Cruise report
Irish Anglerfish & Megrim Survey 2017

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Cláir Chistí Eorpacha Struchtúrtha agus Infheistíochta na hÉireann 2014–2020
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Contents

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Introduction

The 2017 Irish Anglerfish and Megrim Survey (IAMS) took place from 14th February to 7th March (area 7bcjk) and 8-17th April 2017 (area 6a) on RV *Celtic Explorer*.

The main objective of the survey is to obtain biomass estimates for anglerfish (*Lophius piscatorius* and *L. budegassa*) and establish an abundance index for megrim (*Lepidorhombus whiffiaginis* and *L. boscii*) in areas 6a (south of 58°N) and 7 (west of 8°W).

Secondary objectives are to collect data on the distribution and relative abundance of anglerfish, megrim and other commercially exploited species. The survey also collects maturity and other biological information for commercial fish species.

The IAMS survey is coordinated with the Scottish Anglerfish and Megrim Survey (SIAMISS) and uses the same gear and fishing practices.

Methods

Stratification

The stratification is based on the following considerations:

- Depth: 0-200m; 200-500m and 500-1000m.
- 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 & 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 those areas.
- Regions 6a and 7 are treated separately because they are comprise different assessment and TAC areas.

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 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) despite the differences in depth and bottom type.

The strata are shown in Figure 1 and summary statistics are provided in Table 1. The naming of the strata reflects the region (VIa or VII), area (continental shelf or slope) and density of stations (Low, Medium, High).

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 so that the stations with the highest priority will be the ones that were removed last – this ensures that regardless of how many stations are selected in a stratum, they will always be distributed approximately evenly (but randomly) in space

The target number of stations is approximately 45 in area 6a and 70 in area 7bcjk. This means that stations with priority number 1-45 and 1-70 respectively would have been selected to be trawled. In practice some of the high priority stations may have been dropped (in cases where it was impossible to achieve a valid tow) and replaced by the 'spare' stations with priority numbers >45 and >70 respectively.

A tow track was picked to go through the randomly selected points. Where it was impossible to do so (e.g. underwater cables, passive gear, unsuitable bottom) it was attempted to find a tow track that came within 1nm of the selected point.

Four to six weeks prior to the departure a Marine Notice was issued (www.dttas.ie) to advise seafarers and fishermen about the proposed work. This document included a brief description of the survey methods and objectives including a list and map location of the proposed stations.

Fishing operations

The trawl 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 16'' rock hopper disks and a 19mm tickler chain is mounted between the wings, rigged to run ahead of the ground gear. The trawl doors were 5.45m^2 Thyboron Type 16 straight oval doors (adapted from the 5.25m^2 doors used in 2016; see section: 'Changes in gear, protocols, estimation')

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).

Wet lab protocol

All fish and invertebrate species were sorted and weighed. Biological data were collected for the species listed in the table below. Occurrence of the following vulnerable or sentinel invertebrate species was noted if present: corals, sea pen, fan mussel and ocean quahog.

Priority	Task
1	If you are under extreme pressure only sort and sample anglerfish and megrim For anglerfish, record the gutted weight in the 'serial number' box ; collect otoliths as well as illica
2	Sort and weigh all fish and squid species, *Nephrops* and rubbish (pelagics and squid are weighed-only) Record the total weight of benthos as a comment Sort benthos only for indicator species (see table below) record weights. Take picture or preserve sample if unsure about ID and record as comment
3	Take biological samples for the demersal listed in the table below.

Note: If you can't 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 you can still collect biological data.

	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	300-349 / 350-399	yes	yes	1pcm	**yes**	**yes**	**yes**	**yes**	**yes**
	MON*	U	400-499	yes	**never**	100%	**yes**	**yes**	**yes**	**yes**	**yes**
	WAF*	U	500-599	yes	**never**	100%	**yes**	**yes**	**yes**	**yes**	**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	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes**	no	no
	HKE	U	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes**	no	no
	JOD	U	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes**	no	no
	LBI	F/M	990-999	yes	yes	1pcm	**yes**	**yes**	**yes**	no	**yes**
	LEM	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes**	no	no
	TUR	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes**	no	no
	WIT	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes**	no	no
Bio elasmo	BLR	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
	CUR	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
	DGS	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
	DFL	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
	DII	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
	SDR	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
	THR	F/M	wkstn	yes	yes	1pcm	**yes**	**yes**	**yes****	no	no
Others	NEP	U	-	yes	nemesys	nemesys	nemesys	nemesys		no	no
	All other demersal fish species			yes	Yes	none	no	no	no	no	no
	All pelagic fish species and squid			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.
wkstn	use workstation number when prompted for otolith box
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%)
*	any anglerfish <20cm that is not clearly black should be identified using dorsal fin ray counts: WAF 9-10; MON 11-12
**	only determine the maturity of female elasmobranchs if they are already dead, otherwise record as stage 9.

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 was hauled back. Tide and wind direction and speed, barometric pressure, heave, 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. These measurement as well as bottom depth and GPS position are recorded in a SQL database at intervals of approximately one per second.

Catch weights, length frequency distributions and biological data were captured using the CEFAS Electronic Data Capture (EDC) system and stored into local Access '97 databases before being imported into a central SQL database. The CEFAS software FSS (Fishing Survey System) was used to enter station data and import catch data.

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 ($\widehat{N}$) or biomass (B) in the survey area are then:

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

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

Because the gear does not capture small anglerfish very well, fish below 500g (around 33cm) are excluded from the biomass and population number estimates. This coincides with the minimum landings weight observed by the industry.

Changes in gear, protocols or estimation

- The tickler chain was shortened so it is now well ahead of the footrope (approx. 3m) last year it was about 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 5-8m extra door spread in the deeper tows.
- 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 codend was replaced after the area 7 part of the survey was completed (legs 1 and 2) but before the 6a part of the survey took place.
- 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.

Results

Cruise narrative

Date	Comments
Mon 13/02/17	Scientific gear loaded in Galway
Tue 14/02/17	Fishing gear loaded. Planned departure at 19:00 delayed due to engine problems. Scientific crew remain on board on stand-by
Wed 15/02/17	Departed Galway docks 07:30. Engine tested in bay. Test tow off Spiddal. Dropped back engineer to Rossaveal at 16:30. First valid station at 23:00. Moderate swell.
Thu 16/02/17	4 valid hauls completed. Swell decreasing.
Fri 17/02/17	5 valid hauls completed. Good weather conditions.
Sat 18/02/17	5 valid hauls completed. Good weather conditions.
Sun 19/02/17	5 valid and one invalid haul. Good weather conditions.
Mon 20/02/17	5 valid and one invalid haul. Wind picking up slightly.
Tue 21/02/17	5 valid hauls competed. Wind and swell increasing but still very workable.
Wed 22/02/17	6 valid hauls completed. Wind and swell building
Thu 23/03/17	Dodging into the weather from 03h-15h. Completed 2 valid hauls
Fri 24/03/17	Docked in Cork for crew changeover. New Scanmar unit fitted. Sailed 20:00 hrs heading west now due to a series significant weather events next 2-3 days being centred around Celtic Sea
Sat 25/03/17	Headed west from Cork due to poor forecast for Celtic Sea central following few days. 4 Hauls completed
Sun 26/03/17	Headed to shelter at 01:00
Tue 28/03/17	Sailed at 11:00. Arrived at station 50 at 17:30. Completed 2 valid stations
Wed 01/03/17	4 valid hauls completed. Weather poor
Thu 02/03/17	7 valid hauls
Fri 03/03/17	2 valid hauls
Sat 04/03/17	Weather started to abate around 7am shot away 07:20 on station 63 (SE corner 34D8). Starboard door wouldn't stand up, a lot of stones fell off door when hauled back to gantry. Local IGFS Stn FG213 7nmi SW also reported significant rock damage to belly and wings. Moving to next stn given the swell. Completed 3 valid stations.

Sun 05/03/17	Serious trawl damage at c.01:30am at Stn 23 (35D7) Haul 64. Multiple sheets, belly, wings etc, repairs complete 11:30am. Three further hauls carried out. Knocked out at 22:30 due to wind and swell.
Mon 06/03/17	Towing again at 01:30. Finished Leg 2. Completed 4 valid and one invalid hauls. Heading to Galway for demob.
Saturday 8/4/17	Mobbed and departed Galway at 16:00. Test tow in Galway Bay at 16:31. Steamed to first station (12hrs).
Sunday 9/4/17	Arrived at first station at 04:00. Completed 7 valid stations. Stations very close together and bulk catches large so bottom time reduced to 30 minutes.
Monday 10/4/17	8 valid stations.
Tuesday 11/4/17	7 valid stations (3m swell, uncomfortable but workable). Finished slope strata.
Wednesday 12/4/17	6 valid stations. Working down shelf stratum.
Thursday 13/4/17	6 valid stations and 1 invalid (pots observed in the area).
Friday 14/4/17	5 valid stations.
Saturday 15/4/17	3 valid stations. Steaming to Galway (17hrs).
Sunday 16/4/17	4 multinet tows at back of Aran Islands.
Monday 17/4/17	Arrived in Galway Docks and demobbed. Post cruise on board at 11:00.

Downtime, damage

Weather downtime	**3 days**
Technical downtime	None
Gear damage	Serious trawl damage on 5/03/17 at Station 23 (35D7) Haul 64. Multiple sheets, belly, wings etc.

Summary statistics

Table 1. Summary statistics by stratum. Stratum area is given in Km^2, 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 Km^2), catch numbers are given for L. piscatorius (MON), L. budegassa (WAF) and L. whiffiagonis (MEG).

Stratum	Stratum Area	Num Hauls	Swept Area	Catch Num Mon	Catch Num Waf	Catch Num Meg
VIa_Shelf_L	38,424	16	6.38	156	35	111
VIa_Shelf_M	4,441	7	3.56	121	126	62
VIa_Slope_H	3,114	11	4.35	298	74	411
VIa_Slope_M	3,044	8	2.53	134	0	7
VII_Shelf_H	50,764	15	7.08	62	184	179
VII_Shelf_L	42,034	13	5.90	128	75	156
VII_Shelf_M	14,621	7	3.32	81	141	70
VII_Slope_H	35,768	25	12.31	271	273	191
VII_Slope_M	29,406	7	4.02	85	1	6

Biomass estimates

Estimated numbers and biomass for the survey area are given in Table 2. 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 2. Estimated numbers (millions) and biomass (kT) in the survey area, with CV (relative standard error). Only fish >500g live weight (approximately 32cm) were included in the estimate.

	6a MON	7 MON	6a WAF	7 WAF
Numbers (1e6)	4.74	10.29	0.74	6.36
Numbers CV	16.7%	11.8%	25.1%	11.8%
Biomass (KT)	8.11	31.44	0.81	9.27
Biomass CV	17.9%	11.5%	24.7%	11.3%

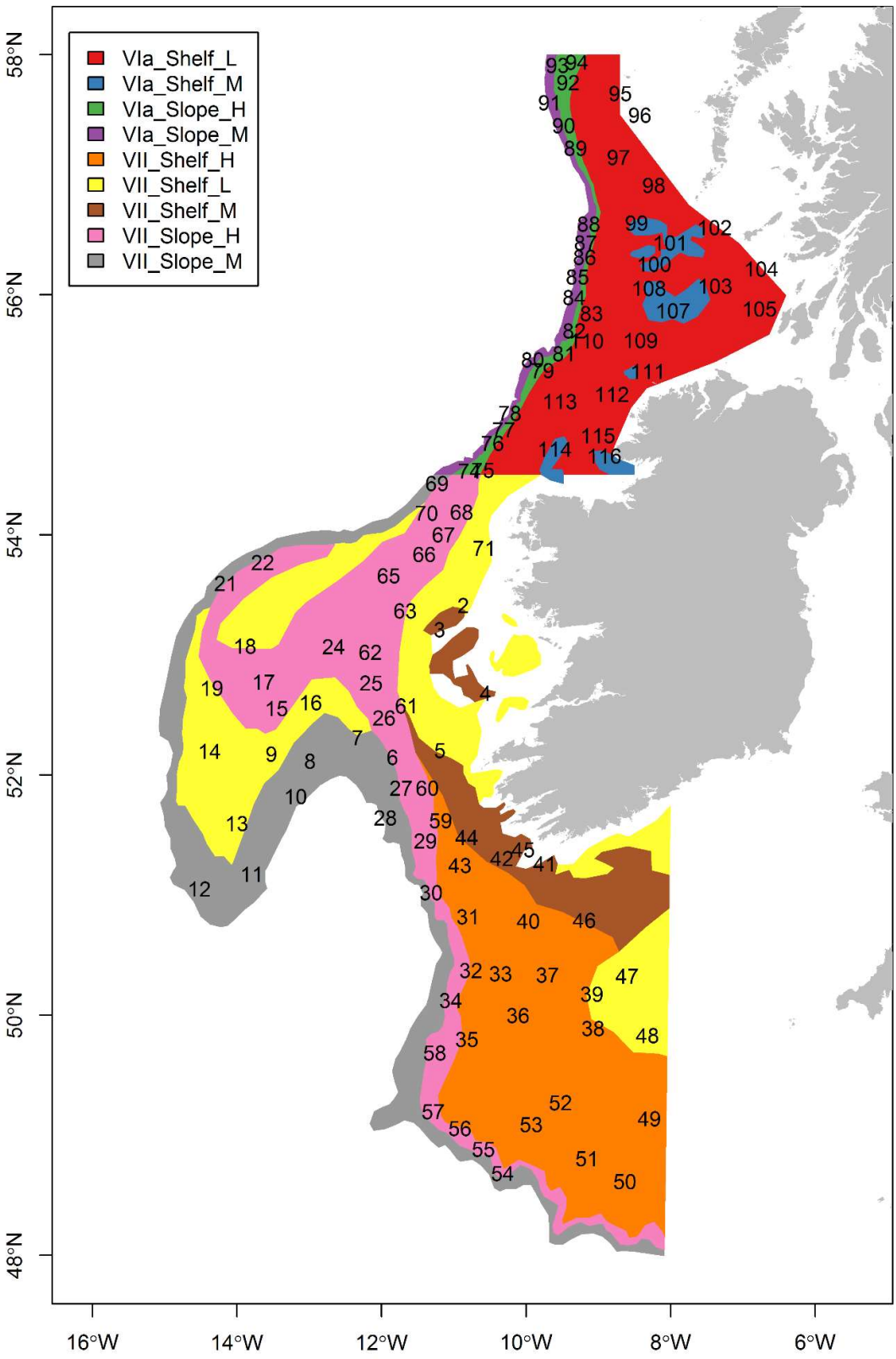

Figure 1. Valid tow positions, the numbers refer to the haul number.

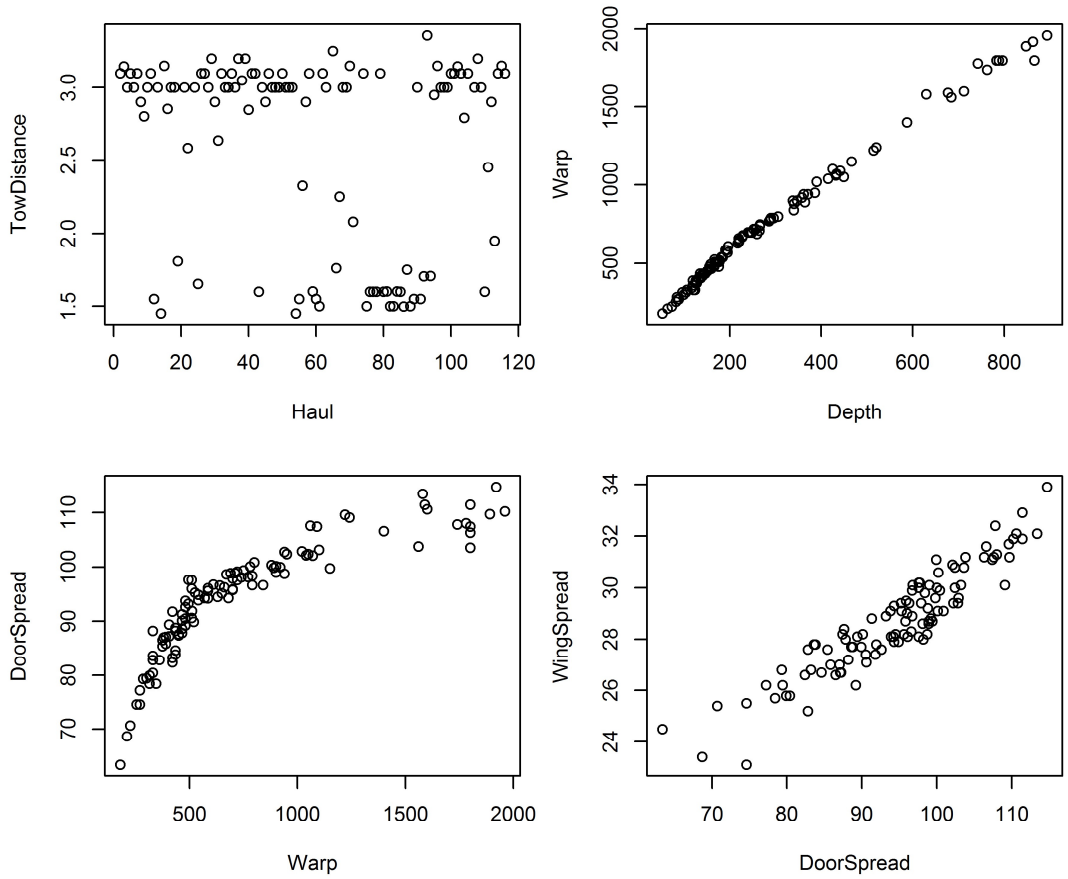

Figure 2. Gear parameters for the valid hauls

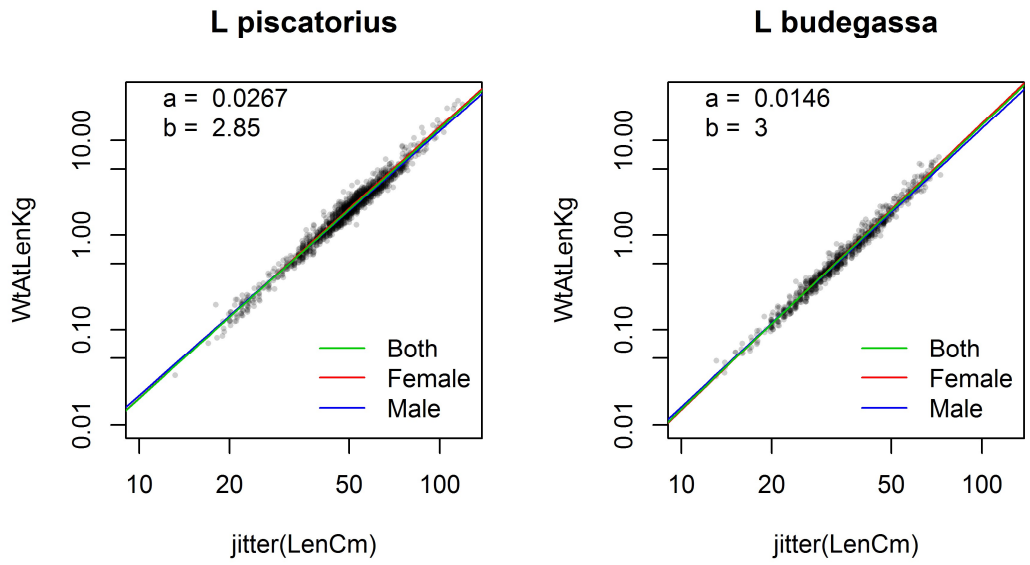

Figure 3. Length-weight parameters

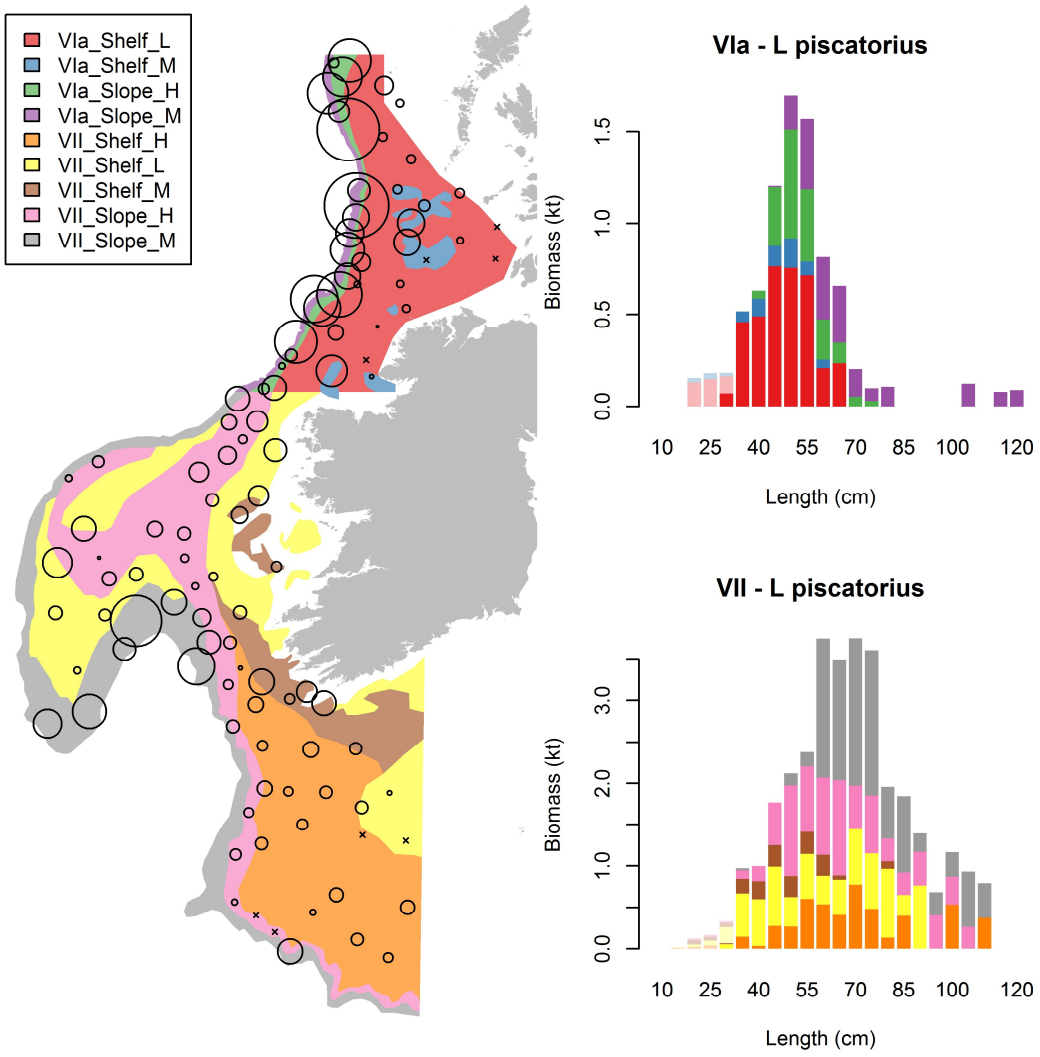

Figure 4. Bubble size is proportional to the biomass of L. piscatorius *per swept area at each sampling station (left; >500g fish only) and biomass per size class and stratum (right; fish <500g in pale shades).*

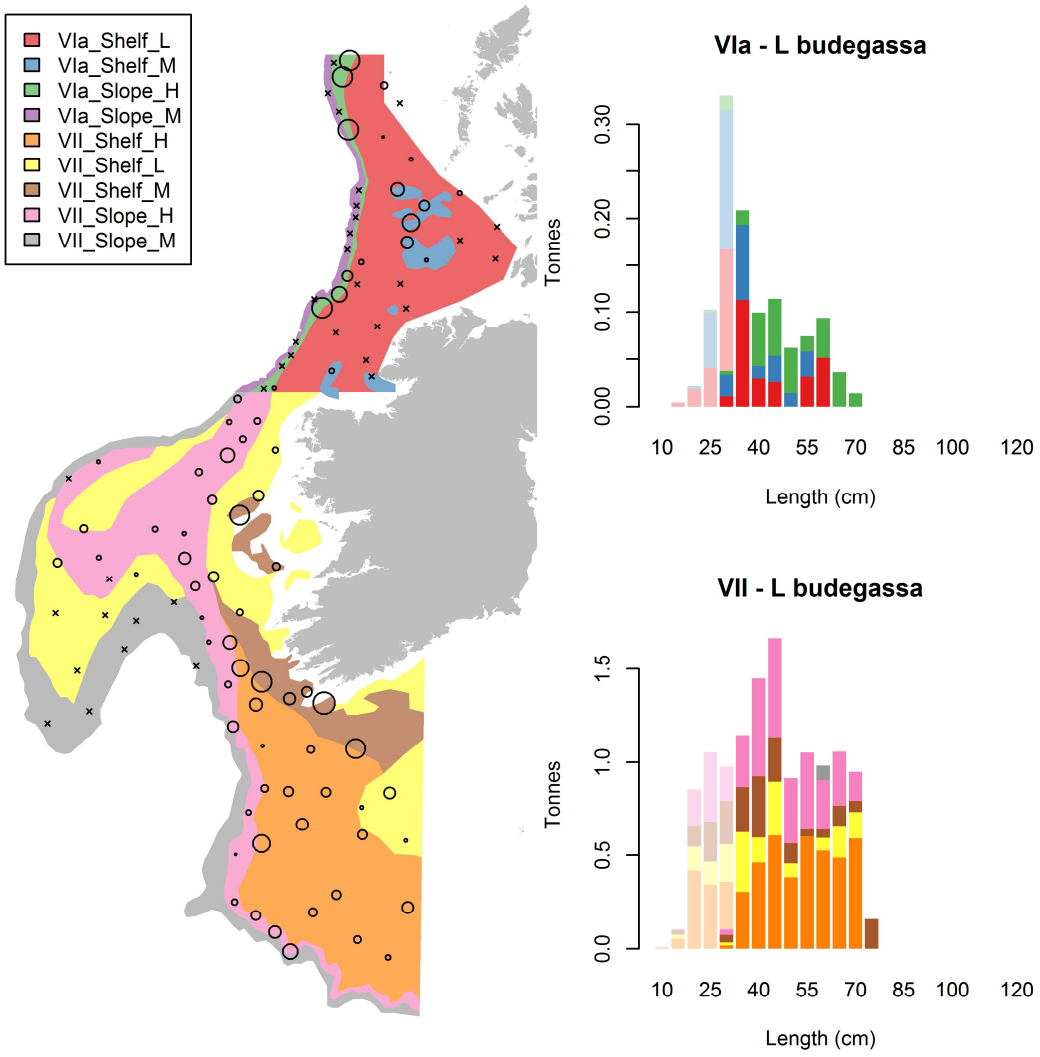

Figure 5. Bubble size is proportional to the biomass of L. budegassa *per swept area at each sampling station (left; >500g fish only) and biomass per size class and stratum (right; fish <500g in pale shades).*

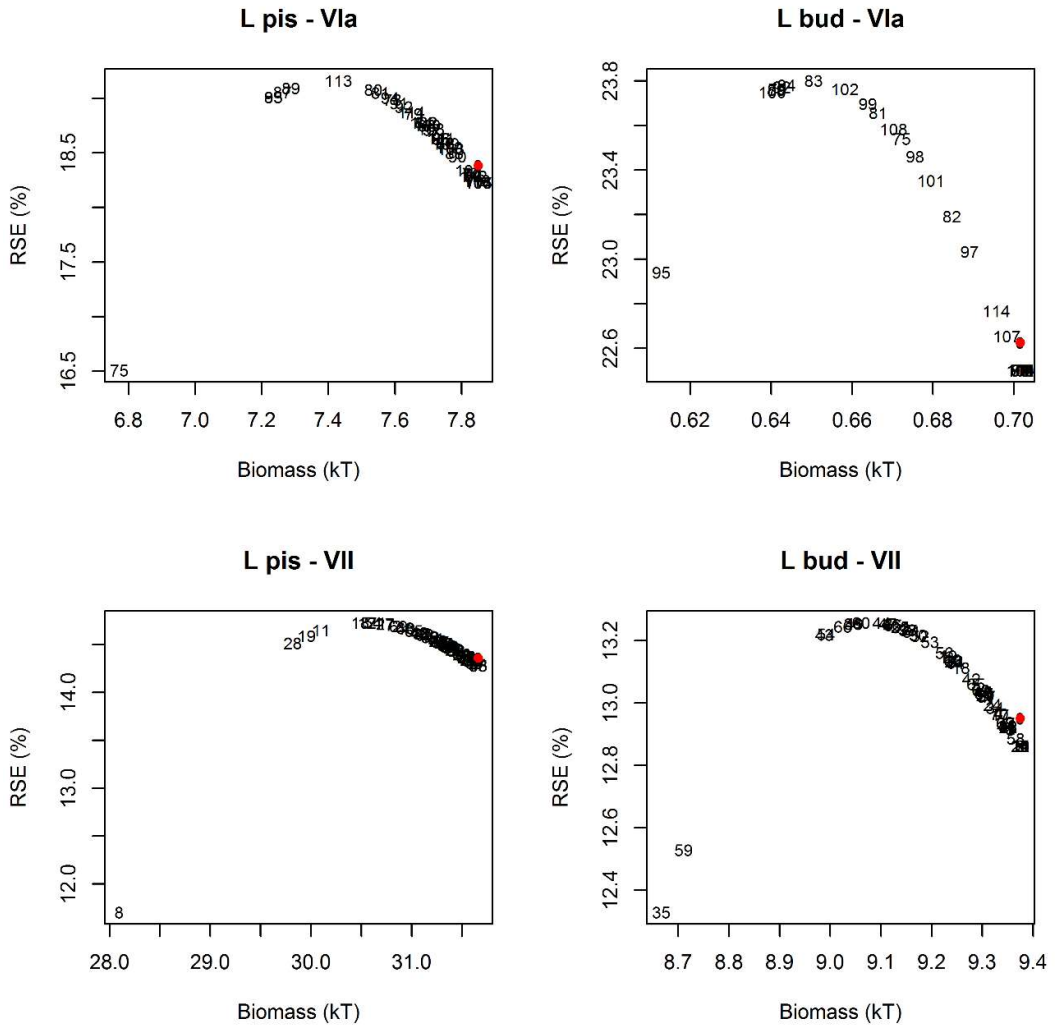

Figure 6. Influence that each tow had on the final biomass estimate. Estimates were obtained by sequentially removing each of the tows from the analysis. The top left figure shows that without station 91 the biomass estimate of L. piscatorius*. In VIa would have been considerably lower. In VII, stations 35 and 49 were strongly influential.*

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List of survey staff

Name	Organisation	Role
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Brendan O'Hea	Marine Institute	Scientist In Charge
Catherine Jordan	Unaffiliated	Wetlab Assistant
Christina O'Toole	GMIT	Wetlab Assistant
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Summary of station location, gear geometry and catch

Haul	Stratum	Lon DegW	Lat DegN	Depth mtr	Dist nm	Door mtr	Wing mtr	Mon Num	Waf Num	Mon Kg	Waf Kg	Mon $KgKm^{-2}$	Waf $KgKm^{-2}$	Mon Tons	Waf Tons
2	VII_Shelf_L	-10.869	53.415	137	3.1	82.4	26.6	38	28	35.8	13.1	19.3	5.4	884	420
3	VII_Shelf_M	-11.199	53.213	138	3.1	84.6	26.7	12	26	12.4	19.2	12.9	17.8	198	352
4	VII_Shelf_M	-10.561	52.684	116	3.0	78.4	25.7	6	9	4.1	3.2	5.1	2.9	90	86
5	VII_Shelf_L	-11.195	52.204	137	3.1	83.2	26.8	17	16	16.2	5.6	8.4	2.1	402	215
6	VII_Slope_H	-11.847	52.149	461	3.0	99.8	29.6	18	2	58.2	1.9	15.1	0.6	546	20
7	VII_Slope_M	-12.334	52.313	659	3.1	113.4	32.1	11	0	37.2	0.0	29.8	0.0	875	0
8	VII_Slope_M	-12.988	52.117	705	2.9	110.6	32.1	24	0	153.8	0.0	121.2	0.0	3565	0
9	VII_Shelf_L	-13.524	52.177	441	2.8	107.4	31.1	3	0	12.1	0.0	6.6	0.0	279	0
10	VII_Slope_M	-13.189	51.822	886	3.0	110.2	31.9	7	0	26.0	0.0	24.3	0.0	715	0
11	VII_Slope_M	-13.796	51.177	681	3.1	111.4	31.9	11	0	70.2	0.0	53.1	0.0	1563	0
12	VII_Slope_M	-14.520	51.053	791	1.6	108.0	31.3	4	0	25.1	0.0	37.6	0.0	1106	0
13	VII_Shelf_L	-14.004	51.597	430	3.0	107.6	31.2	1	0	5.1	0.0	2.3	0.0	98	0
14	VII_Shelf_L	-14.381	52.200	348	1.5	99.0	30.1	2	0	9.3	0.0	8.9	0.0	376	0
15	VII_Slope_H	-13.453	52.555	342	3.2	100.4	29.9	8	0	41.8	0.0	9.6	0.0	343	0
16	VII_Shelf_L	-12.983	52.605	512	2.9	109.6	31.7	5	1	19.3	1.1	8.8	0.6	371	25
17	VII_Slope_H	-13.632	52.777	247	3.0	95.8	28.7	1	2	1.9	4.7	0.5	1.1	18	40
18	VII_Shelf_L	-13.892	53.074	191	3.0	94.2	28.1	19	5	54.5	5.7	27.9	2.8	1202	137
19	VII_Shelf_L	-14.348	52.724	358	1.8	100.0	30.0	11	1	52.9	6.0	40.6	3.4	1707	143
21	VII_Slope_H	-14.153	53.599	433	3.0	103.2	30.1	3	0	9.6	0.0	2.3	0.0	84	0
22	VII_Slope_H	-13.642	53.772	369	2.6	98.8	29.2	7	1	29.6	2.5	6.7	0.7	238	24
24	VII_Slope_H	-12.662	53.072	383	3.0	102.4	30.0	17	2	44.4	6.6	11.1	1.5	408	55
25	VII_Slope_H	-12.144	52.768	287	1.7	98.2	28.0	4	10	5.7	14.8	3.3	6.6	117	253
26	VII_Slope_H	-11.965	52.478	272	3.1	99.4	28.7	5	17	8.8	14.9	2.5	3.7	88	163
27	VII_Slope_H	-11.729	51.894	418	3.1	102.2	29.4	24	3	116.9	2.6	25.9	0.8	925	29
28	VII_Slope_M	-11.948	51.644	841	3.0	109.7	31.2	17	0	76.2	0.0	62.6	0.0	1842	0

29	VII_Slope_H	-11.394	51.452	255	3.2	99.2	28.8	11	15	20.9	11.8	4.5	1.9	173	118
30	VII_Slope_H	-11.313	51.021	263	2.9	98.1	28.6	11	22	29.1	23.1	8.2	5.6	294	253
31	VII_Shelf_H	-10.801	50.820	173	2.6	90.6	27.1	6	7	9.1	2.0	5.3	0.5	268	96
32	VII_Shelf_H	-10.765	50.374	195	3.1	94.3	27.9	4	7	31.7	6.7	11.0	2.6	559	179
33	VII_Shelf_H	-10.353	50.345	148	3.0	87.4	28.2	4	9	10.3	9.9	4.4	4.7	231	257
34	VII_Slope_H	-11.041	50.124	287	3.0	100.1	29.1	3	25	19.9	9.5	4.7	1.4	166	139
35	VII_Shelf_H	-10.821	49.799	163	3.1	90.5	27.4	3	71	18.5	38.9	7.5	13.9	381	1211
36	VII_Shelf_H	-10.114	49.999	145	3.0	88.2	27.2	7	15	13.5	15.6	5.8	6.5	323	406
37	VII_Shelf_H	-9.705	50.335	138	3.2	87.2	26.7	6	6	16.8	9.9	7.5	4.4	381	229
38	VII_Shelf_H	-9.073	49.890	134	3.1	88.2	27.2	0	11	0.0	10.0	0.0	4.4	0	275
39	VII_Shelf_L	-9.091	50.177	134	3.2	89.4	28.1	3	2	20.5	1.9	7.6	0.7	319	41
40	VII_Shelf_H	-9.968	50.784	127	2.8	86.5	26.6	6	5	24.7	6.1	11.6	2.6	587	166
41	VII_Shelf_M	-9.741	51.263	106	3.1	78.4	25.7	22	34	27.8	24.1	27.4	22.4	450	463
42	VII_Shelf_M	-10.335	51.306	131	3.1	87.1	26.7	3	11	4.6	8.2	5.1	6.6	75	142
43	VII_Shelf_H	-10.917	51.248	180	1.6	94.9	27.9	6	5	17.3	11.4	11.3	7.6	574	419
44	VII_Shelf_M	-10.820	51.481	169	3.0	91.9	27.8	16	38	34.9	23.0	29.9	18.7	444	417
45	VII_Shelf_M	-10.038	51.378	103	2.9	79.9	25.8	19	18	21.1	8.1	20.1	5.0	355	191
46	VII_Shelf_M	-9.195	50.791	125	3.1	87.0	27.0	3	5	6.7	19.5	7.0	17.3	102	259
47	VII_Shelf_L	-8.604	50.327	114	3.0	83.6	27.8	2	8	2.7	12.7	1.1	6.2	54	296
48	VII_Shelf_L	-8.323	49.830	139	3.0	91.8	27.4	1	4	0.0	1.4	0.0	0.6	5	51
49	VII_Shelf_H	-8.295	49.139	143	3.0	83.8	27.8	4	6	26.5	14.2	9.6	6.5	495	337
50	VII_Shelf_H	-8.633	48.616	170	3.1	96.0	29.0	3	4	10.6	3.4	4.6	1.4	232	81
51	VII_Shelf_H	-9.160	48.805	170	3.0	95.3	29.1	5	4	17.0	6.0	7.3	2.5	371	146
52	VII_Shelf_H	-9.526	49.271	153	3.0	91.3	28.8	5	6	21.3	9.2	9.4	3.9	476	217
53	VII_Shelf_H	-9.931	49.089	159	3.0	92.6	27.6	1	11	5.2	8.7	1.9	3.5	95	246
54	VII_Slope_H	-10.324	48.681	204	1.5	94.5	28.2	8	16	57.4	20.5	29.3	10.7	1047	437
55	VII_Slope_H	-10.590	48.884	177	1.6	89.9	27.7	0	10	0.0	15.4	0.0	7.0	0	270
56	VII_Slope_H	-10.916	49.057	184	2.3	93.9	28.1	2	33	0.3	15.1	0.0	4.2	13	269
57	VII_Slope_H	-11.286	49.196	293	2.9	96.7	28.9	3	28	7.3	10.9	1.8	1.9	68	169

58	VII_Slope_H	-11.265	49.686	400	3.1	102.9	29.6	7	7	22.8	2.4	6.1	0.3	224	37
59	VII_Shelf_H	-11.183	51.621	194	1.6	96.1	28.1	2	17	0.8	19.9	0.8	13.1	64	871
60	VII_Slope_H	-11.366	51.893	219	1.6	96.6	28.3	8	25	17.1	19.9	7.7	8.8	276	457
61	VII_Shelf_L	-11.652	52.577	165	1.5	89.2	26.2	6	5	4.1	3.9	3.9	5.1	254	230
62	VII_Slope_H	-12.156	53.024	262	3.1	98.9	28.6	9	5	34.8	3.1	7.9	0.8	284	37
63	VII_Slope_H	-11.673	53.370	194	3.0	95.6	28.2	20	14	32.3	16.7	7.6	3.7	280	163
65	VII_Slope_H	-11.900	53.662	303	3.3	100.9	29.1	22	6	76.4	10.5	17.9	2.4	641	87
66	VII_Slope_H	-11.408	53.839	260	1.8	97.6	28.1	11	17	34.0	21.3	14.9	9.8	534	360
67	VII_Slope_H	-11.141	54.003	227	2.3	98.7	28.2	5	5	10.5	5.6	3.7	2.0	132	80
68	VII_Slope_H	-10.890	54.191	246	3.0	98.9	28.7	46	6	79.4	7.6	20.2	2.0	724	73
69	VII_Slope_M	-11.233	54.430	517	3.0	109.1	30.1	11	1	27.3	2.8	27.0	2.6	794	77
70	VII_Slope_H	-11.378	54.183	366	3.2	102.8	29.4	18	2	45.4	4.9	11.1	1.2	398	41
71	VII_Shelf_L	-10.576	53.892	143	2.1	88.8	27.7	20	5	35.4	2.5	24.0	1.6	1053	115
74	VIa_Slope_H	-10.782	54.535	346	3.1	99.9	31.1	4	0	12.0	0.0	5.9	0.0	18	0
75	VIa_Shelf_L	-10.598	54.541	204	1.5	96.8	30.1	16	1	46.4	1.1	28.1	0.8	1078	29
76	VIa_Slope_H	-10.466	54.766	351	1.6	100.2	30.6	1	0	2.4	0.0	1.9	0.0	6	0
77	VIa_Slope_H	-10.310	54.877	326	1.6	96.7	29.9	3	0	7.8	0.0	6.9	0.0	21	0
78	VIa_Slope_M	-10.227	55.015	805	1.6	103.6	30.8	12	0	72.6	0.0	84.4	0.0	257	0
79	VIa_Slope_H	-9.772	55.372	222	3.1	96.3	29.4	57	26	120.1	32.9	62.6	19.3	196	63
80	VIa_Slope_M	-9.907	55.461	867	1.6	106.3	31.2	13	0	94.8	0.0	103.6	0.0	315	0
81	VIa_Slope_H	-9.477	55.510	244	1.6	95.9	29.5	45	8	89.7	9.5	94.4	11.3	294	35
82	VIa_Slope_H	-9.334	55.703	225	1.5	95.2	29.4	14	6	28.2	5.2	31.8	5.4	99	22
83	VIa_Shelf_L	-9.095	55.847	149	1.5	87.6	28.4	11	3	22.5	1.5	16.0	1.3	615	71
84	VIa_Slope_M	-9.334	55.979	807	1.6	107.4	31.1	11	0	41.5	0.0	53.7	0.0	163	0
85	VIa_Slope_M	-9.291	56.151	776	1.6	111.4	32.9	9	0	25.8	0.0	36.7	0.0	112	0
86	VIa_Slope_M	-9.190	56.315	714	1.5	103.8	31.2	8	0	23.8	0.0	32.7	0.0	100	0
87	VIa_Slope_M	-9.177	56.435	779	1.8	107.8	32.4	59	0	167.2	0.0	193.2	0.0	588	0
88	VIa_Slope_M	-9.136	56.593	607	1.5	106.6	31.6	5	0	13.6	0.0	23.5	0.0	71	0
89	VIa_Slope_H	-9.316	57.223	296	1.6	98.4	29.8	81	8	177.7	20.6	180.8	19.4	563	60

90	VIa_Slope_H	-9.481	57.411	434	3.0	102.4	30.8	15	0	40.2	0.0	20.2	0.0	63	0
91	VIa_Slope_M	-9.673	57.602	860	1.6	114.7	33.9	17	0	61.0	0.0	78.4	0.0	239	0
92	VIa_Slope_H	-9.420	57.771	247	1.7	97.9	29.4	35	15	74.8	19.4	71.8	18.9	224	65
93	VIa_Slope_H	-9.568	57.915	434	3.4	102.1	30.9	4	0	10.0	0.0	4.6	0.0	14	0
94	VIa_Slope_H	-9.296	57.939	231	1.7	94.3	29.3	39	11	94.5	22.1	85.3	18.6	266	62
95	VIa_Shelf_L	-8.697	57.680	157	2.9	93.8	29.1	44	13	38.5	11.2	16.0	2.3	738	175
96	VIa_Shelf_L	-8.427	57.498	159	3.2	90.1	28.2	13	3	8.9	0.6	2.9	0.0	172	19
97	VIa_Shelf_L	-8.721	57.147	118	3.0	85.4	27.6	14	5	8.9	2.0	3.6	0.3	204	55
98	VIa_Shelf_L	-8.234	56.914	132	3.0	85.8	27.0	7	3	8.2	2.1	4.0	0.7	153	47
99	VIa_Shelf_M	-8.471	56.601	158	3.0	97.7	30.2	10	23	6.4	14.1	4.1	8.5	34	73
100	VIa_Shelf_M	-8.233	56.257	175	3.1	97.6	30.2	34	48	41.5	25.6	34.7	13.8	171	133
101	VIa_Shelf_M	-8.007	56.435	175	3.1	97.6	30.0	9	16	8.9	9.9	6.4	5.0	37	50
102	VIa_Shelf_L	-7.394	56.562	169	3.1	93.2	28.9	11	7	11.0	5.0	4.3	1.1	182	86
103	VIa_Shelf_L	-7.389	56.076	106	3.1	80.4	25.8	10	0	4.8	0.0	2.2	0.0	133	0
104	VIa_Shelf_L	-6.747	56.217	67.3	2.8	68.7	23.4	0	0	0.0	0.0	0.0	0.0	0	0
105	VIa_Shelf_L	-6.774	55.883	56.2	3.1	63.4	24.5	0	0	0.0	0.0	0.0	0.0	0	0
107	VIa_Shelf_M	-7.970	55.869	161	3.0	88.6	27.7	3	14	0.7	4.4	0.0	0.7	7	35
108	VIa_Shelf_M	-8.303	56.055	157	3.2	87.8	28.0	27	23	34.7	13.3	32.1	7.0	153	73
109	VIa_Shelf_L	-8.421	55.621	86.2	3.0	79.3	26.8	9	0	6.0	0.0	2.6	0.0	133	0
110	VIa_Shelf_L	-9.165	55.617	107	1.6	82.8	25.2	2	0	2.6	0.0	2.3	0.0	87	0
111	VIa_Shelf_L	-8.318	55.364	80.9	2.5	74.6	23.1	5	0	4.4	0.0	2.9	0.0	124	0
112	VIa_Shelf_L	-8.816	55.174	85.7	2.9	77.2	26.2	2	0	0.7	0.0	0.4	0.0	24	0
113	VIa_Shelf_L	-9.535	55.112	116	2.0	82.8	27.6	12	0	15.7	0.0	10.9	0.0	420	0
114	VIa_Shelf_M	-9.607	54.715	100.2	3.1	79.4	26.2	30	2	45.0	1.3	45.2	1.3	201	8
115	VIa_Shelf_L	-9.010	54.829	70.2	3.2	70.7	25.4	0	0	0.0	0.0	0.0	0.0	0	0
116	VIa_Shelf_M	-8.919	54.660	86.6	3.1	74.6	25.5	8	0	2.1	0.0	1.0	0.0	21	0