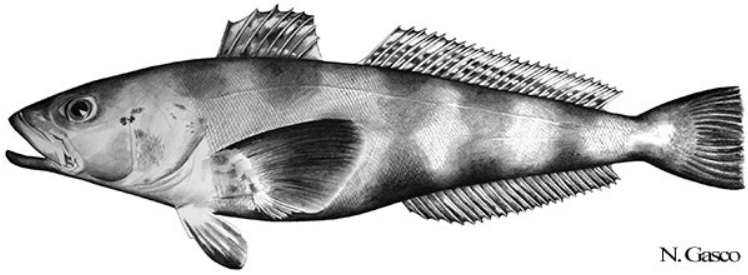
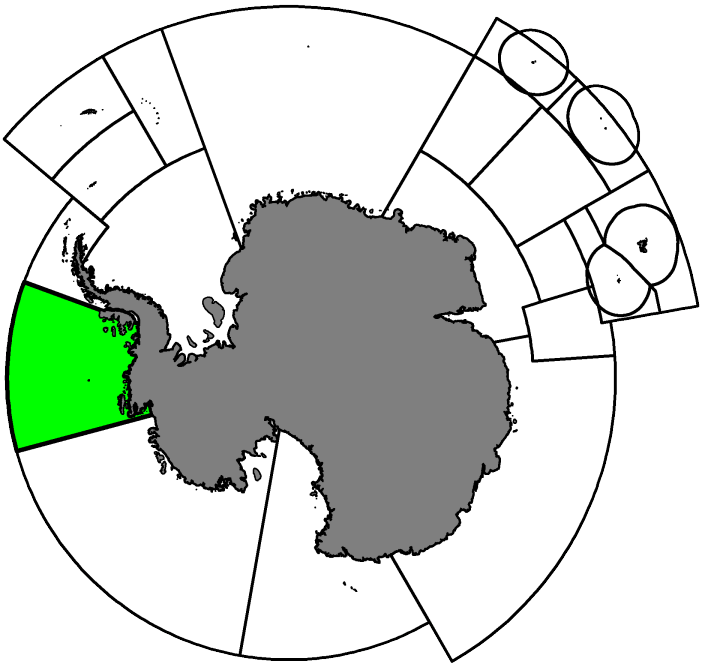
Fishery Report 2021: *Dissostichus mawsoni* in Subarea 88.3

CCAMLR Secretariat

27 May 2022



Antarctic Toothfish, *Dissostichus mawsoni* Norman, 1937.



Map of the management areas within the CAMLR Convention Area. Subarea 88.3, the region discussed in this report is shaded in green. Throughout this report, "2021" refers to the 2020/21 CCAMLR fishing season (from 1 December 2020 to 30 November 2021).

Contents

1. Introduction to the fishery

1.1. History

Research fishing for Antarctic toothfish (*Dissostichus mawsoni*) in Subarea 88.3 has been conducted by Chilean, New Zealand and Russian flagged vessels between 1998 and 2012. Since 2016 research fishing has been conducted by a Korean flagged vessel in Research Blocks (Fig. 1) in this Subarea.

1.2. Conservation Measures currently in force

Directed fishing for *Dissostichus* spp. in Subarea 88.3 is prohibited under Conservation Measure 32-02 until further scientific information is gathered and reviewed by the Scientific Committee and the Working Group on Fish Stock Assessment (WG-FSA).

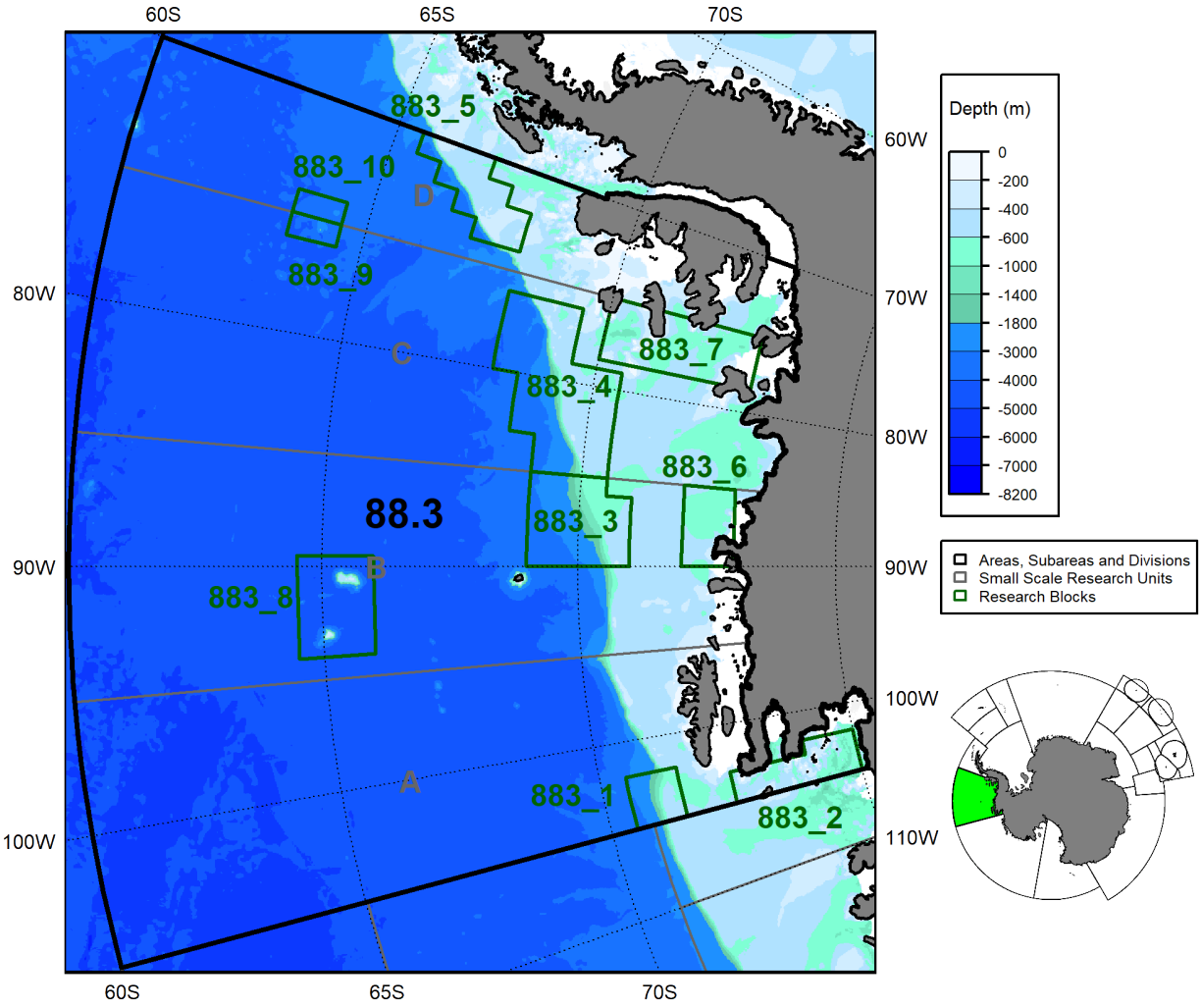


Figure 1: Location of the Research Blocks in Subarea 88.3. The fishable depth range (600m-1800m) is highlighted in shades of green.

1.3. Active vessels

In 2020, when research fishing last occurred, 2 vessels participated in this fishery.

1.4. Timeline of spatial management

Following a proposal from Korea to begin research fishing under Conservation Measure 24-01 in 2016, Research Blocks 1 to 5 were defined (Fig 1). Other subsequent research proposals have included additional Research Blocks.

2. Reported catch

2.1. Latest reports and limits

The total catch reported from the research surveys that have been conducted in Subarea 88.3 is shown in Table 1. In this fishery, the catch of *D. mawsoni* reached a maximum of 119 tonnes in 2017. In 2020, 0 tonnes of *D. eleginoides* and 96 tonnes of *D. mawsoni* were caught.

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).

Season	Number of vessels	Catch limit (tonnes)	*D. eleginoides*	*D. mawsoni*	Estimated IUU catch (tonnes)
2011	1	65		5	-
2012	1	65	0	4	-
2016	1	171	0	106	-
2017	1	171		119	-
2018	1	245	0	39	-
2019	1	245	1	63	-
2020	2	254	0	96	-

Table 2: Catch and catch limits by Research Block in 2020 for *Dissostichus mawsoni* in Subarea 88.3. Source: Fine scale data.

Research Block	Catch limit	Catch (% of catch limit)
883_1	16	5 (31.2%)
883_3	60	29 (48.3%)
883_4	60	55 (91.7%)
883_5	8	0 (0%)
883_6	30	3 (10%)
883_7	30	2 (6.7%)

2.2. By-catch

Catch limits for by-catch species groups (*Macrourus* spp., skates and rays, and other species) are defined in Conservation Measure 33-03 and provided in Table 3.

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 nautical miles away for a period of at least five days.

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

Skates thought to have a reasonable chance of survival are released at the surface in accordance with Conservation Measure 33-03.

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

Season	*Macrourus* spp.		Skates and rays			Other catch	
	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Number Released	Catch Limit (tonnes)	Reported Catch (tonnes)
2016	39.2	3	12.25	<1	0	39.2	1
2017	39.2	7	12.25	<1	0	39.2	<1
2018	39.2	7	12.25	<1	0	39.2	<1
2019	39.2	5	12.25	<1	197	39.2	2
2020	43	11	16	<1	69	43	<1

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.

There are no VMEs or VME Risk Areas designated in Subarea 88.3.

2.4. Incidental mortality of seabirds and marine mammals

There have been no observed bird or mammal mortalities reported by vessels from Subarea 88.3 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.

3. Illegal, Unreported and Unregulated (IUU) fishing

There are no records of illegal, unreported and unregulated (IUU) fishing activities in Subarea 88.3.

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. Summary of available data

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

Following Conservation Measure 22-07, vessels participating in this fishery must report the occurrence of VME indicator organisms on hauled lines. To do so, the vessel's crew observe lines in segments (1000-hook

sections or 1200m sections, whichever is the shorter) and report the number of VME indicator units (either one litre of those VME indicator organisms that can be placed in a 10-litre container, or one kilogram of those VME indicator organisms that do not fit into a 10-litre container). Depending on the number of VME indicator units landed, vessels must immediately report and potentially cease fishing in the area (termed a Risk Area) until further review of the data is completed (see Conservation Measure 22-07). Based on the portion of the line monitored, observers further identify VME indicator organisms to the lowest taxonomic level possible.

The vessel's crew report total catch of non-VME by-catch (mostly fishes) 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, as well as data on individual specimens such as size and maturity.

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

Table 4. Summary of VME indicator taxa by-catch, by-catch of other species and biological data reported by vessels crew and observers in each of the last five seasons. By-catch records correspond to the number of observations of total weight and count of individuals for each taxon identified. Observers may take further biological measurements on toothfish and by-catch taxa. Taxonomic identification may occur at different levels.

Data source	Data class	Variable	2017	2018	2019	2020	2021
Vessel crew	VME	line segments	656	713	1303	935	0
		VME indicator units >5 and <10	0	0	0	0	0
		VME indicator units >10	0	0	0	0	0
	by-catch	taxa identified	10	8	11	14	0
		records	152	128	313	253	0
Observer	VME	line segments	656	713	1392	276	0
		taxa identified	3	2	8	6	0
		weight or volume measurements	2	10	47	19	0
	toothfish	specimens examined	1625	936	2031	2186	0
		length measurements	1625	936	2031	2186	0
		weigth measurements	1625	936	2031	2165	0
		sex identifications	1613	914	2031	2156	0
		maturity stage identifications	1613	914	1999	2144	0
		gonad weight measurements	213	901	1975	2141	0
		otolith samples	270	720	897	1158	0
	by-catch	specimens examined	540	1030	1798	951	0
		taxa identified	6	10	12	16	0
		length measurements	512	981	1797	455	0
		weigth measurements**	540	1024	1797	951	0
		standard length measurements*	0	0	1	0	0
		wingspan measurements*	13	49	75	2	0
		pelvic length measurements*	13	49	75	2	0
		snout to anus measurements*	210	614	981	686	0
		sex identifications**	328	989	1760	909	0
		maturity stage identifications**	315	987	1531	905	0
		gonad weight measurements**	0	0	0	14	0
		otolith samples**	0	0	0	321	0

*: Species-dependent records
**: Voluntary records

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.

By-catch group	Variable	2017	2018	2019	2020	2021
Macrourus spp.	specimens examined	385	616	977	686	0
	taxa identified	1	1	1	3	0
	length measurements	385	616	977	191	0
	weigth measurements**	385	610	977	686	0
	snout to anus measurements*	210	612	977	686	0
	sex identifications**	233	582	956	676	0
	maturity stage identifications**	233	582	863	675	0
	gonad weight measurements**	0	0	0	14	0
	otolith samples**	0	0	0	321	0
Skates and rays	specimens examined	13	42	75	2	0
	taxa identified	1	1	1	1	0
	length measurements	0	0	75	2	0
	weigth measurements**	13	42	75	2	0
	wingspan measurements*	13	42	75	2	0
	pelvic length measurements*	13	42	75	2	0
	sex identifications**	12	42	75	2	0
	maturity stage identifications**	0	42	37	2	0
	gonad weight measurements**	0	0	0	0	0
Other fish	specimens examined	127	364	716	261	0
	taxa identified	3	6	8	11	0
	length measurements	127	364	716	260	0
	weigth measurements**	127	364	716	261	0
	standard length measurements*	0	0	1	0	0
	sex identifications**	83	358	715	229	0
	maturity stage identifications**	82	358	631	227	0
	gonad weight measurements**	0	0	0	0	0
	otolith samples**	0	0	0	0	0

*: Species-dependent records
**: Voluntary records

4.3. Length frequency distributions

The length frequency distributions of *D. mawsoni* caught during research activities 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 during research fishing ranged from 50 to 175cm with two broad modes at approximately 60cm and 150cm.

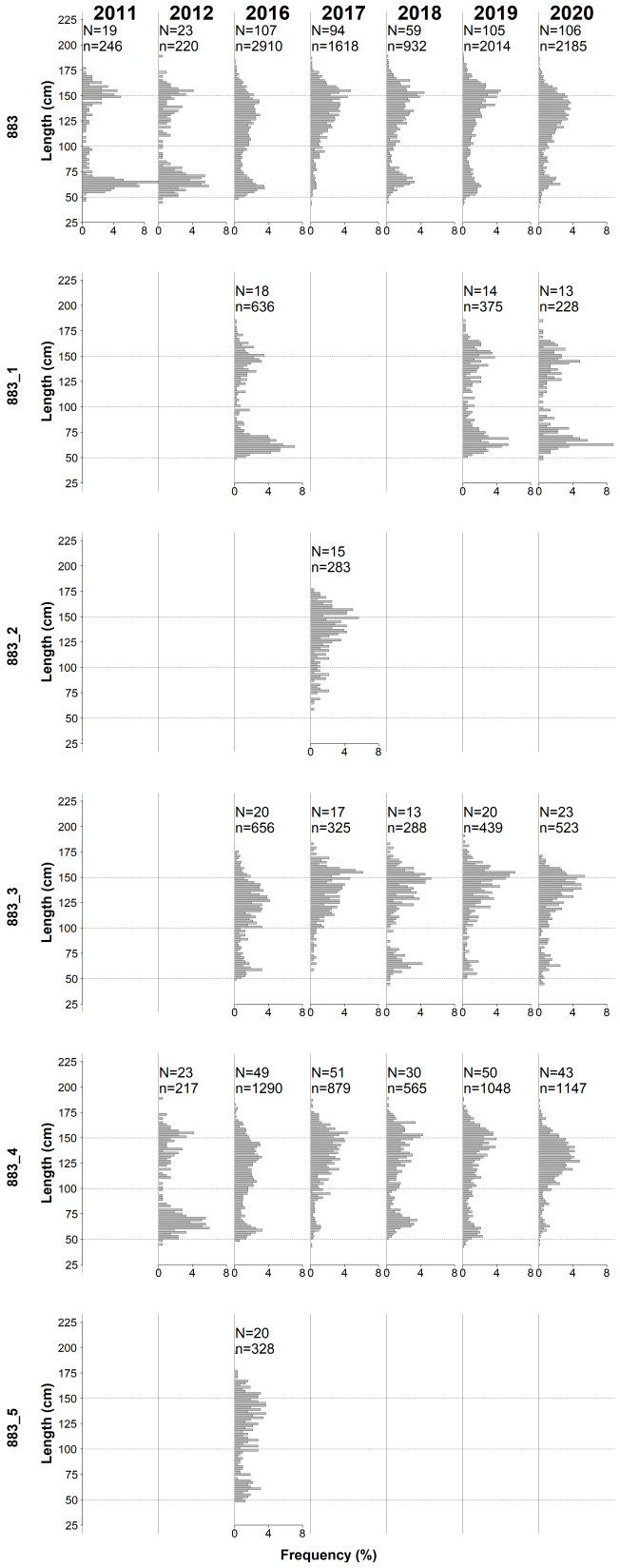


Figure 2. Annual length frequency distributions of *D. mawsoni* caught in Subarea 88.3 and its Research Blocks. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are indicated. Note: length frequency distributions are only shown where more than 150 fish were measured in a given season/area.

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.

To date in this area, 2304 *D. mawsoni* have been tagged and released (11 have been recaptured, 11 of which were released in this area; Table 6), and, 6 *D. eleginoides* have been tagged and released (0 have been recaptured).

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

		Recaptured		
Season	Tagged	2019	2020	Total
2005	8			
2011	30			
2012	63			
2016	566	1		**1**
2017	597	1	1	**2**
2018	203	2	2	**4**
2019	342		4	**4**
2020	495			
Total	**2304**			**11**

5. Research

5.1. Status of the science

There has been a total of 95 research hauls and 131 tagged fish as part of surveys conducted by Chilean, New Zealand and Russian flagged vessels up to 2012. This level of research activities meant that there was insufficient data to assess the toothfish stock in this Subarea. The previous surveys were restricted by sea-ice. However, as the ice concentration in the west of the Antarctic is reducing, this led the Republic of Korea to propose a multi-year research plan for Subarea 88.3 starting in 2016.

New Zealand (in 2017) and Ukraine (in 2018) joined the Republic of Korea in these research efforts.

In 2019, an integrated research proposal for *Dissostichus* spp. in Subarea 88.3 was submitted by the Republic of Korea, New Zealand and Ukraine (WG-SAM-2019/02).

In 2021, an updated research proposal was submitted by the Republic of Korea and Ukraine (WG-FSA-2021/34).

5.2. Research plans

5.2.1. Background The main objective of the proposal is to determine the abundance and distribution of Antarctic toothfish in Subarea 88.3. Secondary objectives are to improve understanding of stock and population structures of toothfish in Area 88, to carry out calibration trials among the vessels, to collect data on the spatial and depth distributions of bycatch species, and to trial scientific electronic monitoring technologies.

5.2.2. Objectives The research proposal (WG-FSA-2021/34) aims at achieving five objectives:

- Determine the abundance and distribution of Antarctic toothfish in Subarea 88.3

- Improve understanding of stock structure of toothfish in Statistical Area 88
- Carry out calibration trials among vessels
- Collect data on the spatial and depth distributions of bycatch species
- Trial scientific electronic monitoring technologies

5.3. Advice by the Scientific Committee

The advice from the Scientific Committee in 2016 on this research proposal is presented in SC-CAMLR-XXXV, paragraphs 3.255 and 3.256. The Scientific Committee recommended that the catch limits and priority for each Research Block should be as in 2016 should ice conditions allow.

In 2017, the Scientific Committee recommended that the catch limits for the Korean and New Zealand joint research plan in Subarea 88.3 be endorsed for 2018 (Table 5 and SC-CAMLR-XXXVI, paragraph 3.142).

In 2019, the Scientific Committee endorsed the Research proposal as described in [WG-SAM-19/02] (SC-CAMLR-38 paragraphs 4.59 to 4.61).

In 2020, the Scientific Committee and the Commission did not reach consensus on this research proposal (CCAMLR-39 paragraphs 5.32 and 5.33).

In 2021, the Scientific Committee endorsed the Research proposal as described in WG-FSA-2021/34, with an updated sampling rate requirement for by-catch species of 30 specimens per species per line, or the entire catch for a line if this was less than 30 specimens (SC-CAMLR-40 paragraphs 3.107).

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. 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.

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