APPENDIX O

FISHERY REPORT: *DISSOSTICHUS ELEGINOIDES* CROZET ISLAND INSIDE THE FRENCH EEZ (SUBAREA 58.6)

CONTENTS

FISHERY REPORT: *DISSOSTICHUS ELEGINOIDES* CROZET ISLAND INSIDE THE FRENCH EEZ (SUBAREA 58.6)

1. Details of the fishery

1.1 Reported catch

The catch limit of *Dissostichus eleginoides* set by France in its EEZ in Subarea 58.6 for the 2005/06 season (defined by France, 1 September 2005 to 31 August 2006) was 1 268 tonnes and was not reached because fishers showed little interest in fishing off Crozet (see below). The catch limit was allocated to seven longliners. The season's catch reported for this subarea as of 31 August 2006 was 641 tonnes. Reported historical catches in the fishery are shown in Table 1. Fishing trials with trawlers have not been continued. In Subarea 58.6, the fishery has been conducted using longlines from 1996/97 to the present. The fishery was active all year. A high level of depredation on *D. eleginoides* catches from killer whales (*Orcinus orca*) is the main reason why fishers avoid the area.

Table 1: Catch history for *Dissostichus eleginoides* in Subarea 58.6 by CCAMLR season in the French EEZ (Crozet).

Season	Reported catch (tonnes)	Estimated IUU catch (tonnes)	Total removals (tonnes)
1976/77	6	0	6
1977/78	370	0	370
1982/83	17	0	17
1986/87	488	0	488
1987/88	21	0	21
1993/94	56	0	56
1994/95	115	0	115
1995/96	3	7 875	7 878
1996/97	413	11 760	12 173
1997/98	787	1 758	2 545
1998/99	877	1 845	2 722
1999/00	1 017	1 430	2 447
2000/01	1 091	685	1 776
2001/02	1 158	720	1 878
2002/03	531	302	833
2003/04	537	380	917
2004/05	385	0	385
2005/06*	641	0	641

* To 31 August 2006

1.2 IUU catch

2. Details of the IUU catches attributed to Subarea 58.6 are given in Table 1. IUU fishing began in 1996 with a peak and has continued at various levels. In recent years, IUU fishing occurs mainly outside the EEZ due to increased surveillance within the EEZ.

2. Stocks and areas

3. 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 still unknown. During the 2005/06 season, 1 240 fish were tagged from commercial longliners in Crozet. Eight tags were recaptured: six from French tagging and two from tagging in Heard Island.

3. Parameter estimations

3.1 CPUE standardisation

4. Haul-by-haul catch and effort data for the French longline fishery (inside the EEZ) in Subarea 58.6 (fine-scale data) for the 1999/2000 to 2005/06 fishing seasons were examined. A total of 5 614 hauls compared to 4 601 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.

5. 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. The Tweedie distribution parameter was revised down from 1.7 to 1.5. 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).

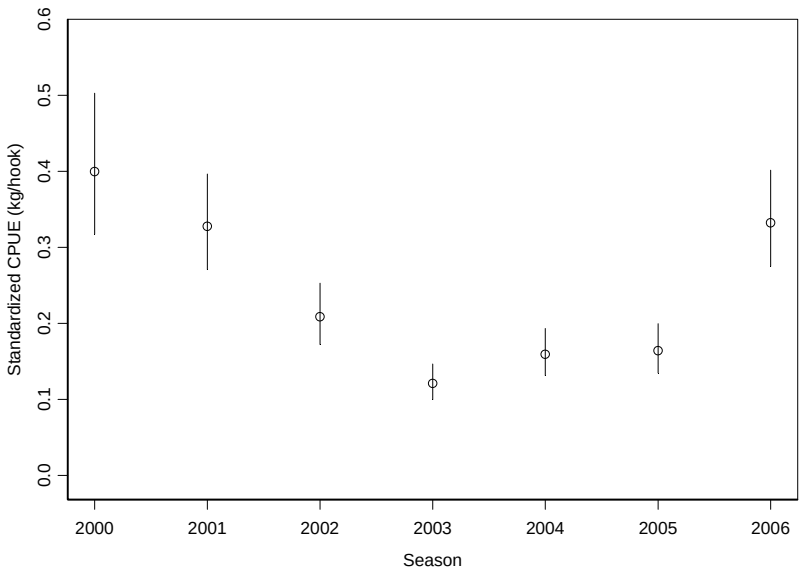


Figure 1: Time series of standardised CPUE (kg/hook) obtained from the GLMM fitted to catch (kg) and adjusted for effort (number of hooks) using a loglink function and the Tweedie distribution with variance power parameter of 1.5 with fixed-model terms of fishing season and calendar month and random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

Table 2: Standardised series of CPUEs in kg/hook for *Dissostichus eleginoides* in Subarea 58.6 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)
2000	0.280 (0.225,0.348)	0.400 (0.316,0.505)
2001	0.245 (0.199,0.301)	0.328 (0.270,0.398)
2002	0.187 (0.152,0.229)	0.209 (0.171,0.254)
2003	0.101 (0.083,0.122)	0.121 (0.100,0.147)
2004	0.120 (0.097,0.148)	0.159 (0.131,0.194)
2005	0.102 (0.082,0.127)	0.164 (0.134,0.200)
2006		0.332 (0.274,0.403)

6. 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 WG-FSA-03/34.

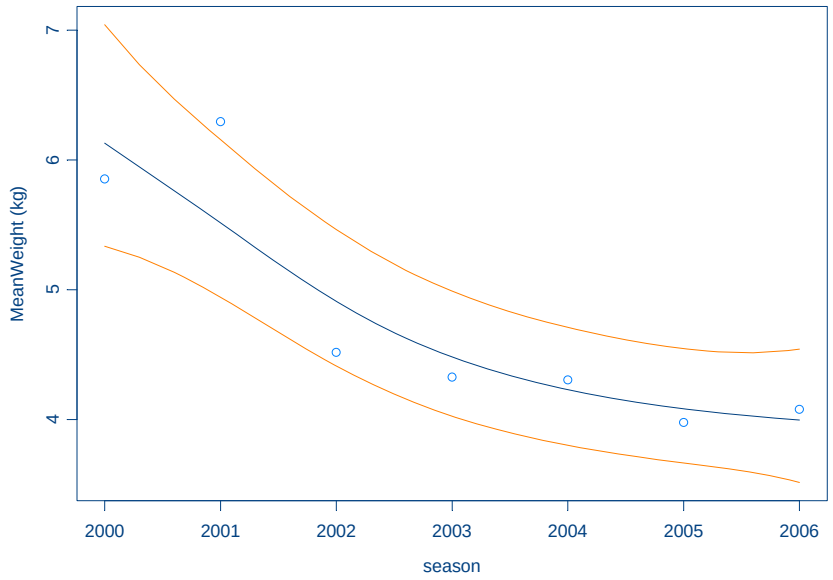


Figure 2: Time series of standardised average weight (kg) obtained from the LMM fitted to log(average weight) using a cubic smoothing spline. (Error bounds represent approximate 95% confidence bounds on the estimates.)

7. These analyses show a general decreasing trend in the standardised CPUE up to 2003 with a subsequent slight increase in 2004 and 2005 and a substantial increase for the 2006 season. 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 of decreasing standardised average weight from 1999 to 2005 showed a slight upturn for the 2006 season but, given the confidence bounds, this slight increase may not reflect a genuine increase in the number of larger fish that are vulnerable to the fishery.

4. Stock assessment

8. No stock assessment has been carried out for Subarea 58.6.

4.1 Research requirements

9. The Working Group encouraged the estimation of biological parameters for Crozet. 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.

5. By-catch

5.1 By-catch removals

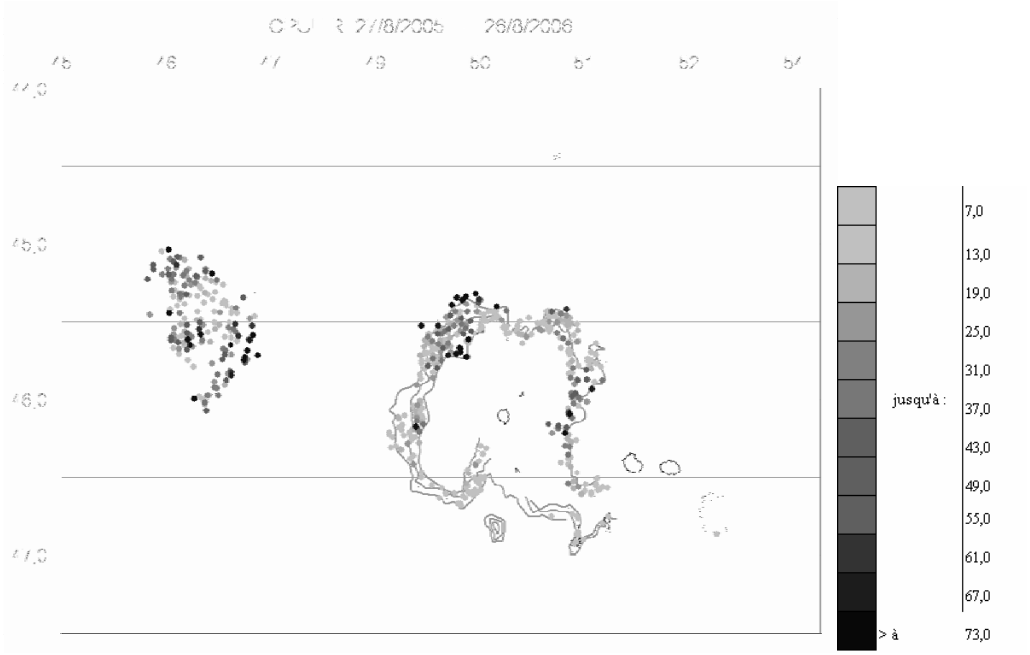
10. By-catch removals for the toothfish longline fishery are detailed in Table 3. In order of importance, grenadiers (*Macrourus carinatus*), rajids (*Raja taaf*) and morids (*Antimora rostrata*) form the bulk of the by-catch. Only the last species is fully discarded, the others being partly or totally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

Table 3: Historical by-catch in the Crozet EEZ (Subarea 58.6) by CCAMLR season.

Season	Reported catch (tonnes)		
	Longline	Trawl	Total
Macrourids			
1998/99	1		1
1999/00	145		145
2000/01	103		103
2001/02	237		237
2002/03	167		167
2003/04	139		139
2004/05	131		131
2005/06*	132		132
Rajids			
1998/99	0		0
1999/00	31		31
2000/01	6		6
2001/02	24		24
2002/03	95		95
2003/04	91		91
2004/05	117		117
2005/06*	163		163
Antimora rostrata			
1998/99	0		0
1999/00	11		11
2000/01	0		0
2001/02	9		9
2002/03	19		19
2003/04	67		67
2004/05	61		61
2005/06*	28		28

* to 31 August 2006

(a)



(b)

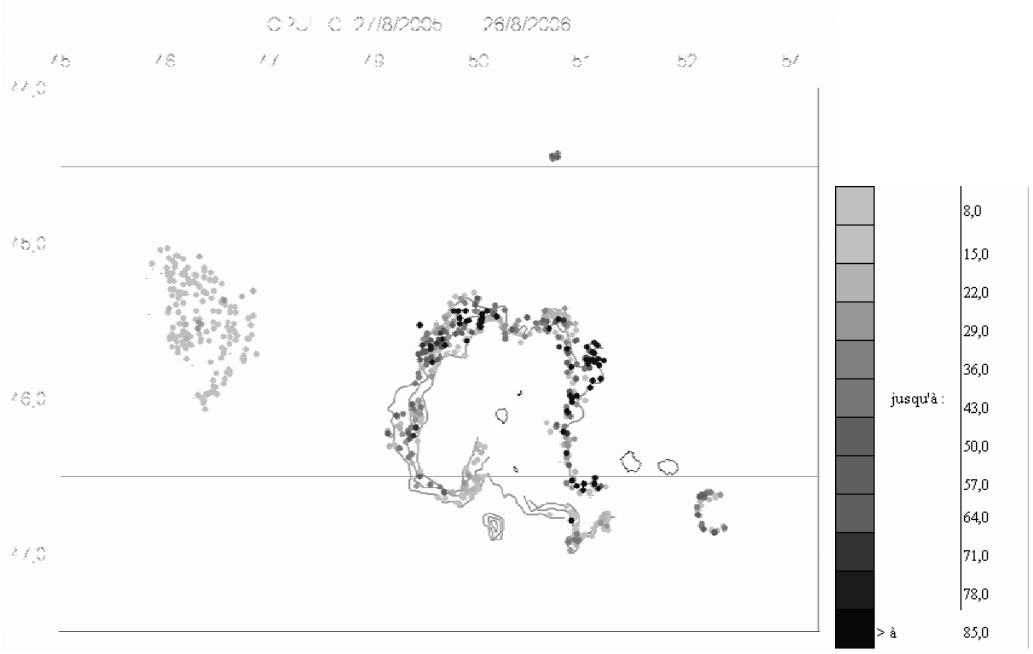


Figure 3: CPUE index for two by-catch species groups in the Crozet EEZ for the 2005/06 season: (a) *Raja taaf* 2005/06 CPUE (grams/hook); (b) *Macrourus carinatus* 2005/06 CPUE (grams/hook).

5.2 Assessments of impact on affected populations

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

5.3 Mitigation measures

12. 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

13. Seabird mortality of white-chinned (*Procellaria aequinoctialis*), grey (*P. cinerea*), sub-Antarctic giant (*Macronectes halli*) and Cape (*Daption capense*) petrels and one rockhopper penguin (*Eudyptes chrysocome*) has been reported (Appendix D, Table 8).

14. Details of seabird by-catches 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 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 Crozet (Subarea 58.6). 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 2004/05 are from SC-CAMLR-XXIV, Annex 5, Table 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	1 326*	360*	-	1 243*	720*	281	242*	242	235
Mortality rate	0.741*	0.186*	-	0.167*	0.109*	0.071*†	0.015†	0.047	0.036

* Reported by captains
† Corrected data

15. No mammals have been reported as by-catch in Subarea 58.6.

6.1 Mitigation measures

16. Details of mitigation measures applied this year are reported in Appendix D, paragraph 14. Details of mitigation measures implemented in 2004 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 24.3% of hooks set. This level of observer effort will be continued in 2006/07;

(iv) 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

17. Various national conservation and fisheries enforcement measures (in addition to those agreed by CCAMLR) are in force, such as:

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

7.2 Management advice

18. The Working Group encouraged the estimation of biological parameters for Crozet. 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.

19. Estimated total removals have declined steadily over the last eight seasons and are at substantially lower levels than those taken before then. Standardised CPUE fell substantially from 1999/2000 to 2002/03 but has since increased. In the absence of a stock assessment, the Working Group agreed that it was unable to recommend appropriate levels of catch for this fishery.

20. 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 of zones of specific high rates of by-catch abundance should be also considered.

21. No new information was available on the state of fish stocks in Subarea 58.6 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.

Reference

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.