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Second Annual Report of the EU Exploratory Patagonian toothfish: George V Fracture Zone, SPRFMO Convention Area

European Union

Georgia Seafoods Ltd

Exploratory Patagonian toothfish demersal longline fishery: George V Fracture Zone, SPRFMO Convention Area

2024-26 Fishing Campaign: Second Annual Report

SAERI (Falklands) Ltd
Stanley Cottage
North Ross Road, Stanley
FIQQ 1ZZ, Falkland Islands
Ph +500 27374

Review table

Name	Reviewed by	Date
Version 1	P Brewin, P Brickle	7 March 2026
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Prepared by: Dr Paul Brewin and Dr Paul Brickle.

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Data Access

All data is stored in the SAERI Environmental Data Centre (https://www.south-atlantic-research.org/) and can be accessed by request and subject to permission from the data owner.

Acknowledgements

Thanks to the captain and crew of the *FV Tronio*, and scientific observers from Consejo Superior de Investigaciones Científícas (CSIC), Spain, and Capricorn Marine Environmental (Pty) Ltd, South Africa.

Contents

1. Introduction

The exploratory fishery campaign 2024-2026 for Patagonian toothfish / Antarctic toothfish (*Dissostichus eleginoides*, *D. mawsoni* respectively) has completed its second year under CMM14e-2024. Fishing was undertaking in an area known as the George V Fracture Zone Research Block (GVFZ) adjacent to the NE of CCAMLR Convention Sub-area 58.4.1 (Figure 1). This follows up from the first campaign (2021-2023) in the area (CMM14e-2021) that finished in November 2023. In this second campaign, exploration effort is split between Research Blocks A (where all the effort had taken place in 2021-23) and Research Block B (which is the section of the RB that was not explored during 2021-23) .

The objectives of this exploratory fishery were;

a) to further explore the presence and distribution of toothfish in the SPRFMO Convention Area;
b) to collect and provide information and data contributing towards the sustainable management of potential toothfish stocks in specific, data-poor zones of the Convention Area;
c) to assess the potential for a future sustainable toothfish fishery in specific zones of the Convention Area;
d) to provide occurrence information on marine mammals, seabirds, sharks, skates and rays and other species of concern;
e) to better understand patterns of seabirds and marine mammals and their potential for interactions with fishing vessels;
f) to evaluate the potential impacts of longlines on non-target associated or dependent species, and vulnerable marine ecosystems; and
g) to undertake tagging activities on toothfish to enable future studies on the migration of toothfish as well as a preliminary stock assessment.

This report summarises all data collected in 2025. An updated biomass assessment after 5 years of fishing in Research Block A and two years of fishing in Research Block B are presented in a separate report. These data will directly inform integration of this region into the current toothfish stock hypotheses and connectivity analyses with other regions where appropriate.

The fishing area straddles the Southeast Indian Ridge at approximately 139ºE / 53ºS, at a position roughly surrounding the George V Fracture Zone (Sempéré et al. 1996). The area is characterised by short chains of seamounts and spreading ridges (Harris et al., 2014) generally rising to approximately 1000m depth (500m depth for the highest seamount) and surrounded in abyssal hills of approximately 2500m – 3500m depth.

2. Methods

2.1 Data collection

All fishing was conducted on the *FV Tronio* using 'Spanish' double line bottom longline fishing gear (CCAMLR Gear Catalogue, specifically WG-FSA-11/53). Two scientific personnel were on board in each year: one scientific observer from the Consejo Superior de Investigaciones Científícas (CSIC), Spain, and a second from Capricorn Marine Environmental (Pty) Ltd, South Africa. All line setting metadata were collected by the vessel as well as total catch of target and main bycatch species. Biological data were collected for target and bycatch species according to the CCAMLR Scheme of International

Scientific Observation, Scientific Observer's Manual Finfish Fisheries (2023) including green weight, total length, sex, and maturity. Conversion factors for toothfish were monitored throughout the campaign. Otoliths were collected for all target species. Tagging of toothfish was conducted by Scientific Observers at a rate of 5 fish tagged per tonne green weight catch. Tissue samples of toothfish and *Macrourus holotrachys* were collected for DNA analysis. Additional data were also recorded, including all seabird and marine mammal interactions, benthic video footage, benthic invertebrate sample collection, and the collection of oceanographic data. Further details are found in the proposed fishing plan (SC11-DW04 EU FOP for an exploratory Patagonian and Antarctic toothfish fishery in the SPRFMO Area).

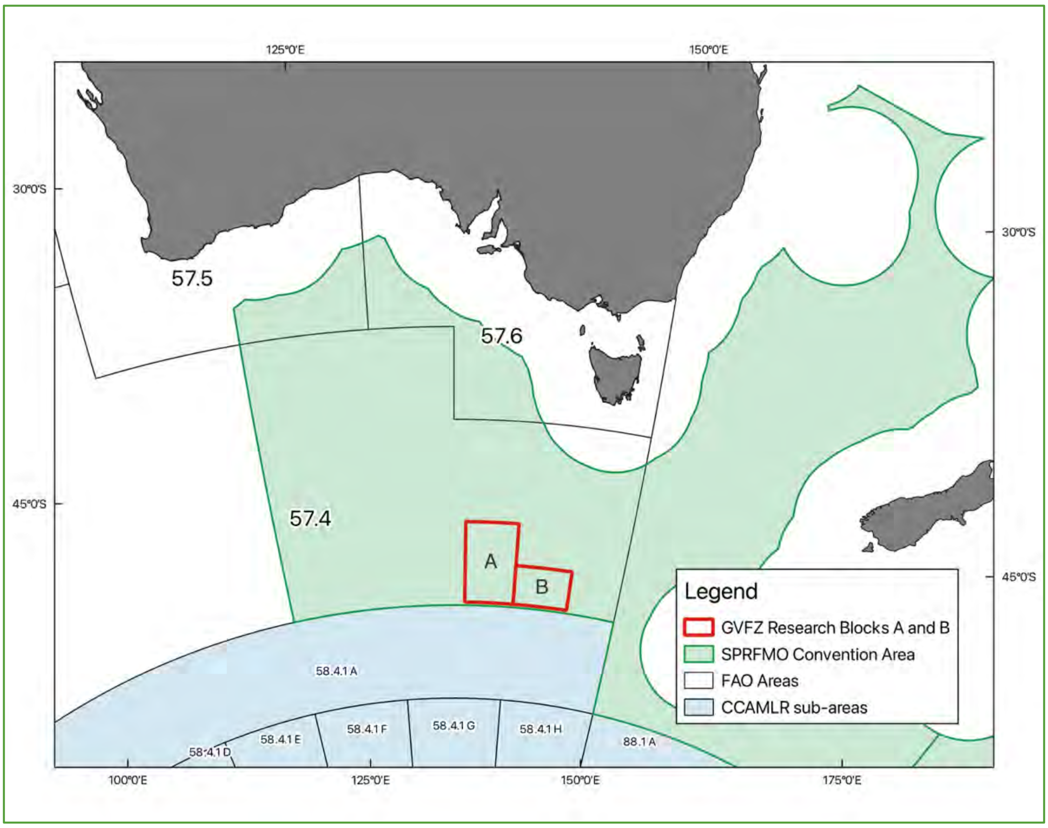

Figure 1 George V Fracture Zone research areas A and B within SPRFMO Convention Area. Also shown are FAO Area and CCAMLR Convention Area.

3. Results

3.1 Catch and effort

3.1.1 Toothfish

Only Patagonian toothfish (TOP) was caught; no Antarctic toothfish (TOA) were caught in 2025. The TAC (Block A – 129t; Block B - 33t) was nearly achieved after fishing for approximately 5 weeks (Table 1). Fishing in Block A was carried out on seamounts previously fished, whilst new and previously fished seamounts were fished in Block B (Figure 2). Line setting depths ranged between 760m and 2300m depth. Number of lines set and numbers of hooks per line were below limits set out in CMM14e 2024. No lines or sections of lines were reported lost.

Table 1 Summary of TOP catch and effort.

Year	Research Block	Fishing period	Days fishing	Number of lines set	Mean line length (m)	Mean hooks set per line	Mean Line set depth (m)	Toothfish green weight (kg)
2025	A	9 Oct – 4 Nov	27	56	8905	4859	1,758	128,837
2025	B	6 Nov – 13 Nov	8	16	7992	4359	2,004	32,859

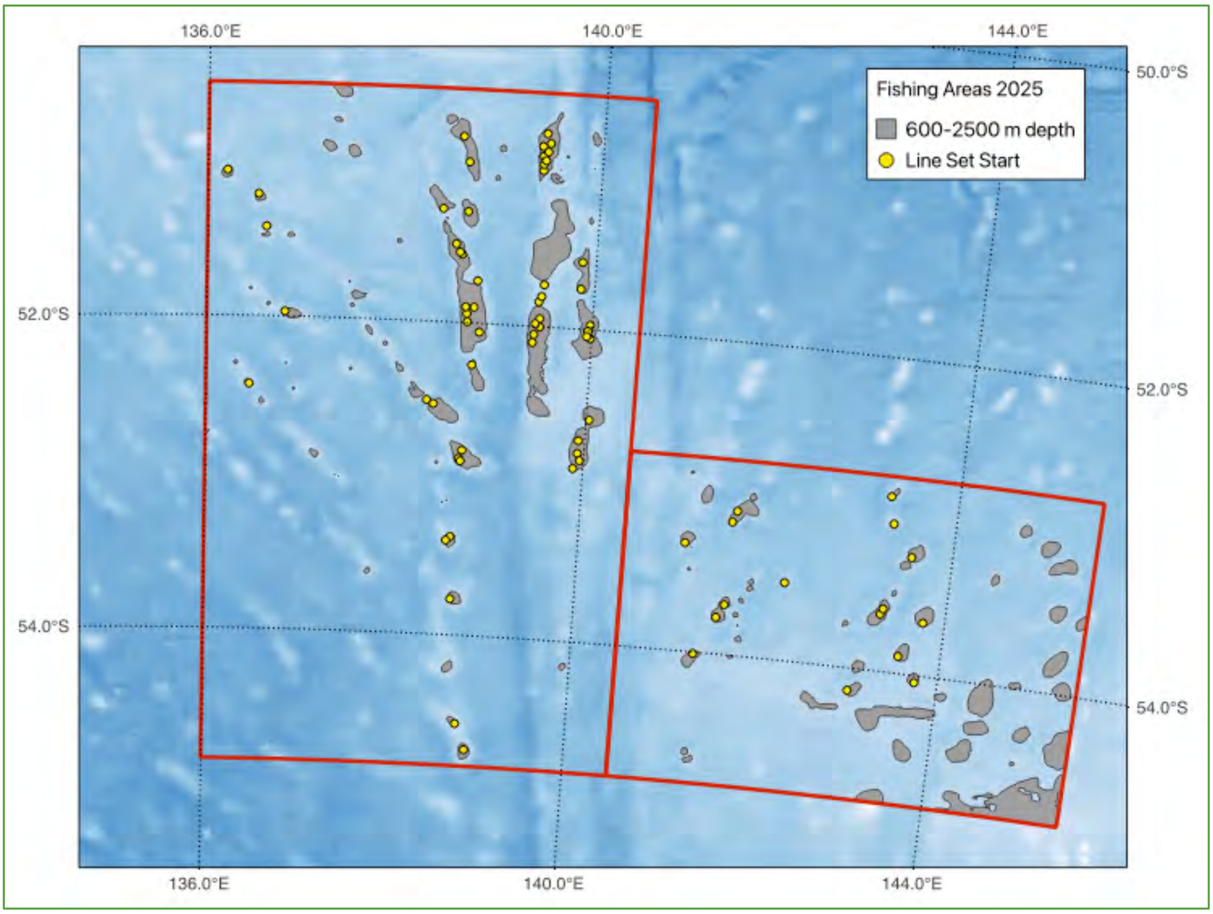

Figure 2. Location of lines set (set_start) in 2025. Highlighted are fishable seamounts defined by bathymetry ranging between 600m – 2500m depth (GEBCO 2025).

Mean CPUE (kg/km of line) in 2025 for Block A was 256 kg/km line, while mean CPUE in Block B was slightly lower (249 kg/km line). CPUEs in both Block A and Block B in 2025 were below the long-term average (2021-2025) of 273 kg/km line (Figure 3).

3.1.2 Fish Bycatch

All bycatch was discarded; none was retained. *Macrourus* spp. was the primary bycatch species in 2025, amounting to approximately 1% of the total toothfish catch (Table 2) similar to previous years. Secondary bycatch species include *Antimora rostrata* that was consistently caught in small amounts each year. *Lepidion* spp., Ophidiidae (possibly *Spectrunculus grandis*) were also caught infrequently.

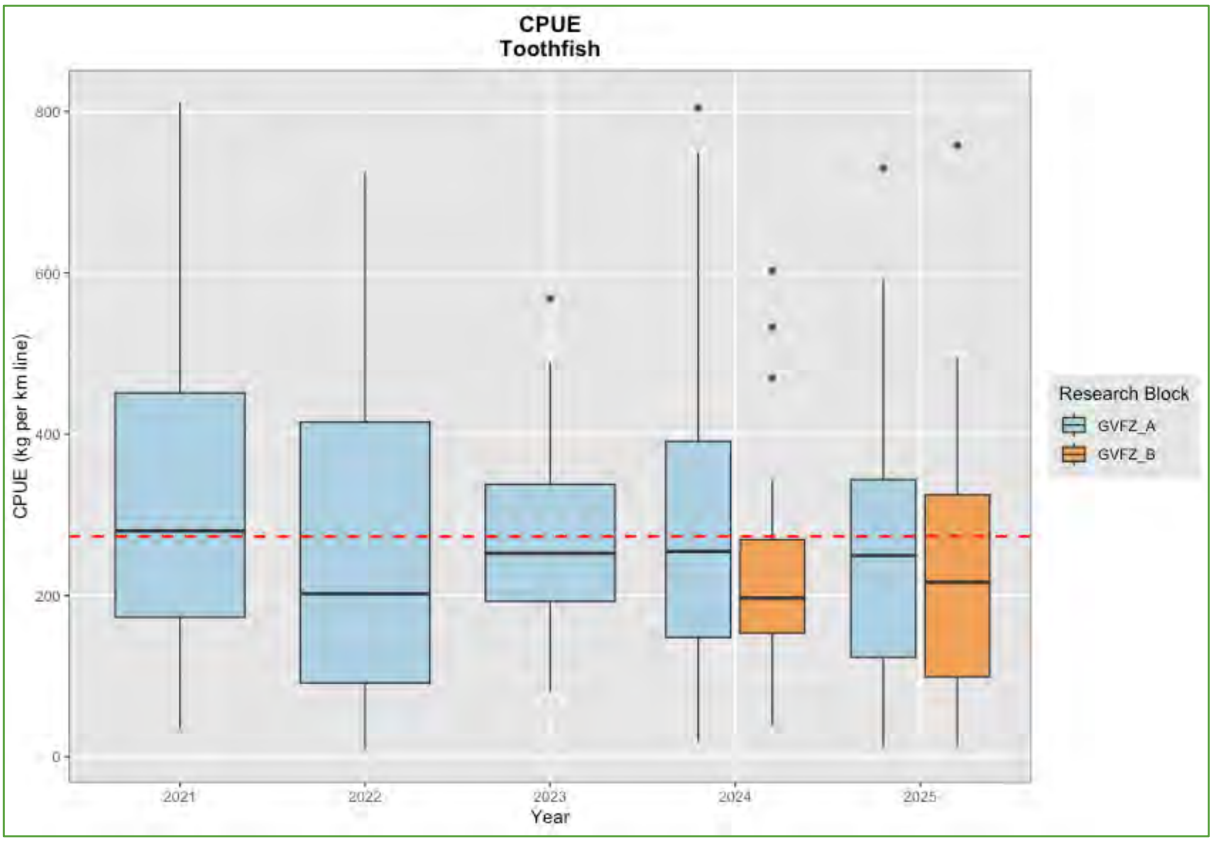

Figure 3. Box and whisker plot of CPUE (kg/km of line) of TOP from all lines in 2021-2025, representing medians, upper and lower quartiles and statistical max and min values. Overall mean (2021-2025) CPUE per line (273 kg/km line) is shown by the dashed red line.

Table 2 Total bycatch of fish species weight (kg) as recorded on the bridge in 2025. 2024 is also presented for comparison.

	Code	Season			
		2024 (A)	2024 (B)	2025 (A)	2025 (B)
Antimora rostrata	ANT	170	138	355	62
Macrourus spp.	GRV	1152	313	1278	127
Lepidion spp.	LEV	-	-	2	-
Lepidion microcephalus	LMF	14	-	-	-
Muraenolepis microps	MOY	117	20	-	-
Ophidiidae spp.	OPH	-	-	93	11
Parastromateus niger	POB	3	-	-	-

3.2 Biological data and analysis

All biological data were recorded in standard Scientific Observer spreadsheets. A total of 276 otolith pairs from TOP were collected in 2025. These will be processed for production of an age-length key. Observers followed protocols for collection of 52 tissue samples of *Macrourus holotrachys* (MCH) for DNA analysis. Results of otolith and DNA analyses will be presented/published in due course.

3.2.1 Length/Frequency - TOP

The length-frequency of TOP from Research Block A and B in 2025 is shown in Figure 4. Median and mean fish lengths were slightly larger in Block A compared to Block B, with overall size distribution similar in both areas.

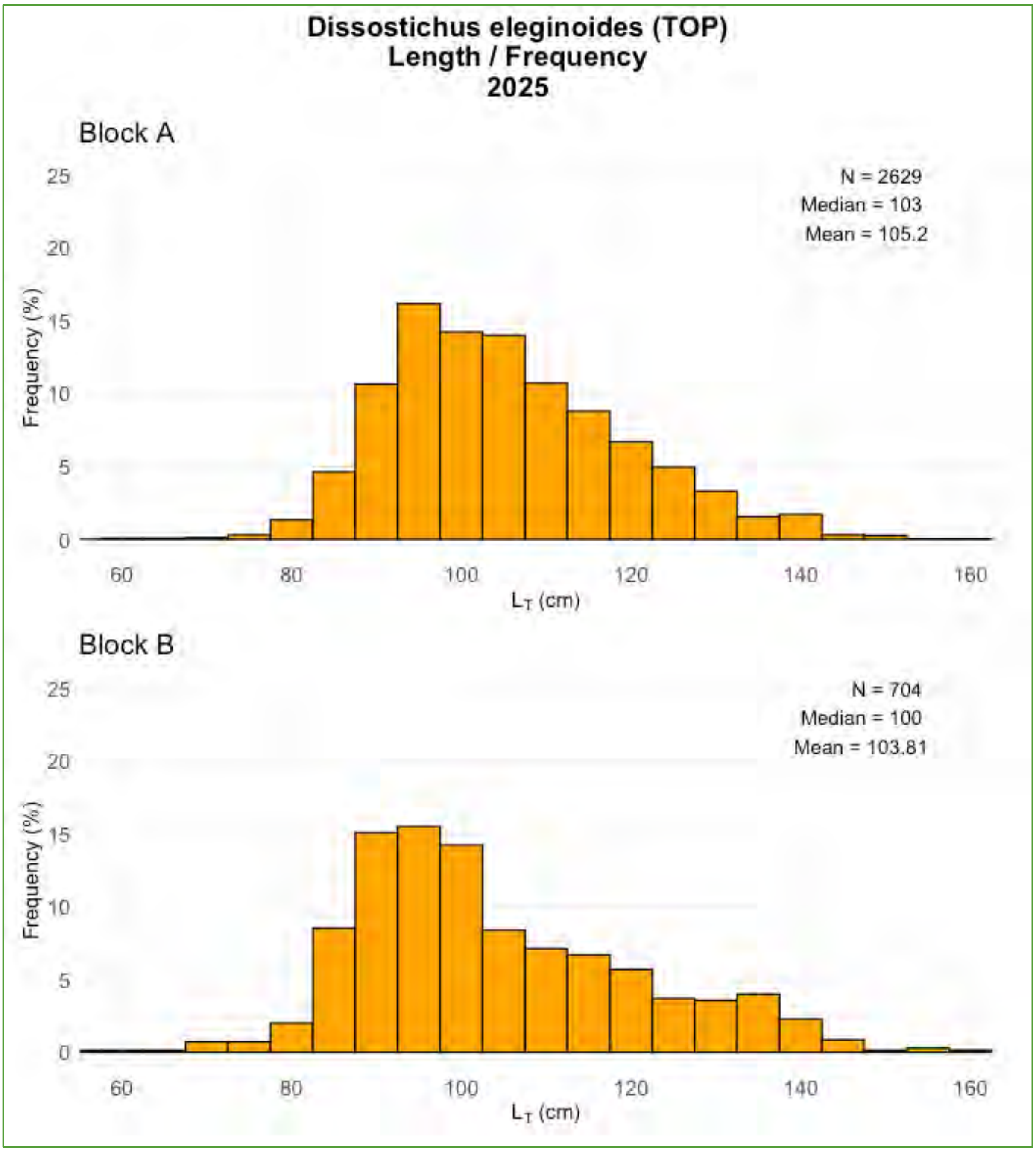

Figure 4 Length-frequency of TOP in 2025.

3.2.2 Sex and Maturity - TOP

Male and female length frequency of TOP in Block A and B is shown in Figure 5. In both Blocks, males were generally smaller than females. The sex ratio for both blocks was approximately M:F = 60:40.

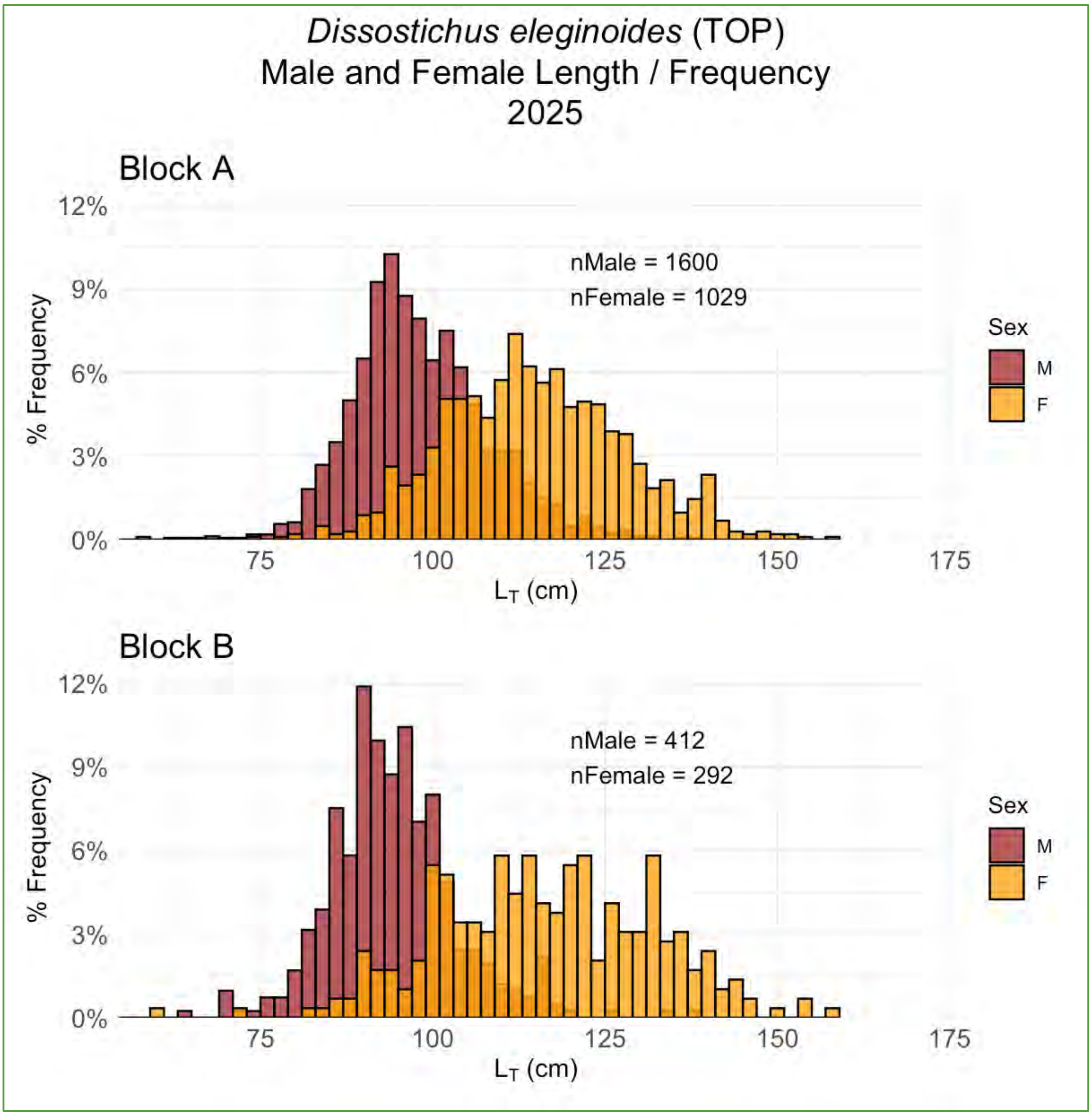

Figure 5 Length-frequency of males and females of TOP in 2025.

Maturity stages of males and females caught in 2025 are shown in Figure 6. Maturity stages 1-5 were found in all years. For Block A and B, the majority of males were in the Stage II and III (Developing and Developed), whilst the majority of females were in Stage V (Spent).

3.2.3 Bycatch

Scientific Observers collected biological data from all bycatch species. Minimum data collected was Total weight and Total length (with preanal length taken for some Macrourids on occasion), summarised in Table 3. Sex and maturity were collected by non-random sub-sampling, with some tissue sampling. Details are found in Observer Data collections spreadsheets.

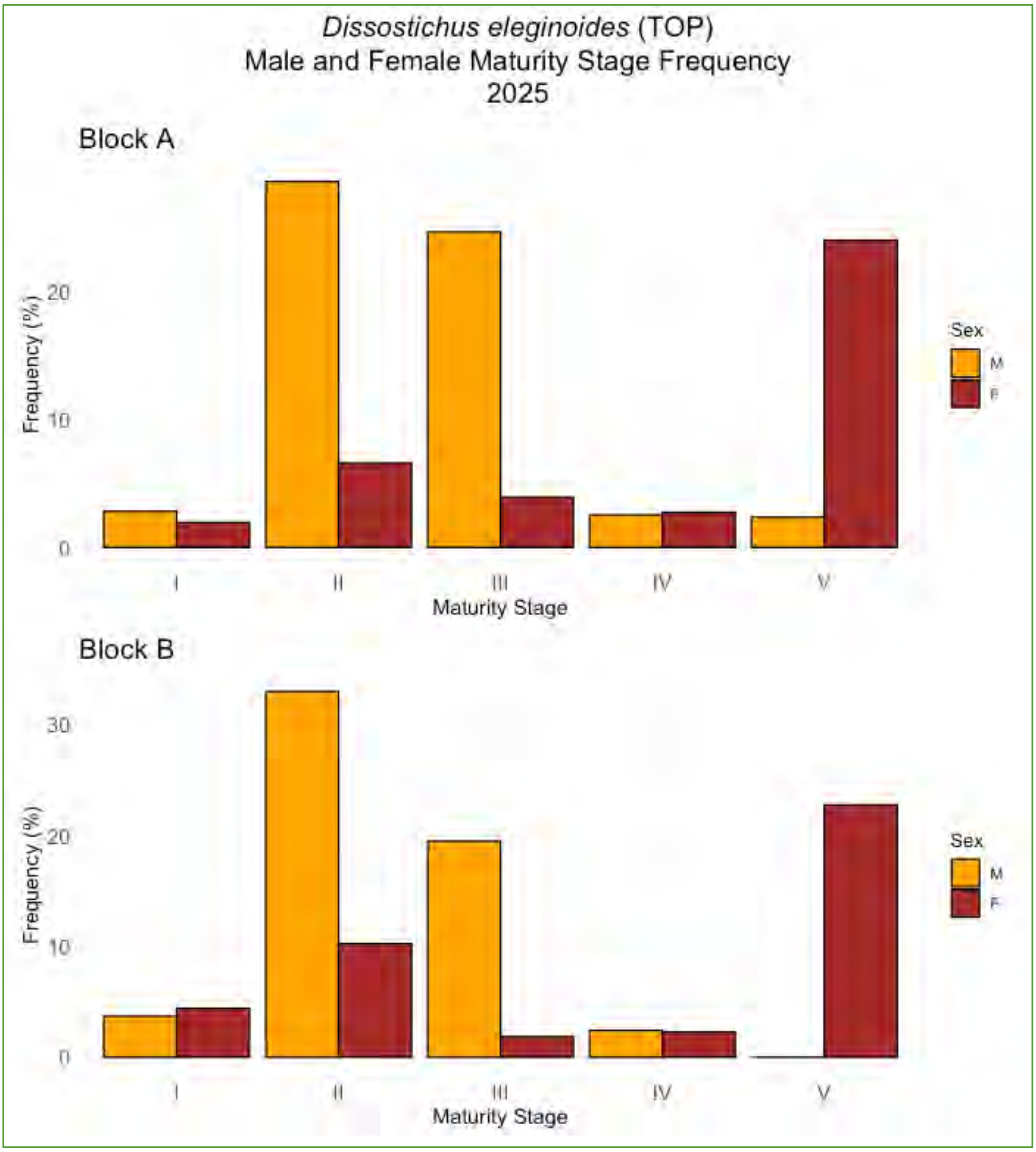

Figure 6 Frequency of maturity of male and female TOP from 2024.

There was no chondrichthyan bycatch recorded.

Macrourus holotrachys (MCH) was the most commonly caught bycatch fish species in 2025, followed by *Antimora rostrata* (Table 3). Length-frequency of MCH for caught in 2025 is shown in Figure 7. Size distribution was similar between Blocks A and B.

Table 3 Length (cm) and weight (kg) of bycatch catch species in Research Blocks A and B as measured by Scientific Observers.

Bycatch species	Number measured	Total Weight (kg)	Length max (cm)	Length min (cm)	Length mean (cm)
Antimora rostrata (ANT)	181	367.8	75	37	60.34
Coryphaenoides spp. (CVY)	12	17.1	64	46	56.83
Lepidion sp (LEV)	1	2.2	66	66	66.00
Macrourus holotrachys (MCH)	388	743.1	86	46	65.48
Ophidiidae (OPH)	25	93.5	102	59	77.76

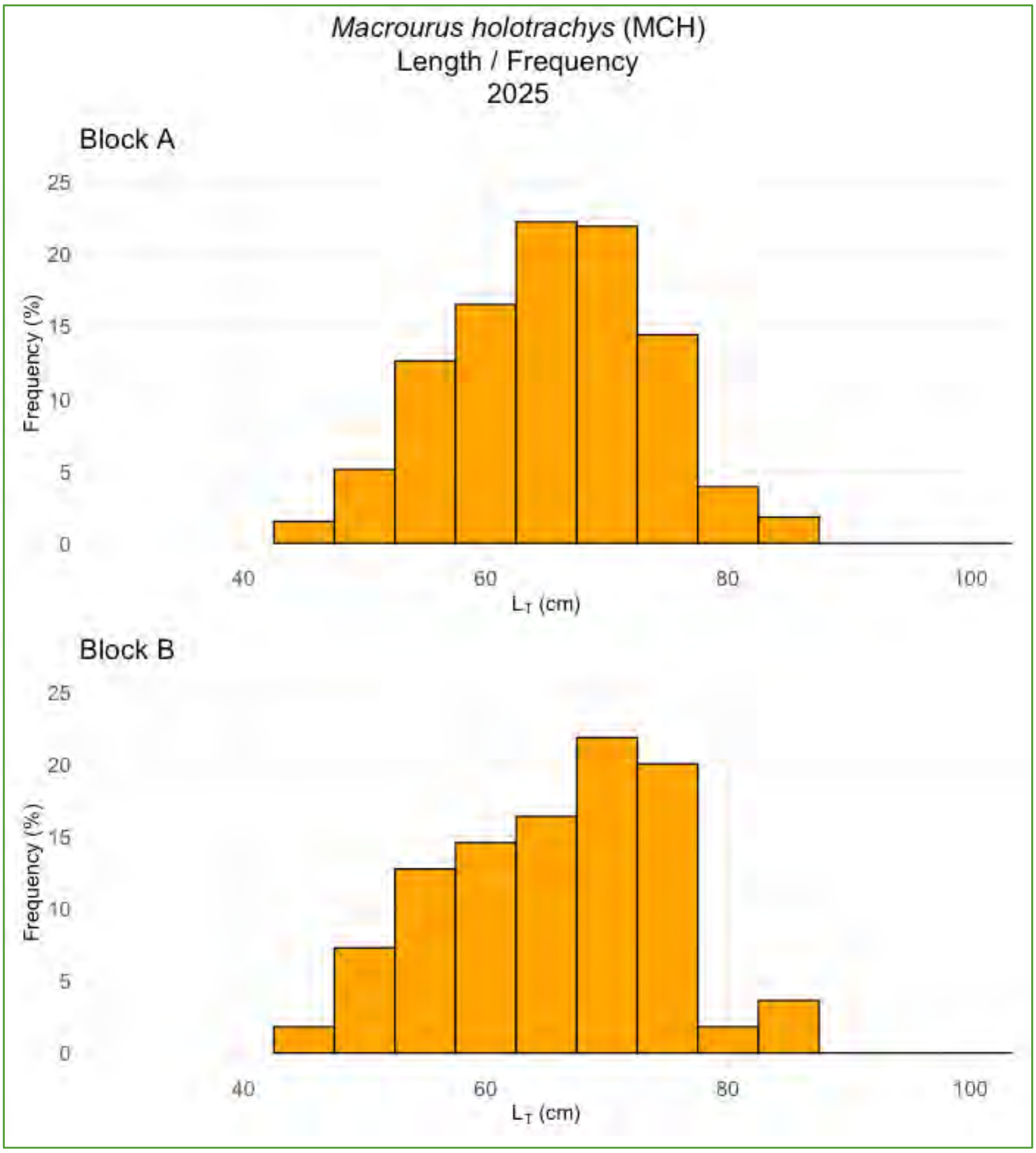

Figure 7 *Macrourus holotrachys* (MCH) length-frequency distribution from 2025.

3.2.4 Tagging – TOP

Tagging of TOP was carried out at a rate of 5 fish/tonne, using standard tagging methods. In 2025, 649 (5.03 fish/tonne) were tagged in Block A and 171 (5.18 fish/tonne) in Block B, and overlap statistics in Blocks A and B were 71.47% and 79.30% respectively, meeting requirements of a minimum of 60% overlap under CMM 14e-2024. No tagged and released fish were re-captured in season.

There were 9 tag recaptures in 2025 from fish originally released in the GFVZ Research Block A. Years liberated were 2021, 2022, and 2024. There were no tag recoveries in Research Block B. The release and recapture positions are shown in Figure 8. Highlighted is the particularly long distance movement of one fish crossing seamounts, whilst other tagged fish travel only very short distances. Four tags were recovered that had been originally released in the Macquarie Ridge fishery 2010 (1 tag), 2015 (1 tag), and 2022 (2 tags). Data have been sent to the Australian Antarctic Division in Hobart and the CCAMLR Secretariate. One tagged fish was recovered with a CCAMLR tag number and is currently being investigated by CCAMLR.

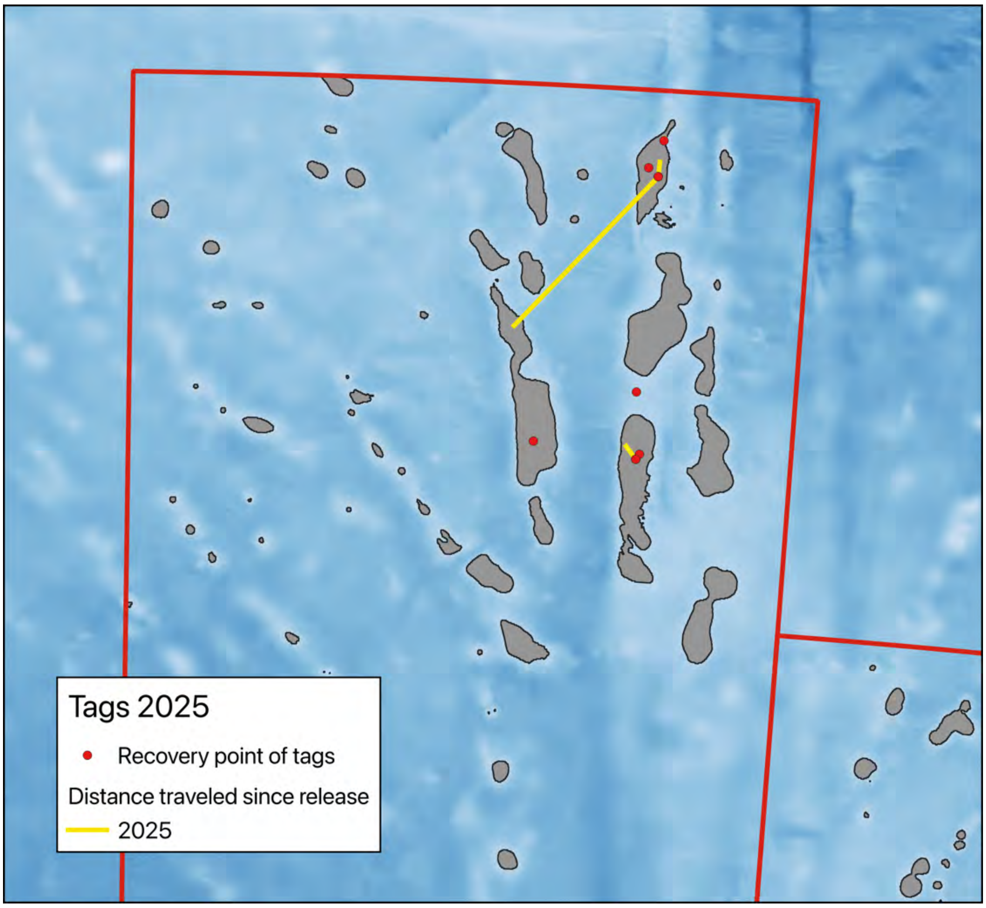

Figure 8. Tag Recoveries in the GVFZ in 2025. Distance travelled since release locations. Yellow line highlights the distance the particularly long distance travelled by one fish, whilst other tagged fish are recaptured very close to their original release points.

3.3 Seabirds and Marine Mammals

There were no incidental mortalities of seabirds or marine mammals recorded during the 2025 season. There were no marine mammals observed. Table 4 summarises the seabirds observations made by scientific observers. Observers recorded 14 species of seabird, with the most commonly observed being Cape petrels, Black-browed albatross, blue petrel, and Giant petrel. Two species observed are categorised as Endangered (EN) under IUCN Red Listing. There were no interactions with the fishing gear.

Table 4 Seabird observations during line setting and hauling in 2025.

Species	Common Name	IUCN Status	2025	
			Observations during Line Setting	Observations during Line Hauling
Daption capense	Cape petrel	LC	276	439
Thalassarche cauta	Shy albatross	NT	-	12
Thalassarche chrysostoma	Grey-headed albatross	EN	3	5
Thalassarche melanophris	Black-browed albatross	LC	255	424
Diomedea exulans	Wandering albatross	VU	158	254
Fulmarus glacialoides	Southern Fulmar	LC	6	9
Halobaena caerulea	Blue petrel	LC	334	622
Macronectes spp	Giant petrel	LC	274	1001
Oceanites oceanicus	Wilson's Storm-petrel	LC	24	106
Puffinus griseus	Sooty shearwater	NT	70	63
Phoebetria palpebrata	Light-mantled Albatross	NT	27	34
Procellaria aequinoctialis	White-chinned petrel	VU	-	4
Phoebetria fusca	Sooty albatross	EN	1	-
Pachyptila desolata	Antarctic prion	LC	62	94
Total			1490	3067

3.4 Benthic Habitats and VME

Very little bycatch of VME indicator taxa was recorded in 2025. VME bycatch recorded are shown in Table 5. Often, VME species recovered were dead fragments. VME move-on rules were not triggered at any time (CMM 03-2025). When physical samples were brought up on the line, observers collected representative photographs of living samples (Figure 9).

Table 5 VME indicator taxa bycatch recorded by scientific observers in 2024. Shown is total weight (kg) for all lines.

VME Group Code	VME Group Name	2025
		Weight (kg)
CSS	Scleractinia	0.40
AQZ	Antipatharia	0.07
AXT	Stylasteridae	0.59
GGW	Gorgoniidae	0.92
OEQ	Euryalida	0.05
DMO	Demospongiae	0.09
SSX	Ascidiacea	0.32
Total		**2.44**

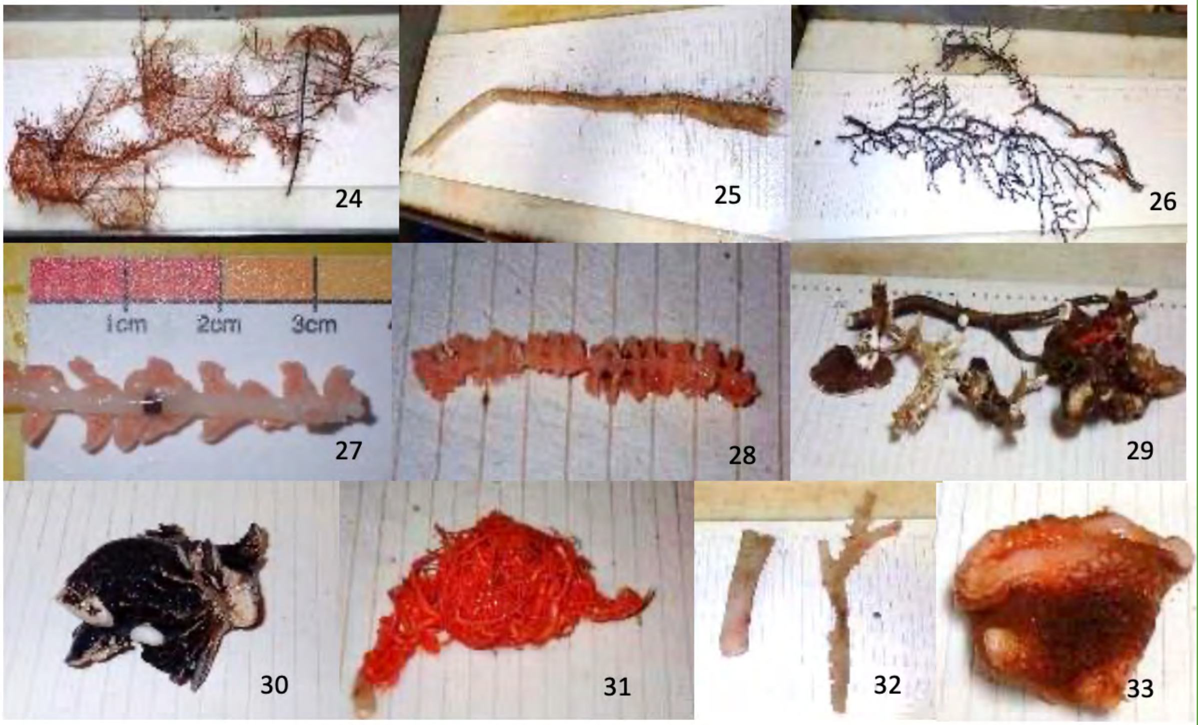

Figure 9: VME images taken by Scientific Observers in 2025. Photographs 24-33. 24: Antipatharia; 25-28: Gorgonaceae; 29: Stylasteridae; 30: Dead Scleractinia; 31: Euryalida; 32: Demospongia; 33: Ascidiacea.

A bespoke video camera and light unit was designed by the vessel for collecting seabed imagery (Figure 10). The camera is an Akaso Brave 4 Pro action camera, and led light (2100 lum). The camera was deployed on 8 lines in 2025 (Figure 11), with a steel weight and baited hook. Lines 21, 30, 40, 54, 62, 68 provided good imagery of the seabed.

Similar to previous camera observations, benthic habitats in the fished areas of Research Block A are depauperate of benthic fauna, with habitats consisting of sand, gravel and rock; line 21 (Figs 12-15). Habitats are a mix of sand/gravel, or sand/cobble. Lithoid crabs and occasionally swarms of isopods were seen, attracted to either the bait or lights (possibly both). The two camera stations in Research Block B showed a sandy habitat not found previously in Research Block A (Figs 16-17). At Line 68, several sea pens were shown in the video.

Figure 10. Benthic camera unit.

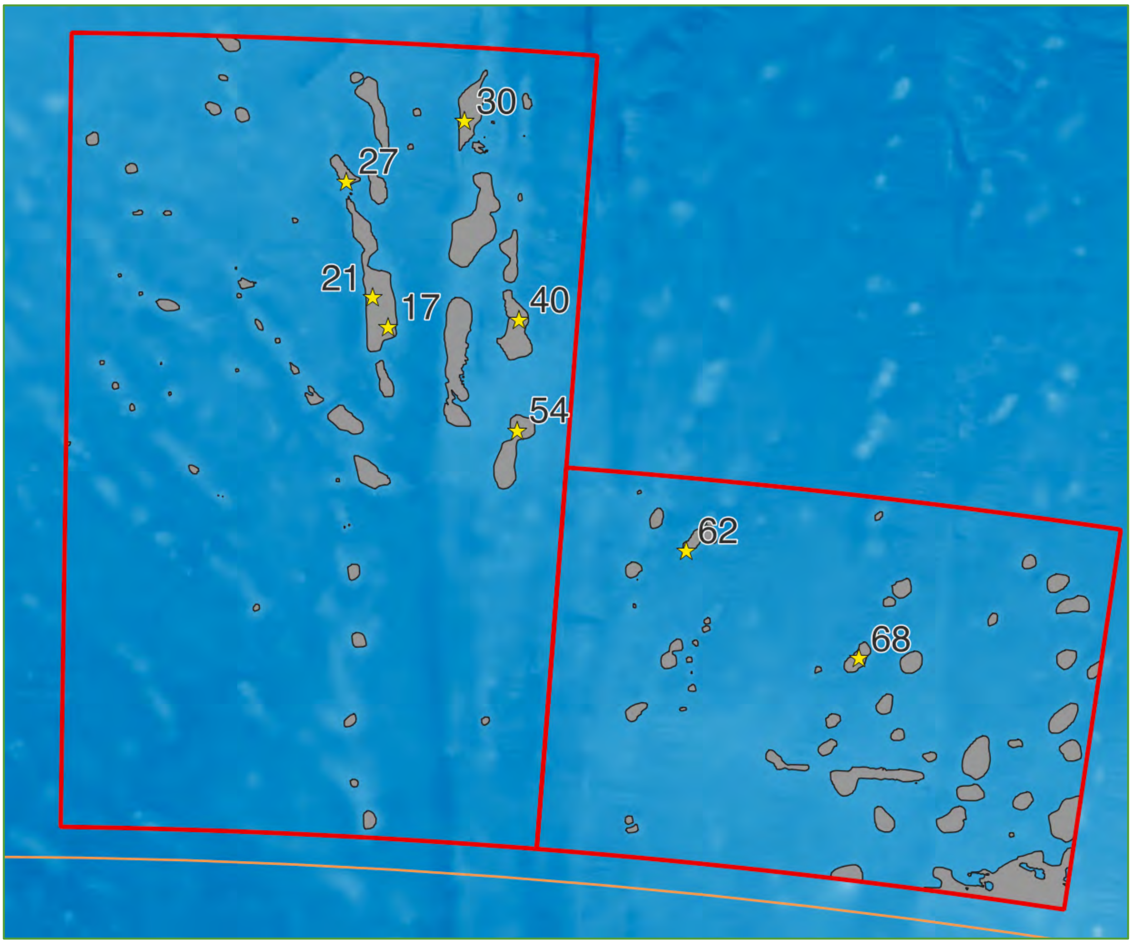

Figure 11. Camera deployment line numbers in 2025.

Figure 12. Station 21 (Research Block A). Sand and gravel habitat.

Figure 13. Line 30 (Research Block A) Close-up of gravel habitat with Lithodid crab and anemone (bottom right).

Figure 14. Line 40 (Research Block A) Sand and cobble habitat showing Caridean shrimp and unbranched coral (Primnoidae).

Figure 15. Line 54 (Research Block A). Sand, cobble and boulder habitat with Caridean shrimps attracted to bait.

Figure 16. Line 62 (Research block B). Sand habitat with Lithodid crab and Patagonian toothfish attracted to bait. The steel weight is approximately 26cm in width.

Figure 17. Line 68 (Research Block B). Sand habitat with sea pens. Some seabed current is indicated by sea pens streaming from right to left in the image.

3.5 Oceanography

Oceanographic data was collected at 22 stations in 2025 using Star-Oddi DST-CTD's (Figure 18), with 10 CTD deployments producing usable data spanning Research Block A and B.

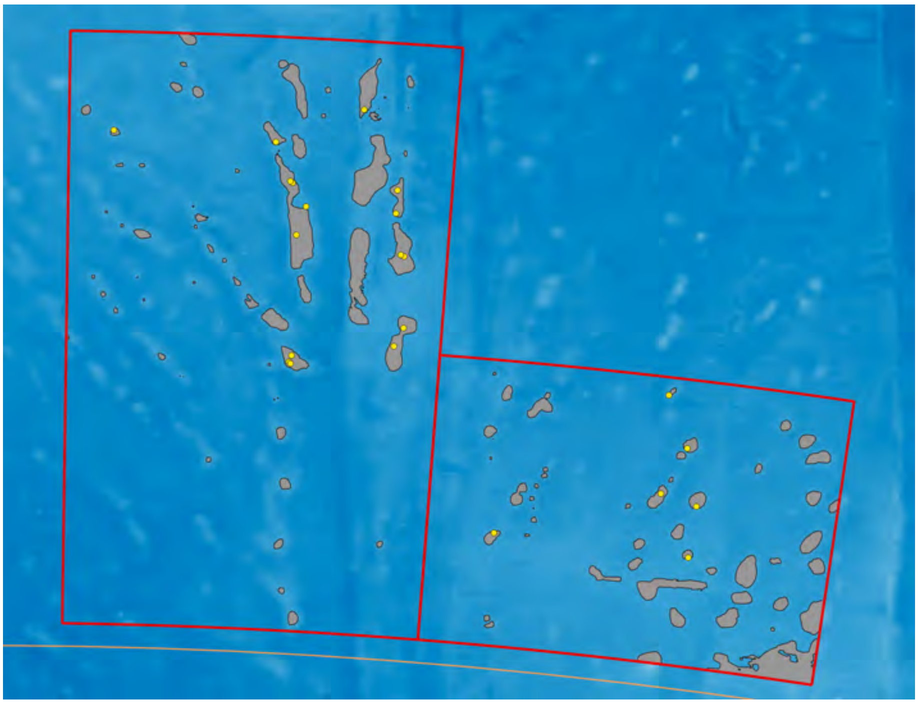
Figure 18. CTD Stations in 2025.

Similar to previous years, the water column is stratified, with a mixed layer down to approximately 250m depth, and colder, saltier water laying underneath (Figure 19, Figure 20). Surface water in the north was warmer than in the southern area. At the seabed there was slight variability in temperature during the 18hrs of line setting.

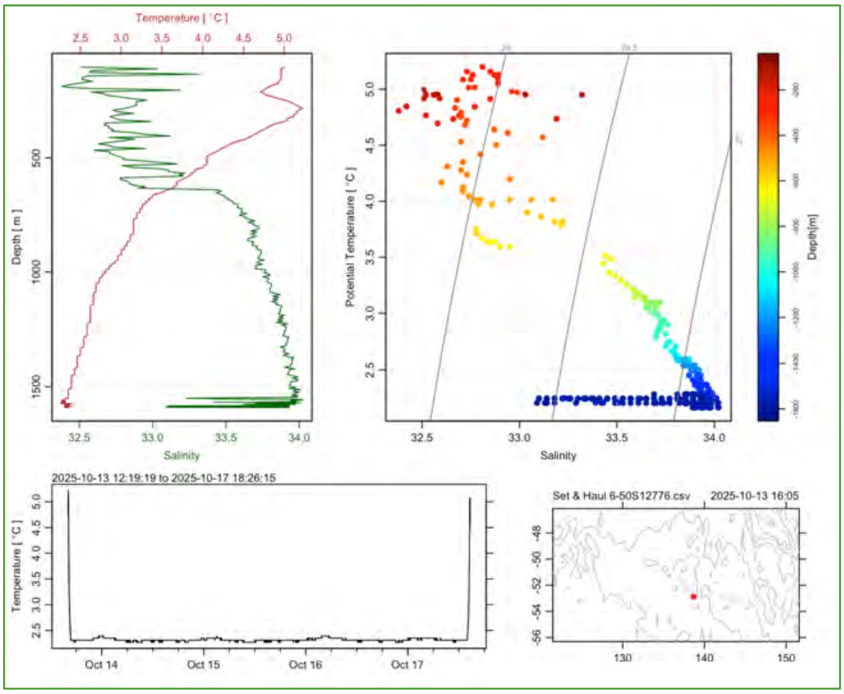

Figure 19 CTD profile at Line 6, 2025, showing temperature and salinity profiles (top left), TS plot (top right), bottom temperature (bottom left), and geographic position and bathymetry at the station (bottom right).

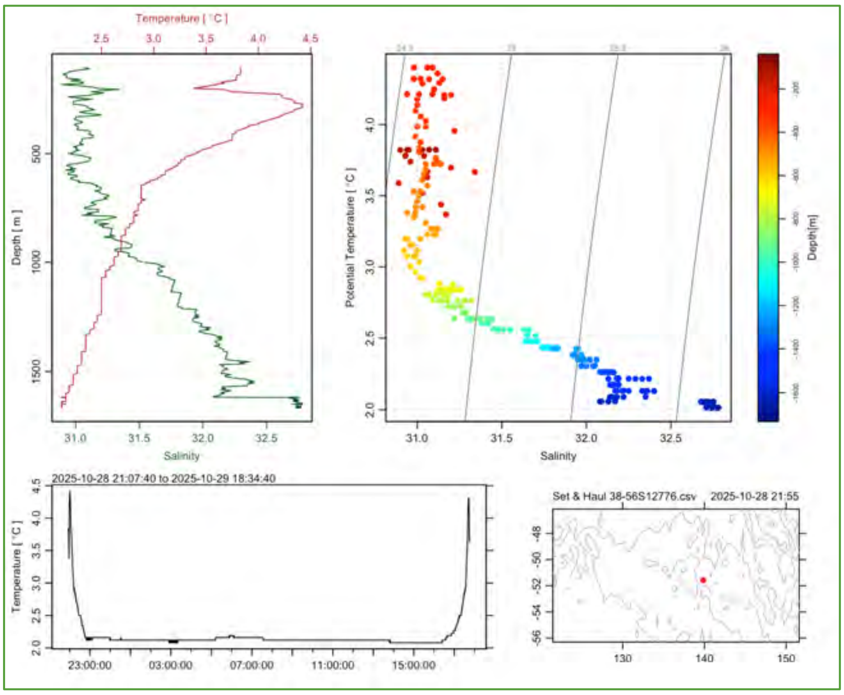

Figure 20 CTD profile at Line 38, 2025, showing temperature and salinity profiles (top left), TS plot (top right), bottom temperature (bottom left), and geographic position and bathymetry at the station (bottom right).

Contour plots of surface temperature throughout Block A and B illustrate a Northwest – Southeast decrease in surface (100m) temperature of about 3 °C (Figure 21). This gradient is less evident at 1000m depths (Figure 22). This gradient marks the transition from the Subantarctic Front in the north, to the Polar Front in the south. Bottom water at these locations is likely to be Antarctic Intermediate Water (AAIW) corresponding to a density surface of approximately 27.4 with overlaying Subantarctic Mode Water (SAMW) (Yaremchu et al 2001).

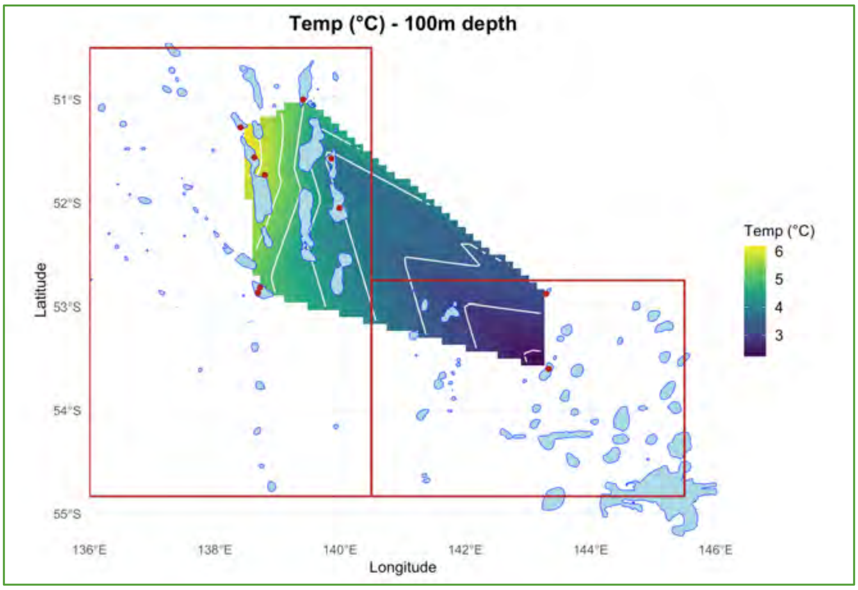

Figure 21. Surface (100m depth) contour plot of temperature throughout Blocks A and B in Oct 2025.

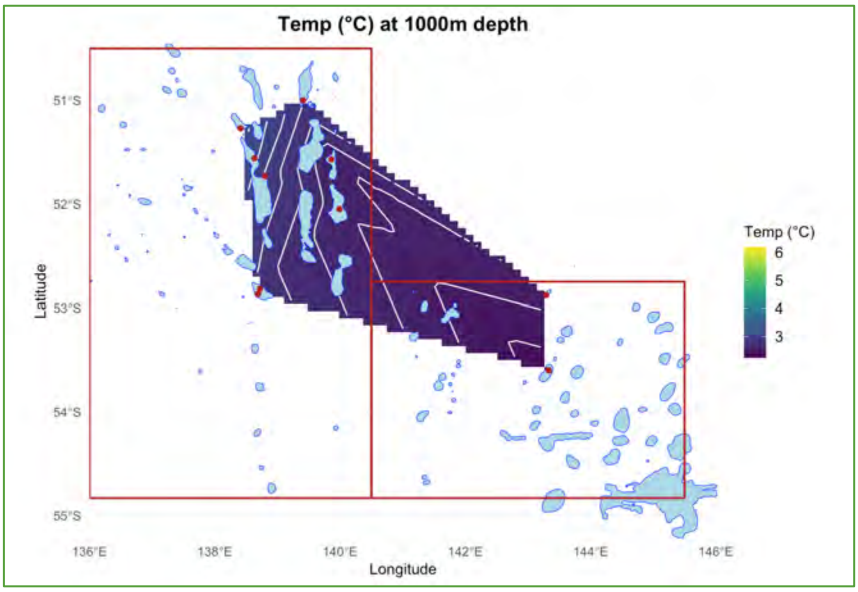

Figure 22 Surface (1000m depth) contour plot of temperature throughout Blocks A and B in Oct 2025.

3.6 Conversion factor

Conversion factor used by the vessel in 2025 was 1.72. Observers calculated conversions factors to be 1.67 Research Block A and 1.63 in Research Block B.

4. Discussion

The knowledge base for the GVFZ is building significantly since the first fishing campaign by the *FV Tronio* 2021. There is a greater understanding of the toothfish population in terms of distribution and biomass among the seamount and ridge system in the area, as well as some data indicating connectivity of the toothfish population with other regions, such as the Macquarie Island toothfish fishery. Fish bycatch is low in the area, with data collected for targeted research on the main bycatch species (MCH). An examination of toothfish biological data is done in a separate assessment report.

Knowledge of VME and seabird distributions are also becoming well resolved. The lack of VME species encountered is valuable confirmation of the predictions of low VME suitability made for the region (Anderson et al. 2016; Tittensor et al. 2009; Davies and Guinotte 2011). However, sea pens were observed in Research Block B; a species and habitat not found in Research Block A. This will be monitored in future fishing campaigns in the area. Notably, the lack of elasmobranch bycatch suggests that sharks and skates are relatively rare; nevertheless, precautionary bycatch monitoring and move-on triggers should remain in place until further exploratory fishing can be conducted. There also appears to be very little marine mammal activity, with no observations of any marine mammal recorded in any fishing campaign to date.

Data can be compared to a useful dataset of oceanographic patterns for the area. Whilst seasonal variation cannot be determined, interannual variation could start to be examined given fishing campaigns have been consistently at the same time of year.

5. Future work

The final year of this exploratory fishery will continue in 2026, collecting similar data across the expanded fishing area.

- expanding the fishing area to new seamounts and ridges in the currently fished area as well as new areas to the east;
- toothfish tagging, and studying the fidelity of tagged fish to areas of seamounts and ridges;
- toothfish population sex ratio, and how that relates to reproduction and maturity patterns;
- collection of *Macrourus holotrachys* genetic samples for connectivity studies;
- continued gathering of benthic imagery for habitat studies and VME species collection and;
- continued deployment of CTDs for oceanographic characterisation of the region.

In the coming years, toothfish otolith and genetic samples from 2021-25 be processed. In addition to age-length analysis from otoliths, stock discrimination studies should be considered, given the apparent immigration rates. This can be conducted in collaboration with Australian Antarctic Division's toothfish program on the Macquarie Ridge.

6. References

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