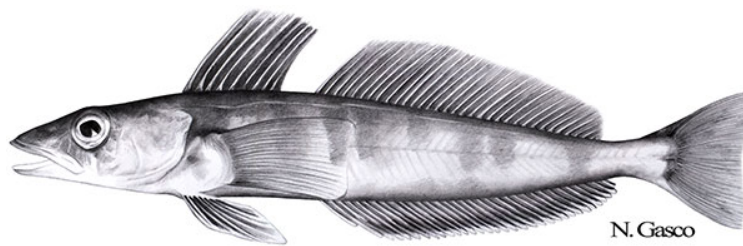


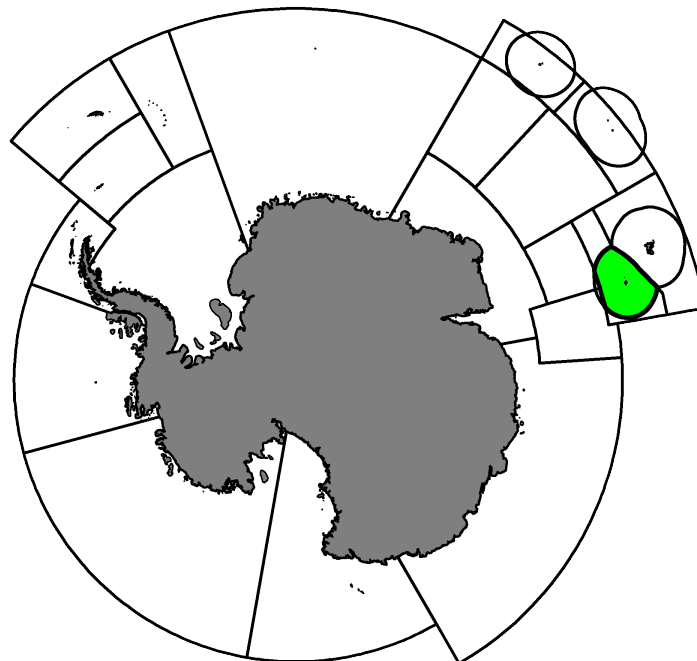
Fishery Report 2019: *Champscephalus gunnari* at Heard Island
(Division 58.5.2)

CCAMLR Secretariat

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Mackerel icefish, *Champscephalus gunnari* Lönnberg, 1905.



Map of the management areas within the CAMLR Convention Area. The region discussed in this report is shaded in green. Throughout this report, '2019' refers to the 2018/19 CCAMLR fishing season (from 1 December 2018 to 30 November 2019).

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1. Introduction to the fishery

1.1. History

This fishery report describes the licensed fishery for mackerel icefish (*Champsocephalus gunnari*) in the area of the Australian Fishing Zone (AFZ) in Division 58.5.2. The area includes the AFZ surrounding Heard Island and McDonald Islands, is located on the Kerguelen Plateau between 50°–56°S and 67°–79°E (Figure 1). An Australian licensed trawl fishery for *C. gunnari* began in 1997, while other nations had fished in these waters during the 1970s prior to the declaration of the AFZ in 1979. The fishing methods used in this fishery are midwater and bottom trawl. The fishery is managed by the Australian Fisheries Management Authority (AFMA) in accordance with the Conservation Measures adopted by CCAMLR and Australian law. The annual catch limit is based on the management advice from CCAMLR.

1.2. Conservation Measures currently in force

The annual catch limit for this fishery (Table 1) is described in Conservation Measure [42-02](#).

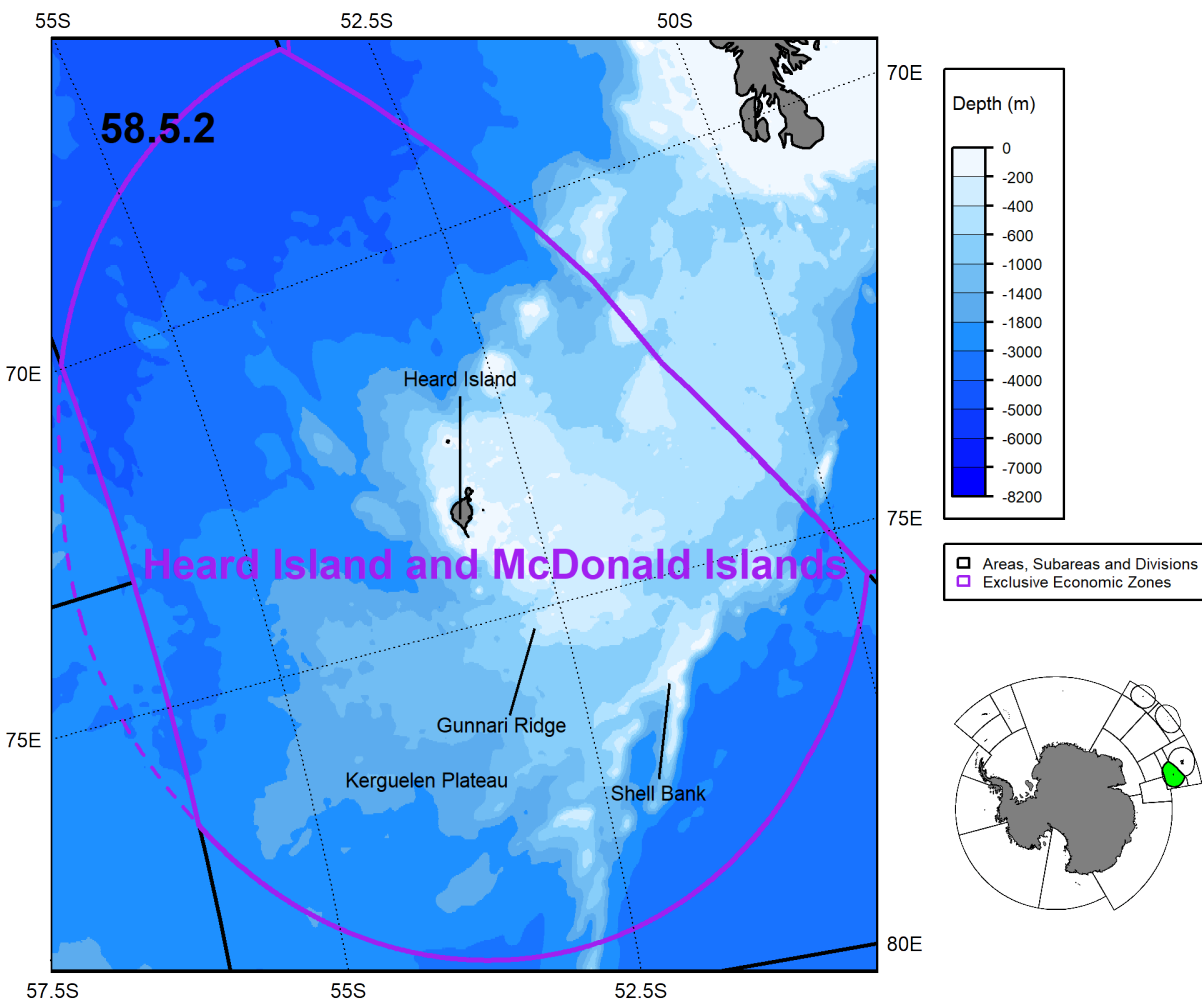


Figure 1: Map of the region discussed in this report.

1.3. Active vessels

In 2019, 1 vessel participated in this fishery.

2. Reported catch

2.1. Latest reports and limits

Reported catches of *C. gunnari* are presented in Table 1. In this fishery, the catch of *C. gunnari* reached a maximum of 2293 tonnes in 2003. In 2019, 443 tonnes of *C. gunnari* were caught.

Table 1. Catch (tonnes) and effort history for *C. gunnari* in this fishery. Source: Fine scale data.

Season	Number of vessels	Catch limit (tonnes)	Catch
1997	2	311	207
1998	3	900	104
1999	1	1160	0
2000	2	916	87
2001	2	1150	1073
2002	2	885	966
2003	2	2980	2293
2004	2	292	84
2005	2	1864	1791
2006	2	1210	663
2007	1	42	1
2008	1	220	199
2009	1	102	99
2010	1	1658	365
2011	1	78	1
2012	1	0	4
2013	1	679	644
2014	1	1267	1123
2015	2	309	10
2016	1	482	469
2017	1	561	543
2018	1	526	515
2019	1	443	443

2.2. By-catch

Catch limits for the most common by-catch species; unicorn icefish (*Channichthys rhinoceratus*), grey rockcod (*Lepidonotothen squamifrons*), *Macrourus* spp., skates (Rajids) and others are defined in Conservation Measure 33-02 and shown for each fishing season in Table 2. These bycatch limits in Conservation Measure 33-02 apply to all fisheries in Division 58.5.2 and so the bycatch levels shown in Table 2 include bycatch from fisheries targetting (*D. eleginoides*) in this Division.

Quantitative risk assessments of *C. rhinoceratus* and Caml grenadier (*Macrourus caml*) were undertaken in 2015 and presented in WG-FSA-15/50 and 15/63 respectively. WG-FSA recommended the catch limits be set to 1,663 tonnes for *C. rhinoceratus*. It also recommended that the limit derived from the risk assessment in WG-FSA-15/63 of 409 tonnes should apply for *M. caml* and Whitson’s grenadier (*M. whitsoni*) combined, and the limit derived from the previous assessment of 360 tonnes should apply for bigeye grenadier (*M. holotrachys*) and ridge-scaled grenadier (*M. carinatus*) combined. The catch limits of grey rockcod (*Lepidonotothen squamifrons*) are based on assessments carried out in 1998 (SC-CAMLR-XVII, Annex 5, paragraphs 4.204 to 4.206). Catch limits for rajids (*Bathyraja* spp.) were set in 1997 (SC-CAMLR-XVI, paragraphs 5.119 to 5.122).

A number of Conservation Measures, which ensure that impacts on the target and other species are minimised, currently apply to this fishery. Conservation Measure 42-02 defines the boundaries of the fishery area, the season, the catch limit and the move-on rules if large quantities of *C. gunnari* smaller than the specified minimum legal length of 240mm are caught in a single haul. Conservation Measure 33-02 specifies that there should be no directed fishing for species other than the target species, the by-catch limits for incidentally caught species and the move-on rules if the limits for any one haul are exceeded.

Table 2. Reported catch and catch limits for by-catch species (*Channichthys rhinoceratus*, *Lepidonotothen squamifrons*, *Macrourus* spp., Rajids and others) in the fishery for *Champsocephalus gunnari* in Division 58.5.2 (see Conservation Measure 33-02 for details). Source: fine-scale data.

Season	<i>Channichthys rhinoceratus</i>		<i>Lepidonotothen squamifrons</i>		<i>Macrourus</i> spp.		Rajids			Other catch	
	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Number Released	Catch Limit (tonnes)	Reported Catch (tonnes)
2004	150	6	80	<1	360	<1	120	3	0	50	144
2005	150	34	80	<1	360	<1	120	5	0	50	96
2006	150	29	80	<1	360	<1	120	7	0	50	2
2007	150	3	80	<1	360	0	120	<1	4	50	<1
2008	150	8	80	<1	360	<1	120	2	639	50	7
2009	150	7	80	<1	360	<1	120	7	447	50	2
2010	150	52	80	<1	360	<1	120	12	8936	50	24
2011	150	1	80	1	360	<1	120	<1	326	50	1
2013	150	48	80	2	360	<1	120	16	530	50	17
2014	150	144	80	5	360	<1	120	9	5686	50	33
2015	150	11	80	<1	360	<1	120	<1	217	50	4
2016	1663	119	80	<1	769	0	120	28	2717	50	17
2017	1663	109	80	<1	769	0	120	44	1858	50	7
2018	1663	37	80	<1	769	0	120	26	1059	50	10
2019	1663	151	80	<1	769	<1	120	55	5702	50	42

2.3. Vulnerable marine ecosystems (VMEs)

Bottom trawl and midwater trawl gear is used to target both *C. gunnari* and Patagonian toothfish (*Disostichus eleginoides*) in Division 58.5.2. The potential impacts of fishing gear on benthic communities are limited by the small area of commercial trawl grounds, a strategy of fishing trawling gear lightly and the protection of large areas sensitive to the effects of bottom trawling within the Heard Island and McDonald Islands Marine Reserve, an IUCN Category 1a reserve, where fishing is prohibited. This marine reserve covers a total area of 71,200 km².

As Conservation Measure 22-06 does not apply to this subarea there are no CCAMLR VMEs or VME Risk Areas designated in Division 58.5.2.

2.4. Incidental mortality of seabirds and marine mammals

A summary of seabird mortality in this fishery is presented in Table 3. The two most common species injured or killed in this fishery were white-chinned petrel (*Procellaria aequinoctialis*) and black-browed albatross (*Thalassarche melanophris*).

The level of risk of incidental mortality of birds in Division 58.5.2 is category 4 (average-to-high) (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

Since 2003 when two Antarctic fur seals (*Arctocephalus gazella*) were killed, no incidents of mammal mortalities have been observed in this fishery.

Conservation Measure 25-03 is in force to minimise the incidental mortality of birds and mammals. Measures include the prohibition on the discharge of offal and discards during the shooting and hauling of trawl gear, and developing gear configurations which minimise the chance of birds encountering the net.

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>Procellaria aequinoctialis</i>	<i>Thalassarche melanophris</i>	Other
1998	1		
2003		1	
2005	4	6	1
2006			1

3. Illegal, Unreported and Unregulated (IUU) fishing

There has been no evidence of illegal, unreported and unregulated IUU fishing activity in this fishery.

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. Length frequency distributions

Recent length frequency distributions of the catches of *C. gunnari* 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. Only catch-weighted length frequency data derived from a random stratified trawl survey are used in assessments in this fishery. Nevertheless, the length frequencies for *C. gunnari* in Division 58.5.2 typically show multiple age/size cohorts progressing through the population over consecutive years (Fig. 2).

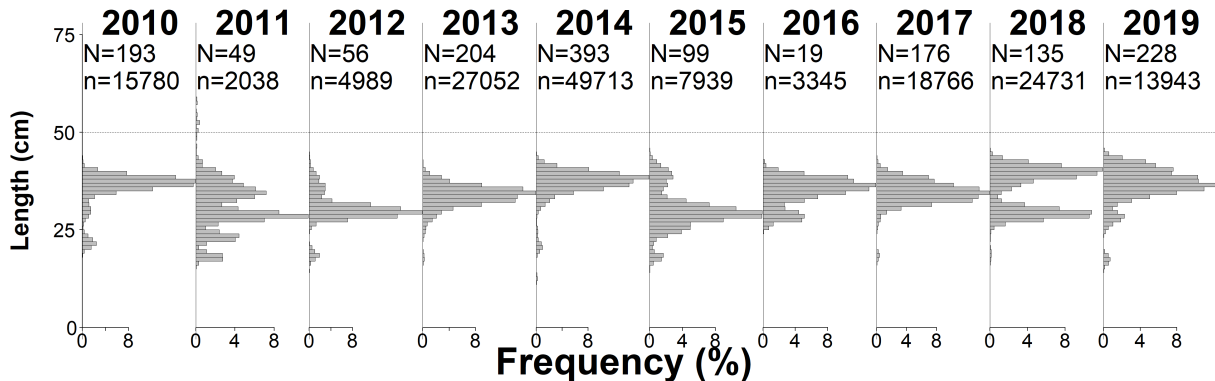


Figure 2. Annual length frequency distributions of *Champsocephalus gunnari* caught in this fishery. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are indicated. Note: length frequency distributions are only shown where more than 150 fish were measured.

5. Research

5.1. Status of the science

Within Division 58.5.2, *C. gunnari* is restricted to the shelf area in the vicinity of Heard Island in water generally shallower than 350m, and a non-contiguous area at Shell Bank to the northeast of the islands. The Heard Plateau and Shell Bank populations have different size structures and recruitment patterns. In 1997, the Working Group on Fish Stock Assessment agreed that in light of this, the two areas should be treated as separate stocks for assessment purposes (see SC-CAMLR-XVI, Annex 5, paragraph 4.277). Shell Bank has been closed to fishing since 1997 due to low population densities observed in annual surveys from 1997 to 2005.

During late March to early April 2019, the annual random stratified trawl survey (RSTS) around Heard Island and McDonald Islands (HIMI) was conducted in CCAMLR Division 58.5.2 (WG-FSA-2019/03), with the completion of 150 stations. The survey was conducted on the FV Atlas Cove. Sampling protocols such as the design and the duration of the hauls were similar to recent surveys, but with a new set of randomly selected station points. However, only 5 of 18 stations were sampled in Gunnari Ridge since the catch limit for *Champsocephalus gunnari* (mackerel icefish) in Division 58.5.2 was reached prior to the completion of the survey.

The calculated biomass for 2019 of the target species *D. eleginoides* and *C. gunnari* in the survey area were close to the highest estimates for the past 10 years. Biomass estimates for the managed by-catch species *C. rhinoceratus* and *Macrourus* spp. remained at a high level and the estimate for *L. squamifrons* remained as low as it was for the last 4 years. The 2019 biomass estimates for each of the three *Bathyraja* spp. (skates) were the highest in the last 10 years.

6. Stock status

6.1. Summary of current status

The 2019 Random Stratified Trawl Survey showed a large 2+ and 3+ cohort dominating the mackerel icefish population in Division 58.5.2 and an initial biomass estimate of 3,724 tonnes (WG-FSA-2019/03).

6.2. Assessment method

The Generalised Yield Model is used routinely for the assessment of short-term yield of *C. gunnari* in the CCAMLR Convention Area. The precautionary approach developed by CCAMLR requires the calculation of the level of mortality that would result in a probability not greater than 0.05 that the spawning stock would be less than 75% of the level it would have been if fishing had not occurred. This estimate is calculated using the bootstrap one-sided lower 95% confidence bound on the trawl survey biomass estimate, giving a two-year projection of the catch.

Following the same approach as employed in previous years, an initial biomass estimate of 3,724 tonnes and a target fishing mortality rate (0.14433 /yr) indicates that catches of 527 tonnes in the 2019/20 season and 406 tonnes in the 2020/21 season, respectively, satisfied the CCAMLR decision rules (WG-FSA-2019/02).

6.3. Year of last assessment, year of next assessment

Assessments 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](#)
- Stock Assessment Report: [pdf](#)

- Stock Annex: [pdf](#)
- [Fisheries Documents Browser](#)