weighting outlined in Conservation Measure 24-02.	Same period and conditions
By-catch	Regulated by CM 33-03.	Carry forward
Mitigation	In accordance with CM 25-02, except paragraph 4 if requirements of CM 24-02 are met. Limit of three (3) seabirds per vessel during daytime setting.	Carry forward
Observers	At least one scientific observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation.	Carry forward
Data	Five-day catch and effort reporting Haul-by-haul catch and effort data Biological data reported by the CCAMLR scientific observer.	Carry forward Carry forward Carry forward
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). Toothfish tagged at a rate of at least three fish per tonne green weight caught.	Carry forward Carry forward
Environmental protection	Regulated by CM 26-01.	Carry forward

8.2 Management advice

32. In 2006 the Scientific Committee noted several features of exploratory *Dissostichus* spp. fisheries in the southern Indian Ocean (Subarea 58.4) which gave cause for concern as to the status of the resource in this area, and the lack of a scientific basis for setting catch limits

(SC-CAMLR-XXV, paragraphs 4.184 to 4.192). In its management advice for this and other exploratory fisheries, the Scientific Committee requested urgent consideration by Members of methods for collecting data and of assessing these stocks.

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

34. No additional management advice was able to be provided by WG-FSA in 2008.

35. The Working Group recommended that vessels entering a new SSRU in Subareas 48.6 and 58.4 should be required to carry out 10 research sets with a maximum hook number of 5 000 (as part of Conservation Measure 41-01) on a stratified random basis through prescribed areas within that SSRU before carrying out their commercial fishing. Sets would be carried out on, or close to, supplied positions within strata based on fishable area where that information is available. Alternate positions could be supplied to replace any positions that were unfishable for any reason. It considered that the prescribed areas could be identified and random positions generated during the week of the 2008 meeting of the Scientific Committee if it agreed to this recommendation. It also considered that, if carried out annually by the same vessels, the research sets could be used to develop a time series of relative abundance indices.

References

- Candy, S.G. 2004. Modelling catch and effort data using generalised linear models, the Tweedie distribution, random vessel effects and random stratum-by-year effects. *CCAMLR Science*, 11: 59–80.
- van Wijk, E.M., A.J. Constable, R. Williams and T. Lamb. 2000. Distribution and abundance of *Macrourus carinatus* on BANZARE Bank in the southern Indian Ocean. *CCAMLR Science*, 7: 171–178.
- van Wijk, E.M., R. Williams and A.J. Constable. 2003. Age, growth and size at sexual maturity of *Macrourus carinatus* caught as by-catch in Australian sub-Antarctic trawl fisheries. *CCAMLR Science*, 10: 139–151.