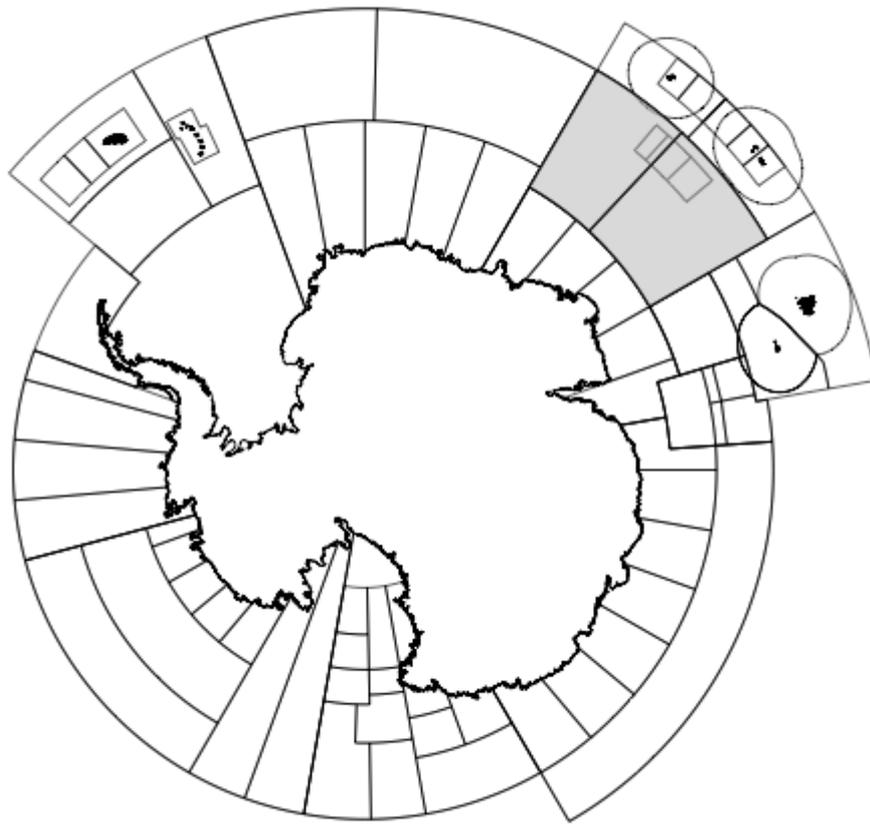




**Fishery Report 2018: Closed fishery for *Dissostichus* spp.
in Divisions 58.4.4a and 58.4.4b**

FISHERY REPORT



The map above shows the management areas within the CAMLR Convention Area, the specific region related to this report is shaded.

Throughout this report the CCAMLR fishing season is represented by the year in which that season ended, e.g. 2015 represents the 2014/15 CCAMLR fishing season (from 1 December 2014 to 30 November 2015).

Fishery Report 2018: Closed fishery for *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b

Introduction to the fishery

1. This report describes the closed fishery for toothfish (*Dissostichus* spp.) in Division 58.4.4. In 1995, Division 58.4.4 was subdivided into Division 58.4.4a (Ob Bank) and Division 58.4.4b (Lena Bank) (SC-CAMLR-XIV, Annex 5, paragraph 5.175). These divisions were managed as a single area and a catch limit for *Dissostichus* spp. applied to fishing north of 60°S, and in waters outside areas of national jurisdiction¹. The longline fishery for *Dissostichus* spp. in Division 58.4.4 began as a new fishery in 1998 (Conservation Measure (CM) 138/XVI). Following the Commission's recognition that high levels of illegal, unreported and unregulated (IUU) fishing for *Dissostichus* spp. in the Convention Area had rendered it unrealistic to consider this fishery as 'new' (CCAMLR-XVIII, paragraph 10.14), the fishery was reclassified as exploratory in 1999.

2. In 1999, the whole of Division 58.4.4 was further subdivided into small-scale research units (SSRUs) A, B, C and D.

3. Expressing concern regarding the low levels of stocks of *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b and the high levels of IUU fishing in that region (CCAMLR-XXI, paragraph 11.36), the Commission prohibited directed fishing for *Dissostichus* spp. in these divisions and closed the fishery in 2002 (CM 32-02). The Commission agreed that such prohibition shall apply at least until further scientific information is gathered and reviewed.

Reported catch

4. In 2008 and from 2010 onward, a catch limit has been allocated to research fishing only. Over the past 10 years, the reported catch peaked at 77 tonnes in 2008, which was below the research catch limit set for that year (Table 1).

5. From 2008 to 2016, a single Japanese-flagged longliner has conducted research fishing in accordance with a research plan submitted under CM 24-01. In 2017, one French-flagged vessel conducted research fishing.

6. The total catch in Division 58.4.4b in 2018 was 2 tonnes (Table 1).

¹ The South African EEZ at Prince Edward and Marion Islands extends into the northern part of Division 58.4.4a.

Table 1: Catch history for *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b. Research catch limits are in brackets. (Source: STATLANT data for past seasons and catch and effort reports for current season, past reports for IUU catch.)

Season	Catch limit (tonnes)	Reported catch (tonnes)				Total	Estimated IUU catch (tonnes)
		Division 58.4.4a		Division 58.4.4b			
		<i>D. mawsoni</i>	<i>D. eleginoides</i>	<i>D. mawsoni</i>	<i>D. eleginoides</i>		
2004	closed	0	0	0	0	0	0
2005	closed	0	0	0	0	0	220
2006	closed	0	0	0	0	0	104
2007	closed	0	0	0	0	0	109
2008	closed (80)	0	18	<1	58	77	*
2009	closed	0	0	0	0	0	*
2010	closed (60)	0	9	0	50	59	80
2011	closed (53)	0	0	0	35	35	*
2012	closed (70)	0	0	0	28	28	*
2013	closed (50)	0	0	0	31	31	*
2014	closed (60)	0	0	0	27	27	*
2015	closed (35)	0	0	0	35	35	*
2016	closed (42)	0	0	<1	42	42	*
2017	closed (42)	0	0	0	31	31	*
2018	closed (42)	0	0	0	2	2	*

* Not estimated.

Illegal, unreported and unregulated (IUU) fishing

7. In each season between 1998 and 2001, the estimated annual catch of *Dissostichus* spp. exceeded 1 000 tonnes. An estimated total of 7 196 tonnes of *Dissostichus* spp. has been removed by IUU fishing since the fishery began with >500 tonnes being removed since 2004 (Table 1). In 2010, the last year in which IUU catch was recorded, an estimated 80 tonnes was taken from Division 58.4.4a.

8. IUU fishing activities were observed in Division 58.4.4a (Ob Bank) during 2008, 2009, 2010 and 2011. French surveillance information suggested that IUU activities have been persistent until 2014. IUU fishing activities were observed in Division 58.4.4b (Lena Bank) during each year from 2006 to 2011, however, given the history of IUU fishing activities in this division, it is possible that IUU activities do still occur, but were undetected from 2011 to 2016. Information from satellite surveillance trials indicated the presence of unidentified vessels in this division in 2016. Since 2011, following the recognition of methodological issues in its assessment, no estimates of the IUU catch of *Dissostichus* spp. have been provided for this division (SC-CAMLR-XXIX, paragraph 6.5).

Data collection

9. Catch limits for CCAMLR's fisheries for Antarctic (*Dissostichus mawsoni*) and Patagonian toothfish (*D. eleginoides*) for the 'assessed' fisheries in Subareas 48.3, 88.1 and 88.2 and Division 58.5.2 are set using fully integrated assessments; more basic approaches are used for the 'data-poor' fisheries (in Subarea 48.6 and in Area 58 outside the exclusive economic zones (EEZs)). The management of these data-poor fisheries has been a major focus

of attention in CCAMLR in recent years after the acknowledgement that commercial fishing by itself had resulted in too few data to develop a full assessment of the targeted stocks in these areas. CCAMLR has developed a framework for designing and undertaking research fishing designed to lead to an assessment of these toothfish stocks in the short to medium term, established under the provisions of CM 41-01. This research planning framework has three phases: prospecting phase, biomass estimation phase and assessment development phase, with a set of decisions and review for the progression between stages.

10. In order to obtain the data necessary for a stock assessment, catch limits for research fishing by commercial vessels are set at a level intended to provide sufficient information (including sufficient recaptures of tagged fish) to achieve a stock assessment within a time period of 3 to 5 years. These catch limits are also set so that they provide reasonable certainty that exploitation rates at the scale of the stock or research unit will not negatively impact the stock. Appropriate exploitation rates are based on estimates from areas with assessed fisheries and are not more than 3–4% of the estimated stock size. In 2012 and 2013, CCAMLR put in place a more structured approach to setting catch limits, and spatially constraining research, in data-poor fisheries. This process attempts to use all available information combined with a regular review process to make progress while recognising the inherent uncertainties and data limitations in data-poor fisheries.

Biological data

11. The collection of biological data under CM 23-05 is conducted as part of the CCAMLR Scheme of International Scientific Observation. Observer sampling requirements for *Dissostichus* spp. in longline fisheries based on the data collection plan are described in WG-FSA-10/32 (SC-CAMLR-XXIX, Annex 8, paragraph 5.34; SC-CAMLR-XXIX, paragraph 3.187). In longline fisheries targeting *D. mawsoni* and *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

12. The length-frequency distributions of *D. eleginoides* caught in this fishery are presented for all years in which the number of that species measured was more than 150 fish (Figure 1). 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.

13. Due to the low level of reported catch, and thus small numbers of length measurements (<150 fish) in each year/SSRU, the length-frequency distributions of *D. mawsoni* have not been presented here.

14. Length frequencies for *D. eleginoides* for each season in Divisions 58.4.4a and 58.4.4b are presented in Figure 1. The majority of *D. eleginoides* caught in the fishery during research fishing ranged from 50 to 150 cm with a broad mode in both divisions at approximately 60–90 cm (Figure 1).

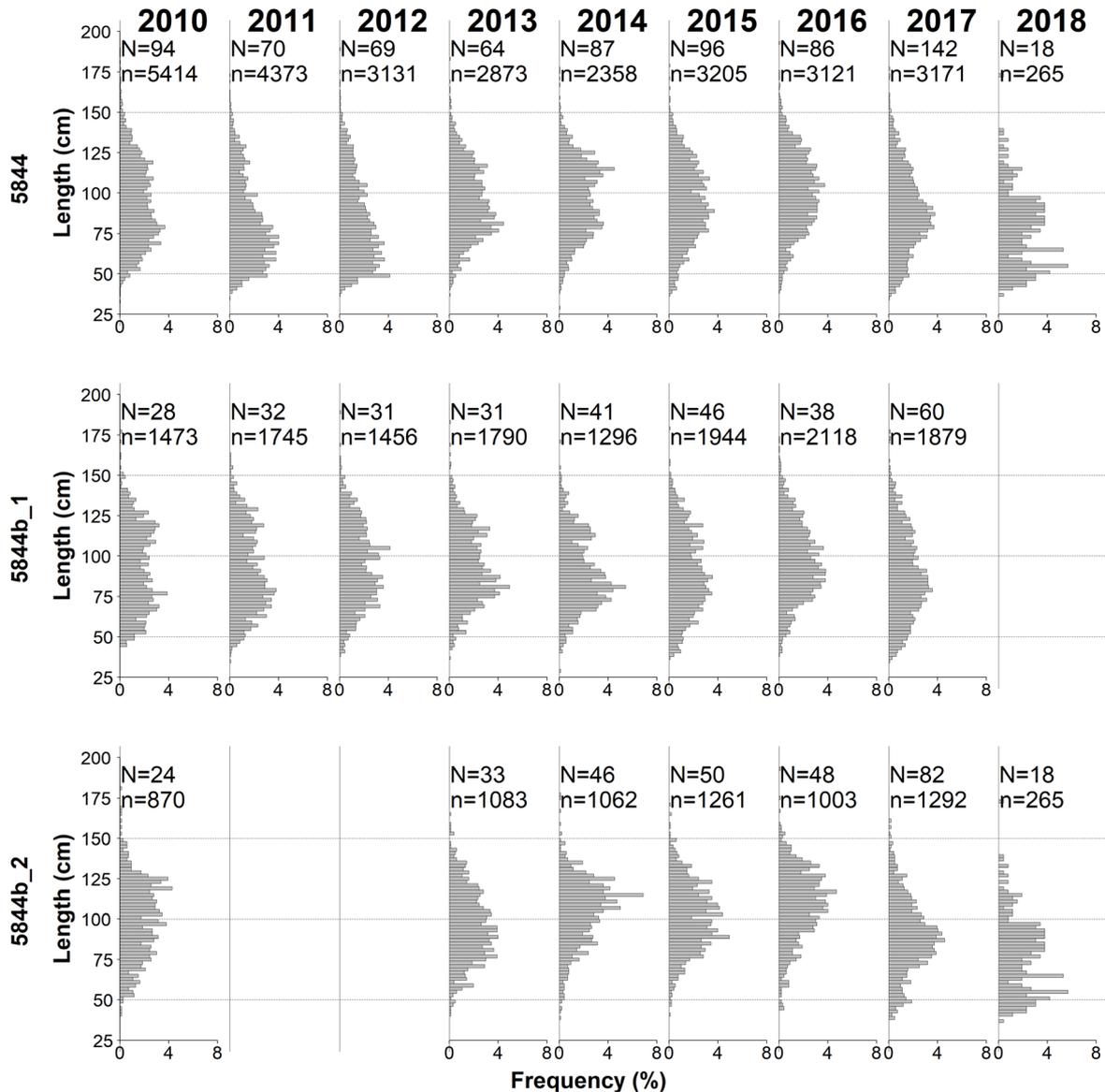


Figure 1: Annual length frequencies for *Dissostichus eleginoides* in Division 58.4.4. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are provided. Note: length-frequency distributions are only presented for those years/SSRUs in which the number of fish measured was >150.

Tagging

15. Since 2012, vessels have been required to tag and release *Dissostichus* spp. at a rate of 5 fish per tonne of green weight caught (Table 2). The tag-overlap statistic estimates the representative similarity between the size distributions of those fish that are tagged by a vessel and of all the fish that are caught by that vessel.

Table 2: Annual tagging rate, reported by vessel, operating in the exploratory fishery for *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b. The tag-overlap statistics (as per CM 41-01) for *Dissostichus eleginoides* are provided in brackets.

Flag State	Vessel name	Season								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
France	<i>Saint André</i>						7.2 (82)		15.9 (77)	
	<i>Ile Bourbon</i>									6.2 (69)
Japan	<i>Shinsei</i>	6.1 (100)	5.3 (95)	6.1 (82)	7.5 (81)	5.9 (85)	6.4 (76)	5.2 (79)	6.3 (73)	
	<i>Maru No. 3</i>									
	Required tagging rate	3	3	5	5	5	5	5	5	5

16. Since 2010, a total of 1 595 *D. eleginoides* have been tagged and 41 recaptured in both Divisions 58.4.4a and 58.4.4.b (Table 3).

Table 3: The number of individuals of *Dissostichus eleginoides* tagged in each year. The number of fish recaptured is provided in brackets.

Flag State	Vessel name	Season								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
France	<i>Saint André</i>						36 (3)		97 (3)	
	<i>Ile Bourbon</i>									10 (3)
Japan	<i>Shinsei</i>	300 (1)	189 (4)	172 (3)	233 (3)	159 (9)	183 (10)	217 (5)	99 (4)	
	<i>Maru No. 3</i>									

Life-history parameters

Data collection

17. The life histories of *D. mawsoni* and *D. eleginoides* are characterised by slow growth, low fecundity and late maturity. Both *D. mawsoni* and *D. 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. However, as this is the period least accessible to fishing, and thus the collection of biological data, specific life-history traits for these species are limited (WG-FSA-08/14). The areas that are considered to be the most likely spawning grounds for *D. mawsoni* include the north of the Ross Sea associated with the Pacific–Antarctic Ridge (SSRUs 881B and C) and the Amundsen Ridge (SSRU 881E) in the Amundsen Sea. In the Cooperation Sea, *D. mawsoni* most likely spawn on BANZARE Bank (Division 58.4.3b). *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).

Parameter estimates

18. A sample of otoliths collected in 2008 has been aged and results reported in WG-FSA-11/16. Ages of 214 otoliths (of 3 013 fish sampled) ranged from 4 to 48 years for females and from 5 to 48 years for males. These ages may be overestimated by one year due to an interpretation issue concerning the location of the first annulus.

By-catch of fish and invertebrates

Fish by-catch

19. Catch of by-catch species groups (macrourids, rajids and other species) are provided in Table 4.

Table 4: Catch history for by-catch species (macrourids, rajids and other species), including catch limits and number of rajids released alive in Divisions 58.4.4a and 58.4.4b. Catch limits are for both divisions combined (see CM 33-03 for details). (Source: fine-scale data.)

Season	Macrourids		Rajids			Other species	
	Catch limit (tonnes)	Reported catch (tonnes)	Catch limit (tonnes)	Reported catch (tonnes)	Number released	Catch limit (tonnes)	Reported catch (tonnes)
2008	closed*	3	closed*	<1	13	closed*	3
2009	closed		closed			closed	
2010	closed*	1	closed*	<1	55	closed*	1
2011	closed*	2	closed*	<1	73	closed*	1
2012	closed*	2	closed*	<1	0	closed*	1
2013	closed*	1	closed*	<1	1	closed*	1
2014	closed*	1	closed*	<1	7	closed*	<1
2015	closed*	4	closed*	<1	189	closed*	2
2016	closed*	1	closed*	<1	84	closed*	1
2017	closed*	7	closed*	1	1426	closed*	4
2018	closed*	<1	closed*	<1	842	closed*	<1

* Research fishing permitted in accordance with CM 24-01.

20. The by-catch in Divisions 58.4.4a and 58.4.4b consisted predominantly of macrourids. Catches of by-catch species groups (macrourids, rajids and other species) reported in fine-scale data, their respective catch limits and number of rajids released alive, are summarised in Table 4.

Invertebrate by-catch including VME taxa

21. All Members are required to submit, within their general new (CM 21-01) and exploratory (CM 21-02) fisheries notifications, information on the known and anticipated impacts of their gear on vulnerable marine ecosystems (VMEs), including benthos and benthic communities such as seamounts, hydrothermal vents and cold-water corals. All of the VMEs in CCAMLR's VME Register are currently afforded protection through specific area closures, the locations and other details of which can be found in Annex 22-09/A.

22. There are no VMEs or VME Risk Areas designated in Divisions 58.4.4a and 58.4.4b.

Incidental mortality of seabirds and marine mammals

Incidental mortality reported

23. There have been no observed bird or mammal mortalities reported from Divisions 58.4.4a and 58.4.4b.

Mitigation measures

24. No mitigation measures apply to this fishery as it is currently closed.

Ecosystem implications and effects

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

Conservation measures and advice from the Scientific Committee for research fishing in 2017 and 2018

26. Directed fishing for *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b is prohibited under CM 32-02 at least until further scientific information is gathered and reviewed by the Scientific Committee and the Working Group on Fish Stock Assessment (WG-FSA).

27. In 2016, the Scientific Committee supported the continuation of this research program and recommended that the catch limit for Division 58.4.4b remained unchanged (from the previous season) at 25 tonnes in research block 5844b_1 and 35 tonnes in research block 5844b_2 for the 2017 season (see Figure 2 and SC-CAMLR-XXXV, paragraph 3.254).

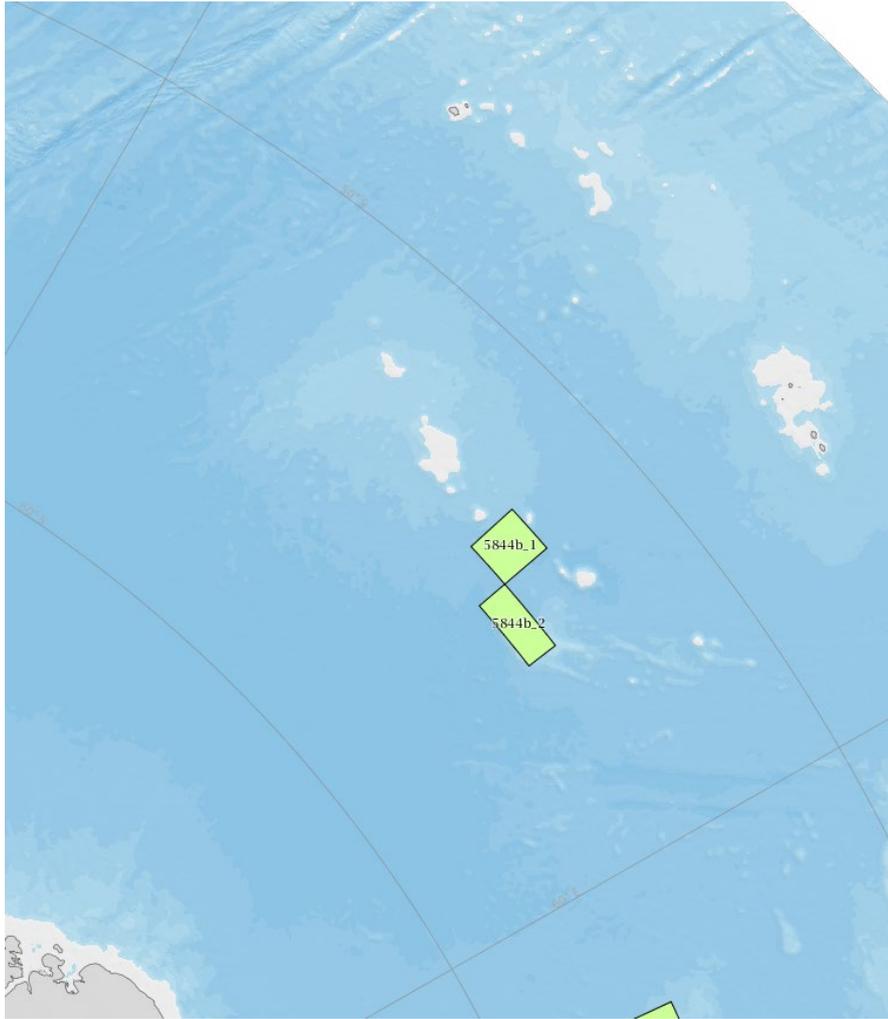


Figure 2: Location of research blocks in Division 58.4.4b.

28. The Scientific Committee noted in 2017 that WG-FSA-17 had reviewed the joint proposal by France and Japan to continue research in Division 58.4.4b and agreed that it is appropriate to achieve the research objectives (SC-CAMLR-XXXVI, paragraph 3.123).

29. In 2018, in response to concerns about the progress of research in this division, the Scientific Committee agreed a revised research plan for this division (see Appendix 1).

Research plan for Division 58.4.4b

(This research plan was adopted as Annex 12 to the report of SC-CAMLR-XXXVII)

Management advice given by WG-FSA-18

1. WG-FSA noted that this is a closed area and requested that the Scientific Committee consider the viability of this research plan and the sustainability of this stock given: (i) that proposed research designs have not been implemented, (ii) low and declining catch rates, (iii) low numbers of historical tag recaptures, (iv) low expected numbers of future recaptures due to low catches, and (v) limited milestone achievement (SC-CAMLR-XXXVII, Annex 9, paragraph 4.137).

Objectives of the research plan (WG-FSA-18/44)

Objective 1 – An assessment of the stock status of Patagonian toothfish (*D. eleginoides*)

Objective 2 – Improving the knowledge about growth of *D. eleginoides*

Objective 3 – Improving the knowledge about population structure of *D. eleginoides*

Objective 4 – Investigating ecological traits of *D. eleginoides*

Objective 5 – Revealing the spatio-temporal pattern of by-catch species distribution

Objective 6 – Improving the knowledge about Antarctic marine ecosystems

Objective 7 – Investigating effects of depredation.

2. Japan and France recognised further clarifications were needed to understand how to recover the delay in achieving the milestones. The proponents announced that they will strengthen their research capacity in 2019 and that a new Japanese vessel will start operation in April 2020 expecting to increase survey capacity.

3. Following the discussions at WG-FSA, the proponents made the following suggestions to improve achievements of the research plan objectives, which are outlined in the research proposal (WG-FSA-18/44):

- (i) amendments to the research design:
 - (a) achieve the catch limit, as far as possible, to be able to meet research objectives
 - (b) respect the grid design (Figure 1) in place since 2012/13 (WG-FSA-12/58), with two additional recommendations:
 - focus effort in research block 5844b_1 where the catch-per-unit-effort (CPUE) is higher and more stable (Figure 2)

- avoid the area where high density of pennatulacea was identified. Figure 3 shows spatial distribution of seapens and fine-scale rectangles that would need to be avoided
- (c) continue the tagging program as set out in the research plan (WG-FSA-18/44)
- (d) agree to transfer allowable catch between vessels if one vessel cannot operate
- (ii) Japan and France will commit to implementing further recommendations made by WG-FSA:
 - (a) use of a holding tank on board to retain tagged toothfish in presence of predators
 - (b) consider e-monitoring on board to estimate reporting rate
- (iii) updates to analyses to be conducted for WG-SAM-19 and/or WG-FSA-19 regarding objectives:
 - (a) the proponents are committed to recover the delay in achieving the agreed milestones, and as follows.

Biomass estimation using CASAL

4. The analyses presented below will contribute to objectives 1 and 2.

5. These analyses will be included in a preliminary CASAL stock assessment model, building on the model presented at WG-FSA in 2015:

- (i) Document WG-FSA-15/23
 - (a) update biological parameters (objectives 1.1 and 4):
 - growth curve (2 000 otoliths read, see Table 2 for details)
 - age-length key
 - maturity ogive (15 000 fish examined)
 - (b) update estimation of illegal, unreported and unregulated (IUU) catches (objective 1.2):
 - using the analyses presented by Australia in Division 58.4.1 (WG-FSA-18/60)
 - (c) estimate depredation from marine mammals (objectives 1.3 and 7):
 - using methods developed in Subarea 58.6

- (d) evaluate effective tagging-survival and tag-detection rate among vessels (objective 1.4).

By-catch analyses

6. The analyses presented below will contribute to objectives 5 and 6:

- (i) retrospective fish by-catch analyses as in WG-FSA-18/28 (in Division 58.4.1)
- (ii) retrospective VME analyses.

7. The milestones table as provided in WG-FSA-18/44 has been amended to consider recommendations by WG-FSA-18.

Table 1: The revised timelines of milestones to conduct research fishing and to report progresses corresponding to objectives 1 to 7 in Division 58.4.4b. A progress report will be provided to WG-FSA every year, which will provide a summary of data collected in the ongoing fishing season. A final report on the research fishing will be submitted to WG-FSA in 2021. Role sharing is represented by an initial letter of Member: F – France, J – Japan. Years 2020 and 2021 appear in grey italic because they will depend on recommendations by WG-FSA-19.

	2017	2018	2019	<i>2020</i>	<i>2021</i>
Survey fishing	F+J	F+J	F+J	<i>F+J</i>	<i>F+J</i>
Objective 1. Stock assessment					
1.1 Update biological parameters:					
Growth curve			J+F	<i>J+F</i>	<i>J+F</i>
Age-length key					
Maturity ogive					
1.2 Update estimation of IUU catches			J+F		<i>J+F</i>
1.3 Estimate depredation from marine mammals			F+J		<i>F+J</i>
1.4 Evaluate effective tagging-survival and tag-detection rates among vessels			F+J		<i>F+J</i>
1.5 Update CASAL model			J+F	<i>J+F</i>	<i>J+F</i>
Objective 2. Growth knowledge					<i>FJ</i>
2.1 Ageing toothfish	J	J	J+F	<i>J+F</i>	<i>J+F</i>
Objective 3. Population structure					
3.1 Reviewing stock hypothesis				<i>F+J</i>	<i>F+J</i>
Objective 4. ecological traits			J	<i>J</i>	<i>J</i>
Objective 5. By-catch pattern					
5.1 Fish bycatch	J+F	J	F+J	<i>F+J</i>	<i>F+J</i>
5.2 Macro-invertebrates by-catch		F	F	<i>F</i>	<i>F</i>
Objective 6. Antarctic Marine ecosystem		F	J+F	<i>J+F</i>	<i>J+F</i>
Objective 7. Depredation			F+J	<i>F+J</i>	<i>F+J</i>

Table 2: Number of otoliths aged by Japan.

Year	Number of otolith readings
2008	652
2010	134
2011	287
2012	265
2013	279
2014	310
2016	207
2017	206 (under aging in this year)

Table 3: Summary table of *D. eleginoides* biological data in Division 58.4.4b. Values are the number of fish observed for each biological parameter and sample collection (WG-FSA-18/67). Data are for all vessels and cruises pooled.

Research block	Season	Length	Weight	Sex	Maturity	Gonad	Otolith
5844b_1	2008	1337	807	804	804	805	806
5844b_1	2010	1149	700	1149	813	813	600
5844b_1	2011	1745	860	1745	1745	1745	858
5844b_1	2012	1589	861	1586	916	916	823
5844b_1	2013	1790	877	1790	1790	1790	848
5844b_1	2014	1296	1295	1162	1166	1166	915
5844b_1	2015	1944	1944	1943	1944	1944	1166
5844b_1	2016	2118	2118	2096	2114	2114	1096
5844b_1	2017	1879	1887	1891	1891	1891	1168
5844b_2	2008	1022	504	504	504	504	503
5844b_2	2010	742	528	742	526	536	485
5844b_2	2013	1083	819	1083	1083	1083	809
5844b_2	2014	1062	1062	836	837	837	790
5844b_2	2015	1261	1261	1260	1261	1261	1115
5844b_2	2016	1003	1039	1029	1031	1031	959
5844b_2	2017	1292	1292	1290	1290	1290	903
5844b_2	2018	265	264	265	265	265	150
Outside	2008	1889	1053	1052	1052	1052	1050
Outside	2010	2876	1408	2868	1756	1756	1145
Outside	2011	2628	1053	2620	2620	2620	1052
Outside	2012	1949	909	1948	1941	1941	843

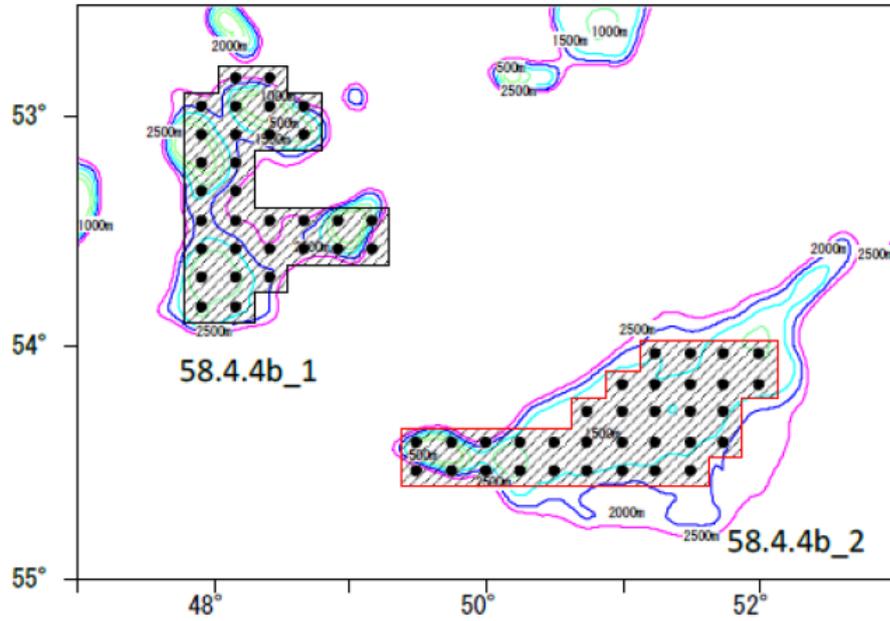


Figure 1: Proposition for allocated locations (64 lattices) for longline surveys in research blocks 5844b_1 (31 lattices) and 5844b_2 (33 lattices) in 2018/19. The longline gear will be set within 7.5 n miles square (grey oblique lined portions) in order to capture toothfish effectively and achieve high tagging performance. Because the fishing areas within the research blocks are small, and the first 64 hauls have to be set under grid survey design, no depth stratification is proposed in the current research plan (WG-FSA-18/44).

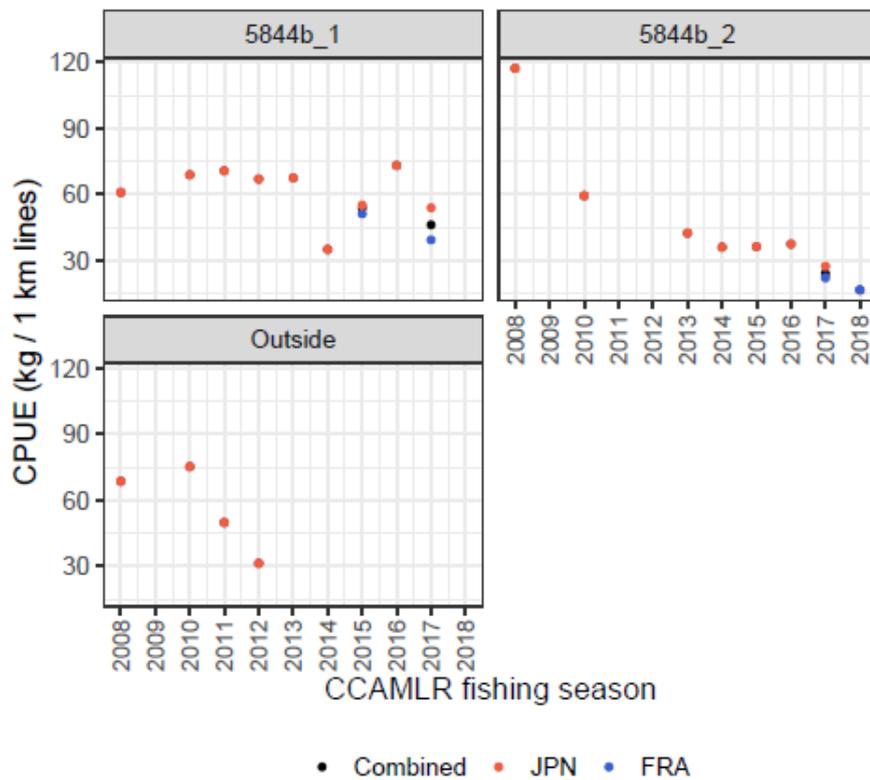


Figure 2: CPUE in Division 58.4.4b for Japanese and French vessels over the last decade (WG-FSA-18/67).

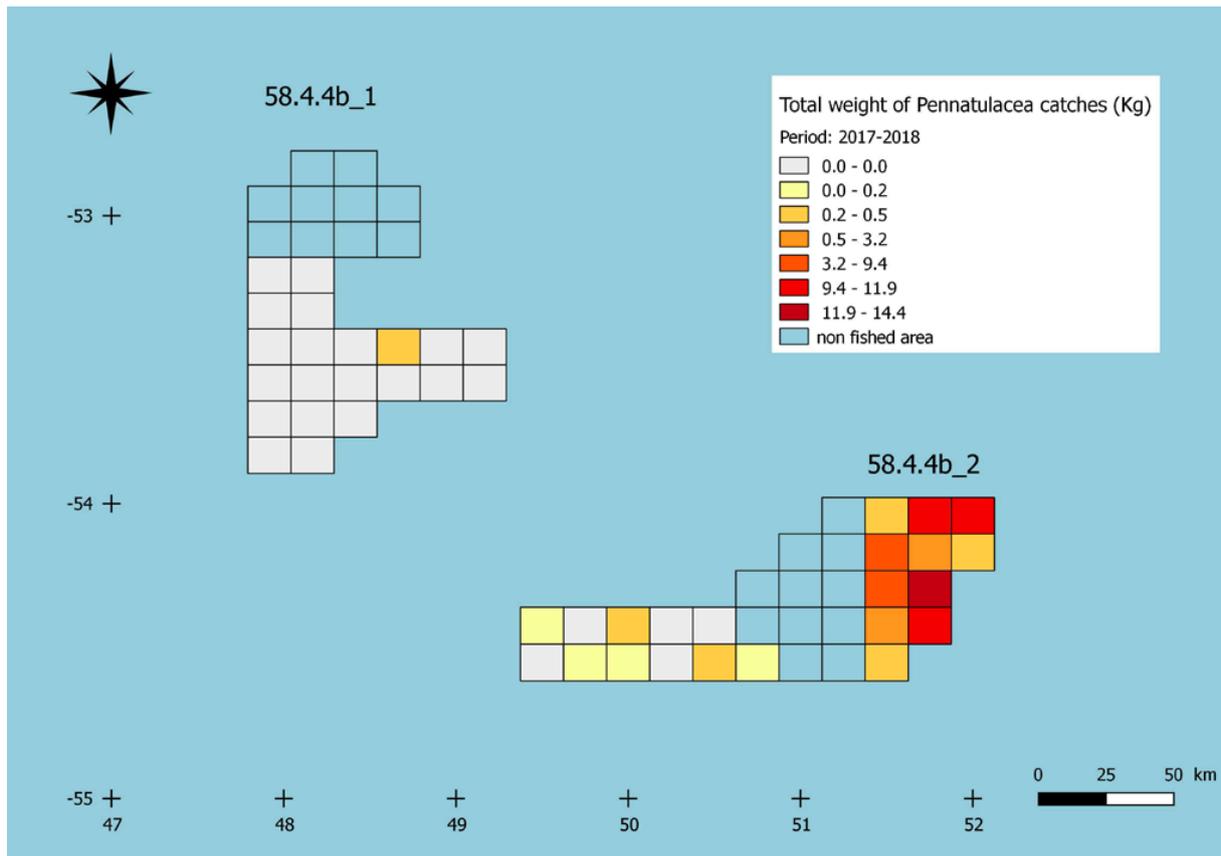


Figure 3: Spatial distribution of sea pen (Pennatulacea) catches in Division 58.4.4b between 12/06/2017 and 08/03/2018; catches given in total weight (kg) per fine-scale rectangle. It indicates that high density of sea pens is limited to the eastern part of research block 5844b_2 which will be avoided by fishing vessels (WG-FSA-18/23).