APPENDIX M

FISHERY REPORT: *DISSOSTICHUS ELEGINOIDES* KERGUELEN ISLANDS (DIVISION 58.5.1)

CONTENTS

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KERGUELEN ISLANDS (DIVISION 58.5.1)

1. Details of the fishery

1.1 Reported catch

The catch limit of *Dissostichus eleginoides* set by France in its EEZ in Division 58.5.1 for the 2005/06 season (defined by France: 1 September 2005 to 31 August 2006) was 4 882 tonnes, and was allocated to seven longliners. The season's catch reported for this division as of 31 August 2006 was 3 045 tonnes. Reported historical catches in the fishery are shown in Table 1. The fishery began in 1984/85 as a trawl fishery targeting *D. eleginoides* and trawling continued to the 2000/01 season; a longline fishery began in 1991/92 and continues to the present. For the last five seasons the fishery has been prosecuted only by longliners. The fishery was active throughout the year except during February for the last three seasons.

Table 1: Catch history for *Dissostichus eleginoides* in Division 58.5.1 by CCAMLR season. Source: STATLANT data and SCIC reports.

Season	Reported catch (tonnes)			Estimated IUU catch (tonnes)	Total extraction (tonnes)
	Longline	Trawl	Total		
1987/88	0	892	892	0	892
1988/89	0	1 311	1 311	0	1 311
1989/90	0	1 243	1 243	0	1 243
1990/91	26	2 982	3 008	0	3 008
1991/92	679	7 079	7 758	0	7 758
1992/93	243	3 354	3 597	0	3 597
1993/94	749	4 632	5 381	0	5 381
1994/95	1 467	4 129	5 596	0	5 596
1995/96	1 233	3 478	4 710	833	5 543
1996/97	1 048	4 012	5 059	6 094	11 153
1997/98	1 747	2 967	4 714	7 156	11 870
1998/99	2 062	2 669	4 730	1 237	5 967
1999/00	3 046	3 093	6 139	2 600	8 739
2000/01	2 593	2 153	4 747	4 550	9 297
2001/02	3 976	178	4 154	6 300	10 454
2002/03	5 291	0	5 291	5 518	10 809
2003/04	5 171	0	5 171	536	5 707
2004/05	5 073	0	5 073	268	5 341
2005/06*	3 045	0	3 045	211	3 256

* To 31 August 2006

1.2 IUU catch

2. Details of the IUU catches attributed to Division 58.5.1 are given in Table 1. IUU fishing began at the end of 1996 and in some years IUU catches exceeded legal catches,

resulting in a high level of total removals (>10 000 tonnes per season). There has been a sharp decline in IUU catches since 2002/03 as a result of increased surveillance within the EEZ.

1.3 Size distribution of catches

3. Catch-weighted length frequencies were not available but could be prepared for next year.

2. Stocks and areas

4. *Dissostichus eleginoides* occurs throughout the Kerguelen Islands Shelf, from shallow waters (<10 m) to at least 2 000 m depth. As fish grow, they move to deeper waters, and are recruited to the trawl fishery on the slopes of the shelf and subsequently to the longline fishery in deeper waters. A general east–west deep-sea movement of adult fish occurs and spawning is restricted to the westerly zone early in winter each year (WG-FSA-05/27). Tagging experiments at Heard Island (Division 58.5.2) (Williams et al., 2002) show long-distance movements of sub-adult/adult fish between zones (Heard to Kerguelen and also Crozet) but the proportion of exchange between stocks is unknown. During the survey, 500 fish were tagged (to 1 October). During the 2005/06 season, six tagged fish were caught on the longlines.

3. Parameter estimations

3.1 CPUE standardisation

5. Haul-by-haul catch and effort data for the French longline fishery (inside the EEZ) in Division 58.5.1 (fine-scale data) from the 1999/2000 to the 2005/06 fishing seasons were examined. A total of 14 090 hauls compared to 11 398 hauls for WG-FSA-05 were used in the standardisation. The standardised CPUE series was derived using the same generalised linear models (GLMMs) and linear mixed models (LMMs) that were described in SC-CAMLR-XXIII, Annex 5, paragraphs 5.177 to 5.180.

6. CPUE: Only one of the two GLMMs used in WG-FSA-05 was used here; this GLMM used fishing season and calendar month as the only fixed predictors and vessel as the only random effect. A value of the Tweedie distribution parameter of 1.5 was continued to be used. The standardisation uses the month of January to set the general level of the series. Figure 1 shows the estimated series while Table 2 gives the estimated series and that given in the WG-FSA-05 report (SC-CAMLR-XXIV, Annex 5).

7. Average weight: The same analyses were carried out for average weight (= haul weight/number caught). Depth of fishing was also found significant in the LMM. Figure 2 shows the time series. These estimated trends were obtained from the LMM fitted to log(average weight) using smoothing splines as described in Candy (2004).

8. These analyses show a general decreasing trend in the standardised CPUE up until 2003, followed by a period up to the current year for which the CPUE estimates are relatively constant. Note that in the 2006 series the estimates in Table 2 differ for seasons prior to 2004/05 to those for the series estimated at WG-FSA-05. This is possible because all parameters in the standardisation GLMM are re-estimated when new data is added and the differences in estimates are likely to be substantial when a large amount of new data is added as is the case here. The trend in decreasing standardised average weight with fishing season continued for the 2006 season and probably indicates that the older age classes are less numerous in the exploited stock.

Table 2: Standardised series of CPUEs in kg/hook for *Dissostichus eleginoides* in Division 58.5.1 estimated using haul-by-haul data up to and including either 2005 or 2006 fishing seasons.

Year	2005 CPUE estimate (Lower 95% CI, Upper 95% CI)	2006 CPUE estimate (Lower 95% CI, Upper 95% CI)
1999	0.465 (0.385,0.562)	0.506 (0.412,0.622)
2000	0.336 (0.292,0.388)	0.379 (0.320,0.447)
2001	0.289 (0.253,0.330)	0.326 (0.277,0.383)
2002	0.301 (0.268,0.338)	0.332 (0.284,0.388)
2003	0.225 (0.201,0.252)	0.243 (0.208,0.284)
2004	0.209 (0.186,0.235)	0.227 (0.194,0.265)
2005	0.212 (0.188,0.239)	0.227 (0.195,0.265)
2006		0.213 (0.183,0.2500

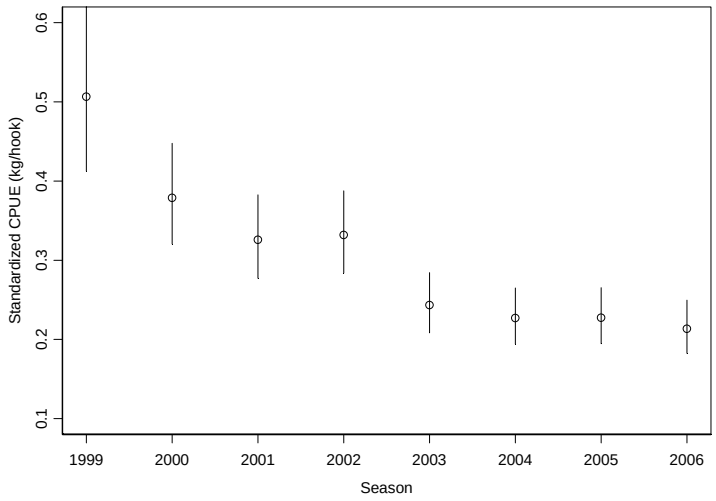


Figure 1: Time series of standardised CPUE (kg/hook) obtained from the GLMM fitted to catch (kg) and adjusted for effort (number of hooks) using a loglink function and the Tweedie distribution with variance power parameter of 1.5 with fixed model terms of fishing season and calendar month and random terms of vessel and haul. (Error bars represent approximate 95% confidence bounds on the estimates.)

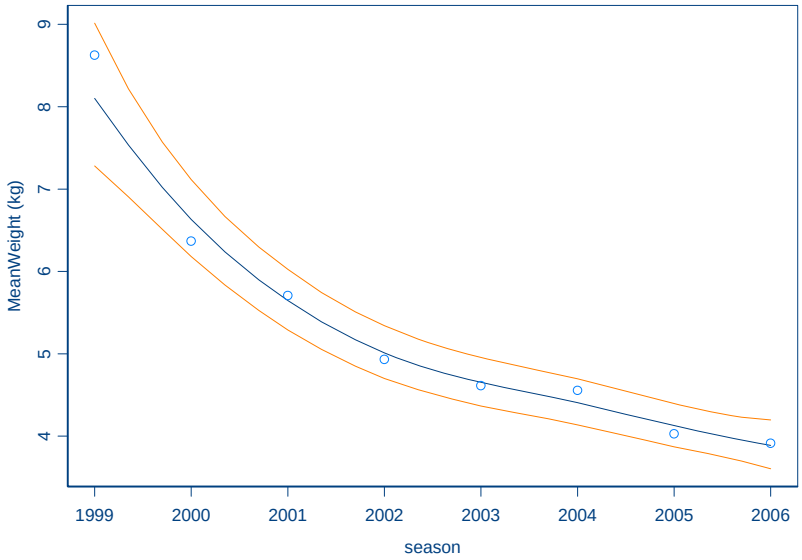


Figure 2: Time series of standardised average weight (kg) obtained from the LMM fitted to log(average weight) using a cubic smoothing spline. (Error bounds represent approximate 95% confidence bounds on the estimates.)

3.2 Biological parameters

9. No biological parameters (except size-at-first-maturity) are available for Division 58.5.1. It is likely that the parameters used in the stock assessment for Heard Island will be valid for the Kerguelen stock (growth curve, natural mortality).

4. Stock assessment

10. The survey on the *Austral* from 30 August to 9 October 2006 has been processed in Kerguelen, so far 205 trawls and 500 fish have been tagged.

4.1 Research requirements

11. The Working Group encouraged the estimation of biological parameters for Kerguelen. The Working Group also noted that a preliminary stock assessment could be carried out if CPUE, catch-weighted length frequencies and biological parameters were available. The Working Group encouraged cooperative work in the intersessional period between France and Australia on analysis of catch and effort data and other data that could be used to progress understanding of fish stock and fishery dynamics for Divisions 58.5.1 and 58.5.2 and Subarea 58.6.

5. By-catch

5.1 By-catch removals

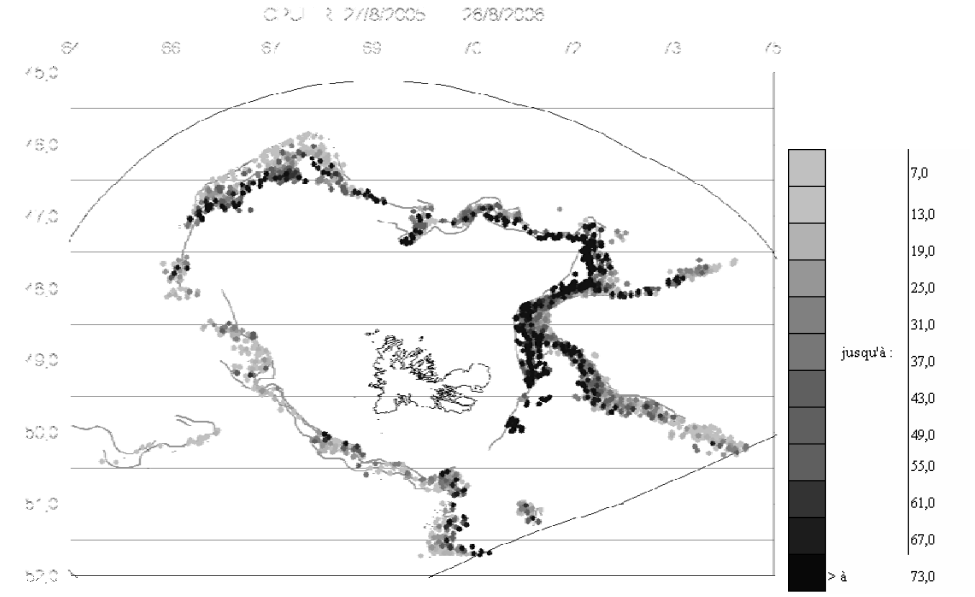
12. By-catch removals for the toothfish longline fishery are detailed in Table 3. In order of importance, grenadiers (*Macrourus carinatus*), rajids (*Bathyraja eatonii* and *B. irrasa*) and morids (*Antimora rostrata*) form the bulk of the by-catch. Only the latter species is fully discarded, the others are partly or totally processed. Local geographic distributions differ from one species to another (Figure 3).

Table 3: Historical by-catch in the Kerguelen EEZ (Division 58.5.1) by CCAMLR season.

Season	Reported catch (tonnes)		
	Longline	Trawl	Total
Macrourids			
1997/98	12	0	12
1998/99	37	0	37
1999/00	111	2	113
2000/01	93	0	93
2001/02	400	0	400
2002/03	820	0	820
2003/04	1 024	0	1 024
2004/05	738	0	738
2005/06*	339	0	339
Rajids			
1990/91	0	0	0
1991/92	0	0	0
1993/94	0	2	2
1994/95	0	0	0
1995/96	0	0	0
1996/97	0	2	2
1997/98	14	6	20
1998/99	42	4	46
1999/00	120	12	132
2000/01	116	3	119
2001/02	537	0	537
2002/03	968	0	968
2003/04	1 200	0	1 200
2004/05	1 010	0	1 010
2005/06*	435	0	435
Antimora rostrata			
1998/99	1		1
1999/00	1		1
2000/01	0		0
2001/02	1	0	1
2002/03	10	0	10
2003/04	15	0	15
2004/05	50	0	50
2005/06*	42	0	42

* To 31 August 2006

(a)



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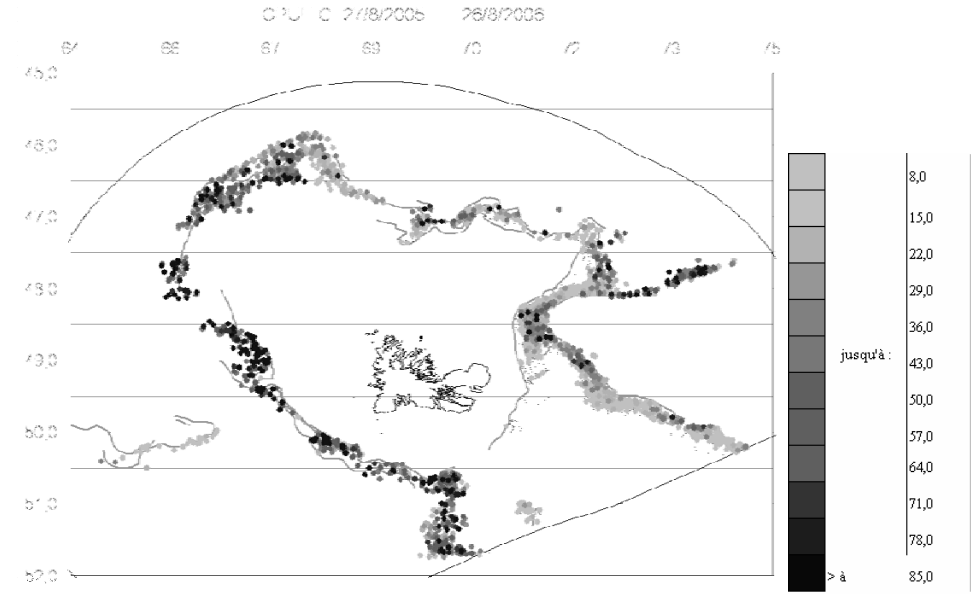

Figure 3: CPUE index for two by-catch species groups in the Kerguelen EEZ for the 2005/06 season: (a) *Bathyraja* spp. 2005/06 CPUE (grams/hook); (b) *Macrourus carinatus* 2005/06 CPUE (grams/hook).

5.2 Assessments of impact on affected populations

13. No stock assessments of individual by-catch species were undertaken.

5.3 Mitigation measures

14. The Working Group recommended that, where possible, all rajids should be cut from the line while still in the water, except on the request of the observer. Areas with high by-catch rates should be avoided.

6. By-catch of birds and mammals

15. Seabird mortality of white-chinned (*Procellaria aequinoctialis*), grey (*P. cinerea*), sub-Antarctic giant (*Macronectes halli*) and cape (*Daption capense*) petrels has been reported (Appendix D, Table 8).

16. Details of seabird by-catch in 2005/06 are reported in Appendix D, paragraphs 14 to 16 and Tables 4 to 8. Details for 2001/02, 2002/03 and 2003/04 are reported in SC-CAMLR-XXIII, Annex 5, paragraphs 7.16 to 7.34. Details for 2000/01 and 2004/05 are reported in SC-CAMLR-XXIV, Annex 5, paragraphs 7.5 to 7.13.

Table 4: Total extrapolated incidental mortality of seabirds and observed mortality rates (birds/thousand hooks) in longline fisheries in the French EEZ at Kerguelen (Division 58.5.1). Data for 1998/99, 1999/2000, and for the period 2001/02 to 2003/04 are from SC-CAMLR-XXIII, Annex 5, Table 7.11. Data for 2000/01 and 2004/05 are from SC-CAMLR-XXIV, Annex 5, Tables 5 to 7, and data for 2005/06 are from Appendix D, Tables 4 and 5.

	CCAMLR season							
	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Extrapolated mortality	4 967*	1 897*	1 917*	10 814*	13 926*	3 485	4 387	2 352
Mortality rate	2.95*	0.308*	0.092*	0.936*	0.518*	2 069* 0.128*†	1 416† 0.123†	0.161	0.092

* Reported by captains
† Corrected data

17. No mammals have been reported as by-catch in Division 58.5.1.

6.1 Mitigation measures

18. Details of mitigation measures applied this year are reported in Appendix D, paragraph 14. Details of mitigation measures implemented are reported in SC-CAMLR-XXIII, Annex 5, paragraphs 7.35 to 7.45:

(i) line-weighting regimes as specified in Conservation Measure 25-02 are now applicable to French autoliners;

(ii) at least two streamer lines meeting the CCAMLR specifications are compulsory. Some vessels use up to seven streamer lines;

(iii) in 2005/06 all vessels had observers on board who observed 25% of hooks set. This level of observer effort will be continued in 2006/07;

(iv) continued closure of Division 58.5.1, classified as a high-risk area, during the main seabird breeding season, from mid-February to mid-March;

(v) the discarding of hooks and the use of black lines are prohibited.

7. Harvest controls for the 2005/06 season and advice for 2006/07

7.1 Conservation measures

19. Various national conservation and fisheries enforcement measures are in force in addition to those agreed by CCAMLR. The national measures include:

- annual fishing season closure (February)
- annual catch limit and limitation of number of longliners (seven)
- compulsory logbooks
- allocation of fishing effort (not more than one longliner per 0.5° latitude x 1° longitude rectangle)
- one French observer on board each licensed vessel
- minimum fishing depth limit (500 m)
- minimum legal size for toothfish (60 cm)
- mitigation measures for the reduction of bird mortality
- landings occur at one place (Réunion Island)
- port inspection.

7.2 Management advice

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

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

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

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.

Williams, R., G.N. Tuck, A.J. Constable and T. Lamb. 2002. Movement, growth and available abundance to the fishery of *Dissostichus eleginoides* Smitt, 1898 at Heard Island, derived from tagging experiments. *CCAMLR Science*, 9: 33–48.