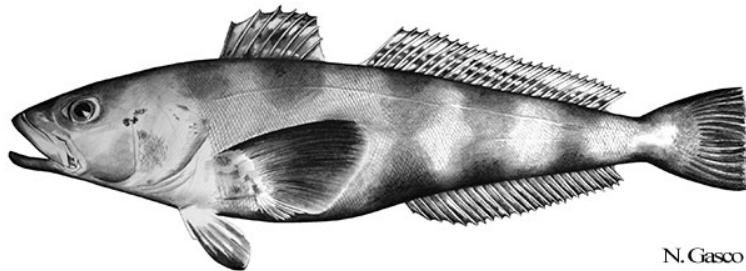


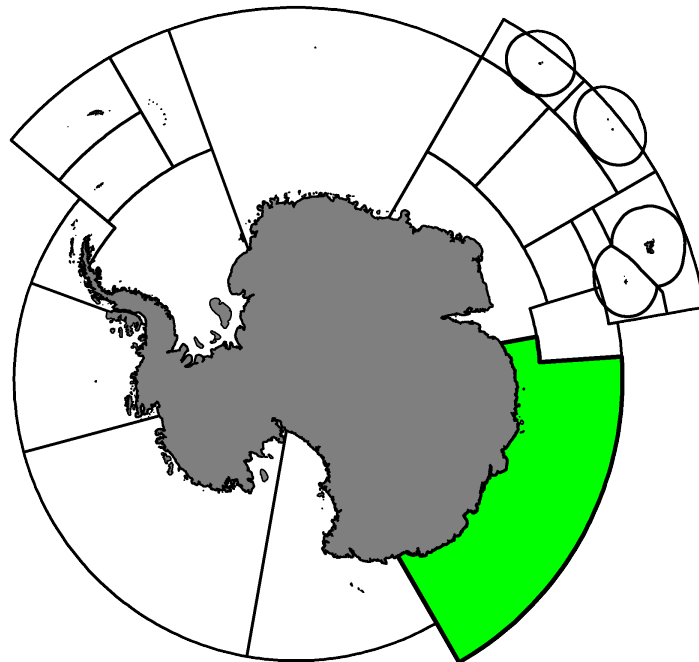
# Fishery Report 2020: *Dissostichus mawsoni* in Division 58.4.1

CCAMLR Secretariat

16 March 2021



Antarctic Toothfish, *Dissostichus mawsoni* Norman, 1937.



Map of the management areas within the CAMLR Convention Area. Division 58.4.1, the region discussed in this report is shaded in green. Throughout this report, “2020” refers to the 2019/20 CCAMLR fishing season (from 1 December 2019 to 30 November 2020).

# Contents

1. Introduction to the fishery . . . . .	3
1.1. History . . . . .	3
1.2. Conservation Measures currently in force . . . . .	3
1.3. Active vessels . . . . .	4
1.4. Timeline of spatial management . . . . .	5
2. Reported catch . . . . .	5
2.1. Latest reports and limits . . . . .	5
2.2. By-catch . . . . .	6
2.3. Vulnerable marine ecosystems (VMEs) . . . . .	6
2.4. Incidental mortality of seabirds and marine mammals . . . . .	7
3. Illegal, Unreported and Unregulated (IUU) fishing . . . . .	7
4. Data collection . . . . .	7
4.1. Data collection requirements . . . . .	7
4.2. Length frequency distributions . . . . .	8
4.3. Tagging . . . . .	10
5. Research . . . . .	12
5.1. Status of the science . . . . .	12
5.2. Research plans . . . . .	13
5.3. Advice by the Scientific Committee . . . . .	13
6. Stock status . . . . .	13
6.1. Summary of current status . . . . .	13
6.2. Assessment method . . . . .	13
6.3. Year of last assessment, year of next assessment . . . . .	13
7. Climate Change and environmental variability . . . . .	14
Additional Resources . . . . .	14

## **1. Introduction to the fishery**

### **1.1. History**

This report describes the exploratory longline fishery for Antarctic toothfish (*Dissostichus mawsoni*) in Division 58.4.1. Prior to 2017, this fishery was classified as an exploratory fishery for *Dissostichus* spp., however, in order to better align the target species with the species that dominates the catch and tagging data, the target species was specified as *D. mawsoni*, with any Patagonian toothfish (*D. eleginoides*) caught counting towards the catch limit for *D. mawsoni*.

### **1.2. Conservation Measures currently in force**

The current limits on the exploratory fishery for *D. mawsoni* in Division 58.4.1 are described in Conservation Measure [41-11](#). Directed fishing did not take place in 2020 as per Conservation Measure [41-11](#) paragraph 1.

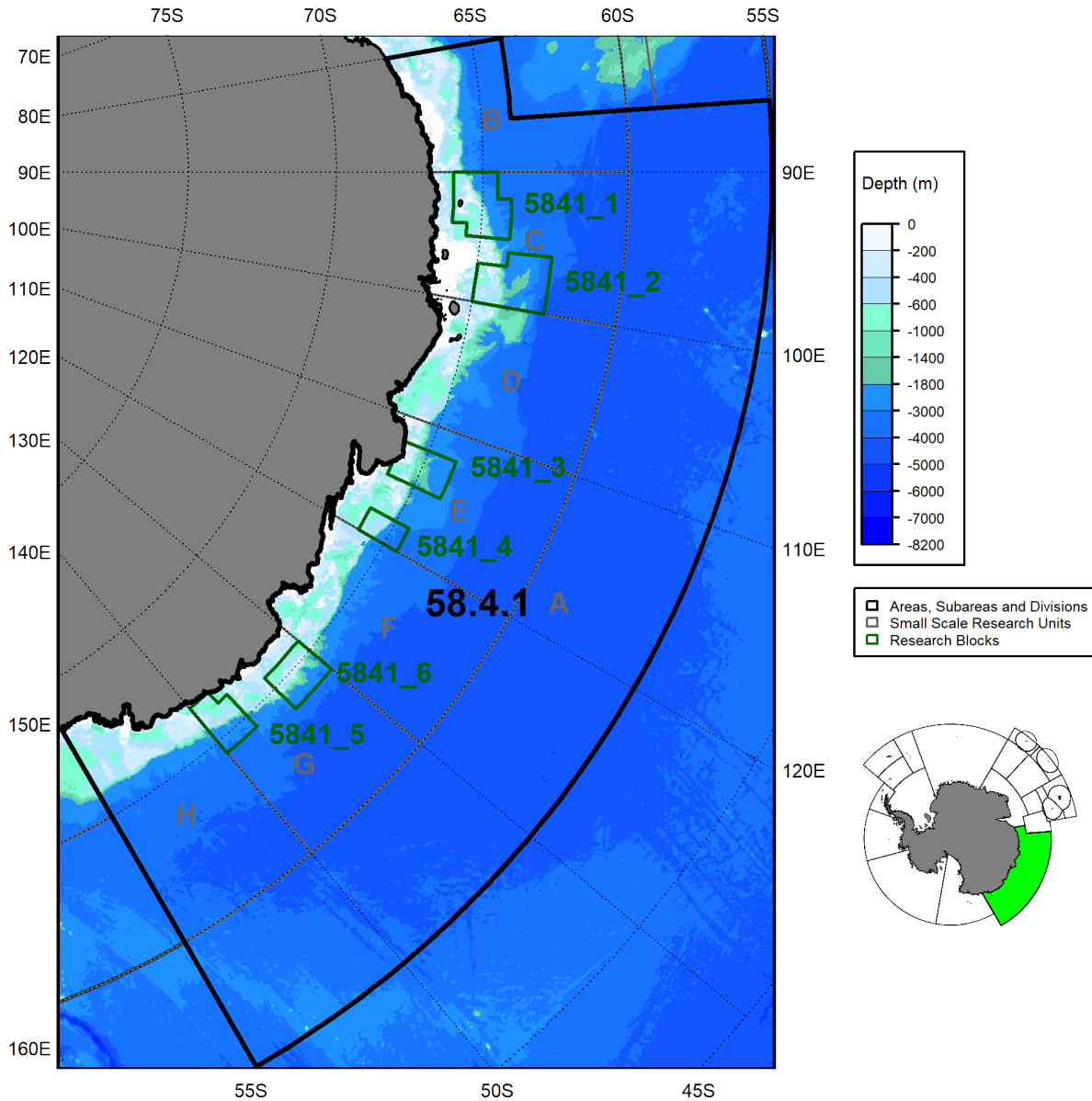


Figure 1: Location of Small Scale Research Units and Research Blocks in Division 58.4.1. The fishable depth range (600m-1800m) is highlighted in shades of green.

### 1.3. Active vessels

In 2019, 7 vessels notified their intent to participate in this fishery. In 2020, 11 vessels notified their intent to participate in this fishery. For the 2021 fishing season, a total of 6 vessels notified their intention to participate in this fishery (2 from Australia; 1 from Japan; 1 from Spain; 2 from the Republic of Korea).

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1, and will not take place in 2021.

## 1.4. Timeline of spatial management

In 2014, five Research Blocks (Fig. 1) were designated in Division 58.4.1 with catch limits applied to each Research Block. 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 division, other than the depletion experiment conducted by Spain, is restricted to the Research Blocks only. Further details on research in this division are given in section 5.

## 2. Reported catch

### 2.1. Latest reports and limits

The catches of *D. mawsoni* and *D. eleginoides* from Division 58.4.1 are provided in Table 1. In this fishery, the catch of *D. mawsoni* reached a maximum of 517 tonnes in 2007. In 2018, 1 tonnes of *D. eleginoides* and 264 tonnes of *D. mawsoni* were caught.

The catches reported in Division 58.4.1 include catch data from particular vessels 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). 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 1. Catch (tonnes) and effort history for *Dissostichus* spp. in this fishery. Source: Fine scale data and past estimates for IUU catch (-: no IUU estimate available; q: catch data currently quarantined).

Season	Number of vessels	Catch limit (tonnes)	<i>D. eleginoides</i>	<i>D. mawsoni</i>	Estimated IUU catch (tonnes)
2005	7	600	1	479	-
2006	6	600		420	597
2007	4	600	0 (q: 94)	517 (q: 24)	626
2008	6	600	1	410	136
2009	3	210		162 (q: 60)	152
2010	2	210	2	86 (q: 108)	910
2011	3	210	0	113 (q: 101)	-
2012	1	210		157	-
2013	2	210	0	48	-
2014	1	724	1	101	-
2015	1	724		122	-
2016	3	660	1	400	-
2017	3	660	2	206	-
2018	4	545	1	264	-
2019		579			-
2020		583			-

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1.

Table 2: Catch and catch limits by Research Block in 2020 for *Dissostichus mawsoni* in Division 58.4.1. Source: Fine scale data.

Research Block	Catch limit	Catch (% of catch limit)
58.4.1_1	138	- (-%)
58.4.1_2	139	- (-%)
58.4.1_3	119	- (-%)
58.4.1_4	23	- (-%)
58.4.1_5	60	- (-%)
58.4.1_6	104	- (-%)

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1.

## 2.2. By-catch

Catch limits for by-catch species groups (macrourids, skates (Rajids) and other species) are defined in Conservation Measure 33-03.

The by-catch in Division 58.4.1 consists predominantly of macrourids (Table 3).

Table 3. Reported catch and catch limits for by-catch species (*Macrourus* spp., Rajids and others) in this fishery (see Conservation Measure 33-03 for details). Source: fine-scale data.

Season	<i>Macrourus</i> spp.		Rajids			Other catch	
	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Number Released	Catch Limit (tonnes)	Reported Catch (tonnes)
2005	96	17	100	<1	0	60	<1
2006	96	15	100	<1	0	60	<1
2007	96	28 q	100	<1	0	60	<1 q
2008	96	36	100	<1	0	60	1
2009	33	3 q	100	<1 q	0 q	60	<1 q
2010	33	5 q	100	0	0	60	<1 q
2011	33	3 q	100	0	0	60	<1 q
2012	33	2	100	0	0	60	<1
2013	33	5	100	<1	0	60	<1
2014	116	6	100	<1	0	100	<1
2015	116	2	100	0	0	100	<1
2016	105	49	100	<1	21	100	2
2017	85	26	28	<1	34	85	2
2018	88	35	27	0	0	88	2
2019	103		30			103	
2020	94		29			94	

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1.

## 2.3. Vulnerable marine ecosystems (VMEs)

All Members are required to submit, within their general new (Conservation Measure 21-01) and exploratory (Conservation Measure 21-02) fisheries notifications requirements, information on the known and anticipated impacts of their gear on vulnerable marine ecosystems (VMEs), including benthic communities and benthos

such as seamounts, hydrothermal vents and cold-water corals. All of the VMEs in CCAMLR's [VME Registry](#) are currently afforded protection through specific area closures.

By the end of this fishing season, there were 2 VMEs and 1 VME Risk Area designated in Division 58.4.1.

## 2.4. Incidental mortality of seabirds and marine mammals

There have been no observed incidental mortalities of birds reported by vessels in Division 58.4.1 in this fishery.

There have been no observed incidental mortalities of mammals reported by vessels in Division 58.4.1 in this fishery.

The requirements of Conservation Measure [25-02](#), including the '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. There is an exemption to the requirement for night setting by achieving the sink rates described in Conservation Measure [24-02](#) and subject to a bird by-catch limit.

The risk level for birds in the fishery in Division 58.4.1 is category 2 (average to low) (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

## 3. Illegal, Unreported and Unregulated (IUU) fishing

Illegal, unreported and unregulated (IUU) fishing activity was reported in Division 58.4.1 in 2006 with four IUU fishing vessel sightings, in 2007 when there were two to three IUU fishing vessel sightings, and in both 2008 and 2009 when one IUU fishing vessel was sighted in each year. This increased to five IUU-listed vessels observed during 2010 followed by four IUU vessels, two using gillnet, one longliner and one refrigerated cargo vessel, in 2011. There were two IUU-listed vessels and one unknown vessel sighted in 2012 and three IUU-listed vessels reported in both 2014 and 2015. In 2014, one vessel that emitted an emergency distress signal was not located, but debris was sighted. No IUU vessel sightings were reported in 2016 although some gillnet was recovered during legal fishing operations. However, 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).

CCAMLR-XXXVI/28 Rev. 2 provided detailed information on fishing activities of IUU-listed vessels from Division 58.4.1 in 2014 following [Operation Sparrow II](#) conducted by Spain. The vessels reported catch for insurance purposes and took an estimated 792 tonnes. The IUU vessels [Asian Warrior](#), [Atlantic Wind](#) and [Zemour 1](#) have a long history of operating together in the Convention Area, usually supported by a reefer vessel, and have likely undertaken similar fishing activities every year since they were first sighted in the Convention Area.

Based on the unprecedented availability of information from IUU vessels in Division 58.4.1, including catch data and video footage of fishing operations, WG-FSA-18/60 evaluated toothfish catch per unit effort (CPUE) (by weight and number), by-catch species and size compositions, temporal variation in the spatial distribution of IUU activity, the temporal and spatial distribution of authorised fishing vessels in relation to available IUU activity to review the potential impacts of IUU removals on previous research conducted in the region and the relationship between reported IUU vessel sightings and actual levels of removals.

## 4. Data collection

### 4.1. Data collection requirements

The collection of biological data under Conservation Measure [23-05](#) as part of the CCAMLR Scheme of International Scientific Observation (SISO) 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.

## 4.2. Length frequency distributions

The length frequency distributions of *D. mawsoni* caught in this fishery are shown in Figure 2. These length frequency distributions are unweighted; 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 changes 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 distributions of fishing.

The majority of *D. mawsoni* caught in the Division 58.4.1 fishery ranged from 100 to 175cm in length, with a relatively consistent broad mode at approximately 140cm (Fig. 2).



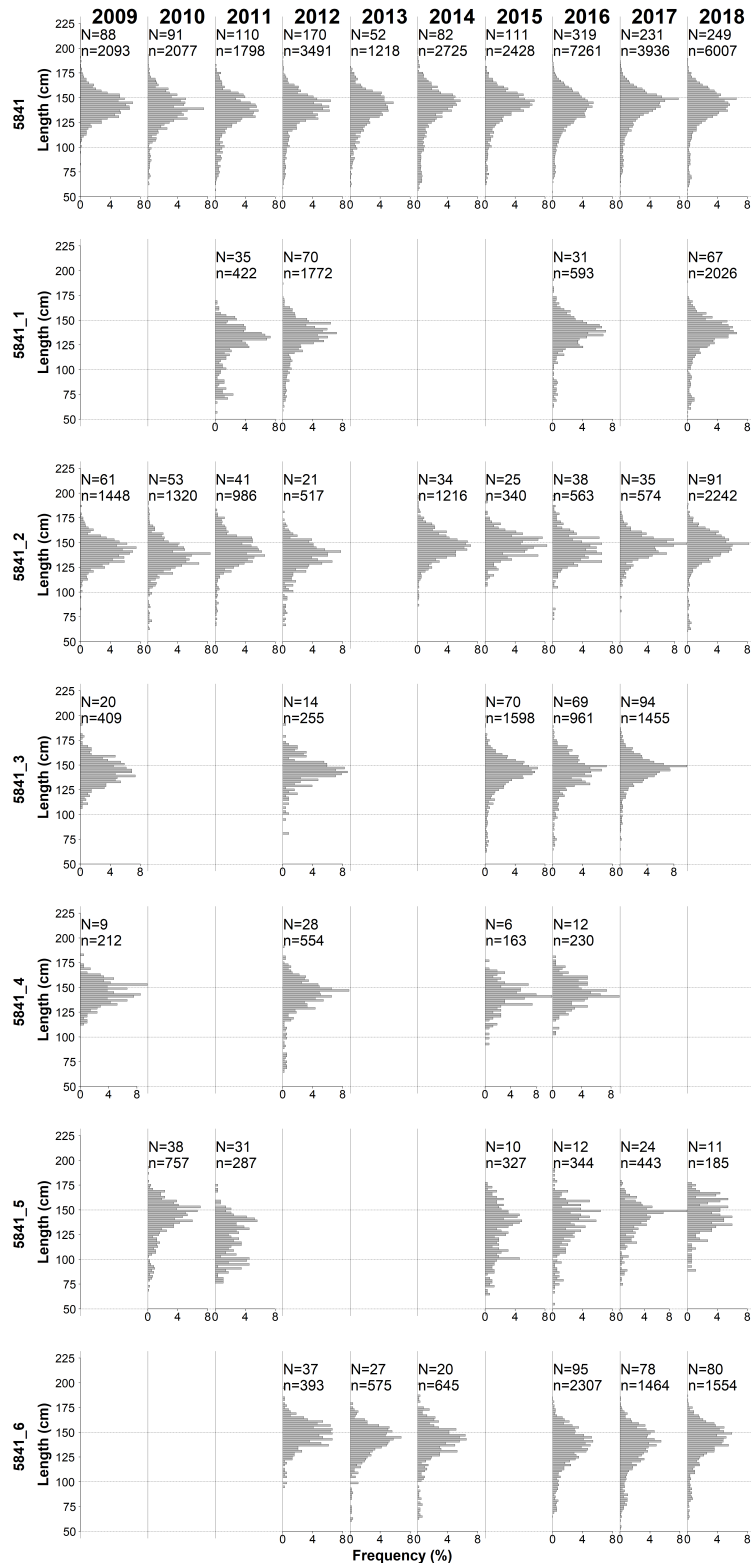


Figure 2. Annual length frequency distributions of *Dissostichus mawsoni* caught in Division 58.4.1 (top panel) and in each Research Block (lower panels). The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are indicated. Note: length frequency distributions are only shown where more than 150 fish were measured.

### 4.3. Tagging

Since 2012, vessels have been required to tag and release *Dissostichus* spp. at a rate of 5 fish per tonne of green weight caught. 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 4). 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).

To date in this area, 12408 *D. mawsoni* have been tagged and released (86 have been recaptured; Table 5), and, 381 *D. eleginoides* have been tagged and released (3 have been recaptured; Table 6).

Table 4. Annual tagging rate (number of fish tagged per tonne of total catch), reported by vessels operating in this exploratory fishery. The tag-overlap statistics (CM 41-01) for *D. mawsoni* and *D. eleginoides* respectively are provided in brackets (NC: Tag-overlap statistic is Not Calculated for less than 30 fish tagged; -: no fish were tagged).

Flag State	Vessel name	Fishing Season										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	Antarctic Chieftain											5.4 (80.2,NC)
Australia	Antarctic Discovery							5.1 (94.1,NC)	6.1 (86.2,NC)	5.3 (85.4,NC)		
Spain	Tronio	3.1 (55.3,NC)		5.2 (69.4,NC)	5.3 (72.1,NC)		5.1 (83.5,NC)	5.1 (67.2,NC)	5 (73.9,NC)			
France	Le Saint Andre											5.2 (71.3,-)
Japan	Shinsei Maru No. 3	3.1 (58.5,NC)										
Republic of Korea	Hong Jin No. 701		4.7 (74.1,NC)	5.2 (89.4,-)								
Republic of Korea	Insung No. 3				9.4 (76.1,-)							
Republic of Korea	Kingstar					5.1 (92.1,NC)	5 (89.1,NC)	5.2 (90.7,NC)				

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1.

Table 5. Number of *D. mawsoni* tagged in recent fishing Seasons. The number of fish recaptured by each vessel in each Season is provided in brackets.

Flag State	Vessel name	Fishing Season										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	Antarctic Chieftain											395 (13)
Australia	Antarctic Discovery							247 (3)	51 (1)			90 (0)
Spain	Tronio		232 (2)		227 (0)	522 (6)		618 (2)	324 (6)			617 (12)
France	Le Saint Andre											260 (2)
Japan	Shinsei Maru No. 3	263 (2)										
Republic of Korea	Hong Jin No. 701		180 (2)	812 (0)								
Republic of Korea	Insung No. 3				29 (0)							
Republic of Korea	Kingstar						624 (3)	1138 (5)	695 (7)			
<b>Total</b>		<b>263 (2)</b>	<b>412 (4)</b>	<b>812 (0)</b>	<b>256 (0)</b>	<b>522 (6)</b>	<b>624 (3)</b>	<b>2003 (10)</b>	<b>1070 (14)</b>	<b>1362 (27)</b>		

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1.

Table 6. Number of *D. eleginoides* tagged in recent fishing Seasons. The number of fish recaptured by each vessel in each Season is provided in brackets.

Flag State	Vessel name	Fishing Season										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	Antarctic Chieftain											0 (1)
Australia	Antarctic Discovery							16 (0)	8 (0)			3 (0)
Spain	Tronio		0 (0)		4 (0)	12 (0)		8 (0)	5 (0)			6 (1)
France	Le Saint Andre											0 (0)
Japan	Shinsei Maru No. 3	12 (1)										
Republic of Korea	Hong Jin No. 701		0 (0)	0 (0)								
Republic of Korea	Insung No. 3				0 (0)							
Republic of Korea	Kingstar						0 (0)	5 (0)	0 (0)			
<b>Total</b>		<b>12 (1)</b>	<b>0 (0)</b>	<b>0 (0)</b>	<b>4 (0)</b>	<b>12 (0)</b>	<b>0 (0)</b>	<b>29 (0)</b>	<b>13 (0)</b>	<b>9 (2)</b>		

Directed fishing did not take place in 2019 and 2020 as per Conservation Measure 41-11 paragraph 1.

## 5. Research

### 5.1. Status of the science

Catch limits for CCAMLR’s fisheries for *D. mawsoni* and *D. eleginoides* for the ‘assessed’ fisheries 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)). 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 Conservation Measure 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.

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.

Spanish and Australian scientists are working on the age and growth estimates of Antarctic toothfish within divisions 58.4.1 and 58.4.2 from 2015 and 2017 respectively. During 2019, Korean scientists have joined this collaborative work (WG-FSA-19/47).

In 2018, an initial stock assessment model was developed for Antarctic toothfish in Divisions 58.4.1 and 58.4.2 (WG-FSA-18/58 rev1) but deemed to be unsuitable to provide management advice on catch limits.

## 5.2. Research plans

**5.2.1. Background** Exploratory fishing for toothfish (*Dissostichus* spp.) in Division 58.4.1 began in 2003. However, a robust stock assessment and catch limits according to CCAMLR decision rules remain to be determined for this Division. Accordingly, the current exploratory Antarctic toothfish (*Dissostichus mawsoni*) fishery in this Division has been identified as ‘data-poor’. In 2011, Research Blocks were designated in areas where previous tag releases had occurred. Research plans are generally focussed in these areas, to facilitate the development of local biomass estimates. All Members notifying to fish in Division 58.4.1 submitted a research plan, based on Conservation Measure [24-01](#), Annex 24-01/A, format 2.

In 2015, proposals to conduct research in Division 58.4.1 were presented in multiple research plans by Australia (commenced 2015/16), France (commenced 2016/17), Japan (commenced 2016/17), Republic of Korea (commenced 2012/13) and Spain (commenced 2012/13). This research has continued in 2016, 2017 and 2018.

In 2018 and 2019, two multi-member research plans on the *Dissostichus mawsoni* exploratory fishery in East Antarctica (Divisions 58.4.1 and 58.4.2) were proposed, one by Australia, France, Japan, the Republic of Korea and Spain (WG-FSA-19/44, WG-FSA-19/44), and one by Russia (SC-CAMLR-XXXVII/BG/23, WG-FSa-19/52). However, CCAMLR could not achieve consensus on any research fishing going ahead in 2019 and 2020.

## 5.3. Advice by the Scientific Committee

In 2016, the Scientific Committee considered the advice of WG-FSA on research in Divisions 58.4.1 and 58.4.2 and agreed that the research plan in WG-FSA-16/29 Rev. 1 is appropriate to achieve the research objectives and endorsed the recommendation from WG FSA-16 (SC-CAMLR-XXXV, Annex 7, paragraph 4.118) that the new proposed Research Rlock 5841\_6 be opened on an interim basis, with results to be reviewed by WG SAM and WG FSA in 2017.

In 2017, the Scientific Committee recommended that the catch limits for these divisions remain unchanged for 2018 and supported the catch allocation scheme developed by the research proponents in 2016.

In 2018, 2019 and 2020, the Commission was unable to reach consensus on the research plan for the exploratory fishery in Division 58.4.1 for 2019, 2020 and 2021, respectively.

## 6. Stock status

### 6.1. Summary of current status

As a data-limited fishery, this fishery does not have such estimates.

### 6.2. Assessment method

Stock biomass and catch limits in data-limited fisheries are estimated using the [trend analysis](#).

### 6.3. Year of last assessment, year of next assessment

Research plans for data-limited fisheries are reviewed annually.

## 7. Climate Change and environmental variability

A recent summary of the potential impacts of climate change on Southern Ocean fisheries (FAO 2018) highlights the following key points:

*The Antarctic region is characterized by complex interaction of natural climate variability and anthropogenic climate change that produce high levels of variability in both physical and biological systems, including impacts on key fishery taxa such as Antarctic krill.*

*The impact of anthropogenic climate change in the short-term could be expected to be related to changes in sea ice and physical access to fishing grounds, whereas longer-term implications are likely to include changes in ecosystem productivity affecting target stocks.*

*There are no resident human populations or fishery-dependent livelihoods in the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Area, therefore climate change will have limited direct implications for regional food security.*

*The institutional and management approach taken by CCAMLR, including the ecosystem-based approach, the establishment of large marine protected areas, and scientific monitoring programmes, provides measures of resilience to climate change.*

There is no formal evaluation of the impacts of climate change and environmental variability available for this particular fishery.

### Additional Resources

- Fishery Summary: [pdf](#), [html](#)
- Species Description: [pdf](#), [html](#)
- Trend Analysis: [pdf](#), [html](#)
- [Fisheries Documents Browser](#)