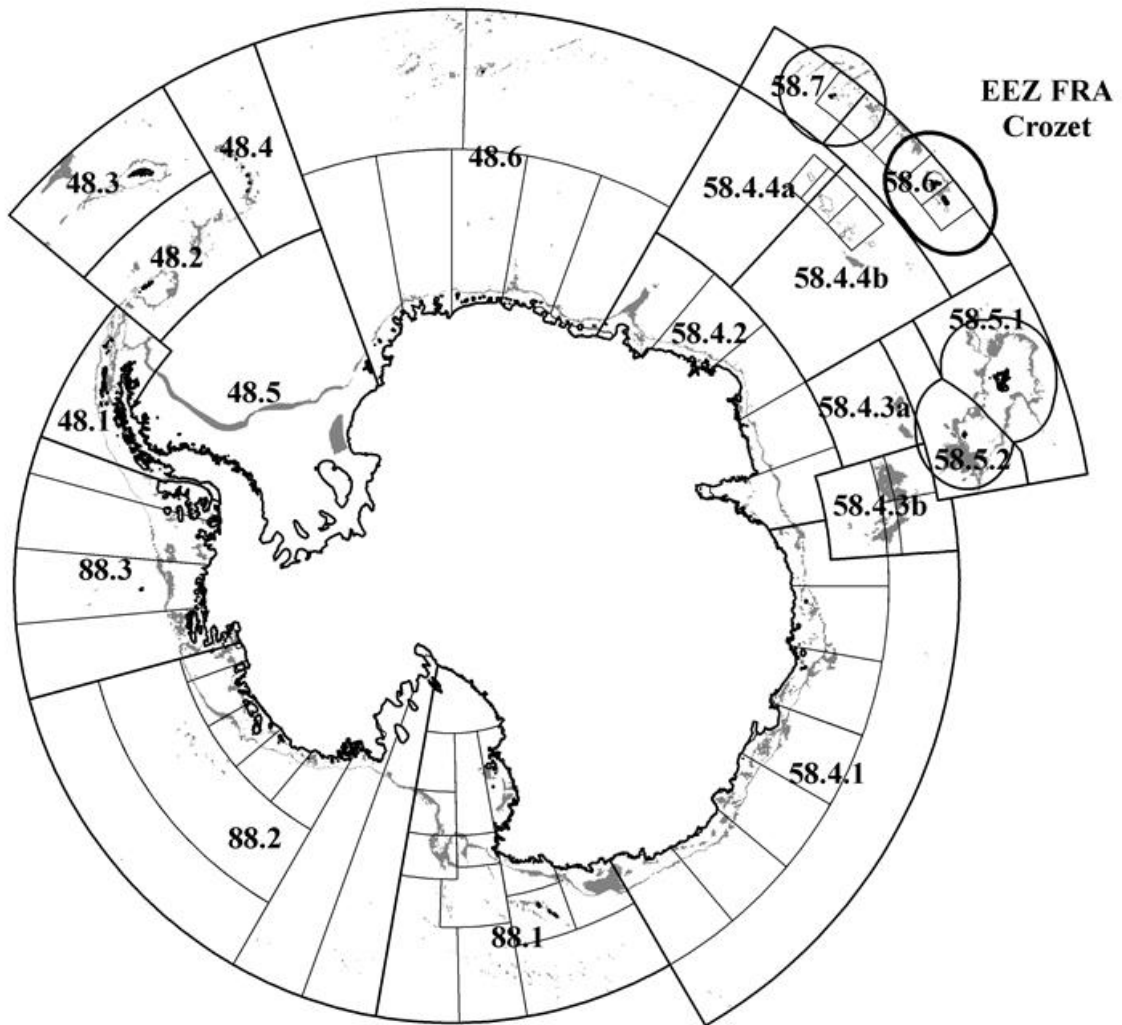


**Fishery Report 2014: *Dissostichus eleginoides* Crozet Island
French EEZ (Subarea 58.6)**



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The map on the cover page shows the management areas within the CAMLR Convention Area, the specific region related to this report is outlined in bold. Depths between 600 and 1 800 m (the ‘fishable depths’ for *Dissostichus* spp.) are shaded.

Throughout this report the CCAMLR fishing season is represented by the year in which that season ended, e.g. 2014 represents the 2013/14 CCAMLR fishing season (from 1 December 2013 to 30 November 2014).

Fishery Report 2014: *Dissostichus eleginoides* Crozet Island, French EEZ (Subarea 58.6)

Introduction to the fishery

1. This report describes the licensed longline fishery for Patagonian toothfish (*Dissostichus eleginoides*) in the French Exclusive Economic Zone (EEZ) established in 1978 around the Crozet Islands, which includes a portion of Subarea 58.6, small-scale research units (SSRUs) B, C and D, and extends into FAO Area 51 (north of 45°S), outside the CAMLR Convention Area.

2. Trials of trawl fishing, which were conducted by Japanese vessels prior to 1979 and by French vessels from 1983 to 1996 and in 2000, have since been discontinued. A joint survey between France and Japan first conducted longline fishing in Subarea 58.6 in 1997, and this has been used in the fishery since then.

3. The fishery is open year-round, but most fishing effort takes place in February and March when the fishery in the French EEZ at the Kerguelen Islands (Division 58.5.1) is closed. A high level of catch depredation (Tixier et al., 2010) by killer whales (*Orcinus orca*) is the main reason why fishers avoid fishing in Subarea 58.6. Fishing effort in this area concentrates on the Crozet shelf slope and on the eastern part of the del Cano Rise.

4. Within the French EEZs, catch limits for target and by-catch species, as well as vessel licensing, are allocated by France. French management measures (TAAF annual decrees), specific zone to the EEZ at Crozet Island, have restricted the longline fishery to waters outside the 12 n miles and no shallower than 500 m. A size limit has been set at 60 cm total length and every vessel must carry a scientific observer and must offload its catch only at Réunion Island. In 2014, a catch limit set by France of 700 tonnes was allocated to seven longliners.

5. An analysis presented in WG-FSA-14/10 estimated that the depredation of *D. eleginoides* by killer whales and sperm whales (*Physeter macrocephalus*) over the period 2003 to 2013 was 2 568 tonnes; this implies a depredation rate of 28 % of all fish caught.

6. A pot-trial cruise was conducted in February 2010 (WG-FSA-10/10) to try to find solutions to the depredation problem (and to reduce seabird mortality). However, while whale depredation and seabird by-catch is eliminated using pot gear, the catch rates of the target species were reduced and the by-catch of king crabs (*Lithodes murrayi* and *Paralomis aculeata*) was considerable.

Reported catches

7. Reported catches of *Dissostichus eleginoides* are presented in Table 1. The majority of the catch taken within the French EEZ is obtained from Subarea 58.6, the highest reported catch, of 1 158 tonnes, being recorded in 2002. In 2014, the catch so far for the French EEZ in Subarea 58.6 was 382 tonnes (Table 1).

Table 1: Catch history of *Dissostichus eleginoides* in the French EEZ at Crozet Islands (Subarea 58.6). The IUU estimate is for all of Subarea 58.6, including the South African EEZ. (Source: STATLANT data for past seasons, fine-scale data for current season.)

Season	Reported catch (tonnes)	Estimated IUU catch (tonnes)	Total removal (tonnes)
1977	6	0	6
1978	370	0	370
1983	17	0	17
1987	488	0	488
1988	21	0	21
1994	56	0	56
1995	115	0	115
1996	3	7 875	7 878
1997	413	11 760	12 173
1998	787	1 758	2 545
1999	877	1 845	2 722
2000	1 017	1 430	2 447
2001	1 091	685	1 776
2002	1 158	720	1 878
2003	531	302	833
2004	537	380	917
2005	559	12	571
2006	775	55	830
2007	410	0	410
2008	823	224	1 047
2009	885	0	885
2010	663	0	663
2011	703	0	703
2012	673	*	673
2013	840	*	840
2014**	382	*	382

* Not estimated.

** Incomplete data.

8. Fishing effort in the French EEZ in Subarea 58.6 is concentrated around the islands, with the highest catches of *D. eleginoides* (>1 000 tonnes) being recorded from SSRUs C and D.

Illegal, unreported and unregulated (IUU) fishing

9. Illegal, unreported and unregulated (IUU) fishing was first detected in Subarea 58.6 in 1996 and peaked the following year at an estimated 11 760 tonnes.

10. Estimates of IUU catch in Subarea 58.6 are presented in Table 1. Due to increased surveillance, IUU fishing has virtually been eliminated inside the French EEZ at Crozet Island. However, IUU fishing still persists outside the EEZ in Subarea 58.6.

11. There is one official report (2013) of IUU fishing inside the French EEZ of Subarea 58.6 since 2009 (CCAMLR-XXXII/21 Rev. 1) and, following the recognition of methodological issues in its assessment, no estimates of IUU catch of *Dissostichus* spp. have been provided since 2011 (SC-CAMLR-XXIX, paragraph 6.5).

Data collection

Biological data

12. The collection of biological data is conducted as part of the CCAMLR Scheme of International Scientific Observation. In longline fisheries targeting *D. eleginoides*, biological data collection includes representative samples of length, weight, sex and maturity stage, as well as collection of otoliths for age determination of the target and most frequently taken by-catch species.

Length distributions of catches

13. The length-frequency distributions of *D. eleginoides* caught in this fishery from 2005 to 2014 are presented in Figure 1. The majority of *D. eleginoides* caught ranged from 50 to 120 cm in length, with a single mode for all seasons at approximately 60–80 cm. These length-frequency distributions are unweighted (i.e. they have not been adjusted for factors such as the size of the catches from which they were collected). The interannual variability exhibited in the figure may reflect differences in the fished population but is also likely to reflect changes in the gear used, the number of vessels in the fishery and the spatial and temporal distribution of fishing.

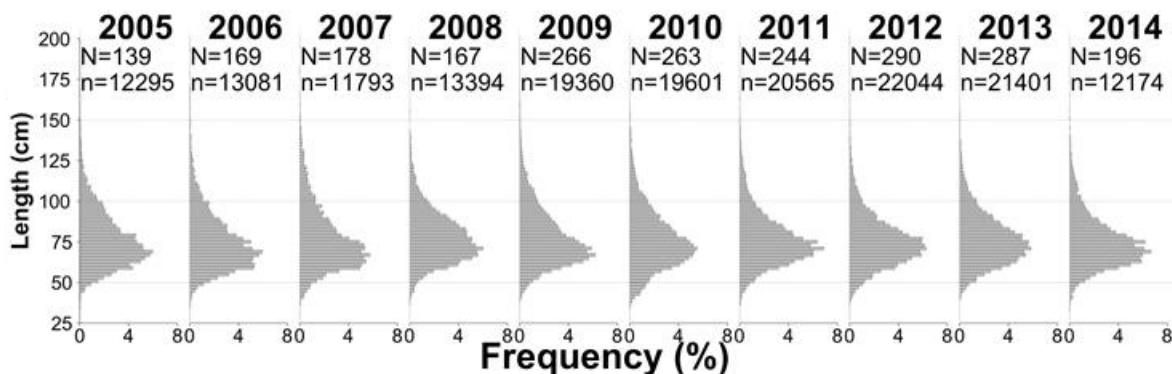


Figure 1: Annual length-frequency distributions of *Dissostichus eleginoides* caught in the French EEZ at the Crozet Islands, Subarea 58.6, from 2005 to 2014. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are provided.

Tagging

14. Within the French EEZ, vessels are required to tag and release toothfish at a rate of one fish per tonne of green weight caught throughout the season.

15. Tagging commenced in 2005 and to date, 6 209 fish have been tagged, of which 321 have been recaptured (Table 2).

Table 2: The number of individuals of *Dissostichus eleginoides* tagged and recaptured in each year in the French EEZ in Subarea 58.6 (*: partial data).

Year	Tagged	Recaptured								
		2006	2007	2008	2009	2010	2011	2012	2013	2014*
2005	91	1	0	0	0	1	0	0	0	0
2006	1 186	13	8	6	18	12	8	13	1	0
2007	502		3	13	7	5	4	1	0	1
2008	550			4	21	7	8	4	8	2
2009	690				10	17	11	9	12	4
2010	618					0	5	10	1	2
2011	727						4	13	6	1
2012	814							3	29	5
2013	809								7	2
2014*	222									1
Total	6 209									321

16. One fish which was tagged in Subarea 58.6 was recaptured in Subarea 58.7 and another in the SIOFA zone. Again, tagged fish from the Kerguelen Plateau (nine from Division 58.5.1 – Kerguelen and 22 from Division 58.5.2 – Heard Island) have been recovered in the Crozet EEZ. Despite these long-distance movements of sub-adult/adult fish, the proportion of exchange between stocks is still unknown and no fish from Crozet Island have been recovered eastward on the Kerguelen Plateau.

Life-history parameters

Data collection

17. The life history of *Dissostichus eleginoides* is characterised by slow growth, low fecundity and late maturity. *Dissostichus eleginoides* appear to have protracted spawning periods, taking place mainly in winter, but which may start as early as late autumn and extend into spring. *Dissostichus eleginoides* are thought to spawn in deep water around South Georgia Island (Subarea 48.3), Bouvet Island (Subarea 48.6) and on the Kerguelen Plateau (Divisions 58.5.1 and 58.5.2), but data in Subarea 58.6 (Crozet) are still not available.

Parameter estimates

18. There are no specific life-history parameters for *D. eleginoides* in the French EEZ. However, the metapopulation of the Indian Ocean sector has been validated by Appleyard et al. (2004) and thus it is likely that the parameters used in the stock assessment for Heard Island, such as growth rate and natural mortality, would be valid for the stock in Subarea 58.6. Age-specific data from Crozet otoliths sampling will be available in the near future.

Stock assessment status

19. A preliminary stock assessment using CASAL was first presented during the 2013 meeting of WG-FSA (WG-FSA-13/05).

20. WG-FSA-14/36 Rev. 1 presented the results of an updated stock assessment of *D. eleginoides* at Crozet Islands (Subarea 58.6 inside the French EEZ). The model included estimated levels of depredation by orca (*Orcinus orca*) from GAM analyses of the fishery data. WG-FSA-14 welcomed this updated stock assessment, which addressed stability issues with data weighting in the model, model fits and some parameters estimated at bounds present in the previous iteration (SC-CAMLR-XXXII, Annex 6, paragraph 4.63).

21. WG-FSA-14 recommended that age frequencies be included once age data are available and that year-class strength be estimated as a sensitivity analysis. It further recommended that alternative estimates of whale depredation, as estimated in WG-FSA-14/10, be investigated further.

By-catch of fish and invertebrates

Fish by-catch

22. Primary by-catch species from the longline fishery at Crozet Islands are the macrourid *Macrourus carinatus*, rajid (*Amblyraja taaf*) and blue antimora (*Antimora rostrata*). The latter species is fully discarded, while the others are partly or totally retained.

23. Catch limits for by-catch (macrourids, rajids and other species) inside the French EEZ are set by France. Avoidance of high level by-catch areas has been promoted and the cut-off protocol is in force to follow the CCAMLR recommendations.

24. The by-catch in the French EEZ at Crozet Islands consists predominantly of macrourids. The maximum catch over the past 10 seasons of 193 tonnes (Table 3), was reported in 2009 and amounts to 22% of the target catch in that year.

Table 3: Catch history for by-catch species (macrourids, rajids and *Antimora rostrata*) taken in the longline fishery for *Dissostichus eleginoides* in the French EEZ in Subarea 58.6 and Area 51. (Source: fine-scale data.) (2014: partial data.)

Season	Macrourids	Rajids	Number released alive	<i>Antimora rostrata</i>
	Reported catch (tonnes)	Reported catch (tonnes)		Reported catch (tonnes)
2005	132	93	-	67
2006	149	121	-	53
2007	117	83	2 118	43
2008	135	46	11 397	64
2009	193	46	17 730	79
2010	113	56	6 836	78
2011	93	29	2 484	23
2012	96	75	2 448	21
2013	64	29	273	17
2014	54	48	4 897	29

Invertebrate by-catch including VME taxa

25. There are no vulnerable marine ecosystems (VME) or VME Risk Areas designated in the French EEZ. Fishery observers have protocols to collect information about benthos taxa, including VME taxa.

Mitigation measures

26. WG-FSA recommended that areas with high by-catch rates should be avoided and noted that from 2012 vessels have received a recommendation to avoid the areas of high by-catch.

Incidental mortality of birds and mammals

Incidental mortality

27. A summary of the historic seabird mortality by longline in the French EEZ at Crozet Island since 2007 is presented in Table 4. The three most common species injured or killed in the fishery were white-chinned petrel (*Procellaria aequinoctialis*), northern giant petrel (*Macronectes halli*) and grey petrel (*P. cinerea*). Night setting requirements have been highly effective in removing the previously high levels of albatross mortality.

28. In 2014, there were six seabird mortalities observed inside the French EEZ in Subarea 58.6, all of which were *P. aequinoctialis* (Table 4), the lowest level ever observed.

Table 4: Incidental mortality of seabirds in the French EEZ in Subarea 58.6 since 2007.

Season	<i>Procellaria aequinoctialis</i>	<i>Macronectes halli</i>	<i>Procellaria cinerea</i>
2007		1	
2008	32		
2009	19	3	1
2010	27		
2011	7	1	
2012	17		
2013	13		
2014	6		
Total	121	5	1

29. The level of risk of incidental mortality of seabirds in the French EEZ at Crozet Island in Subarea 58.6 is considered to be high (category 5) (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

30. There have been no reports of incidental mortalities of marine mammals since 2007.

Mitigation measures

31. The requirements of CM 25-02 'Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area' apply to this fishery. France has applied the CCAMLR mitigation measures for the last seasons and these will continue for the upcoming fishing seasons.
32. Additional measures will also be applied (WG-IMAF-11/10 Rev. 1), including:
- (i) changes to the bird exclusion device to ensure it is effective in all weather conditions
 - (ii) closure of fishing areas and quota allocation reduction to vessels that have high by-catch rates
 - (iii) education and training will be strengthened by regular meetings between TAAF and masters of fishing vessels with high by-catch
 - (iv) a new population survey of at-risk seabird species, conducted in the Crozet archipelago during November 2011, will be compared to the results of a similar survey conducted in 2005.

Ecosystem implications and effects

33. There is no formal evaluation available for this fishery.

Current management advice and conservation measures

34. In addition to those CCAMLR conservation measures that are applied in this fishery, various national conservation and fisheries enforcement measures are applicable, such as:
- annual catch limit and limitation on the number of longline vessels allowed to operate in the fishery (seven)
 - allocation of fishing effort permitting not more than two longliners simultaneously per 0.5° latitude × 1° longitude rectangle
 - obligatory vessel logbooks
 - one French observer on board each licensed vessel
 - minimum fishing depth limit of 500 m
 - minimum legal size limit for *D. eleginoides* of 60 cm
 - mitigation measures for the reduction of seabird mortality
 - a single catch landings site at Réunion Island

- unless retained for commercial processing, all skates are to be released alive
- mandatory port inspection.

35. The limits in force and the advice of WG-FSA to the Scientific Committee for the forthcoming season are:

- (i) WG-FSA-14 agreed that model CR2.1 with fixed year-class strength as described in WG-FSA-14/36 Rev. 1 could be used to provide management advice for 2015. Although a maximum catch limit was not calculated, the current catch limit of 700 tonnes, plus specifying an additional 60 tonnes of orca depredation, satisfied the CCAMLR decision rules
- (ii) 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 CM 32-02, remain in force in 2015
- (iii) biological parameters for *D. eleginoides* in Subarea 58.6 (French EEZ) are to be estimated to improve the stock assessment for this area
- (iv) France is to continue its tagging program in Subarea 58.6
- (v) zones of specific high by-catch should also be avoided
- (vi) monitoring of two boats responsible for the majority of the bird by-catch, including the use of spatial closure, is recommended.

Reference

Tixier, P., N. Gasco, G. Duhamel, M. Viviant, M. Authier and C. Guinet. 2010. Interactions of Patagonian toothfish fisheries with killer and sperm whales in the Crozet Islands Exclusive Economic Zone: an assessment of depredation levels and insights on possible mitigation strategies. *CCAMLR Science*, 17: 179–195.