

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

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

1. Details of the fishery

The fishery for *Dissostichus eleginoides* operates in the French EEZ around the Kerguelen Islands in Division 58.5.1 (Figure 1).

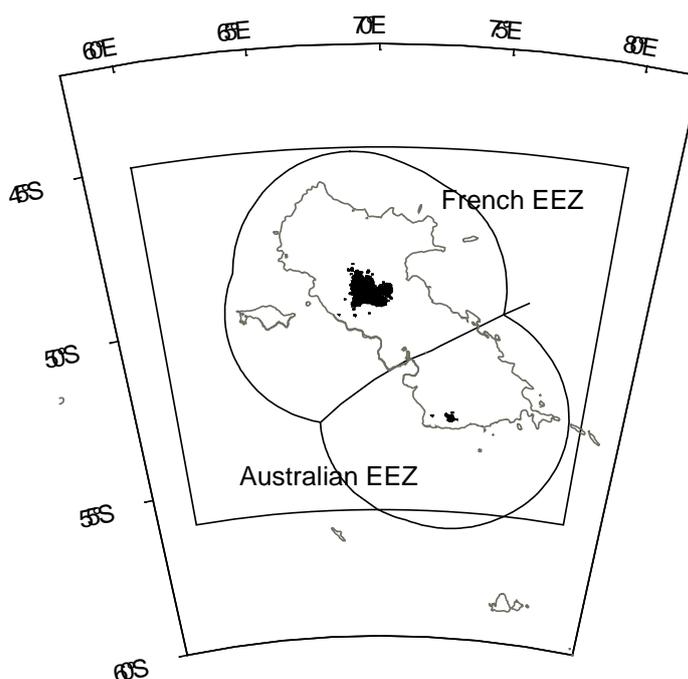


Figure 1: Map of Division 58.5.1 showing the location of the French EEZ, and the adjacent Australian EEZ in Division 58.5.2.

1.1 Reported catch

2. The catch limit of *D. eleginoides* set by France in its EEZ in Division 58.5.1 for 2010/11 was 5 100 tonnes, and this was allocated to seven longliners. The catch for the current season¹ reported to October 2011 was 2 906 tonnes, and the catch history is shown in Table 1. The fishery began in 1984/85 as a trawl fishery targeting *D. eleginoides*, however, trawling targeting other species between 1979 and 1984 caught small amounts of toothfish as by-catch. Trawling continued to 2000/01; a longline fishery began in 1991/92 and continues to the present. The fishery is active throughout most of the year.

¹ Although the fishing season defined by France in its EEZ extends from 1 September to 31 August of the following year, the season used in this report is the CCAMLR season (1 December to 30 November of the following year).

Table 1: Reported catch for *Dissostichus eleginoides* in the French EEZ in Division 58.5.1 and estimated IUU catch in Division 58.5.1 (source: STATLANT data for past seasons, fine-scale data for current season are incomplete, WG-FSA-11/10 and past reports for IUU catch for the whole division).

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
1999/90	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	4 911	254	5 156	144	5 300
2006/07	5 201	0	5 201	451	5 652
2007/08	4 850	0	4 850	720	5 570
2008/09	5 238	0	5 238	0	5 238
2009/10	4 912	0	4 912	22	4 934
2010/11	2 906	243	2 906	*	2 906

* Not estimated

1.2 IUU catch

3. Details of the IUU catches attributed to Division 58.5.1 are given in Table 1. IUU fishing was first detected in 1996 and in some years IUU catches have exceeded legal catches, resulting in a high level of total removals (>10 000 tonnes per season). There has been a sharp decline in IUU fishing since 2002/03 as a result of increased surveillance within the French EEZ and no IUU fishing occurred inside the EEZ since 2004/05. The IUU catch of *D. eleginoides* in 2010/11 was not estimated (SC-CAMLR-XXIX, paragraph 6.5).

1.3 Size distribution of catches

4. Data from the trawl fishery cover the period from 1990/91 to 1997/98 (Figure 2). Most *D. eleginoides* caught by trawl range from 40 to 120 cm in length, with a mode at approximately 60–70 cm. A smaller mode at approximately 40–50 cm is evident in 1994/95.

5. Data from the longline fishery cover the period 1995/96 to the current season (Figure 3). Most *D. eleginoides* caught by longline range from 40 to 120 cm in length, with a mode at approximately 80–100 cm at the beginning of the series, and 60–80 cm in recent seasons.

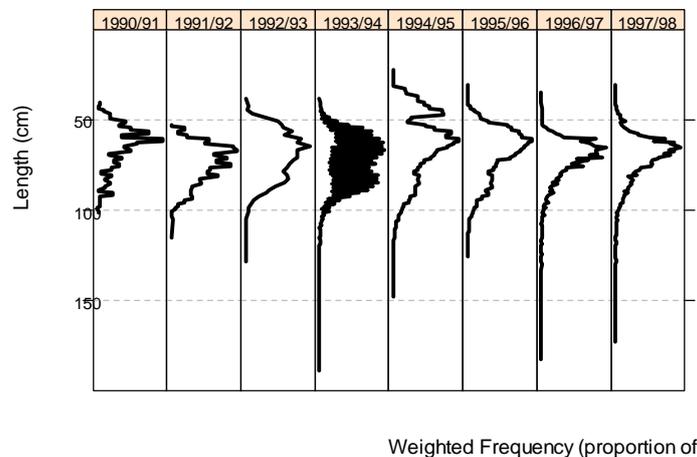


Figure 2: Catch-weighted length frequencies for *Dissostichus eleginoides* caught by trawl in the French EEZ in Division 58.5.1 (source: fine-scale and STATLANT data).

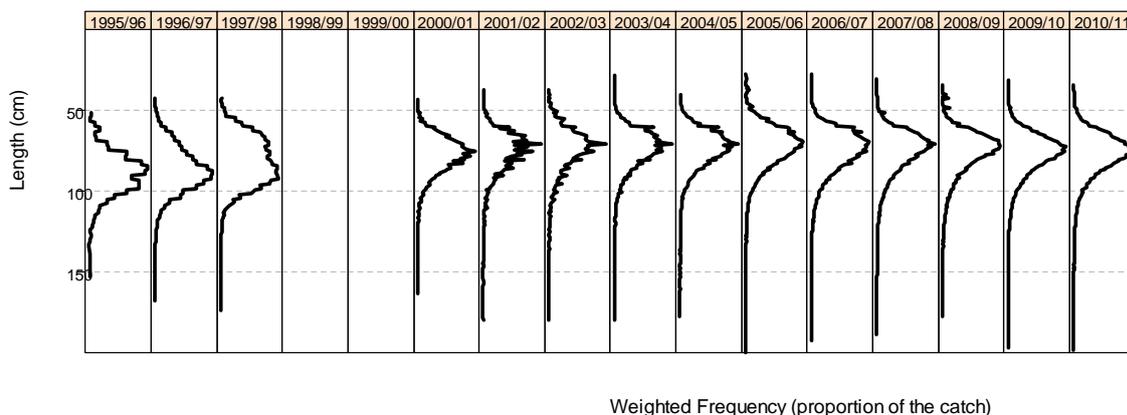


Figure 3: Catch-weighted length frequencies for *Dissostichus eleginoides* caught by longline in the French EEZ in Division 58.5.1 (source: fine-scale and STATLANT data).

2. Stocks and areas

6. *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 (Lord et al., 2006). Tagging experiments at Heard Island (Division 58.5.2) (Williams et al., 2002;

WG-FSA-07/48 Rev. 1) 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.

3. Parameter estimations

3.1 Summary of the longline fishery

7. Reported catches by year and nationality for longline vessels are summarised in Table 2. The average (unstandardised) catch per hook has decreased from 0.37 kg/hook in 1999/2000 to 0.18 in 2003/04 and has increased to 0.23 kg/hook in 2010/11. Effort by month and year from the longline fishery from 1994/95 to 2010/11 is summarised in Table 3.

Table 2: Longline fishery: number of records extracted (sets), catch (tonnes) by nation, number of vessels, mean catch per set, mean catch per hook and mean depth fished (source: C2 data).

Season	Sets	Catch (tonnes)			No. of vessels	Catch/set (tonnes)	Catch/hook (kg)	Mean depth (m)
		France	Ukraine	Total				
1994/95	388	-	302	302	2	0.8	0.03	518
1995/96	1 221	-	812	812	2	0.7	0.06	481
1996/97	719	-	628	628	3	0.9	0.36	473
1997/98	1 177	121	808	929	3	0.8	0.31	499
1998/99	622	513	327	840	3	1.4	0.26	600
1999/00	769	2 992	-	2 992	5	3.9	0.37	1 110
2000/01	862	2 589	-	2 589	5	3.0	0.33	1 083
2001/02	1 688	4 087	-	4 087	9	2.4	0.27	920
2002/03	3 105	5 457	-	5 457	7	1.8	0.20	1 026
2003/04	3 087	5 104	-	5 104	8	1.7	0.18	1 054
2004/05	3 086	5 022	-	5 022	7	1.6	0.19	1 034
2005/06	2 694	4 694	-	4 694	7	1.7	0.20	1 166
2006/07	2 797	5 350	-	5 350	7	1.9	0.21	1 225
2007/08	2 352	4 850	-	4 850	7	2.1	0.23	1 252
2008/09	2 533	5 244	-	5 244	7	2.1	0.26	1 187
2009/10	2 600	4 930	-	4 930	7	1.9	0.22	1 196
2010/11	1 490	2 910	-	2 910	7	2.0	0.23	1 207
Total	31 335	53 863	2 877	57 004				

Table 3: Number of sets by month and year in the longline fishery.

Season	Month												Total
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
1994/95	0	0	0	0	0	0	0	0	0	0	117	271	388
1995/96	284	357	350	155	59	0	0	0	0	0	0	161	1 366
1996/97	126	54	108	54	0	0	0	0	0	0	104	273	719
1997/98	322	301	309	82	0	0	0	0	0	0	39	124	1 177
1998/99	117	62	98	171	94	0	0	0	0	2	47	31	622
1999/00	53	70	69	39	68	83	78	8	0	0	132	169	769
2000/01	24	43	97	90	44	45	52	10	0	36	217	204	862
2001/02	73	183	94	62	176	176	91	70	0	250	370	143	1 688
2002/03	199	268	265	198	291	275	417	164	193	217	391	227	3 105
2003/04	296	345	0	304	285	300	294	150	37	290	477	309	3 087
2004/05	265	371	0	429	257	302	254	64	0	367	517	260	3 086
2005/06	160	350	3	401	182	269	231	37	0	264	513	284	2 694
2006/07	146	419	186	130	337	296	249	29	0	408	395	202	2 797
2007/08	291	411	92	153	227	111	74	44	0	395	450	104	2 352
2008/09	286	418	0	168	257	181	89	26	0	316	495	297	2 533
2009/10	149	412	0	118	303	311	170	33	0	361	502	241	2 600
2010/11	246	367	0	55	332	230	134	89	37	0	0	0	1 490
Total	3037	4431	1671	2609	2912	2579	2133	724	267	2906	4766	3300	31335

8. Depredation has an impact on the catch landed from each line. Depredation was assumed to not have been present before 2001, to have increased linearly to 2003, and to have been constant thereafter. Roche et al. (2007) estimated that the depredation over 2002/03 and 2003/04 was 348 tonnes for a landed catch of 10 900 tonnes. This implies a depredation rate of 3%.

9. The C2 data were used to estimate standardised CPUE indices for the longline fishery from 1999 to 2007. In addition, standardised CPUE indices, assuming depredation, were also estimated by adjusting the C2 catches by a factor of 1 for the years before 2001, 1.031 for the years 2003–2007, and a linear interpolation between 1 and 1.031 for the years 2001 and 2002. Estimated CPUE indices assuming depredation (adjusted) and without depredation (unadjusted) are given in Table 4 and Figure 4. In general, CPUE indices declined between 1999 and 2003, and have remained relatively stable since. The inclusion of depredation had a minimal impact on the trend in the CPUE indices.

Table 4: CPUE indices unadjusted and adjusted for depredation.

Year	Unadjusted			Adjusted		
	Index	95% CIs	CV	Index	95% CIs	CV
1999	2.36	(1.79–3.11)	0.14	2.31	(1.75–3.04)	0.14
2000	1.56	(1.45–1.67)	0.03	1.52	(1.42–1.63)	0.03
2001	1.28	(1.20–1.36)	0.03	1.26	(1.19–1.34)	0.03
2002	0.96	(0.92–1.01)	0.03	0.96	(0.92–1.01)	0.03
2003	0.75	(0.71–0.78)	0.02	0.76	(0.72–0.79)	0.02
2004	0.72	(0.69–0.75)	0.02	0.73	(0.70–0.76)	0.02
2005	0.70	(0.67–0.73)	0.02	0.71	(0.67–0.74)	0.02
2006	0.79	(0.75–0.82)	0.02	0.80	(0.76–0.83)	0.02
2007	0.75	(0.71–0.78)	0.03	0.75	(0.72–0.79)	0.03

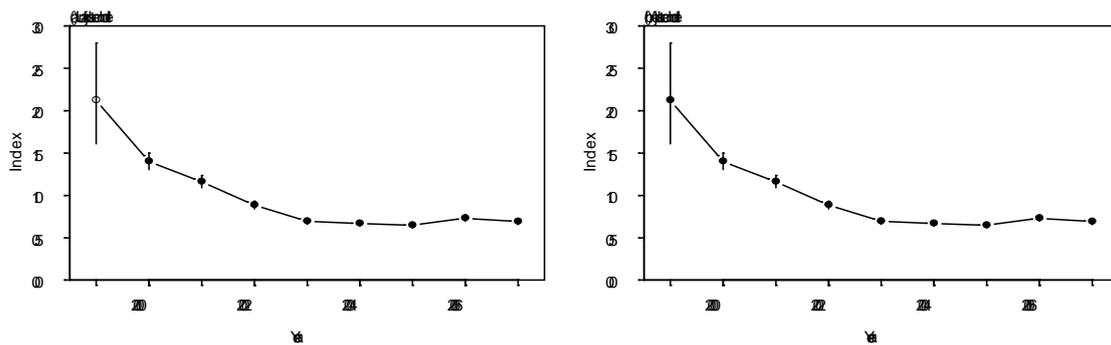


Figure 4: Estimated relative CPUE indices assuming no depredation (unadjusted) and depredation (adjusted).

3.2 Biological parameters

10. No biological parameters (except size-at-first-maturity, see WG-FSA-05/27) 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

11. During the 2006 survey, 639 fish were tagged and 18 848 fish were tagged from the longline fishery, 997 fish were recaptured from French tagging and 130 fish from Heard Island and McDonald Islands tagging so far. During the 2010/11 season, 444 tagged fish were caught on longlines, 416 French tags and 28 Australian tags. A cooperative work between France and Australia has been conducted (May/June 2009–2011, Paris) on analyses of catch, effort and other data to be used to progress understanding of fish stocks and fishery dynamics for Divisions 58.5.1 and 58.5.2.

12. Considerable progress has been made in developing an integrated stock assessment using CASAL. However, some outstanding issues need to be addressed before it can be recommended to provide management advice. The Working Group noted that the data files used to produce the assessment results reported in WG-FSA-11/28 required zero catches in 2011 for several fisheries in order to produce the reported B_0 of 200 722 tonnes. When catches in all fisheries through 2011 were included in the data, the estimate of B_0 hit the upper bound of 205 000 tonnes and produced errors when the boundaries for the estimate of B_0 were widened.

4.1 Research requirements

13. The Working Group encouraged the estimation of biological parameters for the Kerguelen Islands area and also encouraged further cooperative work in the intersessional

period between France and Australia towards a formal assessment of toothfish in this region (WG-SAM-11/20, WG-FSA-11/24 and WG-FSA-11/28). The Working Group encouraged France to continue its tagging program in Division 58.5.1.

14. The Working Group noted the results from the POKER survey in 2006 presented in WG-FSA-07/16, including estimates of biomass, distribution and length frequencies for toothfish and important by-catch species such as *Lepidonotothen squamifrons*, *Macrourus carinatus*, *Bathyraja eatonii* and *B. irrasa*. The Working Group encouraged France to use these data and previously published biological parameters to develop assessments for these species.

5. By-catch

5.1 By-catch removals

15. By-catch removals from the fishery for *D. eleginoides* are detailed in Table 5. In order of importance, macrourids (*M. carinatus*), rajids (*B. 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 (WG-FSA-10/34).

Table 5: Catch history for by-catch species (macrourids, rajids and *Antimora rostrata*) taken in the fishery for *Dissostichus eleginoides* in the French EEZ in Division 58.5.1 (source: fine-scale data).

Season	Macrourids			Rajids			<i>Antimora rostrata</i>		
	Reported catch (tonnes)			Reported catch (tonnes)			Reported catch (tonnes)		
	Longline	Trawl	Total	Longline	Trawl	Total	Longline	Trawl	Total
1997/98	12	0	12	12	7	19	0	0	0
1998/99	37	0	37	42	6	48	1	0	1
1999/00	162	2	164	120	26	146	1	0	1
2000/01	97	0	97	116	261	377	0	0	0
2001/02	452	0	452	537	0	537	2	0	2
2002/03	769	0	769	924	0	924	10	0	10
2003/04	939	0	939	1134	0	1134	12	0	12
2004/05	779	0	779	974	0	974	47	0	47
2005/06	686	0	686	597	0	597	54	0	54
2006/07	782	0	782	546	0	546	56	0	56
2007/08	816	0	816	376	0	376	68	0	68
2008/09	957	0	957	415	0	415	45	0	45
2009/10	887	0	887	456	0	456	58	0	58
2010/11	451	0	451	289	0	289	25	0	25

5.2 Assessments of impact on affected populations

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

5.3 Mitigation measures

17. The Working Group recommended that, where possible, areas with high by-catch rates should be avoided, particularly those shown in WG-FSA-09/42.

6. By-catch of birds and mammals

18. There were 49 seabird mortalities observed inside the French EEZ of Division 58.5.1 for the 2010/11 season (WG-IMAF-11/5 Rev.2, paragraph 8). These consisted of 39 white-chinned petrels (*Procellaria aequinoctialis*), 7 grey petrels (*P. cinerea*), 2 northern giant petrels (*Macronectes halli*) and one rockhopper penguin (*Eudyptes chrysocome*). By-catch rates (birds/thousand hooks) and estimated by-catch of seabirds are shown in Table 6.

19. Further details of seabird by-catch in previous seasons can be found in the Scientific Committee reports.

Table 6: Total extrapolated incidental mortality of seabirds and observed mortality rates (birds/thousand hooks) in longline fisheries in the French EEZ at Kerguelen Islands in Division 58.5.1.

Fishing season	By-catch rate	Estimated by-catch
2000/01*	0.092	1 917
2001/02*	0.9359	10 814
2002/03*	0.518	13 926
2003/04*	0.2054	3 666
2004/05	0.164	4 387
2005/06	0.092	2 352
2006/07	0.0798	1 943
2007/08	0.0585	1 224
2008/09	0.034	417
2009/10	0.015	230
2010/11	0.013	155

* The number of observed hooks has not been collected and the values given are from the total number of hooks set.

20. No marine mammals have been reported as by-catch in Division 58.5.1 in the 2010/11 season.

21. In 2011, as in previous years, WG-IMAF agreed the level of risk of incidental mortality of seabirds in Division 58.5.1 is category 5 (high) (SC-CAMLR-XXX, Annex 8).

6.1 Mitigation measures

22. Details of mitigation measures applied in previous seasons can be found in the Scientific Committee reports (SC-CAMLR-XXIII, Annex 5, paragraphs 7.35 to 7.45;

SC-CAMLR-XXV, Annex 5, Appendix D, paragraph 14; SC-CAMLR-XXVI, paragraph 5.7; SC-CAMLR-XXVII, paragraphs 5.6 to 5.11; SC-CAMLR-XXVIII, paragraphs 3.46 to 3.50; SC-CAMLR-XXIX, paragraph 4.7).

23. Mitigation measures that were put in place during the last three seasons will be continued for the 2011/12 and 2012/13 seasons, however new measures will also be applied (WG-IMAF-11/10 Rev. 1). These include:

- (i) changes to the Brickle curtain to ensure it is effective in all weather conditions.
- (ii) closure of fishing areas to vessels that have high by-catch rates and quota allocation reduced.
- (iii) education and training will be strengthened by regular meetings between TAAF and fishing masters of vessels with high by-catch.
- (iv) data will continue to be collected and submitted using CCAMLR standard methods and forms.
- (v) a demographic study on the white-chinned petrel will be undertaken at Kerguelen Island, as well as the continued population counts of white-chinned petrels on the Kerguelen archipelago.

7. Harvest controls and management advice

7.1 Conservation measures

24. 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 by 1° longitude rectangle)
- one French observer on board each licensed vessel
- minimum fishing depth (500 m)
- minimum legal size for toothfish (60 cm)
- mitigation measures for the reduction of bird mortality
- landings occur at one place (Réunion Island)
- skates to be cut off if not processed (started December 2006)
- port inspection.

7.2 Management advice

25. 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 outside areas of national jurisdiction for *D. eleginoides*, described in CM 32-13, remain in force.

References

- Lord, C., G. Duhamel and P. Pruvost. 2006. The Patagonian toothfish (*Dissostichus eleginoides*) fishery in the Kerguelen Islands (Indian Ocean sector of the Southern Ocean). *CCAMLR Science*, 13: 1–25.
- Roche, C., C. Guinet, N. Gasco and G. Duhamel. 2007. Marine mammals and demersal longline fishery interactions in Crozet and Kerguelen Exclusive Economic Zones: an assessment of depredation levels. *CCAMLR Science*, 14: 67–82.
- 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.