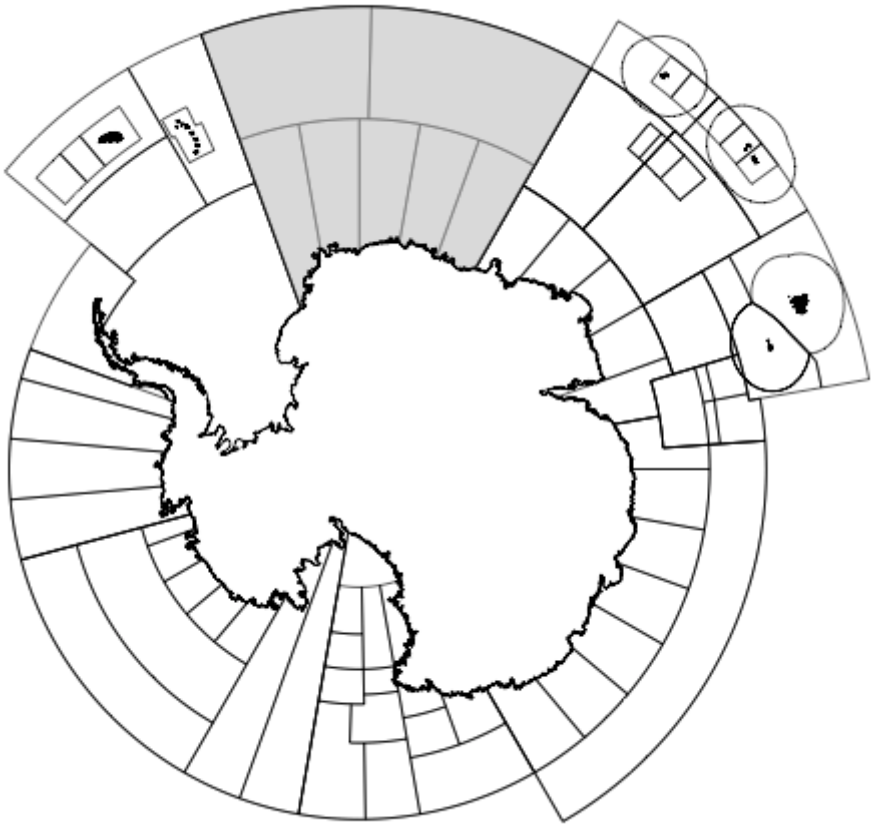
CCAMLR

Commission for the Conservation of Antarctic Marine Living Resources
Commission pour la conservation de la faune et la flore marines de l'Antarctique
Комиссия по сохранению морских живых ресурсов Антарктики
Comisión para la Conservación de los Recursos Vivos Marinos Antárticos

FISHERY REPORT

Fishery Report 2018: Exploratory fishery for *Dissostichus mawsoni* in Subarea 48.6



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: Exploratory fishery for *Dissostichus mawsoni* in Subarea 48.6

Introduction to the fishery

1. This report describes the exploratory longline fishery for Antarctic toothfish (*Dissostichus mawsoni*) in Subarea 48.6. This fishery began as a new fishery in 1997 (Conservation Measure (CM) 114/XV). Following the Commission's decision 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 2000. Prior to 2017, this fishery was an exploratory fishery for *Dissostichus* spp., however, in order to better align the target species with the assessment process, the target species was specified as *D. mawsoni*, with any Patagonian toothfish (*D. eleginoides*) caught counting towards the catch limit for *D. mawsoni.*

2. The current limits on the exploratory fishery for *D. mawsoni* in Subarea 48.6 are described in CM 41-04. From 2008 to 2013, the precautionary catch limit for *Dissostichus* spp. was set at 400 tonnes; 200 tonnes north of 60°S (small-scale research units (SSRUs) A and G) and 200 tonnes south of 60°S (SSRUs B–F). In 2014, the catch limit was revised to 538 tonnes and applied to a suite of research blocks (see Figure 1). The catch limit was revised to reflect *D. mawsoni* as the target species in 2017.

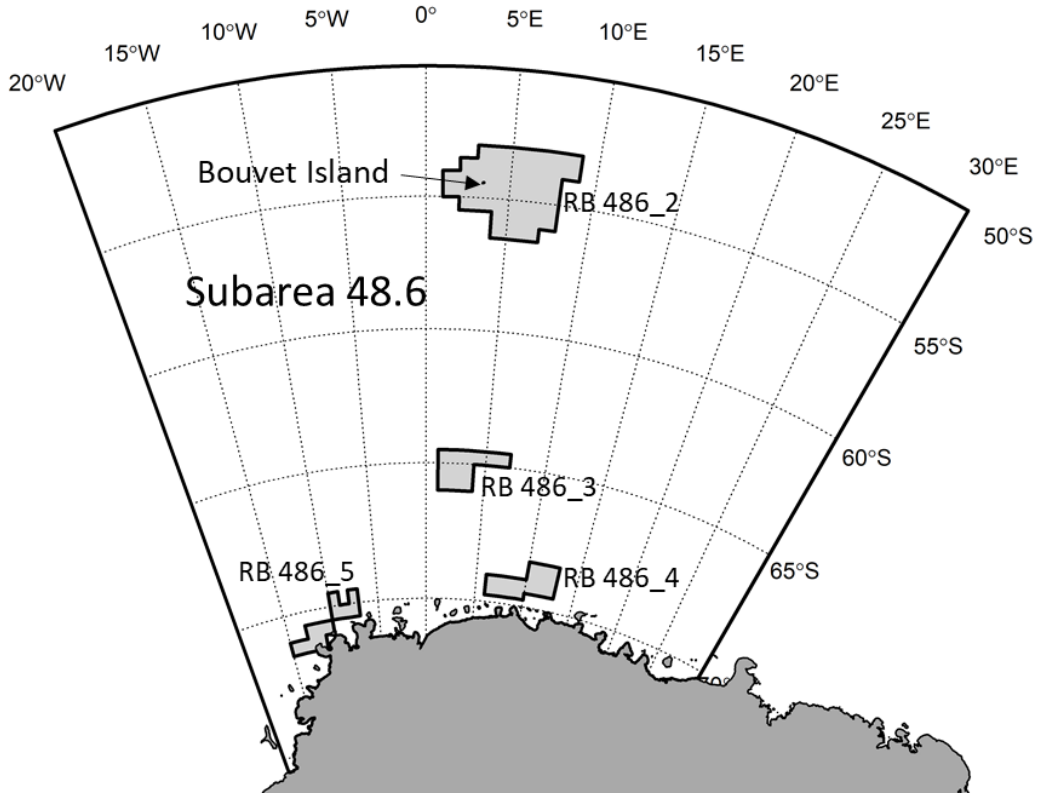


Figure 1: Location of research blocks (RB) in Subarea 48.6.

3. In 2018, the fishery was undertaken by one Japanese and one South African flagged vessel using longlines only. The catch limits by research block are provided in Table 1.

Table 1: Catch limits by research block in 2018 for *Dissostichus mawsoni* in Subarea 48.6.

Research blocks	Species	Catch limit
486_2	*D. mawsoni*	169 tonnes
486_3	*D. mawsoni*	40 tonnes
486_4	*D. mawsoni*	120 tonnes
486_5	*D. mawsoni*	228 tonnes

4. For 2019, a total of three vessels, one each from Japan, South Africa and Spain, have notified their intention to participate in the exploratory fishery for *D. mawsoni* in Subarea 48.6.

Reported catch

5. Reported catches of *Dissostichus* spp. in Subarea 48.6 peaked at 383 tonnes in 2012 (Table 2). The catches reported in Subarea 48.6 include catch data that CCAMLR has agreed should be quarantined as there is no confidence in the amount and/or the location of those catches (SC-CAMLR-XXXIII, paragraph 3.68). Those years that include quarantined data are indicated with a superscript q and specific details are provided in the footnote to Table 2. All ancillary data associated with these vessels (e.g. by-catch, tagging, observer data) is also quarantined and is not included in the data presented in this report.

Table 2: Catch history for *Dissostichus* spp. in Subarea 48.6. (Source: STATLANT data for past seasons, and catch and effort reports for the current season, past reports for IUU catch.)

Season	Catch limit (tonnes)	Reported catch (tonnes)		
		D. mawsoni	*D. eleginoides*	Total
2004	910	0	7	7
2005	910	2	49	51
2006	910	63	100	163
2007	910	34	78	112
2008	400	11	12	24
2009	400	92[q]	17	109
2010	400	242[q]	50	292
2011	400	317[q]	31[q]	348
2012	400	377	6	383
2013	400	275	15	291
2014	538	145	9	154
2015	538	189	1	190
2016	538	232	8	240
2017	510	436	2	438
2018	557	475	5	480

[q] Some catch data in these years is now quarantined, the following catch is not included in the reported catch table above:
2009 – vessel *In Sung No. 22*, 173 tonnes *D. mawsoni*
2010 – vessel *In Sung No. 2*, 100 tonnes *D. mawsoni*
2011 – vessel *In Sung No. 7*, 42 tonnes *D. mawsoni* and 1 tonne *D. eleginoides.*

6. In 2018 there has been a combined total catch of 475 tonnes of *D. mawsoni* and 5 tonnes of *D. eleginoides.* The catches by research block are provided in Table 3.

Table 3: Catch by research block in 2018 for *Dissostichus mawsoni* in Subarea 48.6. (Source: fine-scale data.)

Research block	Species	Catch (% of catch limit)
486_2	*D. mawsoni*	148 tonnes (88%)
486_3	*D. mawsoni*	40 tonnes (100%)
486_4	*D. mawsoni*	104 tonnes (87%)
486_5	*D. mawsoni*	225 tonnes (101%)

Illegal, unreported and unregulated (IUU) fishing

7. IUU fishing activity was not recorded in Subarea 48.6 between 2006 and 2012, however, IUU gear was first reported in 2013 (CCAMLR-XXXII/BG/09). The first reported vessel sighting in Subarea 48.6 was in 2014 of the IUU-listed vessel *Viking*. There is compelling evidence of IUU activity in Subarea 48.6 with vessel sightings and vessel detection as well as recovery of gillnet by scientific observers reported annually from 2013 to 2018 (the reported gillnet in 2017/18 was from the same location as previously recovered gillnets and may be a legacy of previous IUU activity). The location of the gillnet recovery indicated that Maud Rise is a consistent target for IUU activity.

Data collection

8. Catch limits for CCAMLR's fisheries for *D. mawsoni* and *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.

9. 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. A collaborative research program has been undertaken by Japan and South Africa since 2013 to enhance data collection and analysis in this subarea (see Appendix 1).

10. In 2014, five research blocks were designated in Subarea 48.6 with catch limits applied to each research block (Figure 1). These research blocks were designed to ensure that research fishing occurred in those areas with the highest probability of recapturing tagged fish; fishing in this subarea is restricted to the research blocks only.

Biological data

11. The collection of biological data under CM 23-05 is conducted as part of the CCAMLR Scheme of International Scientific Observation. In exploratory 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 the catches of *D. mawsoni* and *D. eleginoides* for each season across the entire subarea and in each SSRU are presented in Figure 2 and indicate a consistent difference in modal size between the two species. 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. The majority of *D. mawsoni* caught in the Subarea 48.6 fishery ranged from 120 to 180 cm in total length (TL), with a relatively consistent broad mode at approximately 130−160 cm (Figure 2a).

14. *Dissostichus eleginoides* exhibits a much wider length distribution with the majority ranging from 60 to 150 cm in TL (Figure 2b). A shifting mode is evident throughout the time series with length distribution skewed towards smaller fish early in the time series and towards larger fish in more recent seasons (Figure 2b).

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 4). 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. Each vessel catching more than 10 tonnes of each species of *Dissostichus* is required to achieve a minimum tag-overlap statistic of 60% (Annex 41-01/C).

16. Since 2010, a total of 12 711 *D. mawsoni* and 911 *D. eleginoides* have been tagged and 255 *D. mawsoni* and 25 *D. eleginoides* have been recaptured in Subarea 48.6 (Tables 5a and 5b for details since 2010). All of the fish that have been recaptured in Subarea 48.6 were also tagged in that subarea.

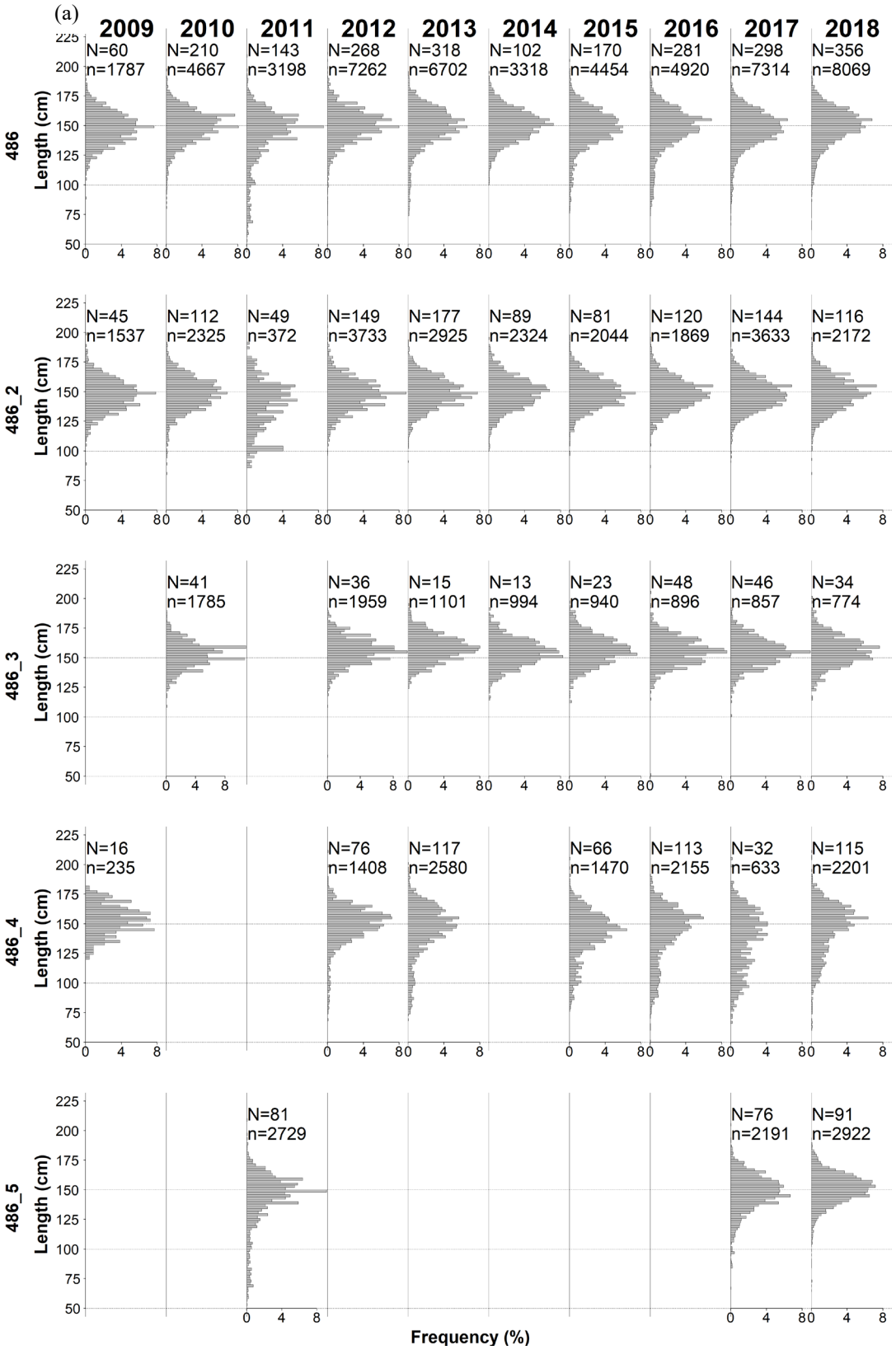


Figure 2: Annual length-frequency distributions of: (a) *Dissostichus mawsoni* caught in Subarea 48.6 and those caught in each SSRU (lower panels). The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are provided. Note: length-frequency distributions are only presented for those years/SSRUs in which the number of fish measured was >150.

(b)

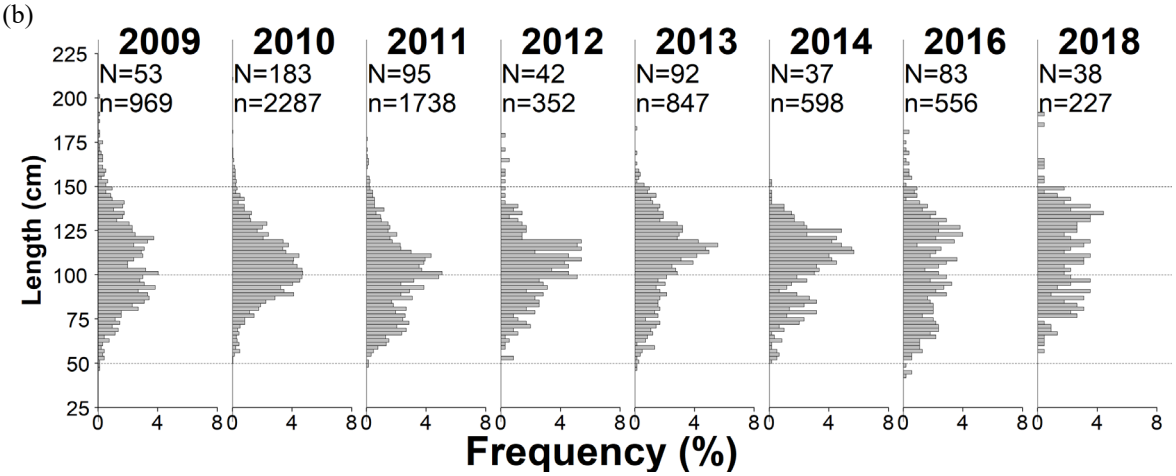


Figure 2 (continued): Annual length-frequency distributions of: (b) *D. eleginoides* caught in Subarea 48.6. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are provided.

Table 4: Annual tagging rate, reported by vessel operating in the exploratory fishery for *Dissostichus* spp. in Subarea 48.6. The tag-overlap statistics (CM 41-01) for *Dissostichus mawsoni* and *D. eleginoides* respectively are provided in brackets. Values for the tag-overlap statistic are not calculated for catches of less than 10 tonnes (2007–2014) or less than 30 fish tagged (since 2015) (*). - indicates that no fish were tagged.

Flag State	Vessel name	Season								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Japan	*Shinsei Maru No. 3*	3.1 (68, 42)	3.0 (95, -)	5.1 (85, *)	5.6 (78, *)	5.2 (85, *)	6.1 (88, *)	5.5 (86,67)	5.2 (74,*)	5.1 (78,*)
Korea, Republic of	*Hong Jin No. 701*		4.0 (84, *)							
	Insung No. 1	3.2 (-, 34)								
South Africa	*Koryo Maru No. 11*		3.1 (*, 82)	5.2 (72, *)	5.7 (68, *)	4.9(77, -)	5.4 (88, *)	5.2 (75, *)	5.3 (81,*)	5.1 (85,*)
Required tagging rate		3	3	5	5	5	5	5	5	5

Table 5: The number of individuals of (a) *Dissostichus mawsoni*, and (b) *D. eleginoides* tagged in each year. The number of fish recaptured by each vessel/year is provided in brackets.

(a)

Flag State	Vessel name	Season								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Japan	*Shinsei Maru No. 3*	560 (1)	594 (1)	1225 (14)	969 (10)	692 (13)	923 (13)	731 (25)	1684 (34)	1576 (41)
Korea, Republic of	*Hong Jin No. 701*		441 (0)							
	Insung No. 1	0 (2)								
South Africa	*Koryo Maru No. 11*		10 (0)	651 (19)	442 (5)	57 (4)	190 (4)	503 (15)	577 (26)	886 (28)
Total		560 (3)	1045 (1)	1876 (33)	1411 (15)	749 (17)	1113 (17)	1234 (40)	2261 (60)	2462 (69)

(b)

Flag State	Vessel name	Season								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Japan	*Shinsei Maru No. 3*	38 (4)		14 (0)	130 (2)	55 (2)	0 (0)	47(12)	0 (0)	
Korea, Republic of	*Hong Jin No. 701*		52 (1)							
	Insung No. 1	310 (3)								
South Africa	*Koryo Maru No. 11*		79 (0)	57 (1)	94 (6)	1 (0)	11 (0)	14 (2)	7 (1)	2 (1)
Total		348 (7)	131 (1)	71 (1)	224 (8)	56 (2)	11 (0)	61 (4)	7 (1)	2 (1)

Life-history parameters

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−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. There are no specific life-history parameters for either *D. mawsoni* or *D. eleginoides* in this subarea; the parameters used in assessed fisheries can be found in the 'Stock assessment' appendices of the relevant Fishery Reports.

Stock assessment status

19. There has been no integrated stock assessment for this data-poor exploratory fishery.

By-catch of fish and invertebrates

Fish by-catch

20. Catch limits for by-catch species groups (macrourids, rajids and other species) are defined in CM 33-03 and provided in Table 6.

21. If the by-catch of any one species is equal to, or greater than, 1 tonne in any one haul or set, then the fishing vessel must move at least 5 n miles away for a period of at least five days.

22. If the catch of *Macrourus* spp. taken by a single vessel in any two 10-day periods in a single area to which a catch limit applies exceeds 1 500 kg in a 10-day period and exceeds 16% of the catch of *Dissostichus* spp. in that period, the vessel shall cease fishing in that SSRU for the remainder of the season.

23. The by-catch in Subarea 48.6 consists predominantly of macrourids with 13 tonnes being reported in 2018 (Table 6).

Table 6: Catch history for by-catch species (macrourids, rajids and other species), catch limits and number of rajids released alive in Subarea 48.6. Catch limits are for the whole fishery (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)
2004	146	0	100	0	-	120	0
2005	146	6	100	0	-	120	0
2006	146	10	100	0	-	120	3
2007	146	13	100	0	-	120	2
2008	62	1	100	0	-	140	0
2009	64	5	100	0	-	140	2
2010	64	10	100	0	-	140	1
2011	64	8	100	0	-	140	1
2012	64	6	100	0	2	140	1
2013	64	18	100	0	-	140	2
2014	86	2	100	0	-	120	0
2015	86	5	100	0	-	120	1
2016	86	10	100	0	-	120	1
2017	81	8	27	0	-	81	1
2018	88	13	27	0	1	88	3

Invertebrate by-catch including VME taxa

24. 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.

25. There are no VMEs or VME Risk Areas designated in Subarea 48.6.

Incidental mortality of seabirds and marine mammals

Incidental mortality

26. There have been no observed bird or mammal mortalities in Subarea 48.6.

Mitigation measures

27. 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.

28. The risk level for birds in this fishery in Subarea 48.6 is category 1 (low) south of 55°S, and category 2 (average to low) north of 55°S (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

Ecosystem implications and effects

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

Current management advice and conservation measures

30. The limits on the exploratory fishery for *D. mawsoni* in Subarea 48.6 for the forthcoming season are defined in CM 41-04: www.ccamlr.org/measure-41-04.

Appendix 1

Research plan for Subarea 48.6

Background

A1. Due to a lack of suitable data, robust stock assessment models able to yield advice on catch limits in accordance with CCAMLR decision rules have not been developed for the fisheries in Subarea 48.6 and Divisions 58.4.1, 58.4.2 and 58.4.3a. SC-CAMLR-XXX (paragraph 3.127) concluded that the research plans developed in line with Conservation Measure (CM) 41-01, Annex 41-01/B, were unlikely to lead to assessments in these fisheries in the next 3–5 years, and designated them 'data-poor exploratory fisheries' (SC-CAMLR-XXX, paragraph 3.122). To rectify this situation, the Scientific Committee recommended a number of changes to CM 41-01 (SC-CAMLR-XXX, paragraphs 3.128 to 3.133), most notably the requirement for Members to submit multi-year research plans that aim at collecting sufficient data to develop robust assessment models within a 3 to 5 year period.

A2. Both Japan (WG-FSA-12/60 Rev. 1) and South Africa (WG-FSA-12/30 and 12/31) responded by submitting proposals to the 2012 meeting of the Working Group on Fish Stock Assessment (WG-FSA-12) to undertake research in Subarea 46.8. The Working Group developed a joint research plan for Subarea 48.6 drawing from both of the proposals. The goal of the research plan is to generate sufficient suitable data to undertake a tag-based assessment of the *Dissostichus* spp. stocks in Subarea 48.6 by 2018. To maximise the probability of recapturing tagged fish, research was limited to four research blocks (Figure 1) and a maximum sample size of 200 tonnes of *Dissostichus* spp. north of 60°S and 200 tonnes south of 60°S (CM 41-04, 2012). In addition, Japan and South Africa voluntarily imposed species-specific limits for each research block based on estimates of stock size per research block given in the research plan proposed by Japan (WG-FSA-12/60 Rev. 1). Japan and South Africa commenced implementing the research plan in December 2012.

A3. Following discussions in 2013 in response to revised estimates of abundance per research block and calculations undertaken during the 2013 meeting of the Working Group on Statistics, Assessments and Modelling (WG-SAM-13) and to operational difficulties experienced by Japan and South Africa, the research plan for 2014 was revised (CM 41-04, 2013) by setting species-specific limits for each research block and by including a fifth research block.

A4. During 2013, the limit set for Patagonian toothfish (*Dissostichus eleginoides*) for research block 486_2 was very low leading to operational difficulties. As a result, the majority of *D. eleginoides* caught were tagged and released. To resolve the problem, a limit was placed on *D. eleginoides* for research blocks 486_1 and 486_2 combined, it was recommended that the vessels access research block 486_1 only after completing sampling of Antarctic toothfish (*D. mawsoni*) in research block 486_2 and then only if the *D. eleginoides* limit had not been reached. The research is now focused on *D. mawsoni*, as reflected in Table 2.

Objectives

A5.1 To collect sufficient suitable data to undertake a tag-based assessment of the *Dissostichus* spp. stocks in Subarea 48.6 by 2018.

A5.2 To collect length-frequency and other biological data from the common by-catch species.

Advice by the Scientific Committee

A6. The experiment was initiated during 2013 in terms of a research plan adopted by the Scientific Committee (SC-CAMLR-XXXI, paragraph 3.137). The research was continued in 2014 in terms of a research plan adopted by the Scientific Committee (SC-CAMLR-XXXII, paragraphs 3.192, 3.195 and 3.196). The research plan was endorsed again in 2016 in terms of a research plan adopted by the Scientific Committee (SC-CAMLR-XXXIII, paragraphs 3.187 and 3.188).

A7. In 2015, the Scientific Committee agreed that the boundaries of research block 486_4 should be revised to include the proposed extension along the continental shelf and exclude the area of Astrid Ridge north of latitude 68°20'S in the research block (SC-CAMLR-XXXIV, paragraphs 3.236 to 3.240). The location of research blocks in this subarea is shown in Figure 1.

A8. In 2019 research will be carried out by the Japanese vessel S*hinsei Maru No. 3*, the South African vessel *Koryo Maru No. 11* and the Spanish vessel *Tronio*.