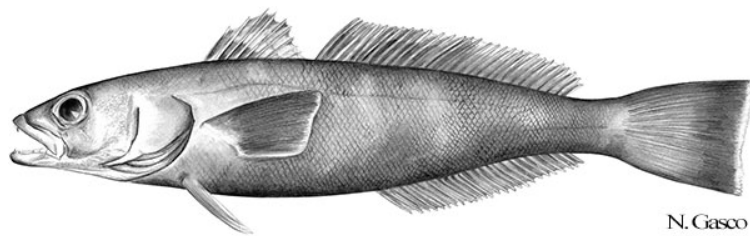


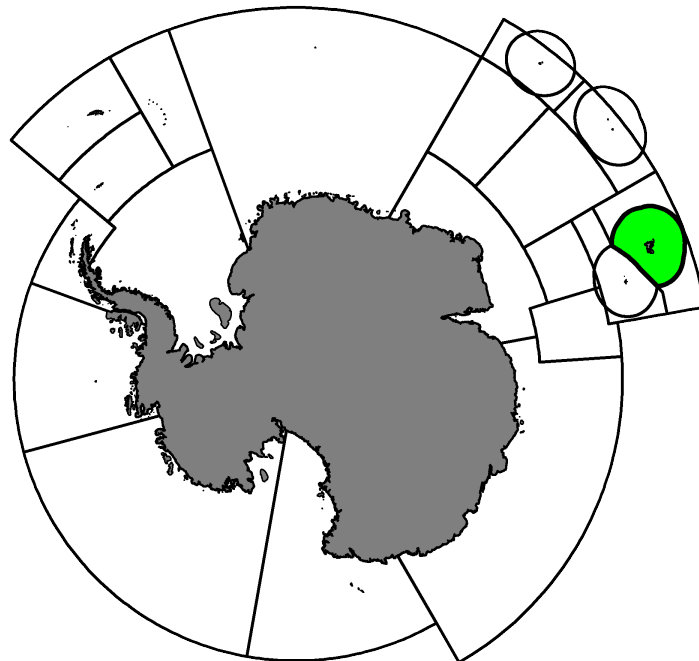
Fishery Report 2022: *Dissostichus eleginoides* at Kerguelen Islands French EEZ (Division 58.5.1)

CCAMLR Secretariat

16 May 2023



Patagonian Toothfish, *Dissostichus eleginoides* Smitt, 1898.



Map of the management areas within the CAMLR Convention Area. The region discussed in this report is shaded in green. Throughout this report, “2022” refers to the 2021/22 CCAMLR fishing season (from 1 December 2021 to 30 November 2022).

Contents

1. Introduction to the fishery	3
1.1. History	3
1.2. Conservation Measures currently in force	3
1.3. Active vessels	4
2. Reported catch	5
2.1. Latest reports and limits	5
2.2. By-catch	6
2.3. Vulnerable marine ecosystems (VMEs)	7
2.4. Incidental mortality of seabirds and marine mammals	7
3. Illegal, Unreported and Unregulated (IUU) fishing	8
4. Data collection	8
4.1. Data collection requirements	8
4.2. Summary of available data	8
4.3. Length frequency distributions	13
4.4. Tagging	13
5. Research	14
6. Stock status	14
6.1. Summary of current status	14
6.2. Assessment method	14
6.3. Year of last assessment, year of next assessment	14
7. Climate Change and environmental variability	14
Additional Resources	15
References	15

1. Introduction to the fishery

1.1. History

This report describes the licensed longline fishery for Patagonian toothfish (*Dissostichus eleginoides*) in the French Exclusive Economic Zone (EEZ) established in 1978 around the Kerguelen Islands in Division 58.5.1.

The fishery, targeting *D. eleginoides*, began as a trawl fishery in 1985 but targeting other species between 1979 and 1984 and caught small amounts of toothfish as by-catch. Trawling continued to 2001 and intermittently in 2006 and 2010; a longline fishery began in 1992 (Duhamel et al., 2011). The fishery is active throughout the year with the exception of a summer closure period (1 February to either 1 or 15 March) which has been in place since 2004.

Within the French EEZs, fishing seasons, catch limits for target species, as well as vessel licensing, are allocated by France. Since 2019, catch limits are set for a period of 3 years. The season extends from 1 September to 31 August. French management measures, annually established by TAAF, specific to the EEZ, have restricted the longline fishery to waters outside the 12 nautical mile zone and no shallower than 500m. Fishing is also prohibited within the strict protection areas of the Marine Reserve since 2006.

1.2. Conservation Measures currently in force

No new information was available on the state of fish stocks in Division 58.5.1 outside areas of national jurisdiction and thus the prohibition of directed fishing for *D. eleginoides*, described in Conservation Measure 32-13, shall remain in force.

Within the French EEZs, catch limits for target species, as well as vessel licensing, are allocated by France. A six-year management plan was adopted in July 2019 with the overall objective of ensuring conditions for a sustainable and optimal exploitation of Patagonian toothfish. It also sets catch limits for a period of 3 years. The 2020-2022 seasonal catch limit was set at 5200 tonnes, and the 2023-2025 seasonal catch limit was set at 5020 tonnes.

In the EEZ of Kerguelen, various national conservation and fisheries enforcement measures are applicable, such as:

- Annual catch limit set triennially since September 2019
- Demersal longlines and pots are the only authorized fishing gears
- Fishing season extends from 1 September to 31 August of the following year with an annual closure from 1 February to mid-March, which differs from the CCAMLR fishing season
- One vessel at a time fishing per 0.5° latitude x 1° longitude rectangle for a maximum period of 10 days
- Fishing is prohibited within the strict protection areas of the Marine Reserve which include areas not exceeding 500m in depth
- Move-on rule to limit catches of *D. eleginoides* of 60cm and less
- Cut-off procedure and move-on rules for skates to reduce fishing mortality
- Mitigation measures to reduce bird mortality
- Move-on rule on VME
- One French scientific observer on board each licensed vessel
- Mandatory vessel logbooks
- A single catch landings site at Réunion Island
- Mandatory port inspection

The limits in force and the advice of WG-FSA-2021 to the Scientific Committee for the 2022 season were:

- (i) The Working Group agreed that the catch limit set by France of 5,200 tonnes in 2022, which accounts for depredation, was consistent with the CCAMLR decision rules for the model runs presented,

- (ii) 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 32-02, shall remain in force for 2022.

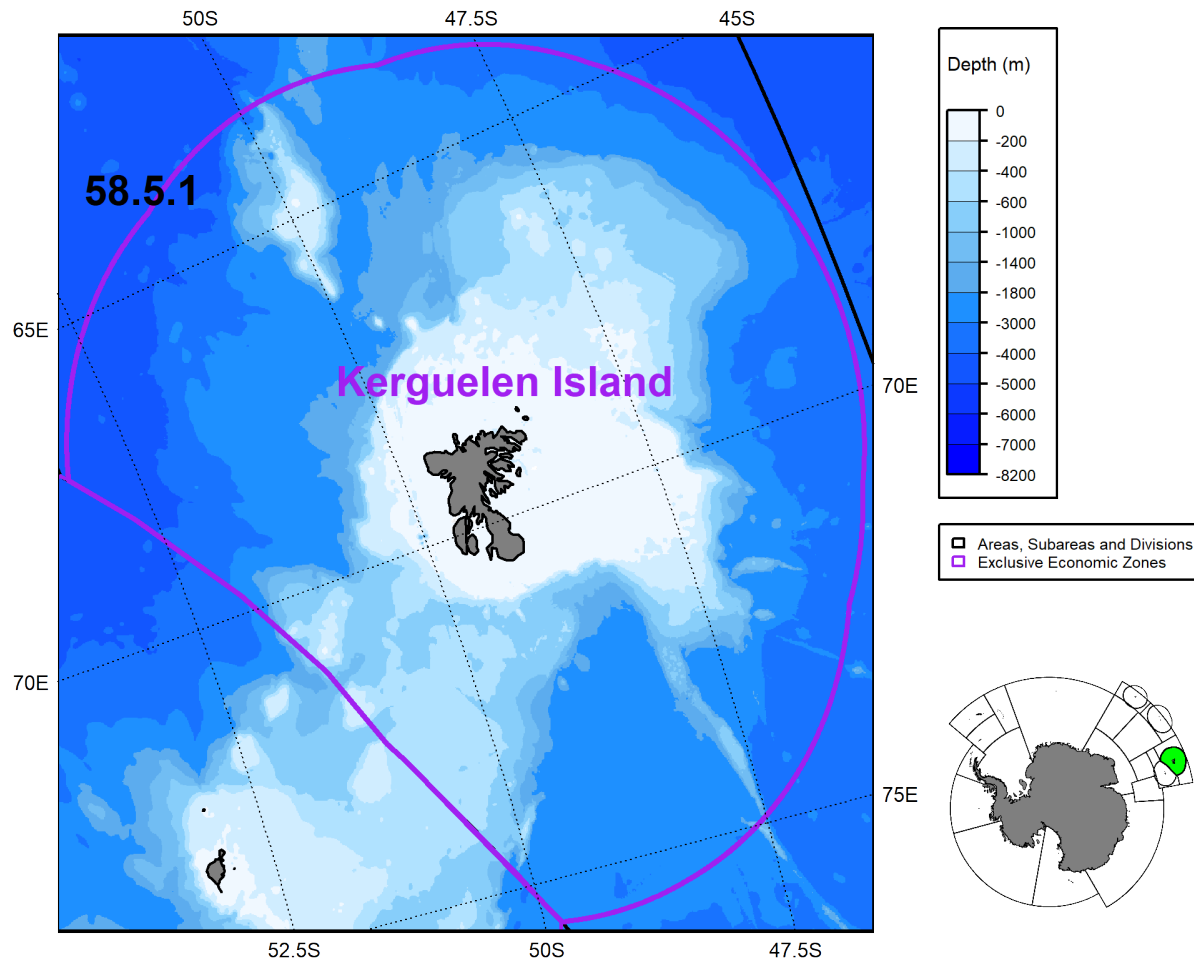


Figure 1: Map of the region discussed in this report.

1.3. Active vessels

In 2022, 7 vessels participated in this fishery.

2. Reported catch

Since the CCAMLR fishing season (1 December to 30 November of the following year, UTC time) and the TAAF fishing season (1 September to 31 August of the following year) do not match, data pooled at the annual scale and shown in this document may not match data reported by TAAF. This distinction is particularly relevant if readers wish to compare annual catch in the Convention Area to annual catch limits as set by TAAF.

2.1. Latest reports and limits

Reported catches of *Dissostichus eleginoides* are shown in Table 1. In this fishery, the catch of *D. eleginoides* reached a maximum of 9130 tonnes in 2000. In 2022, 5196 tonnes of *D. eleginoides* were caught.

Table 1. Catch and effort history for *Dissostichus eleginoides* in this fishery. Source: Fine scale data and past estimates for IUU catch (-: no fishing, or no IUU estimate available).

Season	Longline Catch (tonnes)	Trawl Catch (tonnes)	Pot Catch (tonnes)	Total Catch (tonnes)	Number of vessels	Estimated IUU catch (tonnes)
1992	-	1588	-	1588	1	-
1993	-	1570	-	1570	1	-
1994	-	4348	-	4348	1	-
1995	-	3997	-	3997	1	-
1996	-	3304	-	3304	1	833
1997	-	4011	-	4011	1	6094
1998	121	3525	-	3645	1	7156
1999	504	3614	-	4118	5	1237
2000	2999	6130	-	9130	8	2600
2001	2589	4335	-	6924	8	4550
2002	4075	359	-	4434	11	6300
2003	5452	-	-	5452	7	5518
2004	5099	0	-	5099	9	536
2005	5034	-	-	5034	7	268
2006	4698	254	-	4952	8	144
2007	5345	-	-	5345	7	451
2008	4859	-	-	4859	7	720
2009	5238	-	-	5238	8	0
2010	4915	235	-	5151	8	22
2011	5236	-	-	5236	7	-
2012	4904	-	-	4904	7	-
2013	5377	-	-	5377	7	-
2014	5326	-	-	5326	7	-
2015	4392	-	-	4392	8	-
2016	5553	-	-	5553	8	-
2017	5098	-	-	5098	9	-
2018	4878	-	-	4878	7	-
2019	5270	-	-	5270	7	-
2020	5157	-	-	5157	7	-
2021	5038	-	1	5039	7	-
2022	5196	-	0	5196	7	-

2.2. By-catch

Primary by-catch species from the longline fishery in the French EEZ in Division 58.5.1 are the macrourid *Macrourus carinatus*, rajid skates (*Bathyraja irrasa* and *B. eatonii*) and blue antimora (*Antimora rostrata*). The latter species is fully discarded, while the others are partly or totally retained. The spatial distribution of by-catch indicates specific areas of higher catch rates that differed between species ([WG-FSA-10/34](#)).

The catch histories for by-catch species are provided in Table 2.

Table 2. Reported catch for by-catch species (*Macrourus* spp., skates and *Antimora rostrata*) in this longline fishery. Source: fine-scale data.

Season	<i>Macrourus</i> spp.	Skates		<i>Antimora rostrata</i>
	Reported Catch (tonnes)	Reported Catch (tonnes)	Number Released	Reported Catch (tonnes)
1998	12	12	0	<1
1999	37	42	0	1
2000	162	120	0	1
2001	97	116	0	<1
2002	448	530	0	2
2003	772	929	0	10
2004	938	1133	0	12
2005	779	975	0	47
2006	686	596	0	54
2007	779	546	1954	56
2008	821	376	3593	68
2009	956	415	3432	45
2010	884	455	2	59
2011	861	438	535	52
2012	691	433	15878	26
2013	727	308	12423	67
2014	752	68	32808	72
2015	605	9	33641	69
2016	696	13	53270	56
2017	642	22	44273	49
2018	665	22	44225	38
2019	523	15	52044	43
2020	445	24	62187	60
2021	716	26	60386	94
2022	693	16	50380	88

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 (POKER 2006, 2010, 2013, 2017; Duhamel *et al.*, 2019) and could help in the future. The Working Group on Fish Stock Assessment ([WG-FSA](#)) recommended that, where possible, areas with high by-catch rates should be avoided, particularly those shown in [WG-FSA-09/43](#). The requirement for rajids to be ‘cut-off’ at the surface has been in force since 2014.

2.3. Vulnerable marine ecosystems (VMEs)

All Members are required to submit, within their general 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.

In this fishery, fishery observers collect information about benthic taxa, including those considered as VME taxa.

As Conservation Measure 22-06 does not apply to this area, there are no VMEs or VME Risk Areas designated in Division 58.5.1.

2.4. Incidental mortality of seabirds and marine mammals

CCAMLR mitigation measures are applied in the French EEZ. A summary of the historic bird mortality by longline in the French EEZ in Division 58.5.1 is shown in Table 3. The most common species injured or killed in the fishery was white-chinned petrel (*Procellaria aequinoctialis*). Night-setting requirements have been highly effective in removing the previously high levels of albatross mortality.

Table 3. Number of reported birds caught (killed or with injuries likely to substantially reduce long-term survival) in this fishery in each fishing season.

Season	<i>Macronectes halli</i>	<i>Procellaria aequinoctialis</i>	<i>Procellaria cinerea</i>	Other
2007	3	57	10	1
2008	5	271	14	
2009	2	111	6	
2010	5	63	15	1
2011	9	49	8	1
2012		41	5	1
2013	6	18	2	
2014		4		2
2015	1	9	3	
2016		12	7	
2017		13	1	
2018		9		
2019		22		
2020		7		
2021		27	4	
2022		1		

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

France applies the requirements of Conservation Measure 25-02 'Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area' to this fishery.

Additional measures are also 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 for vessels that have high by-catch rates,

- (iii) education and training is 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 Islands, as well as the continued population counts of white-chinned petrels on the Kerguelen archipelago.

Four Southern elephant seals (*Mirounga leonina*) were killed in this fishery in 2022.

3. Illegal, Unreported and Unregulated (IUU) fishing

Illegal, unreported and unregulated (IUU) fishing was first detected in this region in 1996 and in some years IUU catches have exceeded legal catches, resulting in total removals exceeding 10,000 tonnes in some seasons.

IUU fishing activity was detected in Division 58.5.1 (Kerguelen EEZ) during 2006, with one IUU-listed fishing vessel observed in the division. Two IUU-listed vessels were sighted during 2007 and three IUU-listed vessels were sighted during 2008. One IUU fishing vessel was observed on the boundary of the Kerguelen EEZ during winter 2007, and reports from France indicate that IUU activities sometimes occurred here during each year from 2008 to 2012. One IUU-listed fishing vessel was sighted in Division 58.5.1 during 2010, two during 2012 and one during the 2013. No IUU-listed vessels were observed during 2014, 2015 and 2016, however, IUU fishing gear was recovered from the region during all three years. Following the recognition of methodological issues in its assessment, no estimates of the IUU catch of *Dissostichus* spp. have been provided since 2011 (SC-CAMLR-XXIX, paragraph 6.5).

4. Data collection

4.1. Data collection requirements

The collection of biological data 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. Summary of available data

Both the vessel's crew and observers collect fishing effort, catch, and by-catch information.

The vessel's crew report total catch of by-catch by coarse taxonomic groups given the taxonomic expertise required to discriminate similar species. Observers collect biological information on toothfish and by-catch specimens at a finer taxonomic resolution, and report toothfish length measurements to CCAMLR.

Summaries of data reported to CCAMLR for the past five years are given in Tables 4 and 5.

Table 4. Summary of by-catch and biological data reported by vessels crew and observers in each of the last five seasons in this longline fishery. By-catch records correspond to the number of observations of total weight and count of individuals for each taxon identified. Taxonomic identification may occur at different levels. *N.B.* Data prior to 2021 was collected but not reported (reporting of weight, sex, maturity, gonad weight and otolith samples started in September 2021).

Data source	Data class	Variable	2018	2019	2020	2021	2022
Vessel crew	by-catch	taxa identified	7	8	9	9	13
		records	6885	8014	8943	10271	9249
Observer	toothfish	specimens examined	100901	123759	119084	130880	136678
		length measurements	100901	123759	119084	130880	136629
		weight measurements	0	0	0	499	2604
		sex identifications	0	0	0	18886	96772
		maturity stage identifications	0	0	0	18886	96671
		gonad weight measurements	0	0	0	0	62
		otolith samples	0	0	0	514	2398

Table 5. Summary of biological data for predominant by-catch groups reported by observers (from random subsets of lines) in each of the last five seasons. Taxonomic identification may occur at different levels. *N.B.* Data prior to 2021 was collected but not reported (reporting started in September 2021).

By-catch group	Variable	2018	2019	2020	2021	2022
<i>Macrourus</i> spp.	specimens examined	0	0	0	2218	7306
	taxa identified	0	0	0	1	3
	length measurements	0	0	0	2218	7296
	weight measurements**	0	0	0	24	221
	snout to anus measurements*	0	0	0	2135	5743
	sex identifications**	0	0	0	461	760
	maturity stage identifications**	0	0	0	79	469
	gonad weight measurements**	0	0	0	0	0
	otolith samples**	0	0	0	24	107
Skates and rays	specimens examined	0	0	0	934	2074
	taxa identified	0	0	0	2	2
	length measurements	0	0	0	934	2073
	weight measurements**	0	0	0	41	671
	wingspan measurements*	0	0	0	214	1016
	pelvic length measurements*	0	0	0	0	489
	sex identifications**	0	0	0	933	1926
	maturity stage identifications**	0	0	0	197	1043
	gonad weight measurements**	0	0	0	0	0
Other fish	specimens examined	0	0	0	1249	2721
	taxa identified	0	0	0	3	5
	length measurements	0	0	0	1249	2696
	weight measurements**	0	0	0	37	128
	standard length measurements*	0	0	0	22	66
	sex identifications**	0	0	0	311	191
	maturity stage identifications**	0	0	0	52	57
	gonad weight measurements**	0	0	0	0	0
	otolith samples**	0	0	0	36	104

*: Species-dependent records

** : Voluntary records

The counts of by-catch taxa reported above (Table 5) correspond to specimens that have been individually sampled by observers. These are a subset of all the specimens counted by observers and are generally identified at a more precise taxonomic level. The figures below (Figs. 2 and 3) display the distribution of the most frequently examined by-catch taxa in time and space. It is important to note that observers sample a random subset of lines and do not individually examine all taxa; as such these figures are more representative of the distribution of biological observations than the catch of these taxa or their spatial distribution. At a coarse taxonomic level, the total catch of by-catch species groups is provided in section 2.2 above.

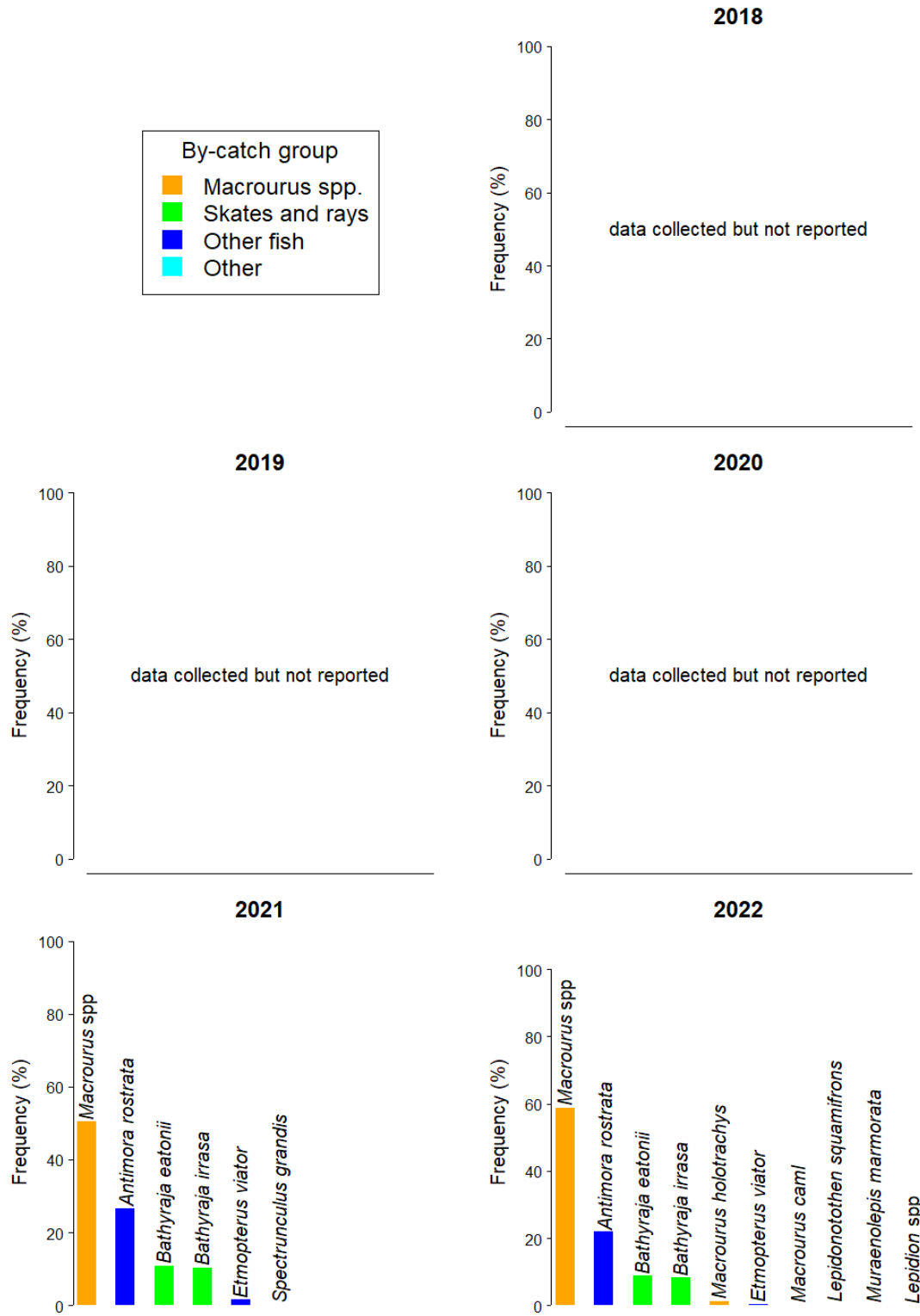


Figure 2. Relative frequencies of the most commonly examined by-catch taxa in each of the last five seasons, from the observer data (unweighted raw counts of individually examined specimens). Taxonomic identification may occur at different levels. *N.B.* Data prior to 2021 was collected but not reported (reporting started in September 2021).

(2021-2022)

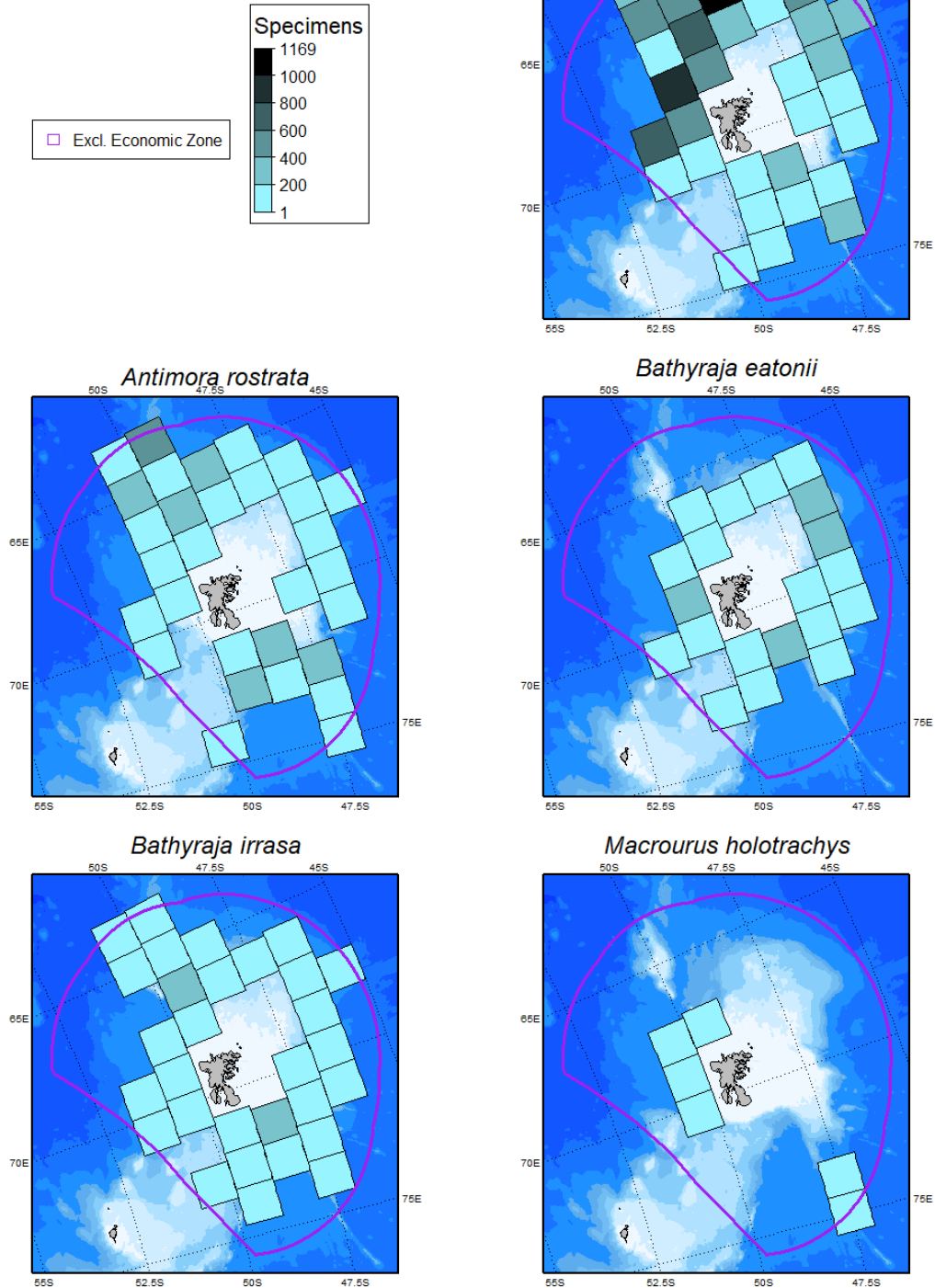


Figure 3. Spatial distribution of the most commonly examined by-catch taxa across the last five seasons, from the observer data (unweighted raw counts of individually examined specimens in each cell). The data were aggregated using equal area (100 km x 100 km) cells. Taxonomic identification may occur at different levels. Refer to Figure 1 for more details on the boundaries shown. *N.B.* Data prior to 2021 was collected but not reported (reporting started in September 2021).

4.3. Length frequency distributions

The recent length frequency distributions of *D. eleginoides* caught in this fishery are presented in Figure 4 (only commercial longline considered). The majority of *D. eleginoides* caught by longline range from 50 to 125cm in length, with a single strong mode for all seasons at approximately 70cm. 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.

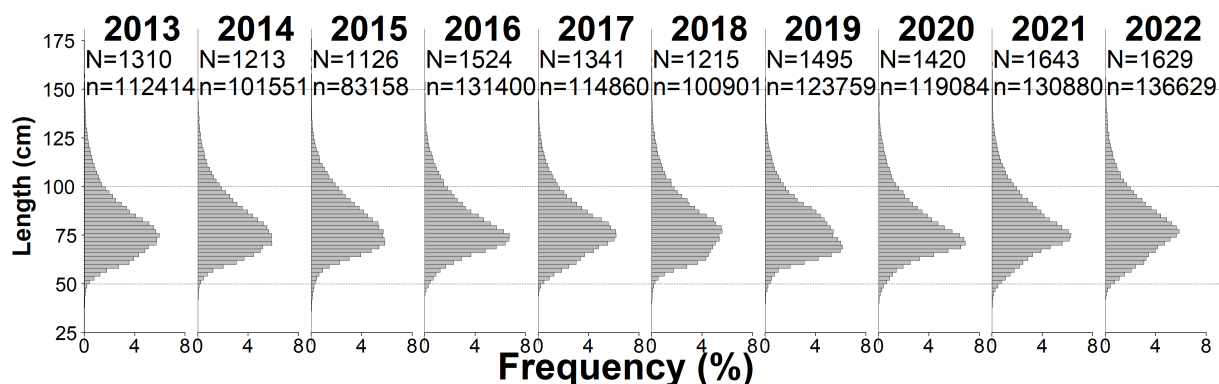


Figure 4. Annual length frequency distributions of *D. eleginoides* caught by longline in this fishery. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are indicated. Note: length frequency distributions are only shown where more than 150 fish were measured.

4.4. Tagging

Within the French EEZ, vessels are required to tag and release toothfish at a rate of 1 fish per tonne of green weight caught throughout the season.

To date in this area, 76571 *D. eleginoides* have been tagged and released (11947 have been recaptured, 11448 of which were released in this area; Table 6).

Table 6. Number of *Dissostichus eleginoides* tagged and recaptured in the area for each fishing Season.

Season	Tagged	Recaptured																	Total
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
2006	636																		
2007	2258	12	58	62	52	37	26	16	11	12	7	6	3	3	1		1	307	
2008	2479		18	87	77	52	46	36	16	12	6	7	9	4	5	2	1	378	
2009	4367			42	116	118	107	93	48	26	23	19	13	4	8	4		621	
2010	4880				27	122	132	121	79	45	49	33	21	12	15	9	4	1	
2011	5378					42	243	236	154	107	98	54	46	40	17	18	14	2	
2012	4987						55	209	180	145	131	72	52	46	25	23	16	1	
2013	5445							72	211	171	161	120	86	60	44	41	19		
2014	5400								44	181	203	135	100	87	50	45	39		
2015	4503									60	194	197	112	95	69	57	24	5	
2016	5631										80	199	265	186	121	92	51	3	
2017	5194											73	250	257	219	126	66	10	
2018	4760												43	301	256	159	86	9	
2019	5399													84	339	228	173	15	
2020	5236														94	298	187	13	
2021	5136															92	263	26	
2022	4882																75	25	
Total	76571																	11448	

The tagging program undertaken by France in its EEZ in Division 58.5.1 has achieved a similar tag-recapture

rate to the tagging program undertaken by Australia in Division 58.5.2, which indicates that tagged fish move mainly short distances, but some fish make longer forays around the slope, as well as long-distance movements outside the Division. Fish from the tagging program at Heard Island (Division 58.5.2) 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 (Williams et al., 2002; [WG-FSA-07/48 Rev. 1](#)).

5. Research

Four biomass survey cruises (named POKER 1, 2, 3 and 4) have been conducted in 2006 (Duhamel and Hauteceur, 2009), 2010 and 2013 (see [WG-FSA-14/07](#)) and 2017 respectively to estimate biomass and recruitment of *D. eleginoides* on the whole shelf and surrounding banks (100-1,000m). Such surveys are planned to be conducted every 3 to 4 years.

Collaborative 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](#), [WG-SAM-15/37](#)).

In 2019, catch removals due to killer and sperm whale interactions across subantarctic fisheries were estimated ([WG-FSA-2019/33](#)). These estimates are routinely updated as part of the stock assessment ([WG-FSA-2021/46](#)).

In 2022, [WG-FSA-2022/19](#) presented an analysis of skate handling practices and condition assessment methods in the longline toothfish fisheries operating in the southern Indian Ocean. Results provided clear guidelines for crew members operating on longline vessels to maximise the survival of released skates. [WG-FSA-2022/20](#) presented a preliminary study on the use of the vertebrae centrum in the age determination of skates (*Amblyraja taaf* in Crozet, and, *Bathyraja eatonii* and *B. irrassa* in Kerguelen waters).

6. Stock status

6.1. Summary of current status

According to the 2021 assessment ([WG-FSA-2021/46](#)), SSB0 is estimated at 233,130 tonnes (CI: 207,030-265,460). The estimate of the current SSB status of the stock is 68.8% (95% CI: 64.5%-73.1%).

6.2. Assessment method

The stock in this fishery is assessed using a fully integrated single-sex CASAL model ([WG-FSA-2021/46](#), [Stock Annex](#)).

6.3. Year of last assessment, year of next assessment

Assessments are reviewed biennially during WG-FSA, the last assessment was in 2021.

7. Climate Change and environmental variability

In 2018, a summary of the potential impacts of climate change on Southern Ocean fisheries ([FAO 2018](#)) highlighted 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. However, as an “under-exploited” fishery, there is potential for krill to play a role in global food security in the longer term. 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.

In 2022, the Commission recognised that climate change is already having effects in the Convention Area (CCAMLR-41, paragraph 6.3) and agreed that it needed to act urgently to prepare for, and adapt to, the effects of climate change on the marine ecosystems within the Convention Area (CCAMLR-41, paragraph 6.5). The Commission noted (CCAMLR-41, paragraph 6.4) that the Scientific Committee had incorporated climate change into its advice (SC-CAMLR-41, paragraph 7.8) and through discussions at the SC-Symposium (SC-CAMLR-41, Annex 11) had also added climate change to the work plans and terms of reference of its Working Groups (SC-CAMLR-41, paragraph 7.14). The Commission also welcomed (CCAMLR-41, paragraph 6.8) the Scientific Committee’s agreement to hold a workshop on climate change in the first half of 2023 (SC-CAMLR-41, paragraph 7.10) and encouraged the inclusion of a range of scientific experts as well as policy makers to foster integration of the best available science into management actions. The Commission adopted (CCAMLR-41, paragraph 6.28) Resolution 36/41.

Additional Resources

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

References

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