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Exploratory Patagonian toothfish demersal longline fishery Survey Report

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Georgia Seafoods Ltd

Exploratory Patagonian toothfish demersal longline fishery: South Tasman Rise, SPRFMO Convention Area

Survey Report: *FV Tronio* (ECJF) 25/10/2019 - 01/11/2019

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Review table

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Data Access

All data is stored in the SAERI IMS-GIS Centre (https://www.south-atlantic-research.org/), and can be accessed by request and permission.

Acknowledgements

We would like to thank the Captain and crew of *FV Tronio* for assistance on the vessel. The Falkland Islands Government Fisheries Department provided laboratory space and materials, in kind.

Contents

1. Introduction

An exploratory Patagonian toothfish (*Dissostichus* spp.) fishing program was proposed at the 7th Annual Meeting of the SPRFMO Commission (23-27 January 2019) by the European Commission (COMM7-Propo14.1), with work to be conducted by the Spanish flagged longline fishing vessel *FV Tronio*. The exploratory fishing activities were to be undertaken in 2019 in the area known as the South Tasman Rise (STR), an area outside the Australian EEZ straddling FAO areas 57 and 81, and which falls within the SPRFMO convention area. The proposal highlighted the Fisheries Operation Plan, including specific proposed areas, target species, fishing methods, fishing period, data collection plan, sample and data management plan. The proposal identified the relevant elements of CMM 03-2017 on Bottom Fishing in the SPRFMO Convention Area, notably a risk assessment of bottom fishing activities outside the established footprint. The proposal was adopted by the Commission through CMM14c-2019 in accordance with Articles 8, 20 and 22 of the Convention.

As far as the authors are aware there has been no historic bottom longlining fishing in this area for Patagonian toothfish, or any other species. The northern part of the area of interest on the South Tasman Rise has had a bottom trawl fishery for Orange Roughy (*Hoplostethus atlanticus*) for a limited period (1997-2002), jointly managed by New Zealand and Australia, but this ceased in 2001-02 following declining catches (SPRFMO SC5-DW13_rev1) and was eventually closed in 2007 (Clark et al 2007).

Because the geographical latitude, oceanography, and bathymetry of the area of interest is similar to that of Patagonian toothfish fishing areas elsewhere, it was considered likely that toothfish may live in this area. However, to our knowledge, no presence of this species has been recorded on the South Tasman Rise. Nevertheless, this survey was considered to be a good opportunity to provide the SPRFMO SC with increased information about the area through data collection, by implementing a survey and sampling design focused on targeted species, by-catch species, accidental catches and Vulnerable Marine Ecosystems (VMEs).

Methods

2.1. Proposed fishing plan

Detail of the proposed fishing plan are presented in COMM7-Prop14.1. Fishing methods, monitoring and data collection during the survey did not deviate from those proposed in the plan. Three survey personnel were originally proposed for the survey. However, unfortunately one Scientific Observer was not able to join due to logistic issues. Ultimately, this had little impact on work being completed on board in part, due to no target species (toothfish) being caught. Reduced personnel had a minor impact on setting observations, where not all line setting was observed. 100% of lines were observed during hauling and in the factory.

With the onset of the global Covid-19 pandemic, samples (fish, elasmobranchs, invertebrates) have not been sent to museums for identification, genetic analyses, and curation as yet, and at the time of writing this report are retained in Stanley, Falkland Islands.

2.2. Fishing area

The South Tasman Rise (Figure 2.1) is a large submerged continental block that abuts southern Tasmania (Hill and Moore 2001). The summit area of the STR is a broad dome rising to about 750 m and is separated from Tasmania by a 3000m deep saddle to the north. The STR forms part of the Australian South-east Marine Region (Hill et al. 2001, cited in Hill and Moore 2001.)

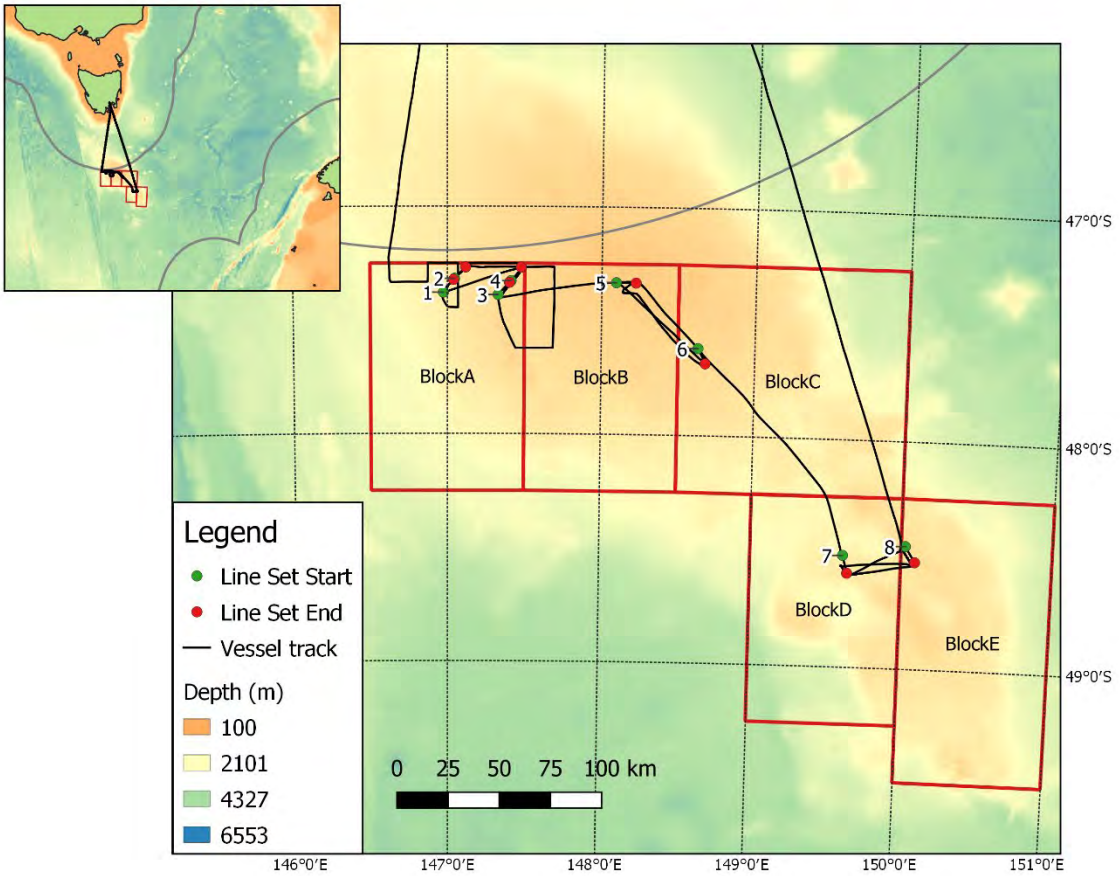


Figure 2.1 Survey map indicating region of the South Tasman Rise (inset), research blocks (A-E), survey track, and station (haul) numbers.

2.3. Vessel

Vessel specific details as required under paragraphs 2 and 3 of Annex 1 of CMM 05-2016 (Record of Vessels) are shown in Table 2.1. Images of the *FV Tronio* are presented in Figure 2.2.

Table 2.1 Vessel details

CMM 05-2016 (Record of Vessels)	
Current vessel flag	EUROPEAN UNION (EU) (SPAIN)
Name of vessel	TRONIO
Registration number	3GC-1-2-05
International radio call sign	ECJF
UVI (Unique Vessel Identifier)/IMO number	9361603

Previous Names	N/A
Port of registry	CELEIRO (Spain)
Previous flag	UNITED KINGDOM (GBR)
Type of vessel	BOTTOM LONGLINER (LL)
Type of fishing method	LLS 09.3.0
Length	55 m LOA
Gross Tonnage	1058 GT
Power of main engine	1378.70Kw
Hold capacity	632,3 m^3
Freezer type	TUNNEL
Number of freezers units	3
Freezing capacity	30Mt
Vessel communication types and numbers	Inmarsat C :422462320 Inmarsat FBB: +870773184117
VMS system details	Satlink ELB 2014
Name of owner	PESQUERÍAS GEORGIA, S.L
Address of owner	Muelle Sur, Almacén 21- Celeiro – Spain
Ice classification	Ice Class 1C

Figure 2.2 *FV Tronio* Starboard showing longline hauling bay (top left), *FV Tronio* Port side (top right), *FV Tronio* astern with longline setting doors closed.

2.4. Scientific personnel

There were two scientific personnel on board: one scientific observer (from the Instituto Español de Oceanografía, Spain), and a scientific representative from the fishing company (Georgia Seafoods Ltd).

2.5. Fishing gear

The 'Spanish' longline system of seabed longline fishing was used (Figure 2.3) (as specified in CCAMLR Gear Catalogue, specifically WG-FSA-11/53).

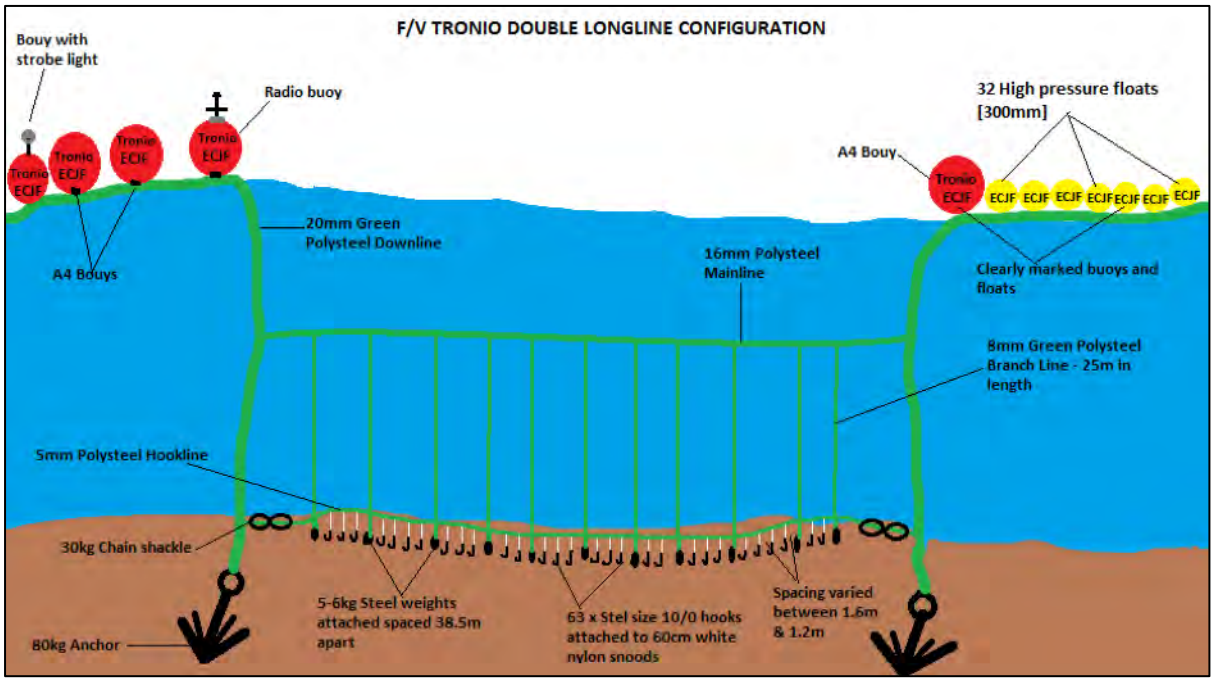


Figure 2.3 *FV Tronio* Spanish system. All steel weights were 6kg (not 5kg as shown in the figure).

2.5.1. Hooks

Hook size used was 'J' type, size 10 (A Poutada and Mustad suppliers). All hooks were marked to identify the ship. Two types of makings were used; either a rectangle or double line on the shank near the eyelet (Figure 2.4).

Figure 2.4 Marked hooks used on *FV Tronio* during STR exploratory fishing program.

2.6. Electronic monitoring

The vessel is equipped with AIS (FURUNO FA-150) and VMS (2 x Satlink ELB2004, 1 x Zunibal V77, and 1 x Caixa Azul Res 02-2-001230 Thrane & Thrane TT-3026) with a reporting frequency set by the Spanish authority (Centro Seguimiento Pesquero - CSP). VMS polling was done to the Caixa Azul Res 02-2-001230 Thrane & Thrane TT-3026 with 1 poll per hour as required by the Spanish authority (Centro Seguimiento Pesquero - CSP). In addition, *FV Tronio* is equipped with CCTV systems (Archipelago Marine Research Ltd) which record time/date and position, and CCTV footage of the stern (during line setting), the setting room (during line setting), and the hauling bay (during line hauling). See Appendix 6.3 for details. This footage and data has been analysed by Archipelago and has been presented to Spain in a separate report.

2.7. Conservation measures

Operations were carried out in compliance with CMM 14c-2019 (Conservation and Management Measure for Exploratory Fishing for Toothfish by EU Vessels in the SPRFMO Convention Area), CMM 09-2017 (Minimising Bycatch of Seabirds in the SPRFMO Convention Area), and paragraph 3 of CCAMLR CM 25-02 (2018) (Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area). Additionally, vessel light emissions were kept to a minimum at night to avoid light-strike.

2.8. Data Collection

All required data was collected according to CMM02-2018 (Data Standards) and CMM03-2019 (Bottom Fishing), as well as CCAMLR CM22-07 (2013) (VMEs).

2.8.1. Station, Catch and effort

All data was recorded by the bridge and/or scientific observer in standard SPRFMO forms.

2.8.2. Biological sampling

The length, weight, and sex and maturity (where visible) were recorded for total catch. All discard was recorded as being discarded live or dead. A selection of fish, shark, and ray species were retained (whole frozen) for further analysis. All depredation was recorded in terms of hooks in head or in lips. All VME species were weighed, and representative samples were photographed and frozen for further analysis.

In the lab, all frozen samples were processed at the Falkland Islands Government Fisheries Department (FIFD) laboratory. Samples were photographed, identified to closest practical taxonomic unit, and preserved in either 96% Ethanol for taxonomic and/or DNA analysis, 10% formalin, or kept frozen for taxonomic analysis. Various subsamples were collected including otoliths, stomachs, and parasites.

2.8.3. Video sampling

A deep-water camera and strobe unit (GroupBInc.com, GPH-1750m + Hero4 GoPro) was deployed on two occasions (Figure 2.5).

Figure 2.5 Benthic camera attachment plate (left) and camera and light system (right).

2.8.4. Oceanography

A Valeport FastCTD (https://www.valeport.co.uk/) was deployed on four occasions, collecting standard CTD (Conductivity, Temperature, Depth) on four occasions, and chlorophyll_a (using a fluorometer) on two occasions. The instrument was fixed to the anchor line at approximately 200m above the seabed. CTD data was processed and plotted in R (2019) (v3.6.2) and the 'oce' package.

3. Results

3.1. Effort

The vessel track and Setting/Hauling stations are shown in Figure 2.1. A summary of station data is shown in Table 3.1. Detailed station data are provided in Appendix 6.1.

There was no gear loss during fishing operations. No previously lost fishing gear was found.

At the start of the survey, four lines were set in Block A. Catch of Portuguese dogfish on each of these hauls would have triggered the move-on rule (CMM 14c-2019). Subsequently, the decision was made to set one line at a time in the next research blocks, where the move-on rule for by-catch of Somniosidae (CMM 14c-2019 paragraph 19j) was triggered at each of these four hauls in Blocks B-E (Figure 2.1).

Table 3.1 Summary of haul station data and effort.

Haul	Date/time (set)	Date/time (haul)	Latitude (set start)	Longitude (set start)	Number of hooks set	Number of hooks recovered	Science instruments deployed	Research Block
1	26/10/2019 05:45	26/10/2019 21:47	-47.380	146.974	4977	4977	none	A
2	26/10/2019 06:30	26/10/2019 18:30	-47.318	147.046	4977	4977	none	A
3	26/10/2019 15:10	27/10/2019 11:15	-47.389	147.329	4977	4977	none	A
4	26/10/2019 15:50	27/10/2019 06:20	-47.328	147.412	4977	4977	none	A
5	27/10/2019 18:50	28/10/2019 03:00	-47.333	148.094	4977	4977	CTD+fluoro	B
6	27/10/2019 22:00	28/10/2019 11:25	-47.617	148.630	4977	4977	CTD, camera	C
7	28/10/2019 23:10	29/10/2019 07:00	-48.508	149.614	4977	4977	CTD, camera	D
8	29/10/2019 01:50	29/10/2019 14:35	-48.460	150.027	4977	4977	CTD+fluoro	E

3.2. Observation times

Time spent monitoring setting and hauling procedures for seabird interaction is summarised in Table 3.2. Seabird by-catch mitigation measures (tori-lines, bird scaring device, line weighting) are detailed in the Scientific Observer report. 100% of all lines were observed in the factory.

Table 3.2 Summary of observations at line setting and hauling, and in the factory.

Haul	Number of tori lines used	Number of hours setting observation	Bird scaring device used at hauling	Number of hooks monitored hauling observation	Percent of line observed in factory
1	2	0.8	Yes	1866	100
2	2	0.5	Yes	2488	100
3	2	0	Yes	2488	100
4	2	0	Yes	2488	100

5	2	0.5	Yes	2488	100
6	2	0.8	Yes	1866	100
7	2	0.3	Yes	2488	100
8	2	0.3	Yes	2488	100

3.3. Total catch

Total catch (as recorded on the *FV Tronio* bridge, excluding VME's) for all hauls was 3,151.5 kg (Table 3.3), among nine species/taxa groups. All catch was discarded with the exception of retained samples for scientific examination. Highest catch was from Portuguese dogfish, *Centroscymnus coelolepis* (CYO). This was the main species to trigger the move-on rule under CMM 14c-2019. Highest catches were in the north of STR (Figure 3.1). Other species caught frequently were the ghost shark, *Hydrolagis homonycteris* (HOL) mainly in the southern STR, *Macrourus sp* (GRV) (*M. carinatus* and *M. holotrachys*) on the central STR, *Etmopterus unicolor* (SHL) on the central STR, *Antimora rostrata* (ANT) on the southern STR, and Congridae (COX) (*Diastobranchus capensis*) (Figure 3.1). Minor catch included *Centroscymnus owstonii* (CYU), *Pseudophycis spp*. (recorded in the logbook as SAO – *Salilota australis*), and Rajiformes (SRX).

All sharks and skates were released if determined to be able to survive post-release. Numbers of released animals was recorded only during line hauling observations, which occurred for 50% on all hauls. Total recorded individuals released alive were 31 skates, and 190 sharks, with additional individuals released during unobserved hauls. Two skates were retained due unlikelihood of survival (broken jaws and/or prolapsed spiral valve), and frozen for positive identification ashore. There was no other skate catch recorded.

Table 3.3 Total catch as reported by the *Tronio* bridge crew. Note that SAO is likely to be *Pseudophycis* spp.

Haul	ANT	COX	CYO	CYU	GRV	HOL	SAO	SHL	SRX	Total
1	48.6	6.8	62.8		7.2	51.1				**176.5**
2	6.4	22.0	86.9		38.4	146.3	10.5			**310.5**
3		4.5	277.9		52.6	3.0				**338.0**
4		2.9	323.6		36.7	20.8				**384.0**
5			527.8	60.1	32.7			51.3		**671.9**
6	1.0	27.7	28.0		146.0	10.0		143.9		**356.6**
7	88.3		59.1		0.3	99.1		0.3		**247.1**
8	101.0	53.3	9.0		55.7	438.9		1.5	7.5	**666.9**
Total	**245.3**	**117.2**	**1375.1**	**60.1**	**369.6**	**769.2**	**10.5**	**197.0**	**7.5**	**3151.5**

3.3.1. Seabirds, marine mammals, reptiles.

No seabird interactions or mortalities were observed throughout fishing activity. No marine mammals or reptiles were by-caught.

3.4. Biological sampling

A total of 843 individuals across 14 species were sampled in the in the factory (compared to 9 groups recorded in the bridge log), with measurements comprising of lengths (TL, PAL, DW as appropriate), and weights. Sex and maturity were recorded where external assessment could be made.

***Antimora rostrata*.** Modal size (N=196) blue antimora was between 45-50cm total length, with relatively high variability around the fitted length-weight curve (Figure 3.2).

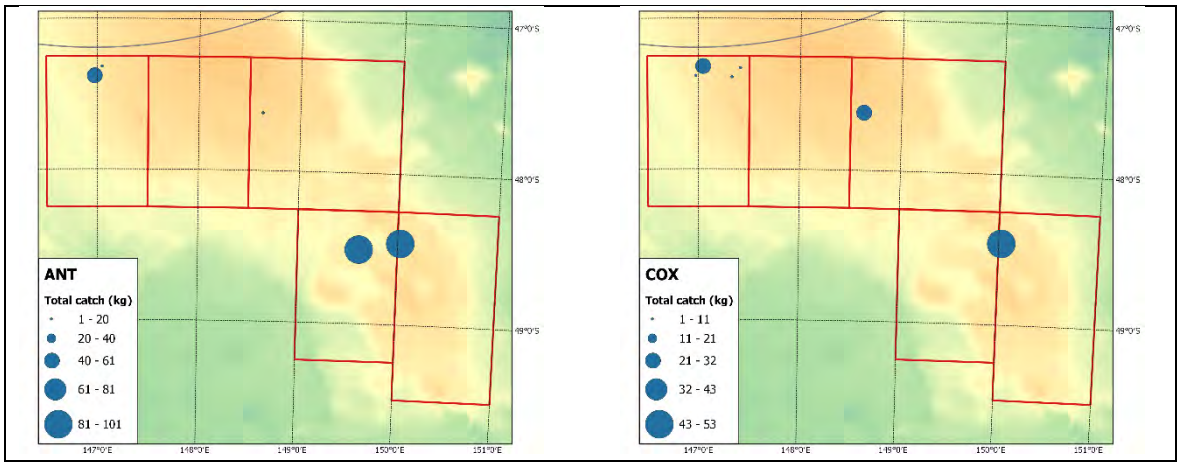
Diastobranchus capensis. A total of 44 basketwork eels were sampled, with a modal length of 80-90 cm (Figure 3.3) There was considerable variability surrounding the fitted length-weight curve.

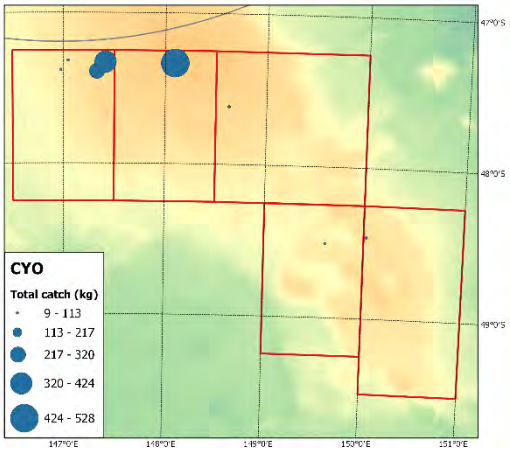
Etmopterus cf unicolor. A total of 118 brown lantern sharks were sampled, comprised of 114 females and 4 males. Modal size was 60-70 cm total length (Figure 3.4). There was little variability around the fitted length-weight curve.

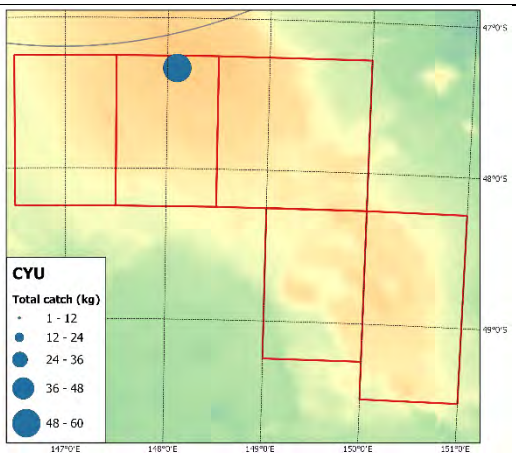
Centroscymnus coelolepis. Possibly two cohorts of Portuguese dogfish were detected among the 368 sampled, with modal size classes of either 60cm or 90cm (Figure 3.5). Length-weight analysis also indicates two distinct size classes were sampled, with moderate variability around the fitted length-weight curve (Figure 3.5).

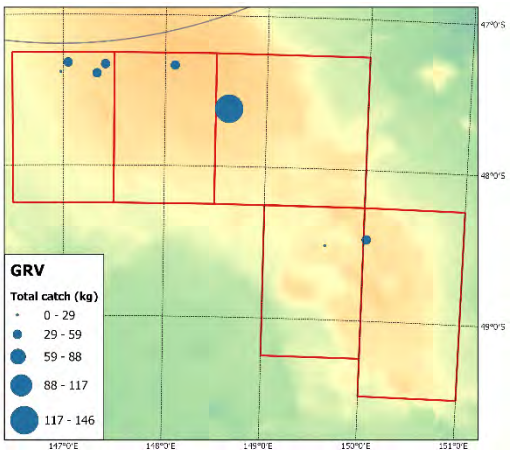
Hydrolagus homonycteris. A total of 75 black ghost sharks were sampled, comprised of 26 males and 47 females (of 2 the sex was not recorded). Modal size was 120cm total length, with the length-frequency distribution highly skewed to sizes above 80cm total length.

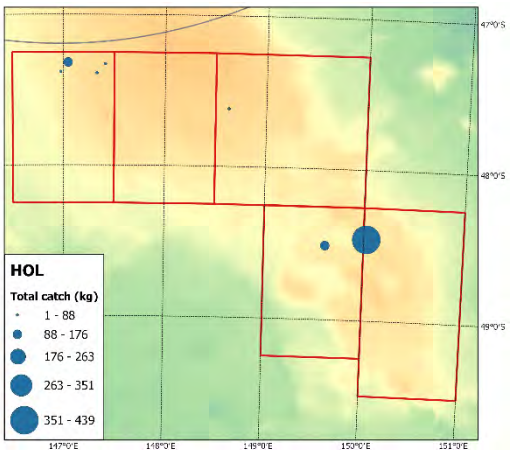
Other species. Most species were sampled in low numbers. Biological data for minor species is shown in Table 3.4.

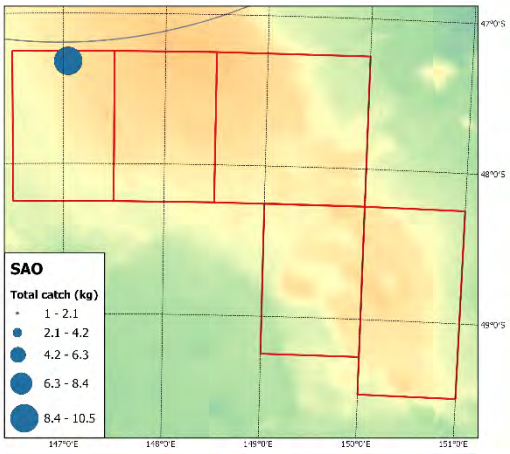


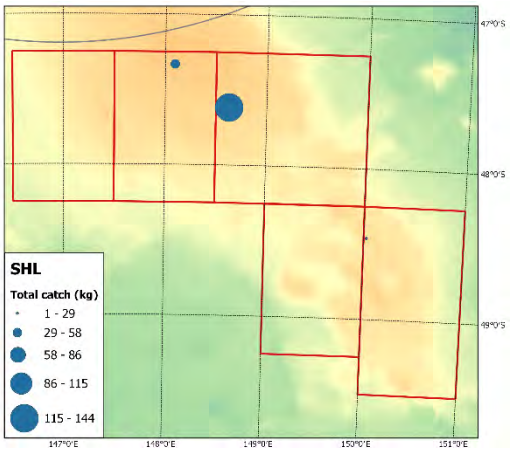

CYO
Total catch (kg)
9 - 113
113 - 217
217 - 320
320 - 424
424 - 528


CYU
Total catch (kg)
1 - 12
12 - 24
24 - 36
36 - 48
48 - 60


GRV
Total catch (kg)
0 - 29
29 - 59
59 - 88
88 - 117
117 - 146


HOL
Total catch (kg)
1 - 88
88 - 176
176 - 263
263 - 351
351 - 439


SAO
Total catch (kg)
1 - 2.1
2.1 - 4.2
4.2 - 6.3
6.3 - 8.4
8.4 - 10.5


SHL
Total catch (kg)
1 - 29
29 - 58
58 - 86
86 - 115
115 - 144

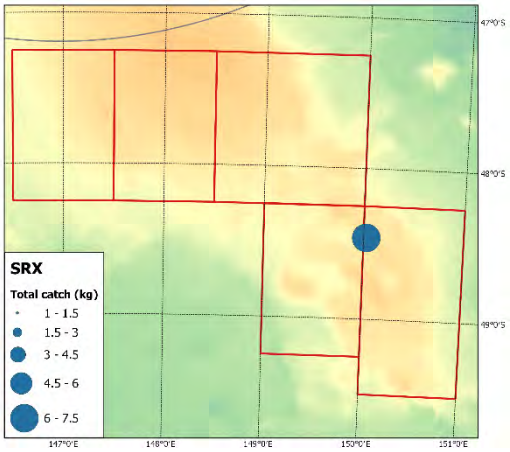

SRX
Total catch (kg)
1 - 1.5
1.5 - 3
3 - 4.5
4.5 - 6
6 - 7.5

Figure 3.1 Total catch as recorded on the *FV Tronio* bridge. Species codes are ANT- *Antimora rostrata*, COX – Congridae, CYO - *Centroscymnus coelolepis*, CYU - *Centroscymnus owstonii*, GRV - *Macrourus* spp., HOL – Holocephali, SAO - *Salilota australis (*note: likely to be *Pseudophycis sp)*, SHL - *Etmopterus* spp., SRX – Rajiformes.

Examples of all fish, shark, and skate species were kept frozen for further laboratory examination at the Falkland Islands Government Department of Fisheries (FIFD). Detailed photographs were taken of each species (Appendix 6.2) as well as biological measurements, sex/maturity, and otoliths (retained at FIFD ageing facility). Whole gut was dissected for future detailed examination. Where internal and external parasites were found, these were retained for taxonomic and genetic analyses (Dr. Haseeb Randhawa, FIFD). Fish specimens and/or samples for genetic identification will be sent to Museums Victoria (Dr. Martin Gomon).

VME species. VME by-catch was recorded on the final line (line 8) only. Total catch of VMEs (recorded in the factory) was 6.06 kg; Alcyonacea - AJZ, Gorgoniidae - GGW, Hydrozoa - HQZ, Ophiurida - OOY. There are no VME threshold levels specified for longline fisheries, but if comparing to CMM03-2020 for towed fisheries, VME catch did not trigger Annex6A or Annex6B VME catch thresholds. Thirteen VMEs and associated species were sampled in the laboratory and preserved in 96% ethanol. These will be sent to Museums Victoria in (Melanie Mackenzie).

Table 3.4 Biological sampling of minor species

Haul	Serial	Code	Species	Length (cm)	PAL (cm)	Maturity fish	Disc width (cm)	Disc length (cm)	Maturity Skate	Weight (kg)	Sex
2	1	CKH	*Coryphaenoides armatus*		12					0.34	
7	1	CVY	*Coryphaenoides spp*		10					0.19	
8	1	CVY	*Coryphaenoides spp*		14	Resting/Developing				0.3	F
4	1	CWX	*Caelorinchus sp.*		20					0.37	
4	1	ETF	*Etmopterus lucifer*	73						2.1	M
2	1	MCC	*Macrourus carinatus*		22	Immature				1.16	F
2	2	MCC	*Macrourus carinatus*		20	Immature				1.03	F
2	3	MCC	*Macrourus carinatus*		19	Immature				0.73	F
2	4	MCC	*Macrourus carinatus*		17	Immature				0.62	F
4	1	MCC	*Macrourus carinatus*		23	Resting/Developing				1.47	M
4	2	MCC	*Macrourus carinatus*		22	Resting/Developing				1.17	M
4	3	MCC	*Macrourus carinatus*		27	Resting/Developing				1.95	M
3	1	MCC	*Macrourus carinatus*		18	Resting/Developing				0.65	M
3	2	MCC	*Macrourus carinatus*		21	Resting/Developing				1.01	M
6	1	MCC	*Macrourus carinatus*		31	Developing				3.26	F
6	2	MCC	*Macrourus carinatus*		30	Developing				2.71	F
6	3	MCC	*Macrourus carinatus*		31	Developing				3.15	F
6	4	MCC	*Macrourus carinatus*		31	Developing				3.3	F
6	5	MCC	*Macrourus carinatus*		30	Developing				2.95	F
6	6	MCC	*Macrourus carinatus*		35	Developing				4.17	F
6	7	MCC	*Macrourus carinatus*		27	Resting/Developing				2.15	F

6	8	MCC	*Macrourus carinatus*		35	Developing				4.47	F
6	9	MCC	*Macrourus carinatus*		34	Developing				5.98	F
6	10	MCC	*Macrourus carinatus*		38	Developing				5.86	F
6	11	MCC	*Macrourus carinatus*		30	Developing				2.79	F
6	12	MCC	*Macrourus carinatus*		26	Resting/Developing				2	F
8	1	MCC	*Macrourus carinatus*		26	Resting/Developing				2.3	F
8	1	MCH	*Macrourus holotrachys*		36					3.72	
8	2	MCH	*Macrourus holotrachys*		37					4.36	
8	3	MCH	*Macrourus holotrachys*		40					5.23	
8	4	MCH	*Macrourus holotrachys*		35	Developing				3.69	F
8	5	MCH	*Macrourus holotrachys*		25	Resting/Developing				1.47	F
1	1	QMC	*Macrourus caml*		18	Resting/Developing				0.66	F
1	2	QMC	*Macrourus caml*		17	Resting/Developing				0.54	F
3	1	QMC	*Macrourus caml*		32	Developing				3.85	F
3	2	QMC	*Macrourus caml*		27	Developing				2.05	M
3	3	QMC	*Macrourus caml*		25	Resting/Developing				1.56	M
3	4	QMC	*Macrourus caml*		22	Resting/Developing				0.94	F
1	1	RAJ	*Amblyraja hyperborea*	76			59	54	Maturing	5	M
1	1	RAJ		150			102	97	Maturing	20.5	M
8	1	RAJ	*Amblyraja hyperborea*	97		Developing	69	69		8	M
2	1	SAO	*Salilota australis* (probably *Pseudophycis spp)*	99						10.5	

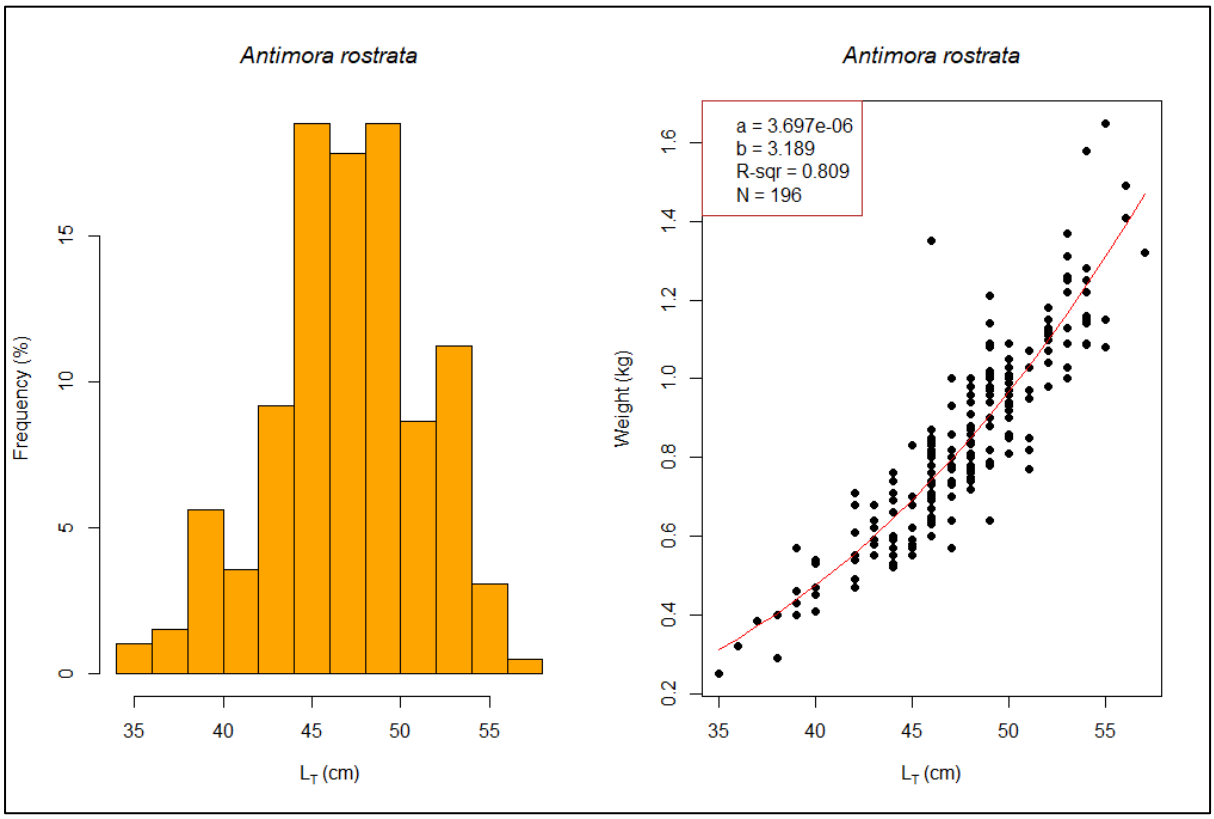


Figure 3.2 *Antimora rostrata*. Length frequency (left) and length-weight fitted curve (right) with details of length-weight equation.

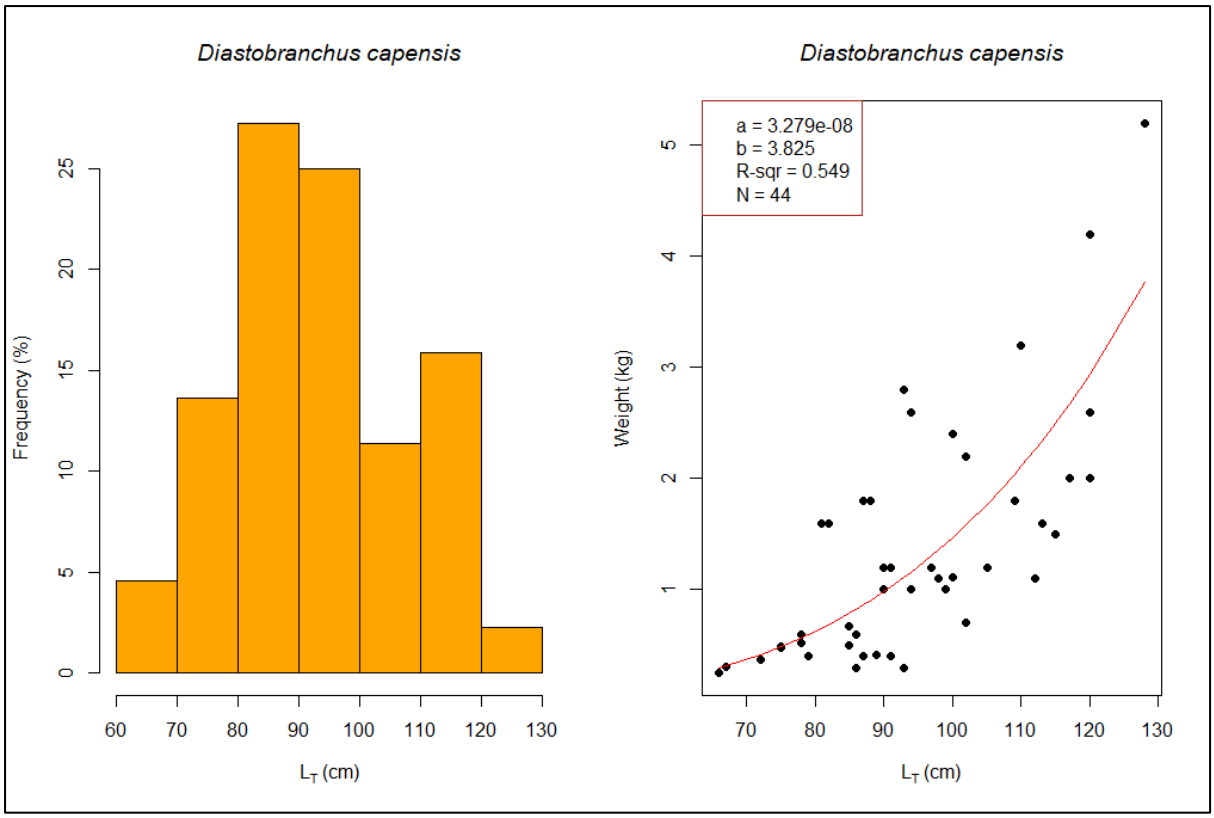


Figure 3.3 *Diastobranchus capensis*. Length frequency (left) and length-weight fitted curve (right) with details of length-weight equation.

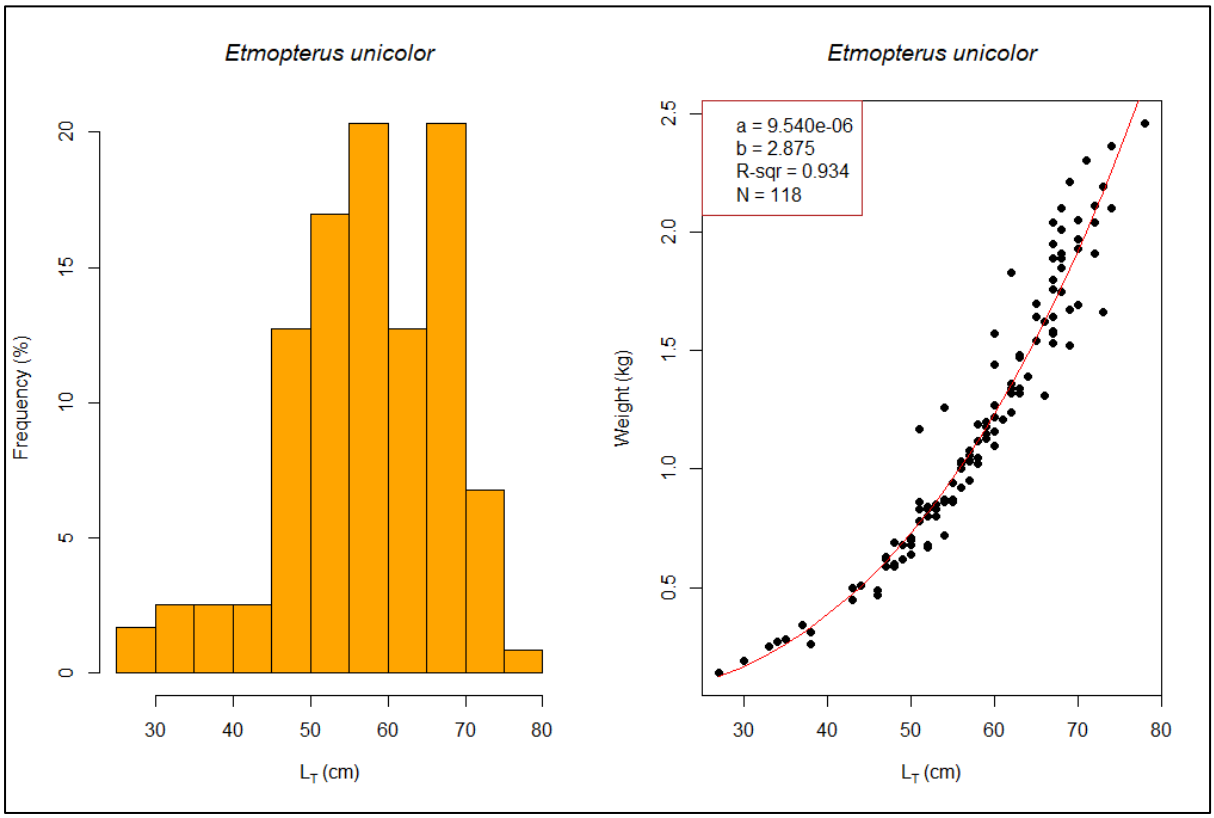


Figure 3.4 *Etmopterus unicolor*. Length frequency (left) and length-weight fitted curve (right) with details of length-weight equation.

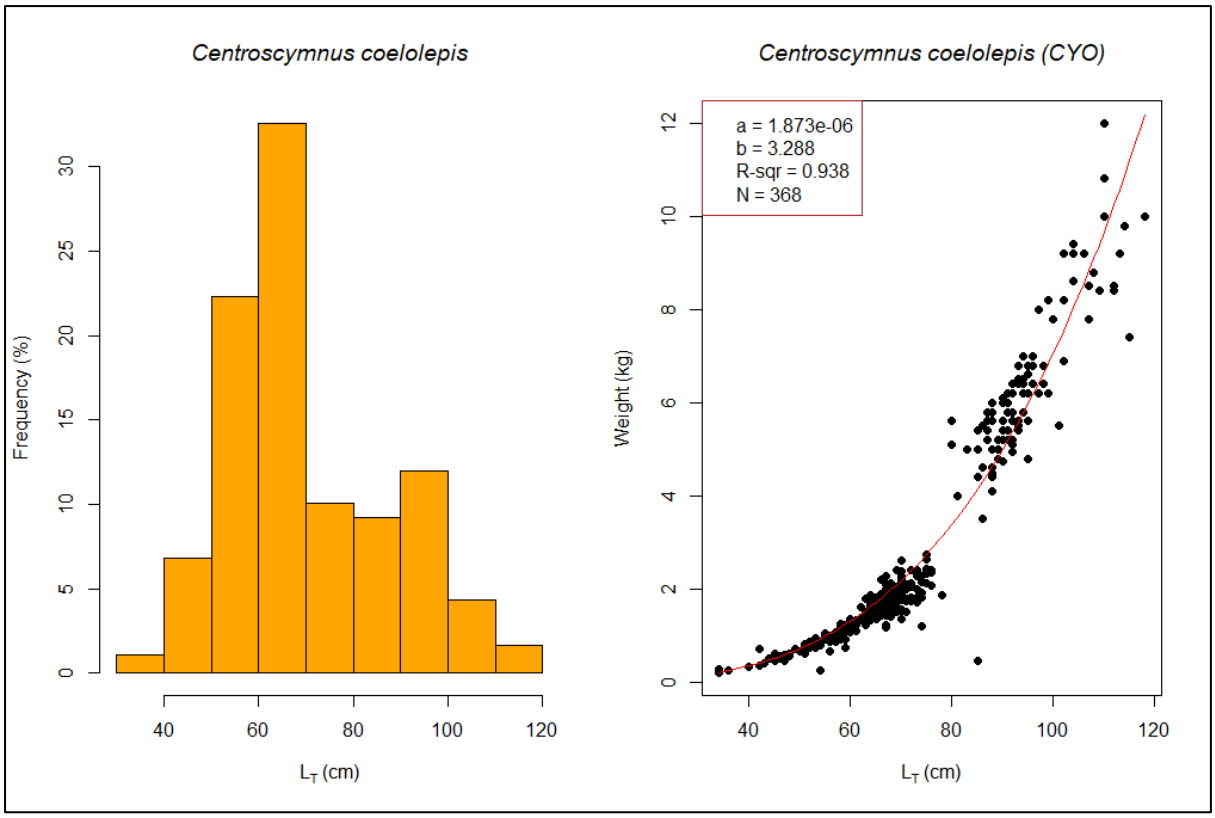


Figure 3.5 *Centroscymnus coelolepis*. Length frequency (left) and length-weight fitted curve (right) with details of length-weight equation.

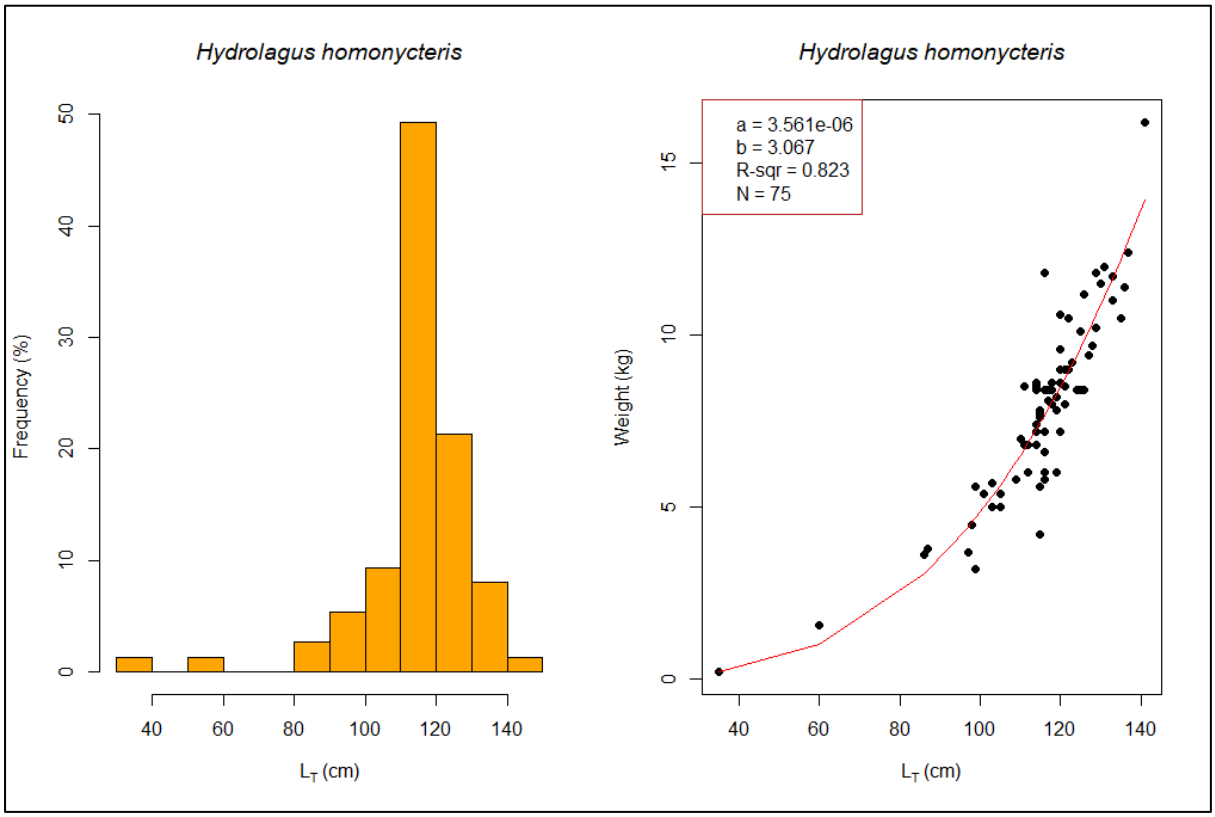


Figure 3.6 *Hydrolagus homonycteris*. Length frequency (left) and length-weight fitted curve (right) with details of length-weight equation.

3.5. Deep-water camera

The deep-water video camera was deployed on Hauls 06 and 07.

Haul06. Video camera was mounted to a drop line near the drop weight (Figure 3.7). The camera collected 42 mins of video footage at the seabed. There was very little activity during this time. A blue antimora was seen, as well as a Portuguese dogfish. These were likely attracted to the camera light. By comparing the size of the animal to the drop weight (approximately 60 cm long), these individuals are likely to be about 60 cm in length. The firm, slightly silty seabed was featureless in terms of epibenthic fauna. On camera descent, the camera recorded some gelatinous fauna including ctenophora.

Haul07. The camera was mounted on a snood oriented towards a baited hook and collected 51 mins of video footage (Figure 3.8) at the seabed. Observed was a blue antimora attempting to feed on the bait (sardine), eventually dying and being preyed on by a basketwork eel (*Diastobranchus capensis*). The only benthos evident were a number of highly mobile brittlestars (Ophiroidea). On camera descent, various gelatinous species were observed.

Figure 3.7 Portuguese dogfish (top) and blue antimora (bottom) caught on video at site Haul 06.

Figure 3.8 Blue antimoral feeding on bait (top), basketworks eel attempting to prey on the antimora (middle), brittle stars (bottom).

3.6. Oceanography

There was a relatively well mixed layer down to 400-600m depth at Haul 05. This station is positioned close to the shallowest area of the STR (Figure 3.9). Below this, temperature and salinity continually decreased to approximately 1000m depth. There were elevated levels of chlorophyll_a at this station, reaching 6 mg/m^3 in the top 200m depth. At the near seabed, temperature varied by approximately 0.5 ^{o}C over a 12hr period.

The surface mixed layer at Haul 06 extended to approximately 200m (Figure 3.10). Temperature and salinity showed continual decrease to approximately 1000m, and possible significant cline in temperature at approximately 600m. Below 1000m depth, water continued to decrease in temperature, but became more saline. Temperature at the seabed was colder and relatively stable compared to Haul 05 over the 12-hour deployment.

The temperature and salinity profiles at Haul 08 were similar to that of Haul 06 (Figure 3.11). Seabed temperature was relatively stable over the deployment period, similar to Haul 07. Fluorescence was relatively low compared to Haul 05, reaching 1.0 mg/m^3 in the top 200m depth layer.

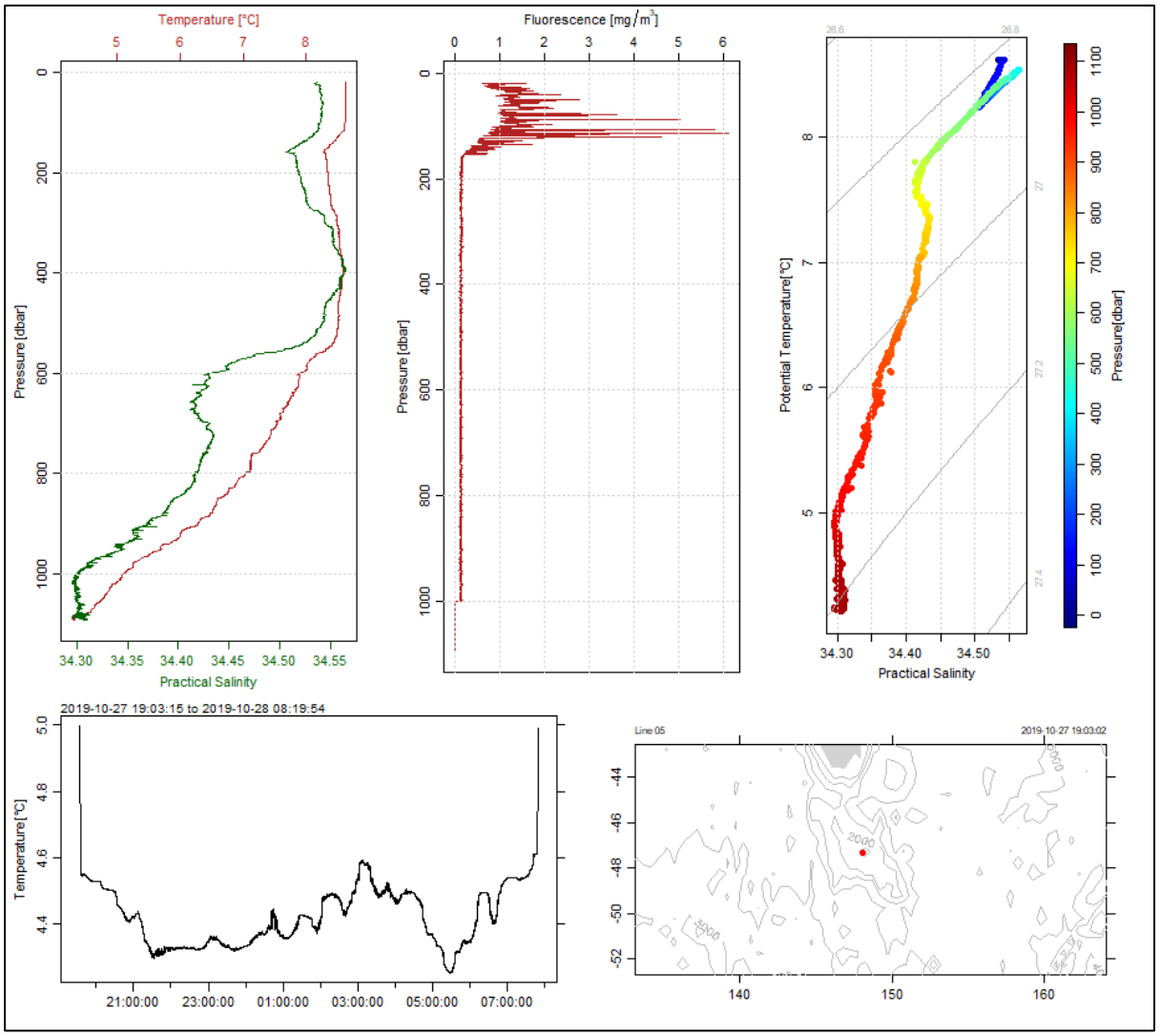


Figure 3.9 Summary or CTD data from Haul 05. Panels show temperature and salinity profile (top left), fluorescence (top middle), T/S density plot with depth colour gradient (top right), temperature at depth over the period of longline deployment (bottom left), and chart of haul location (bottom right).

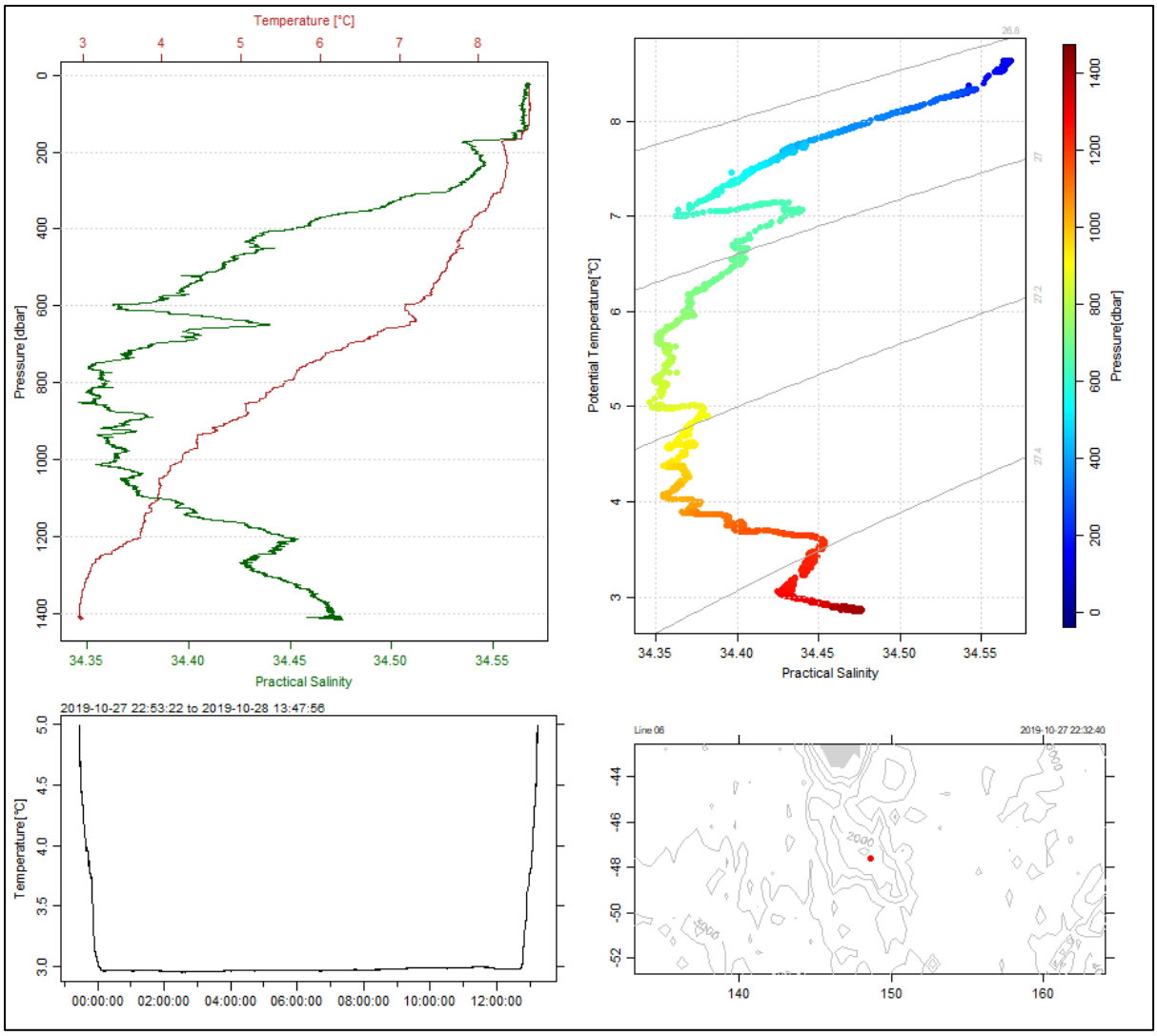


Figure 3.10 Summary or CTD data from Haul 06. Panels show temperature and salinity profile (top left), T/S density plot with depth colour gradient (top right), temperature at depth over the period of longline deployment (bottom left), and chart of haul location (bottom right).

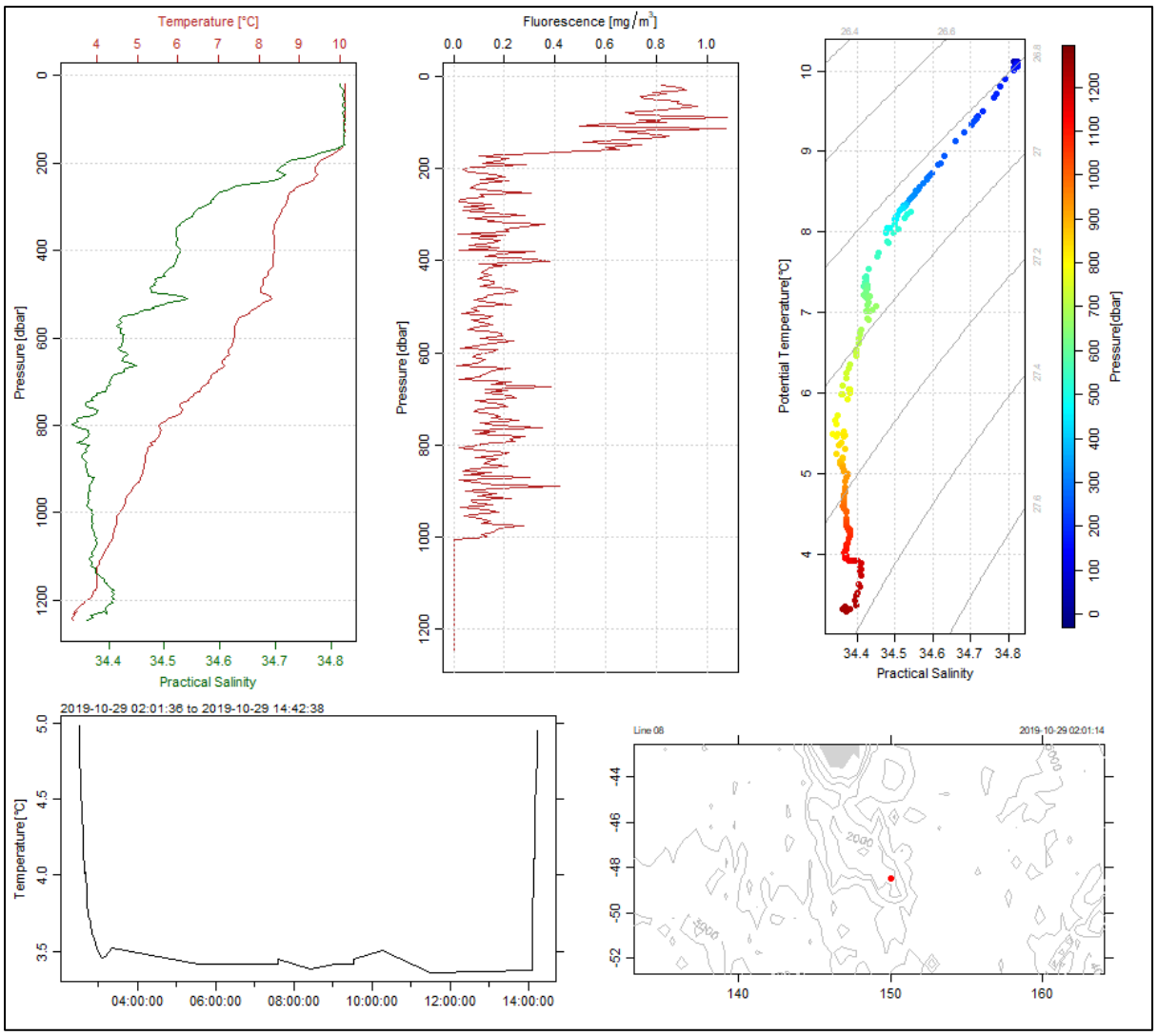


Figure 3.11 Summary or CTD data from Haul 08. Panels show temperature and salinity profile (top left), fluorescence (top middle), T/S density plot with depth colour gradient (top right), temperature at depth over the period of longline deployment (bottom left), and chart of haul location (bottom right).

4. Discussion

No Patagonian toothfish were caught on the South Tasman Rise exploratory research area, suggesting that no further attention should be given to toothfish-targeted deep-set longline activity in this area.

The proposed exploratory survey provisioned for a maximum of 20 longline sets per research block, totalling a maximum of 100 sets. Only 8 hauls were achieved at the end of the program due to the triggering of the move-on rule at each haul. Despite the low level of effort, the program achieved a number of research goals, documenting at least some biological and environmental information for this poorly studied area of the SPRFMO Convention area. Whilst much of the taxonomic and

biochemical analyses are still underway at the time of writing this report, a number of useful observations can be made that may guide fishing operations in the STR in the future.

By-caught species indicate that the risk to potential by-catch species may occur primarily at the seabed. Although only 8 lines were set, no pelagic species were caught. The assessment of potentially 'high' risk to Portuguese dogfish presented in COMM7-Prop 14.1 was justified as these were caught in largest numbers, particularly in the north of the STR where the size range of Portuguese dogfish caught (34cm – 118cm).

Figure 3.5 indicated a high catchability and broad selectivity in this species. A relatively wide size range of Brown lantern sharks were also caught (27cm – 78 cm) (Figure 3.4). Other shark species were caught in too few numbers to make any assessment on catchability / selectivity. These data can inform future deep-set longline proposals for the STR, where move on-rules and specific mitigations for these species should be considered.

No seabird, reptile, or mammal interactions with fishing activity were observed (including bird strike). This may vary depending on time of year. For example, this research program was carried out when Elephant seals are primarily ashore (Van den Hoff et al 2017). Future fishing initiatives on the STR should consider constraining fishing periods this time of year as a potentially useful mitigation strategy.

CTD profiles indicate general agreement with assessments made by Herraiz-Borreguero and Rintoul (2011) for the southern Tasmania region including the STR. Of note is the variability in seabed temperature observed in the northern STR (Figure 3.9). This would suggest a degree of turbulent flow and/or upwellings at temporal scales of minutes-hours in duration. Such knowledge could help inform and fine-scale for example, VME habitat predictive modelling studies where physical drivers my show high levels of variability over short spatio-temporal scales.

Camera deployments were limited to only two hauls on the STR due to technical and logistical constraints. However, the imagery indicates some behavioural information that will be useful for informing future fishing activities on the STR as well as providing some seabed habitat information.

A number of subsamples were collected in the laboratory that are subject to ongoing analyses; these are summarised in Table 4.1. Results of analyses will be made available to the Commission in due course.

Table 4.1 Summary of samples, analyses and storage related institutions that are in progress.

Sample type	Taxa	Number	Location	Contact	Email
Taxonomy	Inverts	13	Museums Victoria	Melanie Mackenzie	mmackenzie@museum.vic.gov.au
Taxonomy	Skate	1	Museums Victoria	Martin Gomon	mgomon@museum.vic.gov.au
DNA	Inverts	13	Museums Victoria	Melanie Mackenzie	mmackenzie@museum.vic.gov.au
DNA	Fish/sharks	14	Museums Victoria	Martin Gomon	mgomon@museum.vic.gov.au
Stomachs	Fish/sharks	14	Falkland Islands Fisheries Dept	Haseeb Randhawa	HRandhawa@fisheries.gov.fk
Parasites	Fish/sharks	14	Falkland Islands Fisheries Dept	Haseeb Randhawa	HRandhawa@fisheries.gov.fk
Otoliths	Fish	2	Falkland Islands Fisheries Dept	Brendon Lee	BLee@fisheries.gov.fk
CTD		4	SAERI IMS-GIS Centre	Data manager	datamanager@saeri.org
Video		2	SAERI IMS-GIS Centre	Data manager	datamanager@saeri.org

References

CCAMLR Fishing Gear Library (https://www.ccamlr.org/en/publications/fishing-gear-library), specifically WG-FSA-11/53.

CCAMLR (2009) VME Taxa Classification Guide. 4 pp.

Clark MR, Vinnichenko VI, Gordon JDM, Beck-Bulat GZ, Kukharev NN & Kakora AF (2007) Large-scale distant-water trawl fisheries on seamounts. Chapter 17. In Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R., Haggan, N. & Santos, R.S. (eds). Seamounts: ecology, fisheries and conservation. Fish and Aquatic Resources Series 12. Oxford, United Kingdom, Blackwell.

Herraiz-Borreguero L, Rintoul SR (2011) Regional circulation and its impact on upper ocean variability south of Tasmania. Deep-Sea Research II 58. 2071-2081

Hill PJ, Moore AMG (2001) Geological framework of the South Tasman Rise and East Tasman Plateau. Geoscience Australia, Record 2001/40

R Core Team (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Van den Hoff J, Kilpatrick R, Welsford Dl (2017) Southern elephant seals (*Mirounga leonina* Linn.) depredate toothfish longlines in the midnight zone. PLoS ONE 12(2): e0172396. doi:10.1371/journal.pone.0172396

6. Appendix

6.1. Detailed station (haul) data

Line Setting data (translated from original Spanish)

Haul	Setting start time (UTC) (dd/mm/yyyy hh:mm)	Setting end time (UTC) (dd/mm/yyyy hh:mm)	*Setting Start*				*Setting End*				Number of hooks set	Number of baskets	Number of hours observed	Deck lighting	Number of tori lines used	Fish discarding during setting
			Lat Deg (-DD)	Lat min (MM.mm)	Lon Deg (DDD)	Long min (MM.mm)	Lat Deg (-DD)	Lat min (MM.mm)	Lon Deg (DDD)	Long min (MM.mm)						
1	26/10/2019 05:45	26/10/2019 06:20	-47	22.77	146	58.46	-47	19.4	147	2.37	4977	79	0.8	Off	2	No
2	26/10/2019 06:30	26/10/2019 07:00	-47	19.1	147	2.77	-47	16.11	147	7.1	4977	79	0.5	Off	2	No
3	26/10/2019 15:10	26/10/2019 15:40	-47	23.35	147	19.73	-47	20.13	147	24.14	4977	79	0	unknown	2	No
4	26/10/2019 15:50	26/10/2019 16:25	-47	19.68	147	24.73	-47	16.1	147	28.63	4977	79	0	unknown	2	No
5	27/10/2019 18:50	27/10/2019 19:40	-47	19.97	148	5.63	-47	20	148	13.29	4977	79	0.5	Off	2	No
6	27/10/2019 22:00	27/10/2019 22:45	-47	37	148	37.79	-47	40.97	148	40.7	4977	79	0.8	Off	2	No
7	28/10/2019 23:10	29/10/2019 00:00	-48	30.5	149	36.85	-48	35.18	149	38.74	4977	79	0.3	Off	2	No
8	29/10/2019 01:50	29/10/2019 02:35	-48	27.58	150	1.63	-48	31.75	150	5.54	4977	79	0.3	Off	2	No

Line Hauling data (translated from original Spanish)

Haul	Hauling start time (UTC) (dd/mm/yyyy hh:mm)	Hauling end time (UTC) (dd/mm/yyyy hh:mm)	*Hauling Start*				*Hailing End*				Bird scaring device used during hauling	Discarding during hauling	Number of hooks observed during hauling	Comments
			Lat Deg (-DD)	Lat min (MM.mm)	Lon Deg (DDD)	Long min (MM.mm)	Lat Deg (-DD)	Lat min (MM.mm)	Lon Deg (DDD)	Long min (MM.mm)				
1	26/10/2019 21:47	27/10/2019 02:10	-47	19.74	147	1.94	-47	22.22	146	59.26	Yes	No	1866	South Tasman Rise_Block A
2	26/10/2019 18:30	26/10/2019 21:25	-47	16.4	147	6.86	-47	19.39	147	2.3	Yes	No	2488	South Tasman Rise_Block A
3	27/10/2019 11:15	27/10/2019 15:50	-47	20.41	147	24.76	-47	23.63	147	20.97	Yes	No	2488	South Tasman Rise_Block A
4	27/10/2019 06:20	27/10/2019 11:00	-47	16.78	147	28.74	-47	19.97	147	25.28	Yes	No	2488	South Tasman Rise_Block A
5	28/10/2019 03:00	28/10/2019 08:05	-47	19.93	148	12.82	-47	20.03	148	6.78	Yes	No	2488	CTD-South Tasman Rise_Block B
6	28/10/2019 11:25	28/10/2019 16:30	-47	40.49	148	40.54	-47	37.81	148	38.52	Yes	No	1866	CTD+CAMARA-South Tasman Rise_Block C
7	29/10/2019 07:00	29/10/2019 12:37	-48	35.18	149	37.99	-48	33.22	149	36.27	Yes	No	2488	CTD+CAMARA-South Tasman Rise_Block D
8	29/10/2019 14:35	29/10/2019 20:20	-48	32.13	150	4.17	-48	28.74	150	0.94	Yes	No	2488	CTD-South Tasman Rise_Block E

6.2. Example images of species caught on the STR

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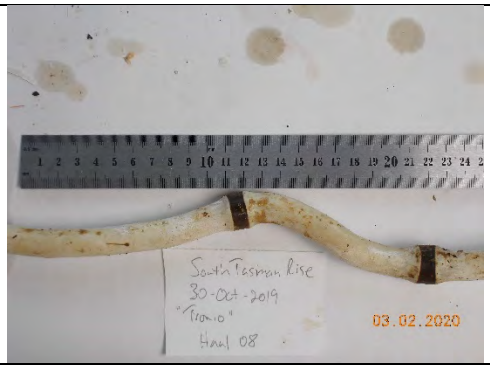
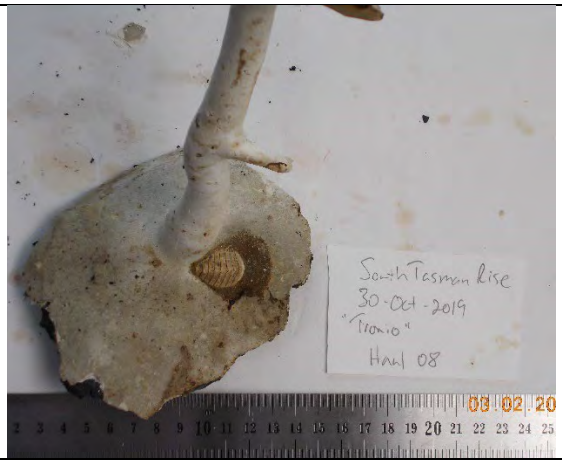
<tr><td>  </td><td>  </td></tr>
<tr><td>Chrysogorgiidae (GGW)</td><td>Isididae (GGW)</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Pennatulacea (NTW)</td><td>Ophiuroids</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Stony coral (AXT) with attached barnacles (Bathylasmatidae – BWY)</td><td>Chiton on bamboo coral base</td></tr>
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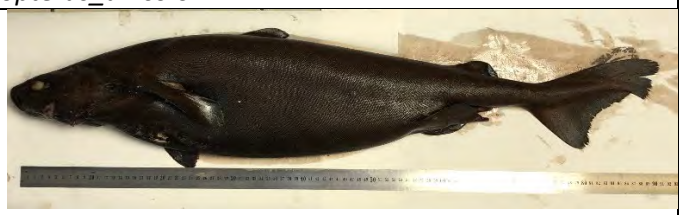
Diastobranchus capensis


Etmopterus_unicolor

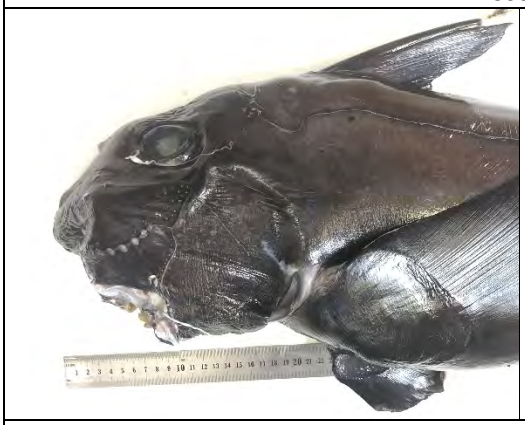



Centroscymnus coelolepis


Centroscymnus owstonii

Deania calcea

Proscymnodon plunketi



Hydrolagus homonycteris

Amblyraja hyperborea

Trachyrincus cf *longirostris*

Macrourus holotrachys

6.3. Archipelago CCTV system - Vessel Installation Details