

**Fishery Report: *Dissostichus eleginoides* (TOP)
Kerguelen Islands (Division 58.5.1)**

CONTENTS

	Page
1. Details of the fishery	1
1.1 Reported catch	1
1.2 IUU catch	2
1.3 Size distribution of catches	2
2. Stocks and areas	4
3. Parameter estimations	4
3.1 Summary of the longline fishery	4
3.2 Biological parameters	6
4. Stock assessment	6
4.1 Research requirements	7
5. By-catch	8
5.1 By-catch removals	8
5.2 Assessments of impact on affected populations	8
5.3 Mitigation measures	8
6. Incidental mortality of birds and mammals	9
6.1 Incidental mortality reported	9
6.2 Identification of levels of risk	9
6.3 Mitigation measures	9
7. Harvest controls and management advice	10
7.1 Conservation measures	10
7.2 Management advice	11
References	11

Throughout this report the CCAMLR fishing season is represented by the year in which that season ended, e.g. 2012 represents the 2011/12 CCAMLR fishing season (from 1 December 2011 to 30 November 2012). Although the fishing season defined by France in its EEZ extends from 1 September to 31 August of the following year, the data reporting period used in this report is the CCAMLR season.

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

1. Details of the fishery

1. The present longline fishery for *Dissostichus eleginoides* operates in the French EEZ around the Kerguelen Islands (outside the 12 n mile zone and down to the 500 m isobath) in Division 58.5.1 (Figure 1).

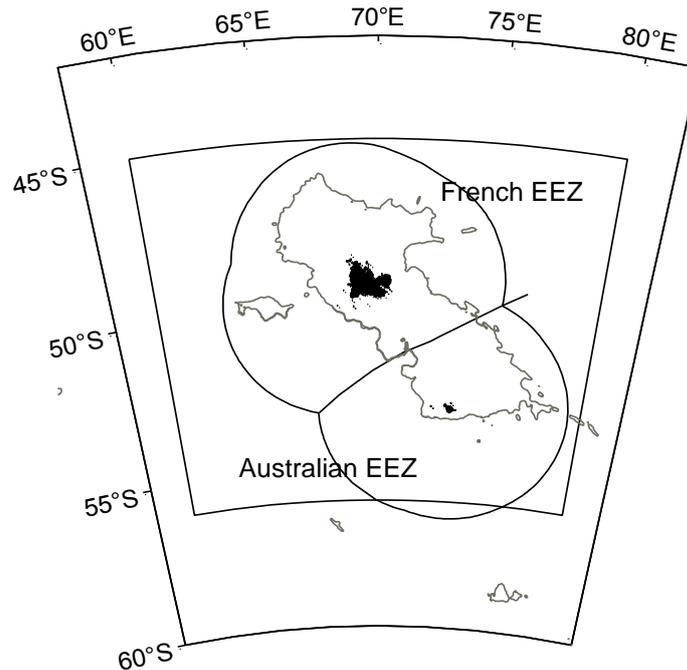


Figure 1: Map of Division 58.5.1 showing the location of the French EEZ, and the adjacent Australian EEZ in Division 58.5.2.

1.1 Reported catch

2. The catch limit of *D. eleginoides* set by France in its EEZ in Division 58.5.1 for 2012 was 5 100 tonnes (season 1 September to 31 August), and this was allocated to seven longliners. The catch for the current season reported to October 2012 was 2 957 tonnes, and the catch history is shown in Table 1. The fishery began in 1985 as a trawl fishery targeting *D. eleginoides*, however, trawling targeting other species between 1979 and 1984 caught small amounts of toothfish as by-catch (see CCAMLR statistical bulletins). Trawling continued to 2001 and occasionally during 2006 and 2010; a longline fishery began in 1992 and continues to the present. The fishery is active throughout the year with the exception of a summer closure period (1 February to either 1 or 15 March) that has been in place since 2004.

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 removals (tonnes)
	Longline	Trawl	Total		
1988	0	892	892	0	892
1989	0	1311	1311	0	1311
1990	0	1243	1243	0	1243
1991	26	2982	3008	0	3008
1992	679	7079	7758	0	7758
1993	243	3354	3597	0	3597
1994	749	4632	5381	0	5381
1995	1467	4129	5596	0	5596
1996	1233	3478	4710	833	5543
1997	1048	4012	5059	6094	11153
1998	1747	2967	4714	7156	11870
1999	2062	2669	4730	1237	5967
2000	3046	3093	6139	2600	8739
2001	2593	2153	4747	4550	9297
2002	3976	178	4154	6300	10454
2003	5291	0	5291	5518	10809
2004	5171	0	5171	536	5707
2005	5073	0	5073	268	5341
2006	4911	254	5156	144	5300
2007	5201	0	5201	451	5652
2008	4850	0	4850	720	5570
2009	5238	0	5238	0	5238
2010	4912	0	4912	22	4934
2011	5235	243	5478	*	5478
2012	2957	0	2957	*	2957

* 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 2003 as a result of increased surveillance within the French EEZ and no IUU fishing occurred inside the EEZ since 2005. The IUU catch of *D. eleginoides* in 2012 was not estimated.

1.3 Size distribution of catches

4. Data from the trawl fishery cover the period from 1991 to 1998 (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 was evident in 1996. Data from the longline fishery cover the period 1996 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. These length-frequency distributions of catches are unweighted and the interannual variability shown in the figure may reflect differences in the fished population but are also likely to be biased by changes in factors such as the characteristics/number of vessels in the fishery and the spatial and temporal distribution of fishing.

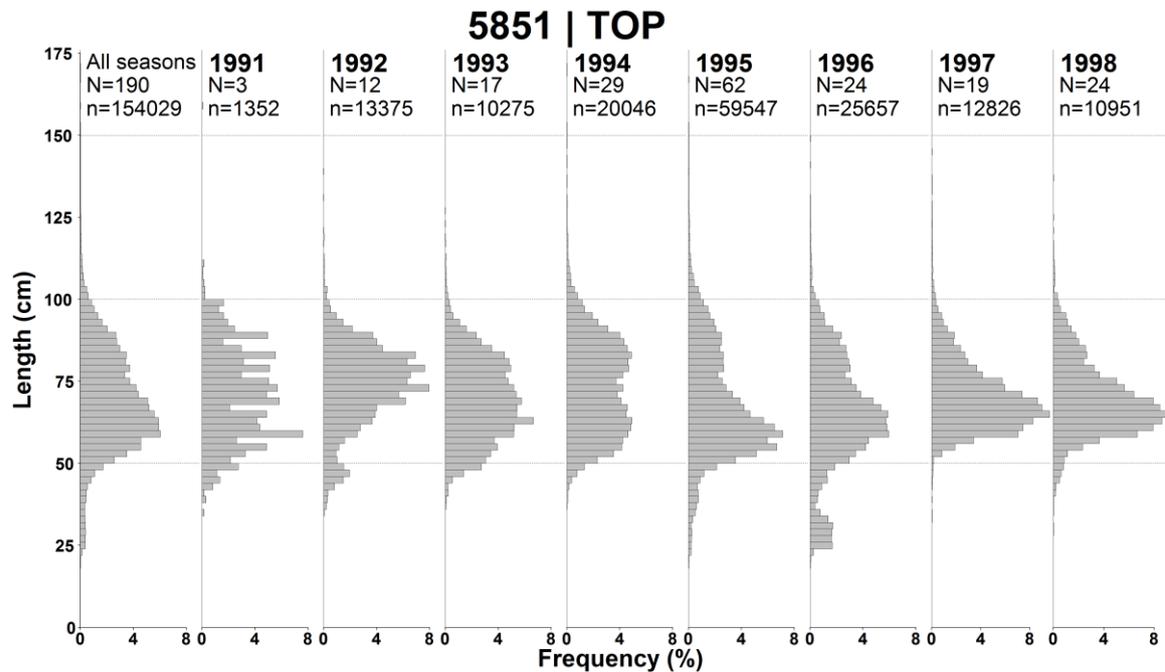


Figure 2: Length frequencies for *Dissostichus eleginoides* in Division 58.5.1 in trawl fisheries. The number reports (N) (data are aggregated over monthly or 10-day reports) and the number of fish measured (n) in each year are given at the top of each panel.

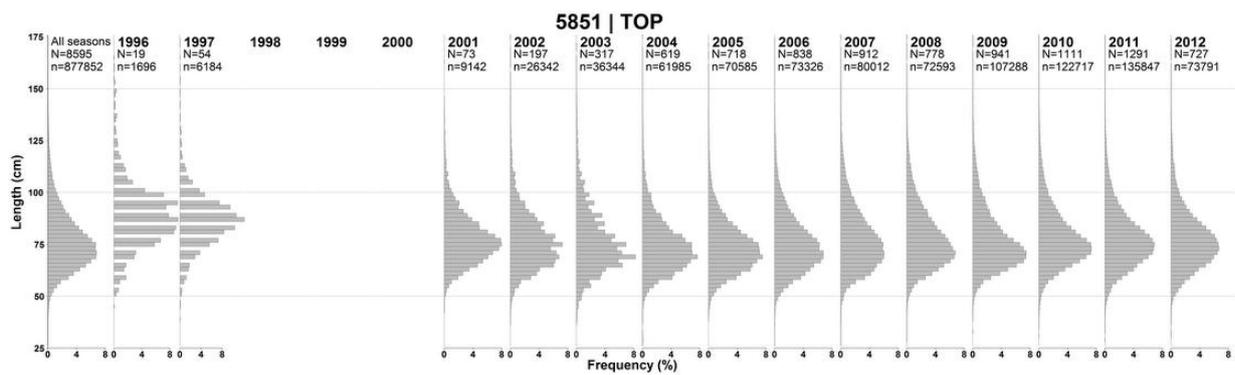


Figure 3: Length frequencies for *Dissostichus eleginoides* in longline fisheries in Division 58.5.1 from 1996 to present. The number of hauls (N) and the number of fish measured (n) in each year are given at the top of each panel. Data from 1996 and 1997 were measured in 3cm intervals.

2. Stocks and areas

5. *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 water 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 during the early winter (Lord et al., 2006). A tagging program that began in 2007 has achieved a similar tag-recapture rate to the tagging program in Division 58.5.2. Movement of tagged fish mainly occur over short distances (Figure 4) but some fish move around the slope as well as outside the division (to Heard Island and Crozet Island). Fish from the tagging program at Heard Island (Division 58.5.2) (Williams et al., 2002; WG-FSA-07/48 Rev. 1) have also shown movement of sub-adult/adult fish between zones (Heard to Kerguelen and also Crozet) but the proportion of exchange between stocks is relatively small.

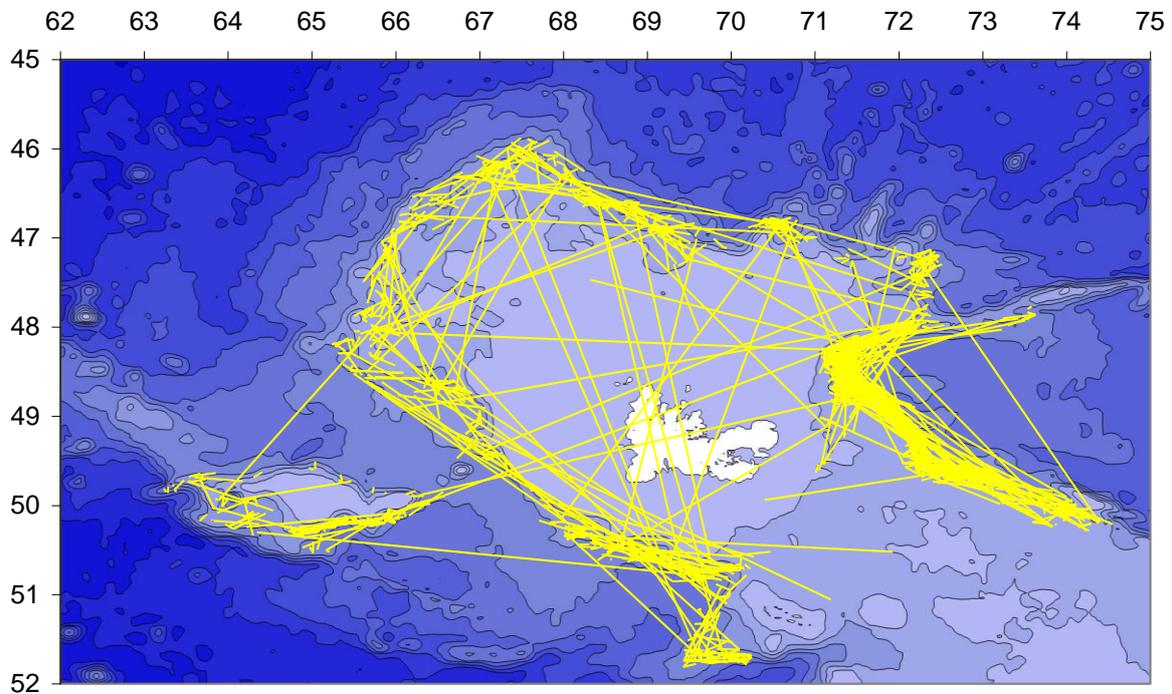


Figure 4: Movement of fish based on tag recaptures in the French EEZ in Division 58.5.1.

3. Parameter estimations

3.1 Summary of the longline fishery

6. 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 2000 to 0.18 in 2004 and has increased to 0.23 kg/hook in 2011. Effort by month and year from the longline fishery from 1995 to 2011 is summarised in Table 3. The monthly values of

the most recent effort shows both the annual partial closure of the fishery (February to March) and the achievement of annual catch limits at the approach of the winter season by longliners (inducing a sharp decrease).

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				
1995	388	-	302	302	2	0.8	0.03	518
1996	1 221	-	812	812	2	0.7	0.06	481
1997	719	-	628	628	3	0.9	0.36	473
1998	1 177	121	808	929	3	0.8	0.31	499
1999	622	513	327	840	3	1.4	0.26	600
2000	769	2 992	-	2 992	5	3.9	0.37	1 110
2001	862	2 589	-	2 589	5	3.0	0.33	1 083
2002	1 688	4 087	-	4 087	9	2.4	0.27	920
2003	3 105	5 457	-	5 457	7	1.8	0.20	1 026
2004	3 087	5 104	-	5 104	8	1.7	0.18	1 054
2005	3 086	5 022	-	5 022	7	1.6	0.19	1 034
2006	2 694	4 694	-	4 694	7	1.7	0.20	1 166
2007	2 797	5 350	-	5 350	7	1.9	0.21	1 225
2008	2 352	4 850	-	4 850	7	2.1	0.23	1 252
2009	2 533	5 244	-	5 244	7	2.1	0.26	1 187
2010	2 600	4 930	-	4 930	7	1.9	0.22	1 196
2011	2 604	5 235	-	5 235	7	2.0	0.22	1 217
2012	1 541	2 957	-	2 957	7	1.9	0.23	1 133

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	
1995	0	0	0	0	0	0	0	0	0	0	117	271	388
1996	284	357	350	155	59	0	0	0	0	0	0	161	1 366
1997	126	54	108	54	0	0	0	0	0	0	104	273	719
1998	322	301	309	82	0	0	0	0	0	0	39	124	1 177
1999	117	62	98	171	94	0	0	0	0	2	47	31	622
2000	53	70	69	39	68	83	78	8	0	0	132	169	769
2001	24	43	97	90	44	45	52	10	0	36	217	204	862
2002	73	183	94	62	176	176	91	70	0	250	370	143	1 688
2003	199	268	265	198	291	275	417	164	193	217	391	227	3 105
2004	296	345	0*	304	285	300	294	150	37	290	477	309	3 087
2005	265	371	0*	429	257	302	254	64	0	367	517	260	3 086
2006	160	350	3*	401	182	269	231	37	0	264	513	284	2 694
2007	146	419	186*	130*	337	296	249	29	0	408	395	202	2 797
2008	291	411	92*	153*	227	111	74	44	0	395	450	104	2 352
2009	286	418	0*	168*	257	181	89	26	0	316	495	297	2 533
2010	249	377	0*	46*	325	234	144	85	77	336	509	222	2 604
2011	221	366	0*	148*	210	238	145	134	79				1 541

* Absence of sets or lower number of sets are explained by fishing closure during all or part of the month.

7. Depredation (sperm and killer whales) has an impact on the catch hauled 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 2003 and 2004 was 348 tonnes for a landed catch of 10 900 tonnes. This implies a depredation rate of 3%.

8. 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 shown in Figure 5. 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.

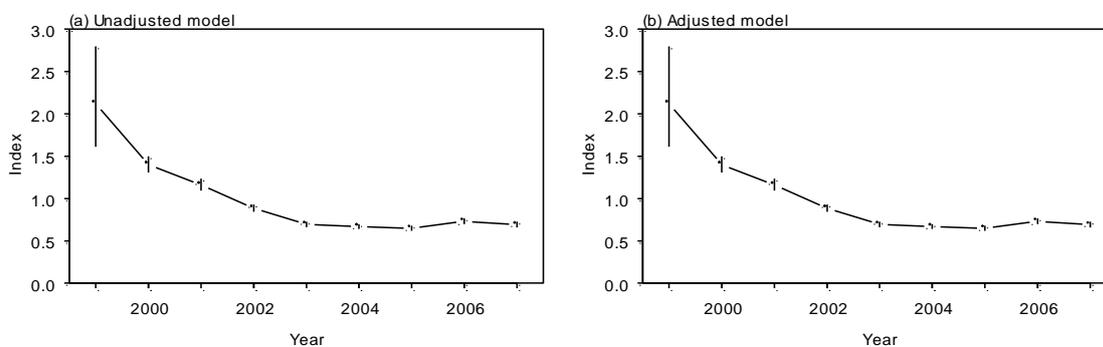


Figure 5: Estimated relative CPUE indices assuming no depredation (unadjusted) and depredation (adjusted).

3.2 Biological parameters

9. Biological parameters are old and concern only a part of the exploited stock (except size-at-first-maturity, see WG-FSA-05/27) for Division 58.5.1. However, it is likely that the more recent parameters used in the stock assessment for Heard Island would be valid for the Kerguelen stock (growth curve, natural mortality) because a metapopulation for the whole Indian Ocean sector of the Southern Ocean seems to be valid (Appleyard et al., 2004).

4. Stock assessment

10. A total of 23 196 toothfish have been tagged in the longline fishery in the French EEZ in Division 58.5.1, of which 1 532 have been recaptured (Table 4); in addition 145 fish from the same plateau (Heard Island, Division 58.5.2) have been recaptured in Division 58.5.1.

Table 4: Releases of tags inside Division 58.5.1 per calendar year and year of recaptures.

Year	Tagged	Recaptured						
		2006	2007	2008	2009	2010	2011	2012
2006	708	2	4	7	8	2	1	0
2007	2 373		35	74	79	78	61	20
2008	2 693			23	108	85	84	25
2009	4 322				44	122	131	56
2010	5 166					46	155	86
2011	5 423						61	126
2012	2 511							9
Total	23 196							1 532

11. Two Biomass survey cruises (named POKER 1 and POKER 2) have been conducted during 2006 (Duhamel and Hautecoeur, 2009) and 2010 to estimate biomass and recruitment of *D. eleginoides* on the whole shelf and surrounding banks. The results have been included in a stock assessment CASAL model (WG-FSA-11/28 Rev. 1 and WG-FSA-12/09). A new survey is expected for 2013.

12. Cooperative work between France and Australia on analyses of catch, effort and other data (survey, tagging) to be used to progress understanding of fish stocks and fishery dynamics for Divisions 58.5.1 and 58.5.2 is ongoing (see WG-SAM-11/20).

13. WG-FSA agreed that, until a more robust stock assessment is undertaken, the integrated assessment using CASAL that was presented in WG-FSA-12/09, could be used to provide management advice for 2013 and agreed that the current catch limit of 5 100 tonnes could be used as management advice for 2013.

14. 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 (CM) 32-13, remain in force.

4.1 Research requirements

15. The Working Group encouraged the estimation of biological parameters for the toothfish population at the Kerguelen Islands 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 Rev. 1). The Working Group also encouraged France to continue its tagging program in Division 58.5.1.

16. 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

17. By-catch removals of macrourids (*M. carinatus*), rajids (*Raja taaf*) and morids (*Antimora rostrata*) from the longline fishery for *D. eleginoides* are detailed in Table 5. Only the latter species is fully discarded, the others being partly or totally processed. The spatial distribution of by-catch indicates specific areas of higher catch rates that differed between species (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
1998	12	0	12	12	7	19	0	0	0
1999	37	0	37	42	6	48	1	0	1
2000	162	2	164	120	26	146	1	0	1
2001	97	0	97	116	261	377	0	0	0
2002	452	0	452	537	0	537	2	0	2
2003	769	0	769	924	0	924	10	0	10
2004	939	0	939	1134	0	1134	12	0	12
2005	779	0	779	974	0	974	47	0	47
2006	686	0	686	597	0	597	54	0	54
2007	782	0	782	546	0	546	56	0	56
2008	816	0	816	376	0	376	68	0	68
2009	957	0	957	415	0	415	45	0	45
2010	887	0	887	456	0	456	58	0	58
2011	860	0	860	438	0	438	52	0	52
2012	435	0	435	278	0	278	14	0	14

5.2 Assessments of impact on affected populations

18. No stock assessments of individual by-catch species are presently undertaken but biomass of a part of the stocks is now available from the biomass surveys and could help in the future.

5.3 Mitigation measures

19. The Working Group recommended that, where possible, areas with high by-catch rates should be avoided, particularly those shown in WG-FSA-09/42. A plan of action to avoid high-concentration areas of by-catch has been proposed to the longliners during 2012 and results will be further analysed.

6. Incidental mortality of birds and mammals

6.1 Incidental mortality reported

20. There were 38 seabird mortalities observed inside the French EEZ of Division 58.5.1 in 2012 (WG-IMAF-12/66). These consisted of 34 white-chinned petrels (*Procellaria aequinoctialis*) and four grey petrels (*P. cinerea*). By-catch rates (birds/thousand hooks) and estimated by-catch of seabirds are shown in Table 6. It is the result of a plan of action approved by CCAMLR and additional mitigation measures in force in the French EEZ.

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

Fishing season	By-catch rate	Estimated by-catch
2001*	0.092	1917
2002*	0.9359	10814
2003*	0.518	13926
2004*	0.2054	3666
2005	0.164	4387
2006	0.092	2352
2007	0.0798	1943
2008	0.0585	1224
2009	0.034	417
2010	0.013	318
2011	0.011	266
2012	0.012	157

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

21. No marine mammals have been reported as by-catch in Division 58.5.1 in the 2012 season.

6.2 Identification of levels of risk

22. The level of risk of incidental mortality of seabirds in Division 58.5.1 is category 5 (high) (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

6.3 Mitigation measures

23. 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).

24. Mitigation measures that were put in place during the last three seasons will be continued for the 2013 seasons, however, new French measures will also be applied (WG-IMAF-11/10 Rev. 1). These include:

- (i) changes to the bird exclusion device 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

25. Various national conservation and fisheries enforcement measures are also in force (in addition to the CCAMLR conservation measures that are applied in this fishery). The national measures include:

- annual fishing season closure (February and half of March)
- 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

26. In 2012 WG-FSA:

- (i) encouraged the estimation of biological parameters for *D. eleginoides* in Division 58.5.1 and encouraged the continued development of a stock assessment for this area
- (ii) encouraged France to continue its tagging program in Division 58.5.1
- (iii) encouraged France to continue its effort to reduce seabird by-catch
- (iv) recommended that avoidance of fishing in zones of specific high rates of abundance in by-catch should also be considered
- (v) recommended that, as no new information was available on the state of fish stocks in Division 58.5.1 outside areas of national jurisdiction, the prohibition of directed fishing for *D. eleginoides*, described in CM 32-13, remain in force.

References

- Appleyard, S.A., R. Williams and R.D. Ward. 2004. Population genetic structure of Patagonian toothfish in the West Indian Ocean sector of the Southern Ocean. *CCAMLR Science*, 11: 21–32.
- Duhamel, G. and M. Hautecoeur. 2009. Biomass, abundance and distribution of fish in the Kerguelen Islands EEZ (CCAMLR Statistical Division 58.5.1). *CCAMLR Science*, 16: 1–32.
- 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.