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MARINE AND FRESHWATER RESEARCH IN ICELAND

A manual for the Icelandic Groundfish Survey in spring 2025

Ingibjörg G. Jónsdóttir, Hjalti Karlsson, Höskuldur Björnsson, Jón Sólmundsson, Klara B. Jakobsdótir og Valur Bogason

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MARINE & FRESHWATER RESEARCH INSTITUTE

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Ágrip

Þessi skýrsla er ensk þýðing á handbók sem lýsir framkvæmd rannsóknaverkefnisins ‚Stofnmæling botnfiska á Íslandsmiðum' sem fer fram í marsmánuði á hverju ári. Í handbókinni er nákvæmlega lýst fyrirhugaðri framkvæmd verkefnisins í mars 2025, m.a. umfangi gagnasöfnunar, hvernig safna eigi líffræðilegum upplýsingum, skráningu mælinga, veiðarfæri og veiðiaðferðum. Einnig eru fyrirmæli um það hvernig aðferðum skuli beitt við tog og gefnar nákvæmar staðsetningar og aðrar upplýsingar um togstöðvar. Þá eru í handbókinni stutt yfirlit yfir sögu verkefnisins.

Lykilorð: Handbók, stofnmæling botnfiska, SMB, Íslandsmið, mars.

Abstract

This is the English translation of the manual for the Icelandic groundfish survey in March. The manual describes the methodology of the Icelandic groundfish survey in spring, a survey conducted annually in March. The manual describes the data collection, provide instructions on sampling of biological variables, registration of information, the survey fishing gear and fishing methods. They provide instructions on towing methods and exact data on locations and other information on the tows. Furthermore, the manual includes a short history of the project.

Key words: Manual, groundfish survey, Iceland, March.

Efnisyfirlit

1 Preface

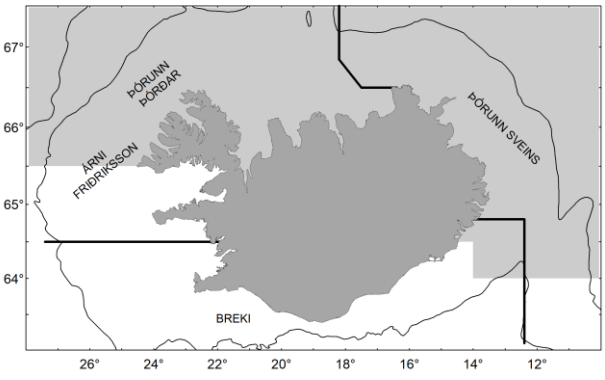
The Icelandic Groundfish Survey (IGS) was initiated in spring 1985 by the Marine Research Institute (MRI, later MFRI), and the survey has been carried out annually since then. The main goal is to study changes in abundance, condition and distribution of demersal fish in Icelandic waters, thereby improving the prevision of stock assessments. The survey is important for stock assessment and fishery advice for cod, haddock, saithe, golden redfish, Atlantic wolffish, spotted wolffish, tusk, ling, monkfish, lumpfish, starry ray and several species of flatfish. Moreover, it provides information on the distribution and condition of many other fish species, as well as on sea-water temperature.

Another original aim was to improve relations with fishmen and people in other sectors of the fishing industry. Fishermen were involved in the planning of the project, especially on aspects such as vessel and gear selection and allocation of stations. The survey gear and methods have been more or less unchanged over the study period.

The IGS covers the continental shelf of Iceland to depths of 500 m. Allocation of stations and data collection based on a division into Northern and Southern areas (see Figure). Stratification in the survey and the allocation of stations was based on pre-estimated cod density patterns. Stations in each statistical square were divided evenly between experienced fishermen and fishery scientists. Fishery scientists selected random single positions for their stations and the tow path was determined by fishermen (tow numbers 11-19). The other half of the stations were selected by fishermen based on their fishing experience (tow numbers 1-9).

Originally, the number of stations was around 590, but in the first years some tows were dropped due to difficulties in towing certain areas. In 1993, a total of 30 tows were added in shallow waters as suggested by fishermen (tow numbers 31-33). The number of stations was reduced by 72 in 1996 due to financial reasons. This included a cutback of all 24 stations on the Iceland-Faroe Ridge, 17 shallow water stations in the Northern area as well as other stations in the Northern area that had not been taken in all the preceding years. Since 2004-2005, as a response o information on a growing abundance of cod on the Iceland-Faroe Ridge in the early 2000s, the area has been surveyed in the same way as in 1985-1995. In 2008-2009, following consultation with the fishing industry, several fixed stations were added (tow numbers 35-38). In 2025, the plan is to collect data at 580 stations, similar to 2009-2024.

In 1985-1995 the MRI rented five Japan-built trawlers for the project, in 1996-2006 four trawlers were used, and in 2007-2013 three trawlers were used together with research vessels. Since 2014, two trawlers and two research vessels have been used in the survey. In 2025, sampling is carried out onboard the trawlers Breki VE and Þórunn Sveinsdóttir VE and the research vessels Árni Friðriksson and Þórunn Þórðardóttir.



The study areas of survey vessels in IGS 2025 (lines) and the division into Northern (grey) and Southern area (white).

Vessel / Registration number	Arnar HU-1 / 1307	Barði NK-120 / 1976	Bjartur NK-121 / 1278	Breki VE-61 / 1459	Breki VE-61 / 2861	Brettingur NS-50 / 1279	Drangey SK-1 / 1276	Gnúpur GK-11 / 1579	Gullver NS-12 / 1661	Hjalteyrin EA-306 / 1476	Hoffell SU-70 / 1275	Jón Vídalín VE-82 (ÁR-1) / 1275 [1]	Ljósafell SU-70 / 1277	Ólafur Bekkur ÓF-2 / 1281	Múlaberg ÓF-32 (SI-22) / 1281 [1]	Páll Pálsson ÍS-102 / 1274	Rauðinúpur ÞH-160 / 1280	Vestmannaey VE-54 / 1273	Bjarni Sæmundsson RE-30 / 1131	Árni Friðriksson RE-200 / 2350	Þórunn Sveinsdóttir VE	Þórunn Þórðardóttir HF
1985	N						NE				S, E					NW		S				
1986	N					NE							E			NW		S				
1987	N					NE							E				NW	S				
1988	N		NE										E	S			NW					
1989	N		NE								E						NW	S				
1990	N		NE										E				NW	S				
1991	N		NE								E						NW	SW				
1992	N		NE										E				NW	SW				
1993			NE			SW					SE				W		N					
1994			NE			SE									W		N	SW				
1995			NE			SE									W		N	SW				
1996						S							E		W		N					
1997			E			S									W		N					
1998			E			N						S			W							
1999			E			N										W		S				
2000			N									S	E			W						
2001				S		N						W [2]	E							W [2]		
2002			N			E							S			W [2]				W [2]		
2003			N	W [3]		E							S			W [3]						
2004			N			E							S			W						
2005			N [4]			E							S			W			N [4]			
2006			N [4]			E							S			W			N [4]			
2007			N, NE										S [2]			W			N	S [2], E		
2008			N, NE										S			W			N	W [5]		
2009			N,NE [6]										S			W			N	N, E [6]		
2010			N, NE									NW	S, SE						N	SW		
2011			N, NE									NW	S, SE						N	SW		
2012			N, NE									NW	S, SE						N	SW		
2013			N, NE									NW	S, SE						N	SW		
2014												NE, E	S, SE						N, NV	W		
2015			E, NE										S, SW						N	NW		
2016			E, NE										S, SW						N	NW		
2017		E, NE											S, SW						N	NW		
2018										E, NE			S, SW						N	W, NW		
2019													S, SW		E, NE				N	W, NW		
2020								S, SW							E, NE				N	W, NW		
2021					S, SW				E, NE										N	W, NW		
2022					S, SW				E, NE										N	W, NW		
2023					S, SW				E, NE										N	W, NW		
2024					S, SW				E, NE										N	W, NW		
2025					S, SW															W, NW,	E, NE	W, NW,

[1] Hoffell and Jón Vídalín are two names for the same vessel. Ólafur Bekkur and Múlaberg are also the same vessel.

[2] In 2001, 2002 and 2007 a comparison was made between r/v Árni Friðriksson and trawlers in the W- and S-areas.

[3] In 2003, a comparison was made between two similar trawlers in the W-area.

[4] In 2005 and 2006 r/v Bjarni Sæmundsson was compared to trawler Bjartur in the N-area.

[5] In 2008 r/v Árni Friðriksson took part in side-projects in the W-area.

[6] In 2009 r/v Árni Friðriksson took stations in the N- and E-area and was compared to trawler Bjartur.

2 Data collection

2.1 Preparation

Before leaving harbour, it is necessary to check whether all instruments are onboard and in working condition. The working area must be prefixed, and scales, computers and headsets must be connected and checked.

It must be checked carefully if there is a danger of losing small fish, e.g. through interstices in processing lines or conveyor belts. The cruise leader, together with vessel members, checks whether the trawls conform to standardized specifications and if instruments used for measuring gear geometry and environmental parameters are onboard and working.

2.2 Species identification

The following material is used for species identification: **„Íslenskir fiskar**“ (Icelandic fishes) (Gunnar Jónsson & Jónbjörn Pálsson 2013) and the manual „**Greiningar á tegundum, kynþroska og fæðu“** (Identification of species, maturity and prey items“).

GENERAL RULE: Putatively rare species, and fish that cannot be identified to species, are to be frozen and brought to a laboratory for further examination.

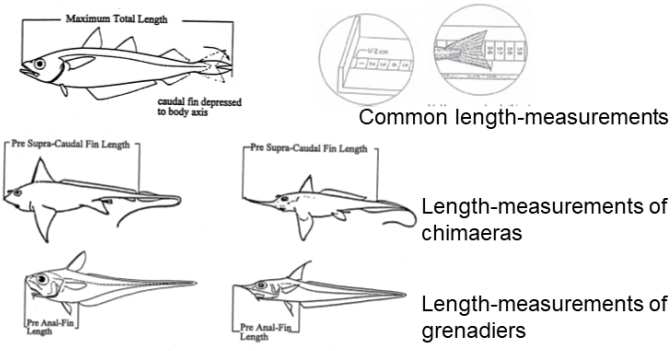
2.3 Length measurements and counting

2.3.1 Length measurements and counting

SOME INDIVIDUALS OF EACH SPECIES MUST BE MEASURED AT EVERY STATION!

Length is measured to the nearest cm on a measuring board where the first length interval is ½ cm. For most species, including sharks and rays, total length is measured from the tip of the snout to the tip of the longer lobe of the caudal fin. Rabbit fish and other chimaeras are measured from the tip of the snout to the front end of the caudal fin. For grenadier species, the pre anal fin length is measured, from the tip of the snout to the base of the first anal-fin ray.

For each station, the general rule is to measure **2-times** the continuous length interval of a given species. For haddock, it is **3-times** the length interval. For other species (non-commercial species) it is sufficient to measure 20 individuals at each station. If the number of fish exceeds these limits, the rest must be counted.



Common length-measurements

Length-measurements of chimaeras

Length-measurements of grenadiers

An example of measuring 2-times interval: *If the continuous length distribution of cod is 80 cm (e.g. between 21 and 100 cm) the number of measurements needed is 160. If the catch of cod at this station exceeds 160 fish, the rest must be counted.*

Samples for length measurements must be **randomly collected** so that the fish measured for length will reflect the length distribution of the total catch. If the length distribution is highly skewed, e.g. a relatively high abundance of small individuals compared to larger fish, care must be taken during sampling to ensure that the **correct proportion** between them is represented in the measurement.

Example 1: *High catches and highly likely that certain sizes will be measured first. Then it is best to divide the length measurement, e.g. 40% is measured in the beginning, 30% in the middle and 30% in the end.*

Example 2: *High abundance of haddock juveniles (11-20 cm) but only 20 individuals larger than 20 cm. It is decided to measure 10% of the juveniles, hence only 10% (or 2 individuals) of the larger individuals can be measured.*

METHODS FOR COUNTING

It is important that counting of fish from large catches is carried out correctly. Usually, a subsample needs to be taken based on certain units e.g. baskets, or compartments of the processing line. The (mean) number of fish in one unit is counted and multiplied by number of units to get the total number in the haul.

For very large catches, at least 2-3 subsamples are needed, e.g. taken at the start, middle and end of the process. Also, subsamples can be taken every n^{th} (e.g. every 10^{th}) unit and the number of units is then multiplied by the average number from the subsamples.

When subsamples are not taken but counting is made fish-by-fish, it is important not to count more than 100 fish at a time. The number 100 is given to the person doing data entry, starting again from zero. Avoid counting more than one species at a time and never count more than two species.

High numbers of fish counted sometimes look suspicious when analysing data. Therefore, it is important to register high numbers in notebooks that are kept with stations sheets. The rule is to **register all counting above 100 fish** in the notebook.

LENGTH BASED COUNTING:

If the length distribution of a species is highly skewed and it is almost impossible to get a representative sample using the method described above, it is possible to use the option ‚**Lengdarbilsháð talning**‘ (length-based-counting) in *Hafvog* data collection program. This option should only be used as an exception.

Using the haddock example above, it would be possible to measure 2-times the length distribution of haddock juveniles and all the larger haddock. The whole of the counted fish is then assigned to haddock at the length interval of 11-20 cm. This method is described in detail in the manual for *Hafvog.*

IMPORTANS: it is not allowed to register counting on the same station if ‚lengdarbilsháð talning' is used for a specific species.

Sex identification during length measurements: For the following species, the sex of individuals measured for length is also recorded: **Lumpfish, all skates and rays, sharks and chimaeras.**

At each station, length, sex and maturity stage of 20 individuals of **capelin** is recorded.

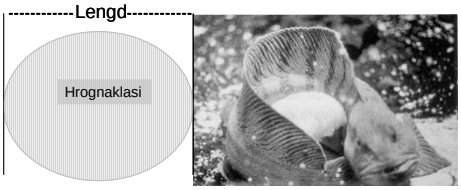
2.3.2 Length and counting of other groups

Number and/or weight of the following species/groups should be recorded:

Species / group	Nr.	Measurement function in *Hafvog*	Registration
Norway lobster and crabs *		*10 – Talning/þyngdarskráning*	Number
Squids	44	*10 – Talning/þyngdarskráning*	Number
Todorodes sagittatus (mantle length)	639	*1 – Lengdarmæling*	Length
Northern shrimp	41	*10 – Talning/þyngdarskráning*	Weight
Cucumaria frondosa	199	*10 – Talning/þyngdarskráning*	Number / Weight
Egg clusters of wolffish – **whole**	904	*3 – Kvörnun*	Length / Weight
Egg clusters of wolffish – **damaged**	904	*10 – Talning/þyngdarskráning*	Number
Egg cases (hatched / full)	90/91	*10 – Talning/þyngdarskráning*	Number
Chimaeras	183	*10 – Talning/þyngdarskráning*	Number
Skates and rays	344	*10 – Talning/þyngdarskráning*	Number
Sharks	345	*10 – Talning/þyngdarskráning*	Number
Marine mammals	1001-1063	*10 – Talning/þyngdarskráning*	Number
Seabirds	1100-1171	*10 – Talning/þyngdarskráning*	Number

* E.g. northern stone crab, common spider crab and other crab species.

Length measurement on whole egg clusters of wolffish is measured for maximum length (see figure). A common size of egg clusters is about 15 cm diameter for Atlantic wolffish and probably a little larger for spotted wolffish. In March, the egg clusters are probably greyish, and it is likely that eyes of larvae are visible.



2.4 Otolith sampling and weighing

Otoliths are sampled from 19 species. Fish for otolith sampling must be **sampled randomly**. Individual that was length measure should not be sampled for otoliths; hence it will be registered twice.

Minimum and maximum number of fish collected for otolith sampling as well as **sampling frequency** differs between species. For cod, sampling frequency differs between Northern and Southern areas. Otoliths collected from golden redfish >60 cm are registered as species 184.

Lumpfish: At each station, otoliths are collected from only one female and one male.

No	Species	Maximum / Minimum	N^{th} fish	Ungutted weight	Gutted weight	Liver weight	Gonad weight [1,2)]	Stomach analysis	Notes
1	Cod N	15/5	30	x	x	x	x	x	Max 10 for stomach analysis
1	Cod S	15/5	7	x	x	x	x	x	Max 10 for stomach analysis
2	Haddock	10/1	30	x	x	x	x	x	Max 5 for stomach analysis
3	Saithe	10/3	3	x	x	x	x	x	Max 5 for stomach analysis
5	Golden redfish	10/1	20	x					
6	Ling	10/5	4	x	x	x	x		
7	Blue ling	10/1	4	x					
8	Tusk	10/5	4	x	x	x	x		Genetic samples: W- and SE-areas
9	Atlantic wolffish	15/1	15	x	x	x	x		
13	Spotted wolffish	10/1	5	x	x	x	x		
14	Monkfisk	Allir		x	x				Two genetic samples from each fish
16	Spiny dogfish	(20/20)		x	x	x			Sex determination and weighing
21	Atlantic halibut	10/10		x	x	x			
23	Plaice	15/5	5	x					
24	Lemon sole	5/3	20	x					
25	Witch	10/5	15	x					
26	Megrim	5/5	15	x					Two genetic samples from each fish
27	Dab	10/3	15	x					
28	Long rough dab	1/1		x					
48	Lumpfish	2/1		x	x	x	x		1 female + 1 male
184	Golden redfish	5/1	20	x					>60 cm

[1)] Gonads weighted for all mature individuals (all lumpfish).
[2)] Female gonads weighted for cod >49 cm.

*A **random sampling** of fish collected for otolith extraction is important!*

Hafvog *is programmed to send a signal for every n^{th} length measured fish. The fish is either taken for otolith extraction immediately or put aside for later inspection. Fish collected for otolith sampling are not measured until the otolith extraction takes place.*

During otolith collection the following must always be recorded: length, sex, maturity stage. Furthermore, the following measurements are made (depending on species, see overview).

- Weight of ungutted fish

- Weight of gutted fish
- Liver weight
- Weight of roe and milt for mature fish and immature female cod > 49 cm

Sexual maturity is identified based on the handbook „**Greiningar á tegundum, kynþroska og fæðu" (Identification of species maturity and prey items)** and guidance found on **Ipad**. It may differ between different groups of fish.

It is important that researchers on different shifts and the cruise leader regularly compare each other when it comes to maturity identification.

Otoliths are extracted from all fish that enter otolith sampling. Small specimens (smaller than length provided in the following table) that enter otolith sampling, only need to be length measured and weighed ungutted, in addition to otolith extraction. The exceptions from this are long rough dab, common dab and plaice.

Number	Species	Length
1	Cod	16
2	Haddock	18
3	Saithe	19
5	Golden redfish	12
6	Ling	19
7	Blue ling	19
8	Tusk	19
9	Atlantic wolffish	25
13	Spotted wolffish	25
21	Halibut	16
24	Lemon sole	13
25	Witch	13
26	Megrim	13
48	Lumpfish	13

Otoliths from **all species** are put in **paper envelopes**. The following information are written on each envelop:

No. of fish – species – cruise id and station – length – sex – maturity

Otoliths are kept at the bottom of the envelope; else they may be broken when the envelope is stamped at the laboratory.

For each station, envelopes from each species are kept together with a rubber band (many) or paper clips (few). Envelopes of all species per station are kept together using rubber bands, without damaging the envelopes.

The envelopes are kept in an open box or bag and stored in a dry place.

2.4.1 Otolith sampling – the whole catch measured for length

The first fish of each species is taken for otolith extraction and every n^{th} fish thereafter, e.g. every 3^{rd} saithe. For species where a minimum of more than 5 fish/station is the rule, it is necessary to estimate whether the minimum number will be obtained by collecting every n^{th} fish. If this does not appear to be the case, the minimum number of fish need to be taken randomly aside for otolith sampling before finishing the length measurement

Example 1: *Plaice: The length interval turns out to be 30 cm, the total number of individuals is 55 and therefore all are measured for length. Every 5th fish (20%) is taken aside for otolith sampling 0.2×60 = 12 fish. The minimum of 5 fish is therefore obtained during the length measurement session.*

Example 2: *Cod: The length interval is 30 cm, the total number of individuals is 55 and therefore all are measured for length. Every 30^{th} fish (3%) is taken aside for otolith sampling 0.03x55=2 fish. The minimum of 5 fish is therefore not obtained and therefore additional 3 fish are taken randomly from the catch.*

2.4.2 Otolith sampling – part of the catch measured for length

When the catch is large and not all the fish are measured for length, sampling for length and otoliths typically happens in the following way (an example for cod in the Northern area):

1. *The length interval is 70 cm and the number of fish measured is therefore 2×70 = 140.*
2. *Every 20^{th} fish (5%) is taken for otolith sampling from the length measured fish, a total of 0.05×140 = 7 fish.*
3. *During counting of the rest of the cod, every 20^{th} fish also needs to be taken aside. A total of 400 cod were counted and from this group 0.05x400 = 20 fish are taken aside.*
4. *A total of 27 fish were therefore taken for otolith sampling, but since the maximum is 15 fish, the remaining 12 fish are registered as counted.*

2.5 Stomach content analysis

2.5.1 Predators and number of stomach analysed

Stomach contents from **cod, haddock and saithe** are analysed at sea. At each station, stomach contents are analysed from the first 10 cod and the first 5 haddock and saithe collected for otolith extraction. These fish should represent the size distribution of otolith-extracted fish (not only the largest or smallest fish).

2.5.2 Methods and registration of stomach content

Preferably the stomach content should be analysed concurrently with the otolith sampling and registered directly in *Hafvog.* Following biological measurements of the fish, the program asks for the ‚condition of the stomach' – categorised into five groups.

1. Containing prey
2. Empty
3. Regurgitated
4. Undigested remains
5. Everted

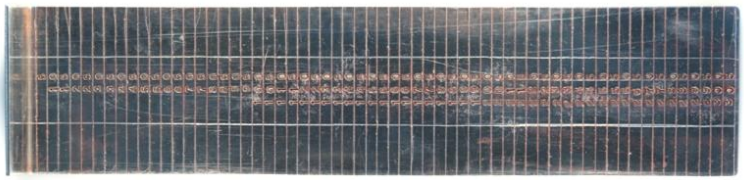
If condition of the stomach is graded 2 or 5 and has been registered as such, the data collection of that individual is finished, and the program asks for the length of the next fish in the otolith sampling.

If condition of the stomach is graded 1 or 3 the prey items are analysed. That follows directly after the entry of the stomach condition. Only use stomach condition = 3 when it is clear that a part of the stomach content has been lost.

1. Condition of the stomach is entered (1 or 3) and then press the **ENT**-key.
2. The prey group is chosen by prey id number (see list of prey groups) and then confirm with the **ENT**-key. **If prey is measured it is done at this step.**
3. **If the prey is to be length measured** select **F5** when the prey has been selected, and the program will enter length measurement of the selected prey. When the length measurement is finished, **F8** is used to get back to the previous step.
4. Total number of the prey (both measured and unmeasured) is registered and confirmed with the **ENT**-key.
5. The prey group is put on the scale and total weight is confirmed by the **ENT**-key. The program now asks for the next prey. If the weight of the prey group is < 1 g, weight should be estimated and the weight inserted manually.
6. When all prey items have been analysed, **F8** is used to go to the next fish in the otolith extraction. It is important to finish stomach content analysis with **F8**, otherwise all registration for the fish can be lost.

During analysis of stomach content, the following methods are applied:

- All prey items that **obviously have been eaten** in the trawl must be rejected, for example prey that is still alive. Fresh prey (but dead) could have been eaten just before the predator was caught by the trawl and must be accepted as valid.
- Fish prey should be identified to species level if possible, or else as far in the classification system as possible considering the conditions at hand. For each group of prey, the total number must be counted or estimated, and the group weighed.
- Intact prey fish that have been identified to species, are **measured for length in steps of 5-mm** using a specified measurement board. The maximum number per stomach is 30 fish of each prey species.



- The shrimp species northern shrimp (*Pandalus borealis*), pink shrimp (*Pandalus montaqui*) and northern ambereye (*Hymenodora glacialis*) are identified to species level when possible, as should Norway lobster.
- Other invertebrates are identified in accordance to the classification system. See list over common prey groups.
- List of prey groups is based on species or group identity numbers in the MFRI database. Arrow buttons can be used to search for prey in *Hafvog*.
- **Plastic materials found in stomachs should be registered in *Hafvog* as species number 998.**

Stomach content analysis can be postponed or made on a different weighing scale aside otolith collection. Then it is important that the connection between the individual fish in the otolith sample and the stomach sample is correct. The connection is the **station number**, **species ID number** and the **otolith ID number**, which is a running number for each species at each station. If analysis of the stomach content is postponed, it must be labelled with the above information to ensure registration to the right individual fish.

If analysis of stomach content is to be postponed, the **F8**-button is used after the condition of the stomach has been registered during otolith removal and weighing process, by which the program asks for the length of the next fish. This applies if stomach condition has been registered as "1 Containing prey" eða „3 Regurgitated", but for other conditions the data sampling is now finished.

Starting the stomach content analysis, the proper station is opened in *Hafvog* and '**20-Fæðugreining'** chosen from the main menu. The fish species and the individual number of the fish (otolith number) are chosen and the analysis of stomach content continued as described above.

2.6 Genetic samples from monkfish, megrim and tusk

Genetic samples will be collected from all monkfish and megrim. Genetic samples will also be collected from tusk according to the following table:

Area	Squares	Vessel	Number of samples
SE	412, 413, 462	Breki	50
W	374, 375, 376, 424, 425, 426	Breki	50
SE	310, 311, 360, 361, 410, 411	Þórunn Sveinsdóttir	50
NW	575, 576, 625	Árni Friðriksson / Þórunn Þórðardóttir	50

Fish are collected through normal otolith procedure. The otoliths are put in envelopes, relevant information written on the envelopes and registered in *Hafvog* in traditional manner. In addition, enter **F4** at some stage of the process to record that a genetic sample has been taken.

It is important to press F4 but not write manually ‚erfðasýni tekið' in the comment column in Hafvog. Otherwise, data will not be transferred between databases.

Instructions for sampling:

- Enter **F4** in *Hafvog* during otolith sampling.
- Use hook within the cap of the tube to remove a piece of muscle from the fish.
- Take two samples from each fish (two tubes). However, only take one sample from each tusk.
- Be sure to close the tubes well.
- Mark the tubes with stickers.
- Register station, species and number of fish on a sheet that is included.
- Put the tubes in a box in the freezer.

2.7 Registering marine litter

Plastic material and other litter that enters the trawl, are registered as number and weight (g) in *Hafvog* under 40-Draslskráning.

First, determine in which of the 3 categories the piece of litter falls:

- **Fishing gear**
- **Fishing industry (other than fishing gear)**
- **Litter (not necessarily originating from fishing industry)**

For example, trawl string pieces and trawl net are registered under 1 Fishing gear, but plastic and aluminium bottles under 3 Litter.

Under each category there are several sub-categories that allow for detailed classification. Only if the littes does not fall under any of the given sub-categories, use the appropriate 'other' subcategory (99). When using 'Other' category, note in the yellow notebook what kind of waste it was and the weight.

If the marine debris is clearly man-made but cannot be identified, use 3 Litter – Unidentifiable (98).

Do not register litter that originates from the ongoing survey. Those will usually be new cuttings of string and netting from mending of the trawl, or broken floats.

Important: All litter, also litter that the crew picks from the trawl on the upper deck, shall be registered. It is important that the crew is aware of this and alert researchers if large items are found. Items that are too heavy or bulky to be brough downstairs shall be classified and their weight estimated and manually entered in *Hafvog*.

2.8 Data registration

All information regarding species, length, counting, otolith collection, sex determination, weighing and stomach content analysis are registered in *Hafvog.* Cruise leader transfers a copy of the data to their computer and adds information from *Hafriti/*station sheets to every station.

2.9 Collection of uncertain species

2.9.1 Uncertain identification

IF SPECIES IDENTIFICATION IS UNCERTAIN – LABEL AND FREEZE THE SAMPLE!!

Some species may be difficult to identify and sometimes cause confusion. For example, skates, especially **grey skate, sharp-nosed skate, shagreen skate** and **spinytail skate**, and eelpouts, especially **Vahl's eelpout** and **pale eelpout. Atlantic poacher** and **poacher** have also been misidentified, as well as the **three-bearded rockling, northern rockling** and **arctic rockling** with the **five-bearded rockling** sometimes adding to the challenge.

When it is not possible to identify fish to the species level, e.g. using groups such as **Lumpenids** (84), **Lycodes sp.** (85), **Liparidae** (92), the specimens must in all cases be frozen.

When identification is uncertain, it is important to freeze the fish for further identification after the survey. When identification is uncertain, the individual is registered in *Hafvog* with the most likely species number, the individual put in a bag, marked 'Species – cruise id – station'. These fish are put in a box marked 'Cruise id – Klara'.

2.9.2 Rocklings

In recent years, occurrence of northern rockling (*Ciliate septentrionalis,* no. 562) has been noted off the south and west coasts of Iceland.

Northern rockling is quite similar to arctic rockling (*Gaidropsarus argentatus,* no. 88) but the two species can be identified by 2 lobes (arctic rockling) or 4 lobes (northern rockling) on the snout. In addition, northern rockling has skin fold above the upper lip and larger mouth. A similar species, the three-bearded rockling (*Gaidropsarus vulgaris*, no. 203) should be easily recognizable by chocolate-brown spots on head and body.

To confirm species identification of rocklings, and for teaching, all individuals of these three species should be collected and frozen on board the **research vessels** and **Breki**.

Northern rockling and three-bearded rockling are unlikely to be found north and northeast of Iceland, but researchers onboard the **research vessels** and **Þórunn Sveinsdóttir** should carefully check all arctic rockling and collect all samples of the other two species.

Rockling species are identified, measured for length and registered in *Hafvog,* and put in plastic bags and labelled with species and station number. Then frozen in a box marked 'Cruise id – Klara'.

2.9.3 Collection of eelpouts

In the survey areas of the research vessels 10 specimen of five species of eelpouts (Esmark's eelpout, Vahl's eelpout, arctic eelpout, pale eelpout, *Lycodes seminudus*) aret o be collected. The individuals may be collected from the same station or from multiple stations. Individuals of the same species and same station are put into a plastic bag, labelled with cruise id and station, the bags are put in a box, marked ‚Cruise id - James' and then the box is to be frozen.

2.10 Samples for contamination

2.10.1 Sampling of cod for monitoring the marine environment (AMSUM)

MFRI takes part in an international monitoring of the state of the fishing grounds in the Northeast Atlantic, with respect to polluting substances and other trace substances. Pollutants measured include heavy metals (e.g. mercury, lead, cadmium, zink, copper, selen and arsene) and persistent organic pollutants (e.g. PCB and DDT).

The substances are found in low concentrations in the muscle tissue, and it is important to avoid any external contamination. Ensure that the fish do not come into contact with any source of contamination. Check carefully if there are any signs of contamination from hydraulic fluids.

Sampling plan (number of individuals within each area):

W-area	E-area	
Árni Friðriksson	**Þórunn Sveinsdóttir**	**Length (cm)**
25	25	30-45

Sampling: Cod may be collected from several stations within the specified area.

Handling of samples, packing and labelling: It is important that the fish and equipment are kept clean of oils or any other smutch and dirt.

1. The length, ungutted weight and gender of the fish are recorded (male/female).

2. The liver is extracted from the fish, put in a 100 ml glass jar and closed tightly. Note that the jars are cleaned thoroughly and should not be kept open for a longer time than necessary. When the livers are in the jars, the jars should be kept in an upright position so that the livers will not touch the lid. Note that labels are not to be put into the jars. The lids of the jars are labelled by running numbers according to the number of fish in the form, using permanent marker. Furthermore, the number is written on an attached sheet.

3. Other viscera are extracted from the fish and thrown away. The fish is put in a plastic bag, labelled with the number of the jar (the number of the sample). The label is put into a small envelope, and the envelope put into the plastic bag with the fish.

4. On the forms following information is to be registered: Cruise and station number, number of sample, ungutted weight and gender of the fish.

5. The samples are put in the freezer immediately after data collection at the station is finished, bot the fish and the jars containing livers.

Fish from the same station can be put together in a separate plastic bad, identified by the cruise and station number. Th fish are to be frozen in a **straight position**.

2.10.2 Monitoring undesirable substances in commercial fish

Sampling for Matís. The purpose of the project is to gather information and evaluate the status of Icelandic seafood products in terms of undesirable substances. Substances measured include heavy metals, dioxins and dioxin like PCB, marker PCBs, brominated flame retardants (PBDE), polyaromatic hydrocarbons (PAH) and pesticides. Below are instructions on how samples shall be collected.

The substances are found in low concentrations in the muscle tissue, and it is important to avoid any external contamination. Take care that the fish do not come into contact with any source of contamination. Check carefully if there are any signs of contamination from hydraulic fluids.

1. The fish is bled when applicable, gutting not needed (exception is the sample where cod is frozen gutted and livers sampled into jars).
2. Each fish is put in a plastic bag.
3. A label containing the following information is put in a small plastic envelope, and the envelope put in the plastic bag for each fish.

   Species – cruise id – station number – size class- number of fish

4. Each sample (usually 10 fish) is put in a separate box and carefully labelled. Note that if all 10 fish are not collected from the same station, it is important that all fish are caught in the sam area/fishing ground. Each individual fish is labelled with station number.
5. Finally, the whole sample is frozen.

Species	Area	Vessel	Number	Size class(cm)
Cod (gutted)	W or NW	Árni Friðriksson	10	60-70
Cod liver	-	Árni Friðriksson	10	-
Atlantic wolffish	W	Árni Friðriksson	10	50-60
Ling	W or NW	Árni Friðriksson	10	Equal size
Cod	E or NE	Þórunn Sveinsdóttir	10	50-60
Saithe	E or NE	Þórunn Sveinsdóttir	10	60-70
Tusk	W or NW	Þórunn Þórðardóttir	10	40-50
Haddock	N	Þórunn Þórðardóttir	10	50-60
Golden redfish	N	Þórunn Þórðardóttir	10	30-40

3 Station information

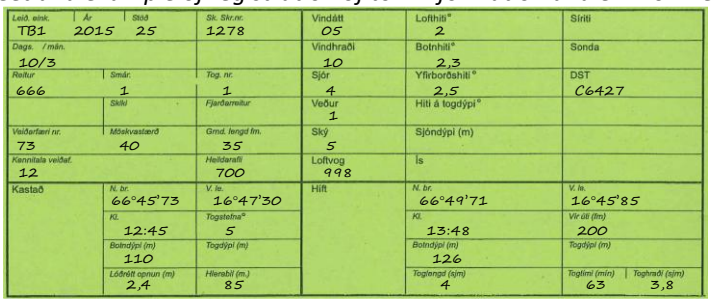
3.1 Station information

Information on the tow and environmental factors are to be registered by the captain and the first officer in the upper part of the paper 'Station sheet', in co-operation with the cruise leader. All remarks and comments regarding the station are written on the 'Station sheet' and later entered in a specific 'comment' field in *Hafvog.* Part of these information are registered automatically through the program *Hafriti*, which in on board the research vessels. Captain/first officer register in *Hafriti* when tow starts and ends. Cruise leader transfers data from *Hafriti* to *Hafvog* when data for individual station is uploaded.

Registration of total catch (kg). In each tow, total catch is estimated in kg, e.g. 50, 100, 200, 300, 500, 1000, 1500, 2000, 3000 kg. This is best done either on-deck or in the fish reception at the trawlers, but onboard the research vessels all catches are weighed in a weighing trough before sorting. The estimated total catch of the station is recorded in the notebook. It must be noted if a large part of the catch is something that is not recorded, e.g. benthic invertebrates or gravel from the bottom.

The cruise leader compares the estimated total catch with the calculated catch in *Hafvog.* This comparison is part of the 'Quality control by cruise leaders' (see Chapter 3.6).

Upper part of station sheet and example of registration of tow information and environmental factors:



Leið, eink. TB1	Ár 2015	Stöð 25	Sk. Skr.nr. 1278	Vindátt 05	Lofthiti° 2	Síriti
Dags. / mán. 10/3				Vindhraði 10	Botnhiti° 2,3	Sonda
Reitur 666	Smár: 1		Tog. nr. 1	Sjór 4	Yfirborðshiti° 2,5	DST C6427
	Skilti		Fjarðarreitur	Veður 1	Hiti á togdýpi°	
Veiðarfæri nr. 73	Möskvastærð 40		Gmd. lengd fm. 35	Ský 5	Sjóndýpi (m)	
Kennitala veiðaf. 12			Heildarafli 700	Loftvog 998	Ís	
Kastað	N. br. 66°45'73	V. le. 16°47'30		Hift	N. br. 66°49'71	V. le. 16°45'85
	Kl. 12:45	Togstefna° 5			Kl. 13:48	Vír úti (lm) 200
	Botndýpi (m) 110	Togdýpi (m)			Botndýpi (m) 126	Togdýpi (m)
	Lóðrétt opnun (m) 2,4	Hlerabil (m.) 85			Toglengd (sjm) 4	Toglími (mín) 63 / Toghraði (sjm) 3,8

3.2 Tow information

A paper ‚Station sheet' must be filled for each tow (station). Information that must be registered include **cruise ID** (e.g. TB1 for trawler Breki, the first cruise in the given year), **year**, **station** (running number), **vessel registry no**. of the given vessel and **date**. Furthermore, number of the **statistical square** within which the tow is located, the number of **sub-square**, and **tow number** which is a fixed number for the tow (see Station list and map). Note that the sub-square for each tow has been fixed and is registered according to the Station list. The ID number of the **gear type** (73), **mesh size** (40 mm), **sweeps length** (35 or 45 fm) and the **gear ID** are also entered.

The **geographical location** of the stations is registered as latitudinal and longitudinal coordinates (in degrees, minutes and seconds converted to decimal minutes) according to GPS calculations, **depth** in meters and **time** in hours and minutes (clock, four number digits) at the **beginning** and **end** of each trawl haul. The tow starts when the trawl touches the bottom and end when the hauling of the trawl starts. **Trawling direction** in degrees is registered, as well as **warp length** used (fm). **Trawling speed** and **trawling distance** is calculated with GPS. **Vertical** and **horizontal opening** of the trawl is registered in meters (mean values for the whole haul) according to information from sensors at the trawl.

If it is not possible to finish a full tow, e.g. because of snagging of the trawl or other malfunctions, it is necessary to register the reasons and the location of the snag.

3.3 Environmental information

Information on weather and other environmental factors are registered as follows:

1. Wind speed is registered in **m/s**. If an anemometer is onboard it is necessary to observe it for a few minutes as wind speed or direction is never stable but fluctuates around some mean value.

2. **Wind directions** are registered according to the following table:

Calm	00	**SE**	14	**W**	27
NNE	02	**SSE**	16	**WNW**	29
NE	05	**S**	18	**NW**	32
ENE	07	**SSW**	20	**NNW**	34
E	09	**SW**	23	**N**	36
ESE	11	**WSW**	25	**Not defined**	99

3**. Weather, clouds, sea state and sea ice.**

	Weather	Cloud cover	Sea ice	Sea	Wave height (m)
0	No clouds, clear	No clouds	No ice	Calm (glassy)	0
1	Cloudy	1/8 or less but not 0	Ice is close, directly visible or in radar, but the type is unknown	Calm (rippled)	0 - 0.1
2	Overcast	1/8	Few icebergs ≤ 10	Smooth (wavelets)	0.1 - 0.5
3	Sandwind, soilwind	2/8	Many icebergs > 10	Slight	0.5 - 1.25
4	Fog or mist	3/8	Very thin or thin cover of drift ice, < 6/10 in density, in more than 1 nm distance from station	Moderate	1.25 - 2.5
5	Drizzle	4/8	Dense or very dense cover of drift ice, > 6/10 in density, in more than 1 nm distance from station	Rough	2.5 - 4
6	Rain	5/8	Very thin or thin cover of drift ice, < 6/10 in density, in less than 1 nm from station	Very rough	4 - 6
7	Snow or sleet	7/8 or more but not 8/8	Dense or very dense cover of drift ice, > 6/10 density, in less than 1 nm from station	High	6 - 9
8	Shower	7/8	Station within a dense drift ice	Very high	9 - 14

4. **Air temperature** is measured in °C.

5. **Surface temperature** is measured in °C and read from a pre-calibrated thermometer in the bridge (sjá next Chapter). Surface temperature is recorded with a 0.1°C resolution.

6. **Bottom temperature** is measured in °C with *Scanmar/Marport* trawl sensor or a similar instrument. The trawl sensor must be calibrated according to next Chapter. Bottom temperature is recorded with 0.1°C resolution. Bottom temperature is also measured every 1 minute with *Starmon TD* temperature and depth recorders places on the upper belly of the trawl (inside the belly, hence in case the recorder loosens it will be captured by the trawl).

When switching between trawls, e.g. when one trawl is damaged, the *Starmon TD* recorder needs to be swapped to the trawl to be used.

7. **Air pressure** is recorded at each station.

3.4 Temperature recorders and calibration of ship sensors

Pre-calibrated recorders from Star-Oddi (*Starmon TD*) are used to log temperature and depth during the tows. *Scanmar/Marport* sensor data are also logged and used to fill out the station sheet. To be able to calibrate the *Starmon TD* and *Scanmar/Marport* data against each other, the following procedure should be followed:

Sensors:

- The main sensor used is *Starmon TD* – in large stainless steel housing. It will remain on the trawl for the entire survey and has to be swapped between trawls in use. *Starmon TD* sensors are delivered on board in measurement mode and will take a measure every minute.
- A spare sensor (*Starmon mini* – small stainless housing) is provided in case of loss of the main sensor. It will be delivered in measurement mode and will take a measure every minute.

Calibration:

- The cruise leader will select 2 stations close to the beginning of each survey half (if possible one in cold and one in warmer sea water).
- A provided *Excel* template is used to register the temperature of the trawl and trawl-door sensors (over a period of at least 10 minutes in one minute intervals) after the trawl has settled on the bottom (comparing bottom temperature).
- When the trawl is hauled at this station it has to be held at the surface for at least 5 minutes (comparing surface temperature) and the measurements entered in the *Excel* sheet.
- An *Excel* sheet can be found with other data provided to the cruise leader.
- Ensure that the dat, time and station for the entries in the *Excel* sheet are correct.
- The comparison and adjustment of temperature will happen after the survey.

3.5 Collecting data from *Scanmar/Marport*

On board the research vessels information from *Scanmar/Marport* are registered in *Hafriti*. This information is gathered with computer connected to *Scanmar/Marport* in the bridge of the trawlers. The data needs to be uploaded into the MFRI database after the survey.

3.6 Quality control by cruise leaders

An important role of the cruise leader is to ensure that the survey is carried out according to the manual for the project and other guidelines. The cruise leader works in close contact with captains,

first officers and researcher, handles registrations, preliminary data analysis, data correction and participates in data collection when necessary. Cruise leader shall call to a meeting with crew and researchers in the beginning of the survey.

It is important that data are preliminary analysed at sea so that errors or incorrect methods can be corrected in time. If it is not possible to correct data, data correction shall be sent to data manager along with other data after the survey.

The following are suggestions for a minimum data-scrutinization by cruise leaders, best preformed with *R*. 'Mælaborð íslenzkra ralla' (SMX app), an inhouse-made app based on *R* has been used to visualize and scrutinize the data and is now the most important method used.

Length measurements:

- Check minimum and maximum lengths for all species and compare to limits allowed in *Hafvog*.
- Check station information in *Hafvog,* e.g. if all species are measured for length (there shoulr be no species where only numbers are counted).

Otoliths and maturity determination: Scan data for fish collected for otoliths. Is there something 'abnormal', e.g. many sexually mature small fish, gadoids with maturity stage 4 (should not be the case at this time of year), big and immature fish, inconsistency between shifts etc. Discuss all discrepancy in maturity identification with researcher.

Weights: Check length-weight relationships graphically. Are there many fish outside confidence limits? This could happen, e.g. if the weighting scale is incorrectly calibrated, or if the person doing data entry enters weight before the weighing scale is stable.

Counting:

- Make sure that all counting of fish above 100 are registered in the notebook. Compare abnormally high numbers in *Hafvog* with numbers written in the notebook.
- Make sure that the methods for counting fish from large tows are properly conducted (e.g. number of subsamples).

Notes and counting in notebook: Check if account has been taken to comments in the notebook, e.g. if counting data are missing or significant correction written in the notebook have not been made in *Hafvog.* It has happened that corrections listed in notebooks have not entered the MFRI database.

Total catch: Check if estimated (weighted) total catch is in accordance with weight calculated by *Hafvog.* If there is a large difference, the cause must be ascertained, e.g. if sampling was skewed or something is wrong with counting of fish.

Stomach analysis: Scroll through prey of fish collected for otoliths in *Hafvog,* abnormal numbers and weights of prey groups etc. There should be no negative values. Check whether number of prey is a common number of prey group (e.g. 186, Krill), which is also the next registered prey.

Species identification: Check species composition at each station, especially look for species that are 'unexpected' for that station. Also, if species that have always been recorded before do not exits this year – and then whether possibly a different species appears that has not been seen before.

Station information:

- At the end of the survey, or 2-3 times during the survey (or before data are sent to data manager): extract all station and tow data into a table. Look for suspicious values, or missing data which should be included.
- Check if the combination square-tow number (e.g. 416-11) has unique values.
- Check carefully if registrations of tow information and environmental factors (e.g. wind speed and units for sea) made by captains, are in accordance to instructions in this manual. Check if the correct units are used.
- Plot environmental factors and tow information graphically. Are vertical opening, horizontal opening etc. similar to earlier years?
- Check dates and timings around midnight. Occasionally, a station is started in *Hafvog* before midnight whereas the haul starts after midnight, and vice versa. The time when the trawl seta at the bottom decides the date.

4 Stations

4.1 Fishing methods

Positions, directions, speed and length of tows: positions of tows are according to the station list and towing trajectories from previous surveys. The tow direction is the one given in the station list or the opposite direction. The towing speed is 3.8 knots over the bottom. The trawling distance is 4.0 nm, from when the trawl has set on the bottom until the hauling begins. However, several tows are shorter than 4 nm.

Warp length: The length of the towing warp of each tow is not fixed but should be similar to earlier years. The length of the towing warp may also be decided in relation to position and status of the trawl according to measurements from trawl sensors.

Invalid tows, snags, net damage etc.:

- A tow is invalid and needs to be repeated if;
  - There is a hang up before a towing distance of 2 nm is reached.
  - Something is wrong in relation to the trawl, such as if the codend is stuck to the headline, the wings are damaged or something is wrong with the otter boards.
  - The codend has a hole.
  - If the trawl is damaged without snagging, the tow is only valid if the locations and/or size of the damage undeniable did not affect catchability of the trawl.
- If the net in the upper or lower belly, wings and the square have holes or are ragged, the tow is only valid if it is believed to have had no effect on the sampling efficiency of the trawl and the tow length is at least 2 nm.
- If parts of the headline, footrope or the sweeps are broken, the tow is only valid if the tow has reached at least 2 nm and the trawl is hauled immediately and snagging is believed to be the cause of the breakdown.

In cases where the tow needs to be terminated due to potentially very high catches, e.g. of golden redfish, it is necessary to sail over the remainder of the tow. Write a note on station sheet whether the echosounder indicates a similar or different amount of fish compared to the first part. On research vessels data from the echosounder need to be saved.

Number of repetitions: When invalid tows are repeated, a towing distance of 2 nm is sufficient. If a repeated tow is also invalid, the cruise leader must decide whether a third attempt shall be made, e.g. by shifting the tow track or changing the tow direction. Trawlers get paid for these tows according to extra tows. No data sampling takes place on invalid tows and they do not receive a station number.

Weather: Trawling is stopped when wind force exceeds 18 m/s or with corresponding sea condition.

Following issues are important during towing and documentation of information on each station:

- Towing station is not fixed; captains decide from which end each tow starts.
- If a stationary fishing gear (e.g. gillnets, longline) are within the towing direction of a given station, the tow shall be relocated by a maximum of **2 nm** from the standard tow, but only if depth and bottom type is similar to the standard tow. Otherwise, the tow is omitted.
- In some years, 1-2 tows at the south coast have been omitted due to hugs amounts of spawning capelin. A tow of 1 nm should be carried out, rather than omitting the tow.
- Sub-square within each statistical square is given in the station list.
- All deviations from the standard tow need to be documented on the station sheet.

Locations and other information on the tows are found in the station lists and maps.

Malfunctions of equipment: It is not self-evident to resume sampling if important research equipment, such as temperature sensors or weighing scales, break down during the survey. In such occasions the possibility must be considered to sail to the next harbour and get the equipment repaired. If this solution is not applicable, the cruise leader must consult the coordinator of the project for the next steps.

4.2 Stations

Total number of stations is 580 and are divided between the vessels:

Area	Vessel	Number of stations
S, SW-area	Breki	154
E, NE-area	Þórunn Sveinsdóttir	151
N, NW-area	Árni Friðriksson / Þórunn Þórðardóttir	275
All areas		**580**

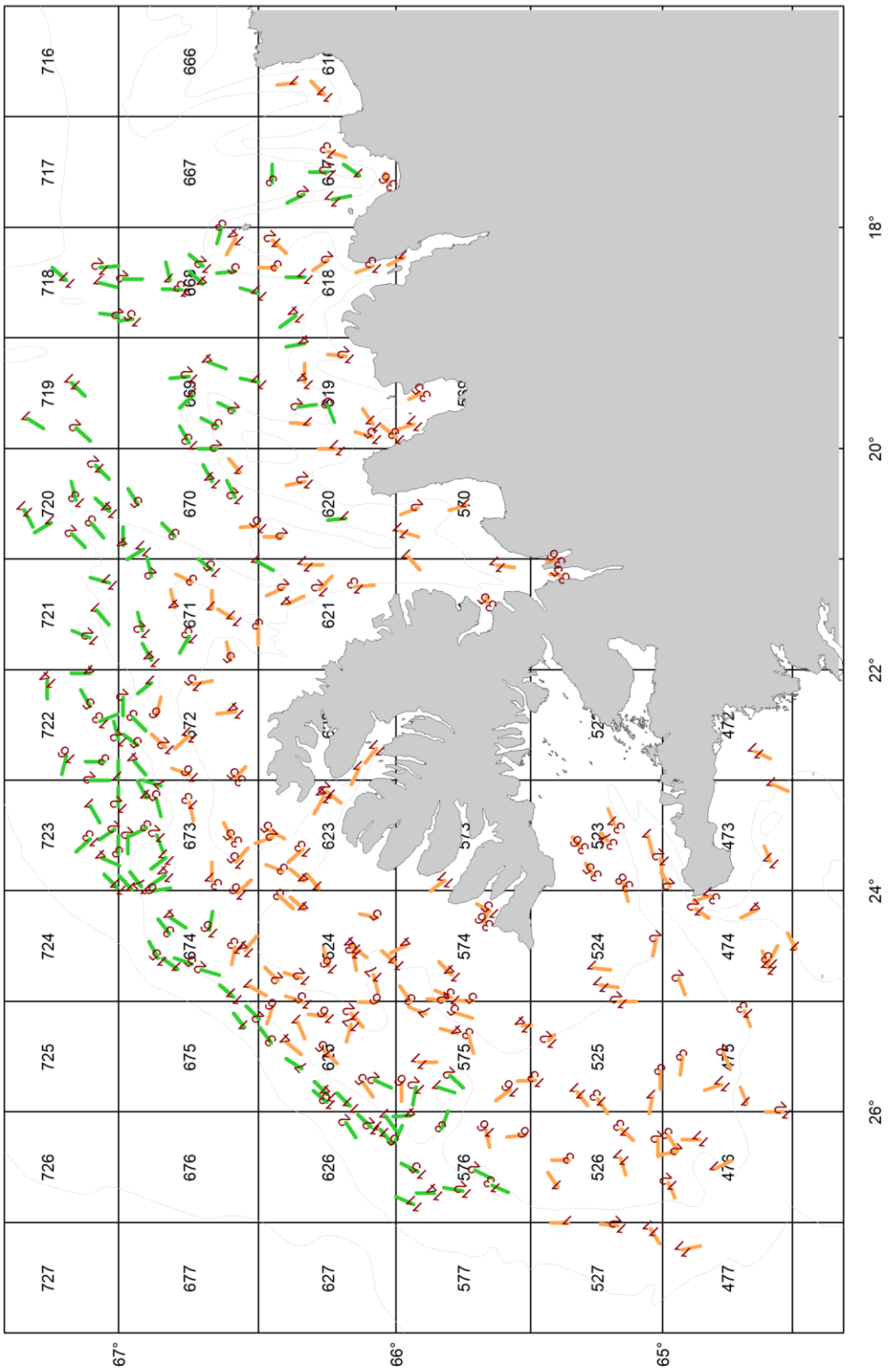
Information on warp lengths in the station list is according to the median of registered warp length in 2005-2013. The column *Warp fm* shows the median of those years.

Tow with tow number 1-9 were originally selected by captains, tows with tow number 11-19 were set out randomly but adjusted by captains, and tow numbers 31-39 indicate shallow-water tows added in 1993 and tows that have been added since then.

CRUISE LEADERS! All notes and comments on tows must be delivered to the coordinator of the project after the survey. Remember to document the comments in the station list form in *Hafvog.*

Plotting the tows. The actual tows must be plotted and saved by captains. Cruise leaders take a copy of the plots at the end of the survey and deliver them to the project coordinator.

4.3 Stations – research vessels



Stations in the survey area of the research vessels. Sweeps of 45 fm are used at green stations.

Station list in the survey area of the research vessels.

Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
472	11	3	643866	224449	643503	224827	44	57	35	100	205	4	
473	1	4	643459	230230	643092	230587	67	99	35	135	208	4	Note
473	2	1	645832	235780	650031	235005	222	226	35	250	50	4	Note
473	11	3	643509	234405	643657	233584	127	137	35	160	65	4	
474	1	4	642905	243151	643103	242286	138	204	35	230	75	4	
474	2	1	645625	244750	645490	245650	136	163	35	230	250	4	
474	4	4	643840	241050	644200	241470	110	140	35	160	320	4	Note
474	11	3	643547	244187	643700	243287	240	280	35	275	60	4	
474	12	2	645244	240970	644936	241488	162	182	35	280	215	4	
474	13	3	643544	243813	643345	242991	247	237	35	280	119	4	Note
474	31	2	644897	240260	645289	240558	69	95	35	100	340	4	Note
475	1	3	644052	255560	644204	254676	210	232	35	260	70	4	
475	2	3	644600	252770	644440	253620	175	200	35	225	240	4	
475	3	1	645540	253040	645600	254000	161	179	35	215	290	4	
475	11	1	644638	254510	645040	254810	186	201	35	220	340	4	
475	12	3	643213	255996	643615	255998	200	228	35	290	360	4	
475	13	4	644117	250515	643973	251339	200	206	35	270	250	4	
476	1	2	644777	263080	644422	262656	203	191	35	240	145	4	Note
476	2	2	645664	262152	650050	262330	154	188	35	200	345	4	Note
476	3	2	645884	261270	645661	262073	164	178	35	230	248	4	
476	11	2	645145	261491	645550	261483	171	186	35	250	355	4	Note
476	12	1	645872	263848	645719	264667	197	216	35	250	245	4	
477	11	2	645549	271470	645138	271269	380	408	35	450	170	4	Note
521	35	2	652344	210869	652571	210833	50	72	35	90	8	2.3	
521	36	2	652438	210011	652635	210125	66	72	35	110	344	2	Note
523	1	3	650330	233031	650235	234000	100	260	35	190	260	4	
523	12	3	650050	234250	650000	235250	148	241	35	240	260	4	
523	31	4	651093	232431	651245	231553	121	135	35	130	73	4	Note
523	35	1	651618	235031	651753	234520	62	57	35	75	63	2.5	
523	36	1	651903	233553	652054	233077	66	55	35	75	41	2.5	
523	37	3	651252	233304	651423	232858	55	58	35	70	47	2.5	
523	38	3	650900	235600	650788	240580	76	98	35	90	250	4	
524	1	3	651580	244184	651187	244282	89	96	35	95	190	4	
524	2	4	650145	242610	650230	243550	103	117	35	125	275	4	Note
524	11	3	651420	245130	651020	245260	96	107	35	110	205	4	
524	12	3	651008	250000	650600	250000	119	126	35	120	180	4	
525	1	3	650228	255190	650310	260100	170	174	35	185	280	4	Note
525	3	3	650050	253810	650050	254760	163	176	35	180	270	4	Note
525	11	1	651950	254900	651710	255650	139	148	35	160	250	4	
525	12	2	652596	252139	652462	251803	94	95	35	140	134	2	Note
525	13	3	651480	255280	651255	260080	148	157	35	165	250	4	
526	1	1	652382	264097	652608	263290	182	200	35	210	67	4	Note
526	2	4	650110	261480	650100	262416	159	174	35	190	270	4	
526	3	2	652120	262626	652520	262606	154	160	35	180	360	4	
526	11	4	650967	262508	650840	263420	164	183	35	180	250	4	
526	12	3	651026	270180	651420	270090	238	250	35	265	10	4	Note
526	13	4	650952	260930	650670	261535	161	170	35	180	220	4	
527	1	2	652145	270030	652540	270002	265	302	35	280	360	4	
527	11	4	650280	270350	650065	271140	232	333	35	290	255	4	Note
568	1	2	655820	181630	660180	182070	90	113	35	150	330	4	
569	11	1	655600	194700	660000	195000	81	117	35	130	343	4	
569	35	1	655447	193009	655714	193347	105	100	35	150		3	
570	1	1	654428	203091	654824	203346	76	95	35	140	343	4	
570	2	1	655515	203220	655890	203590	117	138	35	170	334	4	
570	11	1	655900	204500	655500	204800	126	153	35	175	200	4	Note
571	1	2	655740	205880	655470	210600	110	220	35	260	230	4	Note
571	11	4	653757	210340	653360	210460	120	128	35	150	188	4	Note

571	35	4	653977	212379	653995	212075	150	141	35	250		3	Note
573	11	1	654915	235449	655242	240026	52	63	35	65	340	4	
574	2	1	654934	245945	655310	245870	72	91	35	90	10	4	
574	3	1	655675	250020	655910	245175	102	117	35	130	40	4	Note
574	4	1	655770	242955	660110	243390	70	83	35	95	340	4	Note
574	5	3	654290	245960	654690	245960	69	83	35	90	360	4	
574	13	1	654770	245800	655130	245400	67	71	35	80	207	4	Note
574	14	1	654760	244550	655050	243850	65	80	35	85	45	4	Note
574	15	4	653905	241100	654212	240717	51	23	35	55	30	3.5	Note
574	36	4	654060	241730	653940	241080	26	43	35	55	117	3	
575	1	1	655072	254665	654700	254939	195	207	45	230	220	4	
575	2	1	654799	254007	654500	254687	222	250	45	220	230	4	
575	3	4	654390	251870	654280	252810	135	190	35	190	260	4	Note
575	4	2	654634	251746	655013	251470	102	120	35	120	30	4	Note
575	5	4	654691	250630	654300	250909	74	83	35	90	210	4	
575	6	1	655876	254431	655885	255425	176	194	35	200	270	4	
575	7	2	655340	250680	655712	250320	119	146	35	135	30	4	Note
575	11	1	655502	253290	655100	253297	137	157	35	170	180	4	
575	12	1	655555	254630	655630	255620	189	207	45	200	105	4	
575	13	3	652892	254275	653297	254320	107	120	35	135	360	4	Note
575	14	1	653183	251317	652987	251298	80	79	35	130	180	2	Note
575	16	3	653460	254786	653779	255387	120	129	35	135	330	4	Note
576	2	3	654248	263157	653887	263600	182	172	45	200	209	4	
576	3	2	654990	260931	654850	255950	222	259	45	230	105	4	
576	4	2	655662	260207	660062	260255	182	232	45	225	3	4	
576	5	2	660027	261681	655860	260750	223	230	45	275	116	4	
576	6	4	653128	261250	653538	261360	157	167	35	180	360	4	Note
576	11	1	655610	265020	660000	264600	370	379	45	430		4	
576	12	1	654520	264280	654936	264120	254	309	45	310	15	4	Note
576	13	3	653870	263990	653501	264360	200	195	45	210	203	4	
576	14	1	655150	264426	655550	264400	250	320	45	300	25	4	
576	15	1	655510	263260	655878	262787	287	300	45	300	30	4	
576	16	4	654000	260970	653919	261895	178	189	35	195	255	4	
616	1	1	662200	164190	662600	164280	113	136	35	171	345	4	
616	11	1	661576	164822	661861	164092	196	202	35	250	65	4	
617	1	3	660800	173200	661150	172600	170	180	45	225	35	4	
617	2	1	662015	174220	662380	174680	158	198	45	220	0	4	
617	3	1	662700	173600	662700	172600	216	324	45	370	90	4	
617	11	3	661400	174500	661000	174300	162	216	45	260	175	4	
617	12	2	661500	173000	661900	173000	216	234	45	270	360	4	Note
617	13	4	661500	171900	661100	172200	126	171	35	210	200	4	Note
617	36	4	660192	173577	660238	173089	87	93	35	140	83	2	
618	2	2	661490	181780	661820	182340	171	180	35	230	333	4	
618	3	2	662600	182200	663000	182200	99	162	35	180	360	4	
618	11	2	662000	182700	662400	182700	135	189	45	220	355	4	
618	12	2	662700	180700	662400	181400	63	76	35	130	225	4	Note
618	13	4	660508	182120	660882	182470	72	131	35	155	335	4	
618	14	1	662200	184800	662540	185420	400	431	45	430	310	4	Note
619	1	1	661900	194700	662315	194625	180	200	35	220	360	4	
619	2	1	662150	193747	661750	193620	160	225	45	220	170	4	Note
619	3	3	661495	193650	661355	194580	180	225	45	220	260	4	Note
619	4	2	662000	190300	662400	190500	189	225	45	270	350	4	
619	11	3	660500	194700	660737	193860	117	171	35	170	55	4	
619	12	4	661100	191000	661500	190900	81	126	35	150	0	4	
619	13	3	660000	195400	660310	194776	82	146	35	150	38	4	
619	14	2	662000	192400	662000	191400	117	198	35	200	90	4	
619	15	3	660500	195400	660900	195100	150	153	35	200	17	4	
620	1	3	661100	203800	661500	203900	171	207	45	240	350	4	
620	2	1	662476	204787	662878	204816	176	183	35	230	356	4	Note
620	11	3	661300	200000	661700	200000	135	153	35	200	182	4	
620	12	2	662000	201800	662400	202000	90	162	35	190	350	4	

621	1	2	663040	210120	662688	210613	185	165	45	240	210	4	
621	2	2	662450	211560	662834	211986	160	180	35	225	325	4	
621	3	1	663000	213660	663012	214670	81	133	35	130	270	4	Note
621	4	2	662380	212470	662020	212030	108	133	35	150	325	4	
621	11	2	662000	210300	661600	210300	135	153	35	200	180	4	
621	12	2	661680	211650	661410	210920	100	145	35	160	145	4	Note
621	13	4	660900	211500	660488	211421	90	112	35	140	175	4	
622	1	3	660810	225350	660990	230230	130	139	35	130	300	4	Note
622	11	3	660430	224300	660680	225070	125	130	35	120	310	4	Note
623	1	1	661691	235890	661950	235101	70	82	35	90	50	4	
623	2	1	662690	233120	663080	233420	111	148	35	160	350	4	
623	3	1	662469	234948	662841	234581	152	182	35	175	360	4	Note
623	4	1	662010	235470	662320	234830	107	130	35	125	40	4	
623	5	2	662802	232700	662441	233160	74	157	35	150	205	4	
623	12	4	661520	230620	661210	231250	109	124	35	115	210	4	Note
623	13	1	662046	233771	662358	234450	111	167	35	180	320	4	
623	14	2	661580	230879	661787	231806	65	111	35	90	310	4	
624	1	1	663200	245168	662841	245680	159	166	35	180	210	4	
624	2	1	662580	244880	662860	244150	107	119	35	125	45	4	
624	3	2	662550	240310	662245	240980	120	129	35	130	225	4	
624	4	2	662011	241020	662315	240350	117	120	35	130	45	4	
624	5	4	660410	241470	660800	241270	54	65	35	80	10	4	Note
624	6	3	660420	250030	660825	250033	102	128	35	130	0	4	Note
624	11	3	660007	243937	660312	243245	89	102	35	105	35	4	Note
624	12	1	662070	244720	662450	244438	95	106	35	130	10	4	
624	13	3	660948	243296	660870	244318	89	111	35	115	255	4	
624	14	3	660965	243030	660640	243620	98	126	35	140	205	4	
624	15	1	662030	250020	662420	245711	120	139	35	155	10	4	
624	16	1	661475	244094	661592	243100	83	94	35	90	85	4	
624	17	3	660497	244540	660400	245520	131	136	35	160	250	4	
625	1	2	662157	251117	662002	252024	161	173	35	180	250	4	
625	2	3	660475	254290	660100	254680	181	200	45	190	190	4	
625	3	2	662723	252254	662972	251437	256	296	45	330	45	4	Note
625	4	2	662400	252197	662082	252877	167	185	35	200	225	4	
625	5	3	660739	254379	660500	255180	173	170	35	190	230	4	
625	6	2	662709	250297	662815	251225	175	185	35	205	280	4	
625	7	1	662060	253667	662405	253117	278	333	45	360	30	4	
625	11	3	661010	255680	661295	254980	222	263	45	280	45	4	
625	12	4	660985	250650	660720	251410	102	109	35	120	230	4	
625	13	1	661520	255476	661812	254850	380	393	45	400	35	4	
625	14	1	661500	255047	661786	254349	296	314	45	340	45	4	
625	15	4	661575	252660	661294	253361	150	176	35	170	220	4	
625	16	2	661535	250800	661911	250693	126	148	35	160	15	4	
625	17	4	660985	251250	661095	252210	126	148	35	150	290	4	
626	1	4	660230	260210	660001	261009	191	213	45	210	225	4	
626	2	4	661107	260575	660880	261398	386	465	45	465		4	Note
626	11	4	660342	260960	660085	261737	248	245	45	265	231	4	
626	12	4	660550	260830	660840	260140	265	287	45	320	45	4	Note
668	1	2	664900	182900	665000	181900	230	242	45	300	80	4	
668	2	2	665900	182800	665500	182800	180	225	45	250	180	4	
668	3	4	663800	180000	663900	180900	153	189	45	220	275	4	Note
668	4	4	664200	183100	664500	182400	230	252	45	300	35	4	
668	5	4	663500	182400	663900	182500	180	180	45	220	352	4	
668	11	3	663000	183600	663400	183300	216	216	45	280	17	4	
668	12	4	664200	182100	664500	181500	198	306	45	260	35	4	Note
668	13	1	664659	183408	665065	183358	374	385	45	400	360	4	
668	14	4	663500	180600	663700	181500	81	108	35	130	300	4	Note
668	15	1	665700	185000	670000	185100	225	252	45	280	0	4	Note
669	1	1	664400	193100	664700	193800	216	243	45	270	318	4	
669	2	3	663520	193970	663880	193520	225	243	45	270	20	4	
669	3	3	663884	194820	664238	194360	144	160	45	220	30	4	

669	4	4	664084	191320	663710	191680	288	320	45	330	200	4	
669	11	4	663000	192400	663400	192200	306	306	45	350	15	4	Note
669	12	2	664500	192100	664900	192200	297	315	45	350	350	4	
669	13	1	664500	195700	664700	194800	216	266	45	290	65	4	
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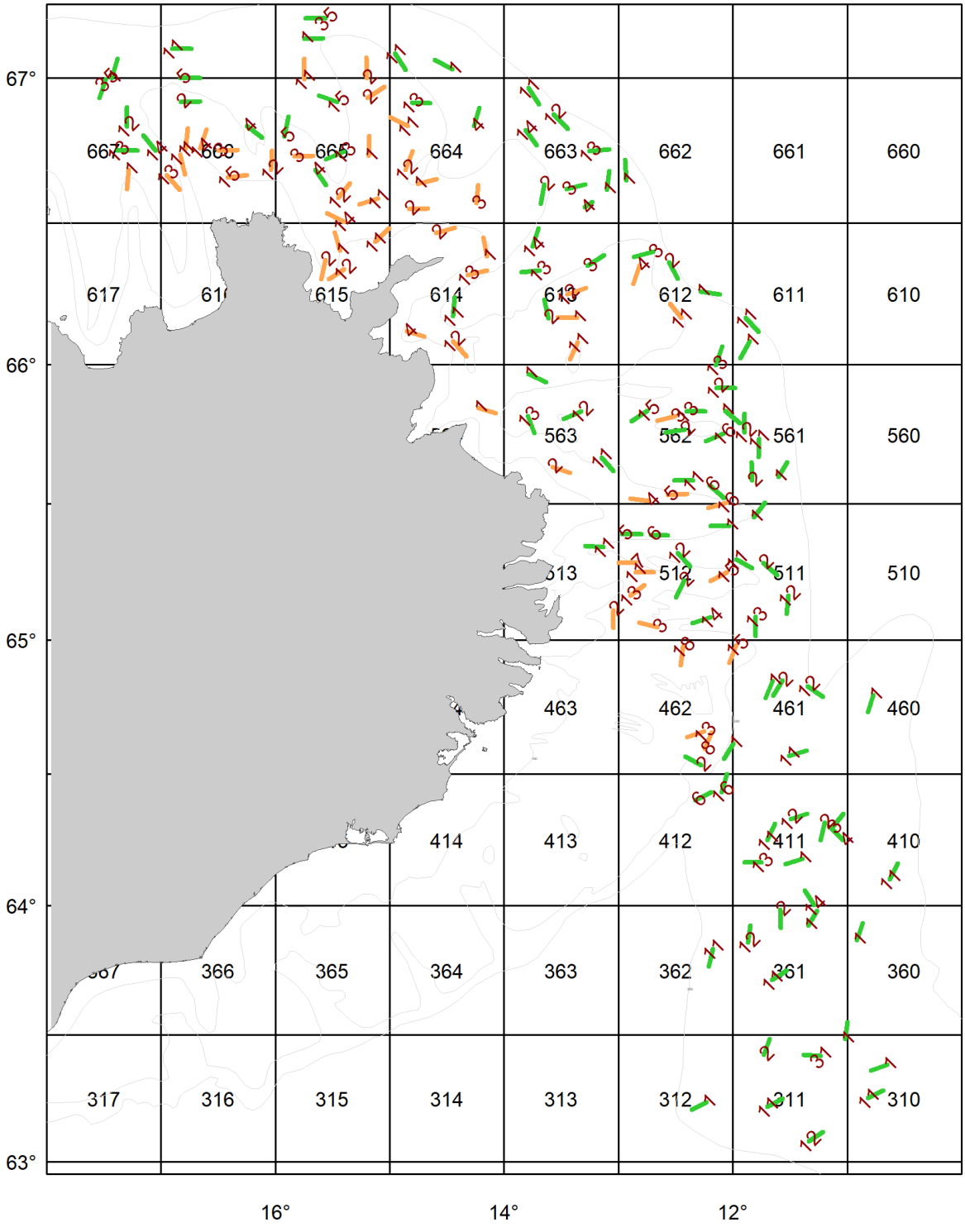
670	2	4	663900	200000	664300	200000	124	162	45	200	360	4	
670	3	1	664800	204780	665080	204050	279	297	45	340	46	4	
670	4	1	665900	205268	665900	204255	177	226	45	240	90	4	
670	5	2	665585	203056	665800	202200	261	288	45	320	57	4	
670	11	1	665480	205470	665820	210030	135	171	45	200	329	4	
670	12	4	663510	202650	663690	201750	272	282	45	300	55	4	
670	14	4	664000	201800	664200	200900	252	250	45	310	53	4	
670	15	3	663000	204200	663400	204300	207	315	35	350	355	4	Note
671	1	4	664000	212700	664000	211700	90	126	35	150	81	4	
671	2	2	665305	210940	665390	205940	120	140	45	180	80	4	
671	3	2	664420	211280	664780	210820	99	108	35	140	26	4	
671	4	2	664805	212650	664895	211650	81	81	35	120	75	4	
671	5	3	663600	215500	663700	214500	72	108	35	130	75	4	Note
671	11	4	663540	213250	663880	212710	108	117	35	150	30	4	
671	12	1	665500	213900	665600	212900	162	162	45	220	80	4	
671	13	1	664500	214200	664700	215100	117	153	45	210	295	4	Note
671	14	1	665300	215500	665500	214600	171	180	45	220	65	4	
671	15	4	664000	210600	664300	210000	189	225	45	270	46	4	
672	1	2	665300	220700	665600	221300	144	171	45	230	330	4	
672	2	2	665900	221520	665900	222510	195	197	45	250	270	4	
672	3	2	665700	222600	665420	223340	162	189	45	230	220	4	
672	4	1	665682	224940	665425	225720	220	225	45	270	230	4	
672	5	1	665600	224100	665900	223500	180	198	45	245	45	4	
672	6	2	665200	222500	665100	221500	126	126	35	200	100	4	Note
672	11	1	664500	223600	664800	224300	81	108	35	130	313	4	Note
672	12	1	665000	224200	665300	223500	126	144	35	200	43	4	
672	14	4	663500	222300	663900	222400	58	68	35	100	350	4	Note
672	15	4	664400	220800	664000	220600	90	90	35	120	170	4	Note
672	16	1	664485	225710	664860	225340	99	123	35	150	20	4	
672	35	3	663491	225857	663286	225287	63	75	35	100		3	
673	1	1	665720	235930	665994	235191	222	241	45	260	50	4	
673	2	1	665800	233000	665800	234000	207	216	45	245	270	4	
673	3	2	665400	232600	665763	233035	216	225	45	250	330	4	
673	4	2	665406	230950	665595	230050	225	225	45	250	65	4	
673	5	2	665196	230980	665100	231967	216	200	45	225	80	4	
673	6	1	665284	240026	664890	235865	159	185	45	190	175	4	
673	7	2	665100	230300	665500	230000	180	216	45	240	10	4	
673	11	1	665000	234211	665316	234829	176	196	45	210	325	4	
673	12	1	665191	232990	665051	233946	185	196	45	220	260	4	
673	13	4	664500	231200	664400	232200	117	139	35	150	250	4	
673	14	1	665003	235157	665338	235760	168	185	45	180	322	4	
673	15	3	663485	234440	663230	233670	126	157	35	160	130	4	
673	16	3	663460	240110	663158	235429	157	204	35	198	130	4	
673	17	1	665517	235791	665762	234980	189	200	45	240	45	4	
673	31	3	664003	235498	664005	234462	96	105	35	115	93	4	
673	35	4	663571	233192	663756	232300	81	77	35	90	63	4	
674	1	1	664742	244269	665064	243670	246	201	45	275	30	4	Note
674	2	3	664242	244294	663853	244581	152	188	45	220	205	4	Note
674	3	2	664912	242338	665162	241540	188	204	45	225	80	4	
674	4	2	664900	241431	664571	242005	176	213	45	220	210	4	
674	5	1	664433	243980	664810	243650	154	175	45	195	20	4	
674	11	3	663544	245758	663836	245131	241	270	45	320	35	4	
674	13	3	663509	243040	663585	244005	104	120	35	130	280	4	
674	14	4	663295	243230	663035	242460	102	111	35	120	140	4	
674	15	1	665155	243680	665355	242770	210	270	45	250	55	4	
674	16	4	664067	242150	663990	241120	161	263	45	220	100	4	

675	1	4	663301	251432	663540	250640	426	383	45	420	50	4	
675	2	4	662989	250971	663271	250256	192	220	45	230	47	4	
718	1	4	670410	183020	670040	183240	163	123	45	200	210	4	Note
718	2	3	670000	184800	670400	184670	162	207	45	230	15	4	Note
718	11	2	671100	182900	671400	182200	416	531	45	510	40	4	Note
718	12	4	670400	182200	670000	182100	162	207	45	250	360	4	Note
719	1	1	671920	194370	671580	194930	288	342	45	360	215	4	
719	2	3	670900	194900	670600	195600	279	297	45	340	220	4	
719	11	4	670990	192430	670710	193170	369	468	45	500	215	4	Note
720	1	1	671426	204020	671770	204570	260	295	45	330	330	4	Note
720	2	3	670990	204630	670710	205370	216	239	45	260	234	4	Note
720	3	3	670580	204060	670320	204850	189	205	45	240	232	4	Note
720	11	1	671994	203340	671806	204260	329	351	45	400	235	4	Note
720	12	4	670490	200930	670210	201670	270	279	45	325	220	4	
720	13	4	670900	202800	671000	201800	234	252	45	280	70	4	
720	14	3	670200	203400	670500	202700	230	252	45	280	50	4	
721	1	3	670470	212770	670210	213570	207	216	45	240	233	4	
721	11	4	670200	211300	670600	211000	171	202	45	200	15	4	Note
721	12	3	670610	214280	670985	213900	207	216	45	250	30	4	Note
722	1	3	670000	225920	670000	224900	234	252	45	300	90	4	
722	2	3	670600	230000	670200	230000	243	252	45	270	180	4	
722	3	3	670300	225000	670700	225000	243	261	45	270	360	4	
722	4	4	670600	220200	671000	220200	216	247	45	265	360	4	
722	5	4	670600	222000	670800	221100	234	234	45	265	60	4	
722	12	3	670000	223800	670100	222800	180	198	45	250	80	4	
722	13	4	670400	222800	670028	222428	198	216	45	240	135	4	
722	14	2	671500	220600	671500	221600	342	378	45	410	270	4	
722	16	3	671100	224700	671200	225700	252	275	45	280	287	4	Note
723	1	4	670600	231400	670400	232300	252	261	45	280	240	4	
723	2	4	670083	232674	670416	233228	234	243	45	255	330	4	
723	3	3	670000	234020	670000	233000	216	234	45	260	90	4	
723	4	3	670355	234231	665982	234631	217	232	45	260	23	4	
723	11	3	670024	235822	670308	235100	250	265	45	280	35	4	
723	12	4	670000	231390	670000	230370	252	257	45	290	90	4	
723	13	3	670600	233200	670900	233900	243	252	45	270	300	4	

*Notes indicate that deviations from standard procedures have been recorded during the execution of the survey, as well as other useful information which must be taken into account during a haul.

4.4 Stations – Þórunn Sveinsdóttir



Stations in the survey area of the trawler Þórunn Sveinsdóttir. Sweeps of 45 fm are used at green stations.

Station list in the survey area of the trawler Þórunn Sveinsdóttir.

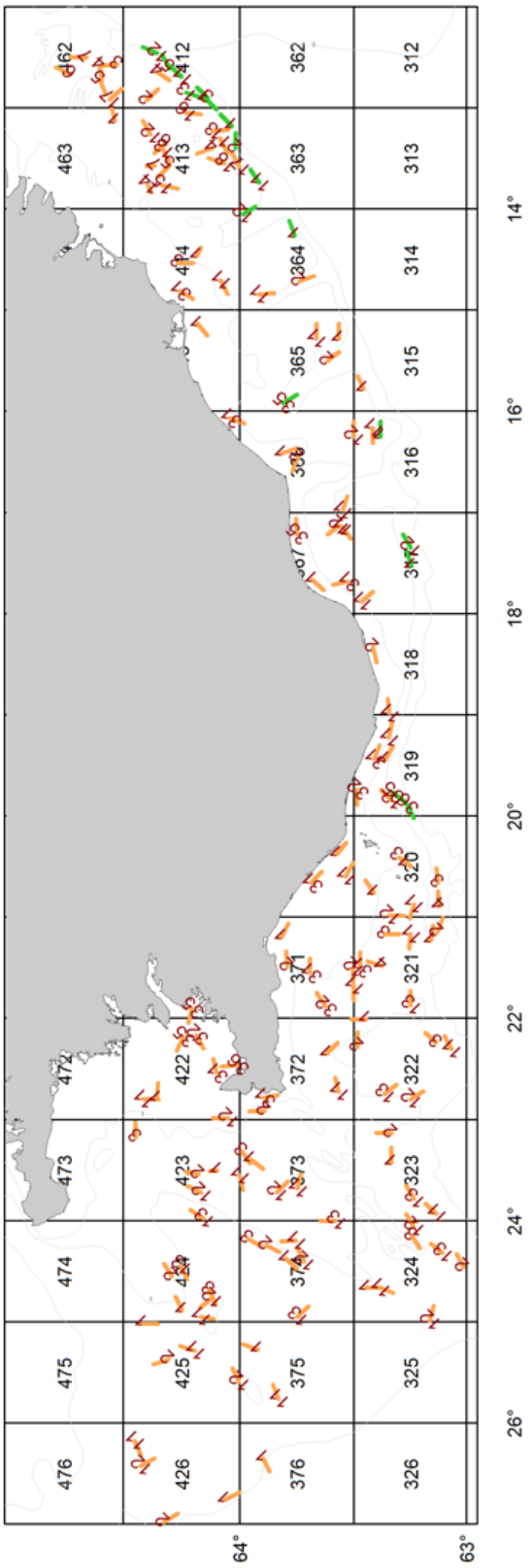
Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
310	1	1	632300	103900	632160	104750	430	438	45	470	250	4	
310	11	3	631513	104900	631700	104100	399	412	45	450	40	4	Note
311	1	2	632907	110122	633307	105986	333	344	45	420	20	4	Note
311	2	1	632530	114370	632900	114070	392	408	45	510	20	4	Note
311	11	3	631300	114200	631500	113400	421	428	45	485	60	4	Note
311	12	4	630490	112020	630710	111270	447	454	45	510	70	4	
311	31	2	632511	111405	632540	112300	333	345	45	420	275	4	
312	1	4	631420	121390	631240	122160	414	435	45	500	227	4	
360	1	1	635200	105500	635600	105200	403	443	45	450	30	4	
361	1	2	635541	112034	635883	111581	371	367	45	415	40	4	Note
361	2	1	635905	113516	635492	113498	324	364	45	405	180	4	
361	11	3	634280	113940	634500	113180	362	384	45	440	60	4	
361	12	1	635150	115210	635545	115090	380	380	45	420	10	4	
362	11	2	635000	121050	634600	121280	403	421	45	460	190	4	
410	11	3	640610	103780	640970	103340	439	458	45	475	30	4	Note
411	1	4	641075	112340	640960	113230	314	330	45	370	240	4	
411	2	2	641900	111200	641500	111400	320	329	45	420	190	4	
411	3	2	641800	110800	642100	110200	333	351	45	420	20	4	
411	4	2	641500	110200	641800	110900	329	359	45	400	315	4	
411	11	1	641500	114200	641870	113800	348	366	45	440	20	4	
411	12	2	641980	112980	642100	112100	375	384	45	425	70	4	Note
411	13	3	641000	114500	641000	115400	348	392	45	420	260	4	
411	14	4	640020	111730	640355	112230	354	340	45	410	325	4	Note
412	6	2	642410	121960	642590	121130	302	330	45	340	70	4	
412	16	2	642600	120600	643000	120300	361	384	45	485	25	4	
460	1	3	644780	104630	644393	104920	428	424	45	515	190	4	
461	1	1	645090	113930	644720	114300	246	300	45	400	205	4	
461	2	1	645100	113400	644770	113890	338	360	45	470	205	4	
461	11	4	643410	113047	643526	112135	436	452	45	480	70	4	Note
461	12	2	644978	112067	644742	111286	468	495	45	550	135	4	Note
461	15	1	645884	115825	645500	120200	178	190	35	250	210	4	
462	1	4	643690	115970	643350	120480	229	256	45	300	205	4	Note
462	2	4	643200	121680	643400	122480	210	234	45	250	305	4	
462	8	4	643570	121475	643934	121110	161	168	35	230	20	4	
462	13	4	643971	121523	643835	122411	161	168	35	230	250	4	
462	18	2	645860	122630	645450	122750	157	180	35	220	180	4	
511	1	1	652710	114897	653020	114313	190	203	45	260	45	4	
511	2	1	651704	114415	651437	113665	223	244	45	310	130	4	
511	11	1	651790	115830	651595	115000	216	197	45	250	130	4	
511	12	3	650990	113090	650586	113178	252	271	45	330	190	4	
511	13	3	650516	114816	650100	114796	207	239	45	300	180	4	
512	1	2	652511	120183	652521	121168	190	223	45	274	270	4	
512	2	4	651319	122570	650949	122989	160	216	45	280	205	4	
512	3	3	650295	123958	650399	124916	144	158	35	210	290	4	
512	5	1	652335	125801	652331	124809	180	210	45	255	90	4	Note
512	6	1	652327	124300	652309	123406	245	282	45	280	90	4	
512	7	1	651715	125090	651708	130000	153	193	35	240	270	4	
512	11	1	651500	125120	651500	124160	135	155	35	250	90	4	Note
512	12	2	651925	122900	651636	122251	209	174	45	265	137	4	Note
512	13	3	650987	125394	651220	124649	149	165	35	220	50	4	
512	14	4	650504	121186	650386	122120	185	205	45	270	250	4	
512	15	4	651500	120320	651310	121170	138	147	35	220	255	4	
512	16	2	653021	120314	652911	121309	165	175	35	250	270	4	
513	2	4	650670	130280	650270	130280	142	137	35	200	180	4	
513	11	2	652051	130795	652084	131750	210	184	45	260	275	4	Note

Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
561	1	3	653580	113626	653907	113136	235	284	45	330	25	4	
561	2	3	653508	115003	653906	115030	200	203	45	270	360	4	Note
561	11	3	654410	114640	654011	114663	212	240	45	270	180	4	
561	12	1	654550	115400	654950	115406	260	185	45	280	355	4	Note
562	1	2	655011	120415	654750	115634	185	196	45	230	125	4	
562	2	1	654611	122514	654550	123535	180	212	45	250	270	4	
562	3	1	654900	123004	654794	123959	129	166	35	200	254	4	
562	4	3	653069	124395	653116	125388	122	139	35	200	270	4	
562	5	4	653195	123403	653220	122400	156	167	35	240	92	4	Note
562	6	4	653402	121231	653129	120472	187	190	45	265	120	4	
562	11	4	653508	122103	653507	123080	214	226	45	270	270	4	Note
562	12	2	655500	120864	655498	115872	252	285	45	330	80	4	
562	13	2	655000	122440	654995	121460	172	190	45	250	90	4	
562	15	1	655013	124491	654788	125320	190	216	45	250	240	4	Note
562	16	4	654523	120501	654358	121432	222	236	45	280	260	4	
563	1	1	655806	134728	655621	133790	175	186	45	260	110	4	
563	2	4	653795	133480	653670	132560	120	117	35	160	110	4	
563	11	4	654004	130900	653705	130257	180	206	45	260	130	4	
563	12	2	654995	131965	654832	132895	223	252	45	310	250	4	Note
563	13	1	654901	134765	654536	134420	194	240	45	273	160	4	Note
564	1	2	655074	141370	654965	140433	148	150	35	215	105	4	Note
611	1	3	660497	115107	660143	115594	259	285	45	340	200	4	Note
611	11	3	660999	115338	660695	114646	262	264	45	330	130	4	
612	1	4	661556	121693	661498	120677	266	302	45	330	90	4	
612	2	1	662178	123348	661826	122903	366	348	45	430	335	4	
612	3	1	662395	124180	662284	125199	154	185	45	250	265	4	
612	4	1	662105	124886	661713	125225	129	145	35	205	200	4	
612	11	3	661000	122706	661299	123295	183	185	35	240	310	4	
612	13	4	655984	120904	660385	120551	271	273	45	340	25	4	Note
613	1	4	660999	132178	661013	133200	128	158	35	200	260	4	
613	2	3	660991	133693	661387	133899	140	190	45	230	355	4	
613	3	2	662097	131633	662316	130774	212	219	45	275	40	4	
613	11	4	660480	132140	660110	132560	86	95	35	150	200	4	Note
613	12	2	661489	132703	661623	131702	155	165	35	200	80	4	
613	13	1	662000	134140	661960	135085	240	263	45	340	75	4	
613	14	1	662498	134500	662889	134209	198	205	45	300	15	4	
614	1	2	662296	140907	662694	141083	90	95	35	160	340	4	
614	2	1	662790	143584	662901	142608	89	102	35	155	73	4	
614	4	3	660711	145112	660600	144200	93	114	35	165	115	4	
614	11	4	661030	142680	661430	142590	216	223	45	290	0	4	
614	12	4	660503	142677	660177	141991	111	165	35	250	135	4	
614	13	2	661897	141922	662000	140914	112	137	35	200	75	4	
615	1	2	662414	152608	662798	152905	107	157	35	180	333	4	
615	2	1	662217	153371	661817	153584	100	144	35	195	195	4	
615	11	2	662600	150758	662889	150050	90	120	35	180	50	4	Note
615	12	2	662026	152385	661811	153202	80	100	35	170	230	4	
662	1	3	663889	125608	664308	125664	228	310	45	350	360	4	
663	1	4	663686	130611	664077	130498	194	262	45	320	5	4	
663	2	3	663801	133899	663400	134086	163	180	45	260	190	4	
663	3	4	663700	132716	663800	131737	198	218	45	270	75	4	
663	4	4	663321	131765	663441	131370	263	272	45	315	53	2	Note
663	11	1	665792	134716	665461	134186	301	294	45	385	150	4	
663	12	1	665252	133411	664953	132657	223	332	45	430	135	4	
663	13	2	664497	131520	664534	130488	208	228	45	280	85	4	
663	14	1	664929	134888	664618	134288	180	247	45	280	160	4	
664	1	3	663810	144540	663908	143560	193	202	35	250	75	4	
664	2	3	663288	145000	663296	144002	147	160	35	230	90	4	

Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
664	3	4	663415	141468	663794	141377	151	182	35	240	4	4	
664	4	2	665008	141581	665393	141297	216	223	45	280	10	4	
664	11	1	665010	145060	665190	145970	109	131	35	185	300	4	
664	12	3	664100	145185	664491	144805	136	164	35	240	210	4	
664	13	1	665494	144846	665488	143870	162	187	45	260	85	4	
665	1	2	664391	151112	664809	151072	151	156	35	220	360	4	
665	2	2	665591	151184	665823	150288	132	150	35	220	55	4	Note
665	3	3	664388	155011	664400	154015	151	190	35	220	90	4	
665	4	3	664102	153900	663785	153366	208	212	45	250	156	4	
665	5	1	664799	155531	665207	155331	257	284	45	350	10	4	Note
665	11	4	663505	150609	663390	151608	150	162	35	220	265	4	
665	12	4	663518	152701	663826	152100	199	210	35	255	30	4	
665	13	4	664478	152398	664319	153338	220	243	45	300	260	4	Note
665	14	4	663025	152414	663206	153303	137	154	35	210	300	4	
665	15	1	665510	152777	665636	153728	176	182	45	235	290	4	Note
666	1	1	664537	164730	664971	164585	110	126	35	200	5	4	
666	2	1	665507	164980	665519	163960	180	190	45	250	90	4	Note
666	3	4	664509	163012	664517	161977	160	178	35	230	90	4	
666	4	2	665017	161512	664766	160685	252	273	45	315	130	4	
666	5	1	670001	165002	670004	163940	256	270	45	300	90	4	
666	11	3	664422	165013	664012	164749	130	135	35	220	175	4	Note
666	12	4	664100	160240	664500	160185	180	207	35	240	360	4	
666	13	3	664001	165693	663695	165044	182	265	35	320	145	4	Note
666	14	1	664560	163950	664940	163620	145	186	35	225	20	4	Note
666	15	4	663945	162520	664000	161510	120	123	35	180	70	4	
667	1	4	664100	171700	663700	171800	158	229	35	220	360	4	Note
667	11	1	665144	180037	665538	180046	364	415	45	450	360	4	Note
667	12	2	665000	171800	665400	171800	216	243	45	310	360	4	
667	13	2	664500	172277	664500	171254	260	245	45	300	90	4	
667	14	2	664500	170300	664819	170936	198	252	45	280	330	4	
667	35	1	665980	172907	665596	173251	276	293	45	330	200	4	Note
714	1	3	670185	142720	670375	143630	225	237	45	310	295	4	
714	11	3	670508	145721	670172	145172	207	230	45	310	145	4	
715	1	3	670804	154491	670810	153517	189	234	45	260	90	4	
715	2	4	670000	151209	670416	151229	162	176	35	275	360	4	Note
715	11	3	665974	154490	670391	154503	158	162	35	230	360	4	
715	35	3	671224	153380	671215	154415	258	263	45	310	270	4	
716	11	3	670600	165440	670600	164410	350	370	45	450	90	4	Note
717	1	4	670000	172600	670400	172300	234	261	45	300	15	4	

*Notes indicate that deviations from standard procedures have been recorded during the execution of the survey, as well as other useful information which must be taken into account during a haul.

4.5 Stations – Breki



Stations in the survey area of the trawler Breki. Sweeps of 45 fm are used at green stations.

Station list in the survey area of the trawler Breki.

Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
315	1	1	632750	154700	632900	153900	192	228	35	250	60	4	
316	1	2	632300	161500	632300	160600	251	284	45	400	90	4	
316	11	2	632500	161000	632500	161900	128	156	35	200	270	4	
317	1	2	631470	173200	631590	172350	183	183	45	290	75	4	
317	11	1	632800	175300	632500	174700	125	180	35	230	140	4	
317	12	2	631500	172100	631700	171300	167	214	45	270	65	4	
318	2	2	632500	182000	632400	182900	20	35	35	100	255	4	
318	11	1	632058	185921	632098	185067	73	57	35	120	75	4	
319	1	2	632170	192660	631970	191880	95	125	35	180	115	4	
319	11	2	632070	191350	631990	190420	40	100	35	125	100	4	Note
319	12	1	632008	195094	632285	194451	136	210	35	250	45	4	
319	31	2	632468	192637	632324	191807	55	47	35	100	110	4	Note
319	32	1	632920	194450	632920	195350	46	81	35	100	270	4	
319	35	1	631980	194618	631656	195143	234	413	45	330	216	4	
319	36	3	631597	195311	631402	200113	460	454	45	450	235	4	
320	1	1	632467	204566	632694	203811	90	100	35	150	45	4	Note
320	3	3	630760	203980	630800	203100	311	322	35	365	80	4	Note
320	4	3	630732	205365	630766	204462	284	293	35	325	80	4	
320	11	3	631413	205242	631516	210096	149	162	35	200	290	4	Note
320	12	1	632063	205908	631661	205919	131	161	35	190	180	4	
320	13	2	631800	202463	631485	203007	130	149	35	220	207	4	Note
321	1	4	630956	211369	630888	210515	274	296	35	300	100	4	
321	2	4	630770	210888	630627	210063	411	430	35	400	100	4	
321	3	2	632196	211013	631796	211005	142	168	35	200	180	4	
321	4	2	632264	212917	632643	212623	128	146	35	180	25	4	
321	11	2	631495	211010	631537	211874	167	200	35	255	270	4	
321	13	1	631495	215240	631490	214350	195	229	35	270	90	4	Note
321	31	2	632825	213000	632825	212100	104	123	35	170	270	4	
322	1	2	632677	220057	633077	220044	155	179	35	200	2	4	
322	2	2	632900	221700	632902	220826	200	218	35	300	90	4	
322	3	4	630807	221457	631103	220847	238	256	35	340	20	4	Note
322	11	4	630403	221841	630590	221059	333	379	35	450	60	4	Note
322	12	3	631486	224807	631151	224323	268	286	35	375	150	4	
322	13	1	632188	224486	631869	223948	240	272	35	340	145	4	Note
323	1	2	632001	232567	632001	231654	333	384	35	500	90	4	
323	2	2	632007	230811	632404	230797	246	281	35	400	360	4	
323	11	3	630801	235595	631103	235006	381	398	35	500	45	4	
323	12	1	631402	240393	631603	235620	240	257	35	310	65	4	
323	13	3	631407	234703	631617	233942	296	325	35	400	60	4	
324	1	1	632690	243994	632295	243963	243	265	35	400	160	4	
324	2	4	630079	242759	630271	241987	393	439	35	440	60	4	
324	3	4	631459	240899	631238	241634	216	131	35	250	240	4	
324	11	1	632300	243998	631960	244290	242	265	35	310	180	4	
324	12	3	630975	245925	630873	245070	304	311	35	350	100	4	
324	13	4	630649	241920	630960	241350	283	311	35	365	10	4	
363	11	1	635490	134430	635710	133670	175	217	45	275	50	4	
364	1	2	634560	141600	634700	140700	218	292	45	300	50	4	
364	2	3	634438	144304	634060	143983	201	223	35	275	170	4	Note
364	11	1	635500	145100	635100	145000	132	192	35	190	180	4	
364	12	2	635920	140330	635580	135870	183	228	45	240	150	4	
365	1	4	633400	151700	633400	150800	132	179	35	230	80	4	
365	2	4	633700	153000	633400	152500	149	176	35	190	140	4	Note
365	11	4	634000	151700	633980	150800	110	125	35	180	70	4	
365	35	1	634852	155529	634501	155028	195	203	45	250	148	4	
366	1	2	634900	162500	634500	162200	59	84	35	125	170	4	

Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
366	2	1	634490	162750	634625	163600	66	73	35	125	290	4	
366	11	3	633298	165893	633174	165044	167	218	35	230	300	4	
366	12	4	633000	161500	633000	160600	113	121	35	180	90	4	Note
367	1	3	634100	174000	633800	174600	26	53	35	100	220	4	
367	11	4	633315	170863	633070	171570	186	115	35	160	228	4	Note
367	12	4	633400	170800	633700	171300	167	179	35	250	320	4	
367	31	3	633163	174098	633550	174307	122	110	35	170	350	4	
367	35	2	634506	171303	634528	170368	69	61	35	90	80	4	
370	1	4	633445	202271	633209	201589	18	27	35	110	115	4	
370	11	3	633215	203578	633016	202799	72	70	35	140	120	4	
370	31	3	634130	203970	633860	203300	30	32	35	100	130	4	
371	1	2	634900	211174	634725	210367	64	66	35	100	100	4	
371	2	2	634740	212927	634790	212034	73	88	35	130	75	4	
371	11	3	633009	214056	633010	214944	128	140	35	180	270	4	
371	12	3	633016	212988	633018	213869	110	128	35	170	270	4	
371	31	4	634150	213317	634161	212460	114	89	35	170	85	4	
371	32	3	633755	215288	633982	214498	140	128	35	170	60	4	Note
372	1	4	633714	222100	633438	221439	201	223	35	250	125	4	
372	2	1	635337	225498	635739	225531	95	109	35	160	360	4	
372	11	3	633402	224356	633494	223520	177	219	35	230	80	4	
372	31	1	635370	224720	635000	224550	47	79	35	120	165	4	Note
373	1	2	635710	232382	635388	232913	128	141	35	180	215	4	
373	3	2	635943	231885	635734	232601	121	133	35	170	270	4	Note
373	11	3	634486	234079	634401	233215	137	168	35	190	90	4	Note
373	12	1	635026	234326	634744	233678	150	152	35	185	140	4	
373	13	3	633480	235990	633884	240007	155	168	35	190	360	4	
374	1	2	634796	242247	634507	242871	322	344	35	340	225	4	
374	2	2	635305	241450	634961	241863	260	271	35	320	205	4	
374	3	2	635781	241078	635432	241515	296	325	35	350	200	4	Note
374	11	2	634522	241187	634922	241249	150	174	35	190	360	4	Note
374	12	4	634309	242428	634484	241618	164	216	35	260	60	4	Note
374	13	3	634501	245697	634202	245097	429	444	35	470	140	4	
375	1	2	635521	251656	635912	251337	232	241	35	300	30	4	
375	11	1	634989	254574	635123	253716	201	241	35	285	80	4	
376	1	2	635383	262092	635215	262870	292	325	35	370	260	4	
412	1	3	640900	125420	640600	130100	264	302	45	420	214	4	
412	2	1	642390	125550	642100	124900	157	166	35	190	130	4	
412	3	3	640820	125440	641100	124800	340	384	45	500	55	4	Note
412	4	1	642120	123890	641800	124400	172	183	35	220	214	4	
412	5	1	641800	123680	642000	122880	232	335	45	320	80	4	Note
412	11	1	641500	124150	641800	123500	245	267	45	340	60	4	
412	12	2	642125	122780	642490	122400	218	247	45	320	30	4	
412	13	3	641390	125090	641000	125380	183	218	45	300	200	4	
413	1	4	640200	131100	640500	130400	274	320	45	420	35	4	
413	2	4	640100	132400	640100	131500	292	460	45	410	80	4	
413	3	4	640700	131400	640300	131300	159	204	35	220	180	4	
413	4	4	640701	132407	641101	132718	150	174	35	220	330	4	
413	5	1	641800	133400	642100	134100	128	150	35	200	300	4	
413	6	2	641900	132100	642200	132700	124	143	35	200	310	4	
413	7	1	642190	133436	642391	133460	153	142	35	160	357	2	Note
413	11	4	640510	131830	640310	132685	165	220	35	270	245	4	
413	12	2	642300	131600	642500	130800	146	165	35	190	60	4	
413	13	2	641980	132480	641800	133300	161	203	35	200	245	4	Note
413	14	1	642365	134568	642285	135017	101	128	35	160	250	2	Note
413	15	1	642000	134600	641600	134800	128	150	35	180	180	4	
413	16	4	641400	130300	641000	130400	139	156	35	200	180	4	
413	17	3	640000	133500	640200	132700	156	183	35	200	55	4	Note

Stat. Sq.	Tow nr.	Sub. sq	Pos. A N	Pos. A V	Pos. B N	Pos. B V	Depth m	Depth m	Sweep fm	Warp fm	Tow dir.	Tow length	Notes*
413	18	3	640400	133300	640800	133000	132	156	35	200	20	4	
414	1	4	641100	142800	641000	142300	113	174	35	190	250	4	Note
414	3	3	641600	143200	641200	143200	106	134	35	160	180	4	Note
414	11	3	640490	144240	640310	145060	104	119	35	160	240	4	
414	31	3	641550	144860	641200	145340	47	38	35	120	205	4	Note
415	1	4	641083	150820	640830	151530	40	60	35	75	230	4	
415	31	3	640250	160400	635870	160720	83	127	35	170	200	4	Note
421	35	3	641229	215398	641335	220289	28	41	35	75	280	4	
422	1	1	642148	224781	642095	223840	51	69	35	100	135	4	
422	11	1	642490	224795	642093	224807	64	88	35	110	170	4	
422	12	3	640288	225955	640686	225898	79	91	35	165	10	4	
422	31	3	640600	223250	640680	222400	35	35	35	80	255	4	
422	32	4	641120	221000	640940	221800	28	33	35	80	245	4	
422	35	4	641455	221100	641630	221920	52	44	35	70	300	4	
422	36	4	640060	222780	640460	222880	33	37	35	65	355	4	
423	1	3	640576	233023	640778	233063	115	114	35	354	150	2	Note
423	2	3	641063	233242	641393	233078	119	120	35	140	10	3.4	Note
423	3	2	642677	231078	642696	230160	123	107	35	150	93	4	
423	11	3	640000	233321	635910	234194	138	151	35	180	260	4	Note
423	12	3	640994	234338	641347	233921	118	107	35	130	45	4	Note
423	13	3	640937	235862	641277	235369	279	320	35	365	45	4	Note
424	1	1	641484	245312	641650	244501	161	193	35	225	65	4	Note
424	2	2	641750	243299	641944	242549	175	185	35	220	60	4	Note
424	3	3	640788	244121	640616	244911	209	222	35	240	245	4	Note
424	11	3	641010	245703	640658	245846	186	205	35	250	180	4	Note
424	12	3	640714	244616	641012	245161	191	207	35	230	320	4	Note
424	13	3	641528	242666	641361	243473	212	231	35	230	245	4	Note
425	1	2	642502	250101	642106	250131	204	227	35	270	180	4	Note
425	2	2	641839	252247	642221	252511	226	256	35	290	340	4	Note
425	11	4	641155	251707	641544	251440	256	271	35	300	20	4	
425	12	3	640009	253570	640182	252767	183	220	35	250	90	4	Note
426	1	3	640381	264574	640002	264120	410	434	35	438	155	4	Note
426	2	1	641957	265878	641598	265378	402	430	35	440	150	4	Note
426	11	2	642705	261068	642538	261929	280	302	35	350	250	4	
426	12	2	642548	262560	642204	262088	302	314	35	360	145	4	
462	3	3	643150	123436	643548	123510	152	178	35	220	350	4	
462	4	3	643600	123500	643533	124437	139	192	35	230	260	4	
462	5	3	643590	124350	643436	125210	154	192	35	215	260	4	Note
462	6	3	644333	124031	644704	123625	137	174	35	220	30	4	
462	7	3	643934	123013	644337	123007	146	156	35	220	360	4	
462	17	3	643340	125530	643020	124870	142	162	35	200	135	4	
463	1	4	643200	130800	643300	125900	117	135	35	180	60	4	

*Notes indicate that deviations from standard procedures have been recorded during the execution of the survey, as well as other useful information which must be taken into account during a haul.

4.6 Additional stations at the slopes – defining the outer distribution of cod

According to earlier surveys, there is some variability in the abundance of cod at the slopes of the continental shelfs. When high catches are taken at the outermost stations, additional tows should be taken further off in order to define cod outer boundaries. Following points should be kept in mind when additional stations are taken:

- The main objective of additional stations is to define geographical boundaries of cod, so that the abundance of cod is low at the outermost stations.
- Additional stations should be taken adjacent to outermost fixed stations containing a relatively great quantity of cod.
- To distinguish additional stations from the fixed stations given in the station list, they shall be given **tow number 21-29** within the given statistical square.

5 Sampling gear

5.1 Description of sampling gear

The trawl used for sampling is of the Granton type. The trawl was originally standardized in cooperation with the captains of the survey trawlers. The following should be attached to each sampling gear:

Unique ID number identified by a plate that is fastened to the headline of the trawl.

Sampling gear number attached according to regulation (see figure):

The headline is 32.0 m long. The footrope is 54.9 m (whereof the bobbin footrope is 18.3 m) weighing about 4200 kg in air and 1900 kg submerged. The meshes of the trawl net are smaller than in an ordinary commercial bottom trawl. The front section of the trawl has a mesh size of 135 mm, the middle section (belly) 80 mm and the codend is covered inside with a 40 mm net. The lower part (lower wings and first panel of lower belly) of the net has a double netting.

Distance between the wings is not measured but the average estimated to be around 17 m. The mean vertical opening fluctuates between 2.0-2.8 m, but opening between otter boards is 70-110 m. All these factors depend on towing depth and sweep length.

The ratio between the 135 mm mesh and the 80 mm mesh is 132 meshes vs. 230, set up in the following way from lastridge to lastridge:
5 × 1/1, then 5/9, then 5 × 1/1

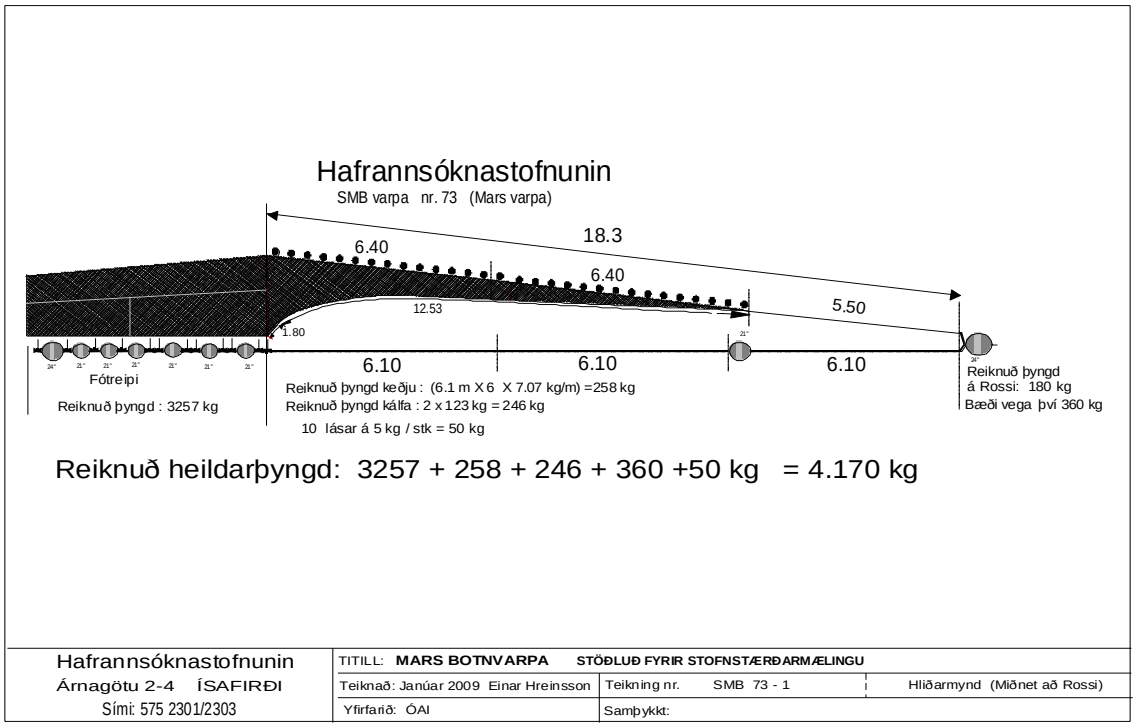
The ratio between the 80 mm middle part and the 135 mm codend middle part is:
5 × 1/1, then 9/5, then 5 × 1/1

The rearmost 1.8 m of the flying line are made of wire (18 mm in diameter).

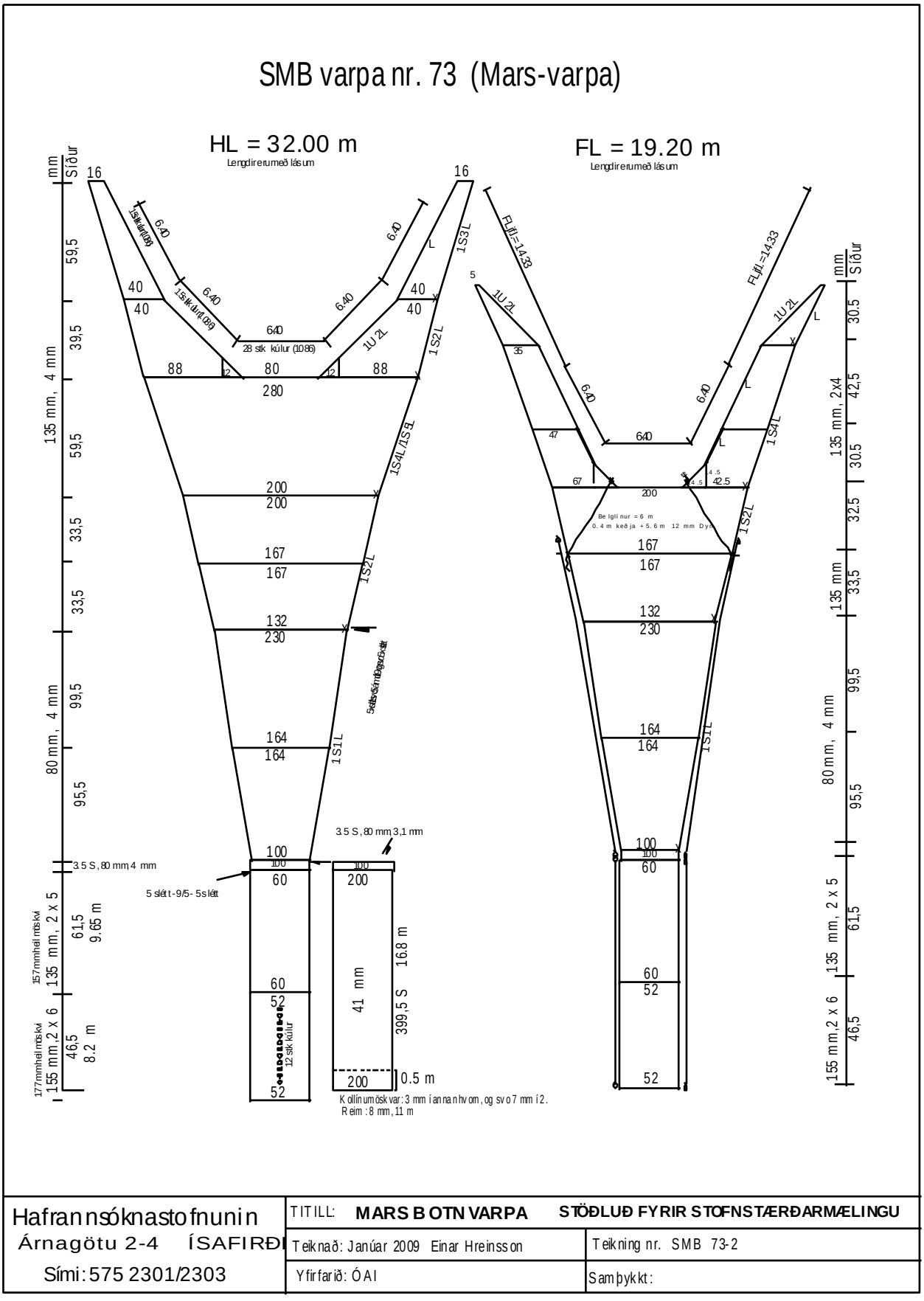
The sweeps are 64 m (35 fm) long and 28 mm in diameter. When towing at depths greater than ~180 m an extension chain of 18.3 m (10 fm) is added (sweeps 45 fm). This does not apply for the SW-area where sweeps of 64 m are used in all stations. At several stations where depth is less than ~180

m, an extension chain of 18.3 m has been used. It is important to follow instructions in the station list regarding sweep lengths.

The otter boards are of ‚Poly-Ice' type no. 7. The weight is about 1950 kg each without back strops. Back strops are 9 m (6 m plus a 3 m extension). Back strops are lock in the middle hole (see figues to the left) and warps in the back hole (see figure to the right).

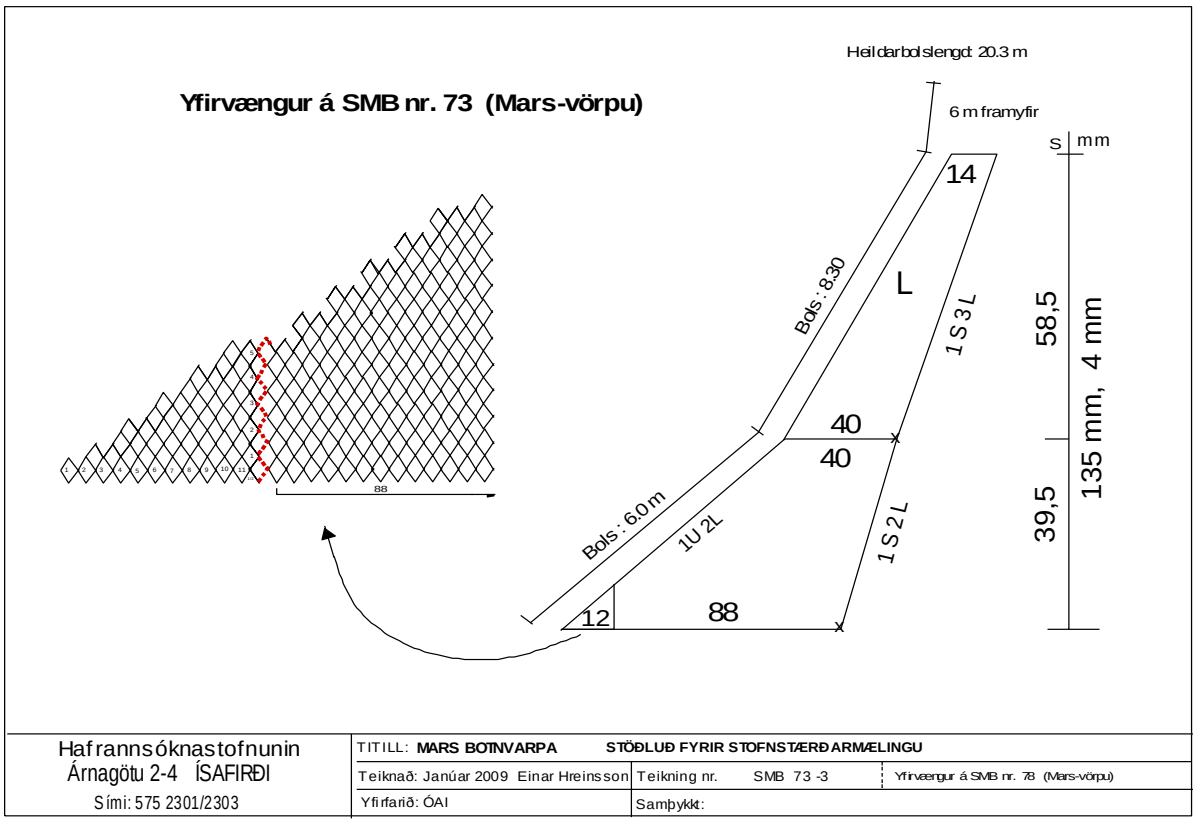


Standardized bottom trawl no. 73used in the IGS. Side view from square to Danleno.

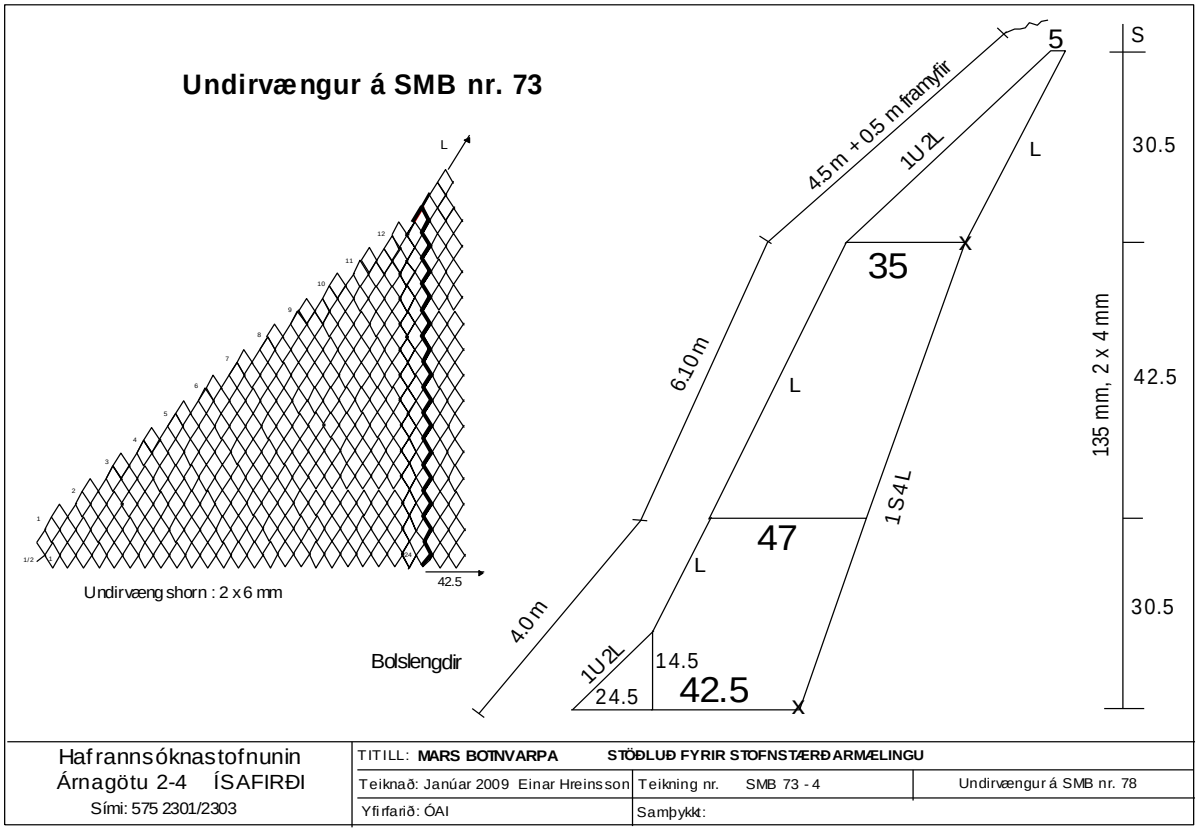


Hafrannsóknastofnunin Árnagötu 2-4 ÍSAFIRÐI Sími: 575 2301/2303	TITILL: **MARS BOTNVARPA**	**STÖÐLUÐ FYRIR STOFNSTÆRÐARMÆLINGU**
	Teiknað: Janúar 2009 Einar Hreinsson	Teikning nr. SMB 73-2
	Yfirfarið: ÓAI	Samþykkt:

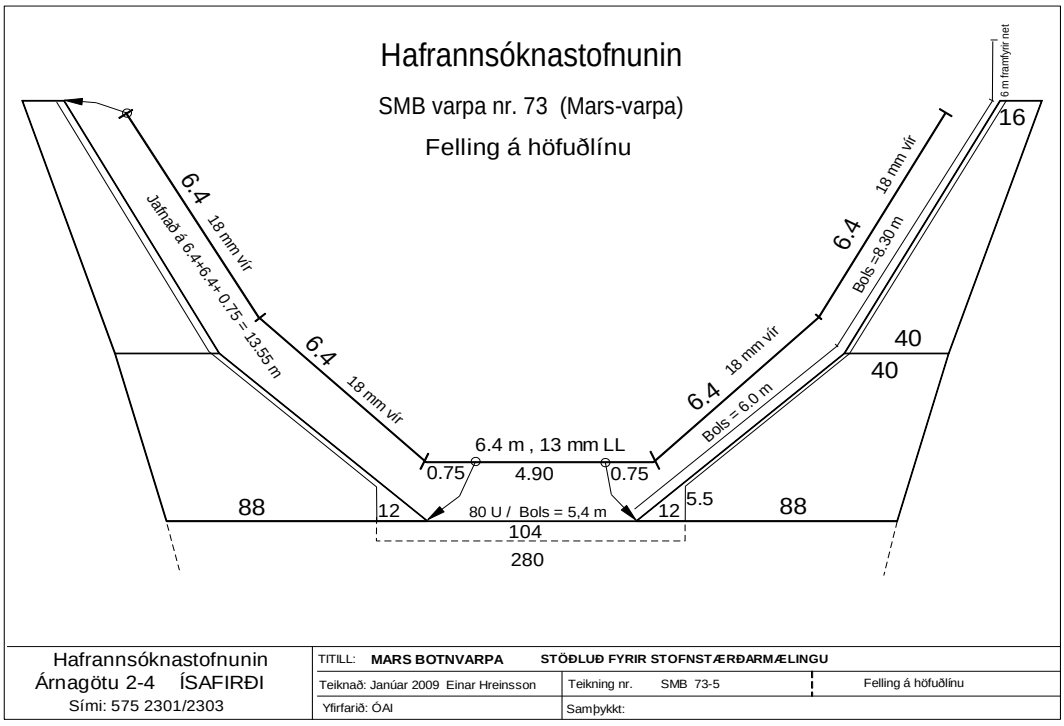
Standardized bottom trawl no. 73 used in the IGS. Main drawing.



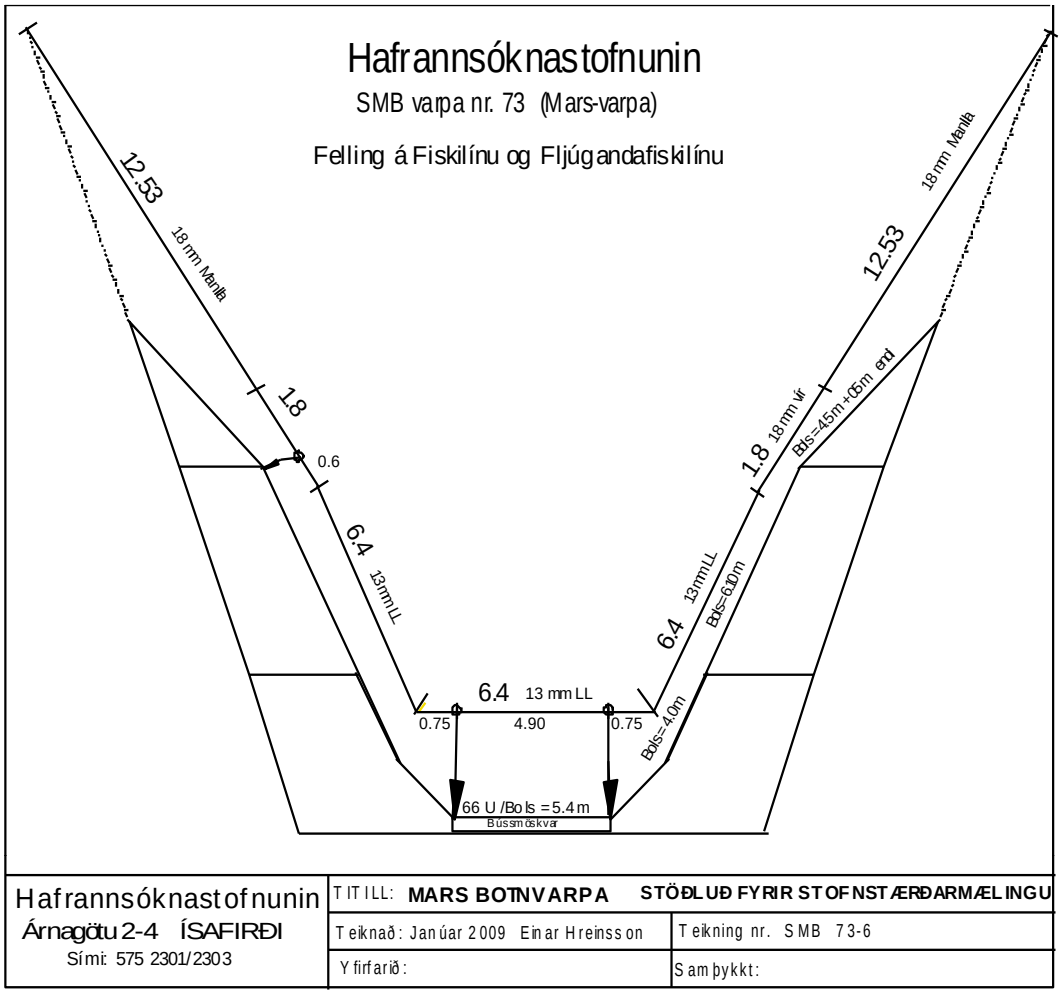
Standardized bottom trawl no. 73 used in the IGS. Top wing details.



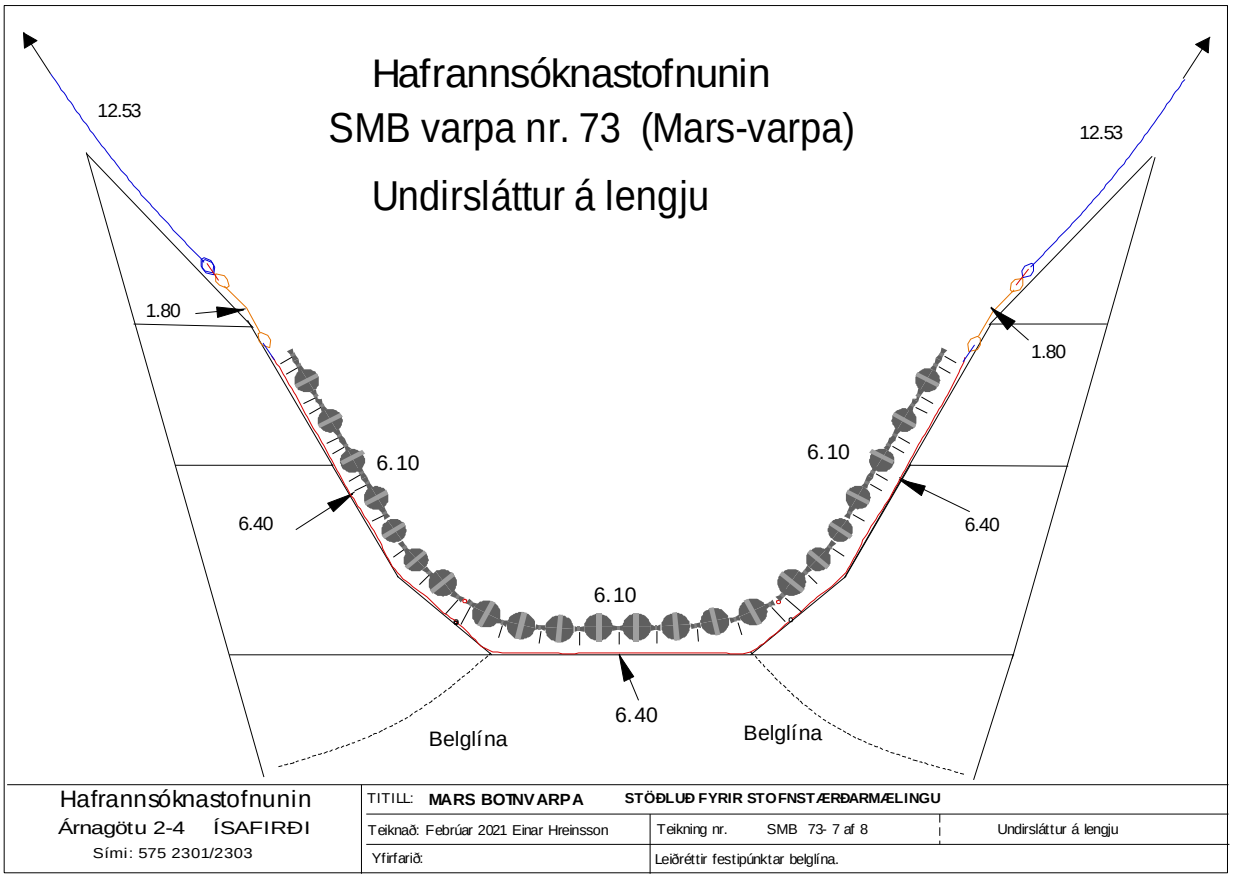
Standardized bottom trawl no. 73 used in the IGS. Bunt details.



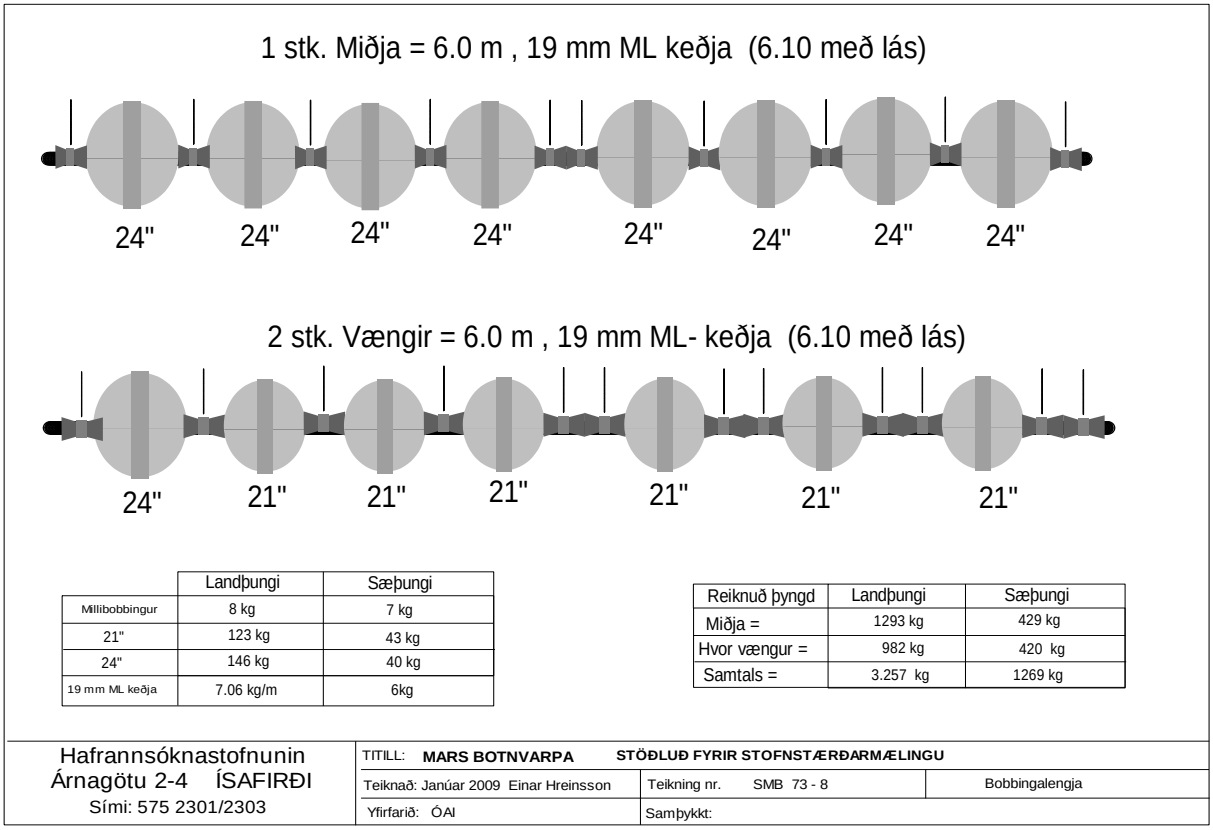
Standardized bottom trawl no. 73 used in the IGS. Hanging of headline.



Standardized bottom trawl no. 73 using in the IGS. Hanging of fishing line and flying fishing line.



Standardized bottom trawl no. 73 using in the IGS. Footrope attachment.



	Landþungi	Sæþungi
Millibobbingur	8 kg	7 kg
21"	123 kg	43 kg
24"	146 kg	40 kg
19 mm ML keðja	7.06 kg/m	6kg

Reiknuð þyngd	Landþungi	Sæþungi
Miðja =	1293 kg	429 kg
Hvor vængur =	982 kg	420 kg
Samtals =	3.257 kg	1269 kg

Standardized bottom trawl no. 73 used in the IGS. Footrope.

5.2 Standardization of the sampling gear

It is critically important that the sampling gear is set up according to the approved standardized gear diagram no. 73. It is therefore necessary to check if all measurements of all gears are in accordance to the diagram. This check is to be done by Hampiðjan net loft and relevant MFRI personnel responsible for the maintenance of the trawls, before they are shipped onboard the survey vessels. Before the vessels leave harbour, cruise leaders and the crew carefully examine whether the sampling gear is set up according to the diagram.

5.3 Finishing up and packing the trawls

Recommendations from Hampiðjan:

Once the last station has been taken, the trawls must be towed at the surface for 10-15 minutes (with the sweeps) with both the inner and the outer bags open. This is done to flush the trawls and get rid of sand, mud, and various organic material before the trawls are put in storage.

When packing the trawls, stretch them well and securely tie the ropes around them. This is necessary because it is often difficult to get them out of the contains because sometimes everything collapses from the ropes. Preferably, wing ends should be tied together.

It is good to mark footropes and ross with their trawl number. It should be sufficient to mark one trawl in each container. This would simplify the follow-up of the condition of bobbins and other accessories. The number of the trawl has e.g. been written with a permanent marker on a torn material from old sea clothes.

The cruise leader keeps record of the number of tows taken with each trawl, and damage that has occurred. The condition of the trawls at the end of the cruise should also be reported.

HAFRANNSÓKNASTOFNUN

Rannsókna- og ráðgjafarstofnun hafs og vatna