Cruise report:
Irish Anglerfish & Megrim Survey 2023

CE23003 and CE23006

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Cláir Chistí Eorpacha Struchtúrtha agus Infheistíochta na hÉireann 2014–2020

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Introduction

The 2023 Irish Anglerfish and Megrim Survey (IAMS) took place from 11th February to 7th March in ICES (International Council Exploration of the Sea) Divisions 7.b-c and 7.j-k, and 14th to 23rd April in ICES Division 6.a on-board the Research Vessel *Celtic Explorer*. The main objective of the survey was to obtain biomass and abundance indices for anglerfish (*Lophius piscatorius* and *Lophius budegassa*) and megrim (*Lepidorhombus whiffiagonis* and *Lepidorhombus boscii*) in ICES Division 6.a (south of 58°N) and Subarea 7 (west of 8°W). Secondary objectives were to collect data on the distribution, relative abundance and biology of other commercially exploited species.

For the fifth year, additional sampling took place in deep water (up to 1,500m) in order to monitor the recovery of exploited deep-water species following the decline of the deep-water fisheries in Irish waters since early 2000s (Kelly and Gerritsen, 2022). This work was funded under Marine Biodiversity Schemes of the European Maritime and Fisheries Fund (EMFF) from 2019 to 2021 and European Maritime, Fisheries and Aquaculture Fund (EMFAF) since 2022.

The IAMS survey is coordinated with the Scottish Anglerfish and Megrim Survey (SIAMISS) as part of ICES International Bottom Trawl Survey Working Group (IBTSWG) and uses the same gear and fishing practices.

Methods

Stratification

The stratification is based on the following considerations:

- Depth: 0-200m; 200-500m; and 500-1,000m.
- Clearly defined fishing grounds (from VMS-logbook data: Gerritsen and Lordan, 2011; Gerritsen *et al*., 2012) were identified as separate strata; an area with high fishing intensity surrounded by low fishing intensity signify that the bottom type and ecology on the fishing ground is different from that of the surrounding area. Examples include the Porcupine, Aran and Labadie *Nephrops* grounds, the Stanton Banks and Stags grounds.
- Catch rates of the target species (anglerfish and megrim) from VMS-logbook data as well as IBTS and previous Anglerfish and Megrim surveys were also taken into account in determining the boundaries of the strata.
- Rocky bottom types are excluded from the survey area which implies an assumption that the densities of the target species are zero in those areas.
- Regions 6a and 7bcjk are treated separately because they comprise different assessment and TAC areas.
- In addition to the main survey strata, additional deep water transects were added in deep water areas 4 and 5 (north of the Porcupine Bank and West of Donegal).

The density of sampling stations in each stratum was either low, medium (twice the low density) or high (four times the low density). These station densities were assigned to each stratum so that the number of stations in each stratum would be roughly proportional to the expected standard deviation of the biomass estimate in the stratum.

Three small sampling strata with expected low abundance of the target species (Aran and Porcupine *Nephrops* grounds and the area of coarse sediment on the Porcupine Bank) were combined into a single stratum (‘VII_Shelf_L’) for estimation purposes, despite the differences in depth and bottom type. The naming of the strata reflects the region (VIa or VII), area (continental shelf or slope) and density of stations (Low, Medium, High). The final sampling strata and stations are shown in Figure 1.

Station selection

Sampling stations were selected at random in the following way:

1. Add a 30nm buffer around the survey area (to avoid edge effects).
2. Select 10,000 random points within the (buffered) survey area.
3. Identify the pair of points that are closest to each other (nearest neighbour).
4. Remove the point of this pair that is closest to its second-nearest neighbour.
5. Repeat steps 3. and 4. until only one point remains.
6. Rank the stations in each stratum based on the order in which they were removed – giving stations removed last the highest priority – this ensures that regardless of how many stations are selected in a stratum, they will always be distributed approximately evenly (but randomly) in space.

After selecting the random points, suitable tow tracks are identified that go through the random point. Where it was impossible to do so (owing to underwater cables, unsuitable bottom etc.) it was attempted to find a historical tow track that came within 1nm of the selected point.

Covid-19 restrictions on staff numbers which were in place since 2020 were fully removed this year and the only requirement were self-administered antigen tests on the day before sailing and on the day of sailing. This meant that 24-hour fishing operations were possible for all of this year's survey. The target number of stations for ICES Divisions 7.b-c and 7.j-k was set at 65 stations and the target number of stations for ICES Division 6.a was 40 stations. This meant that stations with priority number 1-40 for ICES Division 6.a and 1-65 for ICES Divisions 7.b-c and 7.j-k respectively would be selected to be trawled. In practice it was not possible to sample all of the high priority stations (e.g. in cases where it was impossible to achieve a valid tow) and in this situation these stations can be replaced by the 'spare' stations with priority numbers >40 for ICES Division 6a and >65 for ICES Divisions 7.b-c and 7.j-k respectively. In addition to the regular sampling strata there were also two 'deep water' transects included. These transects were each composed of 5 stations extending from 500-1,500m using the methodology of previous Marine Institute deep water surveys that were carried out between 2005 and 2009 (O'Hea *et al*., 2009).

A Marine Notice to advise seafarers and fishermen about the survey operations was issued for Leg 1 and 2 on 16th January 2023 (https://tinyurl.com/3cmw8enp) and for Leg 3 on 15th March 2023 (https://tinyurl.com/3n4frv82). These documents included a brief description of the survey methods and objectives including a list and map of the locations of the proposed stations.

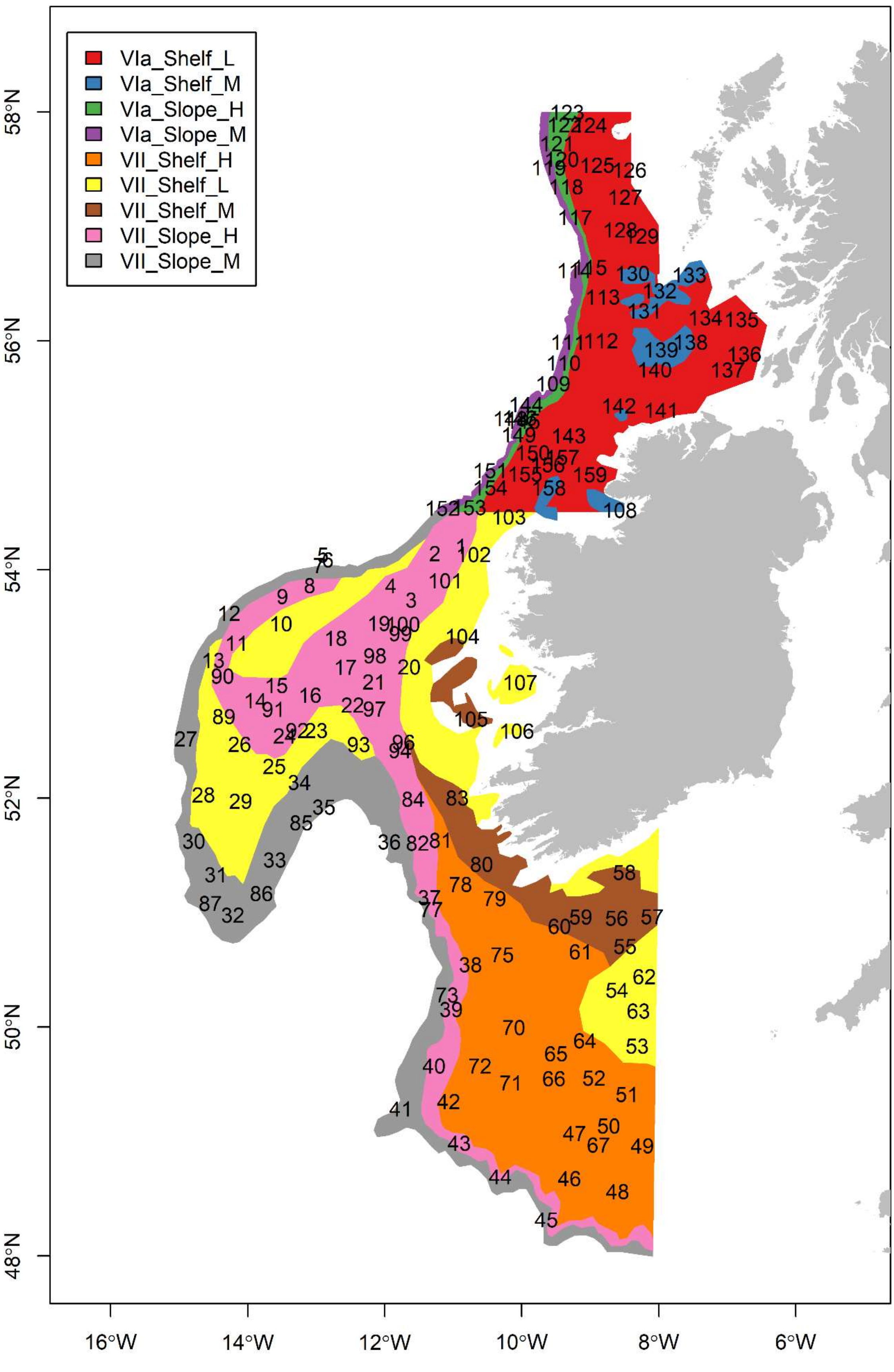

Figure 1*: Valid tow positions (the numbers refer to the haul number).*

Fishing operations

The trawl design is based on a standard commercial otter trawl used in the anglerfish fishery and is described in detail in Reid *et al.* (2007). The mesh size varies from 200mm in the wings gradually reducing to 100mm in the cod-end. The ground gear is fitted with 400mm rock-hopper disks and a 19mm tickler chain is mounted between the wings, rigged to run ahead of the ground gear. The trawl doors used were 5.45m^2 Thyboron Type 16 straight oval doors. The gear was trawled at 3kn for one hour at each station. The warp to depth ratio was 3:1 for depths up to 200m, and 2:1 plus 200m in deeper water. Door spread, wing spread, headline height and bottom contact were monitored using Scanmar and Marport trawl sensors (distance sensors in the doors and wing-ends, headline sensor and a trawl-eye sensor positioned on the top sheet directly over the footrope).

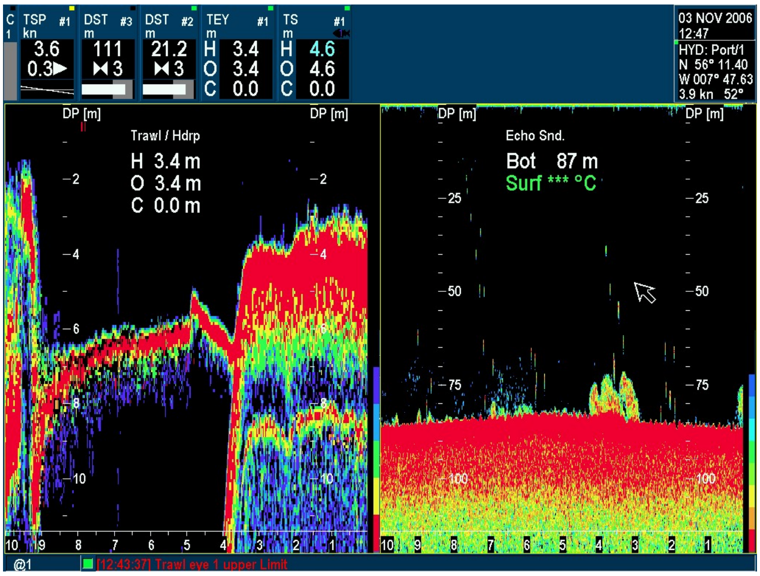

Figure 2: Screengrab of Scanmar display showing trawl geometry, water depth and fish marks

Wet lab protocol

All fish and invertebrate species were sorted and weighed (Table 1). Biological data were collected for the species listed in

Table 2 below. Occurrence of the following vulnerable or sentinel invertebrate species was noted if present: corals, sea pen, fan mussel and ocean quahog.

Table 1: General sampling protocols

Priority	Task
1	Sort and sample Anglerfish and Megrim (For Anglerfish also record the gutted weight).
2	Sort and weigh all fish and squid species, *Nephrops* and rubbish. Sort and enter benthos only for indicator species (corals, sea fans, sea pens, fan mussels, *Arctica islandica*), record weights and count as per Irish Ground Fish Survey. Record unsorted benthos as total weight and comment on main components. Take picture or preserve sample if unsure about ID and record as a comment.
3	Measure fish species listed in Table 2 below.
4	Take biological samples for the demersal listed in the Table 2 below.
Note: If it is not possible to complete all the work, drop tasks in reverse order as listed above. Never record sample weights for a few species; record all or just Anglerfish and Megrim. On invalid hauls it is still possible to collect biological data.	

Table 2: Detailed sampling protocols by species

	Species	Sort by sex	OTO box	Catch weight	Can you subsample	Bio target	Live weight	Sex	Mat	Age	Gutted weight
Aged demersal species	COD	U	100-149	yes	yes	1pcm	yes	yes	yes	yes	**yes**
	HAD	U	150-249	yes	yes	100%	yes	yes	yes	yes	no
	LIN	U	250-299	yes	yes	1pcm	yes	yes	yes	yes	no
	MEG	F/M	300-364 / 365-399	yes	**Preferably not**	1pcm	yes	yes	yes	yes	no
	MON*	U	MONU	yes	**never**	100%	yes	yes	yes	6a†	**Yes**
	WAF*	U	WAFU	yes	**never**	100%	yes	yes	yes	6a†	**Yes**
	PLE	F/M	600-649 / 650-699	yes	yes	1pcm	yes	yes	yes	yes	no
	POK	U	700-749	yes	yes	1pcm	yes	yes	yes	yes	no
	POL	U	750-799	yes	yes	1pcm	yes	yes	yes	yes	no
	SOL	F/M	800-849 / 850-899	yes	yes	1pcm	yes	yes	yes	yes	no
	WHG	U	900-989	yes	yes	100%	yes	yes	yes	yes	no
Biological teleo	BLL	U	BLLU	yes	yes	1pcm	yes	yes	yes	no	no
	HKE	U	HKEU	yes	yes	1pcm	yes	yes	yes	no	no
	JOD	U	JODU	yes	yes	1pcm	yes	yes	yes	no	no
	LBI	U	LBIU	yes	yes	1pcm	yes	yes	yes	no	no
	LEM	F/M	LEMF/LEMM	yes	yes	1pcm	yes	yes	yes	no	no
	TUR	U	TURU	yes	yes	1pcm	yes	yes	yes	no	no
	WIT	U	WITU	yes	yes	1pcm	yes	yes	yes	no	no
Bio elasmo	BLR	F/M	BLRF/BLRM	yes	yes	1pcm	yes	yes	yes**	no	no
	CUR	F/M	CURF/CURM	yes	yes	1pcm	yes	yes	yes**	no	no
	DGS	F/M	DGSF/DGSM	yes	yes	1pcm	yes	yes	yes**	no	no
	SMH	F/M	SMDF/SMDM	yes	yes	1pcm	yes	yes	yes**	no	no
	DGN	F/M	SYTF/SYTM	yes	yes	1pcm	yes	yes	yes**	no	no
	BSH	F/M	BSHF/BSHM	yes	yes	1pcm	yes	yes	yes**	no	no
	GAG	F/M	GAGF/GAGM	yes	yes	1pcm	yes	yes	yes**	no	no
	DFL	F/M	DFLF/DFLM	yes	yes	1pcm	yes	yes	yes**	no	no
	DII	F/M	DIIF/DIIM	yes	yes	1pcm	yes	yes	yes**	no	no
	SDR	F/M	SDRF/SDRM	yes	yes	1pcm	yes	yes	yes**	no	no
	THR	F/M	THRF/THRM	yes	yes	1pcm	yes	yes	yes**	no	no
Others	NEP	U	-	yes	nemesys	nemesys	nemesys	nemesys		no	no
	Most other demersal fish species***			yes	Yes	Measured-only, no need to sort by sex					
	All pelagic fish species, squid; common Demersals ***			yes	No length or biological samples.						
	Invertebrates: Corals, sea fans, sea pens, fan mussels, *Arctica islandica*			Count & weight. If unsure about ID, take pic or freeze with haul label. For coral and *A. islandica* include comment on whether dead or alive.							
	Other invertebrates			Total weight in comment field.							
	Rubbish			As IGFS							
	CTD			As IGFS							

Key

Sex	F/M: record catch weight by sex (flatfish and elasmobranchs); U: do not sort by sex.
Spp#	use number allocated by Spp/Sex when prompted for otolith box. We use otolith process to ensure we get the maturity QC plots.
subsample	these species can be subsampled for length and biological data, if necessary.
1pcm	biological sampling target of one fish per cm size class (otolith target 1).
100%	biological sampling target set per length group, i.e. targets vary by size class (otolith target 100%).

*
- Monk <20cm that are not clearly black should be identified using dorsal fin ray counts: WAF 9-10; MON 11-12.
- Cut illicia to around 1cm so they fit flat in the otolith box and clean them so they don’t stick to the tissue.
- When taking gutted weight, also remove the liver.
- Collect otoliths for MON and WAF in ICES Division 6.a.

** Only determine the maturity of female elasmobranchs if they are already dead, otherwise record as stage 9.

*** Do measure:
- All deep water species.
- Large gadoids like ling, blue ling tusk.
- All elasmobranchs except LSD.
- Any demersal species that is not very common.

Don’t measure:
- Any pelagic species (including Boarfish, Blue-mouth, Argentines).
- Squid, octopus etc.
- Lesser Spotted Dogfish (no need to record weight by sex either).
- Any flatfish not listed in the biological sampling table above.
- Common demersal species of no or limited commercial value like Gurnards, Pout, Poor Cod, Dragonets.

Data collection and storage

Station positions, heading and bottom depth were recorded at the moment the gear settled on the bottom and when the gear lifts off on haul-back. Tide and wind direction and speed, barometric pressure, pitch and roll were recorded at the mid-point in the tow. The median values of the door spread, wing spread and headline height were recorded at the end of the tow. The CEFAS software FSS (Fishing Survey System) was used to enter station data and import catch data. These data are stored in a SQL database (FSS_SURVEY) on a local server. The gear sensor data as well as bottom depth and GPS position were also recorded in a SQL database (FSS_NMEA) at intervals of approximately one per second.

Catch weights, length frequency distributions and biological data were captured using the EFDAQ (Electronic Fisheries Data Acquisition) system and stored into a local database in wet laboratory before being imported into the central SQL database (FSS_SURVEY).

Estimation

Catchability corrections for the two anglerfish species were applied following the methods described by the ICES working group WKAGME (2009). The equations were re-written to express the estimates in terms of capture probabilities (see also Yuan, 2012).
Footrope selectivity at length l, ($\hat{e}_{1l}$) was estimated using a 3-parameter logistic model:

$$\hat{e}_{1l} = \frac{1}{1 + \exp(-\beta_0 - \beta_1(l - \beta_2))}$$

$\beta_0 = 0.82257$, $\beta_1 = 0.11386$ and $\beta_2 = 35.5$

A herding coefficient ($\hat{h} = 0.017$) was applied to estimate herding in the area between the doors and wings (sweeps). The herding selectivity ($\hat{e}_{2li}$) was estimated as follows:

$$\hat{e}_{2li} = \frac{v_{1i} + \hat{h} v_{2i}}{v_{1i} + v_{2i}}$$

v_{1i} is the area swept by the footrope on tow i.
v_{2i} is the area covered by the sweeps on tow i.

The capture probability for a fish at length l in tow i in stratum s, (p_{lis}) is then given as:

$$p_{lis} = \hat{e}_{1l}\, \hat{e}_{2li} \frac{(v_{1i} + v_{2i})\, I_s}{A_s}$$

I_s is the number of hauls in stratum s.
A_s is the surface area of stratum s.

For megrim, no catchability correction is applied, so the capture probability is simply:

$$p_{is} = \frac{v_i\, I_s}{A_s}$$

The estimated number of fish ($\hat{N}$) or biomass (B) in the survey area are then:

$$\hat{N} = \sum\nolimits_{i \in I} \frac{n_i}{p_{lis}} \qquad \hat{B} = \sum\nolimits_{i \in I} \frac{n_i w_i}{p_{lis}}$$

n_l is the catch numbers-at-length in tow i
$\mathrm{w_l}$ is the mean weight-at-length, obtained from the length-weight relationship for the whole survey.

Changes in survey methodology

During the 2016 survey:

- The tickler chain was fitted with a weak link that broke regularly. It was replaced with a G13 connector (not-so-weak link) at the end of the first leg.

Before the 2017 survey:

- The tickler chain was shortened so it is ~3m ahead of the footrope (Previously it was ~1.5-2m ahead of the footrope).
- The doors were modified by fitting a new top-end in order to increase their surface area from 5.25m^2 to approx. 5.45m^2 resulting in an additional 6% spreading power (estimated by supplier). This resulted in 4-5m extra door spread.
- The head rope was replaced and the floats were tidied up (tied on tighter and more regularly spaced). This resulted in an additional 60cm headline height, on average.
- The netting at the tips of the wings was replaced with stronger netting to avoid damage when it is pulled onto the drum on top of the floats.
- This was the first year a CTD was mounted on one of the trawl doors.

During the 2017 survey:

- The cod end was replaced after the ICES Division 7.b-c and 7.j-k part of the survey was completed (Legs 1 and 2) but before the ICES Division 6.a part of the survey took place.

Before the 2018 survey:

- 1.2m length of chain added to the headline bridles. This chain was part of the design of the gear but was omitted from the gear plans. Fitting the chains resulted in an increase in the headline height of round 75cm and an increase in door spread of around 5m compared to 2017. There were no indications that fitting the chains changed the bottom contact or the amount of digging-in of the ground gear.

Before the 2019 survey:

- Additional deep water transects (500-1,500m) were added to survey protocols (3 additional days have been added to legs 1 and 2 to facilitate this work).
- In the middle of the Porcupine Bank there is some very soft ground. This may cause the gear to dig in (you see the door sensors getting unstable), reduce the warp to lift the gear a bit more. If this doesn’t work, increase the speed a bit, e.g. up to 3.4-3.5 knots. (Soft ground can be quite dangerous if trawl belly fills up with mud!).
- The duration of leg 3 (6a) has been reduced due to over-sampling relative to the Marine Scotland effort; the target has been reduced from 50 to 40 stations.
- In case of extreme work pressure, there is an option to only process target species (MON, WAF, MEG; no catch weights or samples for other species). These stations will be flagged with validity code ‘T’ (This did not occur during IAMS 2019).
- There had been some inconsistency in recording the end of the tow in the past. Some chief scientists recorded the end of the tow as the time when the gear is being hauled back, others as the time the gear lifts off the ground. It will be necessary to analyse the sensor data and apply corrections to the historic data in terms of tow length. From 2019 onwards, the end of the tow is being recorded as the time at lift-off.

Before the 2020 survey:

- Operational working hours on Leg III were reduced from 24 to 12 hours due to comply with Covid-19 restrictions. Staffing levels and targets were reduced proportionally.

Before the 2021 survey:

- Additional Marine Scotland stations in 6a (North of 58°) were added to survey plan.
- EFDAQ (Electronic Fisheries Data Acquisition) system used in wet lab (replaced the CEFAS EDC system)

Before the 2022 survey

- Operation working hours on Leg III were increased from 12 to 24 hours due to the lifting of Covid-19 restrictions on shared accommodation on-board the Celtic Explorer. Staffing levels and station target numbers were increased proportionally.

Before the 2023 survey

- Operation working hours on all Legs were increased from 12 to 24 hours due to the lifting of Covid-19 restrictions on shared accommodation on-board the Celtic Explorer. Staffing levels and station target numbers were increased proportionally.

Results

Cruise summary

Weather was occasionally challenging on Leg I (11-23rd February) and at the start of Leg II (23rd February to 7th March) although fishing operations were maintained throughout this period with no days lost. There was bad damage to the net on 25th February when the trawl stopped suddenly and the starboard wire broke and starboard wing sensor was lost. This damage was repaired at sea but it took 24 hours to complete. On the 28th February it was decided to drop a crew member back to Castletownbere as he had fallen on the deck and sustained a chest injury. This required 12 hours of downtime. Weather conditions were very good for Leg III (14-23rd April) and no days were lost. Only 4 hours of downtime were required at the start of Leg III to calibrate the ship's compass. A total of 40 hours downtime was recorded during the three legs (Table 3).

During IAMS 2023 a total of 152 valid tows were completed (out of a target of 115), including 5 additional deep water tows (Table 4). There were 7 invalid hauls (68, 69, 74, 76, 88, 95 and 116). Haul 68 and 116 were invalid due to gear damage whereas hauls 69, 74, 76 and 95 were either too large to bring on-board or hauled <30 minutes to avoid large fish marks on sounder. Haul 88 was hauled early due to gear coming fast on soft ground. Summary statistics by stratum for four main target species are provided in Table 5 (Note: Deep water stations are outside IAMS depth range and not included in this table).

Downtime

Table 3: Details of downtime during survey (Weather, technical and/or gear damage)

Date	Hours downtime	Reason
25/2/23	24	Net mending
28/2/23	12	Crewman to shore
6/3/23	4	Calibrate compass
Total	40 hours (1.7 days)	

Summary statistics

Table 4: Target and achieved stations by stratum

Stratum	Target	Valid	Invalid
DeepArea4	5	2	0
DeepArea5	5	3	0
VIa_Shelf_L	14	21	0
VIa_Shelf_M	7	8	0
VIa_Slope_H	10	11	0
VIa_Slope_M	9	9	1
VII_Porc_L	4	5	1
VII_Shelf_H	16	21	3
VII_Shelf_L	7	10	1
VII_Shelf_M	5	9	0
VII_Slope_H	22	34	1
VII_Slope_L	2	4	0
VII_Slope_M	9	15	0
Total	115	152	7

Table 5: Summary statistics by stratum. Stratum area is given in Km², 'Num hauls' is the is the number of valid hauls in each stratum and 'Swept Area' is the total area swept between the doors in each stratum (in Km²), catch numbers ('Catch Num') are given for *L. piscatorius* (Mon), *L. budegassa* (Waf), *L. whiffiagonis* (Meg) and *L. whiffiagonis* (Lbi).

Stratum	Stratum Area	Num Hauls	Swept Area	Catch Num Mon	Catch Num Waf	Catch Num Meg	Catch Num Lbi
VIa_Shelf_L	37,003	21	9.31	212	44	155	0
VIa_Shelf_M	4,746	8	3.87	105	58	105	0
VIa_Slope_H	3,114	11	5.45	142	137	326	12
VIa_Slope_M	3,044	9	5.19	258	0	11	4
VII_Shelf_H	50,764	21	11.21	75	316	517	66
VII_Shelf_L	42,034	19	9.85	111	112	215	160
VII_Shelf_M	14,621	9	3.91	32	69	137	2
VII_Slope_H	35,768	34	18.15	234	410	691	229
VII_Slope_M	29,406	15	8.95	120	1	14	21

Abundance and Biomass estimates

Estimated numbers and biomass for the survey area are given in Table 6. Note that it is likely that the selectivity correction does not account for all the fish encountered by the gear; therefore, these estimates should not be treated as absolute.

Table 6: Estimated numbers (millions; NumMln) and biomass (kilotonnes; BiomKT) in the survey area, with CV (relative standard error) and 95% confidence intervals (low: CiLo and high: CiHi). Only fish >500g live weight (approximately 32cm) were included in the estimate.

	VIa MON	VII MON	VIa WAF	VII WAF
NumMln	5.370	8.080	1.571	17.793
NumCV	19.189	12.237	23.642	10.760
NumCILo	3.350	6.142	0.843	14.040
NumCIHi	7.389	10.018	2.298	21.546
BiomKT	6.084	20.923	1.229	12.540
BiomCV	19.334	9.136	24.517	7.440
BiomCILo	3.779	17.176	0.638	10.711
BiomCIHi	8.390	24.670	1.820	14.368

Gear and fishing details

Figure 3 gives details of fishing net geometry of valid tows: distance towed, depth / warp length, warp length / door spread and door spread / wing spread. These show expected distributions and ranges.

Catch

The length-weight relationships for *L. piscatorius* and *L. budegessa* over the course of the survey can be seen in Figure 4 and these did not deviate from expectations. Catch weights of *L. piscatorius* and *L. budegessa* at each station across the survey area are shown as bubble plots on the left hand side of

Figure 5 and Figure 6. The right hand side of these figures also include the size distributions by assessment area and stratum. The density of each species by stratum are displayed in Figure 7. *L. piscatorius* (upper left plot) showed highest densities (kg/km^2) in the 'VIa Slope M' stratum and lower densities in the 'VII Shelf H' and 'VII Shelf L' strata. *L. budegessa* (upper right plot) showed highest densities on 'VIa Slope H' and lower densities on 'VIa Shelf L' and 'VII Slope M' and were absent on the 'VIa Slope M' stratum. The lower plots Figure 7 show the standard error associated with the biomass estimates. The values at the base of each column are the total number of stations in each stratum and should be proportional to the expected standard deviation of the biomass estimate in the stratum. However, the survey effort has to be balanced between the two species so this is not always the case. The relative influence each of the stations had on the final density estimate can be seen in Figure 8 and it was generally equitable (i.e. no single tow had a disproportionally large influence on the biomass estimates).

The trends in catch weights per swept area (Kg/Km^2) for anglerfish (*L. piscatorius*, *L. budegassa*) and megrim (*L. whiffiagonis*) from IAMS 2016 to 2023 are shown in Figure 9. For the anglerfish, the footrope and sweep selectivity were estimated as outlined in the Methods section. For megrim, no selectivity figures are available and 100% footrope selectivity and 0% sweep selectivity were assumed. Catch rates for white anglerfish (*L. piscatorius*) in ICES Divisions 7.b-c and 7.j-k peaked in 2017 and declined from 2018 to 2021 although they have been increasing moderately since then. Catch rates of black anglerfish (*L. budegassa*) had also been gradually declining in this area from 2016 to 2020 but the values in 2022 and 2023 are the highest in the time series. Catch rates for megrim (*L. whiffiagonis*) in ICES Divisions 7.b-c and 7.j-k had been declining since 2016, but 2022 and 2023 have been above average. In ICES Division 6.a the catch rates of both white and black anglerfish had been declining since 2017 but 2023 was a substantial improvement. In ICES Division 6.a Megrim catch rates have been more or less flat. It is important to note that for all three species the variability between years is within the uncertainty bounds.

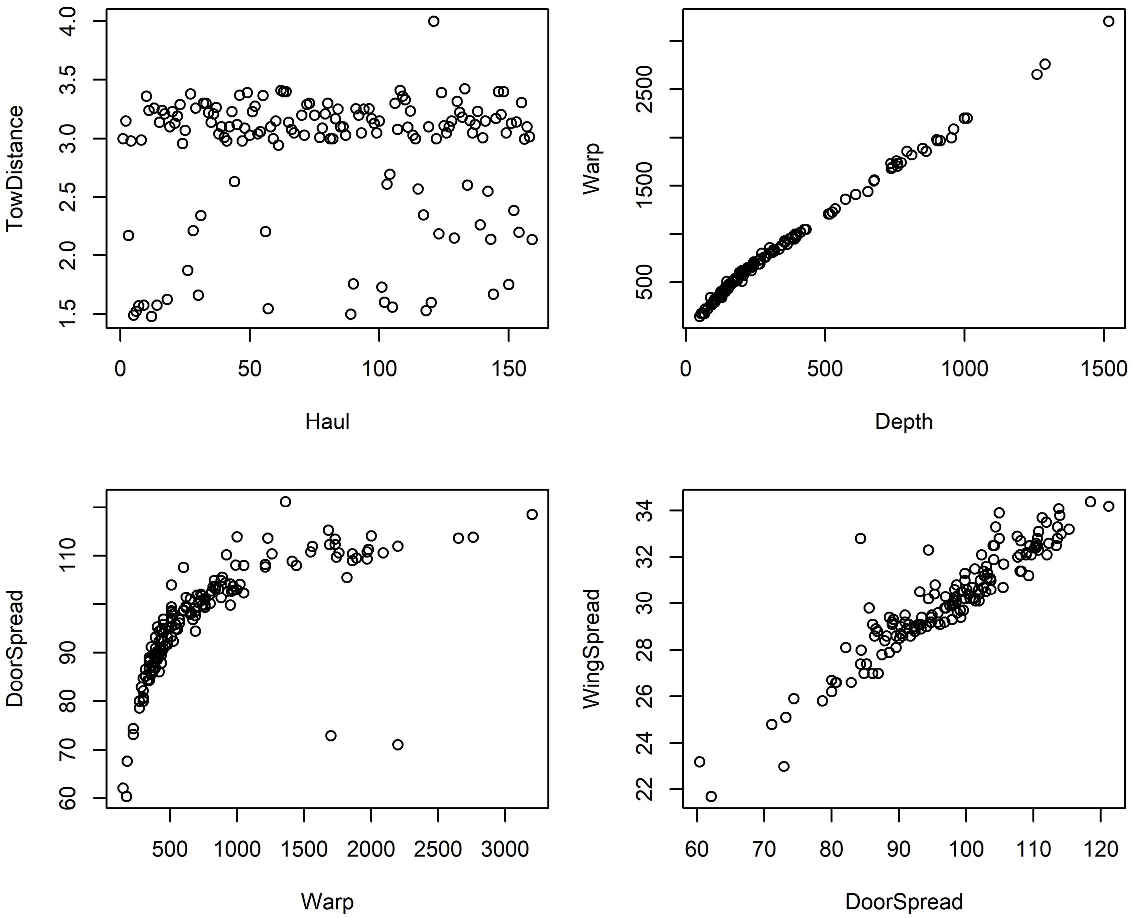

Figure 3: Gear parameters for the valid hauls. Haul is the station number;

Tow Distance in nautical miles; Warp, Depth, Door Spread and Wing Spread in meters

Note: Door spread on stations 7 and 119 (bottom left plot) was less than expected due to soft ground

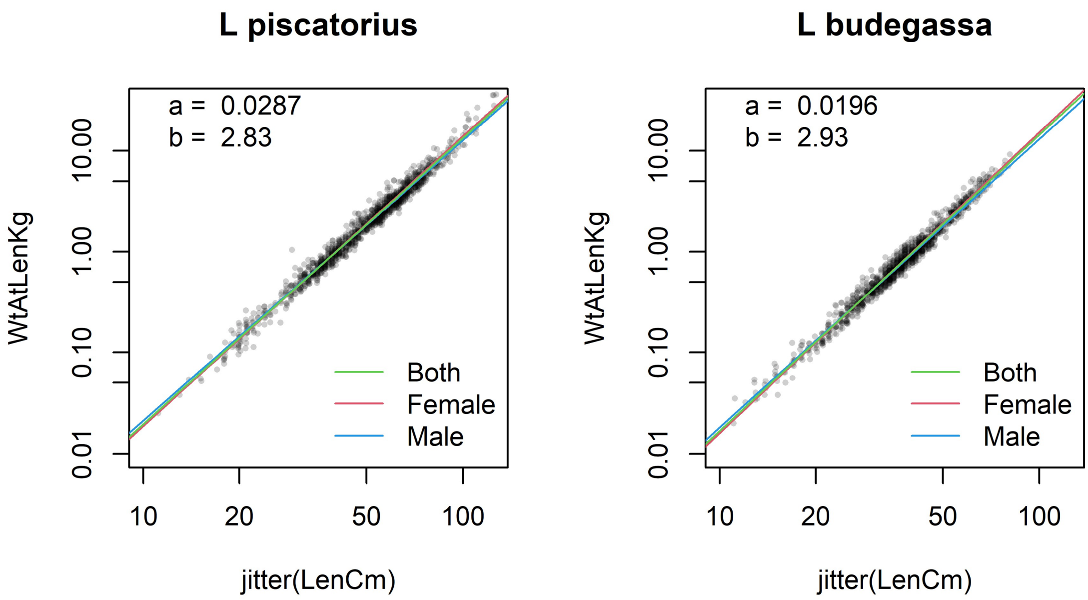

Figure 4: ***Length-weight parameters. Total length in cm and live weight in kg.***

Note: data are presented on the log scale.

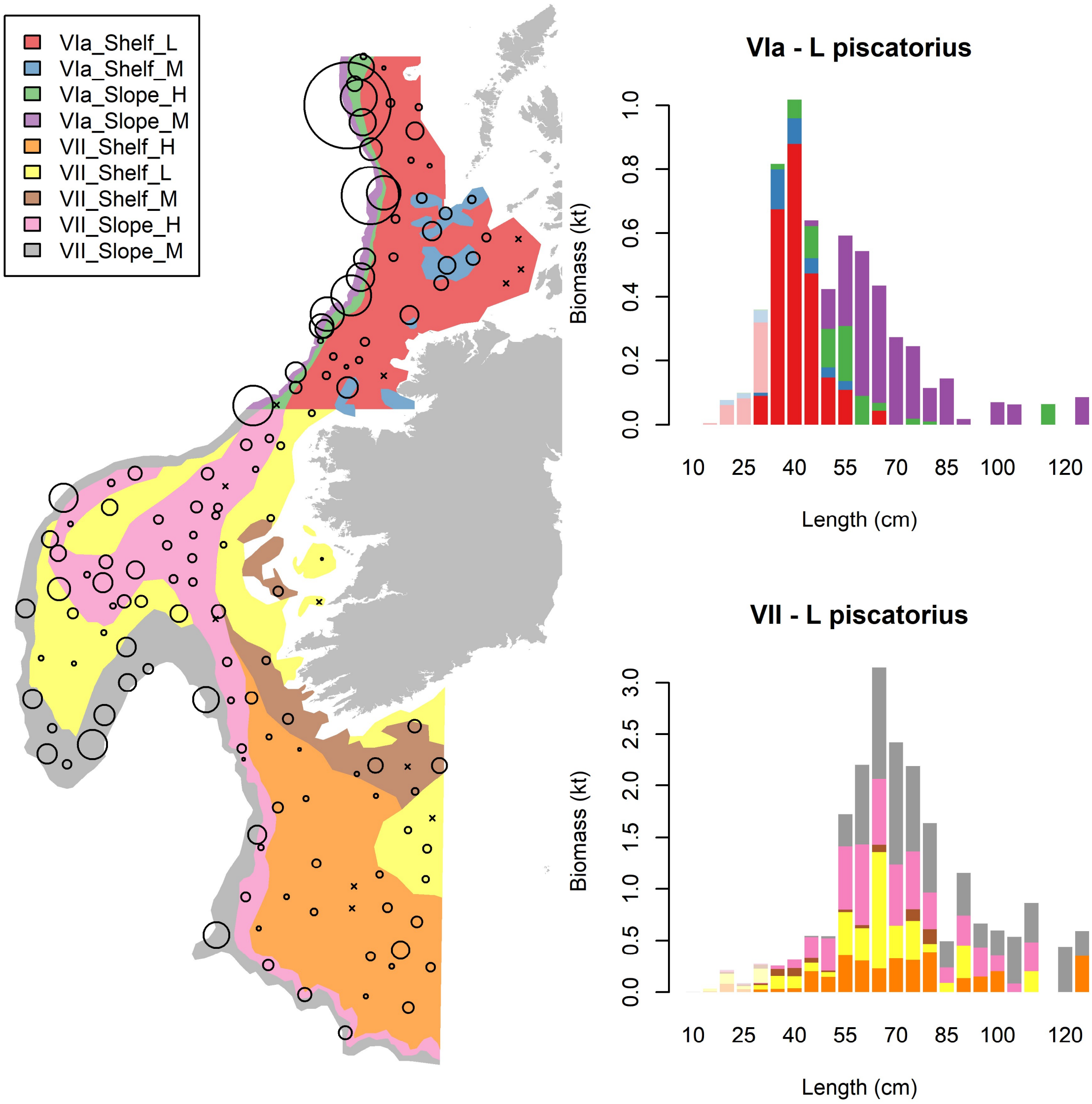

Figure 5: L. piscatorius ***catch weights (left; >500g fish only) and***

biomass per size class and stratum (right; fish <500g in pale shades).

Note: bubble size is proportional to the biomass (kt) per swept area at each sampling station

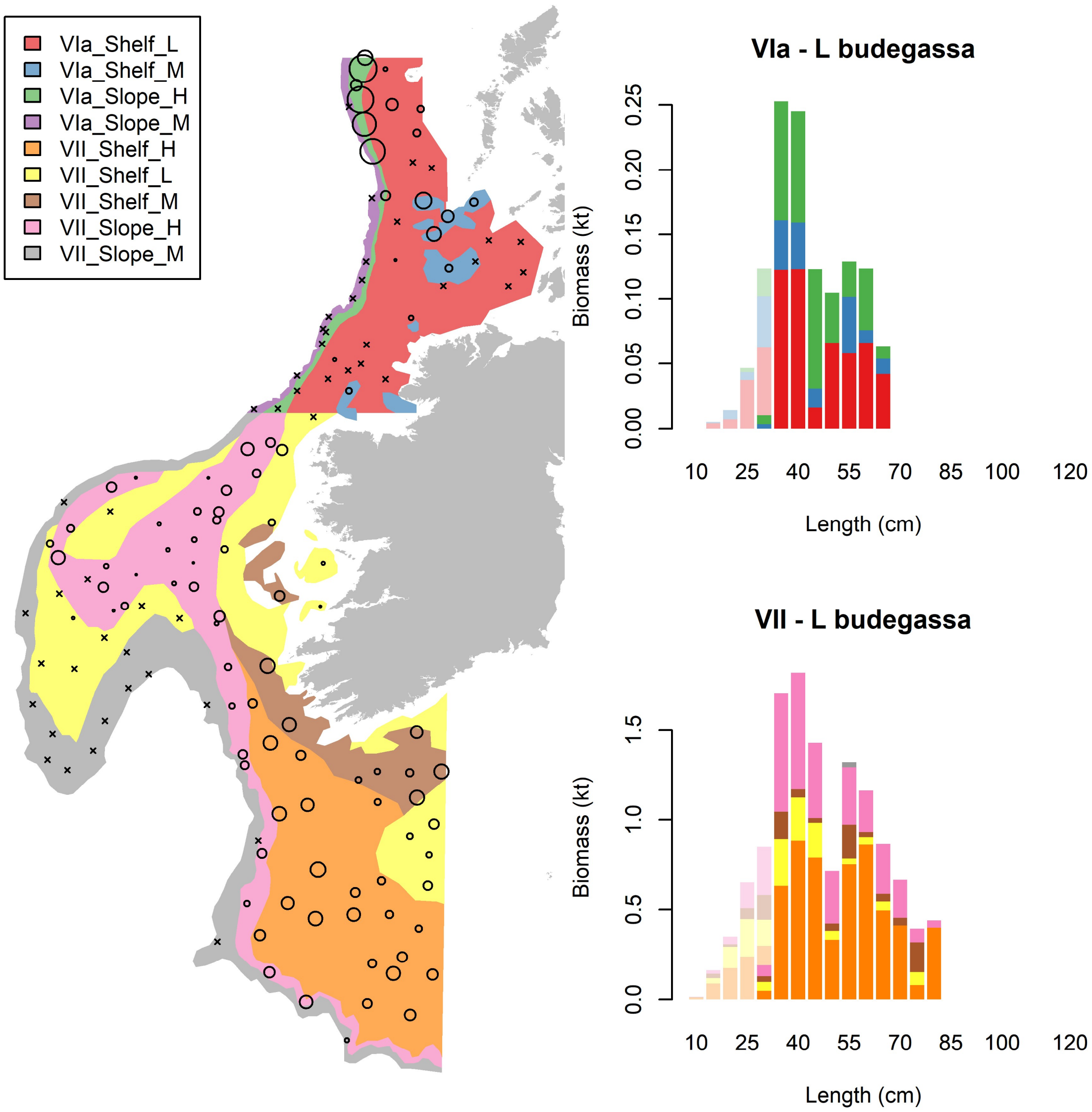

Figure 6: L. budegassa ***catch weights (left; >500g fish only) and***

biomass per size class and stratum (right; fish <500g in pale shades).

Note: bubble size is proportional to the biomass (kt) per swept area at each sampling station

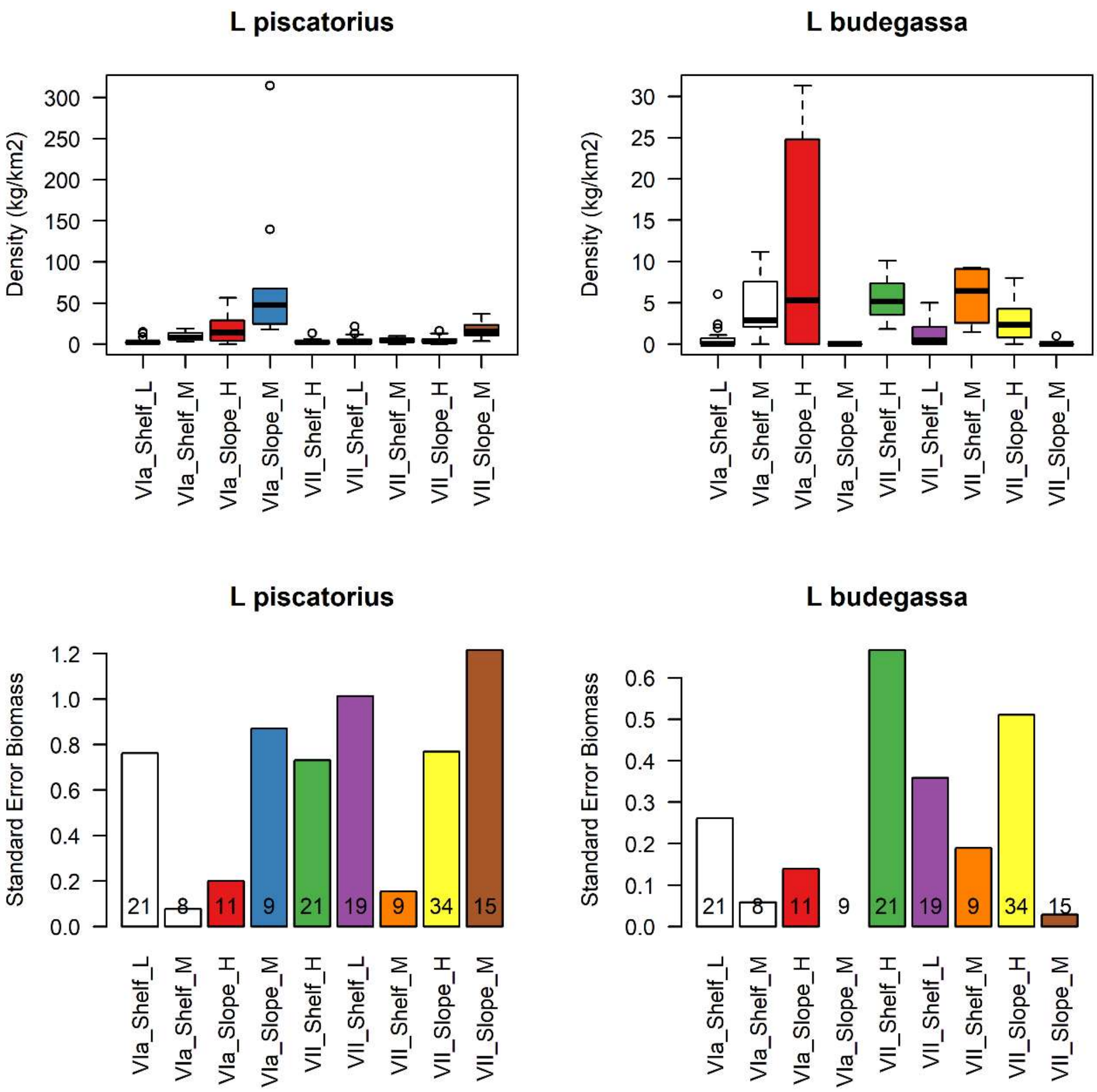

Figure 7: ***Density (kg/km^2) of*** **L. piscatorius** ***(Top Left) and*** **L. budegassa** ***(Top Right)***

and standard error of **L. piscatorius** ***(Bottom Left) and*** **L. budegassa** ***(Bottom Right).***

Note: Numbers in SE bar charts represent the total number of stations in each stratum

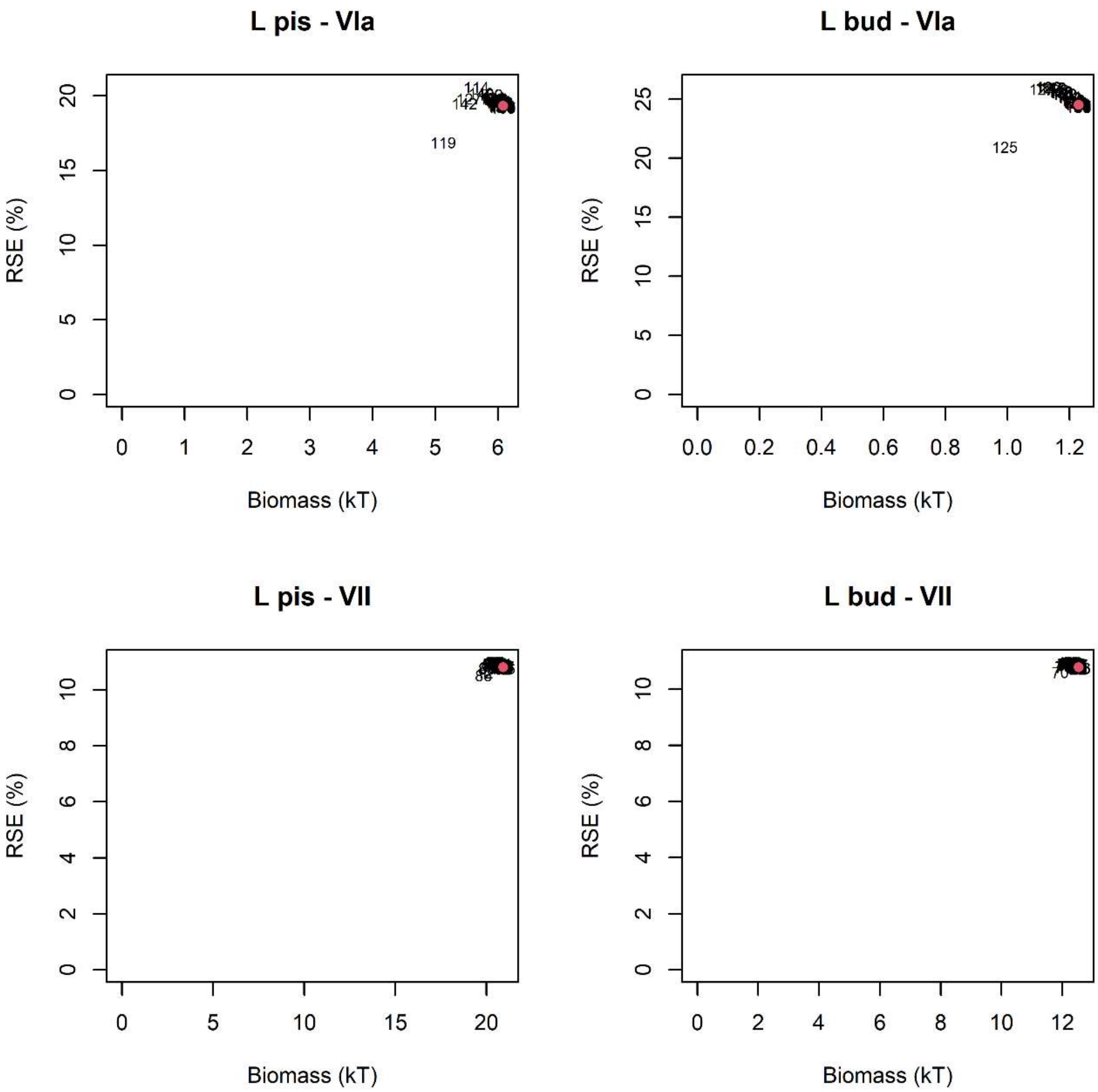

Figure 8: *Influence that each station had on the final biomass estimate. Estimates were obtained by sequentially removing each of the tows from the analysis. The red dot indicates the final estimate with all the valid tows included.*

Note: In area 6a, station 119 was highly influential for L. piscatorius*. This station was taken in stratum 'VIa_Slope M', which normally has a low abundance of anglerfish but covers a relatively large area. A large number of white anglerfish (111 individuals) were caught on this station and this was sufficient to increase the overall biomass estimate from 5kT to 6kT. For* L. budegassa *in area 6a, a relatively small number of black anglerfish were caught (17 individuals) on station 125 but this station was highly influential as it is in low density stratum 'VIa_Shelf_L' that covers a large area. This was sufficient to increase the overall biomass estimate from 1kT to 1.2kT. In Area 7 there were no hauls that stood out as being particularly influential.*

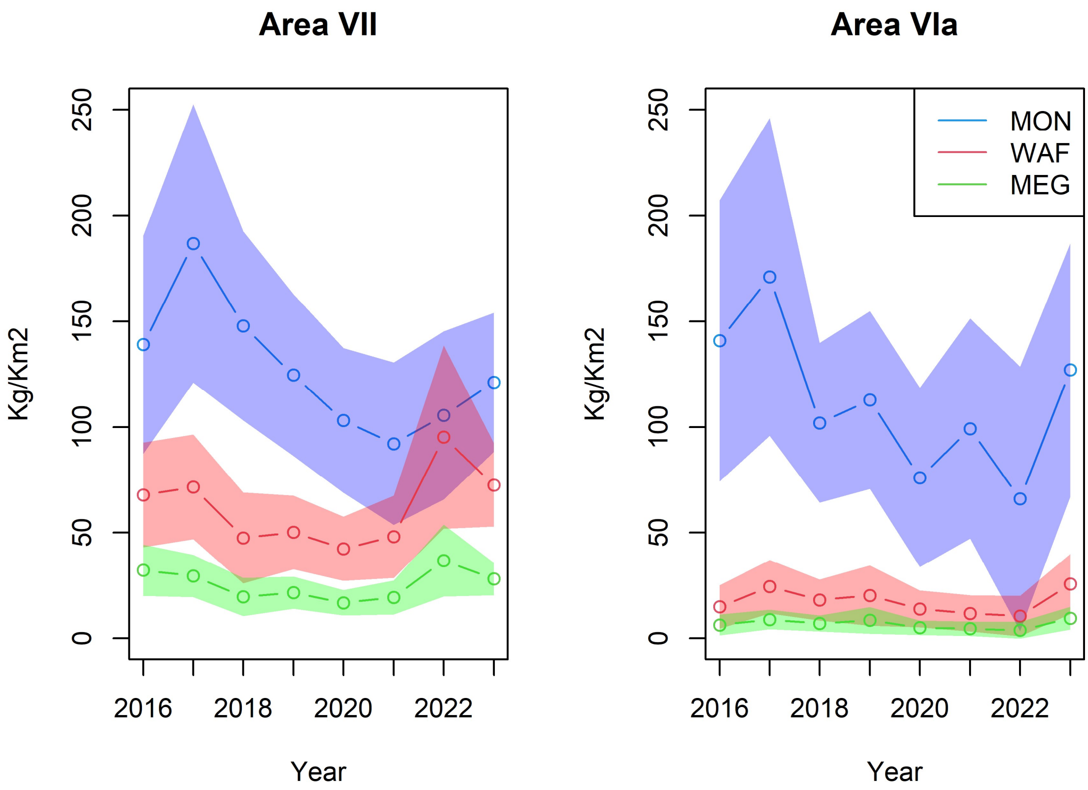

Figure 9: ***Trends in catch weights per swept area for white anglerfish (MON); black anglerfish (WAF) and megrim (MEG).***

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Appendix 1: List of IAMS 2023 survey staff

First Name	Surname	Organization	Role	Start Date	End Date
Sara-Jane	Moore	Marine Institute	Chief Scientist	11/02/2023	23/02/2023
Paul	Coleman	Marine Institute	Chief Scientist	11/02/2023	23/02/2023
Karl	Bentley	Marine Institute	Deckmaster	11/02/2023	23/02/2023
Gráinne	Ryan	Marine Institute	Deckmaster	11/02/2023	23/02/2023
Turloch	Smith	Marine Institute	Wetlab Scientist	11/02/2023	23/02/2023
Sean	O'Connor	Marine Institute	Wetlab Scientist	11/02/2023	23/02/2023
Laurence	Manning	Marine Institute	Wetlab Scientist	11/02/2023	23/02/2023
Ross	O'Neill	Marine Institute	Wetlab Scientist	11/02/2023	23/02/2023
Nicoletta	Perrella	Contractor	Wetlab Scientist	11/02/2023	23/02/2023
Tobi	Rapp	Marine Institute	Wetlab Scientist	11/02/2023	23/02/2023
Anna	Stroh	Smart Sea School	Wetlab Scientist	11/02/2023	23/02/2023
Jack	Glennon	Smart Sea School	Wetlab Scientist	11/02/2023	23/02/2023
Bartley	Hernon	P&O Maritime	Gear Tech	11/02/2023	23/02/2023
Eoghan	Kelly	Marine Institute	Chief Scientist	23/02/2023	07/03/2023
Mikel	Aristegui Ezquibela	Marine Institute	Chief Scientist	23/02/2023	07/03/2023
Dermot	Fee	Marine Institute	Deckmaster	23/02/2023	07/03/2023
Mairead	Sullivan	Marine Institute	Deckmaster	23/02/2023	07/03/2023
Brendan	O'Hea	Marine Institute	Wetlab Scientist	23/02/2023	07/03/2023
Gráinne	Ní Chonchuir	Marine Institute	Wetlab Scientist	23/02/2023	07/03/2023
Dave	Tully	Marine Institute	Wetlab Scientist	23/02/2023	07/03/2023
Robert	Bunn	Marine Institute	Wetlab Scientist	23/02/2023	07/03/2023
Neve	McCann	Marine Institute	Wetlab Scientist	23/02/2023	07/03/2023
Paul	Bouch	Marine Institute	Wetlab Scientist	23/02/2023	07/03/2023
Cláudio	Silva	Smart Sea School	Wetlab Scientist	23/02/2023	07/03/2023
Oisín	Medlar	Smart Sea School	Wetlab Scientist	23/02/2023	07/03/2023
Bartley	Hernon	P&O Maritime	Gear Tech	23/02/2023	07/03/2023
Dave	Stokes	Marine Institute	Chief Scientist	14/04/2023	23/04/2023
Gráinne	Ní Chonchuir	Marine Institute	Chief Scientist	14/04/2023	23/04/2023
Karl	Bentley	Marine Institute	Deckmaster	14/04/2023	23/04/2023
Gráinne	Ryan	Marine Institute	Deckmaster	14/04/2023	23/04/2023
Turloch	Smith	Marine Institute	Wetlab Scientist	14/04/2023	23/04/2023
Ross	Fitzgerald	Marine Institute	Wetlab Scientist	14/04/2023	23/04/2023
Laurence	Manning	Marine Institute	Wetlab Scientist	14/04/2023	23/04/2023
Sean	O'Connor	Marine Institute	Wetlab Scientist	14/04/2023	23/04/2023
Artur	Opanowski	Marine Institute	Wetlab Scientist	14/04/2023	23/04/2023
Frankie	McDaid	Contractor	Wetlab Scientist	14/04/2023	23/04/2023
Paula	Silvar-Viladomiu	Smart Sea School	Wetlab Scientist	14/04/2023	23/04/2023
Josephine	Sabathe	Smart Sea School	Wetlab Scientist	14/04/2023	23/04/2023
John	Cunningham	Contractor	Gear Tech	14/04/2023	23/04/2023

Appendix 2: Additional Sampling

Request	Details	Requested by	Target
Nephrops	Nemesis catch sampling	Marine Institute	All
Litter	Litter log per tow	OSPAR	All
IMR Mackerel	Parasite (*Kudoa thyrsites*)	IMR Bergen	25 juveniles from 6.a, 7.bc, 7.j and 7.fg (100 in total)
IFI Sportfish Tagging	Tag & record elasmobranchs	Inland Fisheries Ireland	Opportunistic
Squid	*Illex coindetii* and *Loligo forbesii*	University of Galway	100 specimens of each species
Hake and Anglerfish	Ethanol for DNA analysis	AZTI Technalia	50-100 of each species from 6a and 7b-k

Appendix 3: Summary of station location, gear geometry and catch

Haul	Stratum	LonDeg W	LatDegN	Depth m	CalcDist nm	Door m	Wing m	Mon Num	Waf Num	Mon kg	Waf kg
1	VII_Slope_H	-10.8910	54.2040	262	3.0	94.4	30.2	11	22	15.1	22.9
2	VII_Slope_H	-11.2685	54.1420	300	3.2	100.1	30.6	10	29	41.8	42.3
3	VII_Slope_H	-11.6130	53.7345	267	2.2	99.8	31.0	0	11	0.0	18.4
4	VII_Slope_H	-11.9055	53.8590	345	3.0	101.3	31.5	12	1	34.6	2.4
5	DeepArea5	-12.9020	54.1270	1517	1.5	118.5	34.4	0	0	0.0	0.0
6	DeepArea5	-12.8300	54.0855	1289	1.5	113.8	34.1	0	0	0.0	0.0
7	DeepArea5	-12.9635	54.0370	999	1.6	71.1	24.8	0	0	0.0	0.0
8	VII_Slope_H	-13.0980	53.8605	355	3.0	102.6	30.7	15	3	53.7	1.4
9	VII_Slope_H	-13.4935	53.7660	318	1.6	103.6	31.1	2	13	6.7	12.7
10	VII_Shelf_L	-13.5165	53.5275	185	3.4	97.9	29.3	12	0	35.4	0.0
11	VII_Slope_H	-14.1610	53.3580	233	3.2	101.0	30.2	3	8	7.9	17.9
12	VII_Slope_M	-14.2750	53.6210	772	1.5	109.7	32.1	12	0	58.0	0.0
13	VII_Shelf_L	-14.5025	53.2075	382	3.3	103.7	31.0	12	6	47.6	7.7
14	VII_Slope_H	-13.8875	52.8585	206	1.6	98.6	30.1	1	0	5.7	0.0
15	VII_Slope_H	-13.5830	52.9865	207	3.1	96.1	29.1	9	2	53.2	6.5
16	VII_Slope_H	-13.0935	52.9040	381	3.2	102.6	31.4	10	1	85.3	1.0
17	VII_Slope_H	-12.5750	53.1480	370	3.2	104.2	32.5	5	1	21.2	4.8
18	VII_Slope_H	-12.7155	53.4005	311	1.6	102.7	31.2	3	1	14.3	1.8
19	VII_Slope_H	-12.0880	53.5295	316	3.1	103.2	31.3	7	9	37.4	13.0
20	VII_Shelf_L	-11.6425	53.1505	163	3.2	91.7	28.6	3	7	4.9	6.0
21	VII_Slope_H	-12.1545	53.0200	265	3.1	102.1	31.0	5	3	20.4	1.5
22	VII_Slope_H	-12.4675	52.8180	412	3.2	104.1	31.9	7	1	19.7	5.5
23	VII_Shelf_L	-12.9990	52.5945	526	3.3	113.6	33.3	8	0	25.3	0.0
24	VII_Slope_H	-13.4595	52.5490	343	3.0	104.9	32.8	3	3	9.6	2.2
25	VII_Shelf_L	-13.6110	52.2815	393	3.1	113.9	33.8	4	1	4.8	0.4
26	VII_Shelf_L	-14.1190	52.4730	317	1.9	104.9	33.9	2	2	12.1	0.8
27	VII_Slope_M	-14.9020	52.5215	737	3.4	115.3	33.2	9	0	48.3	0.0
28	VII_Shelf_L	-14.6470	52.0305	397	2.2	108.1	32.7	1	0	3.3	0.0
29	VII_Shelf_L	-14.1040	51.9770	355	3.3	110.2	32.4	2	7	3.1	2.2
30	VII_Slope_M	-14.7870	51.6265	573	1.7	121.2	34.2	3	0	26.6	0.0
31	VII_Slope_M	-14.4625	51.3335	536	2.3	110.4	32.4	1	0	7.7	0.0
32	VII_Slope_M	-14.2180	50.9790	760	3.3	112.3	32.6	2	0	9.7	0.0
33	VII_Slope_M	-13.6035	51.4620	741	3.3	112.3	32.6	12	0	53.6	0.0
34	VII_Slope_M	-13.2455	52.1400	610	3.2	108.9	32.1	10	0	43.7	0.0
35	VII_Slope_M	-12.8865	51.9255	961	3.1	110.6	32.8	2	0	16.4	0.0
36	VII_Slope_M	-11.9325	51.6195	850	3.2	109.5	32.5	19	0	96.5	0.0
37	VII_Slope_H	-11.3460	51.1345	246	3.3	101.9	30.1	5	15	21.0	19.8
38	VII_Shelf_H	-10.7485	50.5465	182	3.0	92.4	28.8	7	19	18.0	26.8
39	VII_Slope_H	-11.0300	50.1560	285	3.1	99.8	30.2	3	27	8.6	22.3
40	VII_Slope_H	-11.2790	49.6620	391	3.0	99.8	31.3	5	2	22.0	9.1

41	VII_Slope_M	-11.7630	49.2865	912	3.0	110.8	32.3	6	0	94.4	0.0
42	VII_Shelf_H	-11.0665	49.3510	187	3.1	94.8	29.4	1	34	3.0	21.0
43	VII_Slope_H	-10.9120	48.9850	201	3.2	93.3	28.9	9	22	32.2	29.1
44	VII_Slope_H	-10.3085	48.6925	235	2.6	99.2	29.4	7	17	40.9	35.9
45	VII_Slope_M	-9.6425	48.3150	432	3.1	102.3	32.1	4	1	24.8	2.7
46	VII_Shelf_H	-9.3035	48.6765	174	3.4	93.4	29.4	1	9	3.2	14.1
47	VII_Shelf_H	-9.2275	49.0720	155	3.0	93.1	30.5	3	3	12.2	10.4
48	VII_Shelf_H	-8.6020	48.5645	174	3.1	97.0	29.8	5	12	20.3	19.8
49	VII_Shelf_H	-8.2395	48.9630	151	3.4	87.9	28.4	4	15	13.4	16.6
50	VII_Shelf_H	-8.7310	49.1370	152	3.0	91.5	29.1	6	8	59.2	15.6
51	VII_Shelf_H	-8.4620	49.4135	144	3.2	86.1	29.1	4	2	23.1	7.4
52	VII_Shelf_H	-8.9445	49.5555	126	3.3	89.2	29.3	4	13	13.5	8.6
53	VII_Shelf_L	-8.3160	49.8350	141	3.0	94.4	32.3	2	13	8.9	14.2
54	VII_Shelf_L	-8.6090	50.3230	126	3.1	93.2	29.1	4	14	6.8	5.3
55	VII_Shelf_M	-8.4940	50.7060	114	3.4	89.0	29.1	1	10	3.5	14.7
56	VII_Shelf_M	-8.6150	50.9535	115	2.2	88.6	29.4	0	2	0.0	3.4
57	VII_Shelf_M	-8.0935	50.9655	105	1.5	82.1	28.1	1	2	6.3	6.4
58	VII_Shelf_M	-8.5000	51.3535	94	3.1	80.0	26.7	6	7	9.7	9.7
59	VII_Shelf_M	-9.1410	50.9645	120	3.0	86.8	28.8	4	2	12.1	1.5
60	VII_Shelf_M	-9.4490	50.8815	121	3.2	85.6	29.8	3	1	2.2	2.6
61	VII_Shelf_H	-9.1395	50.6605	130	2.9	84.3	32.8	2	2	3.0	8.6
62	VII_Shelf_L	-8.2115	50.4425	122	3.4	91.2	28.9	0	14	0.0	13.0
63	VII_Shelf_L	-8.2960	50.1415	138	3.4	95.3	30.4	2	9	10.9	4.9
64	VII_Shelf_H	-9.0770	49.8830	125	3.4	84.4	28.0	2	9	6.9	10.2
65	VII_Shelf_H	-9.4995	49.7680	151	3.1	94.7	29.2	0	5	0.0	14.7
66	VII_Shelf_H	-9.5295	49.5500	155	3.1	95.8	29.6	0	14	0.0	25.7
67	VII_Shelf_H	-8.8795	48.9715	155	3.1	90.9	29.5	2	11	4.1	29.1
70	VII_Shelf_H	-10.1160	49.9965	142	3.2	90.3	28.7	2	32	10.9	35.1
71	VII_Shelf_H	-10.1575	49.5140	123	3.0	89.6	28.1	6	23	7.1	32.5
72	VII_Shelf_H	-10.6110	49.6640	148	3.3	92.9	29.1	2	23	6.0	25.4
73	VII_Slope_M	-11.0910	50.2815	518	3.3	108.2	31.4	13	0	43.3	0.0
75	VII_Shelf_H	-10.2845	50.6325	151	3.2	92.3	28.9	2	29	4.2	22.8
77	VII_Slope_H	-11.3170	51.0280	265	3.0	100.6	30.2	1	14	2.9	15.5
78	VII_Shelf_H	-10.8930	51.2480	178	3.1	94.9	29.5	3	26	4.4	28.5
79	VII_Shelf_H	-10.3945	51.1250	149	3.2	90.6	28.6	1	12	1.6	14.3
80	VII_Shelf_M	-10.5830	51.4255	152	3.3	89.6	28.6	7	14	6.9	13.3
81	VII_Shelf_H	-11.1840	51.6345	194	3.0	96.8	29.8	18	15	20.5	11.7
82	VII_Slope_H	-11.5215	51.6095	335	3.0	103.7	30.6	5	14	9.3	10.3
83	VII_Shelf_M	-10.9430	52.0060	142	3.2	89.6	28.1	5	24	3.5	13.7
84	VII_Slope_H	-11.5830	51.9930	283	3.3	101.2	30.2	6	14	25.2	11.3
85	VII_Slope_M	-13.2200	51.7875	901	3.1	111.3	33.7	4	0	49.3	0.0
86	VII_Slope_M	-13.7970	51.1700	675	3.1	110.8	33.1	17	0	97.8	0.0
87	VII_Slope_M	-14.5450	51.0815	755	3.0	110.6	32.5	6	0	43.3	0.0
89	VII_Shelf_L	-14.3490	52.7165	356	1.5	104.4	33.3	9	0	34.1	0.0
90	VII_Slope_H	-14.3655	53.0700	240	1.8	99.1	29.7	10	34	39.7	25.7
91	VII_Slope_H	-13.6250	52.7795	243	3.3	96.8	29.2	28	34	111.1	26.5

92	VII_Slope_H	-13.2780	52.5945	394	3.2	103.0	31.6	10	5	47.3	14.3
93	VII_Shelf_L	-12.3795	52.4720	512	3.1	107.7	32.0	9	0	41.4	0.0
94	VII_Slope_H	-11.7750	52.4180	215	3.3	99.6	29.7	0	7	0.0	4.7
96	VII_Slope_H	-11.7270	52.4915	182	3.3	95.8	29.2	19	48	53.7	29.6
97	VII_Slope_H	-12.1475	52.7840	282	3.2	99.3	30.5	5	11	16.5	22.2
98	VII_Slope_H	-12.1400	53.2475	282	3.1	100.9	30.7	4	4	14.7	7.4
99	VII_Slope_H	-11.7705	53.4410	227	3.1	97.9	29.9	5	10	14.7	13.3
100	VII_Slope_H	-11.7365	53.5235	237	3.2	98.1	30.0	6	15	17.3	22.5
101	VII_Slope_H	-11.1155	53.9025	200	1.7	98.7	29.6	3	9	4.7	8.0
102	VII_Shelf_L	-10.7020	54.1325	178	1.6	95.4	30.8	5	13	3.7	7.3
103	VII_Shelf_L	-10.1905	54.4610	117	2.6	87.5	27.8	4	2	5.1	0.5
104	VII_Shelf_L	-10.8670	53.4170	138	2.7	88.6	27.9	19	9	9.4	5.2
105	VII_Shelf_M	-10.7450	52.6930	123	1.6	86.1	27.0	5	7	3.0	4.6
106	VII_Shelf_L	-10.0715	52.5890	89	3.3	78.6	25.8	2	1	0.4	0.6
107	VII_Shelf_L	-10.0240	53.0150	106	3.1	86.6	28.9	11	14	2.2	4.3
108	VIa_Shelf_M	-8.5705	54.5185	56	3.4	NA	NA	4	0	0.4	0.0
109	VIa_Slope_M	-9.5430	55.6260	676	3.4	111.9	33.5	27	0	131.2	0.0
110	VIa_Slope_M	-9.3935	55.8060	653	3.3	108.0	32.1	13	0	58.3	0.0
111	VIa_Slope_M	-9.3250	55.9870	794	3.1	110.4	32.6	10	0	34.4	0.0
112	VIa_Shelf_L	-8.8450	56.0030	137	3.2	90.3	29.0	10	2	9.8	1.5
113	VIa_Shelf_L	-8.8180	56.3845	139	3.0	92.4	29.0	6	0	9.9	0.0
114	VIa_Slope_M	-9.2315	56.6170	953	3.0	114.1	33.0	46	0	249.3	0.0
115	VIa_Slope_H	-9.0075	56.6420	302	2.6	103.1	31.1	37	6	78.3	6.0
117	VIa_Slope_H	-9.2230	57.0800	266	2.3	97.6	29.9	16	32	29.3	35.4
118	VIa_Slope_H	-9.3550	57.3460	244	1.5	98.5	30.3	17	21	25.8	19.3
119	VIa_Slope_M	-9.6065	57.5135	759	3.1	72.9	23.0	111	0	411.2	0.0
120	VIa_Slope_H	-9.4185	57.5870	221	1.6	98.2	30.1	22	21	53.8	26.7
121	VIa_Slope_H	-9.4850	57.7255	273	4.0	102.0	30.4	11	8	26.2	13.2
122	VIa_Slope_H	-9.3775	57.8910	245	3.0	100.3	30.4	24	41	51.1	54.1
123	VIa_Slope_H	-9.3410	57.9975	269	2.2	101.8	30.6	1	8	2.3	12.3
124	VIa_Shelf_L	-9.0060	57.8855	147	3.4	96.9	30.3	3	2	3.2	3.3
125	VIa_Shelf_L	-8.9005	57.5350	144	3.1	94.1	29.0	14	17	9.2	20.3
126	VIa_Shelf_L	-8.4295	57.4930	158	3.1	94.8	29.2	9	3	7.8	6.9
127	VIa_Shelf_L	-8.4945	57.2565	142	3.1	90.1	28.5	45	10	40.5	8.8
128	VIa_Shelf_L	-8.5625	56.9695	131	3.2	90.9	29.2	11	0	5.9	0.0
129	VIa_Shelf_L	-8.2530	56.9145	135	2.2	89.0	29.2	3	1	2.4	0.4
130	VIa_Shelf_M	-8.3850	56.5920	176	3.3	104.0	32.5	8	14	8.9	18.0
131	VIa_Shelf_M	-8.2150	56.2615	171	3.2	98.3	30.6	23	15	22.1	13.7
132	VIa_Shelf_M	-7.9895	56.4385	167	3.2	98.6	30.8	16	15	10.0	11.8
133	VIa_Shelf_M	-7.5570	56.5760	193	3.4	107.6	32.9	3	6	4.6	4.4
134	VIa_Shelf_L	-7.3180	56.2015	99	2.6	80.7	26.6	12	0	7.8	0.0
135	VIa_Shelf_L	-6.7945	56.1860	70	3.2	73.2	25.1	2	0	0.9	0.0
136	VIa_Shelf_L	-6.7535	55.8830	61	0.0	60.4	23.2	0	0	0.0	0.0
137	VIa_Shelf_L	-6.9965	55.7455	51	0.0	62.1	21.7	0	0	0.0	0.0
138	VIa_Shelf_M	-7.5365	55.9895	135	3.2	86.9	27.0	17	3	9.9	1.1
139	VIa_Shelf_M	-7.9700	55.9220	147	2.3	99.4	30.5	14	2	11.7	3.4

140	VIa_Shelf_L	-8.0635	55.7480	104	3.0	84.3	27.4	27	0	21.9	0.0
141	VIa_Shelf_L	-7.9665	55.3930	67	3.2	67.7	NA	0	0	0.0	0.0
142	VIa_Shelf_L	-8.5875	55.4340	102	2.6	80.6	26.6	40	5	36.4	2.7
143	VIa_Shelf_L	-9.3190	55.1695	104	2.1	85.2	27.4	7	0	6.5	0.0
144	VIa_Slope_M	-9.9370	55.4450	862	1.7	109.0	32.2	11	0	41.0	0.0
145	VIa_Slope_H	-9.9840	55.2965	426	3.2	108.0	31.4	9	0	28.7	0.0
146	VIa_Slope_M	-10.0310	55.3260	736	3.4	113.4	32.5	15	0	46.7	0.0
147	DeepArea4	-10.0315	55.3255	1009	3.2	112.0	32.1	3	0	10.2	0.0
148	DeepArea4	-10.1650	55.3190	1260	3.4	113.6	32.8	0	0	0.0	0.0
149	VIa_Slope_H	-10.0470	55.1785	396	3.1	102.9	30.5	1	0	3.1	0.0
150	VIa_Shelf_L	-9.8420	55.0210	124	1.8	86.4	28.6	4	3	3.4	1.9
151	VIa_Slope_M	-10.4575	54.8665	810	3.1	105.5	30.7	5	0	30.4	0.0
152	VIa_Slope_M	-11.1610	54.5380	902	2.4	109.3	31.2	20	0	90.0	0.0
153	VIa_Slope_H	-10.7720	54.5430	364	3.1	105.6	31.7	0	0	0.0	0.0
154	VIa_Slope_H	-10.4590	54.7160	201	2.2	101.4	30.1	4	0	8.4	0.0
155	VIa_Shelf_L	-9.9520	54.8345	90	3.3	88.2	28.6	10	1	9.5	0.4
156	VIa_Shelf_L	-9.6205	54.9170	99	3.0	84.8	27.0	2	0	2.2	0.0
157	VIa_Shelf_L	-9.4110	54.9825	93	3.1	82.9	26.6	7	0	5.9	0.0
158	VIa_Shelf_M	-9.6070	54.7145	101	3.0	80.0	26.2	20	3	18.4	1.5
159	VIa_Shelf_L	-9.0090	54.8300	79	2.1	74.4	25.9	0	0	0.0	0.0

Notes:

Valid stations only.
LonDegW and LatDegW are the mid-point positions of each haul.
Depth m is the average depth of the haul.
Dist nm is the tow distance in nautical miles.
Door m and Wing m are the median door and wing spread.
Mon/Waf num and Mon/Waf kg are the catch numbers and weights of *L. piscatorius* and *L. budegassa*.