

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

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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 2004/05 season (defined by France, 1 September 2004 to 31 August 2005) was 1 218 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 2005 was 385 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	7875	7878
1996/97	413	11760	11673
1997/98	787	1758	2545
1998/99	877	1845	2722
1999/00	1017	1430	2447
2000/01	1091	685	1776
2001/02	1158	720	1878
2002/03	531	354	885
2003/04	537	456	993
2004/05*	385	14	399

* To 31/08/2005

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 fishes between zones (Heard to Kerguelen and also Crozet) but the proportion of exchange between stocks is still unknown.

3. Parameter estimations

3.1 CPUE Standardisation

4. Haul-by-haul catch and effort data for the French longline fishery (inside EEZ) in Subarea 58.6 (fine-scale data) for the fishing seasons 1999/2000 to 2004/05 were examined. A total of 4 601 hauls was used in the standardisation with 235 and 556 hauls added for the 2003/04 and 2004/05 seasons respectively. The standardised CPUE series was derived using the GLMMs and LMMs described in SC-CAMLR-XXIII, Annex 5, paragraphs 5.297 and 5.298. In addition, a CPUE standardisation was carried out using a similar model to that described in WG-FSA-05/27, using most of the predictor variables in that paper and only excluding those predictors for which the data were not available to the meeting. These models were used to investigate trends in CPUE (kg/hook), average weight of fish caught (kg) and fishing depth (m).

CPUE

5. Two GLMMs were fitted, the first of which used fishing season and calendar month as the only fixed predictors and vessels 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 for the series. Figure 1 shows the estimated CPUE series. The alternative standardisation used most of the predictors reported in WG-FSA-05/27. These predictors were bait species and season (summer, autumn, winter, spring), with linear and quadratic terms for fishing depth and soak time. Removing missing values of bait species and restricting soak time to between 4 and 72 hours gave a dataset of 3 630 hauls. Figure 2 gives the standardised CPUE series with the general level of the series set for 'summer', bait species = 'CHP', fishing depth of 1 087 m and soak time of 19.5 hours. Note that there were no data, after the above restrictions were applied, on which to base an estimate of the CPUE value for 1999.

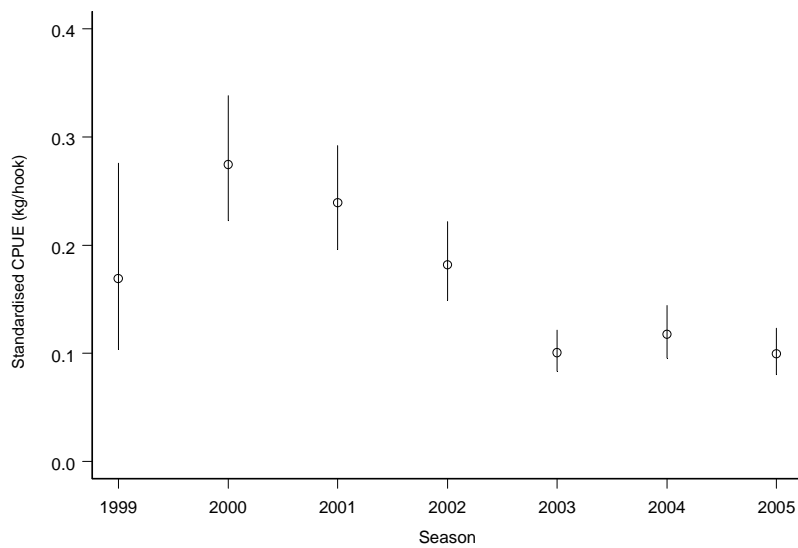


Figure 1: Time series of standardised CPUE (kg/hook) based on the GLMM fitted to catch (kg) and adjusted for effort (number of hooks) using a log-link function and the Tweedie distribution with variance power parameter of 1.5 with fixed-model terms for fishing season and calendar month and random terms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

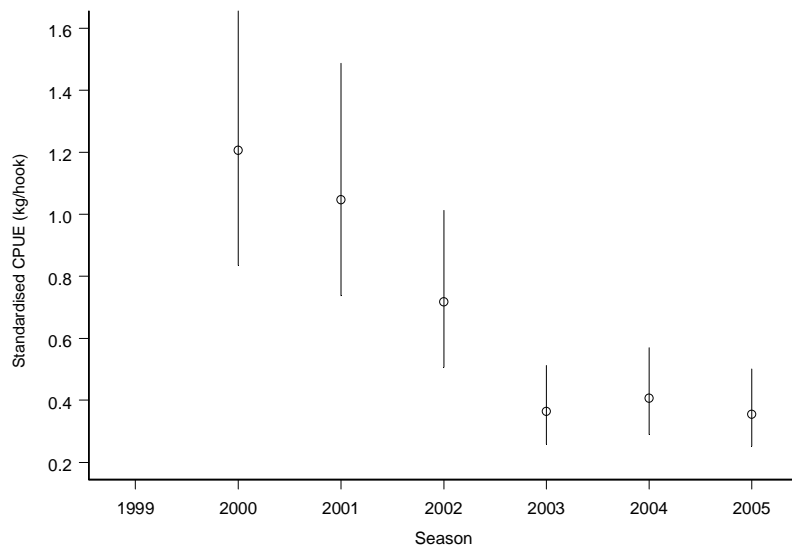


Figure 2: Time series of standardised CPUE (kg/hook). As in Figure 1 but with fixed-model terms for season, bait type and linear and quadratic terms for each of fishing depth and soak time (error bars represent approximate 95% confidence bounds on the estimates).

Average weight

6. The same analyses were carried out for average weight (=haul weight/number caught). Depth of fishing was also found to be significant in the LMM. Figure 3 shows the time series

and Figure 4 shows the trend in average weight versus depth of fishing. These estimated trends were obtained from the LMM fitted to log(average weight) using smoothing splines as described in Candy, 2004.

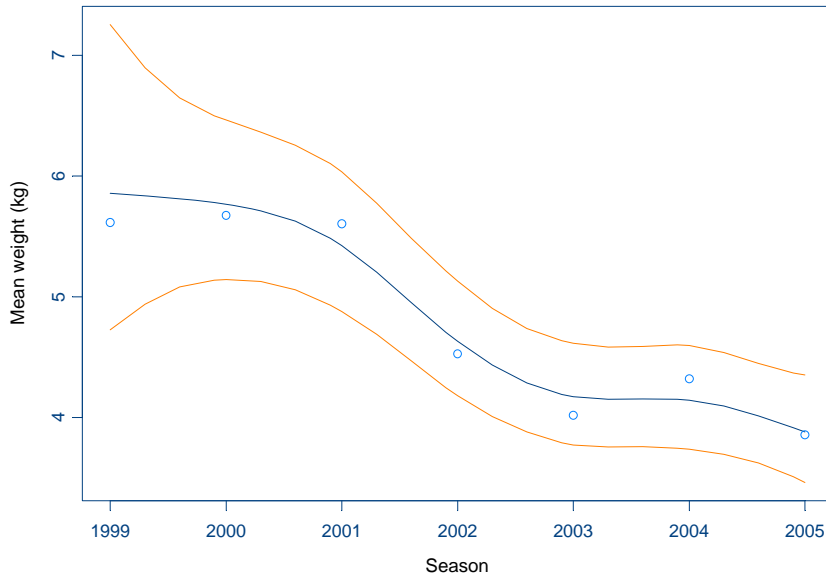


Figure 3: Time series of standardised average weight (kg) obtained using the LMM fitted to log(average weight) using a cubic smoothing spline (error bars represent approximate 95% confidence bounds on the estimates).

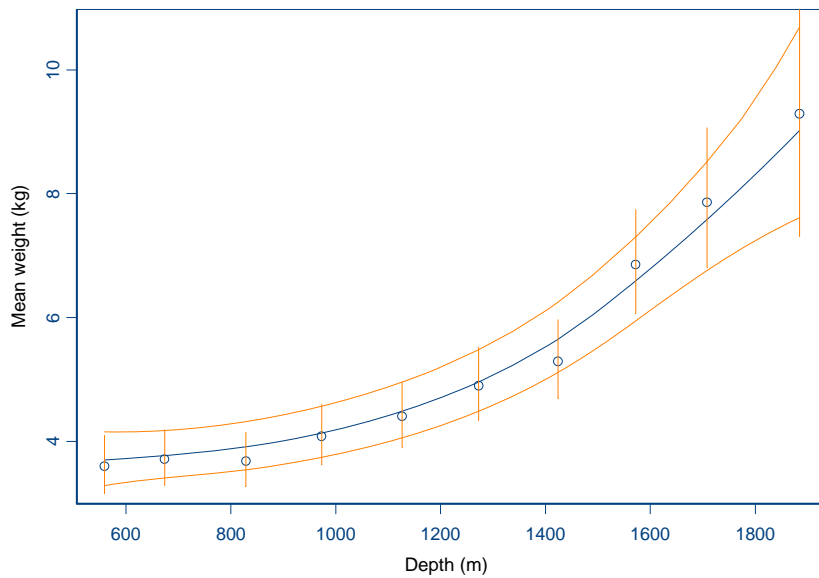


Figure 4: Standardised average weight (kg) obtained using the LMM fitted to log(average weight) using a cubic smoothing spline versus fishing depth class (error bars represent approximate 95% confidence bounds on the estimates).

7. These analyses show a general decreasing trend in the standardised CPUE to 2002/03 with no further decrease indicated between that and the following two seasons. The decrease

in the standardised average weight probably indicates that the older age classes are less numerous in the exploited stock. The average weight generally increased with fishing depth.

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.

10. As for other toothfish fisheries in the Convention Area, the Working Group recommended that tag–recapture experiments be conducted.

5. By-catch

5.1 By-catch removals

11. By-catch removals for the toothfish longline fishery are detailed in Table 2. 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 5).

Table 2: Historical by-catch in the Crozet EEZ (Subarea 58.6) by CCAMLR season.

Season	By-catch taxa		
	<i>Macrourus carinatus</i>	<i>Raja taaf</i>	Other
1991/92			
1992/93			
1993/94			
1994/95			
1995/96			
1996/97	11	2	
1997/98	2	1	
1998/99	37	1	
1999/00	52	9	
2000/01	69	13	
2001/02	186	41	
2002/03	142	80	
2003/04	47	38	
2004/05*	96	70	55

* To 31/08/2005

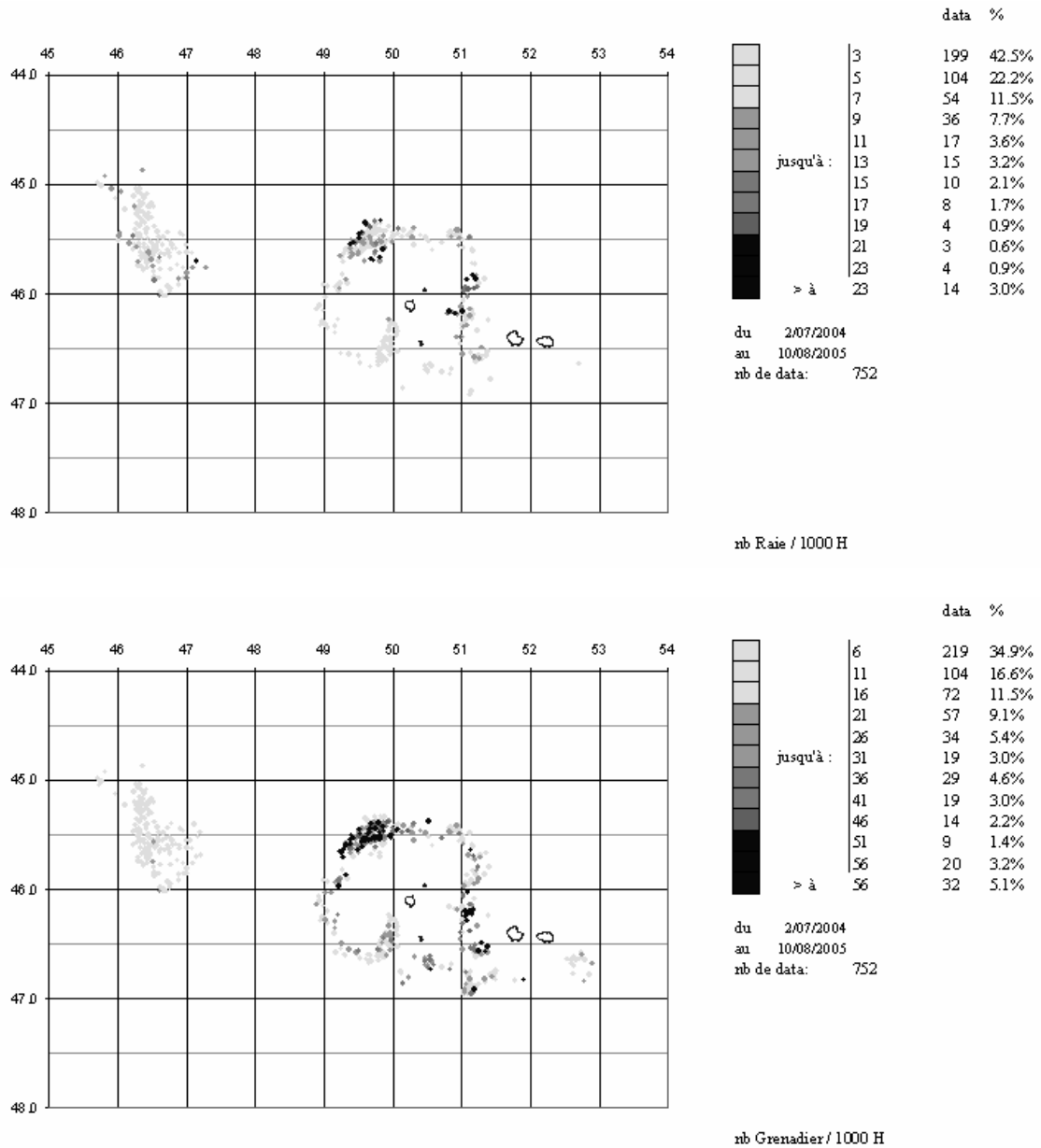


Figure 5: CPUE index for two by-catch species groups in the Crozet EEZ for the 2004/05 season: (a) *Raja taaf* 2004/05 CPUE (number/thousand hooks); (b) *Macrourus carinatus* 2004/05 CPUE (number/thousand hooks).

5.2 Assessments of impact on affected populations

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

5.3 Mitigation measures

13. 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

14. Seabird mortality of white-chinned (*P. aequinoctialis*) and grey (*P. cinerea*) petrels has been reported (Appendix O). CCAMLR mitigation measures are in force.

15. Details of seabird by-catches in 2004/05 are reported in paragraphs O21 to O34 and Tables O7 to O11. Detailed data for 2000/01 are reported in paragraphs O19 and O20 and Tables O5 and O6. Details for 2001/02, 2002/03 and 2003/04 are reported in SC-CAMLR-XXIII, Annex 5, paragraphs 7.16 to 7.34.

Table 3: 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 2001/02–2003/04 are from SC-CAMLR-XXIII, Annex 5, Table 7.11. Data for 2000/01 are from Table O5 and data for 2004/05 are from Table O9.

Subarea	CCAMLR season						
	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Extrapolated mortality	1 326*	360*	-	1 243*	720*	281	242
Mortality rate	0.741*	0.186*	-	0.167*	0.109*	0.071* [†]	0.015 [†]

* Reported by captains

[†] Corrected data

Table 4: Comparison of similar periods for extrapolated incidental mortality of seabirds and mortality rates (birds/thousand hooks) in longline fisheries in the French EEZ at Crozet (Subarea 58.6) and Division 58.5.1, as reported by vessel captains and by observers.

Period	Fishing season	No. of hooks observed (thousands) (% observed)	Mortality rate	Extrapolated mortality
Sep–Feb	2003/04	3 401.0 (100.0)	0.0712*	242*
	2004/05	2 747.7 (100.0)	0.0466*	128*
Apr–Aug	2003/04	492.0 (23.4)	0.0061	13
	2004/05	615.6 (28.3)	0.0114	25

* Reported by captains

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

6.1 Mitigation measures

17. Details of mitigation measures applied this year are reported in paragraphs O36 and O37. Details of mitigation measures implemented last year 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 autoliners, with fishers obliged to comply fully by 1 January 2006;

- (ii) at least two streamer lines meeting the CCAMLR specifications are compulsory. Some vessels use up to seven streamer lines;
- (iii) in 2004/05 all vessels had observers on board who observed 25% of hooks set. This level of observer effort will be continued in 2005/06;
- (iv) the discarding of hooks and the use of black lines are prohibited.

7. Conservation measures

18. 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.

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.